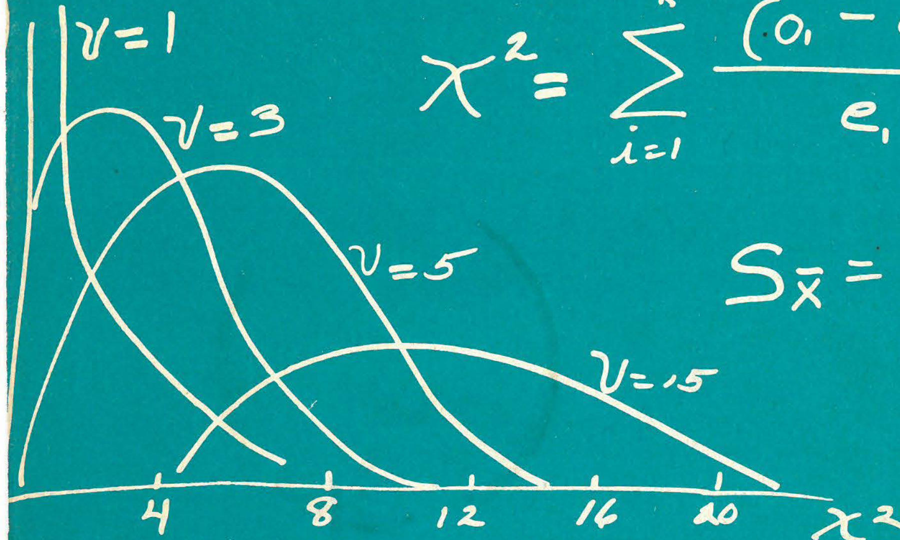


$$\chi^2 = \sum_{i=1}^{k} \frac{(o_i - e_i)^2}{e_i}$$

$$S_{\bar{X}} = \frac{s}{\sqrt{n}}$$

$$= \sqrt{\frac{\Sigma(X-X)^2}{n-1}} \qquad \sqrt{\frac{n}{n-1}}\,\hat{S}$$

Volume 42 · 1971

Bulletin of the

TEXAS ARCHEOLOGICAL SOCIETY

Published by the Society · Dallas, Texas

$$\sqrt{\frac{n}{n-1}}\,\hat{s} \qquad \hat{S}^2 = \frac{n-1}{n} s^2$$

$$S = \sqrt{\frac{n}{n-1}}\,\hat{s} = \sqrt{\frac{n}{n-1}}\,\sqrt{\frac{\Sigma(X-\bar{X})^2}{n}}$$

TEXAS ARCHEOLOGICAL SOCIETY

The Society was organized and chartered in pursuit of a literary and scientific undertaking: the study of man's past in Texas and contiguous areas. The Bulletin offers an outlet for the publication of serious research on history, prehistory and archeological theory. In line with the goals of the society, it encourages scientific collection, study and publication of archeological data.

The Bulletin is published annually for the distribution to the members of the Society. Opinions expressed herein are those of the writers and do not necessarily represent the views of the Society or the editorial staff.

Membership and Publications

Membership in the Society is for the calendar year. Dues are as follows: Student —$5.00; Regular—$7.50; Chartered Societies and Institutional—$10.00; Contributing—$25.00; Life—$150.00. All members of the Society receive the *Bulletin,* which is published annually, and *Texas Archeology,* a newsletter that is mailed out about four times a year. Back issues of the *Bulletin,* up to and including Volume #39, that are still in print may be obtained for $5.00 per volume. Volumes #40 and #41 are $7.50.

Address orders for publications and membership applications to Secretary-Treasurer, Texas Archeological Society, Southern Methodist University, Box 165, Dallas, Texas 75222.

Bulletin of the

TEXAS ARCHEOLOGICAL SOCIETY

Volume 42, 1971

Editor: JOEL L. SHINER

Associate Editor: MAXINE SHINER
Assistant Editor: HUBERT ACHOR

Cover designed by HUBERT ACHOR

PUBLISHED BY THE SOCIETY AT DALLAS, TEXAS 1971

Printed by

SOUTHERN METHODIST UNIVERSITY PRINTING DEPARTMENT

DALLAS, TEXAS

Table of Contents

The John Pearce Site (16CD56): A San Patrice Site in Caddo Parish, Louisiana

Clarence H. Webb, Joel L. Shiner and E. Wayne Roberts

ABSTRACT

The John Pearce Site offers the first opportunity to study two lithic assemblages from a non-pottery site that has a preponderant representation of the San Patrice projectile point type, with only minor representation of stemmed Archaic points. Especial value is attached to the deeper zones in two excavated areas of the site in which there is a tight association of San Patrice points, tools and chipping debris with no evidence of later Archaic admixture.

DESCRIPTION OF THE SITE AND AREA

The John Pearce Site (16CD56) is situated on the crest and slopes of a spur which projects southward from a terrace formation into the valley of Cypress Bayou (Fig. 1). The site is 15 miles SSW of Shreveport and 2 miles south of the town of Keithville; the location is SW¼ of NW¼ of Section 8, Township 15N, Range 14W, Caddo Parish, Louisiana. At this point the valley of Cypress Bayou, between hill crests, is one mile wide and the valley floor is 0.6 miles in width. Active streams course near the valley margins, Cypress Bayou—which forms the boundary between Caddo and DeSoto Parishes (Counties)—near the southern valley limit and Cypress Creek immediately below the spur on which the site lies. These streams unite east of the site and flow northeastward to join Boggy, Gilmer and Brush Bayous to form Wallace Lake (Fig. 1 B).

Atop the spur and along its eastern slope (Fig. 1 A) is a clearing and cultivated field of approximately 5 acres, with the home of the owner, John Pearce (now deceased) and his family. North of the homestead are other fields and pasture lands; the uncultivated slopes are heavily wooded. The crest of the spur is ovate in outline; the east slope is gentle, the west slope rather steep to a gully in which are evidences of a former spring. Southward there is a steep drop from the crest to the valley, interrupted by a formerly cultivated shoulder; the crest is about 25 feet above the valley floor. When we first visited the site a relict cone of the eroded plateau, near the stream, had artifacts on its slopes but during the excavations this cone was removed for highway construction fill. Scattered artifacts were found on the surface of the entire field and along an old road that paralleled the lower margins between the spur and the stream.

The crest of the spur and its western slope are sand covered but the eastern and northern slopes are denuded to compact red clay. Excavation showed the red clay to underlie the sandy topsoil on the crest. This combination of a light gray sandy topsoil underlain by red or orange-red clay is frequent in the uplands of northwestern

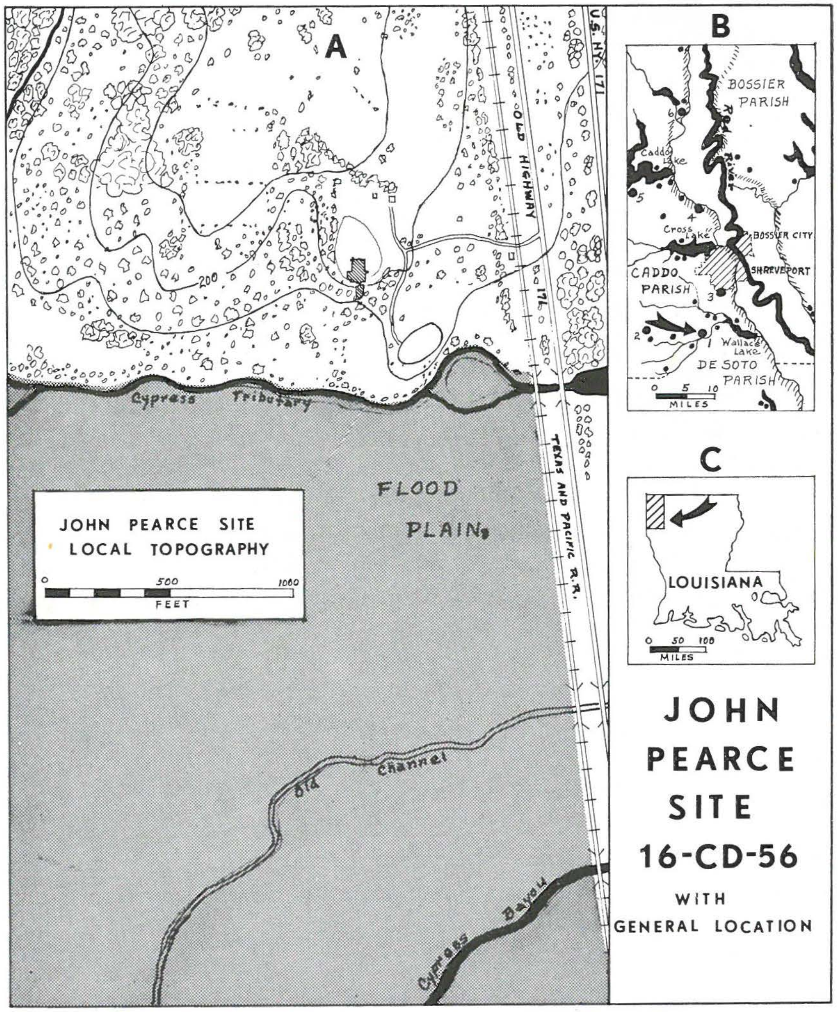


Fig. 1. The John Pearce Site. A: topography of the site and location of the excavated areas. B: Caddo Parish with portions of Bossier and DeSoto Parishes; note river valley, uplands and sites. C: general location.

Louisiana and East Texas. A similar orange-red clay at the Wolfshead Site was identified (Duffield 1963) as Amite type and a riverine deposit.

At the latitude of the John Pearce site the alluvial valley of Red River (Fig. 1 B), eight miles northeastward, is at an elevation of approximately 150 feet above sea level. The western valley margin is marked by an abrupt escarpment of a relatively flat formation which averages 200 feet in elevation, except in eroded areas. This flat to mildly rolling terrace is attributed by R. J. LeBlanc (Baton Rouge, La., 1948, unpublished data) to the Midway group of Paleocene formations in the Tertiary System, with Pleistocene (Quaternary) terrace formations along the valley contact zones. The undulating upland extends from Cross Lake, at the Shreveport level, southward into DeSoto Parish, a distance of approximately 30 miles. From the western margin of Red River valley it rises gradually to the top of the watershed between the Red and Sabine River drainages, about 15 miles west of the Red. The watershed in the western part of Caddo Parish, slanting into DeSoto Parish, is 250 to 300 feet above sea level.

At the time of European contact this upland had extensive grasslands and was described by the Caddo Indians as one of their "prairies." A similar but slightly higher formation is north of Shreveport, between Cross and Caddo Lakes (Fig. 1 B). The river valley, clogged by the Great Raft, was deserted in late prehistoric and early historic times, the people living along the lateral streams and in the uplands. The upland country was farmed during the 19th century but has been used more extensively during the present century for cattle grazing, with limited farming. The topsoil is generally a gray sand with thin humus; the narrow stream valleys have a more fertile humus. The rolling nature of the upland is produced by the erosion of many small dissecting streams which flow eastward into the shallow marginal lakes bordering Red River valley. Growths of pines preempt the higher elevations, while oaks and hickories have encroached on the grasslands and are heavy along the streams. There are scattered gums, hawthorns, walnuts, persimmons, sassafras, hackberry, ash and elms, the usual upland assemblage of the Gulf Coastal Plain (Webb et al., 1969:6). Bois d'arc (Osage orange) and many shrubs are present and native fruits include wild plums, grapes, berries, haws, persimmons and a variety of nuts.

Native small animal, bird and aquatic life has been abundant during the past century. The Red River valley is a flyway for ducks and geese and the shallow waters of the lateral lakes afford feeding places for these migratory fowl. The middens of prehistoric sites with occupations during the past two millenia show numerous deer bones and some bear; bison is missing. There have been occasional finds of mastodon tusks and bones in the valley clays.

A respectable population during San Patrice times is indicated by the occurrence of these points at 24 sites in Caddo Parish (Fig. 1 B) and some in adjoining parishes; at six sites more than single finds are recorded. These are always in the uplands, along the small streams or around the margins of the lakes or the valley.

EXCAVATION OF THE SITE

Initial exploration of the site and surface collections were conducted by Roberts during the summer of 1966. In September of that year a joint visit by Roberts and Webb confirmed the previous indication that this was predominantly a San Patrice Site. The decision was made to initiate excavations in the cultivated field, on the crest of the spur. A line of 5 foot squares was staked along an established axis to transect the sandy crest (Figs. 1 A, 2). A N-S axis was established along the eastern edge of the sand, using magnetic north for the survey; a metal post was sunk at the intersection of the axes for a permanent marker. The initial procedure was to remove and sift the loose topsoil from the cultivation rows, then excavate with trowels by six-inch levels. All dirt throughout the excavations was sifted through one-half inch wire mesh. Unaltered small fragments of ferruginous sandstone, hematite and petrified wood, which occur naturally in this formation, also recent debris, were discarded; all other materials were sacked and labeled.

After the first two squares showed three natural soil zones, excavation by artificial layers was discarded in favor of the natural zones.

Most of the excavating was done by Roberts, with assistance when possible by Webb. William LeGrande helped with the excavations of Area A during the winter of 1968-9. Hosea Pearce, son of the owner, was hired for sifting and worked in this capacity through most of the excavation period; he also made surface collections when conditions were favorable. Roberts kept a daily log, recording possible features and disturbances. A record was also kept of those objects found in disturbed soil, animal burrows and other questionable proveniences. Relative depths of soil zones were recorded for each square and profiles were taken intermittently by Webb.

Sixteen squares were removed across the ridge crest along the E-W axis, W13 to E3. The profiles thus established (Fig. 2 B) showed a surface layer (Zone 1) of sand to 6-8 inches in depth at the crest,

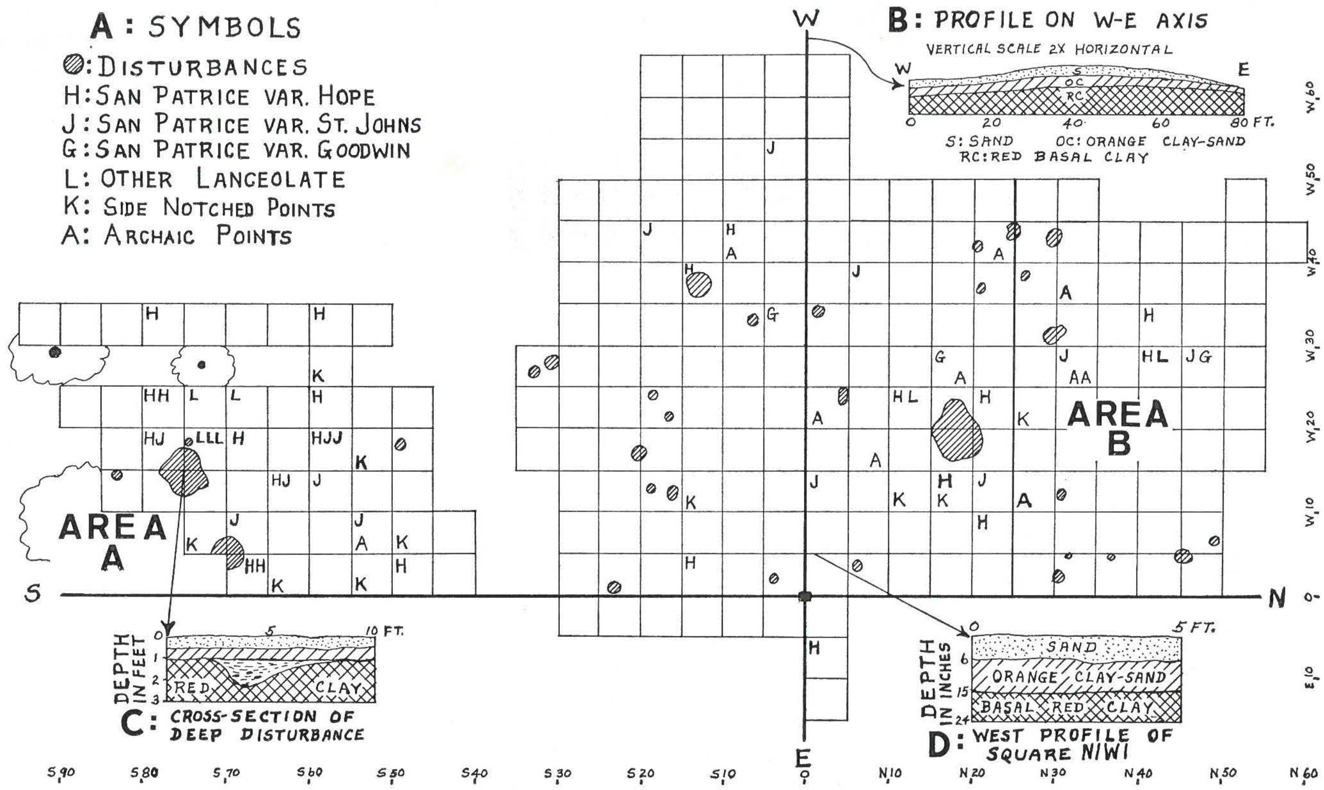


Fig. 2. Excavations, Area A and B. B, C, D: profiles.

diminishing to 5-6 inches at the western margin of the trench and dwindling more rapidly on the eastern slope, to disappear at E3. Zone 1 was disturbed by cultivation, with plow furrows gouging into the underlying clay. Zone 2 was an orange-colored clay with some sand admixture, 6 to 9 inches in thickness and undisturbed by plowing under the crest. It showed cracks and pockets into which sand had filtered, and was interrupted by burned stump holes and numerous burrows of pocket gophers, other animals and insects. Artifacts were found on the surface of this zone and distributed throughout its depth; they were in smaller numbers in the sand of Zone 1. The basal dense red clay of Zone 3 showed less numerous disturbances and contained few artifacts, except at its contact with Zone 2. Several pits were dug into Zone 3 to a depth of three feet from the surface and no change in its color or consistency was found. Subsequent excavations were therefore carried into Zone 3 only to a depth of 3 to 6 inches, well below evidences of soil change or aboriginal artifacts.

Over the next year's time 189 squares were completed in the cultivated field (Fig. 2, Area B). The excavated block extended from S30 to the N55 lines; all except 9 were west of the N-S axis. East of this line, south of S20 and north of N50 lines there were few artifacts found. We decided to terminate excavations in the field and to investigate the uncultivated area south of the field, on the brow of the spur. Much of this is wooded but one clearing, marked by a clump of oleander shrubs, probably was the yard of a former dwelling. We had found late 19th century glass, crockery, clay pipe fragments and metal objects in the sandy topsoil over the southern part of the field.

The N-S survey line was extended southward and Area A (Fig. 2) was staked in 5-foot squares. Excavations were immediately productive and were continued intermittently until the end of February, 1969. They were limited southward and eastward by the steep drop, which was found to be sterile, and westward by the heavy cover of pines.

In Area A, the sand topsoil of Zone 1 had very few artifacts, even flakes, in comparison with Zone 1 of the cultivated field. Most objects were found in the orange clay-sand of Zone 2, except in two features (Fig. 2). The artifacts seemed to have been disturbed very little, often lying flat on top of Zone 2 or within its upper 3 inches. This suggests that many of the artifacts of Zone 1 in the field (Area B) had been moved by cultivation.

FEATURES

A large feature in Area A, thought to be aboriginal, centered at the intersection of lines W15 and S75 and involved four squares. It was cleared of the topsoil and excavated as a unit. In Zone 2 it showed as a darker mixture of sand and clay, contrasting with the orange clay of this zone; it was irregular in outline and approximately five feet in diameter. Penetrating into the red clay of Zone 3, the pit ended 14 inches below the Zone 2-3 junction (Fig. 2 C). Several artifacts were found in the mixed soil of the pit and a number of end and side scrapers, used and unused flakes, a core of red chert and two San Patrice points were found in Zone 2 around the margins of the pit. Two lanceolate points, one certainly and one possibly of Clovis type (Fig. 7 d, e), were found lying flat on the smooth bottom of the pit.

The second feature centered at the intersection of lines W5 and S70. It was 36 inches in diameter, was first noted in the orange clay of Zone 2 and extended into the red clay of Zone 3 for a total depth of 16 inches. It was filled with a mixture of sand and clay, lighter in color and softer in consistency than the surrounding clay; tiny fragments of char were noted in the adjacent clay of Zone 2 but none in the pit. Twenty-four used and unused flakes, a number of pebbles, many small sandstone fragments and one point of San Patrice type were found in the mixed soil of the feature. The orange clay of Zone 2 surrounding the feature also showed a heavy concentration of flakes, flake tools, partially flaked chert cores, sandstone fragments and three projectile points, two of San Patrice and one of side notched types. Altogether, this was the heaviest concentration of aboriginal objects found at the site.

It is conceivable that either or both of these features could represent aboriginal pits; the evidence is uncertain. The numerous interruptions in Area B (Fig. 2), in the cultivated field, are almost certainly post-occupation. Most of them show char resultant from forest clearing and burning of stumps; this is definite for the larger disturbances in Squares N4W4-5 and S3W8, even though both have surrounding concentrations of artifacts. Wood char and ashes were found in both, extending downward in typical root distribution. Nowhere were there evidences of firepits or hearths; no bone, shell or antler were found, and all of the charcoal found was suspected, unfortunately, of being recent in origin. A few circular dark molds in the clay could have been small tree molds or post molds, and none of them showed patterning.

MATERIAL REMAINS

Many site reports, after description of the techniques and results of exploration, will present the total body of material remains almost as a unitary group of associated objects, then attempt a separation into assemblages. The concept of assemblages that the reader may acquire depends on the success of the exploration in achieving a separation of the habitation units, the clarity of the author's presentation, and—too often—the reader's own industry in wading through a mass of detail to formulate his judgments.

The authors prefer to shift the methodology of reporting herewith to place primary emphasis on the separate total assemblages afforded by the excavations, presenting them as units. Clarke (1968:230) has defined an archeological assemblage: "Archeological usage has established an archeological assemblage as . . . an associated set of contemporary artifact types. The important aspects of an artifact assemblage under this definition are that the artifacts may belong to more than one type and that they occur together in definite contemporary association with one another."

The above statement at least partially defines our perspective and foreshadows one of the hypotheses that will be made, namely that each of the two assemblages at the site represents the surviving material manifestations of a settlement. Each settlement presumably was representative of a cultural system, probably a dialectal tribe.

There are two discrete groupings of artifacts at the John Pearce Site, represented by the objects from Area A and the objects from the deeper (clay) levels of Area B (Table I). To the best of our knowledge, there are no phenomena discernible in the stratigraphy (sequence of geological and cultural events) that suggest anything other than two separate encampments. Thus, there are available for analysis two collections of artifacts each of which appears to represent a component of a prehistoric culture.

TABLE I

Distribution of Artifacts

	Area A	*Area B*
Debris	196 - 55%	321 - 57%
Debitage	7 - 2%	8 - 1%
Use retouch	39 - 11%	41 - 7%
Tools	113 - 32%	196 - 35%
Total	355 -100%	566 -100%

Distribution of Debris

	Area A	*Area B*
Chips	93 - 47%	157 - 49%
Cortex	55 - 28%	107 - 33%
Cores	27 - 14%	30 - 9%
Biface thinning flakes	21 - 11%	27 - 8%
Total	196 -100%	321 - 99%

Objects from the disturbed sand level of Area B and from the surface of the site will only be enumerated, virtually as an appendix, to give some idea of subsequent occupations of the site and the presence elsewhere on the site of items similar to or identical with those from the excavated assemblages. These will not be treated as an assemblage or subjected to analysis because of the uncertainty of temporal or cultural associations and the fact that they cannot be conceived of as constituting any cultural component.

The material remains have been studied independently and jointly by Shiner and Webb, but the exhaustive typological studies of manufacturing techniques and usage marks were done by Shiner in the Southern Methodist University laboratories, as were the correlative analyses. In this report Shiner has assumed responsibility for description of all objects other than projectile points, which is done by Webb. Studies of raw materials were carried out independently and later correlated.

The authors are indebted to the following persons who have given opinions about various objects or aspects of the study: H. M. Wormington, M/Sgt. James Grady, Don E. Crabtree, Carl H. Chapman, Walter E. Klippel, J. B. Sollberger, Fred Wendorf, R. King Harris, Dee Ann Story, Jay C. Blaine and Hiram Gregory. We are especially grateful to Hubert Achor for the painstaking photography.

Historical classes seem to be applicable to the projectile points but not to other tools. The San Patrice point varieties are separable by co-variance of attributes, even if no explanation of the variation is forthcoming in this report.

Unifacial tools which include the scrapers, notched pieces, gravers, and the like, are presented according to a morphological typology that incorporates shape plus manufacturing process. Superimposed on the morphology but not a part of it was a "functional" analysis of the edged and pointed tools. This analysis demonstrates a high level of coincidence between tool classes and wear patterns. For example, end-scrapers show wear polish only on the end, regardless of retouched edges elsewhere, gravers show polish on the tip and preforms show no wear at all.

On edged tools the edge angles were measured to determine whether there were consistent parameters for tool classes, and there were. These angles do nothing toward establishing the nature of the activity for which the objects were designed, showing only that form and function appear to coincide.

A separate system of analysis was employed on the chipping debris. Cores, chips, cortex flakes, biface thinning flakes and debitage are viewed as remains of probable steps in the manufacture of tools. However, the relative frequencies of these categories may be useful in comparing or contrasting cultural components.

Areas A and B show significant and consistant similarities in typological categories, technological attributes, apparent motor habits of tool use, and employment of raw materials. We are dealing with discrete, noncontiguous areas, a large number of variables, and apparently adequate samples from each of the areas.

The full description of the tools, informal tools and debris, together with technological observations, is presented below. First, each assemblage is treated separately, then the two assemblages are compared, and finally an explanation is sought for the resemblance.

AREA A

The material remains from Area A total 355 objects (Table I), of which 113 (32%) are chipped stone tools, 39 (11%) are use retouch specimens and 203 (57%) are debris and debitage. Table II lists the chipped stone tools as major tool classes; in this tabulation and that of Table IV the presumed projectile points and fragments thereof are included among the chipped stone tools.

TABLE II

Chipped Stone Tools, Area A

San Patrice points	19 - 16.7%
Side notched points	6 - 5.3%
Lanceolate points	5 - 4.4%
Point fragments	9 - 8.0%
End-scrapers	12 - 10.6%
Side-scrapers	7 - 6.2%
Side notched scrapers	2 - 1.8%
Raclettes	12 - 10.6%
Denticulates	3 - 2.7%
Notched flakes	2 - 1.8%
Gravers, borers	13 - 11.5%

Drills	1 - 0.9%
Bifaces	13 - 11.5%
Burins	2 - 1.8%
Scaled pieces	5 - 4.4%
Retouched flakes	1 - 0.9%
Varia	1 - 0.9%
Total	113 -100.0%

Chipped Stone Tools, Area A

SAN PATRICE POINTS

Nineteen points from Area A that are classified as San Patrice type include 12 of variety *hope* and 7 of variety *st. johns*, as defined by Duffield (1963). Those of variety *hope* (Fig. 3) are stubby fluted points with comparatively wide basal segments that have smoothed lateral and basal concavities, and a short triangular body.

Measurements of San Patrice variety *hope* from Area A, in millimeters, are: length, average 32.3, range 23 to 43; width at shoulder, average 25.2, range 22 to 32; width at base, average 21.3, range 18.5 to 24; maximum thickness, average 6.2, range 5 to 8; thickness across shoulder, average 5.9, range 4.7 to 7.3; height of basal concavity, average 3.5, range 2.5 to 6; width of lateral notch, average 15.2, range 12 to 20. The length/width ratio averages 1.28/1.

The bases have arcuate concavities, with edges ground smooth, rarely showing residues of fluting platforms, but often having traces of minimal unifacial fine retouch. They were thinned by bifacial removal of one to three channel flakes to produce a fluting that extends to mid-point or beyond. The length of fluting scars averages 14.4 mm. One-fourth of the major flutes terminate in a hinge fracture. The thinning scars involve most of the basal width, leaving narrow, steep ridges laterally. The surface from the lateral margins to these ridges was steepened by fine retouch before grinding.

The distal body segment, typically an almost equilateral triangle, appears to have been sharpened by bilateral, bifacial pressure retouch which left narrow parallel scars from the edge to the flute margin, perpendicular to the edge and therefore diagonal to the long axis of the point. The thickest part of the point is usually just distal to the flute channel and the thickness was often reduced by steep beveling, placed on the left margin of one or both faces. Beveling is noted on two-thirds of variety *hope*, on the right edge in only one instance.

Examination of the points under magnification shows, wherever one can be certain, that lateral flaking was done after the fluting spalls

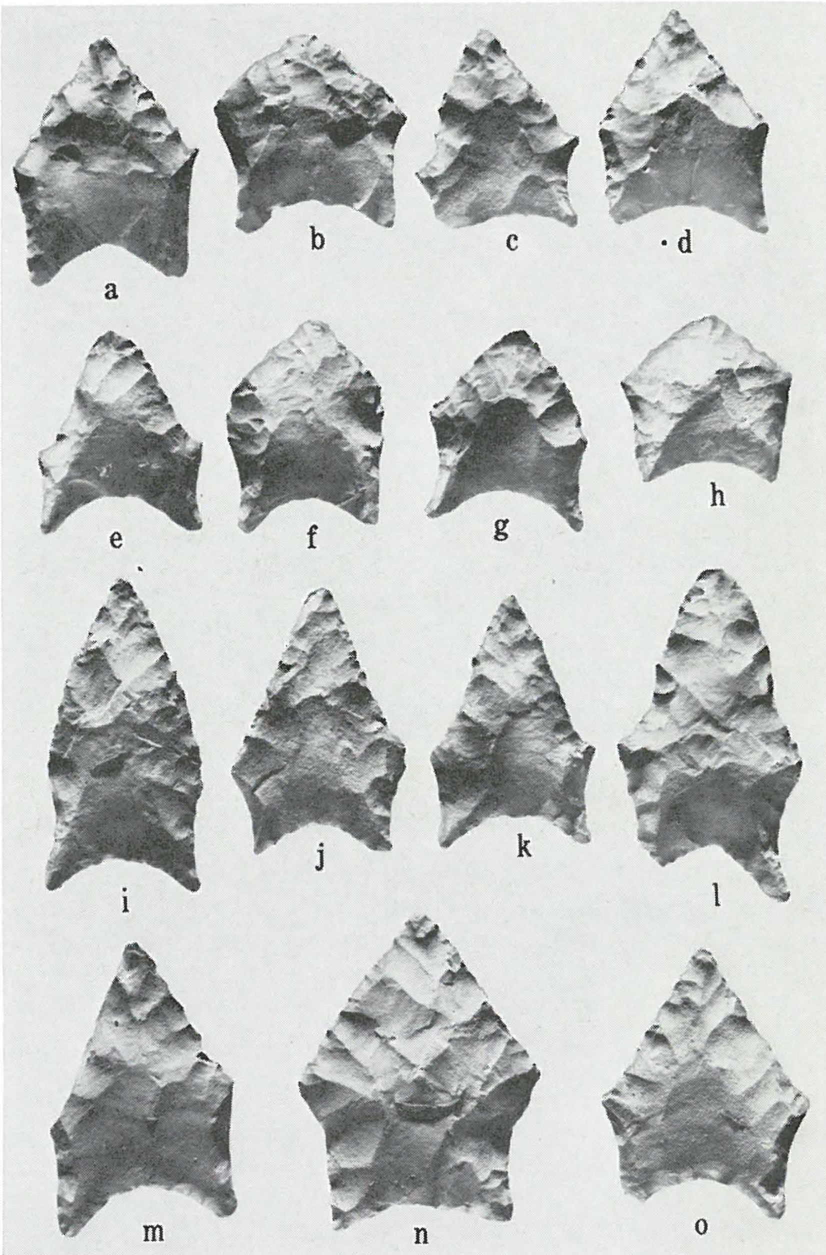


Fig. 3. San Patrice variety *hope* projectile points, John Pearce Site. Specimens i and l termed variety *goodwin* by Duffield. Specimen n, large variety *hope*. Full size.

had been thrown. The following steps seem to be indicated in manufacture of San Patrice points: initial stages of roughing out and primary thinning as described under "Preforms;" preparation of the base and basal platforms by pressure flaking; detaching the longitudinal fluting spalls from each face, occasionally a single wide flake but more often one on each side of the midline and, quite often on San Patrice variety *hope*, a final long central spall (in this instance the lateral flakes seem to have been preparatory to the final); shaping of the lateral margins of the base by pressure retouch; grinding of the basal and lateral margins (this could have preceded or followed sharpening of the distal body); and finally the thinning, beveling, and sharpening of the distal body.

The distal edges are slightly sinuous when viewed tangentially but are not serrated. The tips are usually sharp but occasionally are obtuse. In two instances resharpening is suggested by the accentuation of the shoulders and concavity of the lateral edge just above the shoulder, but beveling and retouch of the lateral edges seem generally to be part of the initial manufacturing process. Smoothing of the flake ridges and distinct patination are frequent.

San Patrice variety *st. johns* (Fig. 4) is chiefly distinguished from variety *hope* by the presence of short, low concavities produced by side or corner notching, ground smooth. The *st. johns* points are consistently more slender and thin, hence are lighter and more delicate than variety *hope*.

Measurements in millimeters of the seven specimens of *st. johns* variety from Area A are: length (6 specimens), average 31.6, range 20-39; width at shoulder, average 19.9, range 18 to 22; width at base (5 specimens), average 16.4, range 10.5 to 21; maximum thickness, average 4.46, range 4.1 to 4.8; thickness across shoulder, average 3.6, range 3.1 to 4.2; height of basal concavity (5 specimens), average 2.6, range 2 to 3.5; width of lateral notch (6 specimens), average 7.4, range 7 to 8. The length/width ratio averages 1.55/1.

The bases have concavities that are narrower and shallower than in variety *hope*; they may be arcuate or V-shaped. Fluting is bifacial and three flute scars are less frequent than one or two. Platform residues are rare and fine pressure retouch of the base is infrequent; most often the thin base was simply ground smooth after fluting was completed. The average thickness between troughs of the flutes at shoulder level is only 2.8 mm., indicating the effectiveness of the thinning maneuvers.

The basal notches vary in placement and execution (Fig. 4). Some are shallow concavities similar to those of variety *hope* but narrower

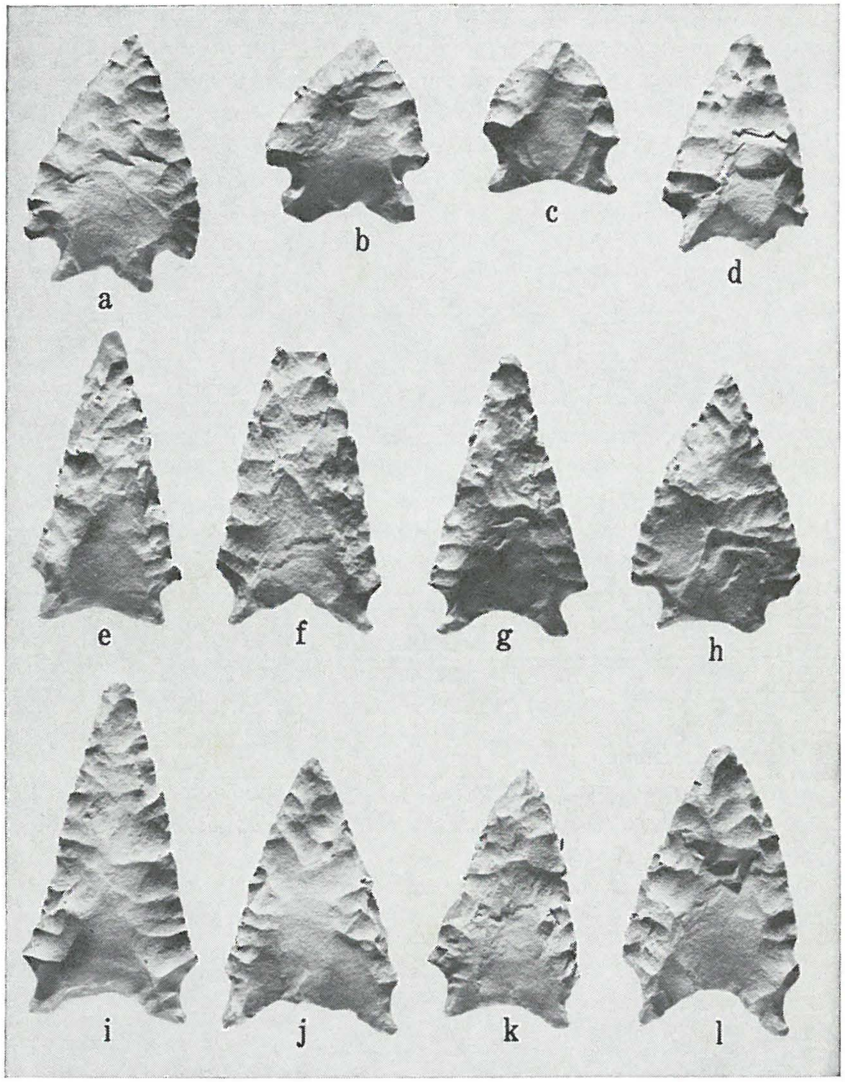


Fig. 4. San Patrice variety *st. johns* projectile points; a-d, variant sizes and forms; e-l, typical outlines, notches and flutes. Full size.

and relatively deeper; others are more distinct notches directed inward from the lower body edge or diagonally upward from the corner. In this respect San Patrice variety *st. johns* is intermediate between variety *hope* and the side notched points in this assemblage. The notches were effected by 3 to 6 tiny bifacial pressure flakings; sometimes a single curving flake was removed from one face to produce the center. Notch edges are ground. The width of notches averages half that of the *hope* variety.

The distal body is also more varied than on variety *hope*; long or short triangles and leaf shapes are seen. Edges are straight or convex in almost equal numbers, rarely concave. The long narrow thinning flakes, perpendicular to the edge, are less distinctly diagonal than in variety *hope*. Edges are generally sharp, mildly sinuous but not serrated, and the tips tend to be keen. Resharpening seems probable on some points but edge beveling is less frequent and less noticeable than in variety *hope*, due to the thinness of the bodies. When present, beveling is on the left edge.

SIDE NOTCHED POINTS

The six side notched points from Area A do not fit any named type. On the basis of noted attributes two varieties are established.

Variety A, four specimens (Fig. 5). These objects have: (1) low side or corner notches, (2) straight or slightly concave bases that equal or are slightly less than the maximum body width, (3) convex and serrated body edges and (4) small size, similar to those of San Patrice, with thicknesses greater than variety *st johns* but less than variety *hope*. They lack the high basal concavity and the long thinning flutes of San Patrice points.

Measurements of the four specimens, in millimeters: length, average 35.2, range 25 to 44; maximum width, average 22.5, range 18 to 27; width at base, average 17.8, range 17 to 18; maximum thickness, average 5.5, range 5 to 5.7; width of notch, average 6.75, range 6 to 8.

The body outlines (Fig. 5 c, f-h) are trianguloid in three instances, spade-shaped in one. The bases are relatively wide, equaling the maximum body width in two instances, narrower in two; two of the bases are mildly concave, one is questionable and one is straight. The bases are thinned by tiny retouch flaking and, in two instances, by unilateral short (10 mm.) central flutes; all bases are ground. The notches are narrower and slightly deeper than those of San Patrice variety *st. johns* but are made as described for that type variety; some notches are ground, others not. The faces tend to be flat or mildly rounded, not ridged, and were formed by irregular baton flaking, then sharpening of the edges by pressure retouch that is less regular than on San Patrice points but is closely placed and alternating, thus producing serration as well as sinuosity. Tips are only fair on three specimens but one (Fig. 5 h) shows slight recurve of the distal edges to form a keen tip. Three of the specimens have beveling, left bifacial on two and right on one.

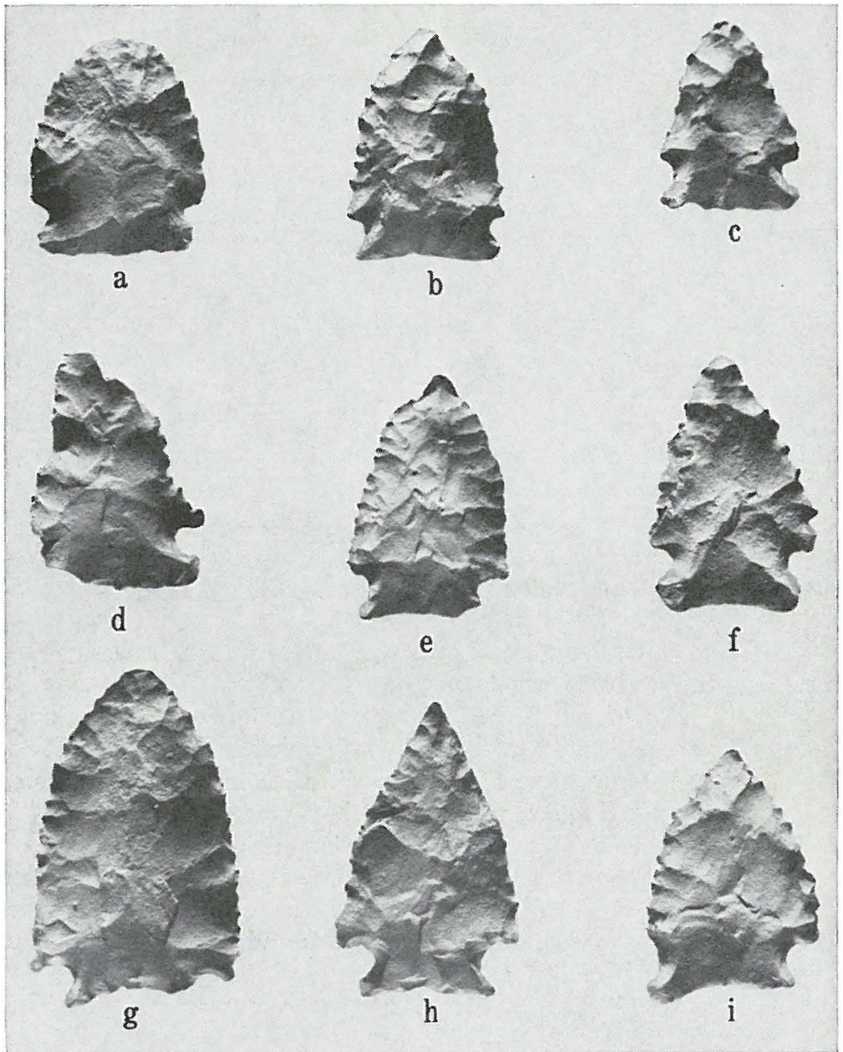


Fig. 5. Side notched points, variety A, from John Pearce Site. Full size.

Variety B, two specimens (Fig. 6 a). These objects are characterized by (1) a triangular outline, (2) low shallow side notches, (3) concave bases that are wider than the bodies, (4) absence of edge serration and (5) small size but with thicknesses that exceed San Patrice and variety A side notched points.

Measurements: One object is 32 mm. long, 20 mm. wide at the shoulder and 23 at the base, and 7.3 mm. thick. The other is 26 mm. in length, 17 mm. in shoulder and 20 in basal widths, and 7.5 mm. thick.

One of these objects is rather crude but the other is more graceful in appearance; neither has the quality of workmanship that is usually seen on San Patrice type. The smaller object is broken at the base and does not have the concavity and grinding seen on the other (Fig. 6 a). Each has grinding of only one notch; both show thinning of the base by short channel flakes, up to 10 mm. in length. The chipping technique is much as described for Variety A and left beveling is present.

LANCEOLATE POINTS

Two of the five lanceolate points were found together at the bottom of the darker sand and clay which appeared as a pit in Area A. The larger point (Fig. 7 d) is of white-speckled honey colored quartzite or chalcedony. It is ovate in outline with concave base and lenticular cross-section. The length is 50 mm., the midpoint width 25 mm, the basal width 21 mm., and the maximal thickness is 6.4 mm. The faces are not ridged but are rounded by the shallow primary flaking. The edges are sharpened over the distal halves by fine retouch; the proximal halves are ground smooth. The concave base is thinned by bifacial

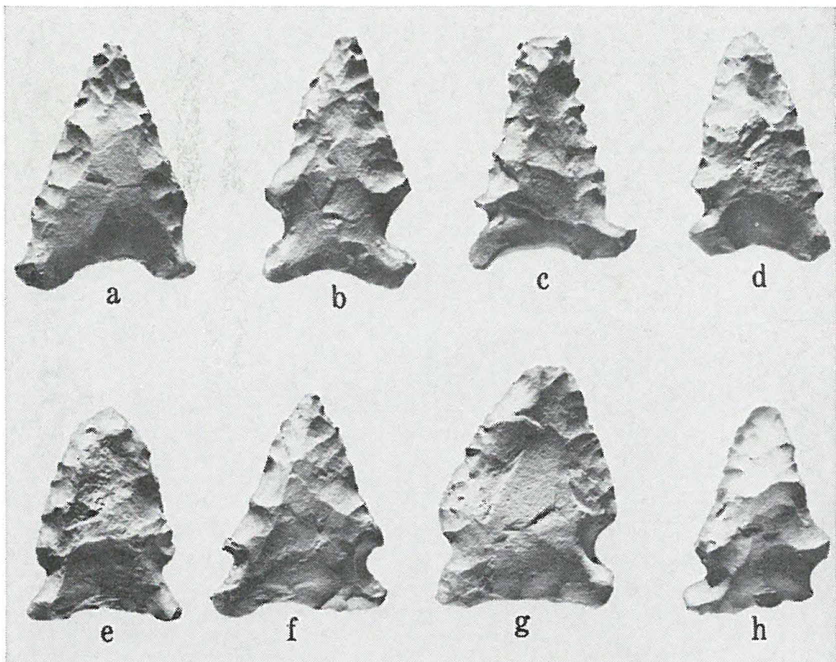


Fig. 6. Side notched points, variety B. Note wide bases. Full size.

fluting. On one face two channel scars are 17 and 23 mm. in length; on the opposite face there are lateral remains of two preparatory flakings, then a deeper central flute which is 6-8 mm. wide and 17 mm. long. A narrow platform remnant was removed from the basal center by a tiny pressure flake; the basal concavity, 4 mm. deep, is ground smooth. The senior author considered it to be of Clovis type and H. M. Wormington (personal communication 1969) says of it "the whole fluted point is a good Clovis, very similar to some from the Murray Springs site in Arizona and other Southwestern sites—even the material would fit in." Shiner and Fred Wendorf (personal communi-

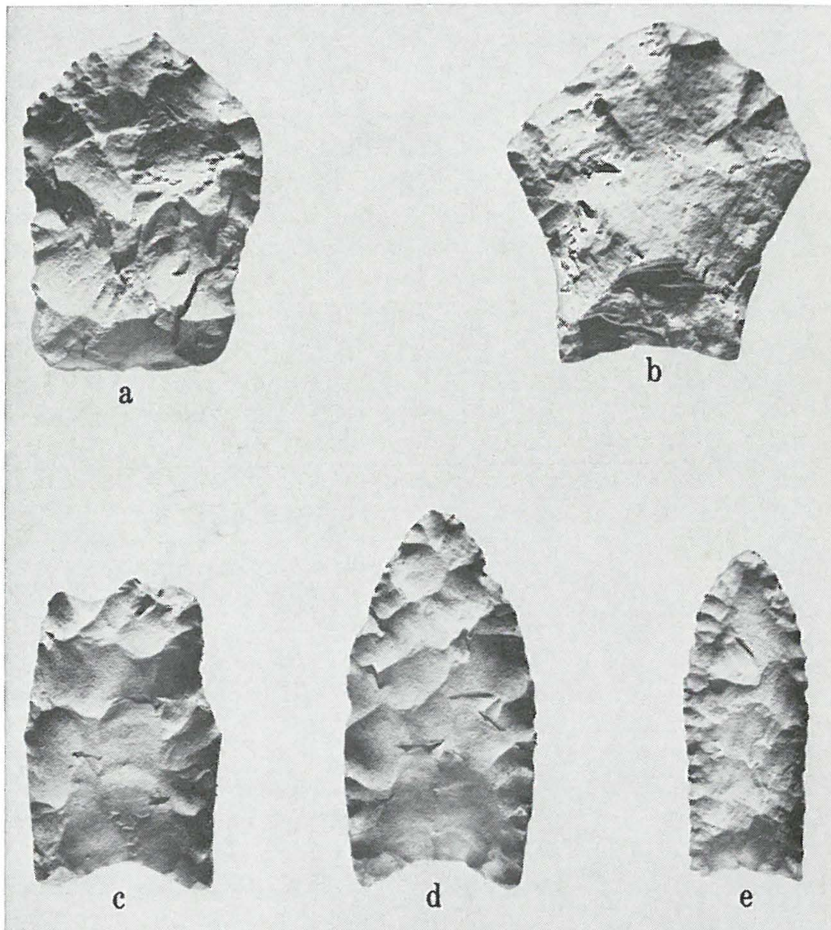


Fig. 7. Lanceolate points from John Pearce Site; a, b, Pelican points; c, Meserve point; d, e, Clovis points. Full size.

cation, 1970) have some reservations and prefer to regard it as an untyped lanceolate.

The second point from the pit is a small lanceolate (Fig. 7 e) made of white-speckled gray chert, thought to be of central Texas origin. The length is 42.5 mm., the maximum width 16 and the basal width 15 mm., with a maximum thickness of 5 mm. The edges are parallel on the proximal half, outcurving at the distal third, then rounding in to an obtuse tip. The basal half of each edge and the mildly concave base are ground. The base is beveled on one face by three narrow flake scars on each side and a larger central scar that thins the base for 4 mm. upward; the opposite face shows two longer flake channels that meet at the center and thin the base for 8 mm. upward. The body faces are convex with shallow flaking over the center and narrow ripple flaking around the margins; the cross section is lenticular. Sharp and slightly sinuous edges result. If this point were doubled in size it would duplicate most Clovis points found in northwestern Louisiana (Webb 1948, Fig. 45). Gagliano and Gregory (1965, Fig. 3 e) illustrate a similarly tiny Clovis point.

The remaining three lanceolate points are less well made. One of banded white, gray and pink chert, presumably of Central Texas origin, is broken transversely at about midpoint. There is shallow percussion flaking but no edge retouch and no basal or edge grinding. The base is concave and three conventional flutings are on one face but the opposite has only two abortive lateral attempts with no central flute, possibly because of the gnarled character of the flint. It is possible that this specimen was broken in manufacture. The other two specimens are ovate lanceolates made of local tan chert. One is 42 mm. long, 25 mm. in maximal width and 4.9 mm. thick. It has excellent primary flaking and a few small pressure flakings at the base and tip. The base has a shallow concavity and is partially ground; one face shows thinning by two short transverse flake scars, while the converse has diagonal scars. The final specimen is 49 mm. long, 27 mm. wide and 6.2 mm. thick. It was made from a thin pebble and flat cortex is in the center of one face; the opposite face is flattened by large shallow flake scars. The edges are sharpened by large and small flake scars. The narrow, straight base is unfluted.

POINT FRAGMENTS

There are 9 fragments of projectile points from Area A, broken in ways which prevent classification. Materials from which these were made are included in Table III.

END-SCRAPERS

The class is defined as consisting of unifacially flaked tools with steep retouch at the end of the flake or blade opposite the platform. The steep retouch is stepped and the retouched area is convex in plan. There are 12 of this class in Area A.

The average length (10 complete specimens) is 23.4 mm., measured along the axis of the flake. Average width is 19.2 mm., measured at the bit (Movius et al. 1968:11). The average edge angle is about 77 degrees, with difficulties in measurements making it impractical to be more precise.

There are other attributes of the end-scrapers that are of particular interest in that they appear on these objects and at other sites. They concern deliberately chipped sharp corners and corner spurs (Irwin and Wormington 1970:28). Seven specimens from Area A have simple rounded bits (Fig. 8 a, b). Two specimens have "square" sharp corners, two have single retouched beaks or spurs (Fig. 8 c), and one end-scraper has a retouched beak on both lateral edges.

SIDE-SCRAPERS

These tools are infrequent, only seven occurring in Area A, and they are also heterogeneous and varied. They are made on flakes as well as flat pebbles, and have convex as well as straight edges. Thus they fail to meet any kind of rigid morphological typology except for the presence of regular, stepped "cutting" edges with angles near 70 degrees. The range is from 62 to 83 degrees. The lengths cluster around 38 mm. and widths around 27 mm. Side-scrapers are on thick sturdy edges in contrast to the raclettes. Some retouch on opposite edges may be considered backing (3 specimens).

SIDE NOTCHED SCRAPERS

A very special side-scraper appears in both Areas A and B of the John Pearce Site. It is unifacial, side notched like a projectile point, and is made on thin tabular pebbles of tan chert. This form has been reported in the past (Webb 1946, Duffield 1963) as Albany spokeshave. Duffield (1963:113) reports two specimens "apparently made on reworked projectile points." Webb (1946:10 plate 1) preferred the term Albany scraper but also used the alternate term "spokeshave." We prefer to term these objects side notched scrapers because the bevel angle is similar to those of other scrapers. Some of the objects have convex or straight edges, and there is no evidence of a functional use as a "spokeshave." It is conceivable that the presence or depth of concavity of the beveled edge may depend on resharpening.

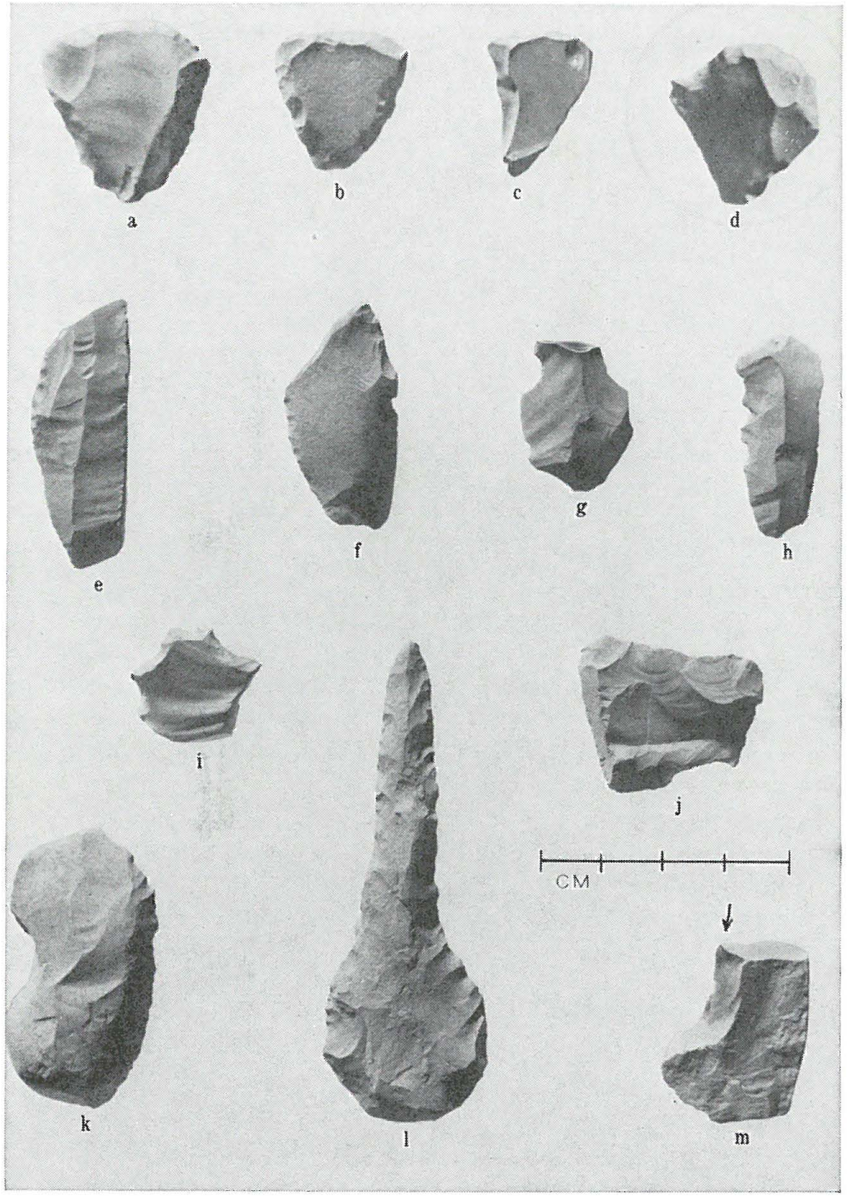


Fig. 8. Various Stone Tools, John Pearce Site: a, b end-scrapers; c, d end-scrapers with corner spurs; e, f raclettes; g notch; h denticulate; i graver, multiple; j scaled piece; k side-scraper; 1 drill; m burin.

RACLETTES

Thin edges, light retouch covering only part of an edge, and considerable variation in length-width ratios characterize this class (Fig. 8 e, f), which numbers 12 in Area A. The above attributes, however, are comparative rather than definitive.

Metrically, the raclettes range from 4 mm. down to 2 mm. in thickness of bits, with an average of less than 3 mm., whereas the side-scrapers range in thickness from 4 mm. to 10 mm., with an average of 6 mm. Edge angles on all side-scrapers are over 60 degrees, while on raclettes all but one specimen have angles under 57 degrees. The single exception is only 2 mm. thick. Thus, the distinctive attributes of raclettes are edge angles close to 52 degrees and thicknesses of bits (Movius et al. 1968:11) close to 3 mm. On the specimens that are difficult to classify, we have resorted to the flake or blade thickness. The minimum thickness for flakes made into side-scrapers is 7 mm. and the maximum thickness for flakes made into raclettes is 6 mm. Nine specimens have a single working edge while three are worked on both lateral edges.

DENTICULATES AND NOTCHED FLAKES

Several contiguous notches on a flake or blade produce a serrated edge. We do not know the function of the denticulate tools (Fig. 8 h) and the sample, 3 specimens, is too small for much speculation on sizes and shapes. Pieces with single or non-contiguous notches (Fig. 8 g) do not provide clues to their function in the form of wear patterns.

GRAVERS AND BORERS

These tools are linked as a class because of the similarity of shape and process of manufacture. There are 12 gravers (Fig. 8 i) from Area A. They are unifacially chipped to a delicate point or beak. The single borer is formed by chipping one edge of the bit from the dorsal surface and one edge from the ventral. This gives a "twist" to the tool.

DRILLS

The single specimen (Fig. 8 l) is classical in that it has all of the attributes usually assigned to "drills." The bit is bifacially flaked to a thick lenticular cross-section. The base is expanding, oval and flaked all over. There is a slight taper along the bit, although the greater part of it might be described as parallel edged. Wear on both edges is as heavy at 4 cm. away from the tip as it is at a distance of 1 cm. It is difficult to see how drilling could produce this kind of wear.

BIFACE "PREFORMS"

A complete range of variation is included among these 13 objects, from the earliest stage of "roughing out" to the last stage of pressure flaking before completion. (These are similar to specimens illustrated from Area B, Fig. 10 g, h, i). Evidence to support the following postulation is presented in various parts of this paper but may be summed up by stating that we believe that projectile points were produced in three or four major stages. First, thin tabular pebbles or possibly large flakes were roughed out with hard percussors. The second stage thinned the bifaces by percussion, leaving the distal end thicker than the proximal or basal. A third stage removed flutes from those points, like San Patrice, that were fluted, presumably by pressure. The last stage applied pressure retouch to even out the edges, thin the distal segment and point the objects, after which grinding smoothed the bases and notches. In nearly every case it is obvious why the preforms were abandoned. Most were broken, some developed knots or bulges because of hinged thinning flakes, and some were discarded because the material was flawed. There is no evidence of wear on the edges or tips and it is our opinion that none of this group is a finished tool; no good purpose seems to be served to describe the forms, many of which relate to the raw materials.

BURINS

Burins have been described in numerous publications. The two represented in Area A are: burin-on-truncation and burin-on-snapped piece (Fig. 8 m). Both have spalls removed from the distal end and directed parallel to the main flake axis.

SCALED PIECES

Four examples are of the local chert. These are thin flakes, altered by removing flat flakes from all directions on both faces, to produce an irregularly rectangular outline. The result resembles a bipolar core that has been rotated and then turned over for further flaking. Since these pieces are as small as the smallest finished tools in the assemblage, it is difficult to visualize them as cores. Any flakes removed from then would be smaller than any of the tools.

RETOUCHED FLAKES

A single retouched flake from Area A is chipped along part of one edge in the manner of a raclette. It is not as formal a tool as the raclette, but the retouch is deliberate.

VARIA

One example, an end-scraper made on a former lanceolate point, is the only member of this class. It is 30 mm. long, 25 mm. wide, and has an edge angle of about 60 degrees.

Use Retouch

Thirty-nine objects from Area A were classified as showing use retouch, which is primarily of a sort that might be expected if the flake or blade edges had been used in scraping and slicing motions. Two or three corners are polished as if they had been used as gravers. This group forms 11 percent of all artifacts in Area A.

It is always difficult to sort these artifacts with a high degree of confidence. Our approach has been to examine all flakes and blades before making decisions. Bag or trowel retouch is highly irregular in position, direction and intensity, and includes V-shaped notches. Deliberate retouch has often been defined as patterned and regular, but it should consist of chipping too forceful to be the result of mere use. Replicative experiments were employed as a suggestion of the amount of force used in producing chipped and worn edges; these included scraping, hacking and sawing on wood, green bone and horn. The kind of retouch resultant from these actions determined the attributes of the class of "use retouch".

Chipping Debris

The sample of chipping debris and debitage totals 203 objects among the entire total of 355 artifacts from Area A, or 57 percent. Included are the categories of chips, cortex flakes, debitage, cores and biface thinning flakes. For a breakdown of the frequency of these classes see Table I.

The sample of debris is smaller than it should be, since the excavated dirt was passed through a half-inch screen. A number of small chips may have been overlooked, but the same standards of collecting were imposed everywhere (Shiner 1970:30-32). Frequencies for various categories are therefore not affected in contrasting Areas A and B, but the extra-site comparisons will be distorted in the classes of technological attributes, if different methods were used.

Debris is indicative of specific chipping activity. Both areas show evidence of considerable cortex removal, especially involving local raw materials. Both areas show that biface foliates were thinned there in significant numbers. Cores for the production of flakes are numerous, as might be expected in view of the large number of small flake tools.

Technological Observations

BLADE-TOOL INDEX

Projectile points and point fragments were not considered since there are no remaining clues as to whether they were made on flakes or blades. Of the 74 other tools in Area A, 3 are made on blades, an index of 4 percent. This is extremely low and in no way indicative of the deliberate production of blades. In addition to the tools, use-retouch is present on 4 blades.

RAW MATERIAL

The selection of raw materials from which things are made constitutes a cultural choice only when there is more than one source. From the excavations at the John Pearce Site we find both local and exotic stone. The local rolled pebbles are chert and range in color from light yellow, buff or tan through brown to black. All shades may appear within a single pebble. Local uplands are strewn with tabular cleavages of petrified wood which is mostly granular but is sometimes capable of conchoidal fracture. Only the finer grained petrified wood can be studied morphologically because chipping of the granular material looks the same as natural exfoliation.

Exotic materials include gray or gray-green flint, gray-white fossiliferous chert, white or gray novaculite, and gray, pink or banded quartzites.

Table III illustrates the frequencies of kinds of materials used in the several artifact classes and also compares the raw materials of Areas A and B.

TABLE III

Raw Materials, Areas A and B

	Area A	*Area B*
Non Tools		
Local chert	131 - 54%	239 - 65%
Petrified wood	49 - 20%	58 - 16%
Exotic flint/chert	36 - 15%	38 - 10%
Quartzite	22 - 9%	15 - 4%
Other	4 - 2%	20 - 5%
Total	242 -100%	370 -100%
Tools (except points)		
Local chert	49 - 66%	104 - 68%
Petrified wood	6 - 8%	11 - 7%
Exotic flint/chert	16 - 22%	23 - 15%
Quartzite	2 - 3%	8 - 5%
Other	1 - 1%	10 - 6%
Total	74 -100%	156 -101%
Projectile points and fragments		
Local chert	30 - 77.0%	28 - 70.0%
Petrified wood	1 - 2.5%	1 - 2.5%
Exotic flint/chert	7 - 18.0%	9 - 22.5%
Quartzite	1 - 2.5%	1 - 2.5%
Other	0 - 0	1 - 2.5%
Total	39 -100.0%*	40 -100.0%
Grand Total	355	566

Three-fourths of the projectile points and point fragments from Area A are of local chert, and half are of local tan-buff chert. Lesser frequencies of the other tools are of local chert, probably because petrified wood was satisfactory for some of the less formal classes.

EDGE ANGLES

Tools with unifacial retouch are assumed to be all sorts of things by different researchers, often by analogy or, possibly, intuition. The scrapers and raclettes at John Pearce Site were classified according to shape and process of manufacture. The classes were then tested by examining edge angles and, later, wear patterns.

Scrapers had been divided into end, side, transverse and raclette classes. All scraper edge angles were measured more or less by the technique published by Wilmsen (1970), except that we found a goniometer easier to handle than coordinate graph paper.

End-scrapers range from over 60 degrees to just over 85 degrees, with an average of 77 degrees. Side-scrapers were not recovered in sufficient numbers to permit a significant statement about angles, but they average around 70 degrees. Raclettes show very different edge angles, with an average of 52 degrees and a range from about 40 to 65 degrees.

WEAR PATTERNS

Clear wear patterns were observable on end and side-scrapers, gravers and borers; less definite facets were found on raclettes and notched pieces.

Although lateral edges on end-scrapers are often chipped, the wear is always on the cortex end opposite the bulb and platform. End-scrapers were pulled toward the user with the ventral side facing him, and there is no wear visible on the ventral face. On side-scrapers, the direction of use is similar, but the attributes of form and size suggest that several functions may have been filled. On other tools, gravers show wear only at their tips, borers show rotary wear and denticulates show polish on their "teeth."

There is good consonance, therefore, among the morphological, technological and functional attributes of the various groups of objects toward validating the established classes.

AREA B

There is a total of 566 objects from the clay levels of Area B, of which 196 (35 percent) are chipped stone tools, 41 (7 percent) are use retouch objects, and 329 (58 percent) are debris and debitage. All references to Area B hereafter concerns this assemblage of objects from the clay levels.

The list of chipped stone tools in Table IV was compiled using the same attributes that were considered for Area A.

TABLE IV

Chipped Stone Tools, Area B

San Patrice points	20	10.2%
Side notched points	4	2.1%
Lanceolate points	3	1.5%
Stemmed points	1	0.5%
Point fragments	12	6.1%
End-scrapers	31	15.8%
Side-scrapers	12	6.1%
Side notched scrapers	3	1.5%
Raclettes	16	8.2%
Denticulates	6	3.1%
Notched flakes	5	2.6%
Gravers, borers	24	12.2%
Drills	0	0.0%
Bifaces (unfinished)	27	13.8%
Burins	3	1.5%
Scaled pieces	5	2.6%
Retouched flakes	21	10.7%
Varia	3	1.5%
Total	196	100.0%

Chipped Stone Tools, Area B

SAN PATRICE POINTS

The 20 San Patrice points from Area B include 13 of variety *hope* and 7 of variety *st johns.*

The points of San Patrice variety *hope* (Fig. 3) include three larger specimens that might be incorporated in Duffield's (1963) San Patrice variety *goodwin* (Fig. 3, i, l). This variety was established on the basis of only one specimen at the Wolfshead Site and the statement that such points have been found at a site in Jasper County, Texas. The specimens from the John Pearce Site appear to fall within the range of typology of San Patrice variety *hope,* differing only in large size and high basal concavity. Until more convincing evidence of typological and temporal differences are presented we prefer to consider these objects as large examples of variety *hope.*

Measurements in millimeters of San Patrice variety *hope* from Area B: length (10 specimens), average 34.6, range 26 to 46; width at shoulder (12 specimens), average 23.8, range 22 to 26; width at base (10 specimens), average 21.5, range 18 to 24.5; maximum thickness, average 6.6, range 4.4 to 7.4; thickness across shoulder, average 6, range 3.4 to 7; height of basal concavity, average 4.4, range 2 to 7; width of lateral notch, average 14.8, range 10 to 20. The length/width ratio of 10 whole specimens is 1.45/1.

The chief differences in measurements between the specimens of this variety in Area B from those described from Area A are in greater length, greater height of basal concavity and larger length/width ratios. The two latter attributes are probably resultant from the extra length, which is reflected both in average and range of lengths. The average and range of all other measurements are very similar from the two areas. It is to be noted, with respect to size, that the most massive (relatively) of all variety *hope* points is a specimen (Fig. 3 n) from Area A.

Apart from these differences in measurements, the points of this variety from Area B differ little from the descriptions from Area A. One of the larger points from Area B (Fig. 3 l) has a V-shaped instead of arcuate basal concavity, and the body edges are recurved (possibly from resharpening). Another (Fig. 3 i) has convex body edges and a more slender outline than is usual for San Patrice variety *hope*. The materials (Table III), techniques of manufacture and general appearance show good correspondence. The number, width, length and technical attributes of fluting scars show no appreciable variation; grinding of bases and lateral concavities is universal. Seven of the 13 specimens from Area B have bifacial left edge beveling, one has right edge beveling and five objects lack this attribute.

The 7 San Patrice variety *st. johns* points from Area B show even closer concordance with those from Area A. Measurements in millimeters are: length (5 specimens), average 32.3, range 21.5 to 40; width at shoulder (6 specimens), average 21.1, range 18 to 24; width at base (6 specimens), average 18, range 13 to 20; maximum thickness, average 4.5, range 3.5 to 5.6; thickness across shoulder, average 3.43, range 3 to 4; height of basal concavity, average 3.6, range 1.8 to 5.5; width of lateral notch, average 8.1, range 7 to 10. The length/width ratio of 5 whole specimens is 1.57/1.

These measurements show a slightly larger size, but the differences are statistically insignificant. Similarly, there are no significant differences in materials (Table III), techniques of manufacture or appearance from those described for Area A. Fluting, lateral retouch and grinding of bases and notches are present on all specimens. Beveling is left bifacial on three specimens, left unifacial on two, right bifacial on one and inapparent on one.

SIDE NOTCHED POINTS

Three of the side notched points from Area B are of variety A, one of variety B. Those of variety A (Fig. 5 b, e, i) differ little from the descriptions of this variety from Area A. All have low side notches and mildly concave bases that are ground. Only one base has a flute scar, unilateral and only 10 mm. in length. The convex body edges of all three specimens are serrated and all show distal edge recurving to narrow the tips. All have left bifacial beveling.

Measurements in millimeters of side notched variety A from Area B: length 31 to 34; maximum width 21 to 23; basal width 16 to 19; maximum thickness 5.3 to 5.7; width of side notches 6 to 8.

The variety B point (Fig. 6 h) is small, made of native tan chert, with poor technology and damage at one corner of the base. The base is straight and not ground or fluted. The body edges are irregular and slightly concave. The specimen is 28 mm. in length, 17 mm. in width at base and shoulder, and is 5.4 mm. thick.

LANCEOLATE POINTS

Three lanceolate specimens from Area B are untyped. One, of mottled gray flint which may originate from Central Texas, is small; measurements are: length 36.5 mm., width 29 mm. maximum and 20 mm. at the base, and thickness 5.3 mm. The faces are ridged distally and show long parallel flaking from the edges, producing sharp edges and tip. The base is deeply concave. A central flute on one face ends in a hinge fracture 13 mm. from the base. On the converse face a lateral preparatory fluting attempt was almost disastrous, extending deeply to the upper edge to alter its symmetry; the central flute ends in a hinge fracture 11 mm. from the base. There is no basal grinding but the lateral edges are smoothed over the proximal 8-9 mm.

The second small object, of glossy black chert, has edge, tip and basal corner breaks that evidence rough usage. It is 35 mm. long, 24 mm. wide and 5.3 mm. thick. The edges and base are not ground but the base is deeply (5.5 mm.) concave. It is thinned by removal of a 16 mm. flute from one face and 9 mm. from the opposite.

The third lanceolate object, of gray-brown chert—possibly local—is small and complete. It is 36 mm. long, 21 mm. wide at mid-body and 16 at the base, and is only 4.8 mm. thick. There is wide, shallow central flaking of each face, narrow retouch on one edge and deep or serrated flaking of the opposite edge. The proximal portions of the edges are recurved, with minimal smoothing. The base is straight, unground and thinned by single bifacial flutes, 18 and 21 mm. in lengths, each ending in a hinge fracture.

STEMMED PROJECTILE POINT

A single specimen from the orange clay level of square N7W6, Area

B, is similar to the Fairland type, which is ascribed (Suhm and Jelks 1962:191) to the Archaic stage of the Edwards Plateau area, in Central Texas.

This is a moderately large point of tan chert, 52 mm. in length, 25 mm. in width at the shoulder and 26 mm. at the base, with a maximum thickness of 9 mm. The body is a long triangle, the shoulders distinct, the side notches long and shallow, and the stem expands to a greater width than the body. Primary and retouch flaking are good, with faint serration of one edge. The concave base is thinned by a series of small flakings; the basal concavity as well as the side notchings are ground smooth. The distal body and tip are dark, suggesting possible heat treatment of the stone before manufacture.

This point appears morphologically foreign to the others from Areas A and B, and seems to fit better with the stemmed and presumably Archaic points found on the surface of the site and in the sand layers of Area B. The excavation record of its position is clear, however, and records no recognized disturbance in the vicinity. We would like to think that it was introduced into the clay layer during occupation subsequent to San Patrice times, in a way that was not recognized during excavation, but, there are no honest reasons for doing this.

PROJECTILE POINT FRAGMENTS

Twelve objects from the clay levels of Area B appear to be fragments of projectile points, too small or broken in such a way as to prevent classification. Materials are included in Table III.

END-SCRAPERS

There are more varieties of this class than there were in the assemblage from Area A. Normal convex end-scrapers are 17 in number (Fig. 9 e, f, g). An additional 5 specimens have chipped beaks on one or both corners of the bit (Fig. 8 d, Fig. 9 b, i, j). Another specimen has square, sharp corners (Fig. 9 h) instead of beaks and a final specimen has a bit at both ends.

There are 5 examples of transverse scrapers (bit is wider than tool is long) in the assemblage. Three of these have broad convex bits and two have square, sharp corners, but there are no beaks.

Two specimens are end-scrapers with side notches and appear to have been made on former side notched points (Fig. 9 k). They only superficially resemble the side notched side-scrapers.

SIDE NOTCHED SIDE-SCRAPERS

All three of these objects (Fig. 10 d, f) are made on thin tabular pebbles flaked unifacially except for the notches and a single row of flat chips removed from both faces of the base. One of these scrapers

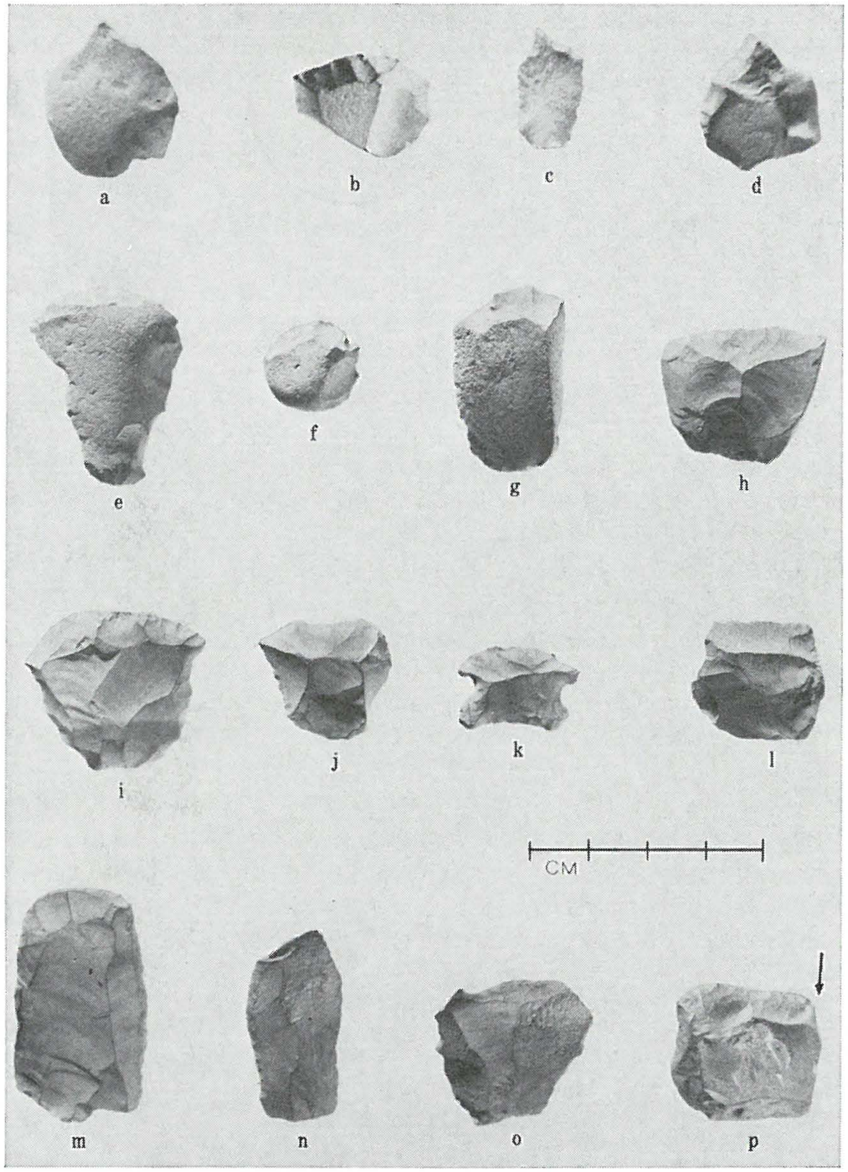


Fig. 9. Chipped Stone Tools, Area B: a, c gravers; b, i, j end-scrapers with corner spurs; d borer; e-h end-scrapers; k side notched end-scraper; 1 scaled piece; m, n raclettes; o retouched flake; p burin.

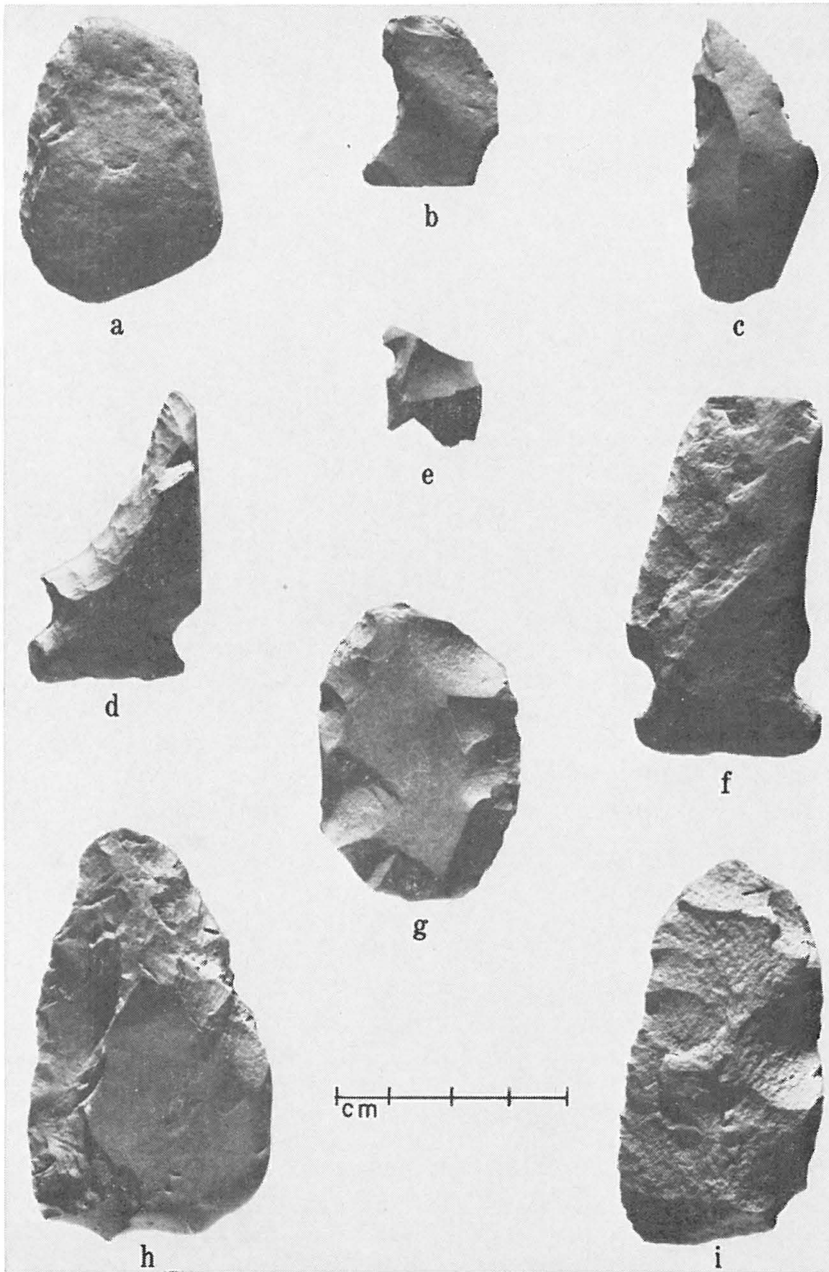


Fig. 10. Chipped Stone Tools, Area B: a side-scraper; b concave side-scraper; c raclette; d, f side notched side-scrapers; e notch; g-i biface "preforms."

has a ground base and all three are ground inside the notches. One specimen would be viewed as a concave scraper (Albany type). Another has a convex edge but is otherwise nearly identical. The third is broken and shows only the basal portion and too little of the bit to determine its shape.

SIDE-SCRAPERS

As was noted in the description from Area A, these objects vary considerably in size, shape and edge attributes. Seven specimens are straight to slightly convex (Fig. 8 k, and Fig. 10 a), three are concave (Fig. 10 b), and two are double-convex.

RACLETTES

Twelve specimens have single "scraping" edges (Fig. 9 m, n and Fig. 10 c). Four are chipped on both lateral edges.

BURINS

All three examples were struck on truncations (Fig. 9 p). Two spalls were removed parallel to the main axis of the flake and one is transverse.

VARIA

This heterogeneous category includes one steeply truncated flake, one tabular flake with battered edges (not a scaled piece), and a combination scraper-denticulate.

All other tool categories are so similar in their ranges of variation that the descriptions and remarks made about them in Area A apply equally to Area B.

Use Retouch

The forty-one flakes and blades with wear patterns constitute 7.4 percent of all objects recovered in Area B. The users of these artifacts took advantage of thin edges and sharp corners, apparently for scraping, slicing and graving various materials, as described under Area A.

Chipping Debris

The chipping debris and debitage from Area B forms 58 percent of the total sample, 329 pieces out of 566. Table I shows the number of various kinds of debris, also demonstrates that almost no differences can be found from that of Area A.

Technological Observations

BLADE-TOOL INDEX

Eleven of the 156 tools, excepting points, from Area B are on blades. The index of 7 percent is higher than that for Area A (4 percent) but still far below what would be considered to be a blade industry. A few blades with use-retouch, 5 in number, were also recovered.

RAW MATERIAL

The raw material of the artifacts in Area B is similar in kind to those of Area A. Table III shows that some frequencies differ but that these differences are not great.

EDGE ANGLES

The edge angles on end-scrapers from Area B have an average of about 76 degrees, with a range of 63 to 87 degrees, as measured on 24 specimens. Only 7 side-scrapers were available, an inadequate sample. The average angle of 70 degrees is close to that of side-scrapers from Area A.

Raclettes, with 16 specimens, ranged in edge angle from 38 to 63 degrees, with an average of about 54 degrees.

WEAR PATTERNS

The wear patterns are exactly what might have been expected after the examination of scrapers, raclettes, gravers, and other tools from Area A, with no detected difference between the two areas.

Comparisons of Areas A and B

In order that we may examine the theoretical (anthropological) implications of the two assemblages, it is necessary to demonstrate how much similarity exists between the two. Several modalities will be used.

TYPOLOGICAL COMPARISONS

The tool lists from Area A and B were reduced by those classes that were represented by less than five specimens in each area. A standard Chi-square test was applied to the contingency table of nine classes and two columns.

TABLE V
Tools Used for Chi-square Test

CLASS	*Area A Number*	*Area B Number*	*Total*
End-scrapers	12	24*	36
Side-scrapers	7	12	19
Raclettes	12	16	28
Gravers - borers	13	24	37
San Patrice points	19	20	39
Point fragments	9	12	21
Bifaces (unfinished)	13	27	40
Scaled pieces	5	5	10
Denticulates - notches	5	11	16
Total	95	151	246

* This number does not include transverse scrapers.

In each determination 0 is the observed number of specimens in each class for that area. E is calculated as the total in the class (both areas) multiplied by the number in the area, and divided by the total number of specimens. This is standard, book procedure for Chi-square (Alder and Roessler, 1968:205).

The formula $X^2 = \frac{(O_i - E_i)^2}{E_i}$ was calculated with a degree of freedom of 8 (dictated by having nine classes and two columns), and $X^2 = 4.206$. The critical value for a .05 level test of significance, according to Chi-square distribution tables is 15.51. Since this greatly exceeds our result of 4.206, the hypothesis that the two collections might be different is firmly rejected.

PROJECTILE POINT COMPARISONS

Projectile points from each of the two areas include both varieties of San Patrice type, both varieties of side notched points and examples of untyped lanceolate points. Reference has been made to the similarities of technology in the manufacture of the several types and varieties, as well as the close similarity of materials out of which they were made (Table III). A further test is in the comparative measurements. Table VI shows the major measurements of the two varieties of San Patrice points and the side notched points from the two areas: average length, width at shoulder and maximum thickness. There is close conformity in the measurements of variety *st. johns* from the two areas, less close in variety *hope* and the side notched points. The numbers of the latter are small, however. If we remove from the computations the four unusually large variety *hope* points, one from Area A and three from Area B (two of which would be called variety *goodwin* by Duffield's typology), the remaining *hope* points show closer conformity. The measurements would be, for Area A and B respectively: lengths 31.2 and 30.3 mm., widths 24.5 and 24.1 mm., and thicknesses 6.13 and 6.04 mm.

TABLE VI

Comparative Measurements of Projectile Points

Type and Variety	*Measurement*	*Area A*	*N**	*Area B*	*N**
San Patrice, *hope*	Average length	32.3mm.	(11)	34.6mm.	(10)
San Patrice, *hope*	Average width	25.2mm.	(11)	23.8mm.	(10)
San Patrice, *hope*	Average thickness	6.2mm.	(11)	6.6mm.	(10)
San Patrice, *st. johns*	Average length	31.6mm.	(6)	32.3mm.	(5)
San Patrice, *st. johns*	Average width	19.9mm.	(6)	21.1mm.	(5)
San Patrice, *st. johns*	Average thickness	4.5mm.	(6)	4.5mm.	(5)

* N=number in sample

Side notched points	Average length	33.8mm. (6)	31.4mm. (4)
Side notched points	Average width	21.3mm. (6)	20.5mm. (4)
Side notched points	Average thickness	6.1mm. (6)	5.5mm. (4)

CHIPPING DEBRIS

The debris of manufacture at the camp sites represented by the two areas gives some indication of the similarity of artifact production (Table VII).

TABLE VII

Comparisons of the Various Items of Debitage and Debris

Objects	*Area A*	*Area B*
Chips	93 - 45.8%	157 - 47.7%
Cortex	55 - 27.1%	107 - 32.5%
Debitage	7 - 3.5%	8 - 2.4%
Cores	27 - 13.3%	30 - 9.1%
Biface thinning flakes	21 - 10.3%	27 - 8.2%
Total	203 -100.0%	329 - 99.9%

The close similarity in relative proportions of these items of debris, in addition to the close resemblance of the materials and the techniques of reduction from original materials to finished products, already detailed, indicates a near-identity of manufacturing processes in Areas A and B.

SIZE AND EDGE ANGLES OF SCRAPER FORMS

The study of size and edge angles of end-scrapers, side-scrapers and raclettes is detailed in the descriptions previously presented under scraper and raclette headings. In Table VIII these three groups or classes from the two areas are compared.

TABLE VIII

Comparisons of Edge Angles

Objects or classes	*Area A*	*Area B*
Edge angles of end-scrapers	77 degrees	76 degrees
Edge angle of side-scrapers	70 degrees	70 degrees
Edge angle of raclettes	52 degrees	54 degrees
Average length of end-scrapers	23.4 mm.	24 mm.
Average width of end-scrapers	20 mm.	19.4 mm.
Average length of side-scrapers	38 mm.	42 mm.
Average width of side-scrapers	27 mm.	23 mm.
Average length of raclettes	31 mm.	34 mm.
Average width of raclettes	22 mm.	19 mm.

Edge angles of all three scraper forms are duplicated in Area A and B. Length and width averages are duplicated in end-scrapers, but vary in the raclettes and side-scrapers. This is not unexpected because of the wide variations in size and shape among these tools. At the risk of being repetitious we believe that in these two classes the edge angle is the major concern, even though we did not define the classes by edge angle alone.

It appears that the inhabitants, in manufacturing end-scrapers, chose size, shape and edge angles carefully, apparently as carefully as these attributes were selected in projectile points. Each of these two classes conforms to narrow limits set by the makers, not only within one assemblage, but across both assemblages (Fig. 11).

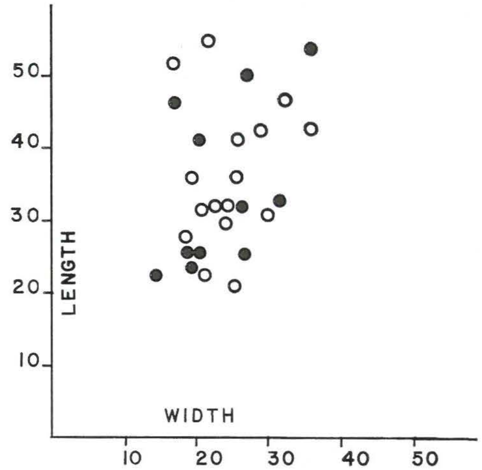
Speculation on Similarities

Significant resemblances have been observed, measured and described for the two assemblages. They are particularly close in typological tools, both in kind and frequency. The technological attributes, seen as manufacturing stages, are practically identical as are lengths, widths and edge angles of cutting tools. Raw materials chosen do not appear to differ significantly, although this cannot be tested easily.

We are able to detect a large series of choices made by the inhabitants at each of the two camps. Certain raw materials were selected; these were cleared of cortex and reduced by chipping according to set, culturally determined motor habits. Choices were exercised in the production of certain proportions of highly stylized types (the several varieties of points and notched scrapers) and the more ubiquitous tool forms. Further options were made in the selection of certain dimensions and ratios, both in flake sizes and shape alterations. Finally, certain cultural decisions were expressed by the manner in which these tools were utilized, as observed through wear patterns.

When two sites or occupation areas are significantly different, the explanation can only be sought in terms of the several possible combinations of: (1) ethnic, (2) temporal and (3) activity differences. Conversely, absolute identity between two assemblages can only mean that members of the same society were engaged in the same activities. The latter also requires that the time must be so close that no significant evolution or acculturation processes have occurred.

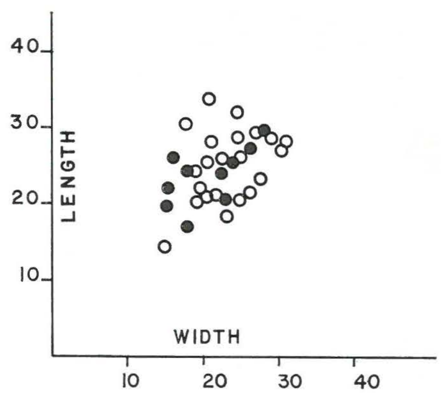
Areas A and B are extremely similar. We believe that similarities in one cultural category, as interpreted through material remains, can have a number of explanations. Thus, stylistic attributes in projectile points do not necessarily define the economic or the ideological subsystems of an archeological "culture." On the other hand, close similar-



DIMENSIONS OF RACLETTES (mm.)

AREA A = ●

AREA B = ○



DIMENSIONS OF END-SCRAPERS (mm.)

AREA A = ●

AREA B = ○

Fig. 11. Distribution of size proportions of end-scrapers and raclettes.

ities between two assemblages in processural stages of production, in style of products, and in motor habits of tool use, all of which show the exercise of culturally controlled behavior, must be treated as homologous.

SURFACE MATERIAL REMAINS

Objects that were found on the general surface of the site, chiefly on the cultivated east slope but secondarily on the south slope and knoll next to the stream, also from the sand levels of the excavated areas (confined largely to Area B), are combined in Table IX. We have stated that these objects clearly do not constitute an assemblage; rather, the material is to be looked on as a collection of remains from a number of occupations. We therefore have made no attempt to subject it to analysis.

TABLE IX

Material Remains From Sand Levels And Surface

A. Major Categories of Objects

Chipped stone tools	289 - 36.1%
Use retouch objects	64 - 8.0%
Ground stone objects	3 - 0.4%
Debris	444 - 55.5%
Total	800 -100.0%

B. Chipped Stone Tools

San Patrice points	23 - 8.0%
Side notched points	15 - 5.2%
Lanceolate points	14 - 4.8%
Stemmed points	28 - 9.7%
Projectile point fragments	26 - 9.0%
End-scrapers	21 - 7.3%
Side-scrapers	9 - 3.1%
Side notched side-scrapers	3 - 1.0%
Raclettes, end	5 - 1.7%
Raclettes, side	30 - 10.4%
Denticulates	12 - 4.2%
Notched flakes	13 - 4.5%
Gravers - borers	18 - 6.2%
Drills	2 - 0.7%
Bifaces (Unfinished)	24 - 8.3%
Burins	1 - 0.3%
Scaled pieces	12 - 4.2%
Retouched flakes	28 - 9.7%
Varia	5 - 1.7%
Total	289 -100.0%

C. Ground Stone Objects	
Pitted stones	2 - 66.7%
Grooved hematite pendant, tiny	1 - 33.3%
D. Debris and Debitage	
Chips	221 - 49.7%
Cortex	124 - 27.9%
Core fragments	51 - 11.5%
Biface thinning flakes	39 - 8.8%
Debitage	9 - 2.0%
Total	444 - 99.9%

Some of this material belongs, typologically, with the buried *in situ* levels of Area A and B. Included in this category are San Patrice and side notched points, the majority of the lanceolate points, end-scrapers with beaks or spurs, side notched side-scrapers (Albany), and scaled pieces.

One of the lanceolate points is classified as Meserve type, another as Clovis (unifacially fluted and broken transversely, probably in manufacture; typed by Webb and Wormington), and four are Pelican type (Gagliano and Gregory, 1965). The remainder are ovate with concave bases, of local materials, and consistent with most of the lanceolates from Areas A and B.

Significant numbers of tools from the sand and surface might belong to the lower level assemblage or they could just as easily be from later occupations. These tools include many raclettes, gravers, end and side-scrapers, notches and denticulates, as well as a group of unfinished objects (bifacials). Also in this category of uncertainty are chipping debris and use retouched flakes or blades.

Finally, there are artifacts that appear to be typologically unrelated or incompatible with the lower levels. Stemmed points classified as Gary, Ellis, Yarbrough, Bulverde, Marshall and Edgewood have variously been reported as associated with periods later than that of the San Patrice points and tools, as also have the pitted stones and notched hematite pendant. One infers intermittent occupation of this spur by a number of Archaic bands, prior to the advent of arrow projectiles and pottery.

SUMMARY OF SAN PATRICE TOOL COMPLEX

In each of the John Pearce components, Areas A and B, the major projectile point type is San Patrice, with an adequate representation of *hope* and *st. johns* varieties to assure that each is a valid form of the assemblage and that *hope* is the dominant form. Side notched points are part of each assemblage, with variety A the more frequent. It also appears that the San Patrice complex includes untyped lanceolate forms that vary in such attributes as fluting, concavity of bases and grinding of the bases and edges.

The reluctance to accept five distinct varieties of points in a single assemblage led us to explore two possibilities: (1) that all five fit into a spectrum of variation in a single "type" or (2) that sufficient time is involved in the occupation to allow for a multiplicity of varieties, each associated with a different group of people. The near identity of the types and varieties in Areas A and B and the similar proportions in the two areas mitigate against these propositions. Technologically we cannot demonstrate a spectrum, the varieties are discrete in both areas. Finally, the physical position of the objects in the clay zones was carefully reviewed. The chief excavator did not indicate the exact position of every artifact but he did record the finding of each point, noting whether it was on the surface of the clay layer of Zone 2 or within the clay. He noted the depth in a number of instances. Nineteen points of variety *hope* were recorded as within the clay and the measured depth below the clay surface was between one and three inches in 4 instances, at 8 and 12 inches in two others. Twelve of the 14 variety *st. johns* were below the clay surface, with measured depths of two to three inches for 3 specimens. Five side notched points were below the clay surface, with one recorded depth of 10 inches. Apart from the two lanceolate points in the pit, four were recorded within the clay, two at measured depths of one and three inches. We therefore conclude that, at John Pearce Site, all five varieties of points are members of the San Patrice complex.

Among the tools several kinds of end-scrapers, side-scrapers, raclettes, gravers-borers and bifaces (incomplete) are in sufficiently large numbers in each area to leave no doubt of their being part of the complex. Side notched (Albany) side-scrapers, notched flakes, denticulates, burins, scaled pieces and retouched flakes are in lesser numbers but derive from both areas and seem to be valid constituents. The several varia appear to be technologically consistent. Objects showing use retouch and the various categories of debris are unquestioned but not distinctive.

There is doubt, because of isolated occurrence and technological qualities, whether the two Clovis-like points found together in the dark stained pit of Area A, the expanded base drill from Area A, and the stemmed Fairland type point from Area B should be included in the San Patrice tool complex.

Several general observations may be made about the tool complex.

(1) It is a small tool complex. The great majority of points and other tools are less than 40 mm. in length and most of the tools are made from comparatively thin flakes. (2) It is a chipped stone complex. No ground or polished stone objects were found in either area. (3) Apart from projectile points, this is preponderantly a unifacially worked tool complex. (4) This is a tool complex made from local materials, indicating adjustment to the area and its resources.

COMPARISONS AND DISCUSSION

The results of these two habitation studies, so nearly identical as to suggest members of the same society within a narrow time span, permit few conclusions and only limited speculations about such important cultural concepts as settlement patterns, subsistence systems, population estimates and social structures. All of the non-lithic cultural items have disappeared and much of the evidence is negative. Nevertheless, we now have two assemblages that will stand as cultural entities. Tool frequencies are statistically reliable, and debris categories are internally usable in terms of the ½ inch minimum size.

The inference from the limited occupation areas and density of artifacts is of small bands, possibly extended family groups, in a (base?) camp situation. The absence of evidence of substantial structures or deep midden deposits or even definite hearths is against fixed habitations. The absence of large cutting or chopping tools—axes, celts, adzes—from which one might infer forest clearing or tree-log manipulation in the construction of dwellings or dugouts weighs against (but does not disprove) these activities.

From the tools one infers hunting, dismemberment of game, hide preparation and various scraping, cutting and boring activities, presumably of bone, antler and wood. There is an absence of milling and grinding tools which are usually interpreted as evidence of seed or grain preparation. None of the artifacts—or absences—gives us any real clue to the amount of food gathering in the economy, which must have been considerable in this environment.

The opportunity to visualize areal culture patterns is also severely limited by lack of comparable excavations. To the extent that one can judge by surface collections, the occurrence of San Patrice, side notched and lanceolate points at a considerable number of other sites, the characteristics of which are poorly known, indicates more than a casual occupation of the area. It has been noted that San Patrice points have been found at 24 other sites in Caddo Parish and there is a likelihood of a similar frequency in all of the northwestern Louisiana parishes bordering on Red and Sabine Rivers. Sufficient numbers of the typical points and other tools have been gathered from six sites to assure respectable occupations during this period.

The Spring Ridge Site (Fig. 1 B, 2) is on a tributary of Cypress Bayou about 10 miles west of John Pearce Site. Surface collections and limited excavations by James H. Long and Charles C. Clark of Shreveport yielded artifacts characteristic of ceramic, Archaic and Paleo-Indian periods. Included in their collections from the site, reviewed by Webb and Roberts in 1968, are: 40 San Patrice points showing a preponderance of *st. johns* over *hope* variety, 33 side notched points of varieties A and B, 19 lanceolate points which include 8 Meserve, 3 Pelican and 2 Scottsbluff types, a number of end-scrapers, side-scrapers and bifaces, 6 side notched side-scrapers (Albany), and two each of gravers and expanded base drills.

The Linwood High School Site (Fig. 1 B, 3), eight miles north of the John Pearce Site and within the city limits of Shreveport, was explored by a youth in the neighborhood before the school was constructed. His surface collections, seen by Roberts, included 15 points of San Patrice type; no other tools were collected.

Surface collections were made from the Albany Landing Site (Fig. 1 B, 4) by Webb, Roberts, Clark and others. The site is 7 miles north of Shreveport, situated on the terrace crest overlooking Red River valley and immediately above a relict channel of this river. The collections include: 18 San Patrice points of both varieties, 12 side notched points, undifferentiated, 14 lanceolate points (including one Scottsbluff, two Meserve and one Pelican types), 2 end-scrapers, 21 side-scrapers, 11 side notched (Albany) side-scrapers, 65 bifaces, 5 drills (2 with expanded base, 3 straight quadrilateral), and one graver. The major occupation is Archaic, with nearly 1,000 stemmed points in the collections.

The Swanson's Landing Site is on Caddo Lake, about 18 miles northwest of Shreveport (Fig. 1 B, 5). It is a multicomponent site with the major occupations during the Archaic and ceramic periods. Included in the senior author's collection, however, are 9 San Patrice points, 9 side notched points, one untyped lanceolate, 9 end-scrapers, 11 side-scrapers, 4 side notched (Albany) side-scrapers, and many bifaces.

The Litton Site (Fig. 1 B, 6) is situated on a remnant outrider of the terrace near Kelly Bayou, a lateral valley tributary of Red River, about 25 miles north of Shreveport. It is a non-ceramic site with Archaic and Paleo-Indian artifacts. Surface collections and limited test excavations by Webb and Ralph McKinney, Hosston, Louisiana, produced 10 San Patrice points, one side notched point, one untyped lanceolate, one end-scraper made from a stemmed point, 5 side-scrapers, 5 side notched (Albany) side-scrapers and 5 bifaces (incomplete).

In DeSoto Parish the San Patrice type site is near the town of Pelican, 33 miles (air) from the John Pearce Site. Surface collections of a local resident, Mike Wellborn, were studied and the site was visited by the senior author. There is a small Caddoan ceramic component, many Archaic stemmed points and a lesser number of Paleo-Indian artifacts. The collections include: 19 San Patrice points of both varieties, 25 side notched points (undifferentiated but including varieties A and B), 11 lanceolate points (one Meserve, two Scottsbluff, one Eden types), 1 small end-scraper, 6 side notched end-scrapers, 4 side-scrapers, 7 side notched side-scrapers (4 Albany, 3 reworked projectile points), 8 drills of expanded base, straight quadrilateral and reworked projectile point varieties, 1 graver and 22 bifaces.

Sites containing San Patrice points are in two natural settings: (1) on the margins of the upland terraces, overlooking the river valley or the large lakes and lateral streams that flow into the valley, and therefore offering a combination of upland and lacustrine-riverine biosystems; (2) on small streams that dissect the uplands, well away from the valley or lakes. We have inadequate information to say whether the two kinds of sites vary in tool complexes or other patterns.

It is difficult, also, to compare the San Patrice assemblages at John Pearce and the Wolfshead Site (Duffield 1963) in East Texas, because of the cultural mixture evident at the latter site and the failure (using artificial instead of natural levels of excavation) to separate an assemblage of tools directly associated with San Patrice points. San Patrice variety *st. johns* was nearly three times more numerous than variety *hope* at the Wolfshead Site. Concave base lanceolate points were assigned in the analysis to the early horizon with San Patrice points, but side notched points, also side notched, end and side-scrapers were assigned to the subsequent early Archaic horizon. It was suggested that objects associated with San Patrice and lanceolate points were: small 'snub-nose" end-scrapers, cortex, D-shaped and multi-edged scrapers, bifaces and grinding slabs. One questions the assignment of grinding slabs to this assemblage, in view of the fact that only one specimen was found and this in the fourth of five levels with a mixed assortment of objects. All other ground and polished stone objects were assigned to the Archaic assemblage. A comparison of technology at the two sites is difficult because many of the Wolfshead tools were made of petrified wood, and debris was not tabulated.

Gagliano and Gregory (1965) and the senior author have established the occurrence of San Patrice points in all parts of Louisiana except the coastal areas and the river floodplains. This type is reported from eastern Oklahoma by Wyckoff (1967:44, 48) and from a number of sites in southern and central Arkansas (Frank E. Chowning personal communication 1967). In East Texas, in addition to Wolfshead site, San Patrice points have been reported from the Yarbrough (Johnson 1962), Jake Martin (Davis and Davis 1960) and Wood Pit (R. K. Harris, personal communication, 1967) sites. At the latter site San Patrice and Plainview points were found in addition to Archaic materials. A radiocarbon date on mussel shells found near the base of the deposit was reported (Campbell, 1959) at 3980 B.C. ± 200 years.

San Patrice and Pelican points (one each made of tan chert and one or two each of flint) were recovered at the Obshner Site near Dallas, and at a site near Terrell, Texas, (R. K. Harris, personal communication); neither site produced side notched side-scrapers or scaled pieces.

A single San Patrice, but no side notched side-scrapers or scaled pieces, was found at the Acton Site, Hood County, Texas, (Blaine, et al, 1968).

At the Horn Number 2 Site, also on the Brazos in Bosque County, Texas, three or four stylistic San Patrice points were excavated. None of the accompanying tools particularly resembled those from the John Pearce Site (Albert Redder, personal communication).

Gregory Perino (personal communication, 1967) has found San Patrice points in small numbers in eastern Arkansas, especially in the Western Lowlands near Forrest City. He reports single specimens from St. Louis and Warren Counties in Missouri. Hence, the range of occurrence of San Patrice type is from the Brazos River in Texas to the Mississippi, and from Lake Pontchartrain northward to Missouri. This lies between and partly overlaps the ranges of the typologically related Meserve type to the west and Dalton type to the east. The latter type, centering in Missouri and Arkansas, has been reported from Alabama (DeJarnette, Kurjack and Cambron, 1962) and South Carolina (James L. Michie, personal communication 1970). Michie describes the Van Lott point from South Carolina as typologically closer to San Patrice than is Dalton. He also describes a side notched side-scraper (Edgefield type) that is typologically very similar to those from the John Pearce Site; it is found at Paleo-Indian sites of South Carolina and Georgia.

A comparison of the John Pearce materials to the general "Paleo-Indian tool types in the Great Plains" shows very significant similarities.

Irwin and Wormington (1970) describe and partially illustrate many varieties with cutting, scraping and boring classes of tools. Most of these can be found in the John Pearce assemblages, duplicating several combinations of attributes. Most significant, we believe, are the several variations on end-scrapers, these with and without beaks and spurs and some with inverse retouch at the corners of the bits. Beaks and spurs on flakes, burins, drills and numerous other tools common to Paleo-Indian sites in the Plains also appear at John Pearce. Most of these tools are either scarce or else unreported at "Archaic" sites in the Southeast.

Edge angles on end and side-scrapers from John Pearce are in some small variance from those of Wilmsen (1970), but these are probably due to measuring techniques. Our figures show, as did Wilmsen's, that end-scrapers consistently have larger average angles than side-scrapers, and that the differences are often in the range of eight or ten degrees.

These technological observations do not prove a real relationship to Plains Paleo-Indian material, but indicate that the John Pearce technology is closer to what has been reported by Irwin and Wormington, and by Wilmsen, than it is to the material that has been reported for the "Archic" of East Texas and the Southeast.

Through the middle portions of the country and the Southeast the assemblages of late Paleo-Indian and early Archaic times are best known from excavations of caves and rock shelters, specifically Graham Cave (Logan, 1952) in central Missouri, Modoc Rock Shelter (Fowler, 1959) in southern Illinois, and Stanfield-Worley Shelter (De-Jarnette, Kurjack and Cambron, 1962) and Russell Cave (Miller, 1956, 1957) in northern Alabama. These established the association of lanceolate points, predominantly Dalton type, side notched points like the Big Sandy type, and a variety of unifacially chipped small tools: end and side-scrapers, notches, denticulates, gravers and borers, made on flakes and blades. Bifaces, "knives", and drills are included and bone tools (chiefly awls) were found. Radiocarbon dates from several of the sites place these assemblages between 8,000 and 6,000 B. C. Opinions have been expressed (Winters, 1959:7, Griffin, 1967:178) that the fluted point tradition, as reflected in Meserve-Dalton types, came to a close by 6,000 B.C. Subsequent Archaic cultures exhibit a greater variety of stone tools, especially of ground and polished milling, "nutting", cutting and problematical objects.

CONCLUSIONS

John Pearce is a non-pottery site with its most significant occupation by people who made San Patrice points and other culturally distinctive tools. Two discrete assemblages were isolated from the lower levels of the stratified deposit, and they represent homologous cultural entities. They comprise an association of San Patrice, side notched and lanceolate points with other tools that are small, unifacial, and made preferentially of local stone. The latter include a diversity of end-scrapers, side-scrapers, side notched scrapers, gravers, borers, notched flakes, denticulates, burins, scaled pieces, retouched flakes and varia, made from thin flakes and, occasionally, blades.

The absence in the lower levels of ground and polished tools, the virtual absence of stemmed points, and the stratigraphic evidence indicate that the San Patrice complex antedates the complexes of this area that are usually termed Archaic.

Indications of manufacturing and use technology are offered as a result of studies of the debris, debitage and use marks on the tools. There are clear indications of the use of projectiles, of scraping (probably hides) and of other activities including slicing, making grooves and boring holes. Other tools can not be assigned specific functions. In terms of a multiplicity of behavioral traits, the material culture content and activities of this group appear to have been defined more successfully than has generally been achieved for pre-pottery cultures.

The technology of the San Patrice socio-cultural unit as reflected at this site is closer metrically and morphologically to that reported for the Paleo-Indian complexes of the Plains than to the Archaic of East Texas and the Southeastern United States. There is one piece of evidence that this industry existed prior to 4,000 B.C. and it seems probable, from extraneous comparisons, that it was not later than 6,000 B.C. A range of occupation over a considerable area of the western portion of the Southeast, centering in northwestern Louisiana, is suggested. It remains to be demonstrated what parts of this range incorporate the association of tools similar to those found at the John Pearce Site with the stylistic San Patrice points.

REFERENCES CITED

Alder, Henry L. and Edward B. Roessler
1968 *Introduction to Probability and Statistics.* Fourth Edition, W. H. Freeman and Co., San Francisco.

Blaine, Jay C., R. K. Harris, Wilson W. Crook and Joel L. Shiner
1968 The Acton Site: Hood County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 39.

Campbell, T. N.
1959 A List of Radiocarbon Dates from Archeological Sites in Texas. *Bulletin of the Texas Archeological Society*, Vol. 30.

Clarke, David L.
1968 *Analytical Archaeology*. London, Distributed in U.S.A. by Barnes and Noble, Inc.

Davis, W. A. and E. Mott Davis
1960 The Jake Martin Site, an Archaic Site in the Ferrell's Bridge Reservoir Area, Northeastern Texas. *Archeology Series*, No. 3, Department of Anthropology, University of Texas

DeJarnette, David L., Edward B. Kurjack and James W. Cambron
1962 Stanfield-Worley Bluff Shelter Excavations. *Journal of Alabama Archeology*, Vol. 8, Nos. 1 and 2, University, Alabama.

Duffield, Lathel
1963 The Wolfshead Site: an Archaic-Neo-American Site in San Augustine County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 34.

Fowler, Melvin L.
1959 Modoc Rock Shelter: an Early Archaic Site in Southern Illinois. *American Antiquity*, Vol. 24, No. 3.

Gagliano, Sherwood M. and Hiram F. Gregory
1965 A Preliminary Survey of Paleo-Indian Points from Louisiana. *Louisiana Studies*, Vol. 4, No. 1, Louisiana Studies Institute, Northwestern State College, Natchitoches.

Griffin, James B.
1967 Eastern North American Archeology: a Summary. *Science*, Vol. 156, No. 3772.

Irwin, Henry T. and H. M. Wormington
1970 Paleo-Indian Tool Types in the Great Plains. *American Antiquity*, Vol. 35, No. 1.

Johnson, LeRoy, Jr.
1962 The Yarbrough and Miller Sites of Northeastern Texas, with a Preliminary Definition of the LaHarpe Aspect. *Bulletin of the Texas Archeological Society*, Vol. 32.

LeBlanc, R. J.
1948 Geological Map of Louisiana, unpublished data secured through Coastal Studies Institute, Louisiana State University.

Logan, W. D.
1952 Graham Cave, an Archaic Site in Montgomery County, Missouri. *Missouri Archeological Society*, Memoir No. 2. Columbia.

Miller, Carl
1956 Life 8000 Years Ago Uncovered in an Alabama Cave. *National Geographic Magazine*, Vol. 110, No. 4.
1957 Radiocarbon Dates from an Early Archaic Deposit in Russell Cave, Alabama. *American Antiquity*, Vol. 23, No. 1.

Movius, Hallam L. Jr., Nicholas C. David, Harvey M. Bricker, and R. Berle Clay
1968 The Analysis of Certain Major Classes of Upper Paleolithic Tools. *American School of Prehistoric Research*, Bulletin No. 26, Peabody Museum, Harvard University.

Shiner, Joel L.
1970 Activity Analysis of a Prehistoric Site. *Bulletin of the Texas Archeological Society*, Vol. 41, Dallas, Texas.

Suhm, Dee Ann and Edward B. Jelks
1962 Handbook of Texas Archeology: Type Descriptions. *Texas Memorial Museum Bulletin* No. 4 and *Texas Archeological Society Special Publication* No. 1. Austin.

Webb, C. H.
1946 Two Unusual Types of Chipped Stone Artifacts from Northwest Louisiana. *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 17.

1948 Evidences of Pre-Pottery Cultures in Louisiana. *American Antiquity*, Vol. 13, No. 3.

Webb, Clarence H., Forrest E. Murphey, Wesley G. Ellis and H. Roland Green
1969 The Resch Site, 41HS16, Harrison County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 40.

Wilmsen, Edwin N.
1970 *Lithic Analysis and Cultural Inference: A Paleo-Indian Case.* University of Arizona Press, Tucson, Arizona.

Winters, Howard D.
1959 The Paleo-Indian Period. *Illinois Archeology, Illinois Archeological Survey*, Bulletin 1, Urbana.

Wyckoff, Don. G.
1967 The Archeological Sequence in the Broken Bow Reservoir Area, McCurtain County, Oklahoma. *Oklahoma River Basin Survey Project*, The Stovall Museum of Natural History and the University of Oklahoma Research Institute, Norman.

Shreveport, Louisiana
Dallas, Texas

Archeological Investigations at the La Jita Site Uvalde County, Texas

THOMAS ROY HESTER
WITH APPENDICES BY DAVID H. RISKIND AND T. R. HESTER

ABSTRACT

During the early summer of 1967, archeological excavations were made at the La Jita site (41 UV 21) in northeastern Uvalde County, Texas. The site is located in a wooded area on a low terrace of the Sabinal River. Three closely-grouped burned rock middens are present and are surrounded by large amounts of occupational debris buried in terrace fill. Data obtained from the analysis of the excavated artifact assemblage indicate that the La Jita site was occupied throughout the Archaic period and into late prehistoric times. Radiocarbon dates are available for the latter part of the occupational span. The burned rock middens at the site are attributable to Middle Archaic activities, and a hypothesis is proposed regarding the accumulation of these cultural features. Additional information on aboriginal activities at the site is provided by a flake analysis. Studies of the faunal and shell remains from the site are also presented.

ACKNOWLEDGMENTS

There are many to whom I am grateful, both for aid at the site and for advice and criticism during the preparation of this paper. The Bexar County Council of the Girl Scouts of America provided funds for the work, aided by Mr. John F. Camp, Sr., of San Antonio. Officers of the council, particularly Mrs. John F. Camp, Sr. and Mrs. Etta Ward, were of great assistance. Mr. Glen Evans of Midland assisted in setting up the project. At the site, Mrs. Jean Griffith helped during the field school. The 14 young ladies who participated in the field school worked long and hard, and I thank them for enduring (with good humor) the heat, dust and ticks. The staff at the La Jita camp during the summer of 1967, including Mrs. D. Bailey Calvin (director) and Mrs. Louise Ward, were of much help. Mr. W. W. Stout and his family also assisted us to a great extent. Before and after the field school, Dan Fox and Damon Kasper helped with the excavations, as did Ronnie Bownds and Louis Long of Utopia. Volunteer labor and other assistance were provided at times by Mr. J. W. House and members of the Carrizo Springs High School Archeological Society and by Mr. John W. Greer.

In Austin, I am grateful to Drs. T. N. Campbell and Dee Ann Story for their aid. Dr. E. Mott Davis and S. Valastro, Jr. facilitated the

analysis of radiocarbon samples from the site. Other staff members at The University of Texas who were of much help include: M. B. Collins, James E. Corbin, Harry J. Shafer and William Sorrow. Joy Stevenson, Jackie Foster and Van Fowler assisted in the laboratory. Dr. Joel Shiner, Southern Methodist University and Editor of the Texas Archeological Society, offered helpful criticisms. T. C. Hill, Jr., of Crystal City, Texas, made available notes, photographs and artifacts from his investigations at 41 UV 29 in Uvalde County.

I wish also to express my thanks to Dr. Robert F. Heizer, University of California, Berkeley, for reading and commenting on this paper. Special gratitude is extended to my wife Lynda for the many hours she spent working at the site and in the laboratory.

INTRODUCTION

In June and July, 1967, archeological investigations were carried out at the La Jita site (designated by The University of Texas as site 41 UV 21) in the Sabinal Canyon of northeastern Uvalde County, Texas (Fig. 1). The site is located on the La Jita Girl Scout Ranch, about 3 miles south of the village of Utopia. The excavations at the site were directed by the author. For 2 weeks, an archeological field school for advanced Girl Scouts was held at the site. During that period, and throughout the remainder of the time spent at the site, work was supported by the Bexar County Council of Girl Scouts, with the generous aid of Mr. John F. Camp, Sr., of San Antonio.

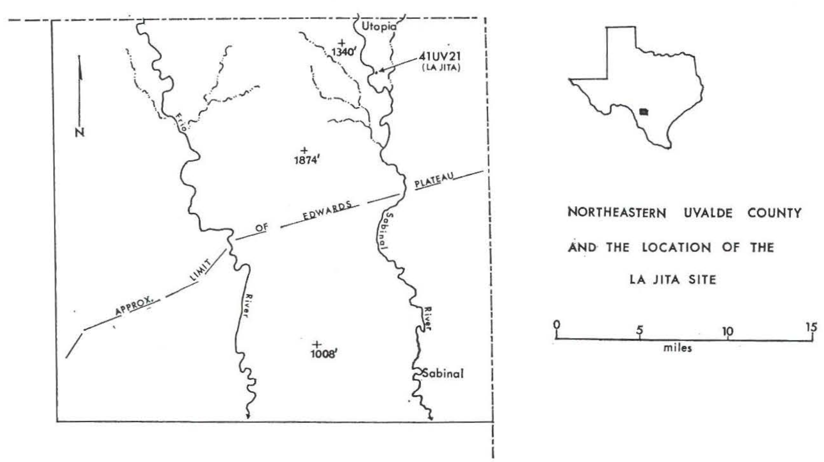


FIG. 1 Northeastern Uvalde County and the Location of the La Jita Site. Inset shows the location of Uvalde County within the state. Elevations shown on map are above sea level.

A major goal of the La Jita work was to test extensively the terrace areas surrounding the burned rock middens at the site. Excavations in the midden accumulations were also carried out. Most previous excavations in central Texas burned rock middens had concentrated on the middens themselves, while little attention had been paid to adjoining occupation areas.

ARCHEOLOGICAL BACKGROUND

The archeology of the central Texas region has been summarized by Suhm (1960), and should be consulted by the reader for an overall perspective of the prehistory of this area. Archeological work began in the Uvalde County area, and in the southwestern Edwards Plateau, in the 1930's when a number of sites were visited and briefly tested by A. T. Jackson and others from The University of Texas. The results of these investigations were not reported, although Jackson's work at the Gildart site has been published by Hester (1970a). In the same period, Huskey (1935) published a brief paper dealing with the sites and archeological materials in the Nueces Canyon of Uvalde and Real Counties. The only previous major excavation in Uvalde County was at Kincaid rockshelter, on the Sabinal River about 20 miles downstream from La Jita. A full report on these investigations has not yet appeared (see Suhm, 1960). In more recent years, sites have been visited and recorded by students from The University of Texas (notes on file at the Texas Archeological Research Laboratory), and Hester (1968a; 1970a) has reported the vandalism of 3 burned rock middens in northwestern Uvalde County.

Little has been published pertinent to the archeology of the immediately surrounding region of Medina, Bandera, Bell, Edwards and Kinney Counties. In these counties, too, excavation and reconnaisance were conducted by W.P.A. crews from The University of Texas, but the results of most of the work remain unpublished. Campbell (1957) has reported the excavations at Fields rockshelter in Edwards County, and Hester (1963; 1966) has recorded data from the Lackey site in Real County.

The Paleo-Indian period in the southwestern Edwards Plateau is represented primarily by random finds of Late Paleo-Indian projectile points (such as Angostura, Meserve and Plainview), as well as occasional fluted points (a Clovis fragment is illustrated by Hester, 1970a). However, at Kincaid rockshelter, several Folsom points have been found, though not in context (see Sellards, 1952, and Wormington, 1957).

Archaic cultural remains are very common, and there are numerous burned rock middens and open camp sites attributable to this period (see Suhm, 1960). Though the southwestern Edwards Plateau adjoins the south Texas and Trans-Pecos regions, the Archaic materials show a strong affinity to those of central Texas. The typical artifact forms of the Archaic of this area are reflected by the materials described from the La Jita site.

Late Prehistoric (or Neo-American) occupations are typically found on open camp sites and burned rock middens, overlying Archaic materials. The Late Prehistoric artifacts from La Jita are characteristic of the region though at most sites ceramics are not as abundant. There may have been increased occupation of rockshelters during this period, since relic-collectors report quantities of Late Prehistoric cultural remains from their uncontrolled excavations in these sites on the Sabinal, Frio and Nueces Rivers. An archeological program should be designed for the investigation of these rockshelter sites before all are destroyed by relic-collecting. Pictographs occur in some of the shelters (see Jackson, 1938), though the cultural affiliation of most are uncertain.

THE SETTING

The site is situated just east of the narrow, spring-fed Sabinal River, on the north bank of an old channel of that stream (see Fig. 2). The

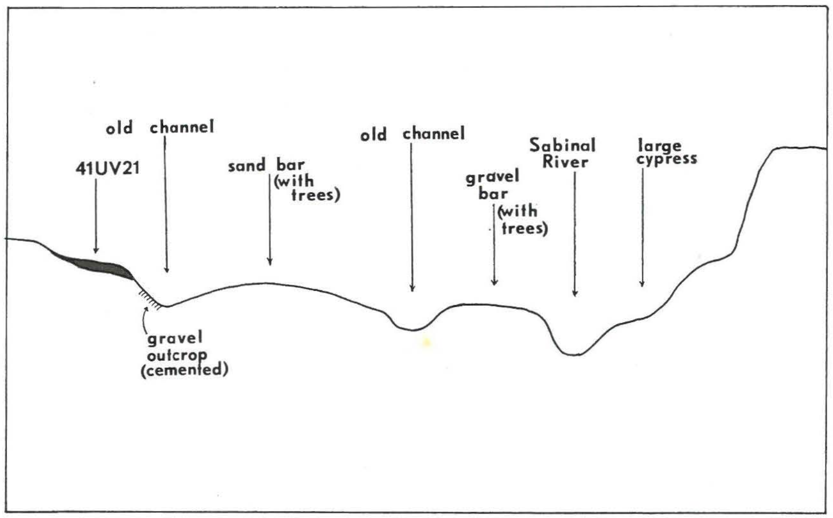


FIG. 2. Cross Section in Area of the La Jita Site. This rough east-west section shows the position of the site, and its relationship to the present Sabinal River and two of its former channels.

site area is characterized by a heavy vegetation cover, especially during moist periods. Trees on the site proper include fairly large live oak (*Quercus virginiana*), a number of Texas persimmon (*Diospyros texana*), as well as representatives of common hackberry (*Celtis reticulata*), sugar hackberry (*C. laevigata*), elm (*Ulmus sp.*, probably *U. crassifolia*), and bitternut hickory (*Carya cordiformis*). Mesquite (*Prosopia juliflora*) is present in the immediate vicinity on the floodplain and on the uplands. It may be a rather late introduction in the region, though it was observed in the area as early as 1691 (see

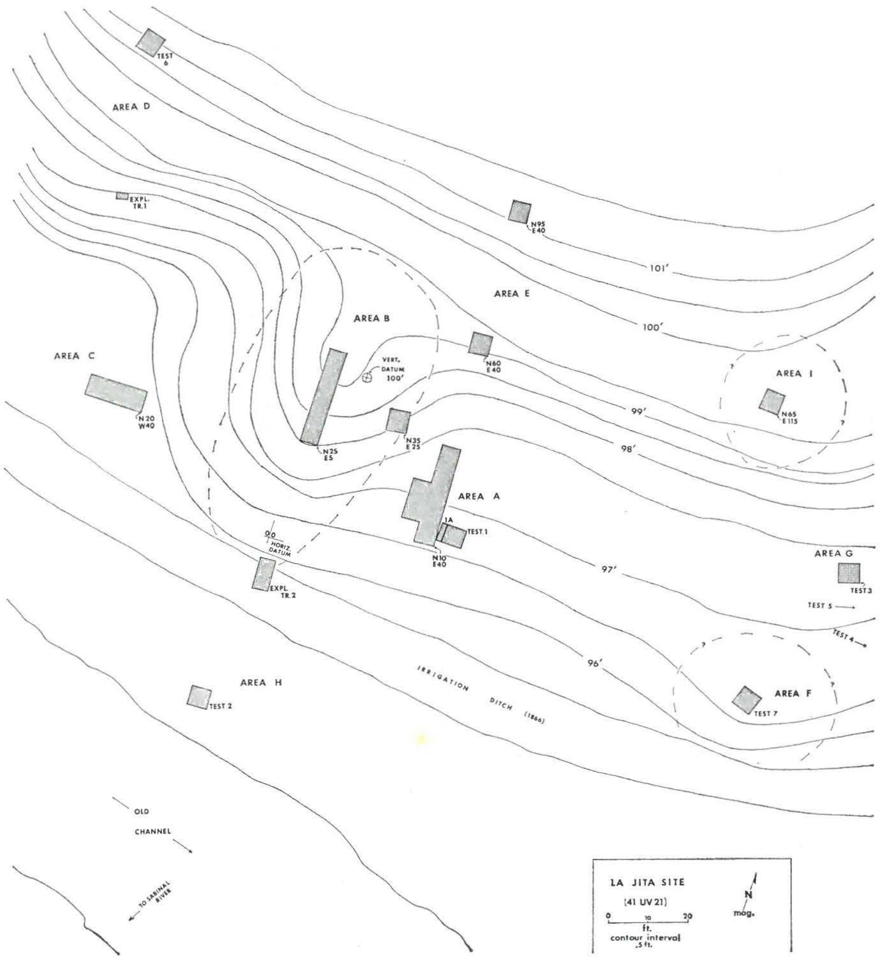


FIG. 3. The La Jita Site. Topographic map showing the plan of excavations. Excavation areas are also indicated. Contour interval is .5 feet.

Inglis, 1964:69). Just west of the site, huge cypress (*Taxodium* sp.) up to 35 feet in circumference line the banks of the present Sabinal channel. Other trees in the vicinity of the site are pecan, redbud (*Cercis* sp.), buckeye (*Aesculus arguta*) and *Mimosa* (Sellards and Chelf, n.d.). Plants in the area include Spanish dagger, bear grass, several varieties of cactus, especially prickly pear (*Opuntia lindheimeri*) and devil's pincushion. In addition, there are many types of native grasses and wildflowers, as well as wild grapes and dewberries.

The site is located within the Sabinal Canyon. The canyon is about 20 miles in length, beginning in Bandera County and extending southward into Uvalde County; the width of the canyon varies from 1.5 to 6 miles. The floodplain of the river is usually rather narrow and there are a series of low terraces in various parts of the stream valley, but these have yet to be studied. Rimming the valley on both sides are eroded limestone hills, rising 200-250 feet above the valley floor; these hills are covered with cedar and other sparse vegetation. The site is on the southern edge of the Edwards Plateau, a rugged area of dissected Comanchean Cretaceous limestone. About 8 miles to the south of the site, the Coastal Plains begin. The site also lies on the southern edge of the Balconian Biotic Province (Blair, 1950:112-115). The climate is semi-arid, and mesothermal, with rainfall averaging about 22 inches annually. The fauna of this province are quite varied, with Blair (1950:113-114) recording 57 species of mammals, 1 species of land turtle, 16 lizard species, 36 species of snakes, 15 species of anurans and 7 species of urodele fauna. He also notes (p. 113) that ". . . the most characteristic plant association of the Balconian is a scrub forest of Mexican cedar (*Juniperus mexicana*), Texas oak (*Querqus texana*), stunted live oak (*Q. virginiana*) and various other less numerous species". Such an association can be noted on the uplands flanking the Sabinal River. He goes on to add (*Ibid.*): ". . .the floodplains of the streams are occupied by a mesic forest of large live oaks, elms, hackberries and pecans".

The position of La Jita within the Sabinal Canyon indicates that it was favorably located for the exploitation of the local resources by its prehistoric occupants. It is near the perennial Sabinal River, and the varied flora and fauna within its environs constitute a relative abundance of available food items. The site is also near the edge of the uplands (low terraces) which extend eastward across the valley toward the hills.

THE SITE

The La Jita site (located at 29°34′ N Lat., 99°31′ W Long.) is com-

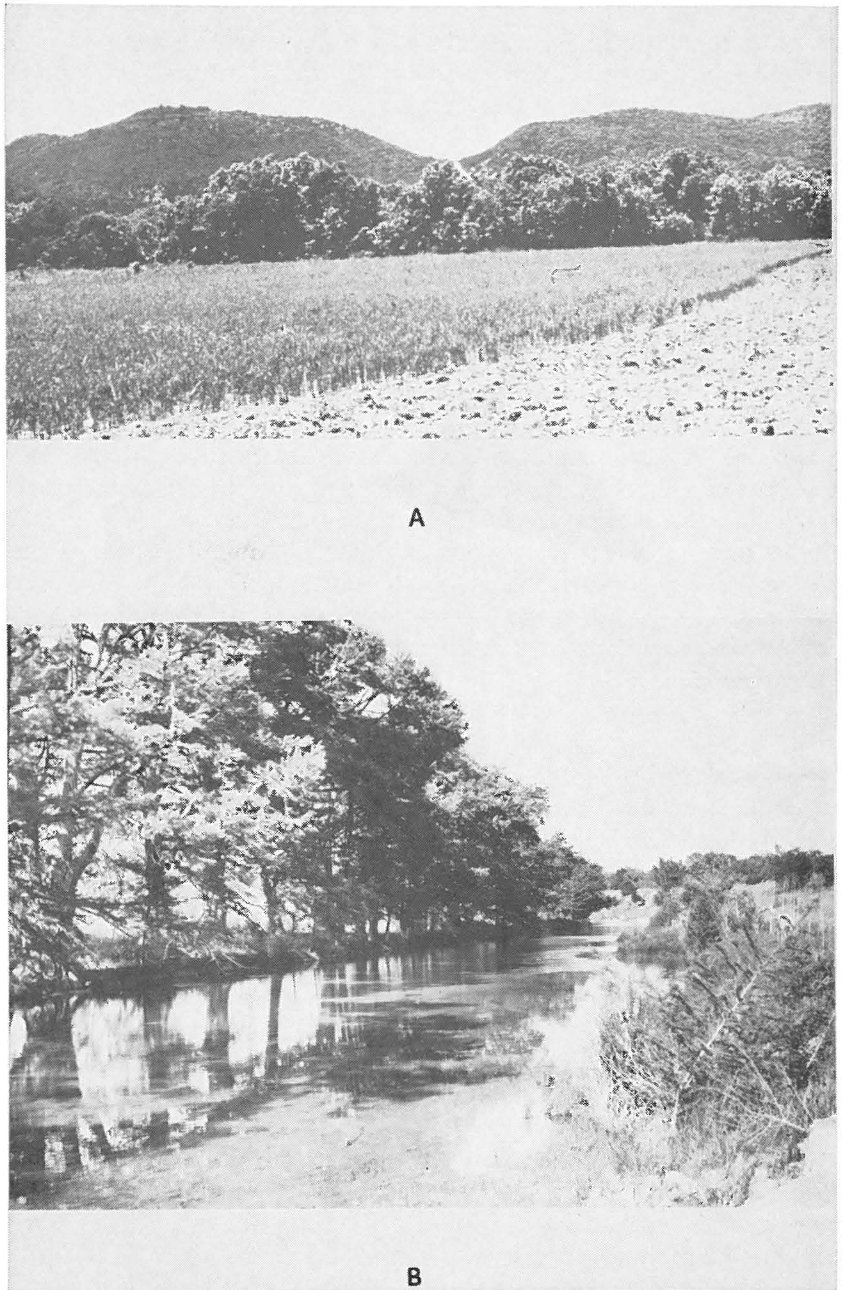


FIG. 4. A, The Western Edge of the Sabinal Canyon, Near the La Jita Site; B, The Sabinal River, Near the La Jita Site. Note the large cypress trees bordering the west bank of the stream.

posed of 3 burned rock middens and surrounding terrace deposits. The area of occupation extends about 150 feet north to south and is over 300 feet in width. An irrigation ditch dug in 1866 runs roughly east-west through the southern 1/3 of the site area (see Fig. 3). The site is bounded on the south by an old channel of the Sabinal River, and on the east by a tributary of that channel. The site area slopes gently to the south.

The burned rock middens were designated as Areas B,F, and I. The Area B midden extends for about 60 feet (north to south) and is approximately 45 feet wide, and roughly ovoid in outline. The horizontal dimensions of Areas F and I were impossible to determine, since most of both appeared to be buried in the terrace, with only portions exposed. Area F is situated about 90 feet southeast of Area B, and Area I is about 40-55 feet north of F and 100 feet east of B. In addition to the burned rock middens, there were small concentrations and scatters of burned rock exposed in other areas of the site, especially in the extreme southeast part, along the channel bank. The bulk of the occupation was concentrated on the terrace around the 3 burned rock middens. Prior to excavation, however, there was little surface indication of occupational debris, due to a heavy vegetation cover and lack of erosion.

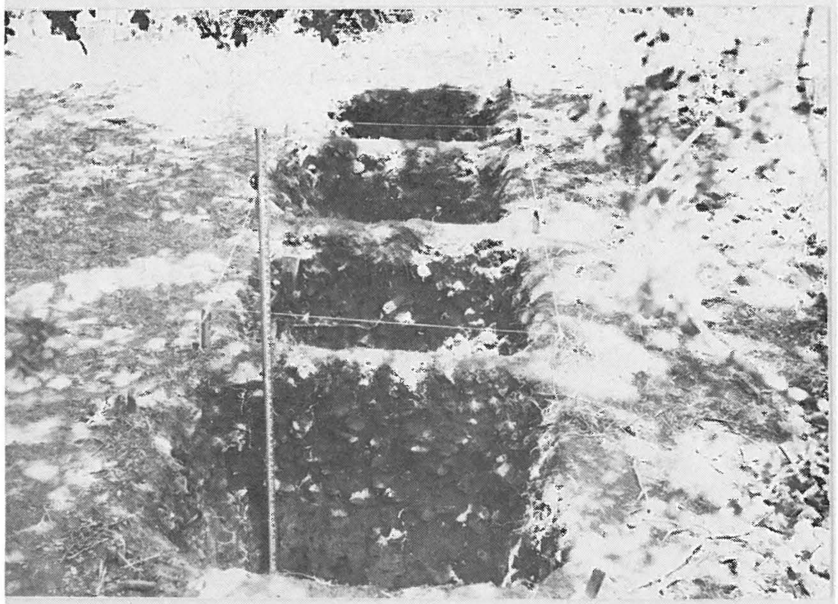
THE EXCAVATIONS

Standard archeological procedures were employed during the investigations at La Jita. Prior to excavation, the site was cleared of underbrush and a contour map was made with the use of a telescopic alidade and plane table. A grid of 5-foot squares (oriented on the cardinal directions; horizontal datum indicated in Fig. 3) provided horizontal control. Each square was designated by the coordinates of its southeast corner stake. In addition, a series of 7 test pits (5-foot squares) were scattered in various parts of the site to insure some sampling of all areas; these were not oriented on the grid. Two exploratory trenches were also dug.

All vertical measurements were taken in relation to a datum plane with an assumed elevation of 100 feet. This datum was established near the bottom of a large liveoak in Area B. Excavations proceeded using half-foot arbitrary levels. In 2 units of Area C, .25-foot levels were used in excavating the upper part of the deposit. Profiles were drawn of most unit walls.

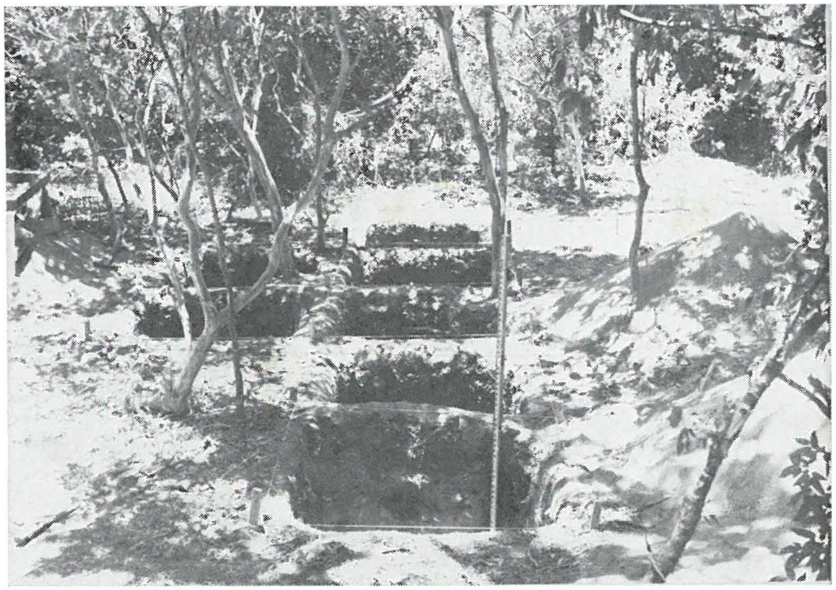
All excavated materials were passed through 1/4-inch mesh and were bagged according to level. In addition to the artifacts, as much flint debris as possible was saved and all bones and mussel shells

A

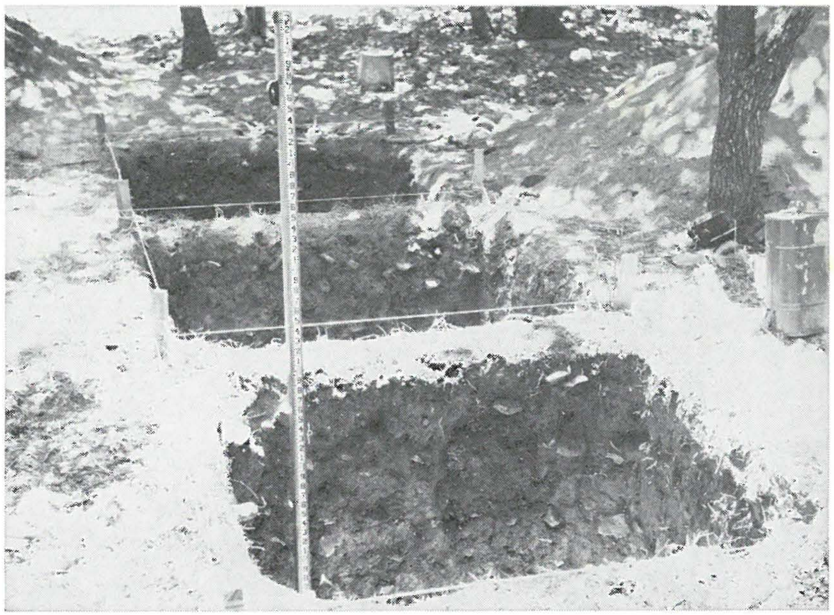


B

FIG. 5. A, Area B. Prior to Excavation; B, Excavations in Area B.



A



B

FIG. 6. A, Excavations in Area A, Looking South. B, Excavations in Area C, Looking West.

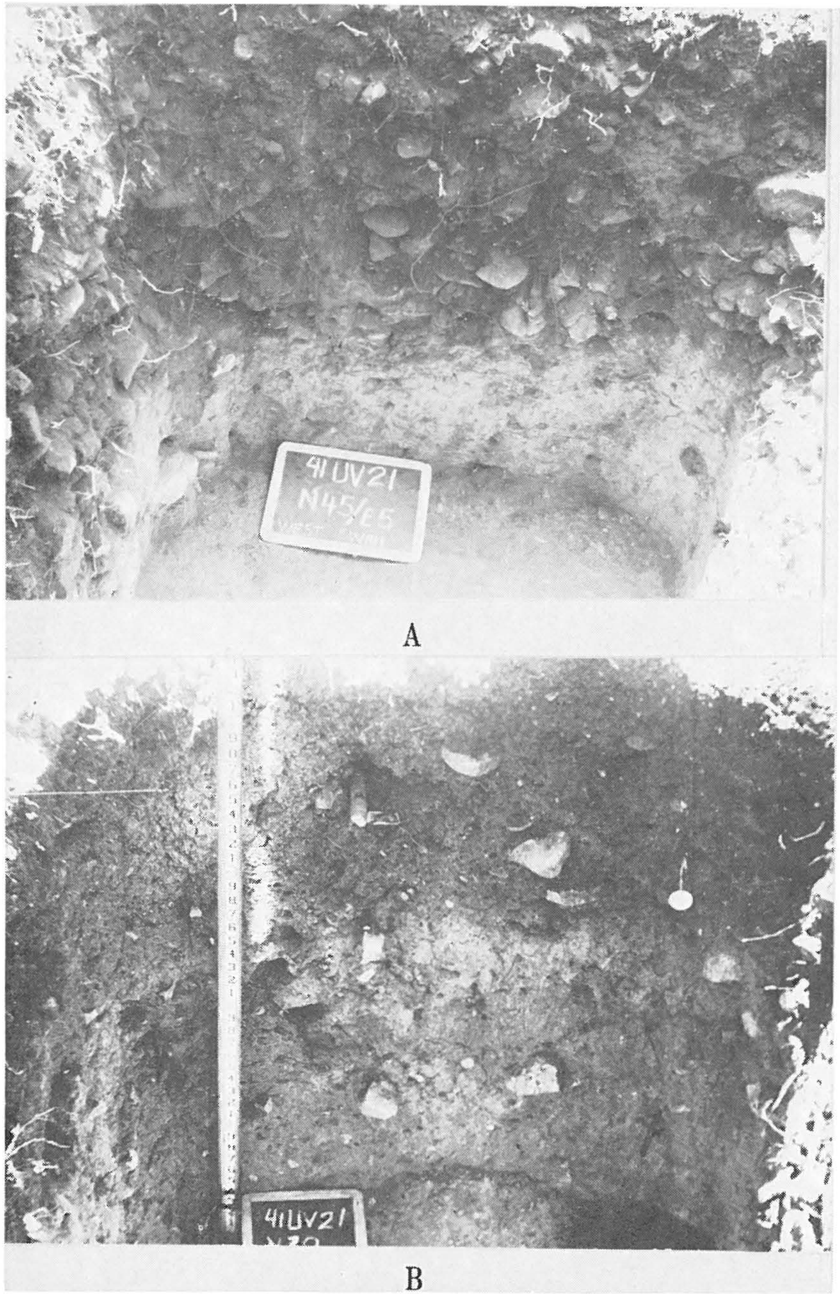


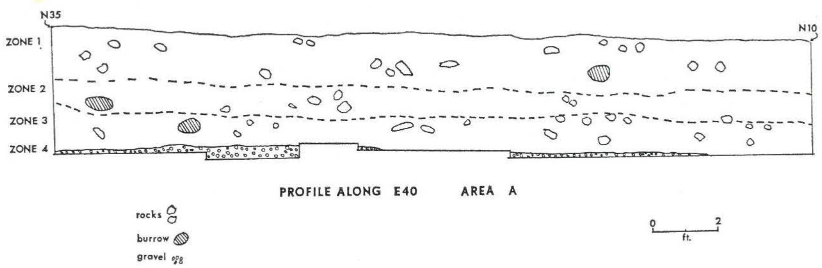
FIG. 7. A, Profile of N45 E5 (Area B), West Wall, At Depth of 4 Feet; B, Profile of N30 E5 (Area B), West Wall, At Depth of 4 Feet.

were collected. Samples of land snails were collected from each level. Several charcoal samples suitable for radiocarbon dating were obtained.

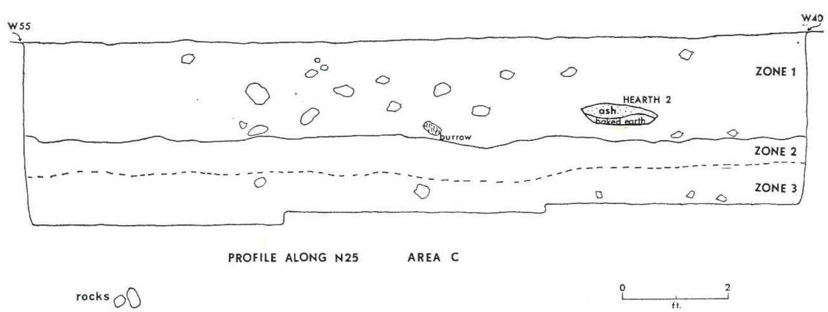
Nine excavation areas were established. A total of 28 units were excavated and are indicated in Fig. 3. These were distributed as follows: Area A (9), Area B (5), Area C (3), Area D (2), Area E (2), Area F (1), Area G (2), Area H (1), Area I (2) and Miscellaneous (1).

Internal Structure

In the terrace deposits (see Profiles 1 and 2; tested primarily in Areas A and C), an A-B-C soil profile appears to be present. The deepest, Zone 5, is a basal caliche. Zone 4, which overlies Zone 5, is a reddish-brown clay filled with caliche gravels and is culturally sterile; it seems to be a IIC soil zone. Zone 3 overlies it and is composed of a hard, compact clay (a IC soil zone) varying in color from yellowish-tan in Area A to brownish-red in Area C. It contains scattered burned rock and other archeological remains. Zone 2 (a B soil zone) is a light gray soil containing some clay material. It is fine-grained in texture and contains abundant occupational debris. The top zone (Zone 1, and A soil zone) averages about 2 feet in thickness and is a



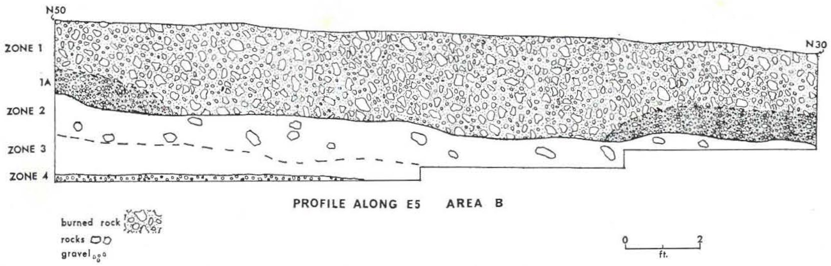
Profile 1. Area A. Profile along E40.



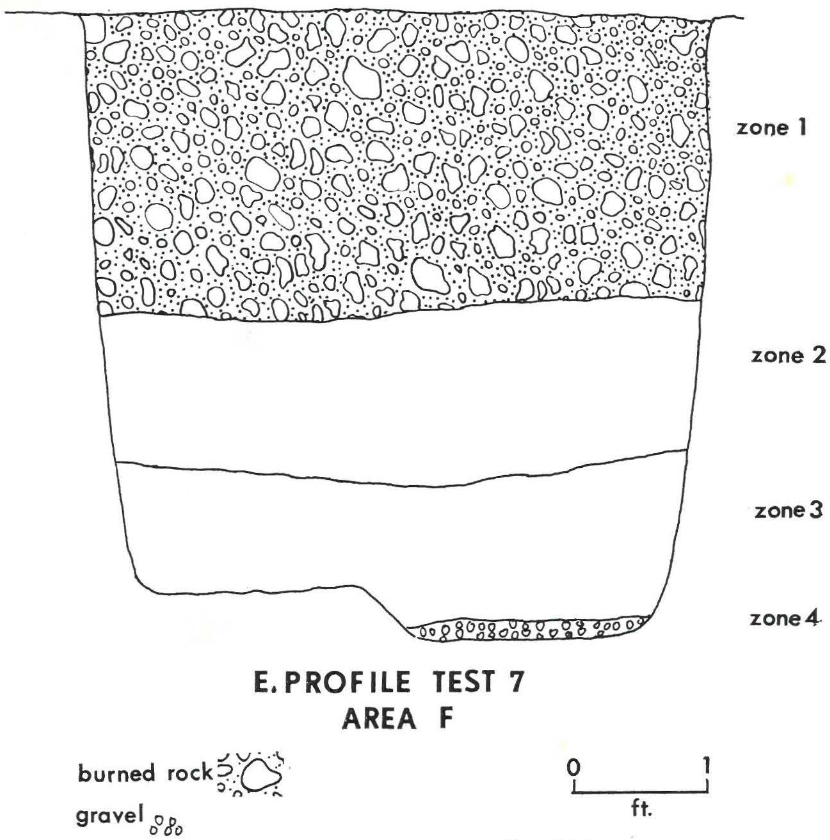
Profile 2. Area C. Profile along N25.

granular gray-brown soil, both humus and midden-stained. Large amounts of cultural material were recovered from this zone. The upper zones shown in Profiles 1 and 2 become considerably thicker near the old river channel at the southern edge of the site.

Profiles 3 and 4 show the stratigraphy encountered in the excava-

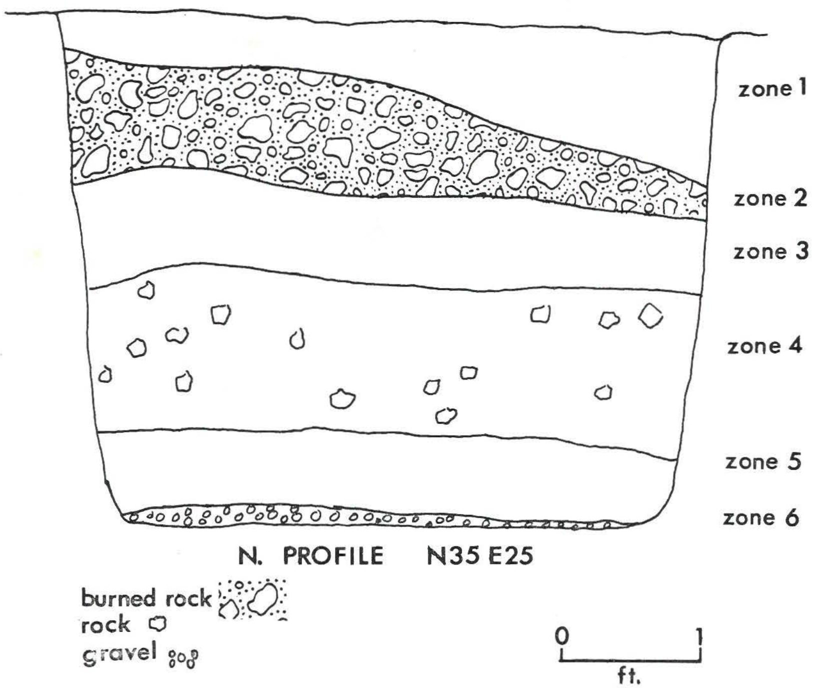


PROFILE 3. Area B. Profile along E5.



PROFILE 4. Area F. East profile of Test 7.

tions in 2 of the burned rock midden areas, B and F. In Area B (Profile 3), Zone 4 (noted in the terrace also as Zone 4) is a caliche-filled reddish brown clay. Overlying it are 2 zones (3 and 2) which are basically clay in their composition, with the brownish-tan Zone 3 grading into the yellow-tan Zone 2. A few burned rocks occur in Zone 2, along with a number of artifacts, specks of charcoal and numerous land snails. Zone 3 contains a little flint near the top of the zone, but snails and burned rock are absent. The uppermost zone (Zone 1) is a thickly-packed burned rock midden, with sparse amounts of a very fine, loose ashy-gray soil. A subzone (1a) was noted in 2 places in the profile; within the subzone, the soil is much more compact and somewhat lighter in color. Zone 1 varies from 1.3 to 2.7 feet in thickness. In Profile 5, the eastern edge of the Area B burned rock midden (Zone 1) is noted. In that profile, Zone 1 of the terrace deposits (see Profiles 1 and 2) overlies the burned rock zone. Underlying the burned rock (shown in Profile 5 as Zone 2) are 4 other strata, 1 of which was not noted elsewhere. That particular zone (Zone 3) is an ashy, tan to dark gray soil with no burned rock but containing other cultural debris. Zone 4 is a light gray soil with scattered burned rock and may



PROFILE 5. Unit N35 E5, North profile.

correspond to Zone 2 of the terrace areas. Zone 5 is a hard compact tannish clay (Zone 3 of the terrace) which overlies Zone 6, a caliche-filled tannish clay (corresponding to Zone 4 of the terrace).

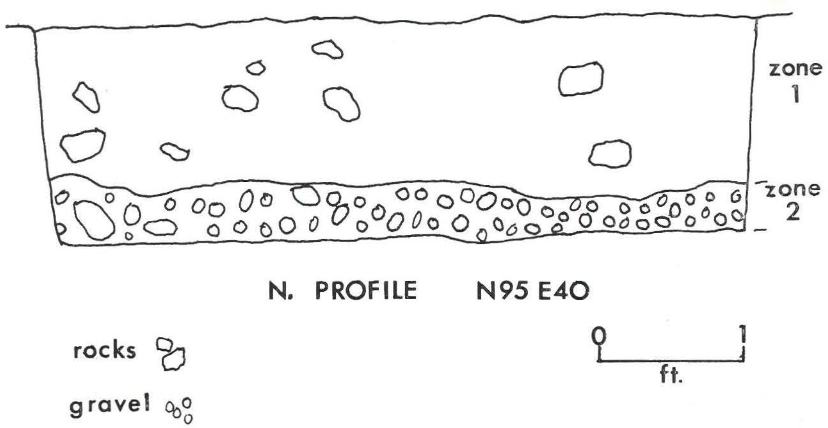
Profile 4 shows the 4 zones evident in Area F. Zone 4 is the caliche-filled clay previously noted in the terrace areas. Zone 3 is the tannish clay also noted as Zone 3 in the terrace. Zone 2 correlates very well with the similarly-designated zone in the terrace. Zone 1 is a burned rock midden, about 2 feet thick, composed of tightly-packed burned rock and loose ashy soil.

Near the northern edge of the site, Unit N95 E40 was excavated and the north wall of that unit is shown in Profile 6. In that area, the deposit is very thin and is represented by Zone 1, a dark brown granular soil containing flint, pebbles, some burned rock and numerous snails. This top zone rests on Zone 2, a light brown clay, full of caliche gravels.

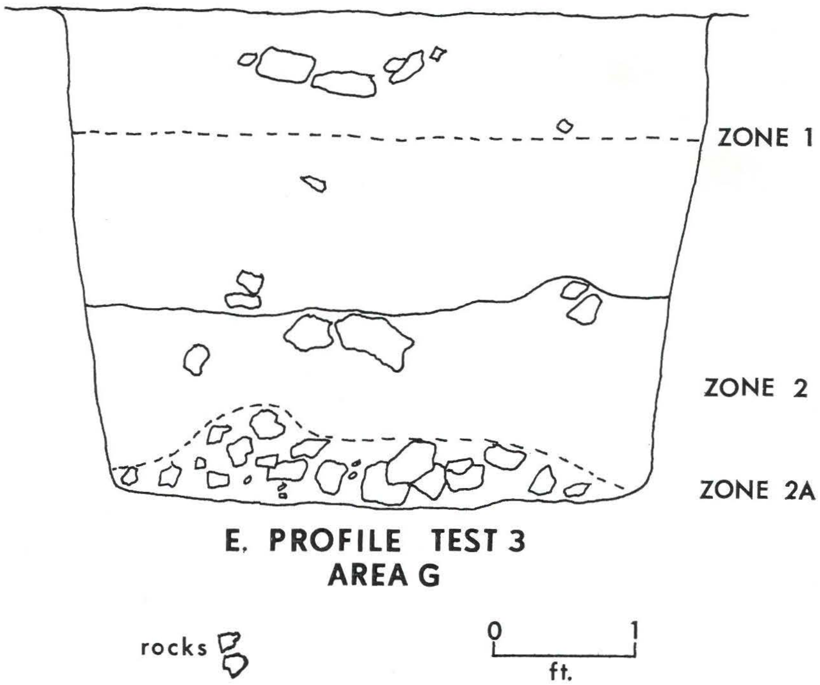
Another profile of interest was recorded in Test 3 (Profile 7). Zone 1 is a homogeneous granular soil, gray to light tan in color, and appearing to change very slightly from darker near the surface to somewhat lighter at the bottom (note the dotted line on the profile). Underlying it is a light tan clay (designated as Zone 2) with some scattered burned rock near the contact with Zone 1, and what seems to be part of a buried burned rock midden near the bottom (shown on profile as Zone 2a).

HEARTHS

In Level 3 (94.45′ elevation) of Unit N20 W40 (Area C), a fire hearth was uncovered and designated as Hearth 1. It appeared as a



PROFILE 6. Unit N95 E40, North profile.



PROFILE 7. Area G. East profile of Test 3.

rough oval, about 1 foot in diameter with an area of white ash covering reddish fire-baked earth. Just to the east of the hearth a group of 7 burned rocks was found. It seems probable that these stones were once components of the hearth and were later, for some reason, removed.

Less than a foot north of Hearth 1, an edge of Hearth 2 was noted, and though it was not completely excavated, it is shown in cross section in Profile 2. It seems to have been similar in composition to Hearth 1.

Hearth 3 was found in Level 2 (96.49-96.43′ elevation) of Unit N15 E35 (Area A). It was a circular area with a maximum diameter of 1.5 feet, and was characterized by an ashy-gray appearance. The following materials were in place within or adjacent to this feature: 2 burned and 8 unburned flint flake fragments, 2 interior flakes, 1 secondary cortex flake, 4 lipped flakes (2 burned), a fragment of a thinned biface, 22 *Bulimulus schiedeanus* shells, 10 *Helicina* sp. shells, 1 turtle carapace fragment, 6 fragments of split deer long bone, 1 deer tooth, 2 small pieces of burned bone and 11 miscellaneous bone fragments. In addition, small pieces of charcoal and 4 small burned limestone rocks were present within the hearth. A radiocarbon date (on charcoal) of AD 1290±70 (Tx-687) was obtained for this level.

THE ARTIFACTS

The excavations at La Jita resulted in the recovery of 845 artifacts. The following broad categories were established through the analysis of the specimens: Chipped Stone Artifacts (including Projectile Points, Other Bifacial Tools, Unifacial Tools, and Miscellaneous Chipped Stone), Ground Stone Artifacts, Bone and Antler Artifacts, and Ceramics. In the following section, the various classes of artifacts under each of these categories will be briefly described. Projectile points were generally sorted according to the typology of Suhm, Krieger and Jelks (1954). In addition, 2 new projectile point types are tentatively proposed. All measurements are in millimeters with the dimensions indicated by the following abbreviations: L: length; MW: maximum width; MT: maximum thickness; SL: stem length; and, SW: stem width. Vertical and horizontal provenience data are presented in Tables 6-9.

CHIPPED STONE ARTIFACTS

Projectile Points

ARROW POINTS

A total of 104 arrow points were found, including the Cliffton, Edwards, Perdiz, Sabinal and Scallorn types. Other arrow points are a series of triangular specimens, as well as miscellaneous unclassified or damaged specimens.

CLIFFTON (3 specimens; Fig. 8, a, b). They show crude workmanship and have short stems and strong barbs. L: 19.5-20; MW:14-16; MT: 3-4.

EDWARDS (19 specimens; Fig. 8, c-j). This type was initially defined by Sollberger (1967:12-22). The La Jita specimens have triangular blades with straight or slightly convex edges. Deep, narrow corner notches (or in 2 cases, side notches) have produced flaring stems with broadly concave to recurved basal edges. As Sollberger has observed, they resemble diminutive Frio dart points in many respects. At La Jita, they are the earliest arrow point form to appear (see Hester, 1970b:18). They are also known from the Montell rockshelter in western Uvalde County (Texas Archeological Research Laboratory collections). L: 27-31; MW: 14-21; MT: 2-4.5; SL: 7-9.

PERDIZ (20 specimens; Fig. 8, k-s). These specimens fit well within

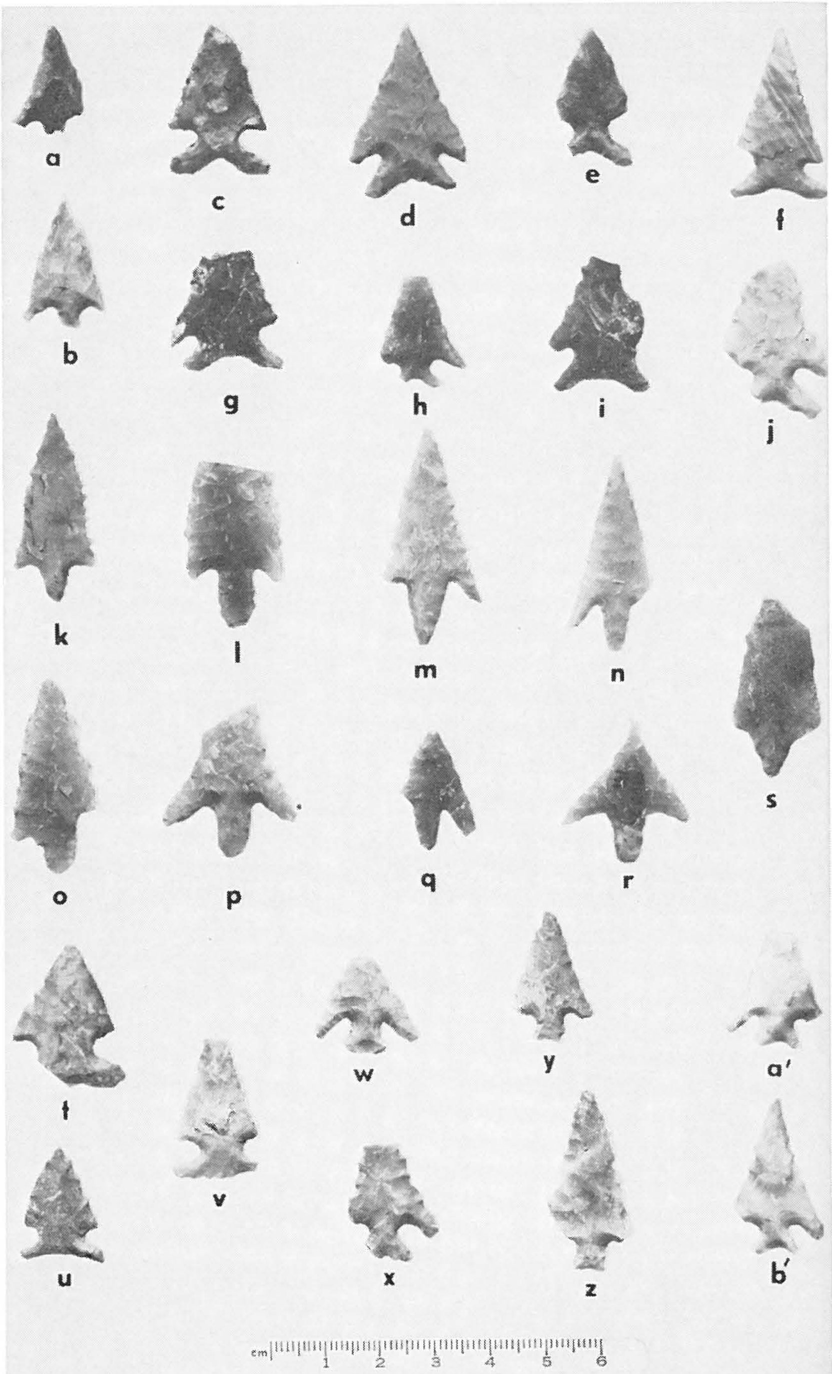


Fig. 8. Arrow Points. a, b, Cliffton; c-j, Edwards; k-s, Perdiz, t-b', Scallorn.

the Perdiz type as described by Suhm, Krieger and Jelks (1954). On 9 specimens, the blade is unifacially chipped. On all specimens, stems are bifacial. Most have heavy barbs, and 13 have serrated lateral edges. L: 21.5-39; MW: 15-24; MT: 2-4; SL: 7-13.

SABINAL (tentative new type; 7 specimens; Fig. 9, a-f). This series of arrow points is proposed as a new local type and is therefore described in some detail. The specimens have long, narrow triangular blades, with the lateral edges often deeply convex to recurved. They have heavy barbs (often bulbous at the ends) which flare outward and curve up. The barbs often extend down to, and even with, the basal edge. The stems were produced by long, narrow basal notches and expand moderately, with straight to slightly concave bases. L: 18-39.5; MW: 16-21; MT: 3-4.5; SL: 4.5-6.5; SW: 6-7.5. The type seems to be present throughout the late occupation of the site. Other specimens of the type have been observed in private artifact collections in the Utopia area of northeastern Uvalde County. Several are present in the collection from the J. W. Sparks site (Real County; T.A.R.L. collections), and a single specimen is known from the Montell rockshelter (T.A.R.L. collections).

SCALLORN (13 specimens; Fig. 8, t-b'). The type representatives here have been divided into 3 previously-recognized varieties (Jelks, 1962). Six specimens are of the *sattler* variant, 4 are of the *coryell* variety, and 3 are of the *eddy* variety (*Ibid.*:28-31). Overall dimensions are: L: 20-32; MW: 15-22; MT: 2.5-4; SL: 5-7.

TRIANGULAR ARROW POINTS (24 specimens; Fig. 9, k-e'). These specimens have been grouped into 3 forms. These briefly are: Form 1 (8), with crude workmanship and straight to slightly convex sides; Form 2 (11) has a wide size range with both thin, well-made specimens, and crude, thick ones; and Form 3 (6) with convex to rounded bases and very crude workmanship. Form 3 is reminiscent of the Young type (Suhm, Krieger and Jelks, 1954: 510). Dimensions of these 3 forms are: Form 1, L: 40-43; MW: 19.5-27; MT: 4.5-7; Form 2, L: 20-32; MW: 14.5-22; MT: 3-7; Form 3, L: 31-43; MW: 16-24; MT: 4-5.5.

MISCELLANEOUS ARROW POINTS (15 specimens; Fig. 9, t-e'). A number of arrow points could not be placed within existing types. Two specimens are similar to the Edwards type. Another is lanceolate in outline and has been made on a flake blade, primarily through unifacial chipping. It is 39 mm. long, with a maximum width of 16 mm., and a maximum thickness of 4 mm. (Fig. 8, é). It and 11 other specimens are shown as Forms 1-12 in Fig. 9, t-e'.

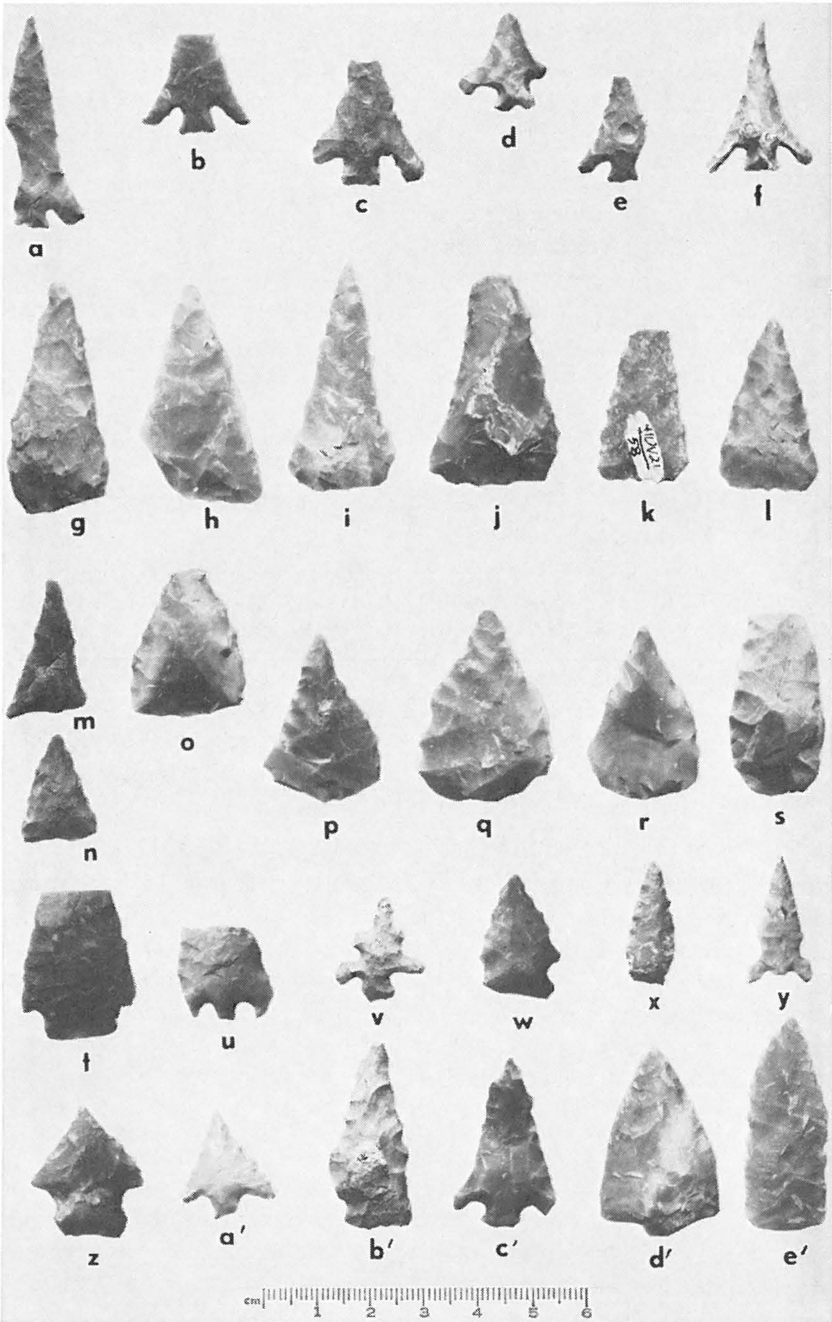


FIG. 9. Arrow Points. a-f, Sabinal; g-j, Triangular Form 1; k-n, Triangular Form 2; o-s, Triangular Form 3; t-e', Misc. arrow points, Forms 1-12.

OTHER STEMMED ARROW POINTS (7 specimens; not illustrated). This residual category includes damaged specimens, most of which may represent the Edwards and/or Scallorn types.

DART POINTS.

310 dart points were found. There are a variety of types, as well as some groups of untyped specimens (described as "forms") and a number of miscellaneous and damaged examples.

ABASOLO (1 specimen; Fig. 10, a). The specimen is complete and has a subtriangular outline with a rounded base and straight lateral edges. L: 53; MW: 24; MT: 8.

ALMAGRE (4 specimens; Fig. 10, b, c). All are fragmentary, and are characterized by contracting stems with rounded bases and crude workmanship. Shoulders are strong on 2, and short barbs are present on another. L: (too fragmentary); MW: 43-51; MT: 7-10.5.

BULVERDE (1 specimen; Fig. 10, d). It is a fragment, with long rectangular stem and a straight base. Barbs were present, but are now broken. The blade was trianguloid, but it has been notched from the distal end downward through the middle of the blade. L: 55 (fragment); MW: 39; MT: 7.5.

CASTROVILLE (11 specimens; Fig. 10, e-g). Most of the specimens are complete. All have broad, thin triangular blades and expanded stems, with convex, straight or slightly concave bases. Heavy barbs are present. Bases are thinned by the removal of 1 or 2 broad vertical flakes. L: 45-58.5; MW: 33-47; MT: 6-8.5.

"EARLY CORNER NOTCHED" (22 specimens; Fig. 10, h-u). The term applied to this particular group of dart points is a purely descriptive one, and should not be considered as a "type" designation by others. The term refers to dart points at the La Jita site which were found stratigraphically below diagnostic Early Archaic forms. The specimens have been separated into 3 varieties. Often, specimens of 2 or more varieties were found together in the same level.

VARIETY 1 (10 specimens, Fig. 10, h-1). Most are fragmentary; the complete specimens have triangular blades with straight (or just slightly convex) lateral edges. Deep, narrow corner notches have produced expanded stems. Bases are concave, usually in the shape of a wide V, or recurved. Slight barbs are present, though on 1 specimen, they are wide and heavy. Workmanship is good; 1 specimen is thermal-fractured. L: 33-75 (estimated); MW: 29-38; MT: 4.5-7; SL: 9.5-12.5; SW: 16-29.

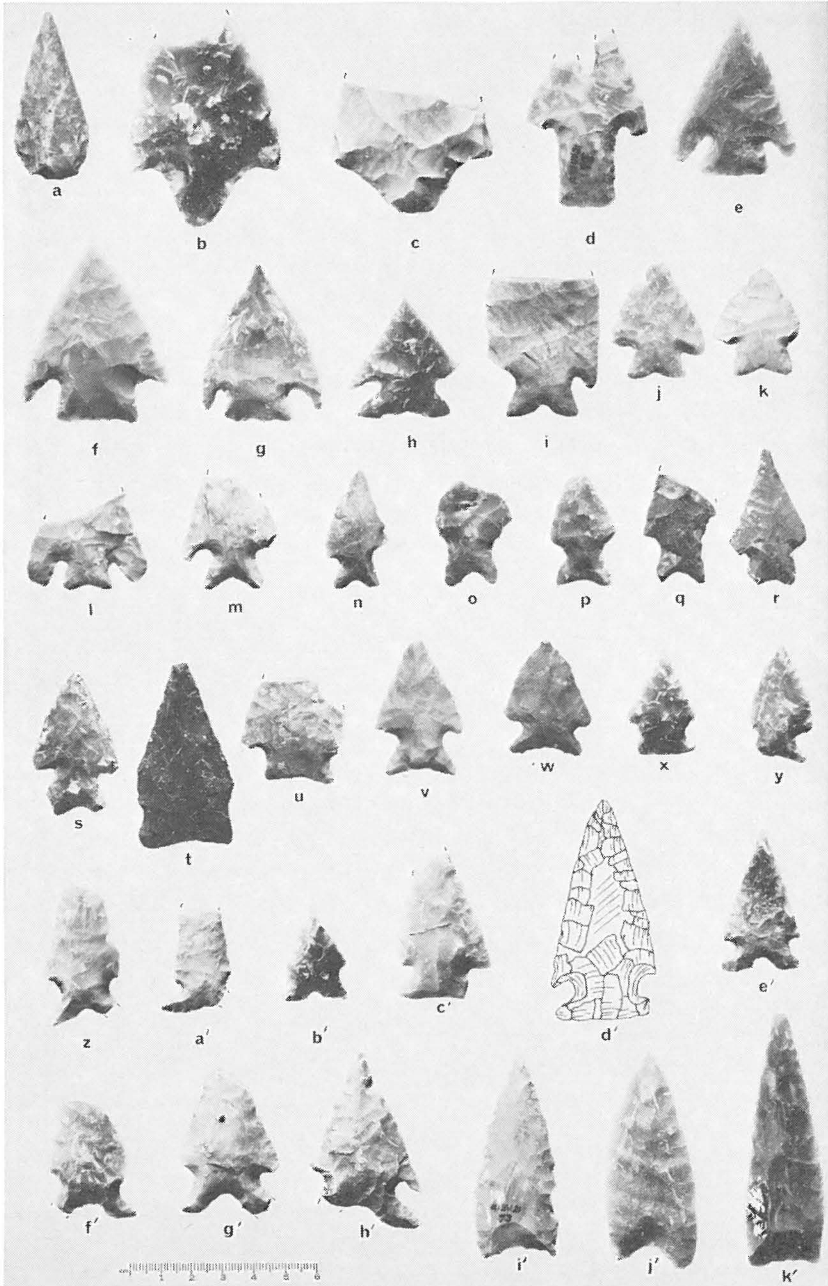


FIG. 10. Dart Points. a, Abasolo; b, c, Almagre; d, Bulverde; e-g, Castroville; h-l, "Early Corner Notched", Variety 1; m-s, "Early Corner Notched", Variety 2; t, u, "Early Corner Notched", Variety 3; v, w, Edgewood; x, Ensor, Variety 1; y-b', Ensor, Variety 2; c', Ensor, Variety 3; d', Ensor, Variety 4; e', f', Frio, Variety 1; g', h', Frio, Variety 2; i', k', Kinney.

Most specimens in this group are reminiscent of the Martindale type (Suhm, Krieger and Jelks, 1954:446). But in recent years, morphologically-similar dart points have been found in what appear to be Early Archaic contexts. At the Landslide site in Bell County, Sorrow, Shafer and Ross (1967) found similar specimens near the bottom of the site, well below Travis, Nolan and Bulverde types. At Baker Cave (Val Verde County), James H. Word (personal communication) has found Martindale-like points just above a Plainview-bearing zone. The Jetta Court site (41 TV 151) in Travis County has produced a number of corner-notched points in what seems to be an Early Archaic context (field notes by the author, on file at the Texas Archeological Research Laboratory). A similar situation exists at the J. W. Edwards site (41 BN 1) in Bandera County, as well as at Kincaid rockshelter (41 UV 1: Uvalde County). At Kincaid, 18 specimens very similar to Variety 1 were obtained from disturbed backfill from Zones 5 and 6. Radiocarbon dates are available for these 2 zones, but the dates are badly mixed (Stipp and others, 1962).

VARIETY 2 (10 specimens; Fig. 10, m-s). Blades are triangular (with straight to slightly convex edges), and are barbed to strong-shouldered. Wide, shallow corner notches have formed slightly expanded stems; bases are U-shaped on 7 and only slightly concave on the others. Workmanship is poorer than in Variety 1; 4 are thermal-fractured. L: 37-45; MW: 20-34; MT: 5-8; SL: 12-19; SW: 14-20.

Three specimens similar to Variety 2 were found at Kincaid rockshelter, and 1 specimen is known from 41 UV 29, upstream from La Jita (T. C. Hill, Jr., personal communication).

VARIETY 3 (2 specimens; Fig. 10, t, u). They are much different from Varieties 1 and 2. These have broad, triangular blades with wide, shallow corner notches and wide expanded stems. Bases are concave. Workmanship is fair, with 1 specimen made of a purple river gravel, possibly originating from a source further to the west. L:58 (1 specimen only); MW: 31-33; MT: 6.5-7; SL: 11-15; SW: 22-30.

EDGEWOOD (3 specimens; Fig. 10, v, w). All have triangular blades (distal tip of 1 is reworked) with slightly convex edges. Stems are expanded with concave bases. L: 28-43; MW: 21-28.5; MT: 5.5-8.

ENSOR (11 specimens; Fig. 10, x-d'). The type has been divided into 4 varieties, briefly described below:

VARIETY 1 (3 specimens; Fig. 10, x). They have triangular blades, broad side notches and straight bases. The tip on 1 specimen is alternately-beveled. L: 35-37.5; MW: 22-24; MT: 4.5-5.5.

VARIETY 2 (6 specimens; Fig. 10, y-b′). These fit Tunnell's Variety C (1962:87,88). They are distinguished by a centrally-placed basal notch, usually U-shaped. Two specimens have reworked tips, while another has a burin-like facet along 1 side of the lateral edge. L: 29-53 (estimated); MW: 22-26; MT: 4.5-6.

VARIETY 3 (1 specimen; Fig. 10, c′). This specimen is much larger than Varieties 1 or 2. It has deep narrow side notches and a slightly concave base. L: 53; MW: 31 (estimated); MT: 6.

VARIETY 4 (1 specimen; Fig. 10, d′). It has a triangular blade with straight sides. The base is straight, and the expanded stem is formed by side notches. L: 71; MW: 33; MT: ? (in Stout Collection).

FRIO (14 specimens; Fig. 10, e′-h′). The type has been sorted into 2 varieties, described below:

VARIETY 1 (2 specimens; Fig. 10, e′, f′). They are much larger than Variety 2, and have triangular blades, corner-notches, and deeply concave bases. L: 47-56; MW: 33-38; MT: 6.5-7.

VARIETY 2 (12 specimens; Fig. 10, g′, h′). This series is rather uniform in size but only 1 specimen is complete. All have triangular blades, but bases vary greatly, as follows: broad and deeply concave (2); concave but shallow (3); U-to-V shaped notches (6); and, small, narrow notch (1). L: 43-53; MW: 21-31; MT: 6-7.5.

KINNEY (4 specimens; Fig. 10, i′, k′). All are triangular in outline, with concave bases and convex lateral edges. Basal thinning was accomplished on 1 by the removal of a series of short vertical flakes, and on the others by short arc-shaped flakes. One specimen is unifacially beveled along 1 lateral edge. L: 42-79.5; MW: 23-39; MT: 7-10.

LA JITA (tentative new type; 7 specimens; Fig. 11, a-e). A new type is proposed for this group of specimens, characterized by the following traits: (1) expanded, round stems (3 of which are alternately-beveled to the right) with convex or slightly concave bases; (2) triangular blades with straight to convex edges; and (3) fair workmanship. None are complete and 1 is badly thermal-fractured. The bases are generally thinned by the removal of 2 or 3 long, broad flakes from both faces of the stem. L: 40-75; MW: 25-31; MT: 5.5-8; SL: 15-17; SW: (on 6 specimens) 23-24, on another, 29.

Though vertical distribution for the type is somewhat mixed, it is probably Middle Archaic in age. Other specimens are known from the D. W. Hudson site in Real County and the J. W. Edwards site (41 BN

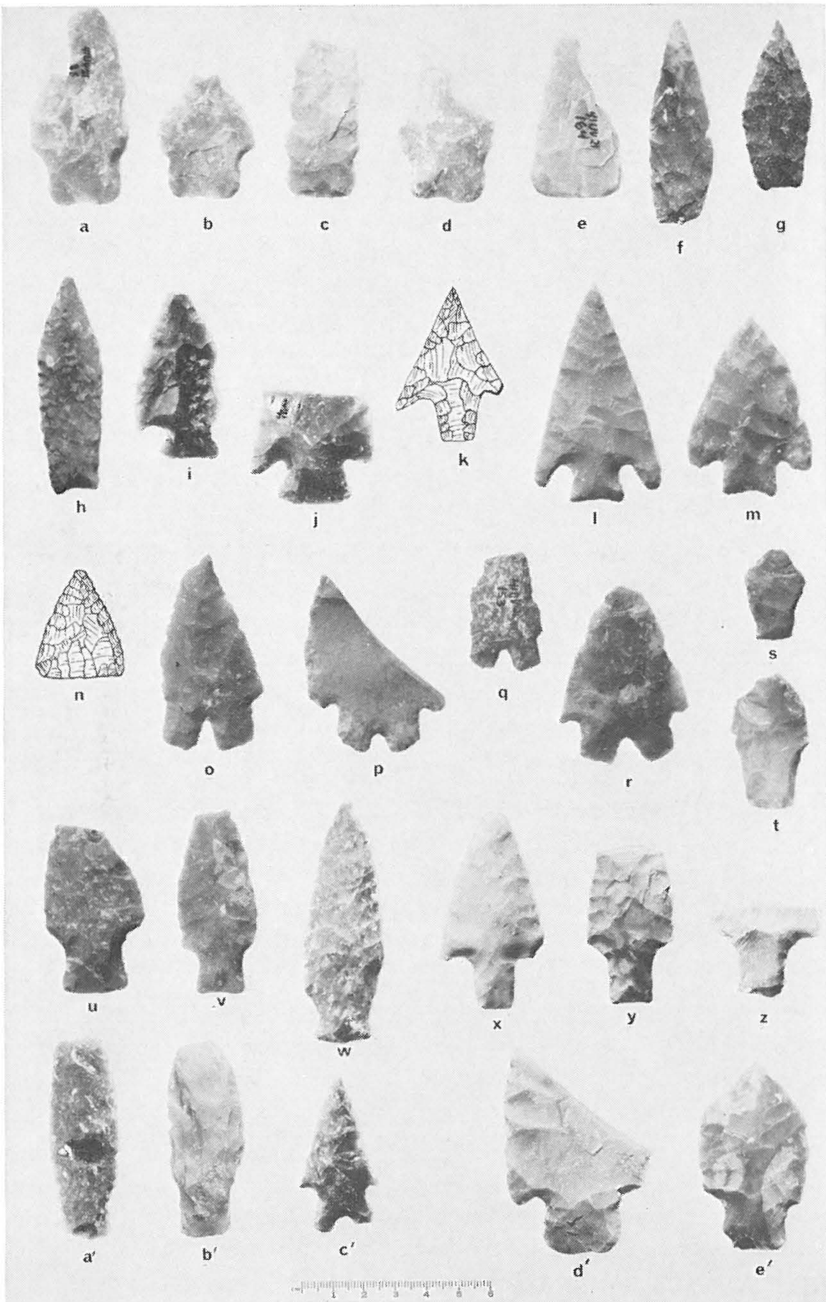


FIG. 11. Dart Points. a-e, La Jita; f-h, Lanceolate; i, j, Lange; k, Langtry; l, m, Marshall; n, Matamoros; o-r, Montell; s-v, Nolan; w, Pandale; x-z, Rectangular Stemmed; a', b', Travis; c', Uvalde; d', e', Williams.

1) in Bandera County (Texas Archeological Research Laboratory Collections).

LANCEOLATE DART POINTS (4 specimens; Fig. 11, f-h). These specimens have lanceolate outlines, with concave (2) or straight (2) bases. One specimen (A; Fig. 11, h) fits within the Angostura type (as described by Suhm, Krieger and Jelks, 1954:402). It has parallel flaking and smoothed lateral edges. Another specimen (B; Fig. 11, g) is similar in outline to Angostura; a third specimen (C; Fig. 11, f) is somewhat asymmetrical, and the fourth (D; not illustrated) is a basal fragment. Specimen B was found at the base of the terrace deposits and is the deepest projectile point from the site. The Angostura-like specimen (A) was apparently out of context in Level 5 of Area E. The measurements of each are: L: A, 70; B, 54; C, 64.5; D, ?; MW: A, 20.5; B, 22; C, 20; D, 22.5; MT: A, 7.5; B, 6; C, 8.5; D, 6.

LANGE (2 specimens; Fig. 11, i, j). Both are broken (1 is thermal-fractured). Stems are expanded (formed by deep corner notches), with straight and convex bases. Both specimens are barbed. L: 59-?; MW: 32-39; MT: 7-9.

LANGTRY (1 specimen; Fig. 11, k). It has a triangular blade with straight sides and strong barbs. The stem is contracted and has a straight base. L: 50; MW: 37 (estimated); MT: ? (Stout Collection).

MARSHALL (5 specimens; Fig. 11, l, m). Three are fragments and 2 are thermal-fractured. Stems are formed by basal notches and expand slightly; bases are convex. Thinning of the bases was accomplished by removal of 2 or more vertical flakes from both sides of the stem. The distal tip of 1 has been reworked unifacially to a convex edge. L: 49-70; MW: 34.5-40.5; MT: 6-7.

MATAMOROS (1 specimen; Fig. 11, n). It has a triangular outline, with straight edges. The base has been thinned by several vertical flakes on both faces. Morphologically, it is quite similar to southern Texas specimens examined by the author. L: 34; MW: 29; MT: 5.

MONTELL (15 specimens; Fig. 11, o-r). Only 3 are complete; some are burned. Blades are broad with straight or slightly convex edges. They are corner-notched and have broad expanding stems which have been notched near the center of the base. All are barbed. The blade on 1 specimen is unifacially chipped. L: 51 to 85 (estimated); MW: 32-47; MT: 5-8 (most are 7-7.5).

NOLAN (12 specimens; Fig. 11, s-v). These conform rather closely to the type as described by Suhm, Krieger and Jelks (1954:458). The stems are rectangular with straight to convex bases; alternately-beveled stems occur as follows: on the right (8), and on the left (1). In addition, 2 specimens are beveled unifacially on the stem, and 1 is not beveled at all. One specimen (a basal fragment) has a transversely-broken blade with a burin present on 1 edge. Two specimens have reworked blades, and a single specimen is thermal-fractured. L: 52-70 (estimated); MW: 24.5-37; MT: 5.5-8.

PANDALE (1 specimen; Fig. 11, w). The specimen has a lanceolate blade (tip missing), an expanded stem and a convex base. The transverse cross section is characteristically twisted (Suhm, Krieger and Jelks, 1954:464). The stem is unifacially beveled. L: 77 (estimated); MW: 26.5; MT: 9.5.

PERDERNALES (101 specimens; Fig. 12, a-é). By far the predominant projectile point type at La Jita, these specimens show a wide range of morphological diversity. Blades vary from broad to narrow usually with convex or nearly straight edges (only 5 have concave edges). Barbs are present on less than half, and strong barbs are present in only 3 or 4 cases. Stems usually make up about 1/3 of the total length, and are rectanguloid to slightly expanded. Bases are mostly deeply concave to U-shaped, but V-shaped basal edges (as well as those which are only slightly concave) also occur.

Attempts were made to sort the specimens morphologically, using stem shape as a basic criterion. This proved meaningless. Eventually, they were sorted by arbitrary levels (by provenience), and this showed that the morphological groupings were valid in only 2 cases (see below). Generally, most forms were scattered throughout the levels. A group of 3 long, narrow specimens, with narrow parallel-edged stems and deep narrow basal notches were confined to Level 4. Another group of 3, characterized by concave blade edges and narrow, needle-like tips, were also restricted to that level.

In Level 5, there are 4 examples of unfinished Pedernales points. One seems to have been formed from a roughly-chipped preform, and the stem is ill-defined. A second specimen also appears to have been made on a preform, but apparently broke when attempts were made to thin 1 lateral edge. The third unfinished specimen is made on a large flake. The stem is present as is a portion of the blade; however, on 1 edge, a broad vertical break is present. This perhaps could have served as a striking platform to facilitate thinning of that edge, but this was never accomplished. In Level 4, there is a fourth incomplete specimen, also made on a flake; the stem has been roughed out, and the blade is only slightly modified.

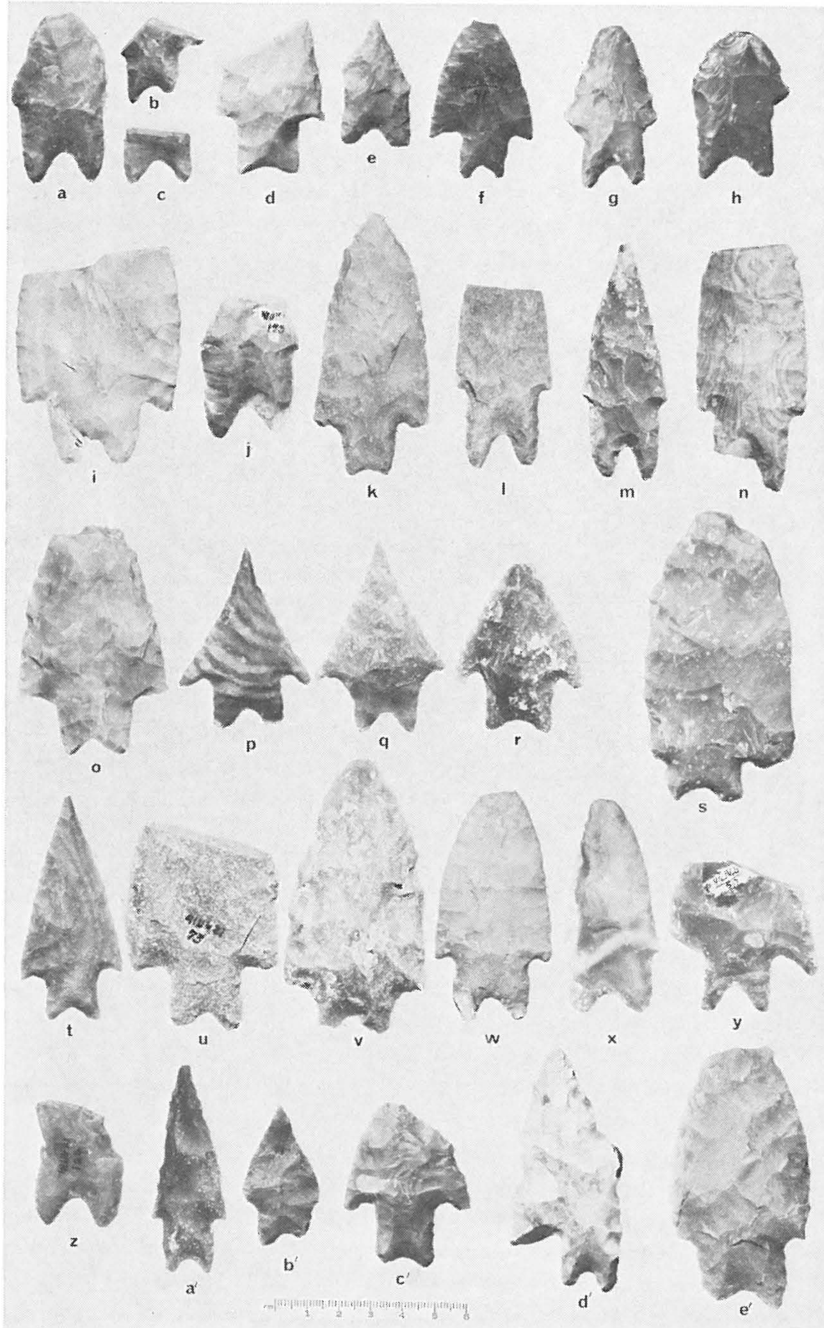


FIG. 12. Dart Points. All of the Pedernales type. a-h, Levels 1-3; i-n, Level 4; o-s, Level 5; t-y, Level 6; z-d', Level 7; e', Level 8.

Basal thinning of the Pedernales specimens consists most often of a single channel flake removed from the center of the base on both faces of the stem. These flake scars are sometimes arc-shaped.

In general, workmanship varies from crude to good. Seven specimens have been thermal-fractured. The tips of several have been reworked, and heavy reworking is evident along 1 lateral edge of another specimen.

The dimensions of the complete specimens are: L: 45-100; MW: 23-53; MT: 6-11; SL: 13.5-27; SW: 15-29.

The greatest popularity of the type was during the Middle and Late Archaic (Levels 4, 5, and 6), though it occurs throughout the deposits. Additional comments on the occurrence of the type are found in a following section.

TRAVIS (2 specimens; Fig. 11, a′, b′). The distal tips are missing from both. Blades are lanceolate, and shoulders are absent on 1 and weak on the other. Stems are rectanguloid, with slightly convex bases. Stems are unifacially beveled on both edges. L: 73-82 (estimated); MW: 23-24.5; MT: 9-9.5.

UVALDE (1 specimen; Fig. 11, c′). The specimen is complete, but has been burned. The blade is triangular with straight edges and short, flaring barbs. The stem is expanded and has a U-shaped base. L: 50; MW: 26; MT: 8.

WILLIAMS (4 specimens; Fig. 11, d′, e′). Three are fragmentary, with convex bases and expanded stems. One of these appears to have had a blade which far exceeded the range given in the type description by Suhm, Krieger and Jelks (1954:259). The fourth specimen is complete with a broad ovate blade, a slightly expanded stem and a straight base. L: 59-?; MW: 34.5-46; MT: 8-9.5.

MISCELLANEOUS DART POINTS. Described below are 2 groups of triangular dart points, along with 13 dart point "forms", individual unclassified dart points, miscellaneous damaged dart points, and unfinished projectile points.

"EARLY TRIANGULAR" (7 specimens; Fig. 14, a-g). This is a series of triangular dart points found in a probable Early Archaic context at La Jita (see provenience tables). Two (A, B) are alternately beveled along the right blade edge, and would seem to fit within the Tortugas classification (as defined by Suhm, Krieger and Jelks, 1954:482). Three others (C, D, E) could also be placed in that type. However, 1 specimen fits better into Kelley's "Taylor Thinned Base" category, and the other 2 resemble what he termed "Baird Beveled Blade" (Kelley, 1959: Fig. 2). A sixth specimen is more crudely made than the others and is concavo-convex in longitudinal cross section. Four of the specimens have basal thinning characterized by short vertical flakes removed from both sides of the base. One specimen is badly thermal fractured.

The dimensions of each specimen are given below:

Specimen	*L*	*MW*	*MT*
A (Fig. 14, a)	40	31	5
B (Fig. 14, d)	41	31 (est.)	6
C (Fig. 14, e)	41	38	6
D (Fig. 14, c)	65	42	6.5
E (Fig. 14, b)	64	38	8
F (Fig. 14, g)	69 (est.)	32	7.5
G (Fig. 14, f)	71	35	6.5

"LATE TRIANGULAR" (5 specimens; Fig. 14, h-l). These are triangular dart points (?) found in Middle to Late Archaic contexts. They vary considerably, especially in workmanship (from very crude to good). Two are characterized by a series of vertical thinning flakes along both sides of the base. Another specimen, very crude, has a V-shaped basal edge which has been thinned by removal of a single broad flake from both faces. The other 2 specimens have been thinned on 1 side of the base by a large flute-like flake, while short vertical flakes are present on the opposite face. L: 44-68 (estimated); MW: 28-35; MT: 6.5-10.

RECTANGULAR STEMMED DART POINTS (3 specimens; Fig. 11, x-z). All are characterized by rectangular stems with straight bases. Blades are triangular with slightly convex edges; 2 have oblique shoulders while the third has slight barbs. They are reminiscent of the Langtry type. A cortex striking platform remains at the base of 1 specimen. L: 65-67 (estimated); MW: 28-36; MT: 5.5-7.5.

MISCELLANEOUS DART POINT FORMS. Forty-one dart points which do not fall within the existing taxonomy are described below as "forms":

FORM 1 (3 specimens; Fig. 13, a, b). They have expanded stems with concave bases and are reminiscent of the Marshall type. All are too fragmentary for measurement.

FORM 2 (4 specimens; Fig. 13, c, d). These are Frio-like specimens with corner notches, expanded stems and deeply concave bases. They were found in Late Archaic contexts. L: 39-48; MW: 21-25; MT: 5-6.

FORM 3 (3 specimens; Fig. 13, e-g). Stems are rectangular to expanded, with convex bases. The blades are triangular and have slight to heavy barbs. L: 37-46 (estimated); MW: 25-35; MT: 5-7.5.

FORM 4 (2 specimens; Fig. 13, h, i). Both are fragmentary, with broad contracting stems and very slightly concave bases. Slight barbs are present. Blades are triangular with straight edges. L: 55-78 (estimated); MW: 30-35; MT: 7 (both).

FORM 5 (2 specimens; Fig. 13, j, k). Both are complete and have triangular blades with convex edges, contracted stems (with convex to rounded bases) and oblique shoulders. L: 49-61.5; MW: 22-31; MT: 6-7.

FORM 6 (4 specimens; Fig. 13, 1-n). Only 1 is complete. It has a triangular blade with convex edges, a long contracting stem and a slightly convex base. The others are similar, with shoulders on all oblique. L: 57 (complete); MW: 22-27; MT: 5-8.

FORM 7 (6 specimens; Fig. 13, o, p). All are complete and are very crude, with triangular outlines and convex bases. L: 37-56; MW: 26-29; MT: 8-9.5. These specimens have varied proveniences and were separated from the other triangular dart points on the basis of the extreme crudity of their workmanship.

FORM 8 (2 specimens; Fig. 13, q, r). In outline, they are broadly lanceolate with concave bases. They are suggestive of the Kinney type but greatly exceed the size range given by Suhm, Krieger and Jelks (1954:434). They may have functioned as knives rather than dart points, but there is no physical evidence of this. L: 90-93 (estimated); MW: 35-39; MT: 7.5-10.

FORM 9 (4 specimens; Fig. 13, s, t). This series of fragmentary dart points is characterized by triangular blades with moderate to heavy barbs, and expanded stems (produced by basal notching) and straight to concave bases. They are similar to the Lange type (which does not have heavy barbs), while the blades and barbs resemble those on Castroville specimens. L: around 70 (estimated); MW: 37-43.5; MT: 6-9.5.

FORM 10 (2 specimens; Fig. 13, u, v). They have long, narrow triangular outlines, 1 with a straight base, the other with a concave base. Workmanship is very crude and for this reason (coupled with their size), they were separated from the other previously-described triangular dart points. L: 82-84; MW: 30-31; MT: 11-13.5.

FORM 11 (2 specimens; Fig. 13, w, x). Both are complete, with long, narrow lanceolate outlines. Toward the base there is a slight contraction forming a slightly expanded stem with a convex basal edge. Both

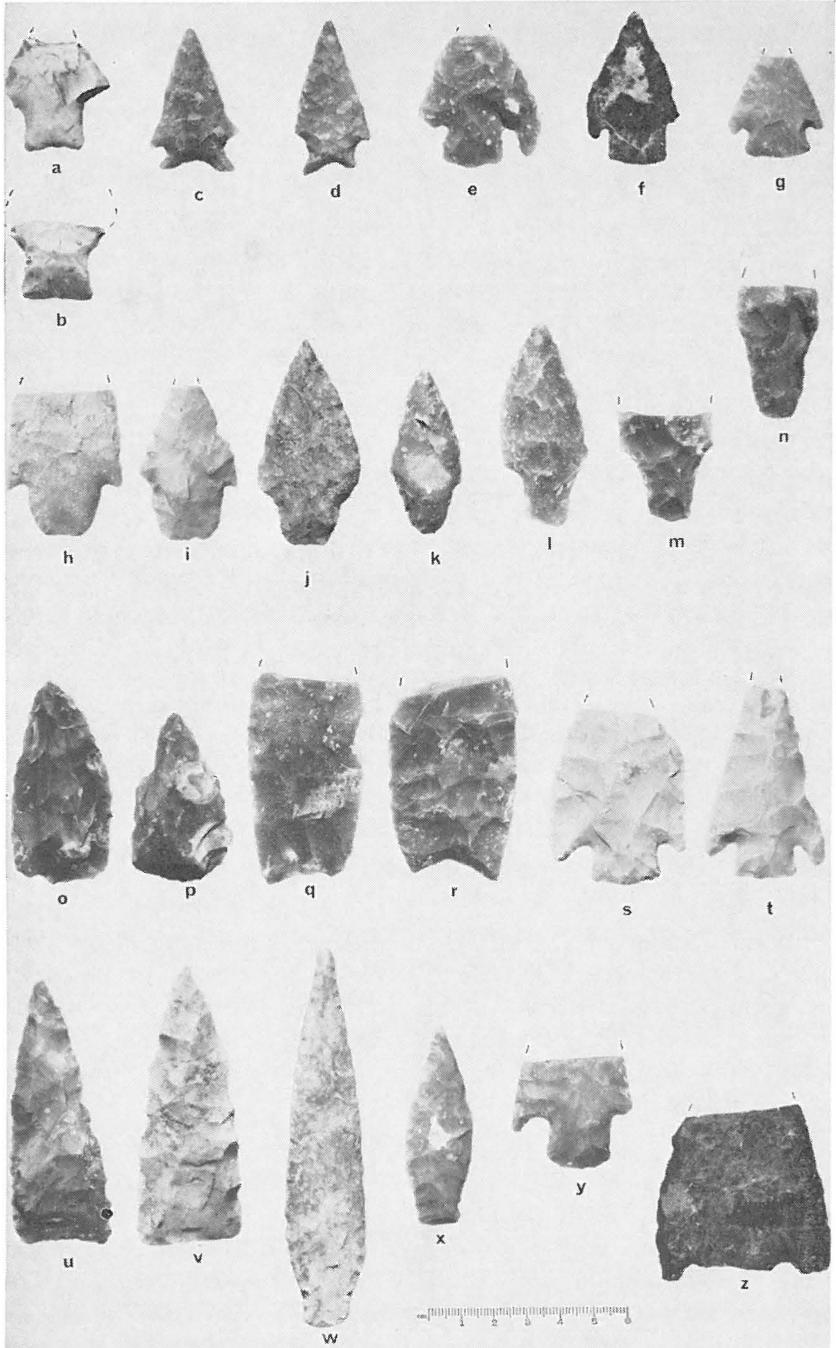


FIG. 13. Dart Points. Miscellaneous forms are shown. a, b, Form 1; c, d, Form 2; e-g, Form 3; h, i, Form 4; j, k, Form 5; l-n, Form 6; o, p, Form 7; q, r, Form 8; s, t, Form 9; u, v, Form 10; w, x, Form 11; y, Form 12; z, Form 13.

are well-made and are somewhat similar to Weir's proposed Buda type (1967:39-40). L: 60-112; MW: 20.5-23; MT: 6-8.

FORM 12 (2 specimens; Fig. 13, y). Both are fragments, with rectangular stems with straight and convex bases. Barbs are present on 1 but broken on the other. On 1 shoulder of the latter specimen, a burin facet is present, while another is present at 1 corner of the transversely broken blade. L: (too fragmentary); MW: ca. 34 on both; MT: 6-6.5.

FORM 13 (1 specimen; Fig. 13, z). This specimen is made of basalt (the only such artifact of this material at La Jita) and shows rough workmanship. The basalt could have been obtained either from Rio Grande gravels far to the west, or perhaps from basalt intrusions on the nearby Frio River (see Duessen, 1924). The distal 1/3 of the specimen is missing and the stem appears to have been broken and then reworked, leaving a very short remnant. Short broad barbs are present and 1 edge of the blade has been reworked and steeply beveled. L: (too fragmentary); MW: 53; MT: 7; SL: 3; SW: 23.

INDIVIDUAL UNCLASSIFIED DART POINTS. This is a group of 13 stemmed and unstemmed dart points which do not fit into any currently-defined type. They are illustrated in Fig. 13 (m-y).

MISCELLANEOUS DAMAGED DART POINTS. These are 22 dart points on which the stems are too damaged to allow sorting or classification. Of these, 8 may have been Pedernales and 2 may have been Montell.

UNFINISHED PROJECTILE POINTS. These are 3 dart points at different stages in the manufacturing process; none appear to have been finished. Several unfinished Pedernales specimens were previously noted. The first specimen (Fig. 15, e) is an ovate biface with a rough outline of a stem present at 1 end. L: 77; MW: 40; MT: 14. The second (Fig. 15, c, d) has a well-defined stem with deep basal notches and heavy barbs. The blade is globular with a very thick distal tip. There is a flaw in the material near the tip, and there is evidence of repeated attempts to remove it, but these failed. The specimen resembles the Marshall type. L: 62; MW: 57; MT: 12. The third specimen is a very large trianguloid flake. One face bears only a few flake scars and the bulb of percussion has been removed. On the opposite face, a great deal of cortex remains, though a few flakes have been removed along 1 edge. A slightly expanded, straight-based stem has been formed by deep basal notches. Little modification of the stem has occurred. Both faces are illustrated (Fig. 15, a, b).

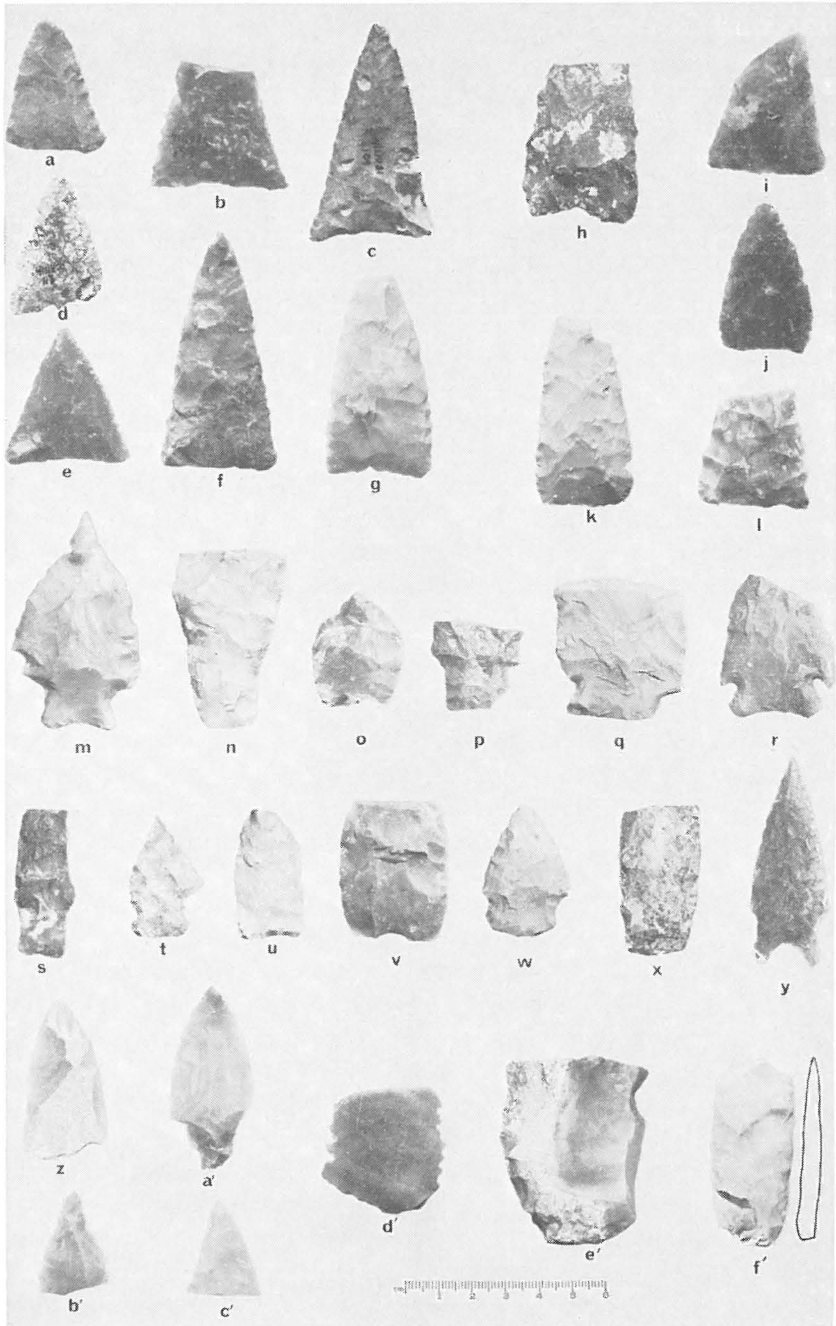


Fig. 14. Dart Points and Unifacial Artifacts. a-g, "Early Triangular"; h-l, "Late Triangular"; m-y, Individual Unclassified Dart Points, Specimens 1-13 (see text); z-c', pointed flakes; d', e', notched flakes; f', retouched blade.

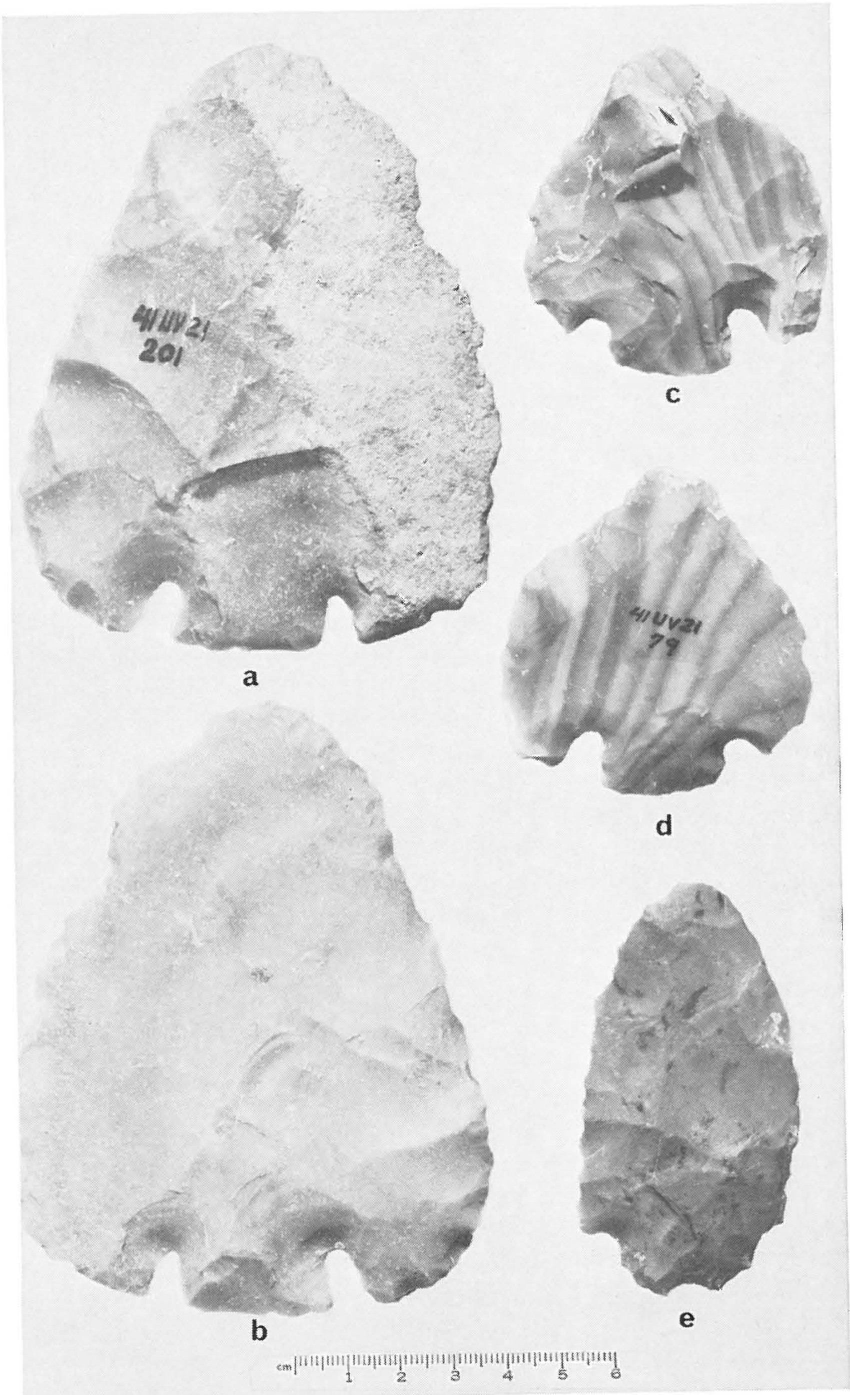


FIG. 15. Unfinished Projectile Points.

OTHER BIFACIAL ARTIFACTS

GOUGE-SCRAPER (1 specimen; Fig. 16, g). It has a triangular outline with a plano-convex cross section, and 1 end (distal) is steeply beveled. Portions of the beveled edge are dulled from use. L: 46.5; MW: 44; MT:9.

"FIST AXES" (2 specimens; Fig. 16, a, b). Both are subtriangular in outline, with thinned bifacial blades (with straight to convex edges) and a thick proximal end (poll) retaining the nodular cortex. Both are fashioned from cobbles. One specimen is extremely well made and the distal tip has a glaze polish (see Witthoft, 1967:383-388). This polish suggests that this specimen was used as a cutting implement, rather than functioning as an "axe". Because 1 of his specimens from the Nopal Terrace site (Val Verde County) exhibited similar polish at the tip, Sorrow (1968:21) has termed these specimens "butted knives". The second La Jita specimen is rather crude, with the blade rough and thick, with sinuous edges. In short, this specimen seems likely to have been used as an "axe" or chopper. This possibility is strengthened by the fact that short flakes radiate out vertically from the tip, probably due to impact resulting from use in a chopping activity. L: 88.5 and 87.5; MW: 79.5 and 82; MT (at proximal end): 33 and 44.5.

CORE-CHOPPERS (9 specimens; Fig. 16, c, d). This term is applied to a series of rough bifacial artifacts which could have functioned as heavy chopping tools and/or cores. At 1 end of each cobble, a number of broad flakes have been removed bifacially forming a sinuous convex edge. Opposite the convex edge, the proximal end is covered with cortex. The worked edges of 5 show battering. L: 70-123; MW: 62-105; MT: 30-47.

MISCELLANEOUS CHOPPERS (4 specimens; Fig. 21, f-j). All are heavy flint cobbles which have been roughly modified along 1 edge. These edges show battering and other evidence of use which suggests that the tools were used as chopping implements. L: 99-135; MW: 67-111; MT: 23-37.

PEBBLE CHOPPERS (2 specimens; Fig. 16, e, f). Both specimens are made on small flint cobbles. Cortex remains at 1 end (proximal) while the opposite end and much of both faces have been bifacially flaked. One specimen shows considerable battering. L: 57 and 65; MW: 56.5 and 65; MT: 32 and 34.

PERFORATORS (9 specimens; Fig. 16, h-k). Three have rounded ovate bases with long shafts (or bits). The base of 1 is very crude and still covered with cortex on 1 face. A third specimen is an ovate flake with

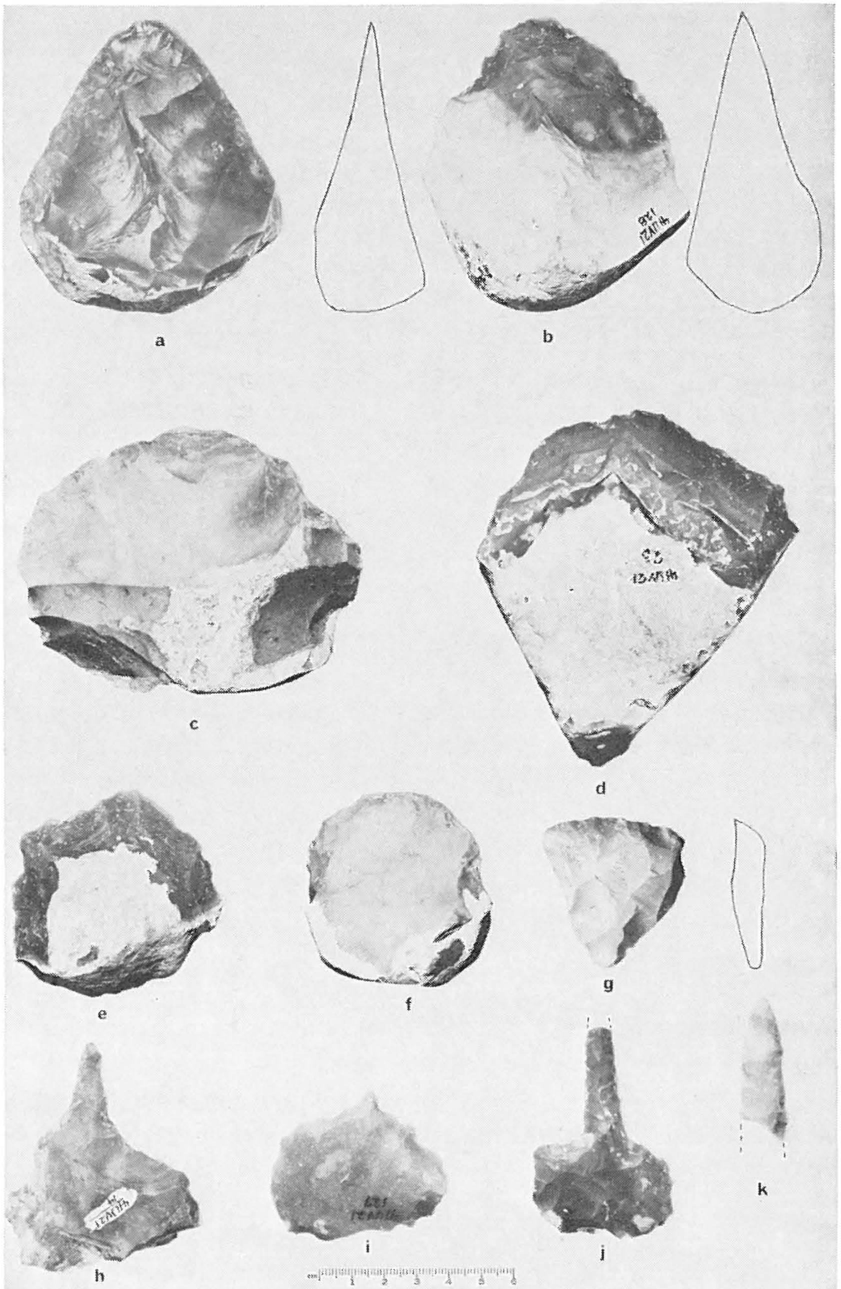


FIG. 16. Bifacial Artifacts. a, b, "fist axes"; c, d, core-choppers; e, f, pebble choppers; g, gouge-scraper; h-k, perforators.

a short shaft protruding from 1 side. Four specimens are distal tips of perforator shafts. The tip of the shaft on 1 complete specimen is dulled, while the others show no apparent wear. L (complete specimens): 45-71; MW (base): 25-58; MT: 6-18.5; L. of shaft: 6-33.

OTHER THINNED BIFACES. This category includes a number of thin bifacially chipped artifacts, excluding projectile points, whose precise functions are not known. Many of the specimens may have been used as knives (indeed, many reports in the Central Texas area have described them as such). Others may represent unfinished artifacts or some may be preforms. Eleven groups are briefly described below:

GROUP 1 (7 specimens; Fig. 17, a, b). Triangular with straight or slightly convex bases; crudely chipped; sinuous lateral edges; no evidence of use. L: 50-58; MW: 35-44; MT: 9-15.

GROUP 2 (2 specimens; Fig. 17, c, d). Asymmetrical, with convex bases and 1 convex and 1 concave blade edge. One is thin, made on a flake; the other is thick and crude. L: 61-82; MW: 44-45; MT: 8-10.

GROUP 3 (5 specimens; Fig. 17, e, f). Fragmentary; seem to have had lanceolate outlines with concave bases; crude; no definable working edges. L: ? ; MW: 41-51; MT: 8.5-12.

GROUP 4 (4 specimens; Fig. 17, g, h). Also lanceolate in outline, but with straight bases; smaller than Group 3; very crude; fragmentary. L:?; MW: 29-47; MT: 9-12.5.

GROUP 5 (8 specimens; Fig. 17, i, j). Triangular; straight to convex lateral edges, and straight to slightly convex bases; thin, good workmanship; most show varying degrees of lateral edge retouch, suggesting use as knives; 1 is thermal-fractured. L: 68-72; MW: 37-57; MT: 7-11.

GROUP 6 (3 specimens; Fig. 17, k, l). Subtriangular with markedly convex bases; rather thin, but crude; no evidence of use. L: 73 (complete specimen); MW: 39-44; MT: 7-11.

GROUP 7 (4 specimens; Fig. 17, m, n). All are basal fragments; probably had broad lanceolate outlines; slightly convex bases; crude. L: ?; MW: 43-52; MT: 6-11.

GROUP 8 (3 specimens; Fig. 17, o). Ovate, with convex bases; base of 1 retains striking platform; along 1 lateral edge of another, there is a black, soot-like residue as if that edge had been burned, and a portion of this edge has been beveled near the tip and shows wear; crude workmanship. L: 78 (complete specimen); MW: 47-56; MT: 10-12.

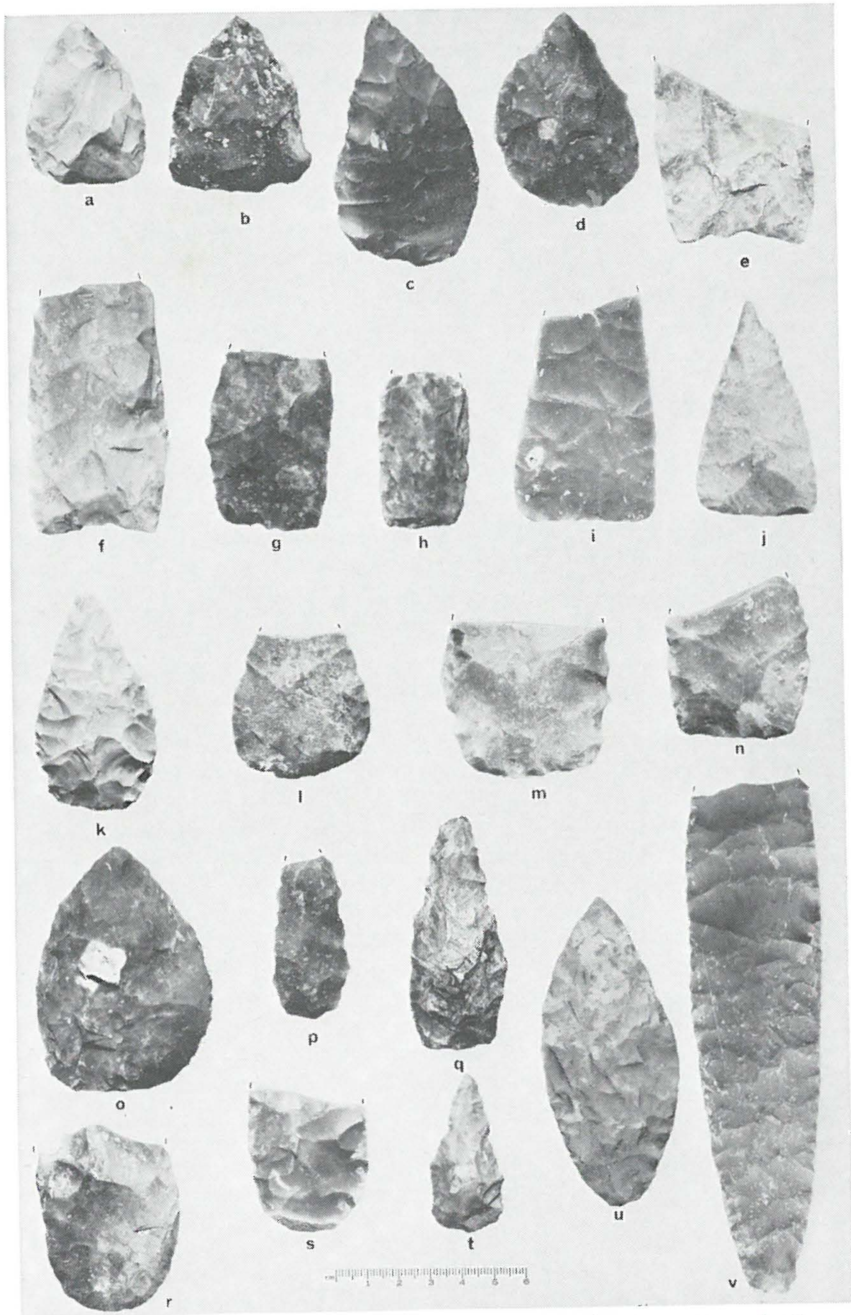


FIG. 17. Other Thinned Bifaces. a, b, Group 1; c, d, Group 2; e, f, Group 3; g, h, Group 4; i, j, Group 5; k, l, Group 6; m, n, Group 7; o, Group 8; r, s, Group 9; p, q, t, Group 10; u, v, Group 11.

GROUP 9 (4 specimens; Fig. 17, r-s). All are basal fragments with rounded bases and convex lateral edges; 1 is thermal-fractured, and another seems to have been broken during manufacture. L: ?; MW: 38-46; MT: 9.5-14.

GROUP 10 (9 specimens; Fig. 17, p, q, t). Small, triangular to roughly lanceolate bifaces; crude; some or all may have functioned as projectile points or knives. L: 50-73; MW: 23-31; MT: 6.5-9 (except 1, which is 14.5).

GROUP 11 (2 specimens; Fig. 17, u, v). This residual category includes 2 well-made specimens. One (A; Fig. 17, u) is bipointed, with convex lateral edges. It is made from a variegated tan-yellow-gray flint not noted elsewhere in the La Jita artifact or debitage sample. It may have functioned as a knife. Jelks (1962:89) has listed "double-pointed knives" as appearing ". . . to be exclusively a Toyah Focus trait in the Central Texas Aspect". The other (B; Fig. 17, v) is a fragment of a large and extremely well-made biface. It exhibits fine parallel-flaking and was apparently lanceolate in outline; it is made from a fine-grained gray flint. The presumed proximal end is straight. L: A, 97; B, 158.5; MW: A, 43; B, 42; MT: A, 9; B, 10.5.

THICK PERCUSSION BIFACES. Twelve groups of heavy, thick percussion-chipped bifaces are briefly described:

GROUP 1 (3 specimens; Fig. 18, a, b). Large, triangular, with convex edges and bases; fair to crude workmanship, with no evidence of use. L: 87-101; MW: 48-54; MT: 16-18.5.

GROUP 2 (5 specimens; Fig. 18, c). Similar to Group 1, though smaller with narrower blades; bases are slightly convex, and all are crude. L: 74-83; MW: 40-51; MT: 12-16.

GROUP 3 (3 specimens; Fig. 18, d, e). Long, narrow leaf-shaped outlines; 1 is bipointed, while the other 2 have 1 pointed and 1 rounded end. All are thick and crude. L: 75-91; MW: 34-27; MT: 16-21.

GROUP 4 (2 specimens; Fig. 18, f, g). Lanceolate outlines; 1 has a convex base, the other, a slightly concave base. L: 84.5-87; MW: 41-45; MT: 19-21.

GROUP 5 (not illustrated; 4 specimens). Ovate outlines; extremely crude with large flake scars and no definable working edge; 1 has been burned.

GROUP 6 (2 specimens; Fig. 18, h, i). Similar to Group 5, but are

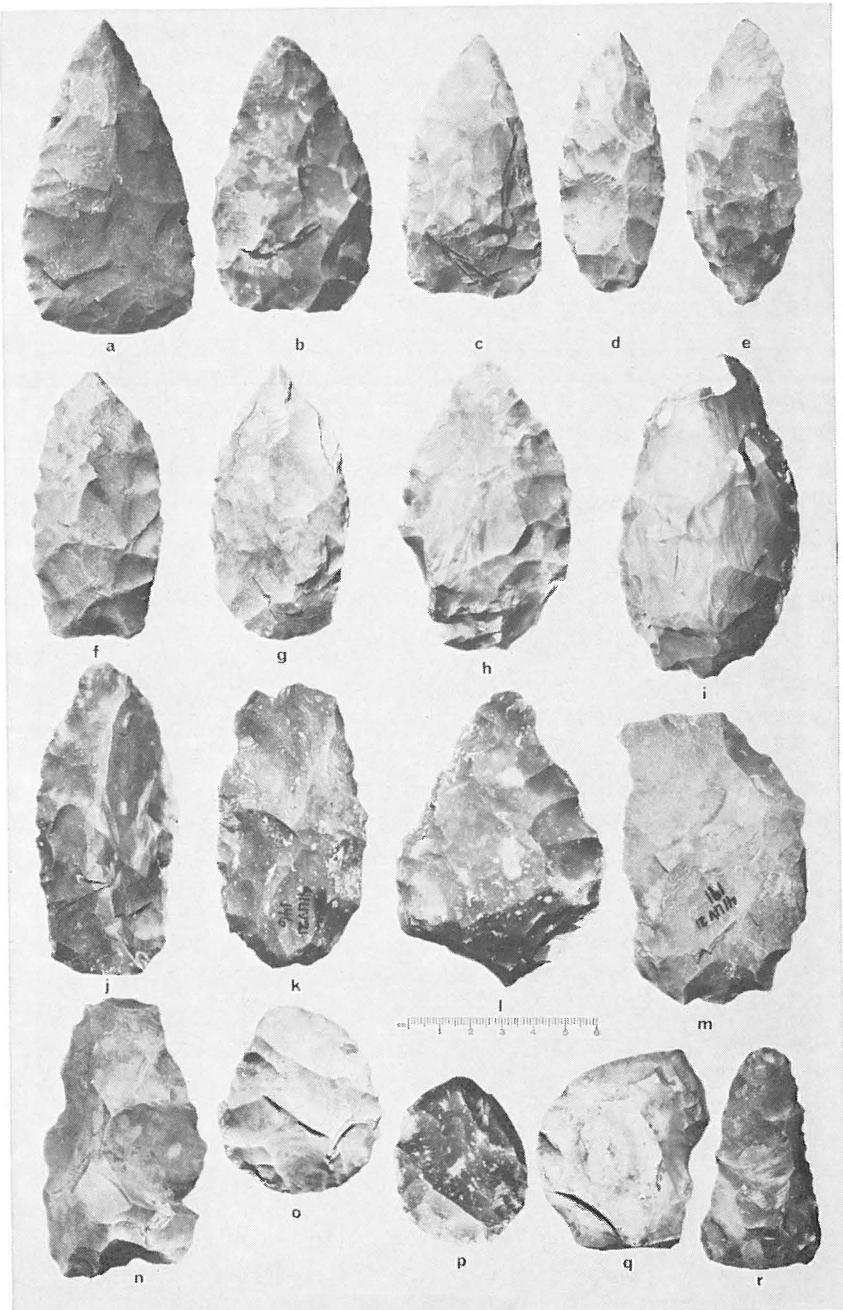


FIG. 18. Thick Percussion Bifaces. a, b, Group 1; c, Group 2; d, e, Group 3; f, g, Group 4; h, i, Group 6; j, k, Group 7; l, Group 8; m, Group 9; n, Group 10; o, p, Group 11; q, r, Group 12.

even more crude; much cortex remains on both faces of each. L: 90-101; MW: 57-63; MT: 21-25.

GROUP 7 (6 specimens; Fig. 18, j, k). Extremely crude; thick, ovate outlines with straight to slightly convex ends; patches of cortex retained on 4; only 1 shows evidence of having been used in cutting/scraping activities (a portion of 1 lateral edge has been retouched and dulled). L: 84-101; MW: 46-59; MT: 9-31.

GROUP 8 (4 specimens; Fig. 18, l). Subtriangular outlines with rounded bases and convex lateral edges; crude, thick, with patches of cortex retained on 2; 1 specimen has heavy battering along 1 lateral edge, apparently from attempts to thin the blade. These specimens are probably preforms. L: 72-96.5; MW: 55.5-64; MT: 18-29.5.

GROUP 9 (5 specimens; Fig. 18, m). Large, and ovoid in outline with sinuous lateral edges; cortex remnants on all specimens; large flakes removed from both faces, and it is possible that these may have been cores. L: 111-123; MW: 70-77; MT: 33-48.

GROUP 10 (5 specimens; Fig. 18, n). Very rough and crude; sinuous lateral edges; outlines vary from rectanguloid to subtriangular; large percussion flakes removed from both faces. L: 80-93; MW: 45-65; MT: 16-26.

GROUP 11 (3 specimens; Fig. 18, o, p). Small, ovate and crude; 2 have no definable working edges, and may be reworked from larger biface fragments; a third exhibits fine retouch along the lateral edges. L: 52-65; MW: 40-51; MT: 12-16.

GROUP 12 (5 specimens; Fig. 18, q, r). This is a residual category composed of miscellaneous crude bifaces; outlines include ovoid, triangular and asymmetrical. MT: 11-20.

CORES. Under this heading, 5 core categories are described:

POLYHEDRAL CORE (1 specimen; Fig. 19, a). This specimen appears to have been made from half of a split river cobble. The face of 1 split half was used as a platform and flakes/blades were then detached around the entire circumference. Judging from the flake scars, flakes up to 42 mm. in length were removed; other attempts resulted in hinge fractures. The platform is oval in outline, with the cross section of the core resembling a truncated cone. L: (across platform): 66; MW: 50; MT (proximal-distal distance): 42.

MISCELLANEOUS PREPARED PLATFORM CORES (6 specimens; Fig. 19, b, c). Two appear to represent halves of split cobbles. At 1 end of both

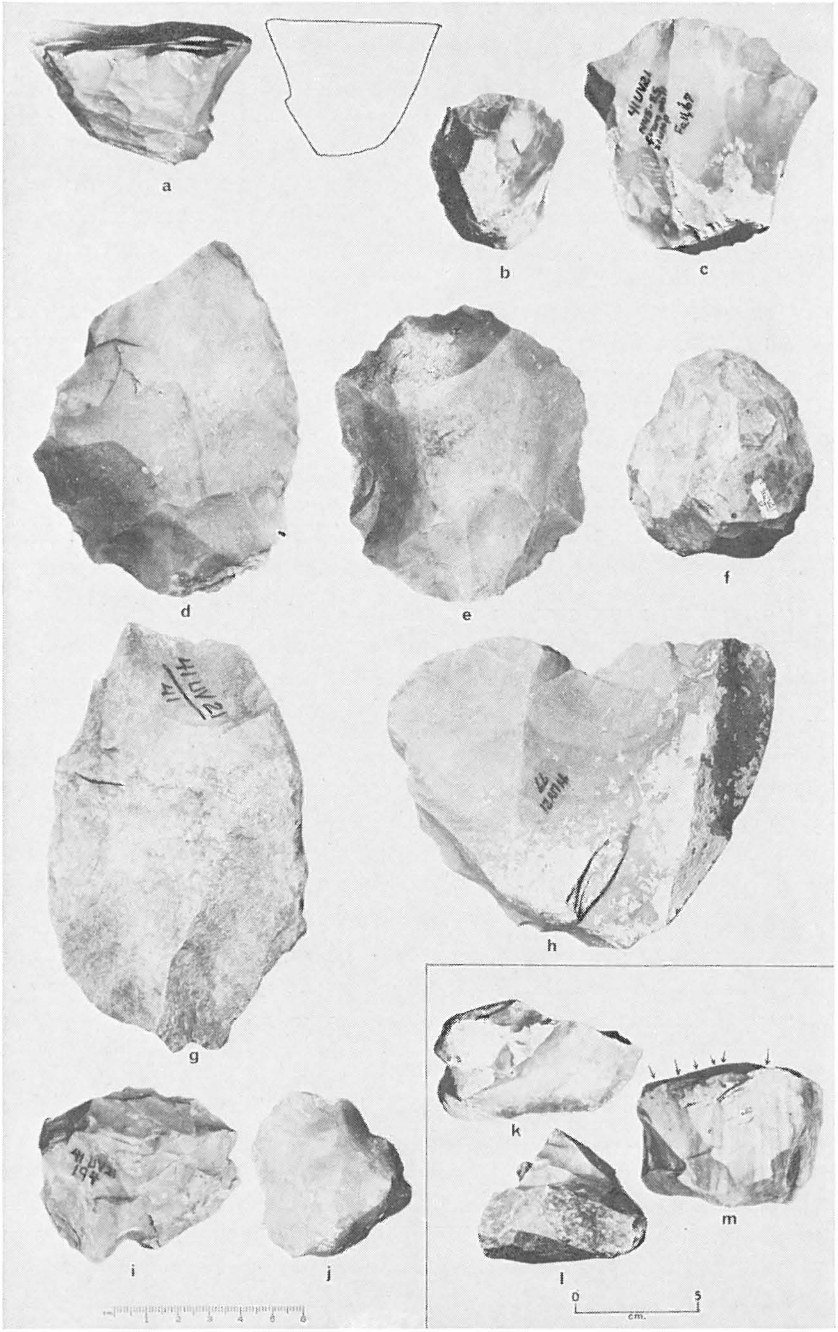


FIG. 19. Cores. a, polyhedral core (cross section shown); b, c, miscellaneous prepared platform cores; d-h, miscellaneous bifacial cores; i, j, core nuclei; k-m, natural platform cores (note change in scale from other illustrated specimens), k, l, plaftorm view; m, frontal view; arrows indicate direction of flake removals.

specimens, a flake or flakes were removed transverse to the long axis of the cobble. Flakes were then removed from the cortex side of both split cobbles by striking along the cortex side of the prepared platform. On 1 specimen, long blade-like flakes (up to 55 mm.) have been detached. The other specimen also exhibits blade-like scars (however, on it a number of flakes were removed parallel to the prepared platform). A third core is a large cobble, at 1 end of which a broad flake was removed across the face. Flakes were then struck off along the edges of the platform. A fourth large cobble had several flakes removed bifacially at random. It was then truncated at 1 end and a number of flakes were removed along 1 edge of the truncation; a couple appear to have been blades. The fifth and sixth are small cobble fragments with broad truncations (striking platforms) at 1 end. Flakes have been removed along 1 end on 1 face, while the opposite face remains mostly covered with cortex. L: 47-113; MW: 38-91; MT: 24.5-54.

NATURAL PLATFORM CORES (3 specimens; Fig. 19, k-m). Two are river cobbles from which a number of flakes have been removed at 1 end by striking the natural (cortex) surface of the nodule. A third is smaller, and flakes have been struck from 2 cortex surfaces of the cobble. L: 73-117; MW: 50-86; MT: 42-72.

MISCELLANEOUS BIFACIAL CORES (11 specimens; Fig. 19, d-h). These cores have the following characteristics: (a) thick ovoid to subtriangular outlines; (b) usually made on river cobbles; (c) flakes removed bifacially at random; (d) patches of cortex often remain on 1 or both faces. L: 65-137; MW: 55-111; MT: 31-54.

CORE NUCLEI (4 specimens; Fig. 19, i, j). All appear to be discarded nuclei of exhausted cores, from which flakes had been removed bifacially at random. L: 51-65. MW: 34-47; MT: 20-41.

UNIFACIAL ARTIFACTS

POINTED FLAKES (6 specimens; Fig. 14, z-c′). These are thin flakes which have been trimmed unifacially (and in 2 cases bifacially). The slight trimming occurs along the edges of the flake, and has produced a point at 1 end. In 2 cases, the striking platform remains opposite the pointed end. Two of the specimens may have been knives and were retouched after being dulled; 1 of these is steeply-beveled along a portion of 1 edge. Three flakes may have been designed to be projectile points; all 3 are made on blade-like flakes with a steep medial ridge on the dorsal face. A sixth specimen may have been used as a graver. L: 30-55; MW: 9-28; MT: 4-7.

NOTCHED FLAKES (2 specimens; Fig. 14, d′, e′). One specimen is a thin, broad interior hinge flake, with a series of small notches on 2 edges. L: 38; MW: 37; MT: 4. The other is a very thick secondary cortex flake, rectanguloid in outline. A notch has been chipped in 1 lateral edge, but no other modification is present. L: 56; MW: 42; MT: 17; L. of notch: 14.

RETOUCHED BLADE (1 specimen; Fig. 14, f′). This artifact is a blade with parallel edges, retaining a prominent bulb of percussion on the ventral face, and a medial ridge on the dorsal. The lateral edges of the blade have been finely retouched unifacially; some large flakes are also present on the dorsal surface. The ventral face is unmodified. L: 56; MW: 25; MT: 7.5.

SCRAPERS. 37 specimens classed as scrapers are described below. Though the vast majority are unifacial, a few bifacial specimens are included. When possible, the specimens were sorted according to the position of the scraping edge in relation to the bulb of percussion, with the bulb oriented downward.

SIDE-SCRAPER, 1 edge (10 specimens; Fig. 20, a-c). This is a varied group, each specimen with 1 distinct retouched scraping edge. Three are quite large and apparently represent scrapers made on cores. The others are much smaller and are all made on flakes. On 4 specimens, the retouched edge is on the dorsal surface, while 1 specimen is retouched ventrally. Outlines include trianguloid (1), ovoid (4) and lanceolate (4). L: 40-108; MW: 42-72; MT: 10-38; L. of scraping edge: 52-98.

SIDE-SCRAPER, 2 edge (5 specimens; Fig. 20, d-f). All are made on flakes, and all have trianguloid outlines and 2 retouched working edges (usually straight to convex). Three are pointed. All of the scraping edges have been formed on the dorsal face. The bulb of percussion (along with the striking platform) is retained on 3 specimens, but has been removed on the others. L: 55-97; MW: 31-60; MT: 9-18; L. of scraping edge: 36-73.

END-SCRAPERS (10 specimens; Fig. 20, g-k). They are subtriangular to ovate in outline with plano-convex cross sections. These specimens are characterized by a steeply beveled scraping edge opposite the bulb of percussion. The bulb has been removed from 1 specimen but is retained on 8 others. Six specimens have retouched lateral edges. Wear in the form of dulling and/or "nibbling" (short, vertical flakes resulting from use) is present on most. Patches of cortex remains on the dorsal faces of 6 specimens. L: 45-67.5; MW: 31-51; MT: 9-18.

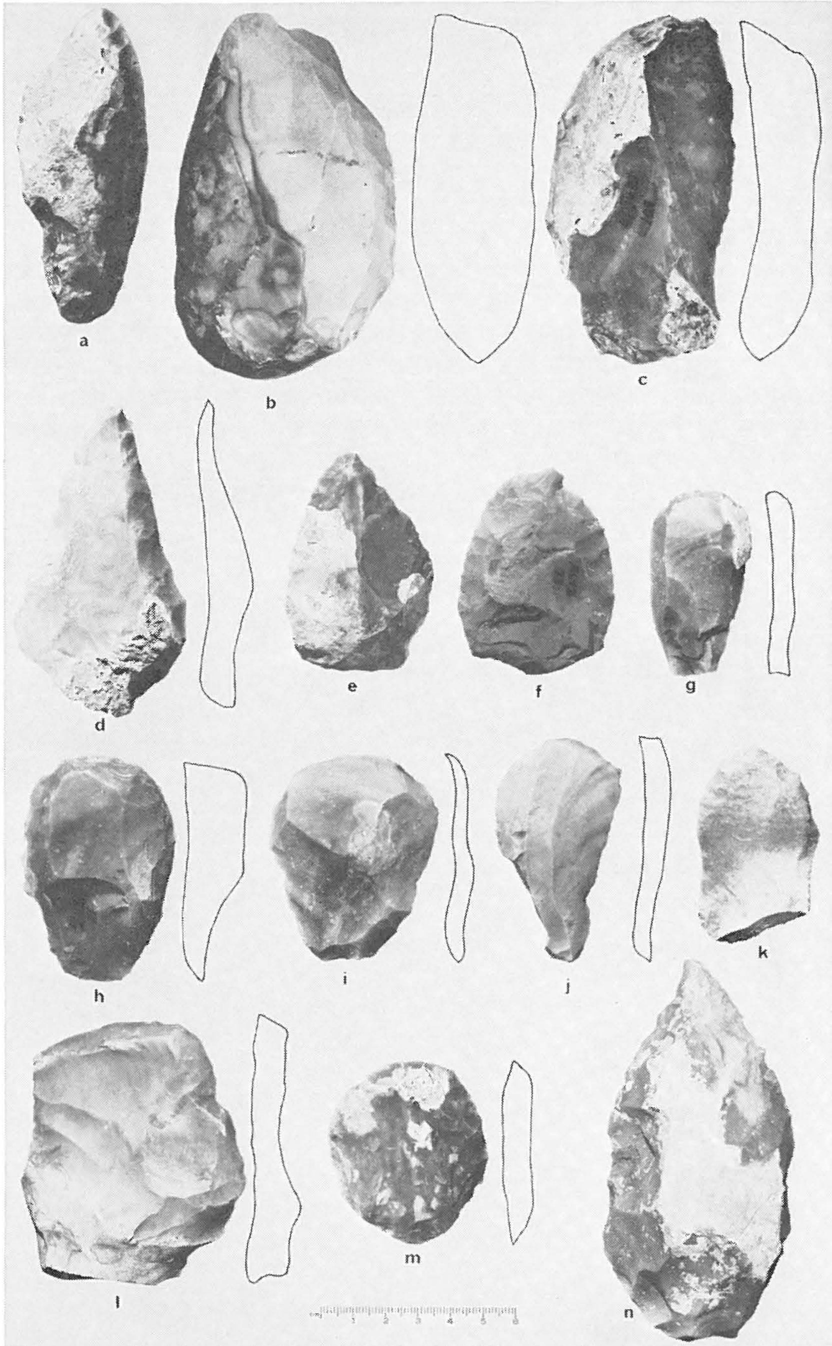


FIG. 20. Scrapers and Other Unifaces. a-c, side-scrapers, 1 edge; d-f, side-scrapers, 2 edge; g-k, end-scrapers; l, end-side scraper; m, oval scraper; n, miscellaneous unifacial tools, Group 1.

END-SIDE SCRAPERS (2 specimens; Fig. 20, l). In the description of the end-scrapers (above), mention was made of retouched lateral edges. However, the edges on those specimens seem not to have been used, but were merely the result of shaping the end-scraper. The 2 specimens described here are a heavy biface and a heavy uniface, with rectanguloid outlines and plano-convex cross sections. One specimen has a steep scraping edge at the distal end, with another steep scraping edge along 1 lateral side. Also present is a pronounced scraping edge at the proximal (bulb) end. The second specimen has a steep scraping edge at the distal end, with a sinuous scraping edge along 1 lateral side. Some cortex is present on the dorsal surface. L: 81-84; MW: 69-74; MT: 21-25.

OVAL SCRAPER (1 specimen; Fig 20, m). The specimen is an oval uniface with a plano-convex cross section. There is a distinct scraping edge along most of the circumference. L: 56; MW: 48; MT: 11.

MISCELLANEOUS SCRAPERS (8 specimens; not illustrated). These are briefly described, though dimensions are not given:

- A. pointed flake; retouch on edges near tip.
- B. badly burned uniface, with pronounced scraping edge on lateral sides, converging to a point opposite the bulb of percussion.
- C. crude uniface, which can be classified as a double-end scraper; scraping edges at both the distal and proximal ends.
- D, E. plano-convex unifaces (1 is badly burned), with slight scraping edges.
- F. thick flake; triangular; pronounced scraping edge along 40 mm. of 1 lateral side; possible wear noted on other edges.
- G. large split cobble, possibly once a core; rectanguloid; scraping edge at 1 end; possible wear along other end and both lateral edges.
- H. oval secondary cortex flake with scraping edges on 2 sides, 1 edge on the dorsal face, the other on the ventral face; burned.
- I. mostly unifacial; thick cortex flake with large bulb of percussion; well-defined scraping edge along 35 mm. of 1 lateral side.

MISCELLANEOUS UNIFACIAL TOOLS. Four groups are described below:

GROUP 1 (1 specimen; Fig. 20, n). Broad lanceolate outline, pointed at 1 end, rounded at the other; longitudinal cross section is concavo-convex; large patches of cortex remain on dorsal face; function of specimen uncertain, though portions of lateral edges may show wear. L: 118; MW: 55; MT: 28.

GROUP 2 (3 specimens; Fig. 21, a, b). Roughly ovoid outlines; rough percussion flaking on 1 face; 2 show no evidence of use, though the third has an area along 25 mm. of 1 edge which is lightly dulled. L: 63-90; MW: 60-80; MT: 21-25.

GROUP 3 (2 specimens; Fig. 21, c, d). Oval outlines with plano-convex cross sections; bulb of percussion retained on ventral face of both; along 18 mm. area of the circumference of 1 specimen, there is light retouch; dorsal faces of both are characterized by rough pressure flaking. L: 62-68; MW: 55-61; MT: 15-18.

GROUP 4 (2 specimens; Fig. 21, e). One is a thick oval cortex flake with crude flaking along portions of the dorsal face; bulb is retained. The second is also a thick cortex flake, with bulb retained; on 1 edge of this specimen there is a 20 mm.-long protrusion which possibly functioned as a perforator. L: 77-84; MW: 58-63; MT: 16-27.

MISCELLANEOUS CHIPPED STONE

BIFACIAL DISTAL FRAGMENTS: 100 specimens were noted, most of which seem to be from dart points, though arrow point tips are present.

MEDIAL FRAGMENTS OF THINNED BIFACES: 15 specimens are present, mostly from dart points.

OTHER BIFACE FRAGMENTS: There are 32 specimens, most of which are pieces of large percussion bifaces. They are often thermal-fractured.

GROUND STONE ARTIFACTS

GORGET (1 specimen; Fig. 22, g). The specimen is fragmentary, representing approximately 1/2 of a long, ovate gorget, made from calcareous siltstone. Both faces have been ground and smoothed, and numerous longitudinal striations remain. Two biconical perforations are present; both have maximum diameters of 9 mm. and are spaced about 9 mm. apart. On 1 face, a shallow pit is located between the 2 holes, probably representing an initial attempt at perforation. L (of fragment): 58.5; MW: 37; MT: 6.5.

LIMESTONE OBJECT (1 specimen; Fig. 22, f). This unusual artifact has a long, narrow lanceolate outline, with nearly-parallel sides. It is pointed at 1 end and slanted at the other. Transverse cross section is triangular. The distal end appears to have been ground to a point and thinned. A larger specimen, though very similar in outline, was found at the Landslide site (Sorrow, Shafer and Ross, 1967:39). Another

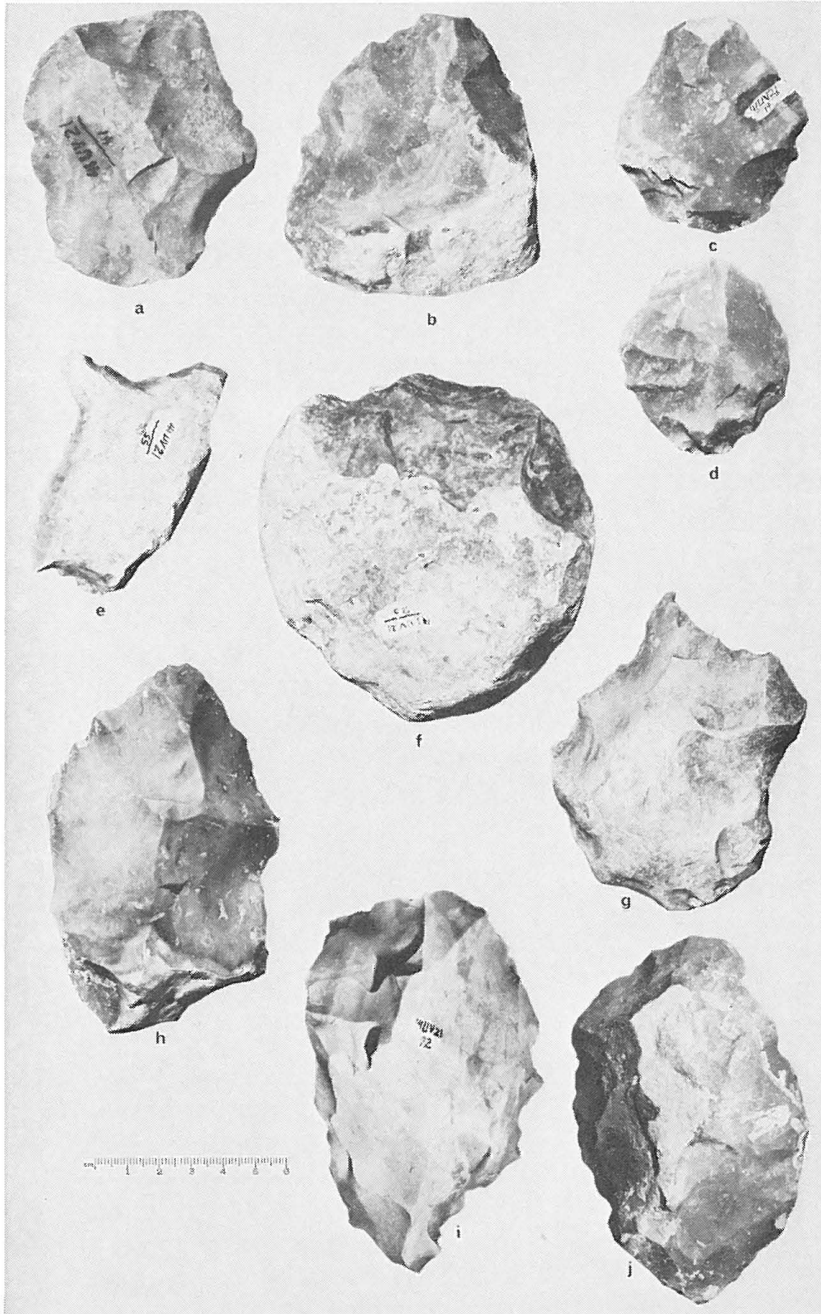


Fig. 21. Unifacial and Bifacial Tools. a, b, miscellaneous unifacial tools, Group 2; c d, miscellaneous unifacial tools, Group 3; e, miscellaneous unifacial tools, Group 4; f-j, miscellaneous bifacial cores and core-choppers.

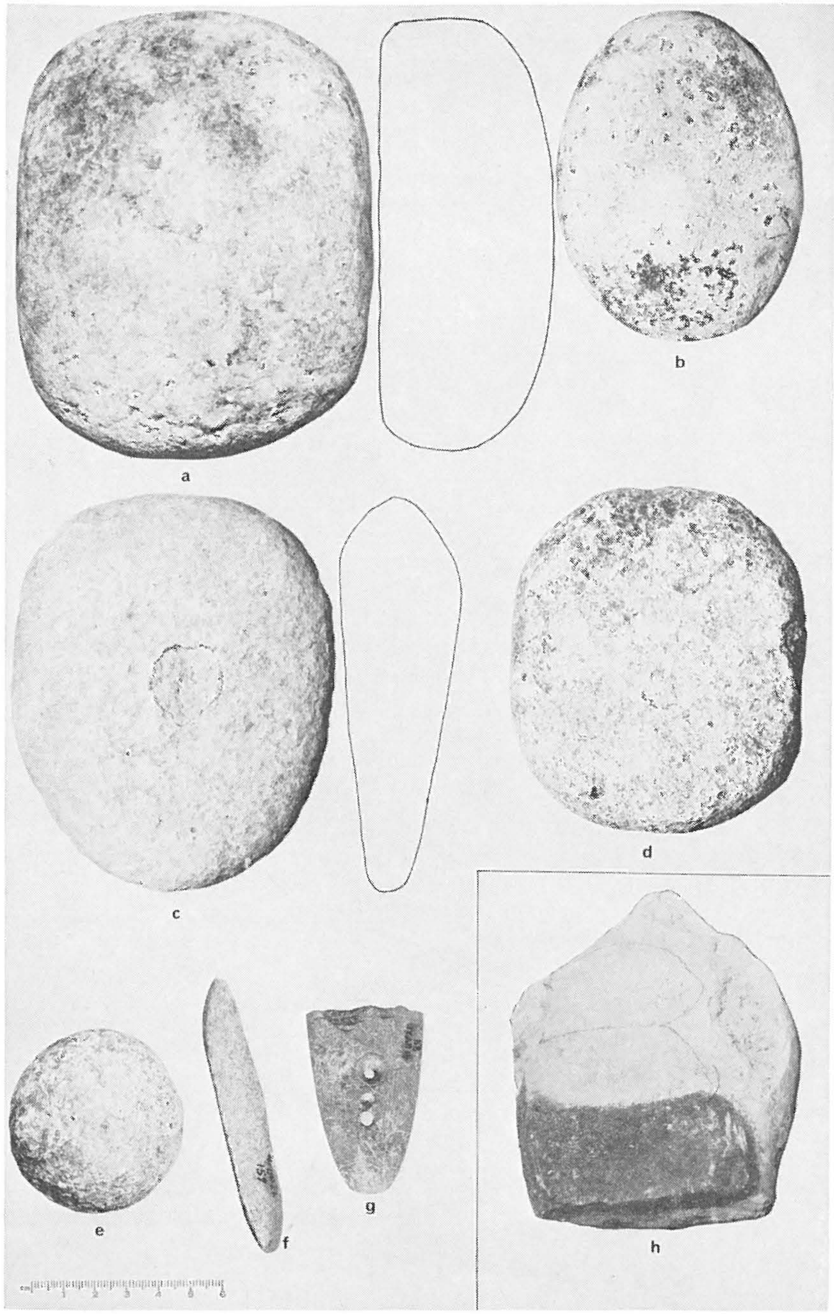


FIG. 22. Ground Stone Artifacts. a, quartzite mano; b-d, limestone manos; e, hammerstone; f, limestone object; g, gorget; h, metate (see text for dimensions).

shaped limestone object has been found at the Gildart site (41 UV 37) and is conical in form (Texas Archeological Research Laboratory collections). The measurements of the La Jita specimen are: L: 88; MW: 15; MT: 10.

MANOS (9 specimens; Fig. 22, a-d). Three are fragmentary. Eight are of limestone and 1 is made of quartzite. The limestone specimens vary from ovate to rectanguloid in outline, and all but 1 have wear facets on both faces, with some pecking around the edges. The quartzite mano is the largest; it is loaf-shaped and very well made, smoothed over the entire surface of both faces, as well as around the sides. L: 95-131; MW: 73-106.5; MT: 40-67.5.

METATE (1 specimen; Fig. 22, h). This limestone metate, or grinding slab, was found partially exposed on the surface in Area A. It is about 43 cm. long, with a maximum width of approximately 23 cm. Two broad, shallow grinding facets are present on 1 face; the opposite face is unmodified.

HAMMERSTONE (1 specimen; Fig. 22, e). This is a round biconvex cobble of hard, dense limestone which shows heavy battering around its circumference. It is possible that the battering results from attempts to shape the stone, and it could have had some other function (besides that of a hammerstone), perhaps as a bolas-stone. L: 55.5; MW: 53; MT: 37.5.

BONE AND ANTLER ARTIFACTS

BONE BEAD (1 specimen; Fig. 23, h). It is made from a shaft segment of small mammal bone and is tubular. L: 19; MW: 10.

MODIFIED DEER ULNAE (2 specimens; Fig. 23, a, b). On 1 specimen, the distal end of the ulna has been cut off, and the remaining portion of the shaft has been ground to a slightly convex edge. The edge is slightly beveled on both faces. The artifact's function is uncertain, but perhaps it was used as a flaking tool. The second is much like the first, though the remaining shaft was fashioned to a point. L: 90 and 85; MT: (shaft): 7 and 6; L (shaft) 22 and 30.5.

BONE SPLINTER AWLS (5 specimens; Fig. 23, d, e). All are made from splinters of mammal long bone (deer?). Only 1 is fairly complete, and it is pointed at 1 end, and both surfaces show vestiges of polish. L: 131. Two other specimens are articular end fragments. The shaft portions show clear evidence of having been shaped and 1 specimen is rather highly polished. The fourth and fifth specimens are tip fragments.

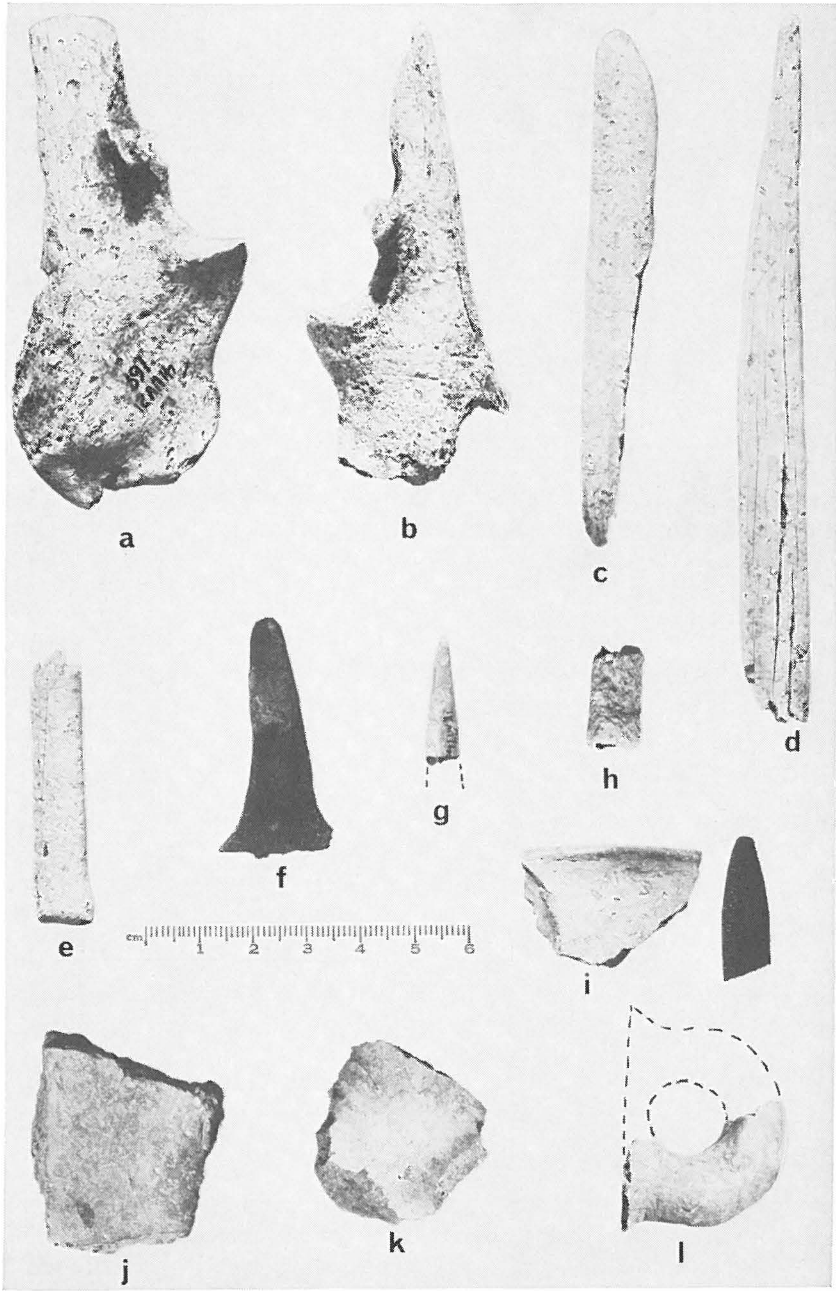


FIG. 23. Bone and Antler Artifacts and Ceramics. a, b, modified deer ulnae; c, spatulate object; d, e, bone splinter awls; f, antler object; g, miscellaneous bone object; h, bone bead; i, rim sherd (profile shown); j, k, miscellaneous body sherds; l, loop handle fragment.

SPATULATE OBJECT (1 specimen; Fig. 23, c). It is fragmentary and seems to have been made from a long bone splinter. One end is rounded and the other is damaged.

MISCELLANEOUS BONE OBJECT (1 specimen; Fig. 23, g). This appears to be a tip fragment of a bone awl. It is highly polished and has an oval cross section.

ANTLER OBJECT (1 specimen; Fig. 23, f). The specimen is an antler tine fragment which has been heavily charred. Its status as an artifact is dubious, though what seems to be areas of polish resulting from use are present on the blunted tip. L: 44.

CERAMICS

Seventy-two potsherds (Fig. 23, i-l) were recovered from the upper levels at La Jita. Most are small body sherds, with a few rimsherds and 1 handle fragment. Generally, the sherds are from well-made, highly fired vessels, with hard and highly smoothed to burnished surfaces. All sherds are bone-tempered, with the bone occasionally burned. At least 3 or 4 vessels are represented. Unsmoothed coil junctures can be seen on the interior of several sherds.

Surface colors are light gray, grayish-brown, dark gray and pink to reddish-yellow. Those sherds in the pink (Munsell 7.5 YR: 7/4) to reddish-yellow (Munsell 7.5 YR: 7/6) range are predominant.

Other traits of the ceramics at La Jita are:

1) paste: compact; often granular, though sometimes laminated.
2) core color: mostly dark gray to brownish gray; one sherd has a reddish-yellow core.
3) hardness: on Moh's scale, 2.5-3.0.
4) thickness: 4-10 mm.
5) rim shape: 1 is rounded, thinned from the interior and flares outward with slight hint of an overlap along exterior part of lip just below the rim. Another is also thinned from the interior, flares outward slightly and has a rather flattened lip.
6) surface treatment: as mentioned above, exterior surfaces are well-smoothed to burnished; interiors are usually rough, and only poorly-smoothed.
7) handle: loop shaped; circular in transverse cross section; roughly smoothed; maximum diameter is 14 mm.; length (vertical): 30 mm.

Pottery is known at several other sites in the immediate area. A few miles south of La Jita, sherds were collected from the Kincaid rockshelter. About 40 body sherds at that site closely resemble the La Jita specimens, especially in surface finish, hardness and color. Also in the Kincaid sherd sample is a thick, grit-tempered sherd, a crudely made bone-tempered brownish-gray ware with a coarse paste (6 sherds), and a single sherd with a black, sandy-grit paste and a deeply scored exterior. Near Kincaid, another site has yielded a group of 17 sherds. All are bone-tempered. Surface colors are light gray, pinkish yellow, light brown and gray. Though they are from well-made vessels with hard surfaces, the surface finish is not as fine as on the La Jita examples.

To the southwest of La Jita, still in Uvalde County, 6 sherds were collected at the E. Stockley Ranch site, near Laguna. Only 2 are now available for study. One has a hard (3.5 Moh's), highly burnished, reddish exterior, with a fine, hard paste, tempered with fine particles of bone and grit. The other has grayish surfaces with a coarse paste, and is bone-tempered. Five other sherds were examined from the E. E. Nelson site near Concan. All are bone-tempered with light brown to gray surfaces. Portions of asphaltum decorations are present on the exteriors of 2.

In Real County, sherds are known from the Grantland and Boles sites. At the Boles site, 2 thin sherds, representing a single vessel, were found. They have very pale brown exteriors, light red interiors and a fine, hard bone-tempered paste. The exterior surfaces are smoothed, but the interiors are rough. At Grantland (sherds not now available for study), A. T. Jackson (ms.) reports a rim sherd ". . . encrusted on both interior and exterior with grease and soot. Sand tempered and excessively fired". Also at the site were 3 sherds ". . . of reddish-yellow ware and heavily tempered with calcareous material" (note: probably bone).

In adjoining Edwards County, 2 sherds are present from a site on the Walter Craig Ranch. Exterior surfaces are light red to light yellowish-brown. The 2 sherds seem to represent different vessels. One has a coarse, contorted paste, with burned and unburned bone temper. The tempering agents are up to 2 mm. in length and the core color is light brown. The second has a very hard, laminated paste with unburned bone temper, and the core color is gray. Both sherds range from 6 to 7 mm. in thickness. At the Grooms Ranch (also in Edwards County) 2 thin sherds (4.5 mm. average) were found, apparently from a single vessel. Surface colors are light red to reddish-yellow. The sherds have a very fine paste, tempered with finely crushed bone.

Bone-tempered pottery, much of it similar to the La Jita materials, has been found in fairly large quantities at a number of sites in Dimmit, Zavala and other south Texas counties (Hester, 1968b:9-11; Hester and Hill, ms.). For the distribution of pottery-bearing sites in the southwestern part of the Edwards Plateau, see Fig. 24.

Flake Study

An analysis of a selected sample of flint flakes and other lithic detritus was carried out. The following units were used: in Area A, N10 E40, N15 E40; in Area C, N20 W40, N20 W45; in Area B, N35 E5, N40 E5; and, in Area F, Test 7. A total of 15,047 pieces from these

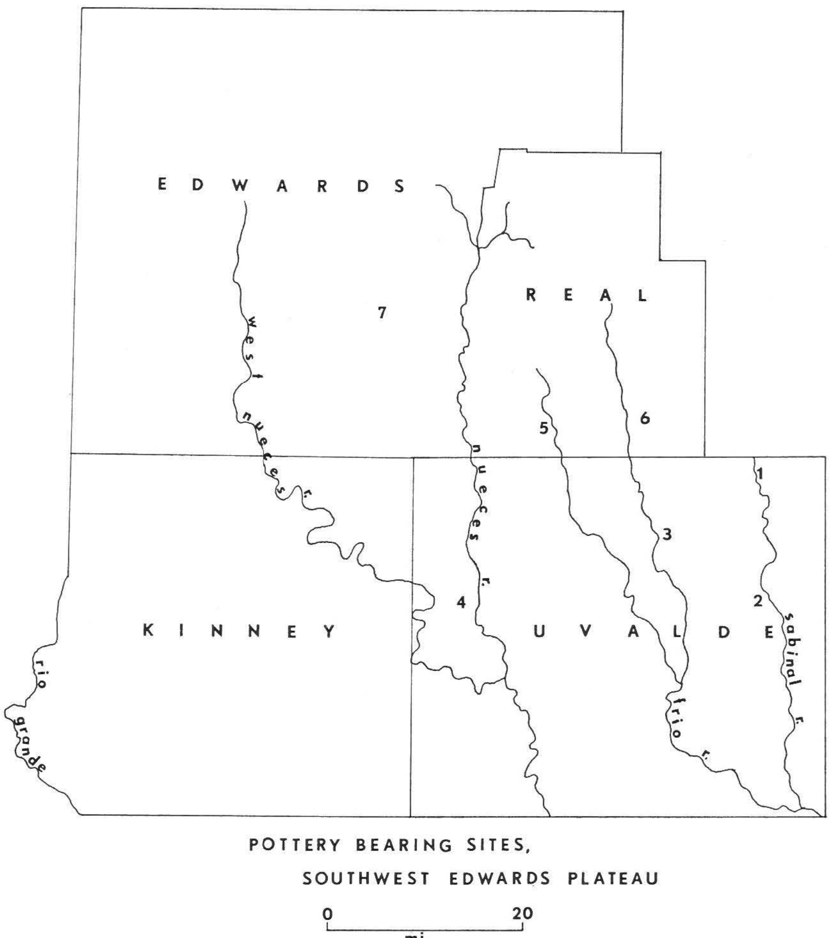


FIG. 24. Pottery-Bearing Sites on the Southwestern Edwards Plateau. 1, La Jita; 2, Kincaid rockshelter; 3, E. E. Nelson; 4, E. Stockley; 5, Boles; 6, Grantland; 7, Craig Ranch.

7 units was examined. The purpose of the study was to analyze the flakes from 2 of the terrace areas along with a similar sample from 2 of the burned rock middens. I hoped for several results, one of which was to determine if the flake debris would indicate that different kinds of flint-working activities were carried out in the terrace as opposed to the burned rock midden areas. Secondly, it was hoped that flake analysis in the terrace areas might reveal some patterns, resulting in the recognition of specific flint-working areas and/or procedures. To achieve this second goal, it would have been ideal to have examined all of the flake debris from all units in the terrace, but the overwhelming quantities of flakes (the total number of flakes excavated at the site is estimated at 50,000-60,000) prevented such an analysis. The results of the flake study are shown in Tables 1-5.

Below are listed flake and detritus categories established to facilitate the sorting. Categories a,b,c,e, and f are based primarily on definitions by Shafer (1969):

(a) INITIAL CORTEX FLAKES result from the removal of the cortex from the nodule. The dorsal surface is covered with cortex.

(b) SECONDARY CORTEX FLAKES are characterized by the dorsal face being partially covered with cortex, but also exhibiting 1 or more flake removals.

(c) INTERIOR FLAKES have no cortex on either surface, since they have been removed from the interior of the core. Platforms are generally large and the vast majority of the flakes appear to have been struck from simple prepared platforms (i.e., they have a flat flake surface; a very small percentage have cortex platforms).

(d) INTERIOR FLAKES WITH MULTI-FACETED PLATFORMS were also recognized in the La Jita sample. These are interior flakes on which the platforms are formed by convergent planes. The flakes appear to have been struck at the peak formed by the convergent planes.

(e) LIPPED FLAKES are characterized by a diffuse bulb of percussion and an overlapping, or "lipped", multifaceted striking platform. Generally, these seem to be the result of biface thinning activities. Only rarely does cortex occur on the dorsal surface and then only in small patches; however, this surface is always multifaceted.

(f) FLAKE BLADES are narrow, parallel-sided flakes, usually twice as long as they are wide. All have either 1 or 2 median ridges on the dorsal surface. Platforms are always prepared, often large and lozenge-shaped in outline. In this category, I have largely followed the definition put forth by Shafer (1969:4).

(g) UTILIZED FLAKES were included in the study to help determine

TABLE 1.

Flake and Detritus Analysis in Area C (in percentages).

LEVEL	*1*	*2*	*3*	*4*	*5*	*6*	*7*
No. of Flakes	986	562	944	489	1146	625	268
No. Classifiable	285	209	301	184	405	231	103
Initial Cortex	1	1	2	2	1	4	4
Secondary Cortex	25	32	30	29	17	23	30
Interior	36	43	36	38	43	36	28
Interior (multi-faceted platform)	10	2	3	2	1	4	3
Lipped	24	16	24	25	31	27	32
Core Fragments	3	5	3	3	5	4	3
Flake Blades	1	1	0	0	0	2	0
Utilized Flakes	1	0	1	1	1	1	0
Total (%)	101	100	99	100	99	101	100

how frequently flakes were used as tools. These flakes are distinguished by light retouch along 1 or 2 lateral edges; most are fragmentary and composed only a minor part of the sample.

(h) CORE FRAGMENTS are chunks of flint which exhibit numerous flake scars and obviously represent pieces of cores. Core nuclei are not included. Some of these pieces probably result from core-trimming or reworking activities. Cores described earlier are not included.

(i) FLAKE FRAGMENTS are pieces on which the bulb of percussion and striking platform are missing, making it impossible to sort them accurately.

A major fact pointed out by the flake analysis was the low density of flakes and detritus occurring in the burned rock midden areas. As shown in Table 4, the unit examined in the burned rock midden in Area F contained only 82 flakes. The 2 units in Area B contained 1,264 flakes, yet the level immediately below the burned rock zone in this area alone contained 1,054 flakes. In marked contrast to the flake counts in Area F and B, the 2 Area A units yielded 5,536 flakes, and the 2 in Area C contained 5,020. In a later section of this paper, I assign the burned rock middens at La Jita to a Middle Archaic occupation(s). If we examine corresponding Middle Archaic levels in the terrace (levels 5 and 6), we find that there are 1,474 pieces in Area A and 1,771 in Area C (contrasting with 82 in Area F and 1,264 in Area B). The occurrence of 1,264 pieces in the Area B burned rock zone seems rather high, given the minute amount in the burned rock zone of Area F. However, this is the result of a concentration of flake debris in Levels 3, 5 and 6 of unit N35 E5 of Area B. These 3 levels account for 666 (or 53%) of the flakes from the area; it is difficult to account for this phenomenon, but it is possible that those concentrations reflect flint-working loci.

Let us now examine the flake categories in each area studied. In Area A, the percentage of the various flake types remain remarkably consistent throughout the occupation there. It appears that all steps in the stone tool manufacturing process did take place within the area. In Area C, a very similar situation exists, though as in Area A, lipped flakes gradually increase in Archaic levels. Initial cortex flakes also increase near the bottom of the deposit, though not significantly. In level 1, there is a high percentage of interior multi-faceted platform flakes.

In Area B, there is a great decrease in the percentages of initial cortex flakes. Secondary cortex and interior flake frequencies remain rather static. Lipped flake percentages do not vary radically, though

TABLE 2.

Flake and Detritus Analysis in Area A (in percentages).

LEVEL	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
No. of Flakes	733	901	1306	498[1]	950	480	524	144
No. Classifiable	224	291	354	178	331	184	167	45
Initial Cortex	2	3	1	0	1	1	3	0
Secondary Cortex	24	21	25	15	16	19	16	13
Interior	36	42	37	40	40	35	34	33
Interior (multi-faceted platform)	2	5	2	3	4	3	7	11
Lipped	25	25	33	38	38	38	34	33
Core Fragments	4	3	1	3	1	3	3	7
Flake Blades	2	1	0	2	1	0	1	2
Utilized Flakes	5	0	1	0	0	0	1	0
Total %	100	100	100	101	101	99	99	99

[1]Flake count on Unit N10 E40 only; corresponding materials from N15 E40 could not be located, apparently having been lost in storage.

there is a 50% occurrence in level 3 (see Table 3), one of the levels which contributed so heavily to the overall flake total from Area B discussed earlier. It seems that such a high frequency of lipped flakes in that level might suggest the presence of a flint-working locus, in this case oriented toward the thinning of bifaces. It should also be pointed out that utilized flakes are at their lowest in this area, being completely absent from the burned rock zone.

In Area F, there is a great deal of fluctuation among the levels, probably attributable to the very small flake sample. Initial cortex flakes are completely absent. Secondary cortex flakes increase greatly below the burned rock midden (i.e., beneath level 4; see Table 4), though interior flakes peak in the burned rock midden zone and then gradually decline. Lipped flakes are most prevalent beneath the burned rock midden zone. Flake blades make up a high percentage of the flakes in level 3, but only 9 flakes were classifiable from that level. As in Area B, utilized flakes are absent from the burned rock midden, though they are present in terrace deposits below it.

In the Middle Archaic levels of the terrace and burned rock midden areas, the occurrence of burned detritus was recorded, in an attempt to see if burned flakes might correlate with one suggested function for the burned rock midden, that of a hearth area (Kelley and Campbell, 1942:322). The results are shown in Table 5. In summary, the burned rock middens contained an average of 21% burned flakes, while the terrace areas averaged about 24%. Thus, there is not a great deal of difference between the two locations. This in itself may be significant. As stated above, one of the suggested explanations for the burned rock midden phenomenon is that it represents an area of superimposed hearths. However, these percentages show that there was as much or even more burning (attributable to hearth areas) going on in the terrace areas during the Middle Archaic, when I believe the burned rock middens accumulated. The implications of this are discussed further in the Summary and Conclusions sections of this paper.

This flake and detritus analysis permits the formulation of several statements having direct bearing on the prehistoric occupations at La Jita:

(1) The greatest concentration of flint flakes and detritus is in the terrace. The mass of bone, charcoal, snails and artifacts in the terrace deposits, coupled with the quantity of flakes, suggest that Areas A and C were the principal living (or occupational) areas at the site. The flake analysis has shown that all steps in the stone tool manufacturing process are represented in these areas. Specific flint-working loci were not recognized.

Table 3.

Flake and Detritus Analysis in Area F (in percentages).
The burned rock midden zone ends in the middle of level 6.

LEVEL	*1*	*2*	*3*	*4*[1]	*5*	*6*	*7*	*8*	*9*	*10*[2]
No. of Flakes	15	27	13	27	14	21	54	41	36	23
No. Classifiable	9	14	9	16	7	13	27	28	21	8
Initial Cortex	0	0	0	0	0	0	0	0	0	0
Secondary Cortex	22	28	0	0	0	46	44	39	28	12
Interior	44	43	11	62	57	31	29	35	38	25
Interior (multi-faceted platform)	0	0	0	12	0	0	4	0	5	25
Lipped	11	28	0	25	43	15	22	14	0	25
Core Fragments	23	0	0	0	0	0	0	7	5	0
Flake Blades	0	0	89	0	0	0	0	0	5	0
Utilized Flakes	0	0	0	0	0	7	0	4	19	12
Total (%)	100	99	100	99	100	99	99	99	100	99

[1] Burned rock midden zone ends at the bottom of Level 4.

[2] Only half of the unit was excavated.

TABLE 4.

Flake and Detritus Analysis in Area B (in percentages).

LEVEL	*1*	*2*	*3*	*4*	*5*	*6 (upper)*	*6 (lower)*	*7*	*8*
No. of Flakes	122	122	230	212	183	395	1054	1389[1]	513[2]
No. Classifiable	45	32	76	80	57	106	283	391	113
Initial Cortex	2	0	0	0	0	1	1	.5	0
Secondary Cortex	22	28	13	14	28	19	16	14	17
Interior	29	33	32	37	32	46	33	33	45
Interior (multi-faceted platform)	4	3	4	3	7	2	3	3	2
Lipped	40	35	50	44	33	30	46	48	34
Core Fragments	2	2	0	3	0	1	1	.5	2
Flake Blades	0	0	1	0	0	0	0	.5	0
Utilized Flakes	0	0	0	0	0	0	1	1	0
Total (%)	99	101	100	101	100	99	101	100	100

[1]Of the total of 1389 flakes, 1072 came from Unit N40 E5.

[2]Materials from Level 8, N35 E5 could not be located; these percentages are calculated on flakes from N40 E5.

TABLE 5.

Percentages of burned flakes in Middle Archaic levels at La Jita.

LEVEL	*AREA* B	*AREA* F	*AREA* A	*AREA* C
1	23%	26%		
2	22	38		
3	9	15		
4	25	8		
5	25		17%	25%
6	18 (upper)		28	25

(2) The high percentages of flakes in levels 3, 5, and 6 in Area B suggest flint-working loci, and one level where 50% of the flakes were lipped may represent a locus devoted primarily to biface thinning.

(3) The flake analysis revealed the presence of flake blades in most areas of the site (see Tables 1-4) suggesting that a specialized technique oriented toward the production of such flakes was practiced by the occupants during most periods of the site occupation. The polyhedral core described earlier tends to substantiate these findings.

(4) Aside from the specialized technique suggested by the presence of the flake blades and a polyhedral core, the flint-working technology at the site appears to have remained without significant change throughout the history of the site. However, a slight decrease in lipped flakes was noted in the upper levels of Areas A and F (see Tables 1 and 4).

(5) The similarities between burned flake frequencies in the Middle Archaic burned rock middens and the Middle Archaic levels in the terrace indicate that the burned rock middens do not represent loci in which all hearth activity was confined. There must have also been hearths in the terrace and it is possible that the burned rock middens were not hearth areas at all.

RADIOCARBON DATES

A number of charcoal samples were collected during the course of the excavations. These were submitted to the Radiocarbon Dating Laboratory at The University of Texas, and the results of the analyses conducted there are contained in a forthcoming paper by Valastro and Davis (1970).

The dated samples (and accompanying comments) are listed below in possible stratigraphic order (top to bottom) based on artifact associations.

Tx-687 (La Jita 49)

A.D. 1290 (660±70)

N15/E35, Level 2. Scallorn and other side-notched arrow points (Scallorn variants?) and a large bipointed biface (Group 11) were found in this level. The date seems late for Scallorn (see Jelks, 1962), but perhaps it represents the time of transition before the appearance of Perdiz points and ceramics at the site.

Tx-684 (La Jita 176)

A.D. 1150 (810±50)

N25/E40, Level 3. This level contained mixed Late Prehistoric and Archaic materials, including Sabinal arrow points, a Pedernales point, and a "Late Triangular" dart point. The sample was split and both parts prepared and counted separately (yielding BP dates of 800±60 and 810±90). I feel that the date most probably represents the Late Prehistoric materials and may be applicable to the proposed Sabinal arrow point type. The "Late Triangular" biface is one of a series of Middle to Late Archaic forms which may have functioned as dart points or perhaps as knives.

Tx-664 (La Jita 86)

A.D. 1240 (710±70)

Test Pit 5, Level 1. Mixed Archaic and Late Prehistoric artifacts were found in this level, which was excavated near the northern edge of the site where the deposits are rather thin. Thus it is not surprising that these materials are mixed. Artifacts include Perdiz arrow points, an Ensor-like dart point and a dart point similar to Marshall. I feel that the date is most applicable to Perdiz, and it is in agreement with dates on that type from central Texas (Jelks, 1962). This date and Tx-687 probably mark the transitional period, after which Perdiz and pottery were introduced.

Tx-665 (La Jita 29)

A.D. 1040 (910±80)

N10/E40, Level 2. The level contained mixed Late Archaic materials (Montell dart point) and early Late Prehistoric artifacts, especially Edwards arrow points. This date, along with Tx-681 and Tx-685 are fairly consistent and apparently represent the transition from Late Archaic to Late Prehistoric at La Jita. It is an intriguing possibility that Montell survived this late, since dates on the type in the Amistad area to the west are around 490-460 B.C. (Dibble, 1967:30), and possibly earlier (Sorrow, 1968:46-47). These 3 dates (Tx-665, 681, and 685) provide us with the first indication of the age of the Edwards arrow point type, and suggest that it was the earliest arrow point form to appear in the southwestern Edwards Plateau (see Hester, 1970 b).

Tx-681 (La Jita 137)
A.D. 960 (990±60)

N15/E35, Level 3. The level included arrowpoint fragments, Edwards arrow points, and a Frio dart point, and dates the period of transition from Late Archaic to Late Prehistoric.

Tx-685 (La Jita 72)
A.D. 930 (1020±70)

N20/W50, Level 3. This sample was collected from a level containing Edwards arrow points, and Pedernales dart points. In general, it is in agreement with Tx-665 and Tx-681. There are a number of ways in which the presence of Pedernales dart points at this late date could be explained, but the possibility should be left open that the type was still in use (see Tx-684, Tx-682, and Tx-683).

Tx-686 (La Jita 147)
A.D. 490 (1460±80)

N60/E40, Level 2. I feel that this date is applicable to the Late Archaic at La Jita; Frio dart points occurred in the level. Middle Archaic forms (Castroville) occur in the level below.

Tx-692 (La Jita 32)
A.D. 100 (1850±180)

N10/E40, Level 4. This date represents Late Archaic or late Middle Archaic. The level contained Montell and Pedernales dart points, and a fragment of a specimen reminiscent of Marshall. The date would suggest that Montell may have been introduced at La Jita at this time or earlier, and survived until around 1000 A.D.

Tx-682 (La Jita 55)
A.D. 1030 (920±90)

N15/E35, Level 4. The level should represent late Middle Archaic occupations, though the only diagnostic dart point found was a Pedernales specimen. I would have expected the date to be earlier, more in line with Tx-692.

Tx-683 (La Jita 160)
A.D. 1350 (600±80)

N20/E35, Level 2. Unlike Tx-682, this sample was obtained from a level which is basically Late Prehistoric in age over the entire site. However, only Pedernales and other dart point fragments were found, suggesting a possible Middle Archaic affiliation. Since the situation in this level appears very confused, I do not feel that the date can be applied to the materials found within the level.

General Comments: These are the first radiocarbon dates to be reported from an open camp site in the southwestern part of the Edwards Plateau. The dates for the Late Prehistoric period at La Jita correspond rather well with those from central Texas (Jelks, 1962), although Scallorn may have been in use until much later. The earliest arrow point form in the area was Edwards, appearing between 900 and 1000 A.D. Ceramics are introduced at the site around or after 1300 A.D. (see Tx-687 and Tx-664). If the La Jita dates are correct, the Late Archaic did not end in the area until about that time, thereby indicating that it continued much later here than in adjoining areas. Unfortunately, no dates were obtained for Middle or Early Archaic materials, though Tx-692 may be applicable to the Middle Archaic.

Distribution Summary

In this section, I have briefly summarized the vertical and horizontal distributions of the archeological materials recovered at La Jita, and have attempted to order these data chronologically. None of the periods discussed below are clear-cut, but rather are based on trends provided by the stratigraphic positions of the materials, and certain of the radiocarbon dates. Sequences defined in other parts of central Texas (Johnson, Suhm and Tunnell, 1962; Sorrow, Shafer and Ross, 1967) have been used for correlative purposes, particularly in the application of data these sources provide concerning temporally-diagnostic projectile point styles.

LATE PREHISTORIC PERIOD.

The Late Prehistoric occupations (note: the term "Late Prehistoric" is employed here because I feel that it lacks some of the connotations inherent in the term "Neo-American", as defined by Suhm, Krieger and Jelks, 1954:20) at La Jita were primarily confined to Areas A and C in the terrace. Scattered Late Prehistoric materials were found in Areas B, D, E, G, H, and I. These late occupations are distinguished by the presence of arrow points, pottery, and associated lithic and bone tools.

Arrow points were confined to the upper 4 levels at the site, but were especially prevalent in the upper 3, and it is these levels (1-3) that are assigned to the Late Prehistoric occupations. Of the 86 arrow points with stratigraphic provenience, 75% were from levels 1 and 2, 16% from level 3, and 9% from level 4. Though there is considerable mixing in these upper levels, some trends in the arrow point sequence are apparent. Edwards is the earliest type, dominating levels 2 and 3; other forms such as Cliffton, sabinal, Scallorn and Triangular are scattered rather evenly throughout the rest of the late occupations. Perdiz, however, clearly is dominant in level 1, perhaps representing the last (or one of the last) occupations of the site in Late Prehistoric times.

Horizontally, the Cliffton type is restricted to Area A, while Edwards, Sabinal, Scallorn and Triangular are found mainly in Areas A and C. Only Perdiz is well-distributed over much of the site, though it, too, is most common in Areas A and C. Only 2 arrow points were found in the burned rock middens (Areas B and I) and both were Scallorn, and seemed to postdate the midden construction. In summary, 88.8% of the arrow points were recovered from Areas A and C.

Tool forms and other materials present in the Late Prehistoric deposits consist of the following (those forms restricted to the Late Prehistoric levels are indicated with an asterisk): gouge-scraper*, core-choppers, miscellaneous choppers, perforators, thinned bifaces (groups 1-4, 7-9, 11, 12), thick percussion bifaces (groups 1-4, 7-9, 11, 12), cores (miscellaneous bifacial, nuclei), pointed flakes, notched flakes*, retouched blade*, scrapers (1-edge side, 2-edge side, end, oval*, miscellaneous), miscellaneous unifaces (group 2), miscellaneous chipped stone (biface distal and medial, other), limestone object*, manos, ceramics*, splinter awls, modified ulnae*, and antler object*.

In addition to the arrow points and the non-projectile point items discussed above, there were a number of dart points found in the Late Prehistoric levels. Their presence can mainly be attributed to mixing, and several of the specimens were recovered from the upper levels of the burned rock midden areas where Late Prehistoric occupations are totally absent. Those dart points which may be of significance in the Late Prehistoric occupations are Ensor and Frio, as well as Montell and Miscellaneous Forms 2,7, and 9. These dart points apparently represent transitional forms. Since several Pedernales points were also found in Late Prehistoric levels in the terrace, it seems possible (though highly unlikely) that they may have remained in use until a very late time at La Jita.

ARCHAIC PERIOD.

Based on my analyses of the Archaic materials, I have separated them as follows: Late Archaic (level 4, terrace only); Middle Archaic (Levels 5 and 6, in the terrace; levels 1-6 (upper) in Area B; levels 1-4 in Area F; and, levels 1-5, Area I); and Early Archaic (levels 7-10 in the terrace, and below the burned rock middens). In each of these 3 divisions within the Archaic at La Jita are certain projectile point types which can be correlated with adjoining regions (Johnson, Suhm, and Tunnell, 1962; Johnson, 1964; Sorrow, Shafer and Ross, 1967) thus facilitating (and somewhat substantiating) the formulation of these units.

LATE ARCHAIC.

At La Jita, this is characterized by the appearance of Ensor, Frio and Montell dart points, all of which seem to continue into the early part of the Late Prehistoric. Pedernales still remains prominent. The presence of 2 Nolan specimens and a single "Early Corner Notched, Variety 1" in the Late Archaic may be due to mixing. Other dart points present include Miscellaneous Forms 1, 5-7, and 9-10. Associated with the projectile points are these materials: "fist axes", perforators, thinned bifaces (groups 3-6, 8, 9), thick percussion bifaces (groups 3, 5, 7, 10), cores (miscellaneous prepared platform), scrapers (end, miscellaneous), miscellaneous chipped stone (biface distal and medial, other), a gorget, and a mano. No bone artifacts were found.

MIDDLE ARCHAIC.

It is impossible to distinguish any clear vertical separation of projectile point types in the Middle Archaic. The major type is Pedernales, constituting 42.5% of the total dart point sample in the Middle Archaic. There is a great variety of other forms, including Almagre, "Early Corner Notched, Variety 1 and 2", Kinney, La Jita, Marshall, Nolan, "Early and Late Triangular", Abasolo, Edgewood, Lanceolate, Montell, Pandale, Travis, Williams, and Miscellaneous Forms 3, 4, 6, 8, and 10-13. Other items in the Middle Archaic inventory are: "fist axes", core choppers, miscellaneous choppers, perforators, thinned bifaces (groups 1, 3-5, 8-10), thick percussion bifaces (groups 1-7, 9, 10), cores (polyhedral, natural platform, miscellaneous bifacial), pointed flakes, scrapers (1-edge side, 2-edge side, end-side, miscellaneous), miscellaneous unifaces (groups 2 and 3), miscellaneous chipped stone (biface distal and medial, other). Manos were found, and bone artifacts were represented by a splinter awl and a miscellaneous bone object.

EARLY ARCHAIC.

This period appears to be represented by the artifacts found in levels 7-10 (although no diagnostic dart points were found in level 10). The major projectile point form is the "Early Corner Notched" series. The 3 varieties of this style comprise 35.8% of the dart points from the 4 levels, and are especially concentrated in level 7. Similar corner notched dart points have been found in early contexts at Baker Cave, Val Verde County (J. H. Word, personal communication) and in the Stillhouse Hollow Reservoir basin of central Texas (Sorrow, Shafer and Ross, 1967:142). The Pedernales type may have begun in the latter part of this period (it constitutes 17.9% of the dart points), reaching its maximum popularity in the succeeding Middle Archaic period. Other projectile point forms in the Early Archaic at La Jita are: Bulverde, Kinney, La Jita, Lanceolate, Nolan, Travis, and "Early Triangular". Miscellaneous Forms 6 and 12 were found, as was a single unclassified dart point. Associated with the projectile points were: core-choppers, miscellaneous choppers, pebble choppers, perforators, thinned bifaces (groups 2, 3, 6, 7, 9, 11B), thick percussion bifaces (groups 2, 8, 9-12), miscellaneous prepared platform cores, core nuclei scrapers (1-edge side, end, miscellaneous), miscellaneous unifaces (group 1), and miscellaneous chipped stone (biface medial and distal, and other). No ground stone or bone artifacts were found.

Though the evidence at La Jita is not clear-cut, it is possible (based on data from Baker Cave, Stillhouse Hollow Reservoir basin, and some unpublished central Texas sites) that the "Early Corner Notched" series and other corner notched dart point forms are pre-Early Archaic in age. Recent data from central and Trans-Pecos Texas sites needs to be summarized and evaluated before we can deal further with this problem.

The living areas (here defined as multi-activity areas, the scenes of day-to-day living, and not to be confused with the excavation "Areas") during the Archaic period were located as follows: Late Archaic concentrated in Areas A and C, with scattered materials in Areas D, E, G; Middle Archaic living areas primarily in Area A, with Areas B, F, I (burned rock middens) as specific activity loci attributable to this period; Early Archaic concentrated almost totally in Area A, and to a much lesser extent in Area F (pre-burned rock midden), and thinly scattered in Areas B, C, E and I.

Some Archaic dart point forms have restricted horizontal distributions (such as Abasolo, Bulverde, "Early Corner Notched, Variety 3", Lange, Matamoros, Pandale, Travis, Uvalde, Miscellaneous Forms 6, 8, 10 and 11; see provenience section), but these data are meaningless since, in most cases, these are represented by single specimens.

An examination of the horizontal distributions of both Late Prehistoric and Archaic non-projectile point materials failed to point out any significant clusterings which might reflect specific activity loci. In fact, the data indicate that most of the varied manufacturing, maintenance, and processing activities were going on within the confines of the living areas. As pointed out earlier, flake analyses suggest that all stages in the stone tool manufacturing process were being conducted within the living areas, and do not appear to have even been restricted to certain spots within those areas. It is possible that if more of the site area could be exposed horizontally, some discrete activity loci might be pinpointed.

SUMMARY AND CONCLUSIONS

Archeological investigations were conducted at the La Jita site, Uvalde County, Texas, in the early summer of 1967. The excavations revealed abundant cultural remains attributable to Archaic and Late Prehistoric occupations. A couple of dart points suggestive of the Late Paleo-Indian period were found, but corresponding occupational remains were absent, or at least not recognizable.

The Archaic occupations at La Jita have been divided into 3 parts: Early, Middle and Late. The Early Archaic is characterized by "Early Corner Notched" dart points, as well as Early Archaic dart points recognized in other central Texas sequences (Nolan, Travis, Bulverde, etc.). Early Archaic occupations were almost entirely restricted to Area A. The Pedernales point type began late in the Early Archaic at La Jita, dominated the Middle Archaic, and continued into the Late Archaic, and possibly the Late Prehistoric. There were a variety of other dart point styles and non-projectile point tools in the Middle Archaic at La Jita. The main living area was in Area A, though scattered occupational debris is noted in other parts of the site. The burned rock middens (Areas B, F, and I) are Middle Archaic in age. Ensor, Frio and Montell dart points appear to be diagnostic of the Late Archaic occupations, with Montell beginning during the Middle Archaic. The Late Archaic materials are concentrated in Areas A and C and are scattered in other areas. There seems to be no significant associations of non-projectile point tools with that of the 3 Archaic divisions.

The Late Prehistoric period is characterized by the presence of numerous arrow points, plain bone-tempered pottery, modified flake tools, and tools of bone. The Late Prehistoric occupations were not clearly defined, and thus no attempt has been made to link them with previously established cultural units in central Texas (Suhm, 1960; Jelks, 1962). Chronologically, Edwards appears to be the earliest arrow point form. Other types include Scallorn, Sabinal (a proposed new type), Cliffton, and a triangular series. Perdiz is common, and along with the pottery seems to be indicative of the final aboriginal occupations of the site.

Radiocarbon dates for the La Jita occupations are somewhat mixed, but the following ranges are suggested (see the section on radiocarbon dates for details): Early Archaic: no dates; prior to 100 A.D. (Tx-692); Middle Archaic: dates are conflicting, but Tx-692 seems most plausible for the latter part; Late Archaic: several dates; ca. A.D. 400 through A.D. 950 (Tx-681, Tx-685, Tx-686 most applicable); Late Prehistoric: again, several dates; probably began 950-1000 A.D., with the advent of Edwards; latest applicable date being 1290±70 (Tx-687). A date of A.D. 1350±80 (Tx-683) was obtained, but on Archaic materials, and is obviously in error.

An analysis of flake debris from the site was carried out. The analyzed sample (15,047 pieces) pointed out several significant facts: (a) the mass of flake debris was in the living areas, thus indicating most manufacturing processes were conducted there; (b) the flint-working technology did not change markedly during the history of the site, though the presence of flake blades and a polyhedral blade core suggest that a specialized technique (oriented toward the production of such flakes) was present.

The faunal analysis by Riskind (see Appendix I), coupled with the analysis of the other cultural debris certainly suggests that the peoples occupying the La Jita site (both during the Archaic and the Late Prehistoric) were hunters and gatherers. They relied quite heavily on bison and deer and other upland fauna (including antelope which is now absent in the region). There was little or no exploitation of riverine resources. Only a few fragments of mussel shell were found (see Appendix II) and there appears to be a total absence of fish remains. The presence of large numbers of adult land snails at the site (see Appendix II) indicate that they were a major item in the food-collecting activities. Of course, we are unable to assess the importance of plant-gathering in their subsistence pattern, since such perishables would not survive in an open camp site. The wooded environs in the site area provided ample opportunity for the gathering of nuts, berries, roots, and other plant resources. Some of these plant foods, such as hackberry, prickly pear fruit, and pecan would be available on a seasonal basis. The presence of manos and a metate suggest the processing and preparation of vegetal materials.

The site is situated along an old Sabinal River channel. Between it and the present channel, there is yet another old river-bed (see Fig. 2). Perhaps the channel adjacent to the site was the main channel during most of the occupation, but this is very uncertain. Even if the river was in or near its present course, water would have been readily available to the inhabitants. The snails (Appendix II) recovered in the excavations indicate an ecological situation similar to that of the present existed at La Jita during its aboriginal occupation. None of these snails, however, would probably be sensitive to minor variations in the climate which might have affected the site at times.

The size of the site, the presence of a variety of archeological debris, at least 2 major living (occupation) areas, and 3 burned rock middens all suggest that La Jita was a favorable camping location and was utilized extensively for thousands of years. It may have been visited by several different groups during their semi-nomadic travels up and down the Sabinal Canyon. During some periods, it may have been a camp site occupied primarily by a single group during seasonal food-gathering visits to the area. However, I feel that the present data do not allow speculation of greater magnitude on this matter.

It is difficult to compare the archeological sequence at La Jita with other sites in the area due to the lack of scientific investigations in this part of Texas. Huskey (1935) devised an "Early, Middle and Late" sequence for the Nueces Canyon area to the west; in some respects, it is similar to the La Jita Archaic sequence. Unfortunately, his data are too poor for detailed comparisons. T. C. Hill (personal communication) has reported site 41 UV 29, upstream from La Jita (see Appendix III). In general, the artifacts are similar to those from La Jita, and the topographical position of the site is comparable. Points similar to the "Early Corner Notched" series of La Jita are present, along with abundant Archaic and Late Prehistoric materials. Other nearby sites in the Sabinal Canyon also provide evidence of Archaic and Late Prehistoric occupations; superficial tests at 41 UV 25 revealed Late Prehistoric and Late Archaic artifacts and sequence similar to those at La Jita.

Twenty miles downstream on the Sabinal River, the Texas Memorial Museum and The University of Texas have conducted excavations at Kincaid Rockshelter (see Suhm, 1960). I have cursorily examined the materials from the site and while the projectile point styles are somewhat similar (especially the presence of numerous specimens similar to the La Jita "Early Corner Notched" forms), the sequence has not yet been published. Pottery is also present there and at nearby sites. But, the non-projectile point tools at Kincaid are quite different from those at La Jita. At Kincaid, there are large numbers of bifacial and unifacial gouges ("Clear Fork"), as well as many "Guadalupe" gouges. These are completely absent at La Jita (there is one small gouge-scraper in the Late Prehistoric materials). Kincaid is situated in a transitional zone between the south Texas coastal plain and the Edwards Plateau. The gouges found at the site are characteristic of archeological complexes present in the northern part of the south Texas area (Hester, 1968c; Hester, White and White, 1969). It seems likely that Kincaid is on a cultural, as well as a geographical, boundary, and that some of the south Texas groups may have lived in it at times. But the differences in tool forms between Kincaid and La Jita might also reflect a difference of some sort in site function. Once more, the data are inadequate.

Before moving on to a final subject, I would like to comment on the settlement patterns in the Sabinal Canyon. Most of the considered sites are described in Appendix III. At most sites, one or more burned rock middens are present. These middens are, almost without exception, situated at the edge of the lowest terrace, overlooking the Sabinal channel. Site size varies considerably, from small isolated burned rock middens 35 feet in diameter (as at 41 UV 27) to a multi-unit site of 2 or more acres (41 UV 26). In brief survey work which I have conducted in the vicinity of the La Jita site, most of the occupational remains seem to be concentrated on the east terraces of the river. Much of the west side of the Sabinal in the La Jita area is dominated by steep bluffs, which would make access to the river difficult. Rockshelters are present in the area (Kincaid to the south; in the La Jita vicinity, I have heard of rockshelters with Late Prehistoric artifacts and burials). Open sites are also present along tributaries of the Sabinal, but I have not examined these.

I would like to discuss a major problem in concluding this paper, that of the origin and function of the burned rock midden. At La Jita, these middens were accumulations of fire-cracked limestone, with intermingled loose ashy soil and are attributed to Middle Archaic peoples. Artifacts within the middens were very rare, as was bone. These items, along with snails and flake debris, were found to be most abundant in the adjoining living areas on the terrace. The flake analysis revealed that there was a higher percentage of burned flakes in the terrace deposits than in the burned rock middens.

Kelley and Campbell (1942), Suhm (1959; 1960), Huskey (1935) and others have proposed that burned rock middens were favored hearth areas, accumulating because limestone hearths were (for some unknown reason) repeatedly constructed in one spot. Kelley and Campbell seem to have good evidence for their hypothesis in the terraces of the Colorado River of central Texas. It is unfortunate that the data on those sites have never been fully published. It may well be that every burned rock midden is attributable to the phenomenon mentioned above, but I think that the La Jita site points out that other factors may have been at work.

First of all, it would seem that if the burned rock middens at La Jita were favored hearth areas, then there should be more debris mixed in among the hearth stones; there should be more signs of human activities. It would seem that the hearth would have been somewhat of a focal point of various activities, resulting in the accumulation of chipping, butchering, and other residues around it (for example, see the description of Hearth 3 in an earlier section of this paper). If there were hearths present, why is there so little burned bone in the burned rock midden "hearth area", though it is fairly abundant in the terrace living areas? When excavators have been fortunate enough to find several hearths at a site (Jackson, 1938; Sorrow, Shafer and Ross, 1967), some hearths have little debris around them, while others have bones, mussel shell, flakes and other materials mixed in among the hearth stones. Surely the numerous hearths that would have been required to build middens like those at La Jita would have resulted in greater amounts of cultural debris in the middens than was found. If the burned rock middens at La Jita were "cooking areas" (areas intermittently being heated to high temperatures), should not the flint flakes mixed in among the stones show a high percentage of burning? Yet the flake analysis shows that there is a much higher percentage of burned flakes in the Middle Archaic levels in the terrace than in the corresponding Middle Archaic burned rock middens. Nearly all of the bone debris (charred bone, butchered bone, bone smashed for marrow extraction) is in the living areas on the terrace; very little was found in the burned rock middens.

But, we did not locate a single undisturbed hearth in the terrace attributable to Middle Archaic occupations, though there was some scattered burned rock. There were disturbed hearths above, in Late Archaic and Late Prehistoric contexts. Since most of the burned flakes, burned and broken bone, charcoal flecks, ash, etc. are in the terrace, where are the hearths? I think that perhaps they *were* being built on the terrace during Middle Archaic times, but that when the components of the hearth were no longer serviceable (i.e., when they broke up into fist-sized angular fragments), they were gathered up and dumped elsewhere. Then a new hearth was constructed and the process repeated. Such continual dumping of discarded hearth stones in a specific area would naturally lead to an accumulation of burned rock and ash. Occasionally, some projectile points, flakes and other debris would have been gathered up when an old hearth was cleaned up and dumped. The Area B burned rock midden would have been well-situated for a dump area, since it is between living areas A and C. The other burned rock middens at the site could have been dumps for yet unexcavated living areas. T. C. Hill, Jr., (personal communication) has uncovered hearths at nearby 41 UV 29. They were situated outside of a burned rock midden at that site. The hearths are ovate, and are formed with several flat limestone slabs, averaging 6-10 inches in maximum diameter. These rounded limestone slabs had been burned and showed signs of beginning to break up. Similar hearths may exist at La Jita, but we were not fortunate enough to find them.

If the burned rock middens at La Jita were primarily dumps of hearth rubble, it is conceivable that the occupants of the site (both Middle Archaic and later) could have used them for other activities. An example would be what seems to be a chipping locus in the Area B midden. Perhaps at times, hearths were actually built on the burned rock middens, but I feel that most of the hearth activity went on in the living areas on the terrace. The rocks in the La Jita burned rock midden are small and angular, much unlike the flat rounded slabs in Hill's hearths at 41 UV 29.

Kelley and Campbell (1942:322) have stated that the burned rock middens are not a culture trait *per se* of central Texas Middle Archaic peoples, since they apparently represent hearth areas ". . . not purposefully constructed". I submit, however, that it may have been a trait of these Middle Archaic peoples to clear their hearths of broken-up hearth stones and then to dump the debris on a conveniently-located pile of rubble.

As I suggested earlier, there may be several factors to consider in the burned rock midden enigma. I realize that the La Jita site does not convincingly demonstrate the rubble dump concept, primarily because we did not locate former hearth areas in the Middle Archaic levels in the terrace from which the rubble should have come. Most will be quick to point out that the burned rock middens at La Jita differ somewhat from some other types of central Texas burned rock middens. Some of the burned rock middens in the region cover a large area and contain abundant bone and chipped flint debris. This would suggest that the peoples were living and working directly on the midden. At other sites, there are later occupations on and above the burned rock middens, postdating the Middle Archaic occupations. This is probably attributable to the fact that burned rock middens were often situated in favorable camping areas. Burned rock middens like those reported by Woolsey (1938) were large and shallow with numerous artifacts and other debris. Kelly (1961) excavated two thin burned rock middens, both with abundant cultural remains within them. We can contrast these sites with burned rock middens like the one in Area A at the Evoe Terrace Site (Sorrow, Shafer and Ross, 1967) which contained very few artifacts (mostly Pedernales points), though there were large quantities of artifacts both below and above the burned rock zone. But then in the same reservoir, a burned rock zone at the Landslide site contained much cultural material. At the Wunderlich site (Johnson, 1962), two burned rock middens 140 feet apart both contained numerous artifacts, and Johnson termed them "occupations" (pp. 15-17). Conversely, Suhm (1959) reports the Williams site, in which the greatest abundance of artifacts and debris are in what seems to be a living area adjacent to the large burned rock midden at the site (it is significant to note that about an equal amount of excavation was carried out in both the midden and the living area). Jackson (1938: Fig. 12, p. 44) reports burned rock middens in the Fall Creek area with very little cultural debris in them. Sturgis (1956) has reported the Panorama site, with several burned rock middens and adjoining living areas (see his Fig. 13). His burned rock middens were quite thin and he noted that 75% of the artifacts and most mussel and snail shells were at the bottom of the burned rock midden. Since the lower 6 inches or less of the burned rock middens contained Early Archaic dart points, most of the debris that he found in his middens might be attributable to pre-midden occupations. In summary, there are a variety of situations encountered in central Texas burned rock middens, and by selecting among the various sites, one could prove just about any theory concerning burned rock midden origin and function.

Closer to La Jita is the Gildart site (41 UV 37), a burned rock midden site on the Nueces River. It has one very large burned rock midden (and adjoining piles of rubble) which is centrally located among 9 much smaller middens (Hester, 1970 a). Jackson tested the central midden in 1934, noting that the midden contained very few artifacts or bone and snail shells; below it, however, were abundant archeological remains in a terrace deposit. He noted the presence of 2 adjoining piles of burned rock, one of which he described as a long continuous heap of burned rock nearly 200 feet in length. Unfortunately, he did not test this heap, nor did he test any of the smaller subsidiary middens or the areas between them. It is possible that these middens are dump areas, as at La Jita (the large midden certainly seems to be), or the smaller ones may simply be hearth areas, since most are between 12 and 25 feet in diameter and a foot or less in thickness. Another large burned rock midden was extensively excavated on the Nueces River in Edwards County (Laxson, 1964) but yielded only 32 artifacts. Hester (1966) has described excavations at another burned rock midden just downstream from Laxson's site. This site (41 RE 1) had a centrally located heap of burned rock rubble with extremely few cultural remains, though abundant artifacts and scattered burned rock surrounded it.

The major hindrance to more meaningful discussions of the rubble heap or dump hypothesis is the almost total lack of excavations that have been conducted in the areas surrounding a burned rock midden (recent work has been done by William Sorrow in the North Fork Reservoir of central Texas). For some reason, archeologists for the past several decades have usually contented themselves to digging only in the burned rock midden proper. It is only with more extensive testing both in and outside of the burned rock middens that the final solution to the burned rock midden problem will be obtained. There may be several factors involved in burned rock midden origin and function (see Castetter, Bell and Grove, 1938; Collier, Hudson and Ford, 1942: 37-38; Greer, 1965; 1967), but these will not be discerned without much more problem-oriented research.

References Cited

Blair, W. Frank
1950. The Biotic Provinces of Texas. *Texas Journal of Science,* Vol. 2, No. 1: 93-117.

Campbell, T. N.
1957. The Fields Shelter: An Archeological Site in Edwards County, Texas. *Texas Journal of Science,* Vol. 9, No. 1: 7-25.

Castetter, E. F., W. H. Bell, and A. R. Grove
1938. Ethnobiological Studies in the American Southwest, VI: The Early Utilization and the Distribution of Agave in the American Southwest. *University of New Mexico Bulletin,* Biology Series, Vol. 5, No. 4.

Collier, D., A. E. Hudson, and A. Ford
1942. Archaeology of the Upper Columbia Region. *University of Washington Publications in Anthropology,* Vol. 9.

Dibble, David S.
1967. Excavations at Arenosa Shelter, 1965-66. Report submitted to the National Park Service by the Texas Archeological Salvage Project, Austin.

Duessen, Alexander
1924. Geology of the Coastal Plain of Texas West of Brazos River. *United States Geological Survey Professional Papers,* No. 126.

Greer, John W.
1965. A Typology of Midden Circles and Mescal Pits. *Southwestern Lore,* Vol. 31, No. 3: 41-55.
1967. Midden Circles Versus Mescal Pits. *American Antiquity,* Vol. 32, No. 1: 108-109.

Hester, Thomas Roy
1963. The Lackey Site. *Special Report of the Carrizo Springs (Texas) High School Archeological Society,* No. 1.
1966. Excavations at the Lackey Site: A Burned Rock Midden in Real County, Texas. Manuscript on file, Texas Archeological Research Laboratory, Austin.
1968a. Destruction of Archeological Sites in Uvalde County, Texas. *Texas Archeology,* Vol. 12, No. 1: 13-15.

1968b. Notes on Pottery-Bearing Sites in Southern Texas. *The Bull-Roarer*, Vol. 3, No. 2: 9-11.

1968c. Paleo-Indian Artifacts from Sites Along San Miguel Creek: Atascosa, Frio and McMullen Counties, Texas. *Bulletin, Texas Archeological Society*, Vol. 39: 147-161.

1970a. Burned Rock Midden Sites on the Southwestern Edge of the Edwards Plateau, Texas. *Plains Anthropologist*, in press.

1970b. Notes on the Edwards Arrow Point Type. *The Record*, Vol. 26, No. 2: 17-18.

Hester, Thomas Roy and T. C. Hill, Jr.

ms. An Initial Study of a Prehistoric Ceramic Tradition in Southern Texas. Manuscript accepted for publication, *Plains Anthropologist*.

Hester, Thomas Roy, L. D. White and Joy White

1969. Archeological Materials from the Oulline Site (41 LS 3) and Other Sites in La Salle County, Southwest Texas. *Texas Journal of Science*, Vol. 21, No. 2: 131-166.

Huskey, Vane

1935. An Archeological Survey of the Nueces Canyon of Texas. *Bulletin, Texas Archeological and Paleontological Society*, Vol. 7: 105-114.

Inglis, Jack M.

1964. A History of Vegetation on the Rio Grande Plain. *Texas Parks and Wildlife Department, Bulletin 45.*

Jackson, A. T.

1938. The Fall Creek Sites. *University of Texas Publications*, No. 3802.

ms. Notes Pertaining to Central Texas Pottery as of December 16, 1938. Manuscript on file, Texas Archeological Research Laboratory.

Jelks, Edward B.

1962. The Kyle Site, A Stratified Central Texas Aspect Site in Hill County, Texas. *Archaeology Series*, No. 5, The University of Texas.

Johnson, LeRoy, Jr.

1962. Wunderlich: A Burned-Rock Midden Site. *In*: Salvage Archeology of Canyon Reservoir. *Bulletin No. 5*, Texas Memorial Museum: 13-48.

1964. The Devil's Mouth Site, A Stratified Campsite at Amistad Reservoir, Val Verde County, Texas. *Archaeology Series*, No. 6, The University of Texas.

Johnson, LeRoy, Jr., Dee Ann Suhm and Curtis D. Tunnell

1962. Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge and Oblate Sites. *Bulletin No. 5*, Texas Memorial Museum.

Kelley, J. Charles

1959. The Desert Culture and the Balcones Phase: Archaic Manifestations in the Southwest and Texas. *American Antiquity*, Vol. 24, No. 3: 276-288.

Kelley, J. C. and T. N. Campbell

1942. What the the Burned Rock Mounds of Texas? *American Antiquity*, Vol. 7, No. 3: 319-322.

Kelly, Thomas C.

1961. The Crumley Site: A Stratified Burnt Rock Midden, Travis County, Texas. *Bulletin, Texas Archeological Society*, Vol. 31: 239-272.

Laxson, Bay

1964. The Lackey Site No. 2. *Special Report*, Carrizo Springs High School Archeological Society.

Sellards, E. H.
1952. *Early Man in America: A Study in Prehistory.* University of Texas Press.
Sellards, E. H. and Carl Chelf (compilers)
n.d. *La Jita.* Bexar County Council of Girl Scouts.
Shafer, Harry J.
1969. Archeological Investigations in the Robert Lee Reservoir Basin, West Central Texas. *Papers of the Texas Archeological Salvage Project,* No. 17.
Sollberger, J. B.
1967. A New Type of Arrow Point with Speculations as to its Origins. *The Record,* Vol. 23, No. 3: 16-22.
Sorrow, William M.
1968. The Devil's Mouth Site: The Third Season-1967. *Papers of the Texas Archeological Salvage Project,* No. 14.
Sorrow, W. M., H. J. Shafer, and R. E. Ross
1967. Excavations at Stillhouse Hollow Reservoir. *Papers of the Texas Archeological Salvage Project,* No. 11.
Stipp, J. J., E. M. Davis, J. E. Noakes, and T. E. Hoover
1962. University of Texas Radiocarbon Dates I. *Radiocarbon,* Vol. 4.
Sturgis, H. F.
1956. A Burnt-rock Midden Site in Travis County. *Bulletin, Texas Archeological Society,* Vol. 27: 111-128.
Suhm, Dee Ann
1959. The Williams Site and Central Texas Archeology. *Texas Journal of Science,* Vol. 11, No. 2: 218-250.
1960. A Review of Central Texas Archeology. *Bulletin, Texas Archeological Society,* Vol. 29: 63-108.
Suhm, Dee Ann, Alex D. Krieger and E. B. Jelks
1954. An Introductory Handbook of Texas Archeology. *Bulletin, Texas Archeological Society,* Vol. 25.
Valastro, S., Jr. and E. Mott Davis
1970. University of Texas at Austin Radiocarbon Dates, No. VIII. *Radiocarbon,* Vol. 12, No. 2: 634-635.
Weir, Frank Alfred
1967. The Greenhaw Site: A Burned Rock Midden Cluster of the Edwards Plateau Aspect. Unpublished M.A. Thesis, The University of Texas at Austin.
Witthoft, John
1967. Glazed Polish on Flint Tools. *American Antiquity,* Vol. 32, No. 3: 383-388.
Woolsey, Arthur M.
1938. Additional Buchanan Lake Sites. *University of Texas Publications,* No. 3802.
Wormington, H. M.
1957. Ancient Man in North America. *Denver Museum of Natural History, Popular Series No. 4.*

Department of Anthropology
University of California,
Berkeley 94720

Artifact Provenience

In this section of the paper, provenience data for specimens collected at La Jita are presented. Tables 6-9 list the artifact proveniences for Areas A, B, C and F, the major excavation areas at the site. Because of necessary space restrictions, the artifact distributions for the other areas (Areas D, E, G, H, I and Miscellaneous) are not presented in table form. However, these data are briefly summarized following Table 9.

Detailed artifact provenience records are filed at the Texas Archeological Research Laboratory, Austin.

Table 6.

Provenience of specimens, Area A.

The area is composed of units N10 E40, N15 E40, N20 E40, N25 E40, N30 E40, N15 E35, N20 E35, Test Pit 1, Test Pit 1-A.

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
PROJECTILE POINTS										
Arrow Points										
Cliffton	1	1	1							3
Edwards	1	5	3	1						10
Perdiz	3	1	1		1					6
Sabinal	2	1	2							5
Scallorn										
Var. 1		2								2
Var. 2	1	1								2
Triangular										
Form 1	1	3		1						5
Form 2	4	2							2	8
Form 3	2	1								3
Miscellaneous	3	3	1	1						8
Other Stemmed		4								4
Dart Points										
Almagre						1				1
Bulverde							1			1
Castroville		2							1	3
Early Corner										
Notched										
Var. 1	1			1	1		4			7
Var. 2					1	2	6			9
Var. 3							2			2
Edgewood	1				1					2
Ensor										
Var. 2	2	1								3
Frio										
Var. 1	1									1

(Continued on following page)

TABLE 6 (Continued)

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
Var. 2		1	2						1	4
Kinney					1	1				2
La Jita	1					1	1			3
Lanceolate					1		1	1		3
Marshall					1					1
Matamoros			1							1
Montell		1	4	2						7
Nolan				1	1	3	2	1		8
Pandale					1					1
Pedernales	3	3	8	22	11	9	1	1		58
Rect. Stemmed			1							1
Travis					1		1			2
Uvalde			1							1
Williams					1	1				2
"Early Triangular"						2	4			6
"Late Triangular"			1		1					2
Dart Points (continued)										
Misc. Forms										
1				2					1	3
2		1	1							2
4							1			1
5				1						1
7	1	1								2
8					2					2
9			1	1						2
10				1	1					2
11					1	1				2
12					1					1
13						1				1
Uncl. Individual										
1					1					1
3							1			1
5			1							1
8					1					1
9		1								1
11				1						1
OTHER BIFACIAL ARTIFACTS										
Gouge-scraper			1							1
"Fist axes"				1		1				2
Core-choppers		1			2		1			4
Misc. choppers			2			1	1			4
Pebble choppers							2			2
Perforators	2	1		1	2					6
Other thinned bifaces										
Group 1			1			1			1	3

(Continued on following page)

TABLE 6 (Continued)

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
3						1	1			2
5				2	1	1				4
6				1						1
7	1						1			2
8		1		1						2
9				1			2			3
10	1	3	1							5
11A		1								1
11B							1			1
Thick percussion bifaces										
Group 2						1	1			2
3				1		1				2
4		1								1
5				2		1				3
6					1					1
7		2	1			1			1	5
8							1			1
10				1	1					2
11	1						1			2
12								1		1
Cores										
Polyhedral						1				1
Misc. Prep. Platform						1				1
Natural Platform					2					2
Misc. bifacial		1				1		1		3
Nuclei			1				1			2
UNIFACIAL ARTIFACTS										
Pointed flakes	1		1		1	1				4
Notched flakes	1									1
Retouched blade	1									1
Scrapers										
1-edge side							4	1		5
2-edge side			1		1	1				3
end		3	1				2			6
oval	1									1
miscellaneous	1		1	1	1					4
Misc. unifacials										
Group 1				1						1
2		1		1		1				3
3				1			1			2
4				1						1
MISCELLANEOUS CHIPPED STONE										
Biface distal	4	7	7	7	13	5	4	3	3	53

(Continued on following page)

TABLE 6 (Continued)

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
Biface medial	2	1		1		4	2			10
Other	1	3	3	1	1	1				10
GROUND STONE ARTIFACTS										
Manos				1					1	2
Metate									1	1
BONE ARTIFACTS										
Modified ulnae	1									1
Splinter awls	1	2								3
Misc. bone object					1					1
Antler object		1								1
CERAMICS	49	4	1						3	57
TOTALS	96	68	51	61	57	47	51	9	15	455

TABLE 7.

Provenience of specimens, Area B.

This area includes units N30 E5, N35 E5, N40 E5, N45 E5, and N35 E25. Levels 1 through upper 5 are burned rock midden deposits.

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
PROJECTILE POINTS										
Arrow Points										
Scallorn										
Var. 3			1							1
Dart Points										
Castroville	1			1						2
Kinney						1				1
La Jita					1					1
Marshall			2		1	1				4
Nolan				1		1				2
Pedernales			1	2	4	6	4			16
Rect. Stemmed						1				1
"Late Triangular"									1	1
Misc. Forms										
1	1									1
9	1								1	2
Uncl. Individual										
2			1							1
13				1						1
Unfinished				1						1
OTHER BIFACIAL ARTIFACTS										
Core-choppers						1				1
Misc. choppers								1		1
Other thinned bifaces										

(Continued on following page)

TABLE 7. (Continued)

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
Group 1	1	1								2
3						1				1
4	1			1						2
5			1							1
6								1		1
7							1			1
9						1				1
Thick percussion bifaces										
Group 1					1					1
2			1							1
3	1									1
6						1				1
7					1					1
8			1				1			2
9					2					2
12		1	1							2
Cores										
Misc. prep. platform									1	1
Misc. bifacial		1								1
UNIFACIAL ARTIFACTS										
Scrapers										
Misc.							1			1
MISCELLANEOUS CHIPPED STONE										
Biface distal	1			1	1	3	1		2	9
Biface medial			1		1					2
Other			1	1		2	2		1	7
GROUND STONE ARTIFACTS										
Manos			2							2
BONE ARTIFACTS										
Splinter awl			1							1
TOTALS	7	4	14	9	12	19	9	2	6	82

TABLE 8.

Provenience of specimens, Area C.
This area is made up of units N20 W40, N20 W45, N20 W50.

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*Surface*	*Totals*
PROJECTILE POINTS									
Arrow Points									
Edwards	2	3	3	1	1				10
Perdiz	4								4

(Continued on following page)

TABLE 8 (Continued)

LEVELS	1	2	3	4	5	6	7	Surface	Totals
Sabinal	1								1
Scallorn									
Var. 1		2	1	1					4
Var. 2		1			1				2
Triangular									
Form 1			1						1
Form 2	2								2
Form 3	1	1	1						3
Miscellaneous	2	3	1						6
Other Stemmed		1		2					3
Dart Points									
Almagre					1				1
Ensor									
Var. 1	1			1					2
Var. 2			1						1
Frio		1	1	1					3
Kinney					1				1
Montell	1			1					2
Pedernales			1	4	5		2		12
"Early Triangular"					1				1
"Late Triangular"	1								1
Misc. Forms									
2			1						1
3			1						1
4						1			1
6				1		2	1		4
7		1		1					2
Uncl. Individual									
7					1				1
9						1			1
OTHER BIFACIAL ARTIFACTS									
Core-choppers					1				1
Other thinned bifaces									
Group 1	1								1
4				1					1
8					1				1
9						1			1
10			1						1
Thick percussion bifaces									
Group 1			1						1
4					1				1
5					1				1
9				1			1		2

(Continued on following page)

TABLE 8 (Continued)

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Surface*	*Totals*
Cores										
Misc. prep. platform			1	1	1			1		4
Misc. bifacial				2		1				3
UNIFACIAL ARTIFACTS										
Pointed flakes							1			1
Scrapers										
1-edge side						1	1			2
2-edge side							1			1
end		1			1					2
end-side						1				1
misc.					1					1
Misc. unifacials										
Group 4						1				1
MISCELLANEOUS CHIPPED STONE										
Biface distal		9	3	3	3	5	3	1		27
Biface medial				1				1		2
Other			3		1					4
GROUND STONE ARTIFACTS										
Limestone object				1						1
BONE ARTIFACTS										
Modified ulnae		1								1
Splinter awls						1				1
TOTALS		27	20	22	22	25	12	7	0	135

AREA D. This area consisted of Test Pit 6 and Exploratory Trench 1; only 10 artifacts were recovered. Level 1: Perdiz (1), Frio, Variety 2 (1), Williams (1); Level 2: Triangular arrow points, Form 2 (1); miscellaneous dart point, Form 2 (1), mano (1); Levels 3, 4 and 5: no artifacts; Level 6: Pedernales (1); Level 7: no artifacts; Surface (Area D): Castroville (1).

AREA E. Thirty-four artifacts were found in this area, which included Units N60 E40 and N95 E40. Level 1: Perdiz (2); miscellaneous dart points, Form 7 (1); biface distal fragments (2); ceramics (1 sherd). Level 2: Lange (1); Pedernales (1); biface distal fragment (1); ceramics (1 sherd). Level 3: Almagre (1); Castroville (1); Frio, Variety 2 (3); La Jita (1); Lange (1); Montell (3); miscellaneous dart points, Form 9 (1); unclassified individual dart points, specimen 4 (1); core-chopper (1); thinned bifaces, group 5 (2); thick percussion bifaces, group 2 (1); biface distal fragments (1). Level 4: miscellaneous dart points, Form 5 (1); unfinished dart points (1); perforators

TABLE 9.
Provenience of specimens, Area F.
This area consists of Test 7. Burned rock midden deposits, levels 1-4.

LEVELS	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Surface*	*Totals*
PROJECTILE POINTS												
Dart Points												
Early Corner Notched												
Var. 1							1		1			2
Var. 2							1					1
Pedernales						1						1
Miscellaneous Form												
12							1					1
OTHER BIFACIAL ARTIFACTS												
Cores												
Misc. bifacial							1					1
Perforators									1			1
Other thinned bifaces												
Group 2		1				1						2
3			1									1
5		1										1
6						1						1
Thick percussion bifaces												
Group 12									1			1
MISCELLANEOUS CHIPPED STONE												
Biface distal			1				1					2
Other			1			2				2		5
GROUND STONE ARTIFACTS												
Gorget			1									1
TOTALS (%)	0	2	4	0	0	5	5	0	3	2	0	21

(1); miscellaneous scrapers (1); biface distal fragments (1). Level 5: lanceolate dart point (1); Level 6: miscellaneous dart points, Form 3 (1).

AREA G. Test Pits 3 and 5 were excavated in this area, and yielded 14 artifacts. Level 1: Perdiz (1); Frio, Variety 1 (1); biface distal fragments (1). Level 2: no artifacts. Level 3: Ensor, Variety 3 (1); miscellaneous chipped stone, other (1); Level 4: Pedernales (3); thinned bifaces, group 4 (1); biface distal fragments (1); miscellaneous chipped stone, other (1). Level 5: Abasolo (1). Level 6: biface distal fragments (1). Level 7: "Early Corner Notched", Variety 1 (1).

AREA H. Test Pit 2 was the only unit excavated in this area. A total of 31 artifacts was recovered. Level 1: Perdiz (1), Sabinal (1), ceramics (9 sherds). Level 2: Pedernales (1). Level 3: miscellaneous arrow point (1); rectangular stemmed dart point (1); thinned biface, group 7 (1); ceramics (1 sherd). Level 4: miscellaneous scrapers (2). Level 5: Montell (1); Pedernales (2); unfinished dart point (1); thick percussion bifaces, groups 1 and 10 (1 each); miscellaneous chipped stone, other (2). Level 6: Almagre (1); Pedernales (1); thick percussion bifaces, group 1 (1). Level 7: thick percussion bifaces, groups 8 and 10 (1 each).

AREA I. Seventeen artifacts were obtained from Unit N65 E115 in this area. Level 1: Scallorn, Variety 3 (1); Montell (1). Level 2: Edgewood (1); Frio, Variety 2 (1). Level 3: Ensor, Variety 3 (1); miscellaneous bifacial core (1). Level 4: no artifacts. Level 5: Castroville (2); La Jita (1); Nolan (2); "Late Triangular" (5). Level 6: La Jita (1). Levels 1 through 5 of this unit were burned rock midden deposits.

MISCELLANEOUS. Forty-six artifacts in the collection were obtained from the surface, Exploratory Trench 2, Test Pit 4, and the W. W. Stout collection. These materials include: Arrow points: Perdiz (4; one of which was found in Level 1 of Test Pit 4), Triangular Form 1 (2), Miscellaneous (1); Dart points: Castroville (1); Ensor, Variety 1 (1); Ensor, Variety 4 (1); Langtry (1); Pedernales (5); Williams (1); unclassified (1). Other bifacial artifacts: core-choppers (2); thinned bifaces, group 1 (1); thick percussion bifaces, groups 9, 11, 12 (1 each); cores (miscellaneous prepared platform, miscellaneous bifacial, nucleus: 1 each). Unifacial artifacts: pointed flakes (1); notched flakes (1); end-scrapers (2); end-side scrapers (1). Miscellaneous chipped stone: biface distal and medial (1 each); other (1). Ground stone artifacts: manos (3); hammerstone (1). Bone artifacts: bead (1); spatulate object (1). Ceramics: sherds (4).

Appendix I

AN ANALYSIS OF THE FAUNAL REMAINS FROM THE LA JITA SITE

DAVID H. RISKIND

The principal objective of this study is to determine the spectrum of fauna exploited by the aboriginal inhabitants of the La Jita Site. A concomitant topic is the analysis of the nature and condition of the faunal remains, and as well to suggest culturally linked activities which may be inferred by the nature of the remains. The total collection submitted for analysis consisted of 2,078 bones and bone fragments, 167 (8%) of which could be identified to the genus/species level (Table 1).

All remains were analyzed by levels as sorted initially by Hester and crew. Each bag of remains was emptied and all recognizable skeletal elements were separated according to Order. Fragments were categorized as far as was feasible, however, they were not individually recorded; rather, they were lumped into categories such as mammalian, reptilian, avian, etc. Mammals were further divided into small (e. g. *Rodentia*), medium (e. g. *Canidae, Mustelidae*), and large (e. g. *Suidae, Cervidae*, and *Bovidae*).

Each recognizable element was then specifically identified; however, the highly fragmented and unrecognizable pieces were merely recorded as fragments of either small, medium, or large mammals or reptiles, etc. In a few instances identification of bone fragments was

TABLE 1

Distribution of Identifiable Bone by Species

Sample: 167 pieces	
Chelydra	1
Terrapine	2
Trionyx	1
Sylvilagus	9
*Sigmodon**	1
Canidae	5
Procyon	1
Odocoileus	118
Antilocapra	1
Bison	28

*not considered a food item.

made on the basis of size in conjunction with bone morphology. For example, a fragment whose thickness (from marrow cavity to periosteal surface) is *ca.* 5mm and whose surface morphology indicates a bone of large volume, was tentatively identified as *Bison*. With the exception of a few complete phalanges, three teeth, and one proximal end of a femur, all *Bison* bone fragments were identified only by consideration of size and morphology.

The reptiles (three turtles) were identified from plastron and/or carapace fragments and in the case of *Chelydra* from a complete humerus.

Results

As would be expected the bone from La Jita (an open site in alkaline soils in an area with 20″+ annual rainfall) was not ideally preserved. All exposed surfaces of the bone are solution pitted—a function of the wet/alkaline soil conditions. In addition, soils such as these harbor many types of fungal spores which would attack any buried organic refuse.

All but a few of the more compact skeletal elements (phalanges, carpals, tarsals, metacarpals and tarsals, and the dentition) were in a highly fragmented condition. Few of the fragments exceeded 5 cm. in their greatest dimension. The breaks on the bone compare favorably with those that have been produced through intentional percussion or snapping as recreated under experimental conditions, thus diminishing the possibility that the bones were fragmented through the physical behavior of the soils in which they were buried. Human agents are then most likely responsible for the fragmented nature of the La Jita faunal remains.

TABLE 2

Distribution of Recognizable Skeletal Elements for Deer at the La Jita site, 41 UV 21

Sample: 118 pieces	
Cranial fragments	10
Mandible	4
Teeth	14
Vertebrae	—
Rib	—
Pelvis	—
Scapula	2
Upper limbs	48
Metapodial	22
Carpals, tarsals, metacarpals, metatarsals, phalanges	18

Elements represented by the fragments were predominantly long bones but also present were round bones (carpals, tarsals, etc.), teeth, and cranial fragments respectively, in descending order of frequency (Table 2). In addition the unidentifiable fragments appeared to be predominantly the remains of deer long bones.

Approximately 11% of all bone fragments counted were either charred or calcined. Signs of obvious tool or butchering marks on any of the bones were not observed (probably due in part to preservation factors), and in addition there was no evidence of rodent gnawing on any of the faunal remains: perhaps suggesting rapid accumulation of the deposits in the site.

Assigning an age to such fragmentary remains is necessarily hazardous, nevertheless, the great majority of the elements examined appeared to belong to mature individuals.

The following is a taxonomically arranged list of the fauna identified from the submitted skeletal remains:

REPTILIA
- Chelonia
  - Chelydridae
    - *Chelydra serpentina* (snapping turtle)
  - Testudinidae
    - *Terrapine ornata* (ornate box turtle)
  - Trionychidae
    - *Trionyx* sp. (soft shell turtle)

MAMMALIA
- Lagomorpha
  - Leporidae
    - *Sylvilagus floridanus/auduboni* (cottontail)
- Rodentia
  - Cricetidae
    - *Sigmodon hispidus** (hispid cotton rat)
- Carnivora
  - Canidae (e. g. dog, fox, coyote)
  - Procyonidae
    - *Procyon lotor* (raccoon)
- Artiodactyla
  - Cervidae
    - *Odocoileus virginianus* (white-tail deer)
  - Antilocapridae
    - *Antilocapra americana*? (pronghorn antelope)
  - Bovidae
    - *Bison* sp. (bison)

*Not considered a food item

Antilocapra (Pronghorn antelope) is questionably included because certain of the fragmentary phalanges (mature) analyzed appeared to be considerably more gracile than comparative *Odocoileus* samples—suggesting either a small deer or more likely Pronghorn antelope, a species known to range into this region of Texas to the present day (Davis, 1966).

Discussion

The most outstanding aspects of this collection are (1) the homogeneous nature of the faunal assemblage and (2) the physical state of the remains themselves.

The faunal data suggests that the aboriginals occupying the La Jita Site were geared primarily to a savannah/grassland hunting economy (or to areas bordering the indigenous juniper/oak woodlands) with little or no emphasis on the exploitation of either lacustrine or riverine environments. No fish bones whatever were encountered in the analysis and only two species of water dwelling reptiles (*Chelydra* and *Trionyx*) were observed to be present. Similarly no avifauna were encountered. Although preservation in the site was not excellent, I do not feel that the absence of either fish or bird remains could be the result of differential preservation.

Preponderance of deer, and to a much lesser extent bison remains suggests that these two mammals provided the bulk of the game food for the aboriginal inhabitants of the site. The fragmentary nature of the remains precludes any accurate (or realistic) quantification of the deer and/or bison taken by the La Jita inhabitants. From the data at hand, however, it would appear clear to me that deer constituted a staple in the diet of the site's inhabitants while the bison represented only a fortuitous dietary supplement.

Several culturally linked phenomenon may be inferred from the nature of the remains and from the skeletal elements represented in the sample. As mentioned above, virtually all skeletal elements of the principal game animal (deer) were tabulated in the faunal analysis. This remains true with minor modification—neither pelves nor vertebrae and their respective pairs of articulating ribs were encountered in the remains. These data and the fact that fragmentary limb bones and scapulae, as well as tarsals, carpals, metacarpals, metatarsals, and phalanges, etc., were encountered in the skeletal refuse suggests that the game was partially butchered in the field some distance from the habitation site and was then transported back to the site for further processing. Had the deer been killed very near the site and then butchered (probably only gutted) all skeletal elements would be represented; conversely, if the deer were killed at a considerable distance from the site fewer skeletal elements would be represented, primarily the larger long bones.

In the case of the La Jita material, the deer were apparently butchered by the removal of all appendages, the head or portions thereof, and of course such cuts as the tenderloins and the backstraps. Easily accessible meat (e. g. neck cuts) would have undoubtedly been stripped from the carcass. Left behind would have been the vertebrae and ribs, and the pelvic girdle—two areas of negligible meat yield.

Similar correlations between skeletal elements present at the habitation site vs. distance from the kill to the site have been hypothesized and substantiated by White (1952, 1953, 1954, 1955), Kehoe and Kehoe (1960), and Wood (1962) for sites on the Great Plains and by Perkins and Daly (1968) for a Mesolithic site at Suberde in Turkey. Although primarily for bison, these data have been demonstrated for many large mammals known to have been hunted by man.

The highly fragmented nature of the bones, as well as the frequency of charred bone suggests that the debris is a result of the smashing of the bones for the extraction of the marrow and of the subsequent rendering of grease from the bones. These food procuring techniques would produce detritus comparable to that found in the La Jita Site.

The dearth of any evidence indicating that the nonartifactual bone was in any way worked or modified lessens the possibility that this bone debris constitutes workshop refuse. Evidence at hand overwhelmingly suggests it is entirely refuse from the butchered and processed fauna.

Summary

Analysis of the highly fragmented faunal debris from the La Jita Site yielded several significant considerations:

1) The aboriginal inhabitants apparently exploited only a narrow spectrum of the animal foods available to them within the environment (see Hester, Summary and Conclusions).

2) Skeletal elements represented in the refuse suggest that the principal food animal (deer) was killed some distance from the campsite, partially butchered, and then brought back into camp. Left behind would have been the vertebrae, pelvic girdle, and ribs. These elements were not represented in the faunal remains.

3) Fragmented and charred remains were apparently produced by human agents. The smashing of bones to obtain marrow and the subsequent rendering to produce bone grease would have yielded debris comprised of fragmented charred bone.

References Cited

Davis, William B.
1966. *The Mammals of Texas*, Texas Parks and Wildlife Department, Bulletin 41, Austin.

Kehoe, R. F., and A. B. Kehoe
1960. Observations on the Butchering Techniques at a Prehistoric Bison Kill in Montana. *American Antiquity*, Vol. 25, No. 3: 420-22.

Perkins, Dexter, Jr. and Patricia Daly
1968. The Potential of Faunal Analysis: An Investigation of the Faunal Remains from Suberde, Turkey. *Scientific American*, Vol. 219, No. 5: 96-106.

White, Theodore E.
1952. Observations on the Butchering Techniques of Some Aboriginal Peoples. No. 1. *American Antiquity*, Vol. 17, No. 4: 337-338.
1953. Observations on the Butchering Techniques of Some Aboriginal Peoples. No. 2. *American Antiquity*, Vol. 19, No. 2: 160-164.
1954. Observations on the Butchering Techniques of Some Aboriginal Peoples. No. 4. *American Antiquity*, Vol. 19, No. 3: 254-264.
1955. Observations on the Butchering Techniques of Some Aboriginal Peoples. No. 9. *American Antiquity*, Vol. 21, No. 2: 170-178.

Wood, W. Raymond
1962. Notes on the Bison Bone from the Paul Brave, Huff, and Demery Sites. *Plains Anthropologist*, Vol. 7, No. 17: 201-204.

Department of Anthropology
The University of Texas
at Austin.

Appendix II

NOTES ON THE SHELL REMAINS FROM THE LA JITA SITE

Thomas Roy Hester

The following is the result of a superficial examination of the shell remains from the La Jita Site. These materials are stored at the Texas Archeological Research Laboratory, Austin.

RIVER MUSSEL. Examples of river mussel (*Unio* sp.) were very rare in the deposits at La Jita, and so fragmented that species identification was not attempted. About 1/2 of the specimens came from Area A, with scattered fragments in Areas C, I and G. No modification was noted on any of the fragments.

LAND SNAILS. Large quantities of land snails were found at the site, so many in fact, that only samples were collected from each level. The snails were especially concentrated in the living areas (A and C), and were notably less common in the burned rock middens. A detailed study of the land snails from the site has not been conducted at present and the following data should be considered preliminary. Identifications and habitat data are based on Allen and Cheatum (1961: 291-316).

FAMILY BULIMULIDAE

Bulimulus alternatus mariae

Bulimulus schiedeanus

Comments: Both species are present in large numbers, and both are characteristic of semiarid southcentral and west Texas. Specimens from 153 lots were cursorily examined. In almost all instances, they are large adults. Though as scavengers they may have been attracted to the debris in the midden areas, it seems more likely that they were gathered as food items (Allen and Cheatum, 1961; Krieger, 1956).

FAMILY HELICINIDAE

Helicina orbiculata tropica

Comments: They often occurred in association with the *Bulimulus*, though in much smaller quantities. Due to their small size, they were probably not utilized as a food source. They are generally associated with woodland conditions, much like those which exist today at La Jita.

FAMILY OLEACINIDAE

Euglandia texasiana

Comments: These were extremely rare, with only 2 or 3 specimens recovered. These thin-walled snails are attracted to well-protected areas where abundant moisture occurs.

FAMILY ACHATINIDAE

Rumina decollata

Comments: They were found primarily in upper levels, usually Levels 1 or 2. This species was introduced through commerce early in the Historic period from the Mediterranean area (Allen and Cheatum, 1961:310).

FAMILY POLYGYRIDAE

Polygyra texasiana

Comments: These small snails occurred in only 3 or 4 levels at the site, primarily in its southern portion. This species is found primarily in open fields and woodlands.

Discussion

This cursory analysis of the snails and other shell remains from La

Jita shows that the land snail species found in the archeological deposits are characteristic of wooded environs occurring within a semi-arid climate. The same species of land snails still occur at La Jita today, thus suggesting that the site environment and the general climatic conditions have changed little, if any, since the site's prehistoric occupation.

The scarcity of mussel shell in the archeological deposits would seem to indicate that this riverine resource was a minor item in the aboriginal diet.

References Cited

Allen, D. C. and E. P. Cheatum
1961. Ecological Implications of Fresh-Water and Land Gastropods in Texas Archeological Sites. *Bulletin, Texas Archeological Society*, Vol. 31: 291-316.

Krieger, Alex D.
1956. Food Habits of the Texas Coastal Indians in the Early Sixteenth Century. *Bulletin, Texas Archeological Society*, Vol. 27: 47-58.

Appendix III

OTHER SITES IN THE VICINITY OF THE LA JITA SITE

Thomas Roy Hester

During the course of the work at the La Jita Site, several other sites were recorded along the Sabinal River. These sites and their materials are briefly described below. Detailed documentation is on file at the Texas Archeological Research Laboratory.

41 UV 24. The site is a small burned-rock midden situated along the edge of a 50-60 foot bluff on the west side of the Sabinal River, about 1.5 miles downstream from La Jita. A flat area with no burned rock, but with large quantities of flint debris is adjacent to the northern edge of the burned rock midden.

Material collected from the surface includes cores and core nuclei, secondary cortex flakes, interior flakes, 1-edge side scrapers, biface fragments, and a small crude biface. Miscellaneous scrapers and retouched flakes were also picked up. The site has been heavily surface-collected in the past.

41 UV 25. This site is located a few hundred yards southwest of La Jita along the old Sabinal channel, at a point where a small tributary enters from the north. Scattered burned rock and flint are found for about 150 feet along the channel bank and for about 50 feet away from it. The occupational deposits are at least 2 feet thick. Two test pits were dug at the site while work was in progress at La Jita. The results of these exploratory excavations are summarized below:

Test 1 (a shovel test; surface to 26 inches below). Zone 1 is a gray black loam with much burned rock, changing to a tannish brown soil (Zone 2) with little burned rock. Artifacts include: 3 stemmed arrow point fragments (including the Edwards and Scallorn types), 3 Frio points, a Pedernales point (from Zone 2), a basal fragment of a large thin triangular biface, a biface distal fragment, and large numbers of interior, secondary cortex and lipped flakes. Core fragments were also found as well as about 200 flake fragments (30% of which were burned).

Test 2 (a 5-foot square; 4 half-foot levels were excavated; stratigraphy the same as in Test 1). Materials recovered from this test are briefly listed:

Level 1 (0-6″): Perdiz, Edwards, Fairland, arrow point distal fragment; initial cortex, secondary cortex, interior and lipped flakes; flake fragments; bone; snails.

Level 2 (6-12″): Edwards, Scallorn *coryell*, and triangular arrow points; triangular bifaces; biface fragments; secondary cortex, interior and lipped flakes; flake fragments; snails; some charcoal; bone.

Level 3 (12-18″): crude Perdiz, Frio (?); secondary cortex and lipped flakes; flake fragments (half of which are burned).

Level 4 (18-24″): Ensor; secondary cortex, interior and lipped flakes; flake fragments; snails; charcoal; bone.

The surface of site 41 UV 25 yielded a rough polyhedral core, 2 bifacial cores, secondary cortex and interior flakes, a crude biface fragment, a convex-base biface, and several flake fragments.

41 UV 26. About 1 mile south of Utopia, a site was located along a terrace on the east side of the Sabinal River. The site has been cultivated and plowing has revealed burned rock and lithic debris in an area of about 2 acres. The following lithic materials have been found at the site: perforator shaft fragment, expanded-stem dart point, Pedernales dart point, lanceolate dart point with a convex base, 2 stemmed dart point fragments, 4 biface fragments, a core fragment, 3 crude ovate bifaces, an end-scraper, a subtriangular biface, 5 secondary cortex flakes, a retouched flake (burned), and a small end-scraper made on an interior flake.

41 UV 27. This site is situated about 1 mile northwest of Utopia on the east side of the Sabinal River. The site is a small burned rock midden, 35 feet in diameter and rising 2 to 3 feet above the surrounding ground surface. It is on the edge of the lowest terrace. Burned rock and other debris are scattered down the terrace slope. Ronnie Bownds made available his collection from the site. Dart point types represented are Pedernales, Bulverde, Nolan, Langtry-like, Montell, Tortugas, and Castroville. Triangular bifaces and biface fragments are also present.

41 UV 28. Approximately 100 yards west of the Sabinal River (on the lowest terrace) and about 1 mile downstream from La Jita, a small burned rock midden is present. The midden is 40 feet in diameter, and is surrounded by scattered burned rocks and other occupational debris. A few small potholes are present. Archaic dart points have been collected, including Martindale-like, Abasolo (2), Pedernales (2), Marshall, a Miscellaneous Form 6 dart point (see La Jita descriptions), and a crude, reworked specimen, resembling Martindale. Also collected were 12 biface distal fragments, 1 crude triangular biface, 1 subtriangular biface (convex-base), 1 lanceolate biface, and lipped, secondary cortex and interior flakes.

41 UV 29. T. C. Hill, Jr. (personal communication) has reported this site, situated on the east side of the Sabinal River, just below Utopia. Occupational remains (including intact hearths) are concentrated in the terrace deposits at the site, in a situation reminiscent of that at La Jita. Hill has found the following materials at this site: Montell, Langtry, Frio (several varieties), Fairland, Travis, Pedernales, Ensor, Martindale-like, Plainview, and triangular dart points; a dart point similar to the "Early Corner Notched, Variety 1" of La Jita; Scallorn and Edwards arrow points; triangular and ovate bifaces (some of which are large and thin); manos and metates; and, large quantities of flake debris.

Prehistoric Settlement of the De Cordova Bend Reservoir, Central Texas

S. Alan Skinner

ABSTRACT

An archaeological survey of the De Cordova Bend Reservoir area in Central Texas recorded 51 prehistoric sites which represented occupations of hunting/gathering adapted peoples during the period 500 B.C. to A.D. 1500. Sites were located in 3 of the 5 recognized microenvironments and it is suggested that site activity is related to the site situation and the natural resources available at each location. Anaylsis of lithic debris suggests that stone tool manufacture involves 3 distinguishable technological steps, cobble collection/primary cortex removal, rough biface shaping/trimming, tool shaping/finishing, and that the spatial distribution of the steps corresponds to different site types. On the basis of the survey data, 3 site types, base camp, seasonal hunting/gathering camp and chipping station, are recognized.

One base camp, 2 seasonal hunting/gathering camps and 2 chipping stations were excavated and are described. The sites illustrate the variations in situation, internal site arrangement and composition, artifact assemblage and site activities. It is suggested that a full maintenance cycle, probably an annual cycle, is represented by the range of activities exemplified at the excavated sites. The concept of Central Based Wanderer as defined by Beardsley and others (1956) is employed to explain the prehistoric settlement pattern described at De Cordova Bend Reservoir. It is also suggested that this model of seasonal dispersal and regrouping be employed to explain the intersite variations recorded by previous archaeological work in central Texas.

ACKNOWLEDGEMENTS

Archaeological investigations were carried out in the De Cordova Bend Reservoir during the spring and fall of 1968 under two contracts between the National Park Service and Southern Methodist University. A total of one hundred and seventy-five man days were used at sites X41HD5 and H41HD26 during March and April under the terms of National Park Service contract 14-10-7:931-6. Excavation at sites X41HD24, X41HD36, X41HD39, and X41HD54 and additional testing at X41HD26 was done during October, November and December of 1968 under the agreements of National Park Service contract 14-10-7:931-30; four hundred and sixty-five man days were used. This report is the result of these investigations and has been prepared in partial fulfillment of the terms of Memorandum of Agreement 14-10-7:931-6 and 14-10-7:931-30. The field notes, artifacts and photographs are on file at the Anthropology Research Center, Southern Methodist University, Dallas, Texas. This report constitutes Southern Methodist University Contributions in Anthropology No. 7.

A number of individuals assisted in the field and analysis phases of the project. A large number of Granbury High School (Pirates) students and recent graduates served as the labor force. Mike Durant and Douglas Gray, in particular, provided invaluable assistance during the work. The help of the school faculty, especially Mr. Best and Mr. Crossland, is appreciated. The land owners, Mr. Zweifel, Mr. Aiken and Mr. Lowden, allowed access through their land and co-operated during excavation. Local amateurs were helpful in locating sites and land owners and in familiarizing the writer with the archaeology of the area. These include Richard Bennett, Randall Rash, Jack Riley, Lecil Meyer, Johnny Luton and Weldon Campbell.

The preliminary results of our work were disseminated to the local residents through meetings of the Hood County Historical Association and in articles published in the *Hood County News* through the courtesy of the editor, Mrs. Crawford. The above mentioned people and many unmentioned residents of Granbury aided in all the various aspects of the work and I wish to express my thanks to all.

Jeanne Jasper, Linda Graham and Barbara Hickman assisted with the laboratory analysis and R. K. Harris aided with the taxonomic identification of projectile points. Ronald Richie and David Gillette of the Shuler Museum of Paleontology, Southern Methodist University, identified faunal materials from the Bluebonnet and Aiken sites. Dr. Elmer Cheatum, Biology Department, Southern Methodist University, identified the shell remains and Fekri Hassan helped with the identification of lithic materials. Nancy Sciscenti and Robert D. Hyatt prepared the graphic illustrations, and Gerald Humphreys is responsible for the artifact photography. The manuscript has been typed and retyped by Hazel Gilboe.

Parts of the manuscript were reviewed by C. Reid Ferring, Anthony Marks and Joel L. Shiner of the Anthropology Department at Southern Methodist University. Many of the ideas on Texas archaeology expressed in the report were discussed with Harry J. Shafer of the Texas Archeological Salvage Project at the University of Texas, Austin. Many of the theoretical concepts and the directions of this report were developed during methodological discussions with James V. Sciscenti, Director of the River Basin Salvage Program at Southern Methodist University, and Principal Investigator on the De Cordova Bend Reservoir contracts.

I wish to thank the Brazos River Authority for their cooperation in supplying information about reservoir construction and the National Park Service for providing the funds to carry out the research upon which this report is based. Rex L. Wilson and Chester A. Thomas of the National Park Service, Southwest Archeological Center were helpful in all phases of the work.

INTRODUCTION

The purpose of archaeological investigations in the area of the De Cordova Bend Reservoir was to define the prehistoric utilization of a part of central Texas within the Brazos River drainage. The first section of the report summarizes the findings of the survey and explains the basis for the selection of certain sites for excavation. The results of site excavations and material analysis are presented in the second section. A summary of the settlement patterns and interpretations as to the way of life of the prehistoric inhabitants and hypotheses for future testing are presented in the concluding section.

The De Cordova Bend Reservoir is a water conservation project of the Brazos River Authority, located on the main channel of the Brazos River in Hood County, Texas (Fig. 1). The reservoir, 33.5 river miles in length, is confined to the narrow limits of the Brazos River channel and floodplain. Consequently, the reservoir is not over two miles in maximum width. One hundred and three miles of shore line will result when the reservoir has reached its 155,000 acre feet storage capacity limit. Construction of the dam began on December 15, 1966 and filling of the reservoir was completed on August 30, 1969.

NATURAL ENVIRONMENT

Hood County is in the physiographic region known as the Grand Prairie (Carter 1931: 68-70) or the West Cross Timbers (Gould 1962: 10), and is a region characterized as ". . . a high rolling and hilly, deeply dissected limestone area crossed by a number of deep valleys through which rivers flow in narrow strips of bottomland (Carter 1931: 68)." The prominent geological stratum in the area is known as the Glen Rose formation, a part of the Trinity group, Comanche series of Cretaceous age. The Glen Rose typically consists of thin to medium-bedded hard continuous limestone strata alternating with marl or marly limestone and weathering in stream cuts to steep canyons (Sellards, Adkins and Plummer 1932: 315-320). The Brazos River, the main drainage through this area, has cut through the limestone formation leaving a meandering pattern. Narrow strips of bottomland border the steep banks of the deeply entrenched river. There are no major tributaries in the area and the few minor tributaries are generally dry during part of the year. Rainfall ranges from thirty to thirty-five inches annually; April and May are the months of high rainfall. The annual temperature range is from 34-96° with a growing season 232 days long (Belo Corporation 1970: 111).

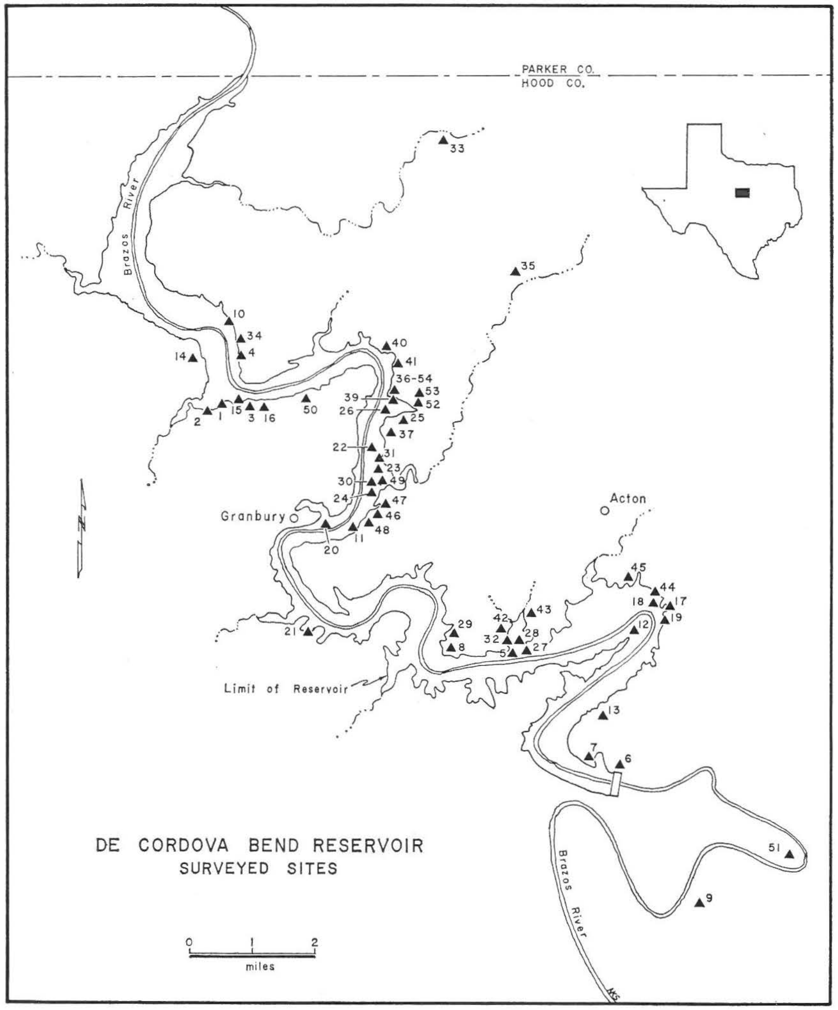


FIG. 1. Map of the De Cordova Bend Reservoir showing distribution of archaeological sites.

MICROENVIRONMENTS

The broad environmental description is presented to enable a reader to visualize the general area. Several subdivisions, microenvironments or ecological niches (Coe and Flannery 1964), are present within the general environment; these are delineated in order to see if human activity loci are directly correlated with specific environmental resources. Five microenvironments (Fig. 2) are recognized within the reservoir limits on the basis of surficial topography and the flora and fauna recorded in these areas. The divisions are: The Brazos River and adjacent flood plain, the alluvial terrace, the tributary stream, the bluff slope and the limestone bluff. Although these units have been described here, it must be pointed out that they are intergrading units, not necessarily identical on opposite sides of the river at any one location.

1). Brazos River and Adjacent Flood Plain.

The Brazos River, crossing Hood County in a southeasterly direction, is the main through-flowing permanent stream. The stream is in a mature stage of development, and has cut through the limestone bedrock leaving an incised meandering pattern (Stricklin 1961) and depositing alluvium in the meanders. The river is sloping at the rate of one foot per mile (Mason, Johnston and Associates 1963: 3). The flood plain is narrow throughout most of the stream length and the meanders have not been cut off nor do they allow easy cross-flooding even at high water. The soil in the floodplain has a high silt content. The first terrace (T-O) is about twenty feet above the normal river level and is in the floodplain (Crook in Blaine, Harris, Crook and Shiner 1969).

No cultural debris was found in this area due to constant flooding of the area. This is not to suggest that the area was unused by the prehistoric inhabitants. The fact that the river has a characteristic

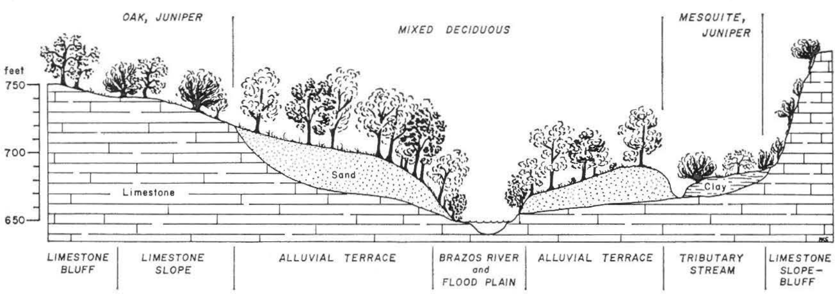


FIG. 2. Schematic profile of microenvironments in and adjacent to the De Cordova Bend Reservoir.

fauna including fresh-water mussels, fish, frogs, snakes, and turtles suggests its potential.

2). Alluvial Terrace.

The alluvial terrace (T-1) has resulted from the cutting of the Brazos River which has produced ingrown meanders by lateral cutting of the cliffs on the outside of the curves. These meanders have continuously enlarged themselves (Hendricks 1957: 48-49), and have subsequently been filled with Quaternary alluvium. The slipoff slopes within the meanders are covered with alluvium and two clearly defined sets of terraces are evident. The first is in the floodplain; the second is forty feet above the normal river level. The terraces are covered with a fine sand containing minor amounts of clay (Hendricks 1957: 44 and Map). Alluvial soils are dark in color and support a heterogeneous plant assemblage including elm, cottonwood, walnut, salt cedar, oak, pecan, and hackberry. Moreover, the terraces provide an avenue for the western movement of animals from the Austroriparian region of Texas (Blair 1950: 101). A permanent source of water is available in the Brazos River, in springs along the river and in a few permanent tributaries. At the entrance and exit of the meanders, the river is funneled through a narrow passageway between the limestone cliffs. The terraces have been cultivated for the past century, obscurring the terrace system and damaging some of the archaeological sites.

3). Tributary Stream.

The tributaries add little to the river flow, and provide a limited source of water and a habitat for aquatic and land animals during the spring and summer. These areas are characterized by a thin red sandy-clay soil based on the limestone. Limestone fragments are common in the soil which tends to be hard and more consolidated than the alluvium in the river terraces.

Grass is thick in the valleys which pierce into this rough land (Carter 1931: 75). The dominant large flora is juniper and mesquite; some oaks and walnut advance up the streams from the alluvial terrace, but their growth is inhibited by the thin soil layer.

4). Limestone Slope.

This microenvironment is the steeply sloping face of the limestone bluff which borders on the river and backs the alluvial terrace within the meanders. The Glen Rose formation does not weather in a way to form overhangs, and consequently rock shelters do not occur. The limestone slope has a thin and patchy soil cover which supports low but thick stands of oak and juniper (Carter 1931: 69-70). Water is available only after rains when it stands in natural basins for a brief period of time.

5). Limestone Bluff.

The bluff borders the river and is slightly rolling in vertical relief. A thin layer of tan soil formed from the decomposition of the underlying limestone supports a flora of grasses and a thick cover of juniper and oak in those areas where they have not been removed. The surface cover includes thistle, prickly pear cactus, and yucca in the open areas. A loosely consolidated layer of conglomerate containing quartzite, flint and an occasional piece of petrified wood is exposed in many areas and provides a source of knappable stone.

ENVIRONMENTAL SUMMARY

The described environmental subdivisions present a sharp contrast in the topography, soils, water, vegetation and fauna of this area. Movement between the zones is easy and resources of all zones are readily accessible. On the basis of the characteristics of the microenvironments, it is suggested that:

a) No single microenvironment would provide ample resources for a total seasonal round. While chippable stone is only available in Zone 5, a permanent water source is available only in Zones 1 and 2. Aquatic plants and animals are primarily present in Zone 1; edible nuts and berries occur in Zones 2 and 3. Large game animals move down to the river at night but stay in the tributaries and outside of the reservoir area during the day.

b) All microenvironments, except the alluvial terrace, would thus be utilized in a task-specific or seasonal manner. Certain resources are localized and can only be obtained in one zone or another, while certain plants and animals are only present during a specific season of the year. The alluvial terrace occupies a central position and these various activities could be based from this location.

c) Habitation of any duration will occur on the alluvial terrace. This location is well-drained, protected from winds, has a permanent water source, is centrally located and has the largest amount of flora and fauna resources of any zone. None of the other zones have all these specifications and thus could not serve for this purpose.

SETTLEMENT PATTERNS

Fifty-one prehistoric sites were located during the three surveys conducted within the reservoir area (Jelks 1954; Lorrain 1967; Skinner 1968). All are open sites located within the alluvial terrace, tributary stream and limestone bluff microenvironmental zone. Rockshelters or caves are not present due to the composition of the limestone. Artifacts exposed on the present ground surface at most sites facilitated delimitation of the horizontal extent of a site. This exposure also allowed the collection of a large sample of artifacts, over one hundred, where possible, which were considered representative of activity(s) at the site, this latter hypothesis was tested by excavation. Each site was treated as the location of a set of activities that were constant throughout the length of occupation, although surface collections frequently included a few tools which on a formal basis have been assigned to specific time periods (horizons) in adjacent areas. The tools, particularly projectiles, are formally similar to some ascribed in the time range of from about AD 1-AD 1500 (Johnson 1967; Johnson, Suhm, and Tunnell 1962) but they could not be associated with other components of a distinctive assemblage at any site. Consequently, they were used primarily to bracket the maximum period of utilization of a site location. The specific activities associated with the occupation(s) represented by these temporally useful horizon markers were tested for by excavation. Combinations of site size, artifact assemblage characteristics and microenvironmental zones are correlated and three types of settlements have been defined.

Sites on the alluvial terrace are situated on level sand covered areas adjacent to a permanent water source. This area is being farmed today and plowing has exposed cultural materials in areas of well over several acres in extent. Although plowing has disturbed the prehistoric deposits, cultural materials cluster in localized concentrations; there is little evidence of horizontal movement of artifacts as noted in recent work in Turkey (Redman and Watson 1970) which has shown that repeated plowing causes little horizontal movement of artifacts. The artifact assemblages from sites on the alluvial terrace include flakes, cores, intentionally retouched pieces, hammerstones, grinding tools, (manos and basin metates), some fresh-water mussel shells, fire-cracked limestone and typological tools (see Fig. 3). The latter category includes projectile points, scrapers, gravers, bifaces, and other tools frequently given taxonomic prefixes. Projectile points are reportedly common at these sites although few were found during the survey because of previous selective collecting. Bone is rarely preserved in the alluvial sand along the Brazos River (R. L. Forrester, personal communication) and its absense in the disturbed middens is not surprising. Alluvial terrace sites cover the largest area of the sites recorded and have a distinct and varied assemblage.

Few sites are located adjacent to intermittent tributaries of the

Brazos River. This may be due in part to the limited area of the microenvironment. The tributaries carry a regular flow of water during the spring and summer but are dry during the remainder of the year. Erosion has exposed cultural material in areas not over an acre in maximum extent and, except for erosion, surfaces have not been disturbed. The assemblages include flakes, cores, retouched pieces, hammerstones, few typological tools, fire-cracked limestone and numerous fresh-water mussel shells. Projectile points and grinding tools are uncommon.

Sites on the limestone bluff are located in the vicinity of a deflated or exposed outcrop of conglomerate. The largest number of sites is recorded in this location, but the sites themselves are smaller and shallower in extent than others elsewhere within the reservoir. Cultural material is exposed in scattered concentrations of up to ten meters in diameter over the surface of these sites. Retouched pieces are the most common tool form and typological tools, particularly notches and gravers, are abundant.

Exceptions to these general patterns were recorded at several sites within and outside the reservoir limits. The assemblage from site X41HD43 is similar to those of sites on the limestone bluff. The site is located on the alluvial terrace adjacent to a permanent tributary of the Brazos River. A layer of conglomerate has been exposed in the vertical cut of the stream. A similar assemblage was recovered at the Zweifel site (X41HD39) which is located in the tributary stream microenvironment. Site X41HD48 is located on the limestone bluff but the tool kit is similar to that of sites on the alluvial terrace. Several sites, notably the Bennett (X41HD33) and Meyer (X41HD35) sites are near permanent springs on the upper reaches of intermittent tributaries of the Brazos at some distance from the river (Fig. 1). These locations are well drained, sand covered, and gently rolling in vertical relief. Artifacts from these sites include large numbers of projectile points as well as grinding tools. Based on the environmental situation and on the artifact assemblages, the sites appear to be functionally similar to sites on the alluvial terrace.

It is suggested that three classes of sites are present within the limits of the De Cordova Bend Reservoir and that different activities were conducted at each. These are:

1) Alluvial terrace sites have tool kits dominated by projectile points which may be indicative of hunting and by grinding tools, hammerstones and some mussel shell which may be indicative of food gathering and food preparation. The natural plant and animal resources of this zone allow for long term occupation. The size and

depth of deposit indicate that the sites were occupied and reoccupied by groups of people for a stratigraphically long period of time, as evidenced by large area of occupation debris and the overlapping and intermixture of the remains.

2) Tributary stream sites were occupied for the prime purpose of collecting fresh-water mussels. This activity was done by smaller groups on a seasonal basis during that part of the year when water was available in the tributary. At the same time, tool preforms were roughed out for later completion.

3) Sites on the limestone bluff appear, on the basis of flint debris and available stone, to have been occupied for the primary purpose of collecting knappable stone. Concommitant with the quarrying activity was another activity which involved the use of notches, gravers and retouched pieces. The nature of this activity is uncertain. The size and scattered appearance of the deposits may indicate that small groups or single individuals were responsible for each of the lithic concentrations. Occupation of this locale was probably on a sporadic basis and for a short period of time as there is no evidence of food collecting, preparation or consumption at these sites.

Lithic Debris

Chipped stone debris in the form of flakes and cores is the largest class of artifacts collected from all sites during the survey. Chipped stone tools are the result of the reduction of a material mass (core) (Nunley 1969) and unutilized flakes are the necessary result of this reduction. Since flakes are the residue of tool making, they should reflect the technical process involved in the making of a tool. By isolating steps in the process, the specific technological aspects conducted at any single location can be isolated; this was tested by excavation.

Nodules of a fine-grained cryptocrystaline quartz herein referred to as flint are contained within layers of conglomerate within the Glen Rose formation. This material is generally exposed on the surface of the limestone bluff (Zone 5). The flint nodules (cobbles) occur in sub-rectangular to spherical shapes. Tan is the most common color but black, red and white colored flints were also recovered. The outer surface of the cobbles is covered with a natural weathered surface referred to as cortex.

The initial reduction of a cobble involves the removal of a flake from the core. The outer surface (dorsal surface) of the flake is covered with cortex. Flakes which have cortex over 100% of the dorsal surface are referred to as PRIMARY FLAKES. This class of flake is the first of a series to be removed from a location on a core. Such flakes were struck by a hard percussion tool, possibly a stone hammerstone.

Subsequent flakes tend to overlap previous flake scars and consequently the dorsal surface does not have cortex over its entirety. Flakes which have some cortex on the dorsal surface are referred to as SECONDARY FLAKES. Flakes which have no cortex on the dorsal surface are referred to as INTERIOR FLAKES. The majority of the secondary and interior flakes were removed by the use of heavy percussion tool as indicated by a thick and pronounced bulb of percussion. A lesser number can be referred to as LIPPED FLAKES (Shafer 1969: 4), having a faceted striking platform and an arched appearance. These lipped flakes are probably all biface thinning flakes which were struck with a bone or wooden batton (Shiner 1969: 225). The term "lipped flake" is used herein as a descriptive category which, if the result of biface thinning, should be shown to co-vary with bifaces at that stage of manufacture. This can be illustrated through the use of flake scatter diagrams.

The weight of complete flakes correlates with the flake category. Primary flakes are the heaviest and interior flakes the lightest, however, this variable has not been quantified. Interior flakes are the result of the last step of the tool making process which involves the removal of retouch flakes.

With the survey material, flint debris was treated as flakes. In subsequent analysis of excavation materials, chips were separated from flakes. CHIPS are flake fragments which lack the striking platform and whose precise appearance and method of detachment could not be determined.

Flakes from each site were sorted into these three categories, primary, secondary, and interior to see if all tool making stages were present at all sites or if particular stages tended to be isolated by site. The result of this analysis (Fig. 3) was the recognition of three distinct flake assemblages interpreted as representative of steps in tool making. The first manufacturing step involves the collection of material and the initial steps of cortex removal. Assemblages from these sites are composed of 5 to 15% primary, 60 to 70% secondary, and 20 to 40% interior flakes and chips. The second step involves further cortex removal and reduction of cores; finer reduction and trimming is represented by an increase in the amount of interior flakes. The assemblages include about 5% primary, 55% secondary and 40% interior flakes. The third step is represented by about 5% primary flakes and by about the same percentage of secondary as interior flakes. Lipped flakes are more common here than elsewhere and the flakes themselves are thinner and finer than at other sites. The three steps as outlined correspond roughly with the limestone bluff (Step 1), tributary stream (Step 2) and alluvial terrace (Step 3) microenvironments. Consequently, it was concluded that tool making involves a set of steps which are conducted at different locations by the prehistoric occupants of the survey area.

Summary

Archaeological survey of the area of the De Cordova Bend Reservoir resulted in the recording of fifty-one prehistoric sites. The purpose of the survey was to determine the prehistoric settlement of the area and the relationship of the activity(s) carried out at these sites to the way of life of the people represented. Three variables, microenvironment, settlement pattern and lithic debris were focused

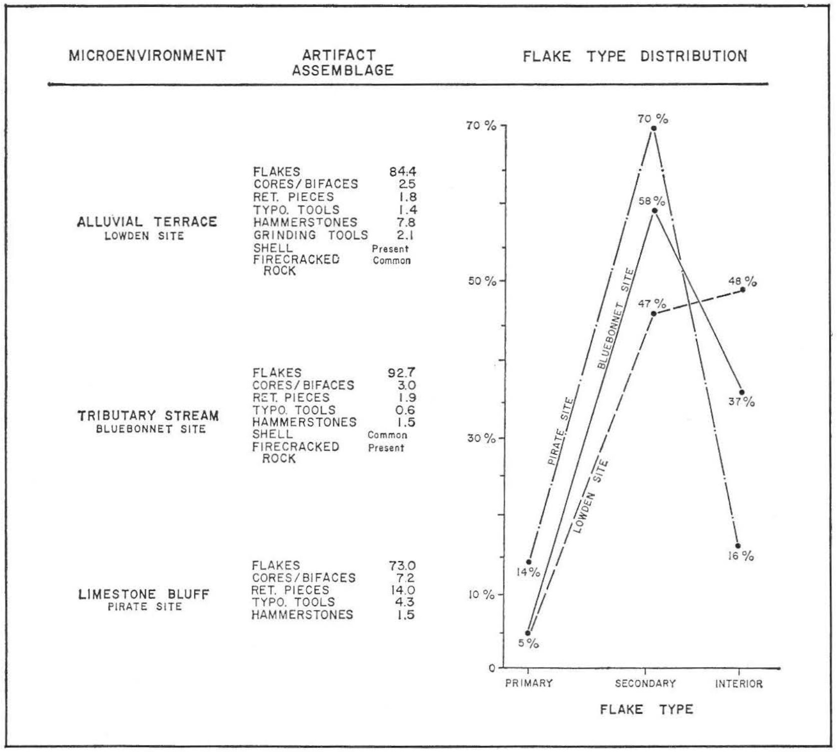


FIG. 3. Diagram showing the artifact assemblage and flake type distribution associated with the alluvial terrace, tributary stream and limestone bluff microenvironments.

upon as a means of outlining available material resources and the uses of and places of use of these resources. On the basis of the patterns already discussed, three types of settlements were recognized. The three are chipping station, seasonal hunting/gathering camp and base camp. In the following, the archaeological and natural characteristics of each type of site is presented with suggestions which arose in regard to this type of site. The excavation recommendations are presented in the conclusion section.

Chipping station sites are located on the limestone bluff where flint is available in exposed or deflated conglomerate layers from within the Glen Rose formation. Discarded chipped stone is exposed in small, shallow concentrations over the site's surface. Gravers, notches and retouched pieces are the only common chipped stone tools. Primary flakes make up five to fifteen percent of the flake category while secondary flakes range from sixty to seventy percent. Water is unavailable in this zone and food resources are limited. It is suggested that:

a) Flint was collected at or near these locations and initial cobble reduction, cortex removal as indicated by presence of primary and secondary flakes was carried out here. Further tool completion was done elsewhere.

b) A secondary activity conducted at these sites involved the use of gravers, notches and retouched pieces.

c) Small groups or single individuals (probably men) chipped flint at one place at any single time. Quarry visits were short-term excursions.

d) Quarrying trips were carried out from a camp where food was available, and such trips were primarily for one purpose.

Seasonal hunting/gathering camps are located along intermittent tributaries of the Brazos River. Small game animals, aquatic fresh-water animals, various nuts and other plants are available on a seasonal basis due to the annual presence of water. Flint resources are available nearby. Site areas are larger than that of chipping sites and the cultural materials are more diverse. Fresh-water mussel shells are common and fire-cracked limestone is present. Chipped stone tools, particularly projectile points, are uncommon as are grinding tools. Although secondary flakes predominate, interior flakes comprise 40% of each assemblage. On the basis of these data, it is suggested that:

a) Tributary stream sites were occupied for the collection of seasonally available food resources, particularly fresh-water mussels.

b) Occupation was during the spring and summer when water was available in the adjacent stream.

c) Initially trimmed flint was carried here and tools were roughed out but generally not finished.

d) Occupation was by small groups of men and women (extended family?) for short periods of the year.

Base camps are located on alluvial terraces adjacent to permanent water sources. This location is well-drained and protected from the extremes of the weather. Moreover, the central location puts natural resources within reasonable distances. Cultural materials occur over large areas as distinct concentrations. Grinding tools and projectile points are common artifacts. Burned mussel shell and fire-cracked limestone are evidence of food preparation. Secondary and interior flakes are about equally represented. Therefore, it is suggested that:

a) Base camps were the loci for more diverse and intense activity by the group of people who occupied the camp for the better part of each year and likely expresses the maximum degree of permanency represented with the reservoir.

b) A base camp was occupied by a corporate group which included the members of smaller work groups who separately occupied seasonal camps. This was the largest group of people gathered together at one time of the year within the reservoir limits.

c) Chipped stone tools were completed here and were used in hunting. Hunting was an important activity carried out from base camps.

d) Gathered plant foods were collected, prepared and consumed and were an important part of the base camp diet.

The importance of these three site types and their relation to the annual seasonal cycle of the prehistoric occupants of the De Cordova Bend Reservoir is uncertain. The activities represented at the sites reported may include the complete annual round, however, since base camps are also located at the headwaters of several tributaries, the relationship of these sites to sites within the reservoir has not been studied. All that can be said in summary, is that the complete range of activities for a complete annual round appears to be reflected in the archaeological remains in sites located within the De Cordova Bend Reservoir.

Survey Recommendations

In planning an excavation program to test the model derived from the survey, two objectives were considered: first, the excavation sites representative of the various site types, and secondly, the excavation of as many of those sites to be flooded and destroyed by reservoir construction. Other factors considered include the present state of preservation, the accessibility and the size of sites. Several sites were destroyed between the first and second excavation seasons and replacements for those originally selected were made. Excavation was planned for sites X41HD12 (base camp), X41HD22 (base camp), X41HD28 (chipping site) and X41HD30 (seasonal hunting/gathering camp), but time was unavailable to conduct work at these sites. The sites described below were excavated and the reasons for their selection are provided.

The Lowden site (X41HD5) is a base camp. Plowing had exposed a large artifact concentration; a local collector reported that over a hundred dart points had been collected during 1967 after the field was deep (chisel) plowed. The site was to be destroyed by land movement operations in conjunction with the reservoir, and in fact, was destroyed early in the fall of 1968.

The Bluebonnet site (X41HD26) is a seasonal hunting/gathering camp located adjacent to Eden Branch. An old road along the base of the bluff crossed the stream at the site and had exposed a large collection of cultural materials. The site was otherwise undisturbed except that juniper had been chained off about fifteen years ago.

The Aiken site (X41HD24) is located adjacent to Rucker Creek in a present-day pecan orchard. The area of the site had once been cultivated for a short period of time and was overgrown in weeds. Cultural material was almost absent in 1968, although a concentration of lithic debris had been noted the previous year (Humphreys 1967 field notes). Therefore, the artifact sample was small. Moreover, the U.S.G. quadrangle indicates that Rucker Creek is a permanent stream. Based on these factors, it was suggested that this might be a seasonal camp or a base camp and that it should be excavated to determine its relationship to the model.

The Zweifel site (X41HD39) is situated in the tributary stream microenvironment but had an assemblage similar to those of chipping sites. The surface of the site was undisturbed and materials were concentrated in a small area.

The Pirate site (X41HD36, 54) is a chipping site located on the limestone bluff. Several isolated concentrations were recognized and a large artifact sample had been collected during the survey. The site was selected to check the reliability of the survey sample and to excavate a representative chipping site.

EXCAVATIONS

The five prehistoric sites (Fig. 4) which were excavated in conjunction with the De Cordova Bend Salvage program are described in the following section of the report. Each of the sites is described separately. A description of the site and the rationale behind excavation is discussed and a summary of the excavation procedures pro-

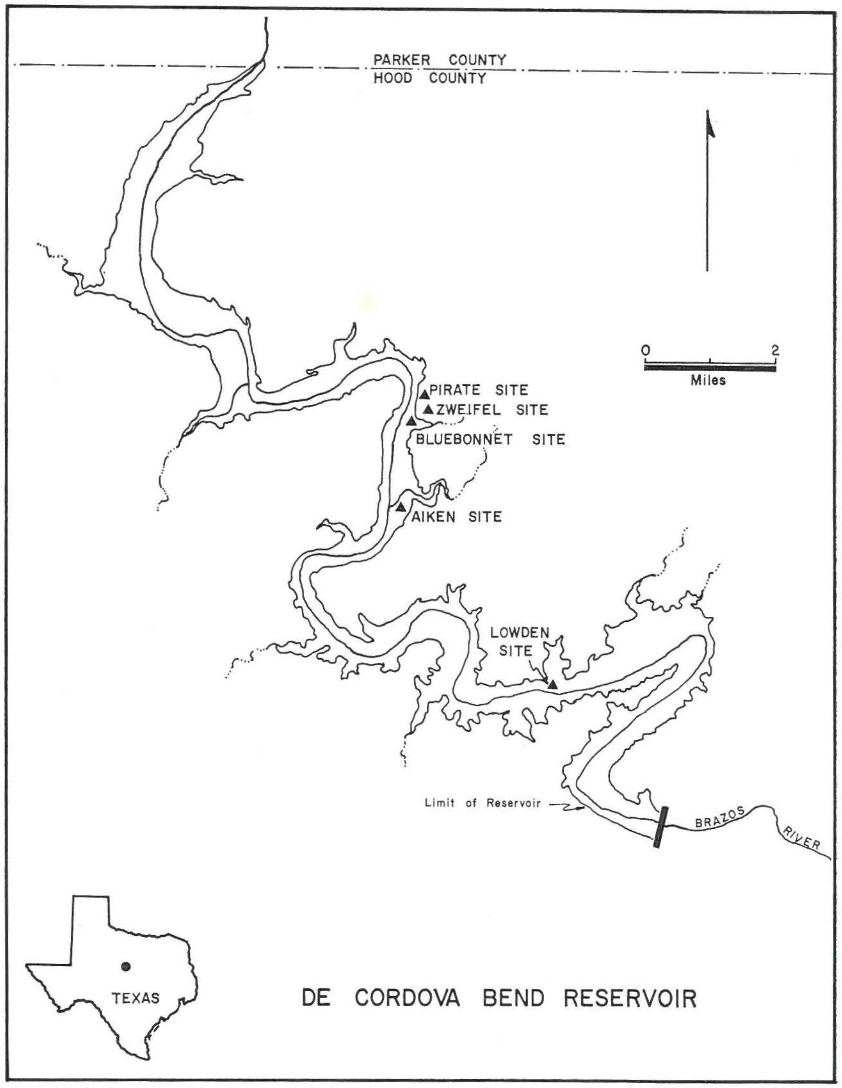


FIG. 4. Map of reservoir showing location of excavated sites.

vided. Architectural features are presented individually and a summary of the apparent settlement pattern at the site discussed, based on architecture and artifact distribution. A section dealing with the artifact assemblage follows the archaeological sections and particular attention focuses upon the composition of the assemblage. A summary of activities represented by artifactual materials and the probable site dating concludes the artifact assemblage section. The architectural and distributional data is combined with artifact assemblege information in the summary of each site report.

The report on the Lowden site is followed by reports on the Bluebonnet, Aiken, Zweifel and Pirate sites. This sequence is used to provide a broad base which begins with the varied assemblage at the Lowden site and progresses to smaller and less diversified sites exemplified at seasonal hunting/gathering camps and eventually, at chipping stations.

Throughout the report, quantitative data on artifact dimensions are presented within the text and in tables. Linear dimensions are in centimeters; weights are in grams. Abbreviations used include: L=length, W=width, T=thickness, SW=stem width, Wt=weight, +=measurement of a fragmentary specimen.

LOWDEN SITE (X41HD5)

Introduction

The Lowden site is located in a sandy peanut field 500 feet north of the Brazos River and just west of an unnamed spring-fed creek which drains into the river. Water in the creek varies from a large to small flow but does provide a year round source for water (Fig. 5). The creek has cut through the twenty-five foot thick mantle of Quaternay alluvium and exposed the underlying limestone bedrock. Bedrock is exposed along the creek drainage to the north and a quarrying site (X41HD43) is located about half a mile upstream where a layer of conglomerate has been exposed. The location of the Lowden site is within the zone referred to previously as the alluvial terrace.

Occupational debris from the prehistoric occupation of the area is scattered over the area outlined in Figure 5 and concentrated in the area indicated. There was little evidence of recognizable spatial clusters of debris within the main cluster described despite the fact that the field has been plowed repeatedly with the subsequent deflation of the surface and the piling up of sand along fences at the field borders. It was reported that numerous dart points had been collected from all over the surface of the field during the past fifty years and that deep plowing the previous year had exposed many dart points.

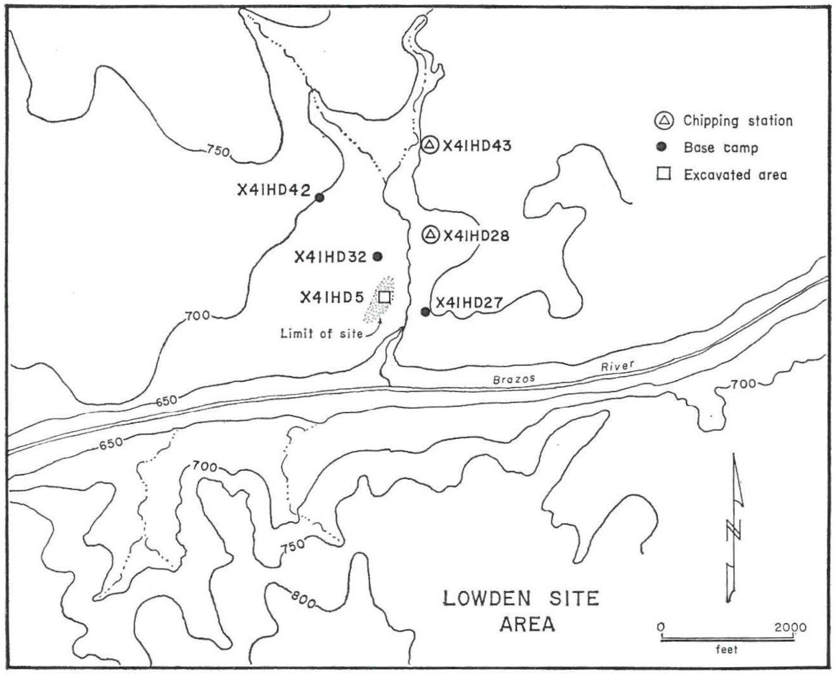


FIG. 5. Lowden site and vicinity showing nearby sites and lay of the land.

In addition to points, the surface assemblage included manos, metates, hammerstones, fire-cracked limestone rock, burned mussel shell, cores, bifaces and debris. The flake category percentages are 5.3% primary, 46.5% secondary and 48.2% interior. Based on the data available, it was originally suggested that the Lowden site was a base camp.

EXCAVATION PROCEDURE

The primary artifact cluster measured roughly 70 by 30 meters in size, was oval in shape and oriented north-south. The artifact concentration decreased to the west and south and may have decreased to the north and east, but these areas were covered by sand along the row of trees and fence in these two directions and no information was available prior to excavation.

A 70 meter long north-south base line was established along the western edge of the cluster and 10 meter wide strips were laid out perpendicular to this base line. These strips, which are referred to as Collection Areas and are lettered A to G from north to south, extended to a maximum of 40 meters to the east, although cultural material was almost non-existant beyond 30 meters. All cultural material was collected from each of these areas prior to excavation. It should be noted that smaller collecting areas would have provided tighter control.

Exploratory trenches (Fig. 6) were used to test the depth of the deposit and to locate sub-surface architectural features. Test trenches were excavated in 20 centimeter levels. Artifacts from the trenches are included within the sample from the respective collection area except where they could be related to an architectural feature. Trenches were cleared using a shovel-scrape technique and fill was screened only in the area of recognized features.

The cultural deposit extends to a depth of over 1.2 meters; water was struck below 1.2 meters and excavation was discontinued. Cultural materials were not found concentrated in any of the test trenches; therefore, a temporal sequence based on the vertical stratigraphy is not proposed.

The relationship of the excavated concentration to the east of the site is uncertain due to the limited amount of testing possible and the present state of exposure at the site. Within the concentration, artifacts are clustered within two areas, an area comprised of Collecion Areas C, D, E and a second area, constituted by Collection Area G

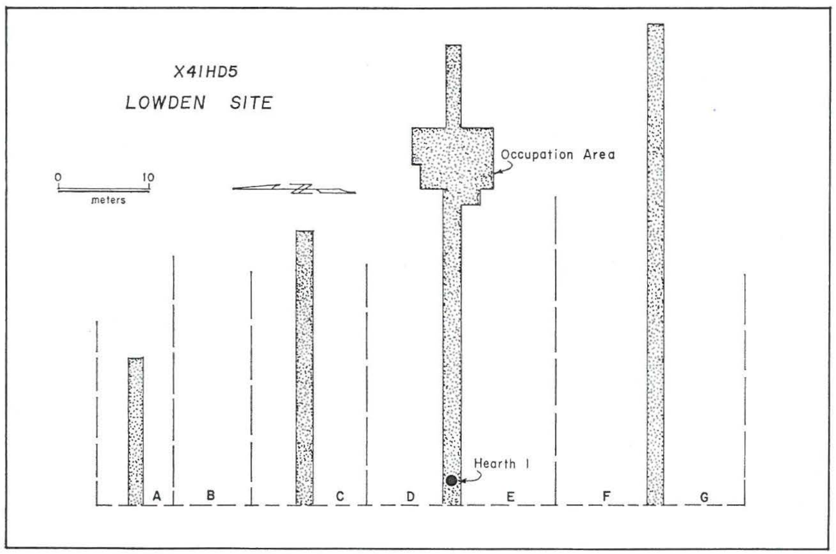


Fig. 6. Plan map of Lowden site showing situation of collecting areas, test trenches and architectural features.

(see Table 1 for details). These two concentrations have artifact assemblages which appear to represent similar activities. Evidence of localized occupation was uncovered in the form of two living areas, both located in Collection Area D. The living area to the east is less disturbed than the one in the center of the field. It is suggested that repeated plowing has destroyed the majority of the living areas which were located in this part of the site and that the disturbed materials were deflated onto the present ground surface.

Architectural Features

As noted earlier, only two architectural features, living areas denoted by centrally located hearths containing burned limestone, were recorded. To a large part, the absence of occupational features is attributed to the extensive plowing of the field. The effect of plowing can be seen in the present state of preservation exhibited in the two features described below.

HEARTH 1

A small concentration of burned limestone constitutes this feature which is located near the southwest corner of Collection Area D. There was no surface evidence of the hearth in the form of burned stone or other artifacts localized in the area.

The hearth stones are concentrated in an oval-shaped area 75 centimeters north-south by 125 centimeters east-west. The hearth stones were scattered over a level surface about 25 centimeters below the present ground surface. Although disturbed by plowing, charcoal stained sand was intermixed between the stones. The hearth stones were 5 to 15 centimeters in maximum length. Additional burned limestone was not found on the same level adjacent to the hearth and no artifacts were found associated with the hearth.

The extent of the living area represented by this hearth is undetermined as are the period of occupation and the activities carried out there.

OCCUPATION AREA

A small lens-shaped midden deposit was bisected by a test trench along the south edge of Collection Area D about 40 meters east of the base line. This location is toward the edge of the field where the midden had been protected from plowing by the overlying sand. The midden was excavated in arbitrary 20 centimeter levels (Level 1=0—20 cm., Level 2=20—40 cm., etc.) in rectangular units and fill was screened through quarter inch hardware cloth. Artifact distribution within the midden did not show any horizontal clustering and the vertical stratigraphic levels are discussed below.

The midden is circular in plan (Fig. 7), approximately 7 meters in diameter, 38.5 square meters in area. The top of the midden is plow-marked and was delimited below 20 centimeters by a dark brown charcoal-stained sand which was 35 centimeters thick in the center

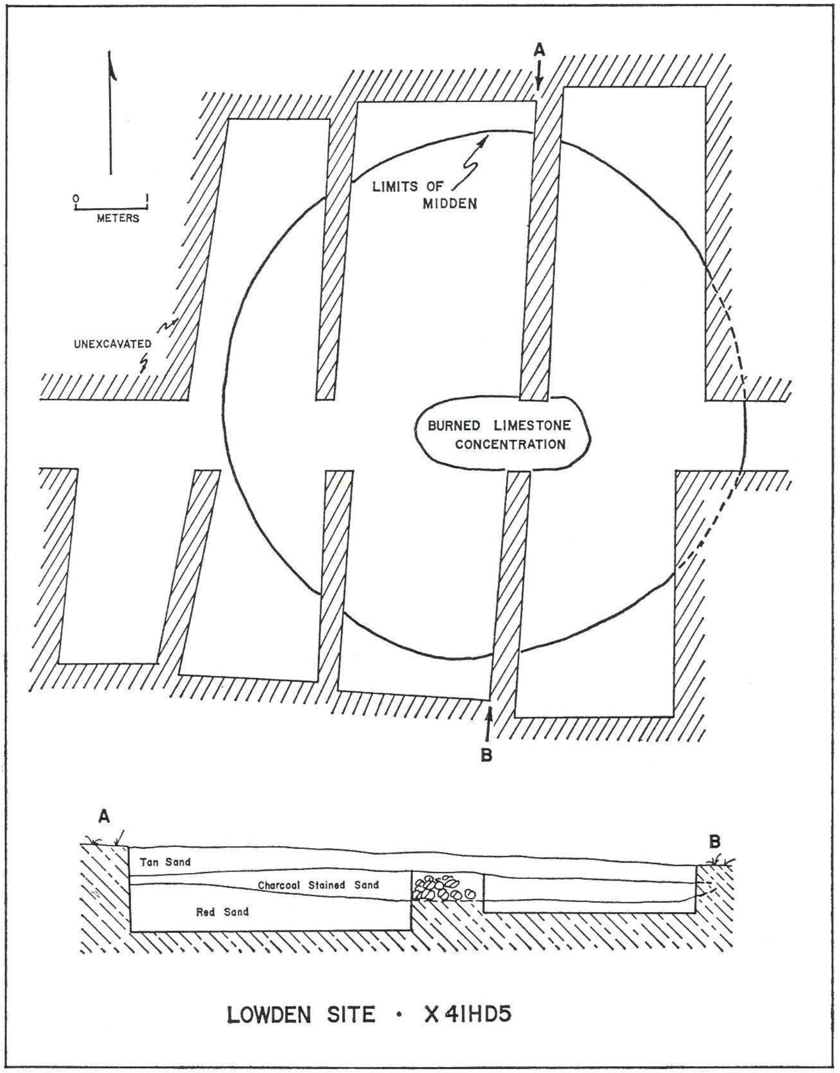


FIG. 7. Plan and profile of occupation area.

of the midden. The midden lenses out toward the edges, the bottom of the midden becomes lighter in color and eventually grades into the underlying red sand. Postholes were not found within or at the edge of the midden. There was no recognizable stratification within the midden nor was there a living surface recognizable as either a hard walked-upon surface upon which artifacts were found or as a stratigraphic level in which artifacts were recorded. Such a recent level may have been destroyed by plowing which penetrated the top of the midden.

An oval-shaped concentration of fire-blackened and burned limestone marks the location of a hearth in about the center of the midden. The stones are piled together in a concentration 20 centimeters thick. They did not form part of a basin-shaped or flat hearth nor were rocks scattered about within the midden at the same level with the hearth stones. The oval arrangement may represent a heating fire or an earth oven.

Cultural material is abundant within the fill and adjacent to the occupation area. Although the artifacts with the upper 20 centimeters (Level 1) (Table 1) have been disturbed by plowing, they remained concentrated above the midden and are attributed to the occupation represented by the midden as are cultural materials within levels 2 and 3, i.e., 20-60 centimeters. Materials thin out by the base of level 3, 60 centimeters. The artifact sample below 60 centimeters is of insufficient size to demonstrate a stratified deposit which might then have been compared to similar deposits elsewhere in central Texas.

Artifacts within the midden include chipped stone tools and tool making debris, hammerstones, grinding tools, fire-cracked limestone as well as broken and burned fragments of fresh-water mussel shell. The making of chipped stone tools is represented by flakes and chips which were discarded in manufacture. This activity is further supported by the broken and unfinished arrow preforms. In addition to unfinished tools, the finished chipped stone tools include a dart point, 10 arrowpoints, 2 gravers, 3 scrapers and numerous retouched pieces. The hammerstones may represent hard hammer percussion tools; soft hammer or pressure tools were not found. Fire-cracked rock was scattered within the deposit as were burned fragments of fresh-water mussels.

Limited excavation and controlled surface collection has shown that most of the cultural remains at the Lowden site have been disturbed by recent plowing.

The discovery of the occupation area discussed above presents an example of a living area located within a base camp. This is the first report of such an area that I am aware of from central Texas. The appearance, circular shape and lenticular profile, and artifactual contents suggest that activities arrtibutable to both men and women are represented. Male-oriented activities include flint knapping and tool making, both of which were carried out in the area of the midden based on the presence of flakes, chips, cores, arrow preforms, etc. Female activities would include the preparation of foodstuffs, as evidenced by grinding tools, mussel shells and the hearth. All these artifacts cluster in the vicinity of the hearth and it is suggested that all activities were carried out at a time when the hearth marked the location of a living area used by a single social unit (family).

Artifact Assemblage

The assemblage (Fig. 8) consists of chipped stone tools, chipping residue, pecked and ground stone tools, fire-cracked rock and burned shell.

Chipped stone residue constitutes 95.7% of the assemblage, cores/bifaces, 0.8%, tools 2.7%, and fire-cracked stone 0.8%. Previous surface collecting may have skewed the amounts of tools and bifaces recovered but it is suggested that these percentages are a relative indication of the activities carried out here, i.e., chipped stone tool making and domestic tasks including wild food collection and preparation. It should be noted that the materials from levels 1-3 of the occupation area comprise nearly 75% of the total sample. Therefore, the conclusions made from this discussion will have particular relevance to the activities carried out in this area.

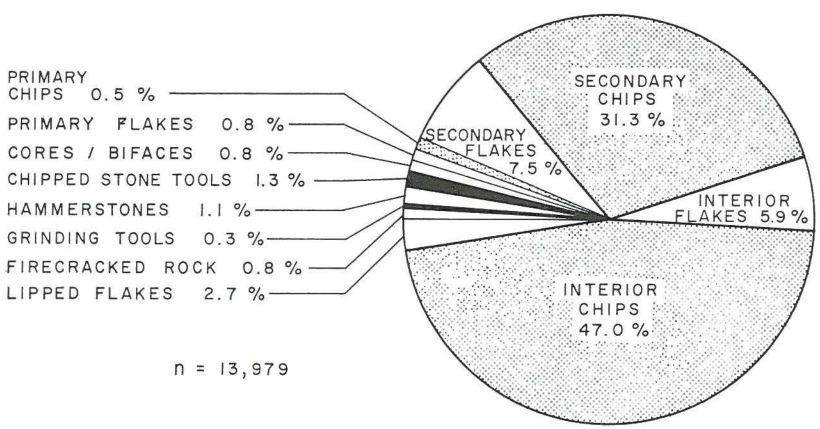


Fig. 8. Diagram of artifact assemblage composition, Lowden site.

TABLE 1. ARTIFACT DISTRIBUTION AT LOWDEN SITE (X41HD5).

	COLLECTION AREAS							*OCCUPATION AREA*						
	A	*B*	*C*	*D*	*E*	*F*	*G*	*L-1*	*2*	*3*	*4*	*5*	*6*	*TOTAL*
Flakes														
Primary	6	----	5	16	4	5	8	27	19	11	9	2	2	114
Secondary	36	23	66	126	57	38	87	339	111	73	50	30	13	1049
Interior	22	6	60	81	22	22	61	293	144	68	33	9	6	827
Lipped	10	6	20	45	21	10	29	112	79	29	9	4	1	375
Chips														
Primary	3	4	22	12	6	4	9	2	6	3	1	----	2	74
Secondary	33	24	45	187	49	----	166	2065	1035	425	231	80	28	4368
Interior	42	32	62	281	98	33	283	2923	1661	761	271	107	27	6581
Cores	3	2	8	11	3	6	9	6	6	5	----	1	1	61
Biface Stages														
A	2	----	----	1	----	----	----	----	----	----	----	----	----	3
B	----	----	----	----	----	----	1	----	1	1	----	----	----	3
C	----	----	2	----	----	----	1	1	2	2	----	----	----	8
D	----	----	----	----	----	----	1	1	1	----	2	1	----	6
E	----	----	----	1	1	----	1	1	2	----	1	----	----	7
F	----	----	1	1	----	----	4	6	1	3	----	1	----	17
Dart Points	----	1	----	----	----	1	----	----	1	----	----	----	1	4
Arrow Preforms	----	----	1	----	----	----	1	6	4	----	----	----	----	12
Arrow Points	----	----	----	----	----	1	----	7	----	----	----	----	----	8
Drill	----	----	----	----	1	----	----	----	----	----	----	----	----	1
Gravers	----	----	1	1	----	----	----	----	----	----	----	----	----	2
Borers	----	----	----	----	----	----	----	1	1	----	----	----	----	2
Serrated Flake	----	----	----	----	----	----	----	----	----	1	----	----	----	1
Scrapers	1	----	2	1	1	----	----	1	1	1	----	----	----	8
Chopper	----	----	----	1	----	----	----	----	----	----	----	----	----	1
Retouched Pieces	5	9	7	11	11	8	22	47	20	7	10	1	----	158
Hammerstones	6	19	18	22	16	22	25	6	10	1	1	----	----	146
Manos	----	2	----	5	2	----	1	4	----	2	2	----	----	18
Metates	2	10	2	2	4	----	1	----	1	----	----	----	----	22
Firecracked Rock	17	5	5	25	5	9	16	8	9	6	5	1	----	111
Shell	----	----	x	x	----	----	----	x	x	x	x	x	----	
TOTAL	188	143	327	830	301	159	726	5856	3115	1400	625	237	81	13979

Chipped stone tools were made from locally available flint which occurs in the form of flint nodules in gravel deposits which cap the limestone bedrock and are exposed upstream at site X41HD43. The cobbles range in color from dark gray to tan and include a granular as well as a glossy form of flint. Artifact provenience is detailed in Table 1.

FLAKES AND CHIPS

This category is the most common artifact form found (13,388 specimens) and represents the discards of tool manufacturing and reflects the stages of manufacturing carried out at the site. Primary flakes and chips make up 1.3% of the total artifact sample. They are relatively more common in the surface sample than from the levels 1-3 in the occupation area. This discrepancy is probably due to the fact that initial cortex removal from cores and bifaces was done before the biface was worked within the confines of the occupation area. Secondary and interior chips are numerically greater than their respective flake categories within levels 1-3 of the occupation area. This indicates that final biface trimming was completed within the occupation area and that the secondary and interior chips and flakes which fell on the living surface were not gathered up and discarded elsewhere. The ratios of flakes to chips between the sum of the collecting areas and the occupation area are divergent. It is suggested that the ratio from the occupation area is more representative of breakage patterns than that collected from the surface since surface materials were collected by hand, not screened. It is further suggested that the occupation area materials are from a primary archaeological context rather than a disturbed and deflated one.

CORES

Cores are represented by 61 flint cobbles which range in weight from 75 to 1431 grams. The majority fall within the range of 75 to 400 grams. Due to the removal of some flakes from each specimen, a meaningful average of selected size is undeterminable without recourse to the original resource areas. Cores were struck by a hard hammer technique probably to determine if the flint was useable. This resulted in the unpatterned removal of primary (cortex) flakes from the core and such a pattern is not interpreted as initial biface preparation. The cores do not represent flake cores except that flakes are a by-product in the making of core tools.

BIFACES

The bifacially flaked cobbles represent the steps or stages involved in the manufacturing of bifacial core tools, particularly, dart points.

This process involves the reduction of a cobble to a useable nucleus as a point preform. This discussion considers that those artifacts frequently described as knives, bifaces, or blades can be viewed in a processual manner in order to arrive at the way in which bifacial tools were made. A similar analysis was carried out by Hoffrichter with materials from the Drowned Head Site at Pat Mayse Reservoir (Lorrain and Hoffrichter 1968). The steps described below as Stages A-F have been separated for descriptive convenience; the prehistoric flint knapper was not involved in producing these stages because the sample is composed of rejects, artifacts which, due to the nature of the stone, the craftman's time or ability, breakage or other factors, did not become tools. The stages serve to illustrate the problems involved in this manufacturing process. Figure 9 shows an illustrated description of the stages which supplements the text.

Selection of resource material prior to flaking probably involved such factors as size and shape of available cobbles, available type of stone, the tools and techniques known to the knapper, as well as his experience with working stone, particularly in the area of study. Those aspects which are reflected in the chipped stone remains can be detected but such things as the available materials cannot be discussed without knowing the resource area since the materials found in any site have already been selected by man. The discussion below focuses upon the technological skills used, the successful result of any stage based on the unsuccessful rejected biface and upon the chip and flake residue of each step. Stages overlap due to the fact that a continuum has been split up for this discussion. Nevertheless, this division allows for a more complete description of the technological processes involved.

STAGE A (Fig. 9 a) The first step in biface preparation after the selection of a cobble was the removal of the cortex. This was done using a hard hammer percussion technique and in most cases a natural flat cortex surface as a platform. This first step of cortex removal prepared flake scars which can serve as platforms later. The end product of Stage A is a biface from which some of the exterior cortex has been removed, although not in a patterned manner. The cobble shape has not been modified nor has it been appreciably thinned in cross section.

The by-product of Stage A is the rejected biface as in Figure 9 a and a number of primary and secondary flakes and chips. The biface was discarded due to the inability to control the depth of the flakes which cut too deeply into the surface and to remove flakes which would have taken off the cortex. Hard hammer percussion has crushed

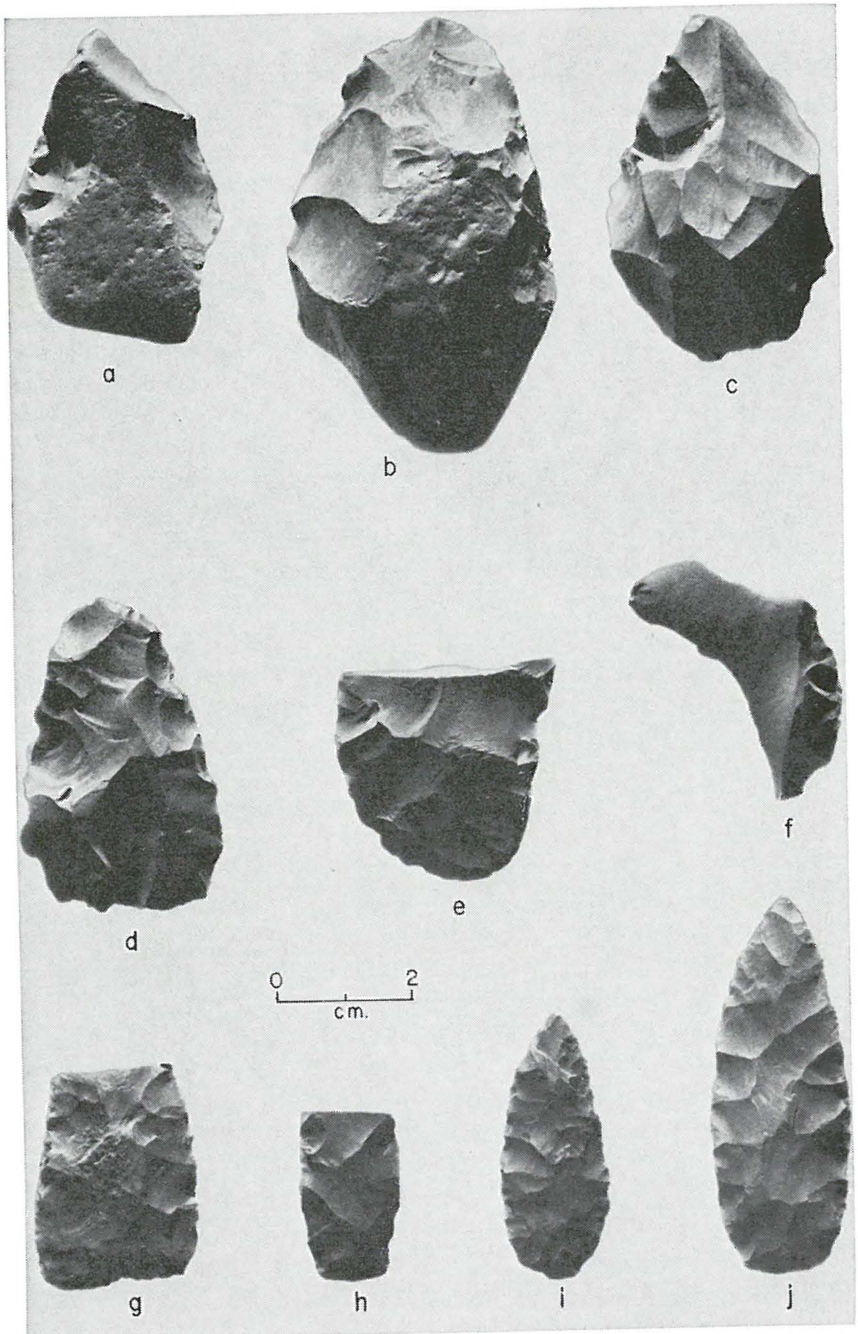


Fig. 9. Bifaces illustrating the stages. a, Stage A; b, Stage B; c, Stage C; d, Stage D; e, f, g, Stage E; h, i, j, Stage F.

the edge of the natural platform. Most of the flakes removed from the core were primary flakes although several secondary flakes as well as a number of chips were also produced.

STAGE B (Fig. 9 b) Patterned and overlapping cortex removal typified the second step. Both prepared and natural platforms were used in a systematic removal of flakes from both faces of the cobble. This was done in an alternating manner on one face then the other and so on around the periphery or circumference of the biface using a hard hammer. In most cases, the flake scars overlap evenly and the bulbar region of flakes is present on the biface surface although the actual platform may be absent. Cortex removal is the object of this step.

A biface such as in Fig. 9 b is the uncompleted result of this step. Attempted cortex removal on the right side did not span a small granular area and the biface was discarded. Overlapping scar patterns on the left side of the biface are evident. Primary and secondary flakes with both cortex and unfaceted platforms were removed as well as a number of chips.

STAGE C (Fig. 9 c) The final removal of cortex and the preliminary thinning of the biface occur during this stage. Hard hammer percussion was continued and the removal of additional secondary and interior flakes resulted in the presence of isolated sections of older flake scars. Rough form shaping is begun but thinning is of particular importance.

Unthinnable bifaces with little cortex present, represent the rejects of this stage. Thinning resulted in a hinge fracture on the left side of the biface and there was no way to effectively remove the hump which is present. Secondary and interior flakes primarily with prepared platforms are discarded as are chips of the same categories.

STAGE D (Fig. 9 d) Stage D involved the final step of biface production in which a hard hammer percussion technique is used; subsequent techniques are soft hammer and pressure. The use of a hard hammer produced crushing of the platforms around the circumference of the biface and also resulted in deep bulbar scars and flakes about as long as they are wide. Flakes generally have prepared unfaceted platforms which show hammer crushing. The end product of this stage is a roughly oval or triangular biface which has a sinuous edge around the circumference.

A thinned biface with deep flake scars and crushed platforms around the circumference is the discarded result of this stage. Hard hammer percussion flakes, secondary and interior, with prepared platforms were discarded. Numerous interior chips also result.

STAGE E (Fig. 9 e, f, g) Soft hammer percussion was begun in this stage using unfaceted platforms prepared around the circumference of the biface. Flakes span the biface in order to thin it, however, this often causes breakage due to over shotting (Fig. 9 f) or shatter (Fig. 9 g). A biface thinned by percussion and more finely shaped into an oval or triangular form is the end result of this stage.

The by-products of Stage E are overshot thinning flakes, parts of bifaces shattered by the force of the percussion, lipped flakes and numerous interior chips. No complete specimens of this stage are represented from the site.

STAGE F (Fig. 9 h, i, j) The use of both soft hammer and pressure flaking occurred during this stage. Pressure is used to prepare flake platforms and to remove ridges resulting from previous flakes. Due to the overlapping of flake scars, it is hard to determine the type of flake removal used. The final biface is a finished triangular or leaf-shaped form which is thinned and has relatively straight edges as opposed to the previously sinuous edges on bifaces.

Bifaces frequently break at this stage (Fig. 9 i) and in some cases, could have been used as tools without further modification (Fig. 9 j); of the 16 examples from the site, only 3 are complete. In others (Fig. 9 h, i), pressure flaking ends in hinge fractures near the edge of the biface and further finishing is not done. Interior flakes and chips predominate at this step, but are frequently not recovered due to their small size.

Stage F is not necessarily the end of the technological sequence as many Stage F bifaces were further modified into dart points of various forms. A preform stage generally occurs between these two steps but due to the low recovery of dart points and dart point preforms, this process is not discussed here. However, some of the Stage F bifaces certainly were not modified into dart points but surely were used as cutting tools, i.e., knives. Recognition of cutting tools requires microscopic analysis which was not carried out during this study.

The description of biface stages presented here has been used consistently throughout the site reports and will not be repeated for each site. The same or similar technological aspects are uniform for core tool production within the area of the reservoir. Utilization of these categories in the following descriptions allows the comparison of sites with respect to the steps involved and their localization within the reservoir. The localization of biface manufacture has been correlated with the available environmental resources, subsistence activities, and lengths of time spent at different sites. Raw material in the form of flint cobbles was gathered at sources located on the limestone bluff and cortex was removed at these locations. Further trimming was carried out at short-term hunting/gathering camps located adjacent to tributary streams and in some cases, dart points were made and used there. In general, bifaces were finished and made into dart points at such base camps as the Lowden site.

DART POINTS

Parts of 4 large points are described under this heading. One is typological and stratigraphically earlier than the others. Each of these specimens weighed more than 4 grams when complete. It appears that all 4 are core tools. On the basis of their over-all size, their weights and the assumed technology, it is suggested that they are distinct from tools herein referred to as arrowpoints. This is consistent with current useage in the New World and it has been demonstrated elsewhere (Fenenga 1953) that the weight distribution of the projectile points sampled forms a bimodal distribution pattern with a break at 3.5 grams.

A point with a broken tip (Fig. 10 b) has been identified as a Trinity (Bell 1958: 96). The broken point is triangular in plan and has broad side notches adjacent to the base. The notches and base have been ground smooth. Subsequent to breakage, an attempt was made to thin the point by using a soft hammer. This resulted in crushing the edges of the body and in leaving deep but short flake scars on both faces. The Trinity point is from level 6 in the occupation area. Dimensions are: L–4.0+, W–1.8, Wt–7.5+, T–0.8.

Two slightly expanding stemmed points are represented by a base (Fig. 10 c) from the fill of the occupation area and a reworked or unfinished point from the surface of collection Area F (Fig. 10 a). The base is from a finished point which had been alternately beveled on the body edges. The stem edges were ground but not the base. Dimensions are: L—2.2+, W—2.5, T—0.5, Wt—3.5+. Breakage may have occurred during the process of beveling or through use. If the latter, we might infer that this is evidence of the re-utilization of the projecile shaft. The other point is also alternately beveled and beveling resulted in a knot of stone on the face which could not be retouched off, its dimensions are: L—4.0, W—2.0, T—0.6, Wt—5.0. The basal edges are not ground and there is no secondary retouch on the edges of the body. Therefore, it is suggested that the point was never finished, and was discarded before finishing. These might be identified as Yarbrough points.

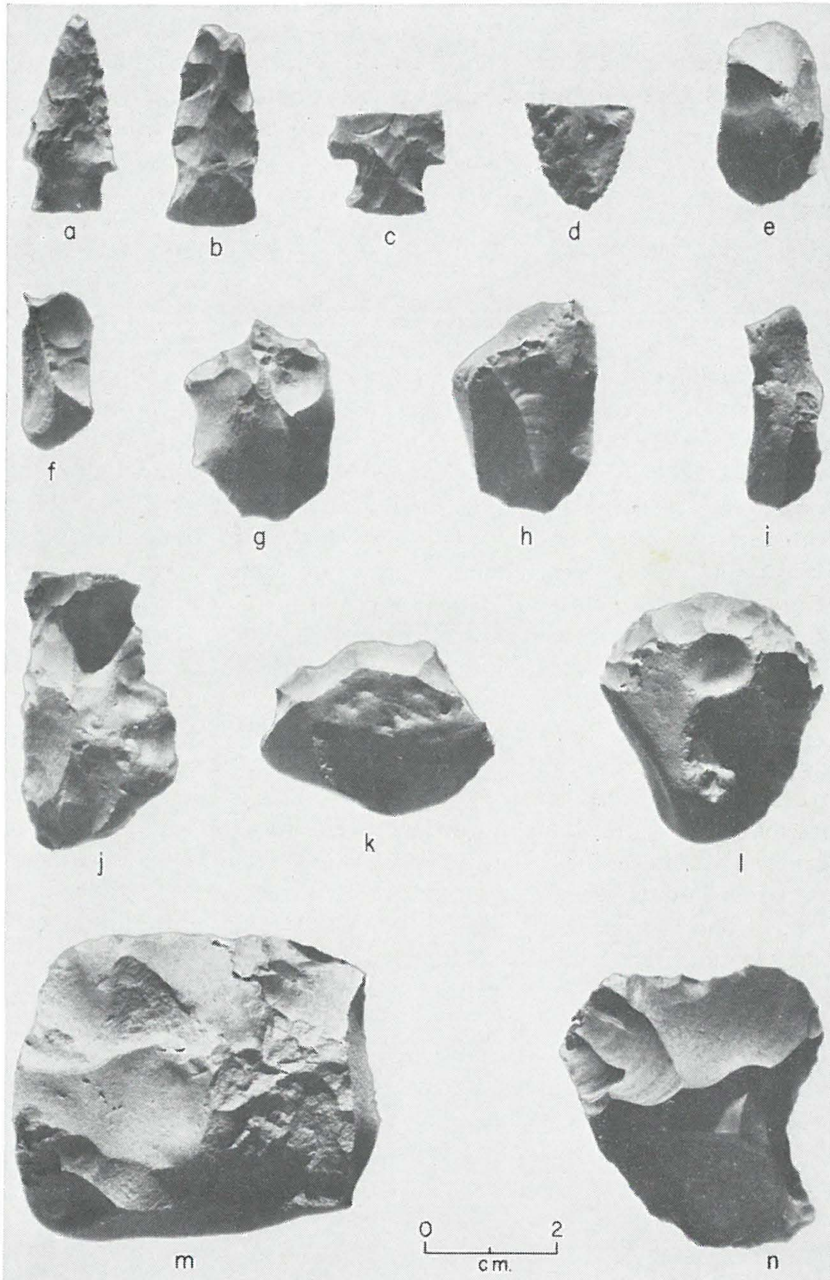


Fig. 10. Lowden site tools. a-c, dart points; d, serrated flake; e,l, end-scrapers; f, borer; g, h, gravers; i, notch; j, side-scraper; k, denticulate; m, chopper; n, concave scraper.

The fourth specimen is missing the tip and most of the base. It is slightly barbed and appears to be corner notched. It is wider and shorter in length than the Yarbrough points. Its dimensions are: L—3.2+, W—2.4, T—0.4, Wt—3.5+.

ARROWPOINTS

This category contrasts with the dart point sample previously described in three respects, first, these are flake tools as opposed to core tools, secondly, the sample from the occupation area includes specimens which are representative of the manufacturing stages, and thirdly, the weight range for whole specimens is 0.8 to 1.5 grams. The manufacturing steps are described below and illustrated in Fig. 11.

The following discussion is a specific description of the making of corner notched triangular shaped projectile points, Scallorn. These materials are from one provenience unit and are basically similar except for part of a Perdiz point (Fig. 11 g) from the same location. Manufacturing involved the procurement of a useable flake, removal of the bulb of percusison, general shaping, trimming and preparation of the body, corner notching and final retouch of the finished tool. These steps may not be represented in some collections, but this method of analysis allows the separation of preforms from finished tools and an explanation of the lithic debris recovered.

The first step is the removal of a useable flake from a core and the trimming off of the bulb of percussion in order to have a flake of uniform thickness to deal with. Useable flakes are larger than they are wide, have little or no twisting, have a smooth ventral surface, tend to be wider near the bulb of percussion than at the distal end and therefore are roughly triangular in plan. Most of these flakes would be classed as interior flakes but the type of platform is not known since in all cases they have been retouched off. The uniformity of this group is illustrated in Figure 11.

The second step involved the general shaping of the flake into a triangular shape and concomitant with this operation is the preparation/thinning of the body. Shaping and thinning is a pressure operation which when completed results in long triangular preforms. Due to the relative smoothness of the ventral surface, little retouching and edge sharpening is needed there. Rejects occur due to several factors, in the case of Fig. 11 c, they were unable to thin these examples, d, was rejected when it broke and e was discarded after thinning resulted in a line of hinge fractures near the right edge of the dorsal surface. The pressure flakes which would have resulted from this operation would pass through quarter inch screen and should be recovered by flotation of midden samples or use of finer mechanical screens.

The third and final step involved the pressure retouch of corner notches near the base of the triangular preform. The corner notch scars overlap retouching on the lateral edges and there are scars on both faces of the flake which provides for the depth of the notch. Corner notching frequently resulted in breakage of the barb (Fig. 11 b, i). The example in Fig. 11 f is an unretouched flake which has had a corner notch prepared. Breakage may have occurred before or

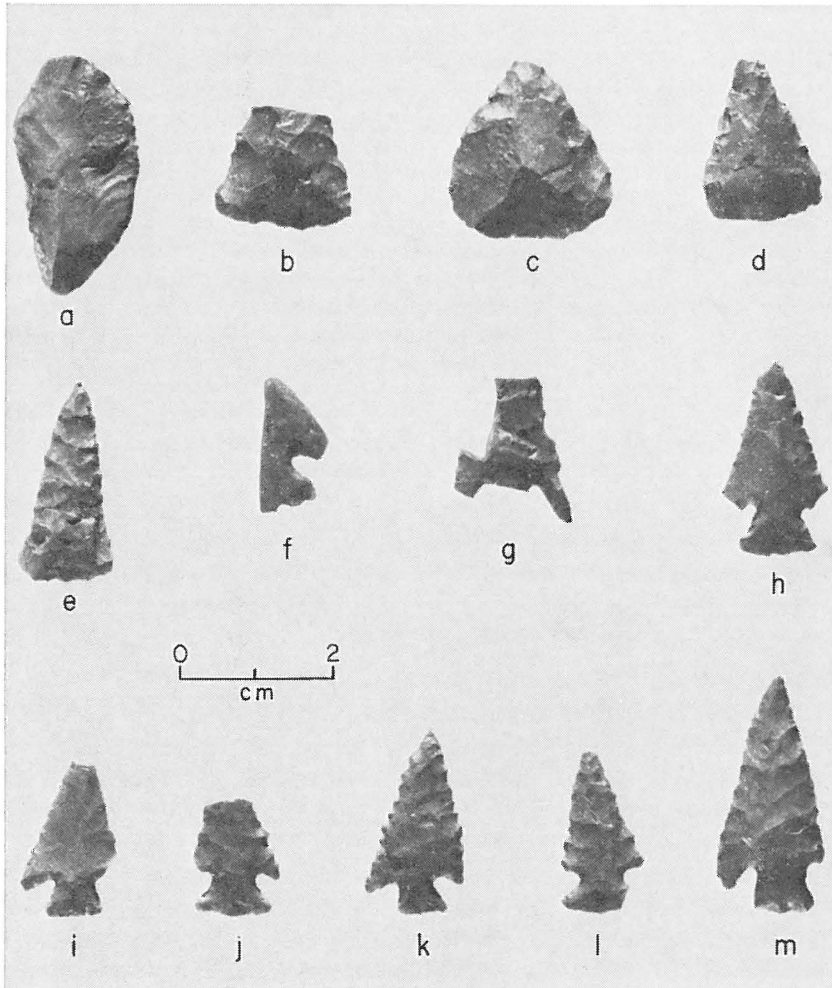


Fig. 11. Arrowpoints showing steps in manufacture.

after the notch was made, but the specimen is not typical in that flakes this thin are rarely used.

Specimens illustrated in Fig. 11 j, m, are examples from the occupation area. The remaining specimens are a tip and a corner notched point without a base. A Perdiz point (Fig. 11 g) is from the same provenience but no Perdiz preforms were recovered.

The question of arrowpoint preforms has been discussed by Suhm (1957) and Long (1961: 231) with regards to preforms for Perdiz. They suggest that they are ". . . crudely chipped, often modified only on one face, or on one face more than the other" (Suhm and Jelks 1962: 269). A similar situation is exemplified by the preforms illustrated in Fig. 11 b, c, which might be identified as Young points (Suhm and Jelks 1962: 295) or Granbury points bono variety (Jelks 1962: 35-36). It is suggested that on the basis of the published description of Young and Granbury bono and technological information from this site, that they constitute unfinished preforms of Scallorn points rather than finished points and should not be ascribed to a type position.

DRILL

The mid-section of a drill made on a core has an off-center biconvex cross section, 0.6 centimeters thick and 1.2 centimeters wide. Bifacial pressure flaking on both edges created a sinuous edge which resulted from an attempt to resharpen the drill. There is no evidence of smoothing or other wear on the edges or the faces.

SERRATED FLAKE

The lateral edge of a partial primary flake (Fig. 10 d) have been serrated. Serration is in the form of obverse (ventral to dorsal surface) retouch which extends for about 1.8 centimeters down the edges on either side of the bulb of percussion. Serration did not extend beyond the end of the broken flake.

GRAVERS-BORERS

All four specimens are on secondary flakes, probably resulting during cortex removal. Two gravers are on large secondary flakes which have the graving point on the distal edge of the flake and formed as a projection left remaining between two adjacent notches. The notches were made by obverse retouch on a thick edge of the flake (Fig. 10 g, h).

The two borers are on secondary flakes which have cortex platforms and have a ridge running across the flake and ending in a natural projection. These projections are naturally strong and the thin edges have been obversely retouched away to create a solid but narrow point (Fig. 10 f).

CHOPPER

This specimen (Fig. 10 m) is a rectangular flint cobble battered on one edge, prepared by the removal of cortex from one face. Cortex removal was done with a hard hammer using the natural cortex as the platform. Crushing has dulled the edge and has broken small flakes from both faces of the edge. There is no evidence of an attempt to resharpen the tool after it became dulled. The cobble measures 7.3 x 6.1 x 2.7 centimeters and weighs 170 grams.

SCRAPERS

Tools within this category include end-scrapers (3), side-scrapers (1), concave scrapers (1), notch (1), denticulate (1), and truncation (2) and in all but one case, these tools are made on flakes. The uncertain case is the bit of an end-scraper which is too fragmentary for determination. All flakes have cortex where they are preserved and all but 2 are secondary flakes. One exception is the fragmentary end-scraper bit, the other is an end-scraper on a primary flake. Two weight clusters reflect the general size and massiveness of the tools. The heavier category ranges from 20.5 to 57.0 grams and includes those tools except one from outside of the occupation area. The lighter category includes 2 specimens weighing 4.7 to 6.0 grams and the fragmentary end-scraper bit for which the weight is meaningless. A truncation from level 3 of the occupation area weighs 36.0 grams and may not be associated with the occupation of the area.

Three end-scrapers on flakes represent three different scraper treatments. The first (Fig. 10 l) is on a primary flake, weighs 47.5 grams and measures 5.0 x 4.5 x 1.7 centimeters. Steep retouch occurs on the convex bit which has been resharpened resulting in shallow hinge fracturing on the bit. The second (Fig. 10 e) weighs 6.0 grams and measures 3.7 x 2.1 x 0.7 centimeters. Retouch was used to sharpen the thin bit and there is no evidence of resharpening. The third example is the fragment referred to previously.

The side-scraper (Fig. 10 j) is on the left side of a flake (5.6 x 3.2 x 1.0 centimeters, 20.5 grams) and was produced by obverse retouching of a previous flake scar. The edge is not well prepared although the retouch is overlapping.

A concave scraper (Fig. 10 n) is distinguished from a notch (Fig. 10 i) on the basis that an entire edge of the flake has been retouched in a concave form. In this case, a natural concavity was retouched to sharpen the edge. The retouch was insufficient to sharpen up the concavity. The scraper is 5.7 x 1.6 centimeters and weighs 57.0 grams. In contrast, the notch (Fig. 10 i) has a single concavity (1.1 centimeter wide) retouched on one lateral edge of the flake. Retouch is obverse and resulted in a notch 2 mm. deep. The flake measures 2.3 x 1.8 x 0.5 centimeters and weighs 4.7 grams. The denticulate (Fig. 10 k) is similar in that it has more than one notch associated along a single edge. Weight is 47.5 grams; measurement is 5.1 x 4.9 x 1.6 centimeters. A hard hammer blow caused the central scar and the lateral scars are due to retouch. Retouch is also present on the opposite edge.

The truncations are flakes which have had a straight edge retouched in an area that was previously curved when the flake was removed from the core. Retouch is shallow on the specimen from Area D; dimensions are L—5.4, W—3.8, T—1.4, Wt—34.0. The specimen from level 3 of the occupation area is steeply retouched on the right edge of the flake. Its dimensions are: L—3.6, W—4.8, T—1.8, Wt—36.0.

RETOUCHED PIECES

Secondary (87) and interior (71) flakes and chips of various sizes and shapes have been retouched. Most of the retouch is obverse, that is, from ventral to dorsal surface, and 39% of the pieces have retouch located on the distal edge of the flake. Fifteen percent and 19% are retouched on left and right sides respectively while 12% are bilaterally retouched and 15% are retouched around the circumference of the piece.

HAMMERSTONES

Oval to rectangular shaped cobbles of quartzite (74%), flint (18%) and sandstone (7%) were used as hammerstones. Inclusion within this class is based on the presence of crushing on prominences or other parts of the cobbles. One hundred and twenty of the 145 individual hammerstones are complete while the remainder are broken fragments. A prominent corner, or other natural projections are the most common location for pecking to have occurred. Pecking also occurs on a flat surface adjacent to a projection as well as scattered around the circumference of a cobble and occasionally as an isolated occurrence elsewhere on the cobble. Pecking occurs at only one location on some tools while at several locations on others. Pecking ranges from very light, indicated by a few percussion cones, to heavy, indicated by complete crushing of a prominence.

Cobbles range from 41 to 1,119 grams in weight; the majority falls within the range of 41 to 538 grams. Thirteen of the complete hammerstones from levels 1-3 of the occupation area fall within the range of 73 to 292 grams. The remainder weigh 394, 414, 496 and 933 grams. It seems unlikely that tools having this range of weight served in a single function, i.e., flint chipping, food preparing, or whatever, therefore it is suggested that hammerstones were selected for specific purposes which involved pounding and that by isolating these tools within structures or in sites, that we will be able to infer specific useage.

MANOS

Water worn sandstone cobbles were made into manos. The cobbles were pecked into a roughly rectangular shape and there is no evidence of the removal of large trimming flakes. The pecked surfaces, particularly corners and edges, were rarely ground smooth and therefore the pitted surface is still present. All but one specimen are fragmentary and of the identifiable specimens, 12 are unifacially ground and 5 are bifacially ground. The resulting cross sections are respectively convex/flat and biconvex and indicative of back and forth grinding motion. The majority of manos were probably two-handed, based on their size and estimated weight. Specimens range from 23 to 6.4 centimeters in thickness and from 7.5 to 9.3 centimeters in width. Due to the fragmentary nature, length is not estimated but the complete specimen is 16.0 centimeters long. Several of the fragments from the collecting areas are burned and may have been a part of a previously destroyed hearth thus suggesting their reuse after breakage occurred.

METATES

Twenty-two metate fragments of sandstone were collected, 21 from the surface of the site. The size and shape of complete metates are uncertain but two of the examples are from bifacially ground metates while the remainder are from unifacial examples. The outside edge is present in 10 specimens and appears to represent a basin metate. Six of the fragments are fire-cracked and may have been part of a destroyed hearth after they had been broken.

FIRE-CRACKED ROCK

Cobbles of fine and coarse grained quartzite make up 80% of this category while sandstone makes up 17% and flint and quartz comprise the remainder. Cobbles from 100 to 750 grams in weight and no clustering of weight, i.e., size, was observed. Fire-cracked rock was collected both from the surface of the site as well as scattered within the fill of the occupation area.

MUSSEL SHELL

The majority of the shell is badly fragmented due to burning and thus is unidentifiable. Burning has caused spalling of shell layers, has softened the shell and in some cases oxidized it. All identifiable specimens are *Quadrula sp.* except for one example identified possibly as *Proctera.* Both genera occur in the Brazos River today. On the basis of the burning, it is suggested that these represent one part of the subsistence base and that the mussels were cooked in the shell.

The artifact sample from the Lowden site consists primarily of chipping debris, but includes a tool sample which constitutes 2.7% of the assemblage. The completion of core tools and of flake tools is represented within the debris. A complete biface sequence from Stage A-F is represented in the collection but shaped dart point preforms are lacking, as are dart points, in general. This absence may be due to previous collection of surface materials or may be due to the completion of this activity elsewhere in the site. The latter seems unlikely in regards to the high incidence of small interior flakes and chips which indicates tool completion. Flake tool manufacture is represented by unfinished preforms which generally are from an in-place context which had not previously been disturbed.

Hammerstones are a tool which is very abundant in the surface collection. All of these stones were brought to the site to serve a purpose but we have no data on the specific activity(s) for which this tool is used, although it seems likely that they were used for flake detachment.

Dating of the artifacts described herein relies solely upon cross-dating of morphologically similar projectile points dated by carbon-14 elsewhere within Texas. Trinity dart points are dated 2000-1000 B.C. (Crook and Harris 1952: 12) and Yarbrough is dated 500 B.C.-1000 A.D. (Suhm and Jelks 1962: 261). One Trinity point was found, and although stratigraphically early (Level 6 in the occupation area), no occupational materials were directly associated with it. Scallorn arrowpoints are dated during "some part of the span 500-1200 A.D. (Suhm and Jelks 1962: 285)"; while Perdiz is dated 1000-1500 A.D. (Suhm and Jelks 1962: 283). Due to the date overlaps, and the association of Scallorn points with a Perdiz in the occupation area, it is suggested that the occupation area was utilized sometime between A.D. 1000-1200.

Summary

Limited excavation of the Lowden site has shown that although the surface was littered with artifacts, "in situ" midden deposit and architectural features were generally destroyed. Nevertheless, the exposure of an intact occupation area located near the edge of the field provides information on the activities conducted within the limits of the living area.

The occupation area is a little over 400 square feet in area and it contained about 75% of the artifact assemblage from the site. Although we did not recognize horizontally separated work areas, the artifacts from the midden deposit represent several different kinds of activities which appear to have been conducted within the limits of the area. Tool making, as represented by lithic debris including flakes and chips, biface stages E and F, arrow preforms and tools, arrowpoints, and possibly hammerstones, is the most prominent activity. Not only is there evidence for arrowpoint making as discussed earlier, there is evidence to suggest that core tools, as represented by biface stages E and F and lipped flakes from similar bifaces, were being made in the same area presumably at the same time. Thus, it is suggested that core tools, both dart points and "knives" should be expected in an assemblage from this time period (Jelks 1962: 86).

Borers, scrapers, and retouched pieces are the other classes of chipped stone tools collected from within the occupation area. Hammerstones may have been used in the process of flint working, but may also have served as pounding tools for use in food preparation, or other maintenance activities. The manos and metate are considered to represent food processing, while the burned mussel shell is the remains of food consumed by the occupants of the area.

The central location of the hearth is considered the focal point around which activities were conducted and based on the floor area and activities represented, it is suggested that the occupants of the area included both men and women. Moreover, based on the amount of materials, the types and variety of materials, and the concentrated midden which surrounds the hearth, it is suggested that occupation was of a continuous long term nature by a group of people who were concerned primarily with a wide range of maintenance and exploitative activities.

BLUEBONNET SITE (X41HD26)

Introduction

The Bluebonnet site (Fig. 4) is situated on the west bank of Eden Branch at the mouth of the valley through which this intermittent tributary drains before it flows across the alluvial terrace and empties into the Brazos River. The site is located about a quarter of a mile from the river. Eden Branch flows regularly in the spring and summer but dries up during the fall and winter. The valley is less than 1000 feet wide at the mouth and narrows abruptly to the north. Scattered clumps of grass cover the ground and a luxurient growth of bluebonnets (*Lupinus subcarnosus*) covered the surface of the site during the spring. Juniper and mesquite are the dominant trees although there are a few live oaks. Limestone is exposed in the stream bed and is overlain by a layer of sterile red clay. The sandy zone which overlies the red clay varies in depth from less than one meter near the eastern edge of the site to over 3 meters near the western edge.

An old road crosses the eastern part of the site and numerous flakes, cores and fresh water mussel shells are exposed in the roadway. The cultural material covers an area the width of the road and extending approximately 100 meters north-south. During the survey there was no evidence of occupation at the western end of the site and it was believed that occupation was limited to the area exposed along the road. The artifact collection from the survey included flakes, cores, hammerstones, retouched pieces, and a large number of fresh water mussel shells. Analysis of the lithic debris showed that secondary flakes constituted the largest amount (58%) while 37 percent of the debris was interior and 5 percent was primary flakes. This distribution (see Fig. 3) was between that of alluvial terrace sites and that of bluff sites. Therefore, it was suggested that the chipping conducted here was intermediate between the other two site locations. In addition, the high quantity of mussel shells, the absence of projectile points and grinding tools, and the distinctiveness of the microenvironment led to the conclusion that this represented a seasonal collecting site at which bifaces were trimmed but not further modified, thus suggesting that hunting was not a primary activity.

Excavation Procedure

A north-south baseline (Fig. 12) was established through the eastern part of the site and excavation was conducted to determine the depth and extent of the cultural zone and to isolate prehistoric living areas. Trenching was done by hand and fill was screened through quarter-inch mesh in those areas where architectural features were exposed and in certain other areas. Excavation revealed that the occupation zone was from 30 to 40 centimeters thick. Concomitant with excavation in the eastern part of the site, test holes (excavated with a posthole digger) were placed adjacent to the cleared areas in order to determine the depth and extent of the cultural zone as well as the location of the underlying strata. A row of test holes, spaced 5 meters apart, was placed in an east-west direction perpendicular to the baseline and extended 60 meters west of the excavation adjacent to the old road. A midden deposit more than two meters in depth

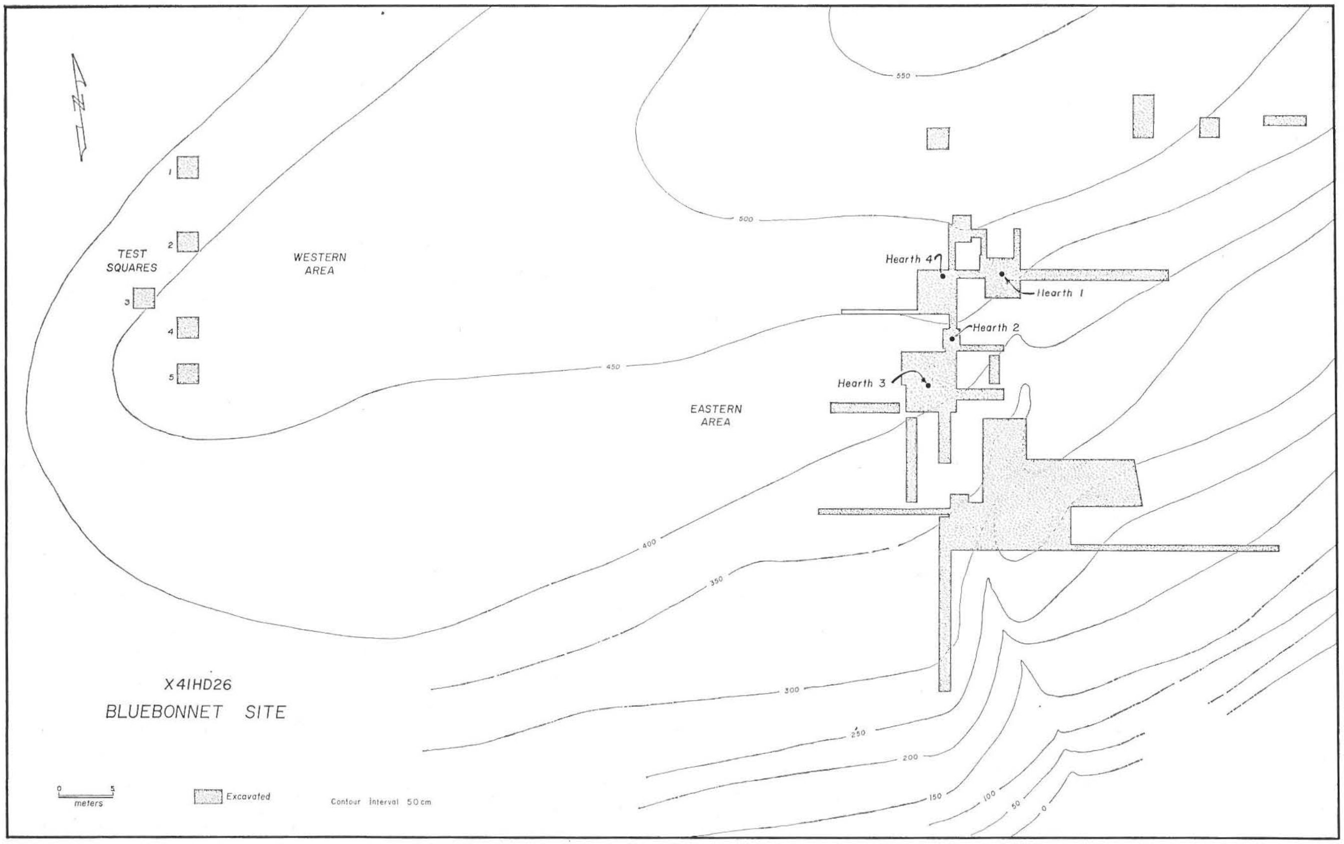


FIG. 12. Base map of the Bluebonnet site showing excavation in the eastern and western parts of the site.

was exposed in the two western-most holes. Subsequently, five 2 x 2 meter test squares were excavated to determine the depth of the deposit and to recover a stratified sample of artifacts. The squares were excavated in 20 cm. levels and all fill was screened through quarter-inch hardware cloth. The midden deposit was more than three meters deep.

Eastern Area

As noted earlier, the culture bearing zone on the eastern edge of the site is shallow and there was little chance of superimposed living areas. Four hearths and their adjacent living surfaces were exposed in the excavated area. The living areas are located on or just above the top of the red clay zone. A contiguous but not overlapping arrangement of hearths is represented by the four hearths. This may be due either to contemporaneous utilization of the hearths which were spatially separated to provide an associated work area or to repeated occupation of a stable ground surface and the construction of new hearths.

HEARTH 1 AND LIVING AREA

A horizontal layer of limestone rocks was bisected by a test trench near the northern edge of the excavated area. This was the first architectural feature recorded at the site and was partly removed during excavation. Rectangular-shaped areas on either side of the trench were cleared and an area of limestone rock and other occupational materials were recorded on the surface adjacent to the stone. The stone lens represented a hearth around which stones were scattered on the associated use surface.

The hearth covered a circular area about 160 centimeters in diameter although the southern half of the hearth had been removed by excavation. About 35 centimeters of fill overlaid the hearth. The stones were laid upon the surface of the ground in a shallow basin in a layer only a stone thick. Although there was a faint black stain on stones in the center of the hearth, no charcoal was recovered. Three small clusters of limestone were located adjacent to the hearth on the northwest, northeast and south sides. Two flint cobble cores, a broken fragment of a hammerstone, parts of two mussel shells and a small amount of flint debris were found on the same level as the hearth and within an area of about 2 meters of the hearth center.

HEARTH 2

A small concentration of limestone constitutes this feature which is located in the center of the excavated section of the site. The stones make up a small hearth.

The hearth is a small basin of approximately 30 fragments which cover an oval shaped area 45 centimeters north-south by 50 centimeters east-west. No charcoal was present in the hearth nor were any chipped stone artifacts associated with it. A collection of limestone fragments was situated to the northeast. The extent of the living area represented by the hearth is uncertain as is the period of occupation and the activities carried out here.

HEARTH 3 AND LIVING AREA (Fig. 13, 14)

A basin-shaped arrangement of burned limestone slabs and chunks was found near the center of the excavated portion of the site. Limestone fragments and a small amount of cultural material were uncovered just above the upper surface of the red clay zone adjacent to the hearth.

The hearth is circular in plan, 150 centimeters in diameter, and basin-shaped in cross-section. The fill was stained black but charcoal was not present. A large fresh-water mussel shell was found on the hearth. The hearth was built by excavating a shallow basin which was then lined with a single layer of limestone slabs.

On the adjoining living surface, numerous concentrations of limestone chunks, as well as a mussel shell and a core, were recovered. Limestone chunks nearly encircle the hearth, there was no concentration of food or manufacturing wastes associated.

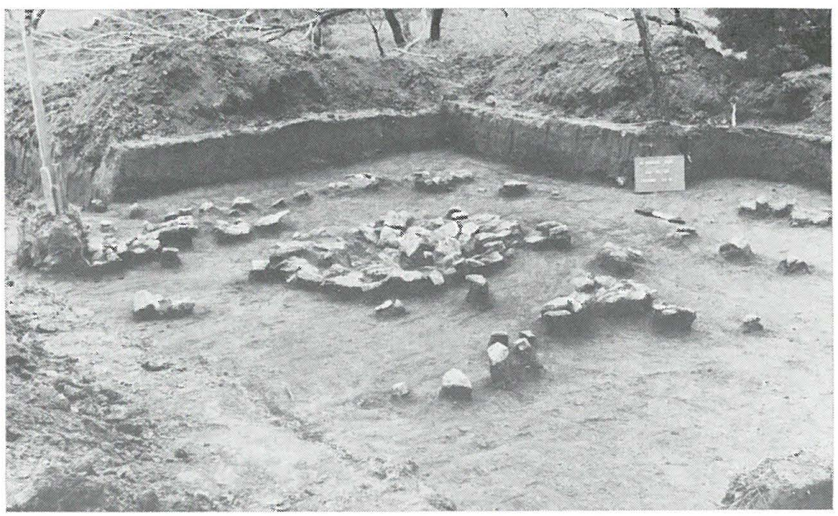


Fig. 13. View of Hearth 3 with limestone chunks on the adjacent living surface, looking southwest.

HEARTH 4 AND LIVING AREA (Fig. 15)

The central hearth and the southwest quarter of the adjacent living area were cleared. Fragments of limestone were uncovered on the adjacent surface and a large amount of lithic material was found in the dark brown zone above the hearth. However, this material is not directly attributable to the occupation of the hearth and living area.

The hearth is roughly circular in plan, approximately 80 centimeters in diameter and is in a shallow basin which is lined with a layer of limestone. A flint core was found adjacent to the hearth and concentrations of limestone chunks were uncovered southwest of the hearth. No limestone was exposed in test trenches to the east and north. A Scallorn arrow point was found in the fill adjacent to the hearth.

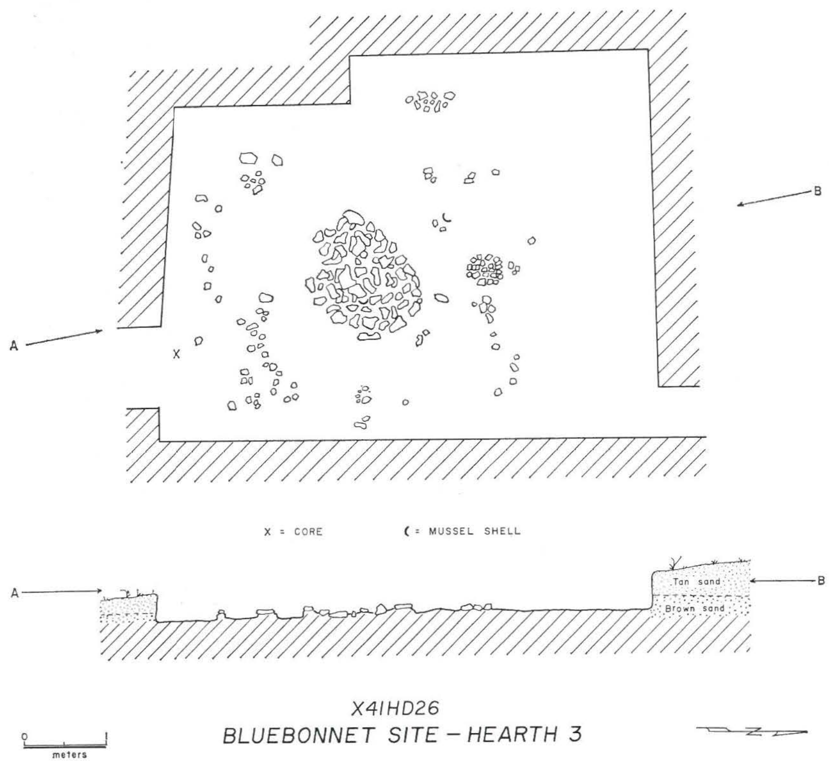


FIG. 14. Plan and profile of Hearth 3.

Western Area

During the spring of 1968, three 2 x 2 meter test squares, squares 1, 2, and 4 were excavated in the western area to determine the depth of the deposit and to collect a vertically stratified sample. Layers of limestone were noted during the excavation but time was not sufficient to record the hearths and/or sections of the living surfaces represented. Squares 3 and 5 were cleared in the fall of 1968. The features which were uncovered, and are described below, include parts of four living surfaces and/or hearths. All squares were excavated in 20 centimeter levels and fill was screened through quarter-inch mesh. Cultural material was generally not recovered in levels 1 and 2 due to the presence of more recently deposited alluvial material. Depth of the various squares are listed below:

FIG. 15. Hearth 4 in background with limestone fragments on use surface, view to northeast.

Test Square	*Maximum Depth*
1	200 cm.
2	160 cm.
3	220 cm.
4	240 cm.
5	300 cm.

STRATIFICATION

Three zones were recognized in each of the squares and although they vary in thickness between squares, they are otherwise similar. They differ in color, texture and composition and are described below using the present ground surface for reference.

ZONE 1: A mantle of light tan sand varies from 40 to 60 centimeters in depth. The sand is unconsolidated and water and grass roots penetrate the zone easily (See Fig. 16). A thin layer of yellow alluvial deposited sand as well as other laminated layers parallel the present ground surface and it is suggested that the deposit was water deposited. Very little cultural material was found in this zone.

ZONE 2: A layer of consolidated brown sand occurs from 60 to about 150 centimeters below the surface. The top of the zone is represented by a color/texture unconformity between the overlying light tan/unconsolidated sand and the brown/consolidated sand of this zone.

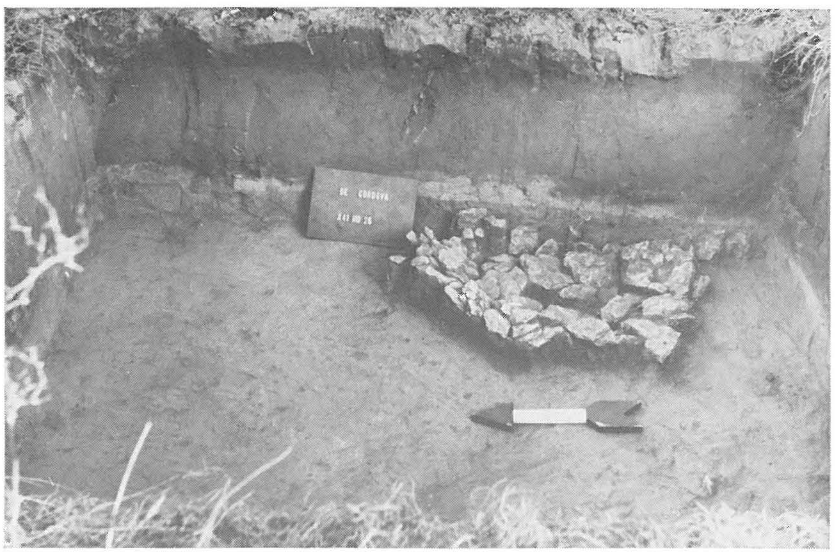


FIG. 16. Square 3, looking east, showing the depth of Zone 1 indicated by the soil change located just above the top of Hearth 1.

This unconformity may be due in part to the effective depth of water penetration. Cultural materials including hearths, shell, flint and some mammal bone were concentrated in this zone. The brownness of the zone may be due in part to the ash and charcoal represented in the deposit. This zone is darkest in square 2 and grades to light brown in the southern squares and thins out to the north and east of square 2.

ZONE 3: The brown sand is intermixed with red clay below 150 cm. and this reddish sandy clay zone extends to the maximum depth of excavation at three meters in square 5. Cultural material continues to the full depth of excavation but decreases quickly from level 8 downward. The zone is consolidated and appears to be an alluvial deposit. Cracks in the red layer which appear to be drying cracks and were filled with brown sand presumably washed into the cracks during deposition of the deposit.

FEATURES

Parts of hearths or living surfaces were uncovered in each of the five squares but due to the size limits of the squares and the depth of overburden it was impossible to expose the entire living surface upon which the hearth was situated. Limestone which appeared to indicate the location of an occupation zone was exposed in levels 4 and 5 of square 1, level 4 of square 1 and level 8 of square 4. A hearth was also exposed in level 7 of square 4.

Hearths and living surfaces exposed in squares 3 and 5 were recorded in place before being removed during excavation and are described individually below. Due to the consistency of the soil and to the continuous deposition represented, it was difficult to isolate a walked upon surface as separate from the adjacent fill. Consequently very few artifacts were attributed to a particular architectural feature.

HEARTH 1 (Square 3): The top of an area of limestone was exposed in the bottom of level 3. At this point, the upper limit of zone 2 was exposed and a hearth (Fig. 16) was noted. No use surface was noted and artifacts were not recovered from the fill of the hearth.

The hearth (Fig. 17) is a shallow basin which was lined with limestone slabs. More than half of the hearth, which measured 50 cm. east-west by 130 cm. north-south, was uncovered within the square. Charcoal was not present.

HEARTH 2 (Square 3): Part of another hearth was exposed in the northeast corner of the square at 140 cm. below the surface. As indicated (Fig 18) this is not below Hearth 1 and as before, a use surface was not exposed. However, a few artifacts were recovered from the hearth fill.

The size and shape of the hearths are undetermined but the stones appear to line the floor of a wide basin. In contrast to other hearths, there is a pile of stone represented, rather than the usual pit floor lining. Charcoal was not recovered and only 24 unutilized flakes and chips were found.

OCCUPATION SURFACE (Square 5): Part of an occupation surface is represented by the artifacts exposed at the base of level 5. Artifacts included at this level are mussel shells, burned limestone fragments and two pieces of flint.

The limestone is concentrated in an area near the northwest corner of the square although a few pieces are scattered elsewhere within

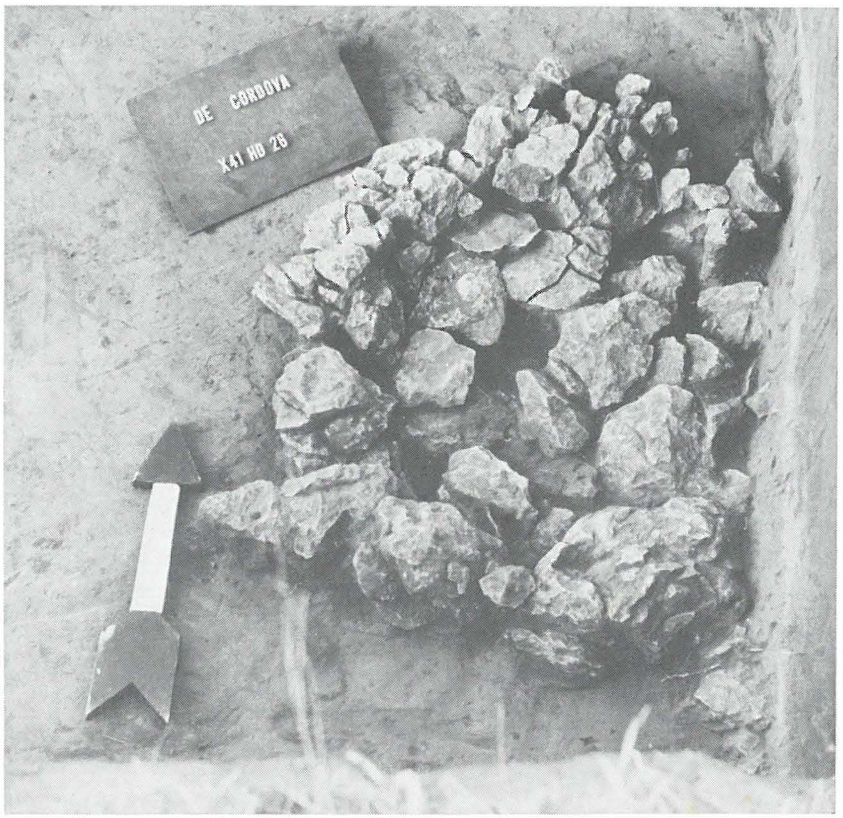


FIG. 17. Hearth 1 in Square 3 exposed near the base of level 3. Arrow points north.

the square. Based on the small amount of material to the east of the concentration and on the general pattern noted in other hearths which were completely cleared, it is suggested that the hearth attributed to this surface is located to the west. As noted, this level is about 40 cm. below the top of zone 2.

HEARTH (Square 5): A portion of a hearth was exposed in the southeast corner of the square at the depth of 200 cm. A concentration and scattered pieces of limestone were found at the same level as the hearth along the eastern wall of the square.

The hearth appears to be a shallow basin lined with limestone slabs. Additional stones overlay the lining but the size and shape of the hearth is uncertain. A concentration of more than 26 limestone fragments were clustered about 50 cm. from the hearth edge. A

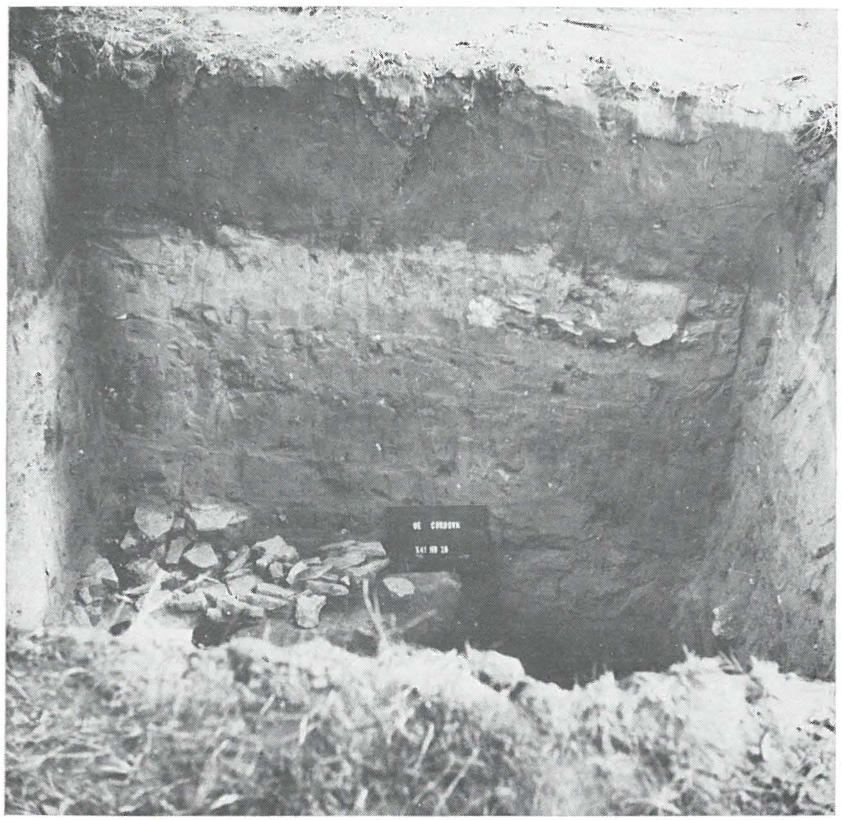


FIG. 18. Hearth 2 in Square 3, looking east. Note location of Hearth 1 indicated in the wall profile.

few scattered stones were found beyond the concentration. A single piece of flint was the only artifact recovered.

Excavations in two separate parts of the Bluebonnet site exposed different situations in which similar activities were carried out. Occupation of the eastern area was recognized by the horizontally scattered situation of 4 living areas represented by the limestone hearths. Due to the small amounts of occupational debris directly associated with the hearths, it is suggested that the living areas were used for short periods of time and at different times.

The occupation of the western area contrasts with the east in that living areas were located on a "floating ground surface." A floating surface is one that gradually rises as water carries soil down the talus slope into the living area" (Struever 1968: 144). A succession of hearths and living surfaces were recorded in Squares 1-5. The size and nature of hearths is similar to those in the eastern area and both areas seem to have been occupied during the same time period.

Artifact Assemblage

The assemblage (Fig. 19) consists of chipped stone debris (cores, bifaces, flakes, chips), chipped stone tools, ground and pecked stone tools and fresh water mussel shells and mammal bones. Provenience is listed in Table 2.

Chipped stone debris makes up 97.0% of the assemblage and of this category cores/bifaces constitute 0.9% and flakes/chips 96.1%.

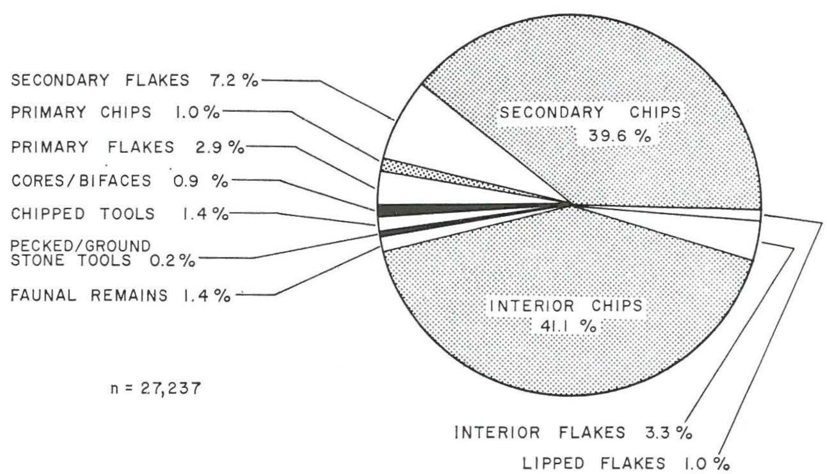


Fig. 19. Diagram of artifact assemblage composition. Bluebonnet site.

TABLE 2. ARTIFACT PROVENIENCE AT THE BLUEBONNET SITE (X41HD26)

	EASTERN AREA				*WESTERN AREA*					
	GENERAL	*HEARTH*			*SQUARE*					
	EXCAVATION	*1*	*3*	*4*	*1*	*2*	*3*	*4*	*5*	*TOTAL*
FLAKES										
Primary	269	2	5	----	104	144	129	73	81	807
Secondary	790	8	25	----	182	390	250	173	141	1959
Interior	330	1	6	----	121	169	113	68	78	886
Lipped	97	4		----	34	37	34	26	44	276
CHIPS										
Primary	74	1	1	----	55	40	56	35	15	277
Secondary	3588	28	27	----	1426	2586	1334	895	884	10768
Interior	3817	26	30	----	1664	2681	1271	932	783	11204
CORES	58	2	1	----	4	7	5	5	9	91
CORE FRAGS.	36	----	1	----	3	9	4	3	2	58
BIFACE STAGE										
A	3	----	----	----	----	2	----	----	2	7
B	8	----	----	----	1	3	2	1	1	16
C	5	1	----	----	----	7	----	3	----	16
D	10	----	----	----	1	5	----	2	----	18
E	18	----	----	----	2	6	5	3	3	37
DART POINTS	6	----	----	----	----	8	2	1	3	20
ARROWPOINTS	1	----	----	1	----	2	----	----	5	9
RETOUCHED PIECES	153	----	----	----	33	113	3	32	4	338
END SCRAPERS	2	----	----	----	----	----	----	----	----	2
DRILLS	----	----	----	----	1	----	----	----	----	1
NOTCHES	1	----	----	----	----	1	----	----	----	2
GRAVERS	3	----	----	----	----	----	----	----	----	3
CHOPPERS	----	----	----	----	----	----	1	----	----	1
HAMMERSTONES	39	1	1	----	1	9	4	1	----	56
MANOS	1	----	----	----	1	----	3	----	----	5
GROOVED COBBLE	1	----	----	----	----	----	----	----	----	1
HEMATITE	----	----	----	----	----	----	----	----	1	1
SHELL	91	----	3	----	28	86	56	59	52	375
BONE	----	----	----	----	----	P	P	P	P	
TOTAL	9401	74	100	1	3661	6305	3272	2312	2108	27234

Chipped stone tools constitute 1.4%, while pecked and ground tools are less well represented (0.2%). Food remains (shell and bone) are minimally represented in the assemblage 1.4%.

DEBRIS

A total of 26,177 flakes and chips were collected at the site. Flakes make up 15% of this number and chips constitute the remaining 85%. A little over one third (34.9%) of the flakes/chips are from the eastern area and the remainder is from Squares 1-5 in the western area. Comparison of the samples shows that the percentages of the flake/chip categories are nearly identical. Primary debris (flakes/chips) makes up 3.9% of the assemblage, secondary debris 46.8%, interior debris 44.4% and biface thinning debris, 1.0%.

CORES AND BIFACES

All the cores are flint cobbles which range in weight from 17-413 grams and have a mean weight of 107.4 grams. About two-thirds of the cores and core fragments collected are from the eastern area. This contrasts with the reverse pattern of flakes and chips from the two areas of the site. This pattern might be indicative of differential use, however, the cores do not show any major typological or technologically differences and the apparent contrast seems to indicate differential erosion as more than a quarter of the cores from the eastern area are surface finds.

Fifty-eight core fragments and 91 recognizable cores were collected. Cortex platform cores are the most common and include single platform cores (32 examples), multiple unpatterned platform cores (22 examples) and circumferential platform cores (18). Among the remaining 20 cores are 6 single prepared platform cores, 3 multiple-prepared platform cores, 6 cores with multiple cortex/prepared platforms, 3 with circumferential cortex/prepared platforms and 1 undetermined type core.

The biface sample includes 94 specimens which represent stages A-E. Thirty of the examples are complete and the remainder are fragments. Biface stages (Fig. 20) are represented by the following number of broken/complete examples:

Stage A-0/7, Stage B-4/12, Stage C-10/6, Stage D-16/2 and Stage E-34/3. Unfinished but complete rejects dominate stages A and B while broken examples of Stages C-E dominate these categories. No examples of Stage F were noted.

On the basis of the kinds and amounts of chipping debris, it is suggested that flint knapping was one of the primary activities carried out at the site. Biface Stages D and E are most common and

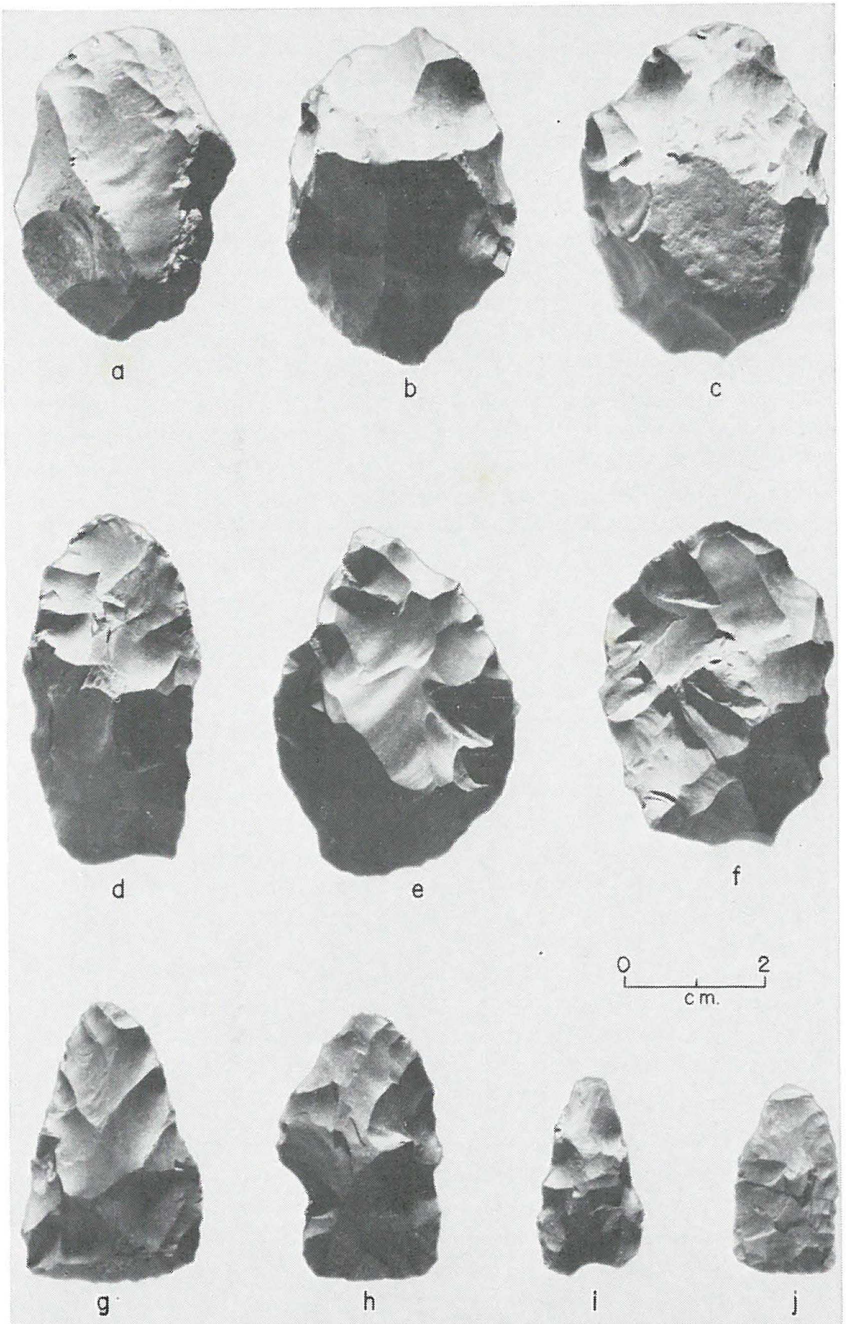


FIG. 20. Bluebonnet site biface sample. a-c, Stage B; d-f, Stage C; g-h, Stage D; i-j, Stage E.

were broken during manufacture. The biface pattern and the relatively equal amounts of secondary and interior debris suggest that bifaces were trimmed at the site but were not made into shaped preforms or completed projectiles.

DART POINTS

Twenty dart points are represented by the complete and fragmentary specimens listed in Table 2. One preform (Fig. 21 m) is of a straight stemmed concave projectile made on a flake. A blow to the left edge snapped the body in half and removed a "burin spall" from the left lateral edge of the preform body. All three dart point tips represent fragments of finished points and do not appear to be manufacturing breaks. The other is a mid-section and base of an expanding stemmed dart point which was roughly shaped but not secondarily retouched.

Dart point bases include specimens represented by broken projectiles (Fig. 21 h, j, k) and by smaller fragments including the barbs and stem or only the stem. No recognizable types were assigned to the smaller fragments (5 examples), although they include 2 straight and expanding stem fragments. The broken specimens include a Yarbrough (Fig. 21 h) with a snapped off tip, a roughly resharpened Morrill point (Fig 21 l) which had a knot on the distal end and two unidentified points with impact snaps. Impact broke the tip and a burin spall off the left side of one unidentified point (Fig. 21 j), as well as crushing the tip end of the point. Weights of these four partial points are 3.0+, 3.4+, 3.5+ and 9.3+ grams.

A Morrill point (Fig. 21 o) is from the eastern area. The stem edges are ground to facilitate hafting and the body is alternately beveled on the left side in order to resharpen the projectile. Edges of the resharpened body are worn or ground smooth and there is no evidence that the edges were retouched after the rough alternate-side beveling occurred.

Two Godley points (Fig. 21 i) are each from level 8 in Squares 2 and 3. They conform to the type description (Jelks 1962: 40) although both specimens have a low body to stem length ratio compared to the examples illustrated from the Kyle Site. Both excavated examples represent projectile points which were broken and then resharpened by shortening and narrowing the body.

Three unidentified projectile points are illustrated in Fig. 21. Alternate beveling was attempted on the left side of the first specimen but flaking resulted in shore hinges on either lateral edge. Basal grinding is present on the stem of the second point (Fig. 21 p). A fire spall broke out of the right edge of the third point (Fig. 21 n).

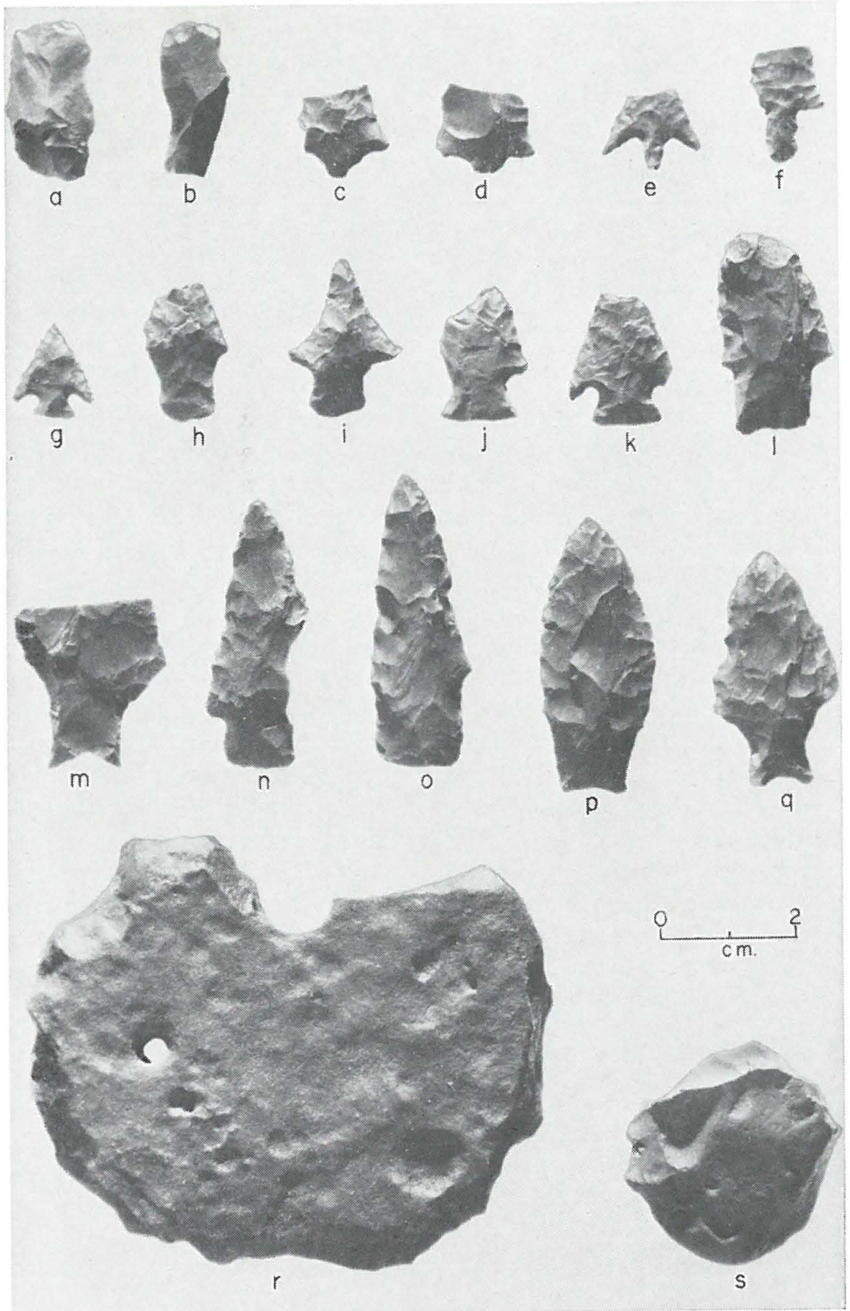


Fig. 21. Bluebonnet site tools. a, graver; b, end-scraper; c-g, arrowpoints; h-q, dart points; r, chopper; s, end-scraper.

Dimensions of the complete projectile points are:

	L	*W*	*T*	*SW*	*Wt*
Morrill	6.3	2.2	0.8	1.9	11.2
Godley	3.4	2.3+	0.5	0.9	3.6+
Godley	3.4	2.4	0.5	1.1	3.3
Unidentifiable	5.0	2.6	0.7	1.2	10.3
Unidentifiable	5.9	2.5	0.8	1.9	13.0
Unidentifiable	5.8	2.0+	0.8	1.6	10.5+

ARROWPOINTS

Parts of two contracting stemmed preforms (Fig. 21 c, d), 1 triangular preform, the bases of 2 Perdiz points (Fig. 21 e, f), and parts of 2 fragmentary untypeable arrowpoints were recovered from the western area. A Scallorn point (Fig 21 g)) was found near Hearth 4 in the eastern area and a fragmentary preform was collected from the surface. All the arrowpoints were made on interior flakes which had the bulb of percussion removed during preparation.

Two preforms might be classified as Cliffton arrowpoints on a strictly formal basis, however, they are both roughly chipped and there has been no secondary retouch prior to breakage. They are situated in Level 6 of Square 5 and a Perdiz point (Fig. 21 e) is from Level 5 of the same square; this association, plus the comments of others (see Lowden site) and the unfinished technological condition of the two specimens suggests that they were not finished products and should not be called arrowpoints.

The two fragmentary preforms (Granbury) are roughly shaped to a triangular form by percussion flaking but were never secondarily retouched. Because these specimens are not finished tools, they are not classed as arrowpoints, although they do fall within the range of Granbury (Jelks 1962: 35-36).

Dimensions are given below:

	L	*W*	*T*	*SW*	*Wt*
Preform (Granbury)	2.0+	1.2	0.4	–	1.7+
Preform (Granbury)	2.3	1.5	0.4	–	1.7
Scallorn	2.1	1.7	0.2	0.7	1.0 gr
Preform (Cliffton)	2.0+	2.1+	0.3	–	1.4+
Preform (Cliffton)	1.8+	2.3	0.4	–	1.8+
Perdiz	2.4+	1.7+	0.3	–	1.4
Perdiz	1.8+	2.1	0.2	0.5	1.0+

RETOUCHED PIECES

Flakes and chips of various sizes and shapes have been retouched, primarily in an obverse manner. The number and percentages of flake/chip categories are: Primary flakes-17 (5.1%), secondary flakes-135 (40%), chips-59 (17.5%), interior flakes-39 (11.6%), chips-51 (15.1%), and lipped flakes-35 (10.7%).

Flakes (67.4%) of the pieces were selected to be retouched and secondary flakes constitutes the largest category of retouched flakes. Interior and biface thinning flakes were also selected for retouching. Primary chips were not found and secondary and interior chips which constitute the largest debris categories accounted for less than one third the retouched pieces.

END-SCRAPERS

Two end-scrapers, both on flint flakes were recovered in the eastern area. One (Fig. 21 s) is a steep end-scraper on a primary cortex flake. The scraping edge has been resharpened but this resulted in short flakes which hinged less than a quarter of the way up the face. Its dimensions are: L–4.6, W–4.5, T–2.1, Wt–55.6. The distal end of a secondary flake (Fig 21 b) was retouched in order to prepare the scraping end. Dimensions are: L–3.2, W–1.5, T–0.4, Wt–2.9.

DRILL

The base of a drill made on a cortex flake of flint was recovered in Square 2. The flake was removed from the core after a prepared platform was made. Cortex remains on part of the dorsal surface but the bulb of percussion has been retouched off the ventral surface by using the flake's striking platform as a platform. The attempted thinning has removed the bulb but ended in abrupt hinge scars on the body. The body is roughly triangular and the evidence of the broken drill bit protrudes from the apex of the triangle. Dimensions are L–3.2+, W–3.0, T–0.6, Wt–8.2+.

NOTCHES

Two secondary cortex flakes, both flint, were made into notches. One notch is located on the distal edge and has removed the bulb of percussion. Retouch is obverse on both and notch depths are 0.2 cm. Notch widths are 1.3 and 1.1 cm. respectively, and corresponding weights are 14.8 and 18.1 grams.

GRAVERS

One secondary cortex flake, an interior flake and an interior chip have gravers retouched on a lateral edge. In all three cases, the graver is 1 mm. long and is located in about the center of the edge. The secondary flake has the graver located on the left edge and inversely retouched. A graver is obversely retouched. A graver is obversely retouched on the left side of the interior flake and on the right side of the chip. Weight of the gravers is 18.1, 3.4 and 1.1 grams respectively.

CHOPPER (Fig. 21 r)

A thin (1.5 cm. maximum) flat slab of highly silicified limestone was roughly flaked around three quarters of its perimeter. The slab is a rounded rectangular shape, 11.2 x 9.1 cm. and weighs 246.2 grams. The flaking consists of large percussion flakes which were all removed in an obverse manner. A natural hole pierces the slab but has not been modified. There is no evidence of wear on the flake scars nor evidence of hafting. Similar artifacts which evidence scraping wear have been reported from near Dallas (Gwin 1941).

HAMMERSTONES

Flint (8) and quartzite (48) cobbles were used for battering as evidence by crushing located at various places on the cobble surfaces. Flint cobble hammerstones range in weight from 56 to 360 grams and average weight is 163.25 grams. Quartzite cobble hammerstone weights range from 44 to 787 grams with a mean weight of 217.08 grams. Mean weight of the combined quartzite and flint cobble sample is 208.96 grams.

PECKED AND GROUND STONE TOOLS

Fragments of five manos, made of sandstone include almost all of a mano from the eastern area, part of a mano from Square 1, and three fragments from Square 3. The nearly complete specimen is roughly circular in plan (8.5 x 6.0+ x 3.4 cm.), is unifacially ground and appears to have been made of a sandstone slab which only required the edges to be pecked to shape it. Two of the mano fragments are bifacially ground and only one grinding surface is present on the other two fragments. Grinding wear patterns suggest back and forth grinding.

Half of a grooved quartzite cobble was recovered on the surface of the eastern part of the site. Half of the cobble is present, but its original shape appears to have been roughly rectangular (6.3 x 4.7+ cm.) and flat (2.6 cm. thick). The circumference of the cobble has been crushed and battered. There is one groove on either face of the cobble and these appear to be the result of pecking and subsequent grinding. Both grooves are deepest and widest at the cobble and blend into the original cobble surface 3-3.5 cm. from the edge. The grooves do not suggest shaft abraders or smoothers nor are they patterned in such a way to have served for hafting, i.e., Waco sinkers or atlatl weights.

A roughly spherical (2.5 cm. thick) nodule of hematite was found in Square 5. The interior color is red which was once covered by a thin layer of yellow hematite. Irregular striated facets which show evidence of grinding cover the surface at various angles. The nodule weighs 21.2 gr.

MUSSEL AND SNAIL SHELL

A sample of at least 43 snails and 169 fresh water mussels is represented by the shells collected from the excavation. The vast majority of mussels is represented by hinges or fragmentary shells. *Quadrula* is the most common genus but examples of *Lampsilis* and *Proptera* were also found. Many of the shells had been burned (Cheatum, p.c.). Shells were scattered throughout the deposit but were not found in any concentration. A few examples of land gastropods, *Bulimulus* and *Polygyra* were found, especially in the Squares 2, 3, and 5. Snails may have served as a food resource (Cheatum, p.c.), but were not as commonly a used resource as were fresh-water mussels.

MAMMAL BONE

Fragments of large mammal bones were found in Squares 2, 3, 4 and 5 from level 3 to level 14. Most of the fragments are badly eroded due to the acidity of the soil and this, plus their fragmentary nature yields them unidentifiable. The majority are fragments of large mammal (presumably deer) long bones, although a vertebra and two phalanges from a deer were found. Other bones include the plate from the head of a drum fish and fragments of a herbivore tooth.

Artifacts from the Bluebonnet site show evidence of a large amount of flint knapping and mussel collection, of some hunting, but little of food preparation by grinding or other activities represented by chipped stone tools. Biface thinning is represented by a number of broken bifaces and the flint debris. There is no evidence that these bifaces were being shaped into projectile points at the site.

Retouched pieces constitute the largest chipped stone tool class and they are not associated with any other tool types. The use of these artifacts is uncertain but they constitute a tool kit of their own. Therefore, they must have been taken elsewhere to be completed. A time period of 1000 B.C. to A.D. 1500 includes the dates attributed to the projectile points found (Suhm and Jelks 1962).

Summary

The excavation of the Bluebonnet site uncovered two areas of occupation and localized living areas within both. Small limestone hearths mark the center of each living area and there is a limited amount of occupational debris including fire-cracked rock on the associated living floors. Utilization of the living areas was probably by a small group of people and the horizontal scattering of hearths probably represents revisits to the site. Re-use of the site is also suggested for the western area, where over 2 meters of midden deposit contains superimposed hearths. Data on the season(s) of occupation are not available, but it is likely that occupation occurred during the spring and summer when water was available in Eden Branch.

Preparation of trimmed bifaces was carried out at the site, although dart points were apparently not made at the site. In contrast, arrowpoints and arrowpoint preforms were recovered from the western area and these tools were being used at the site. Other activities carried out at the site included hunting, based on projectile points and mammal bones and the gathering and cooking of fresh-water mussels. Retouched pieces constitute a tool kit but no activity is positively attributed to these tools, although it has been suggested that they may represent shaft preparation.

The Bluebonnet site is considered to represent a seasonal campsite which was occupied on an intermittent basis during the period of 1000 B.C.-A.D. 1500. Occupation was on a short-term basis and activities included hunting, mussel gathering and biface preparation.

AIKEN SITE (X41HD24)

Introduction

The Aiken site is located on the east bank of Rucker Creek approximately half a mile from its confluence with the Brazos River (Fig. 4). Rucker Creek has cut a channel ca. 5 meters deep and exposed an alluvial deposit in the cut bank. Water washed gravels are present in the creek bed and are exposed during the fall and winter when the creek is dry. The site is situated on the terrace midway between the base of the limestone bluff and the creek. The terrace was farmed for a few years but presently is used as a pecan orchard. The soil is primarily clay with some sand mixed in.

Plowing of the terrace has exposed remains of prehistoric occupation in two locations, 90 meters apart, on either side of a gully which drains into the creek. Few artifacts were present in either location, both of which are about 100 meters from the creek. Based on the location of the site, it was suggested that this might be a seasonal site or a base camp.

Excavation Procedure

Excavations were concentrated in the northern artifact exposure with trenching begun in sterile areas upslope from the exposure (Fig. 22). A shovel-scrape technique was utilized and collections were in 20 centimeter levels. In the major area of excavation, the occupation zone varied from between 20 and 30 centimeters in thickness and corresponded with excavation level 2. Once this was determined, materials from the occupation zone were collected as a unit. Trenches 1 meter wide and 2, 3, and 5 meters long were used to explore the extent of the deposit. Fill was screened through quarter-inch mesh in areas of artifact concentration. The small size of the excavation units allows the replacement of artifacts within a limited horizontal area.

Prehistoric occupation is situated along the edge of a bank which drops off to the creek bottom. Three hearths mark the locations of living areas. Cultural materials were recovered from the slope of the prehistoric bank. A concentration of fresh-water mussel shells overlay one of the hearths and a trash dump was situated near the bank edge. The prehistoric occupation was scattered and was not intense within the excavated areas.

Stratification

A sterile red clay zone (Fig. 23) underlies the excavated area to an undetermined depth. It extends from the eastern edge of the site, just below the plow zone, and slopes down gradually to just west of the dump where it is about a meter below the surface. The zone continues in a downward slope for 7 meters at which point the red clay dips below the level of excavation. A layer of dark brown clay, ranging from 20 to 30 centimeters in thickness, overlies the red clay. The dark brown clay is absent on the eastern edge of the site and is a maximum of 80 centimeters thick in the backhoe trench west of the major excavated area. This zone contained all cultural materials recovered and had been disturbed by plowing, thus exposing some materials on the surface. The dark brown clay zone dips down to the west as it follows the top of the red clay zone.

Overlying the dark brown zone and west of the occupation area is an alluvial deposit which ranges up to 3 meters thick. The alluvial deposit is composed of numerous horizontally oriented water laid lenses of brown, and tan clays with a few layers of red and blue clay. The alluvial deposit extends over the western edge of the living areas (particularly hearth 3). Cultural materials were recovered within the black zone where it was exposed in a stratigraphic test square west

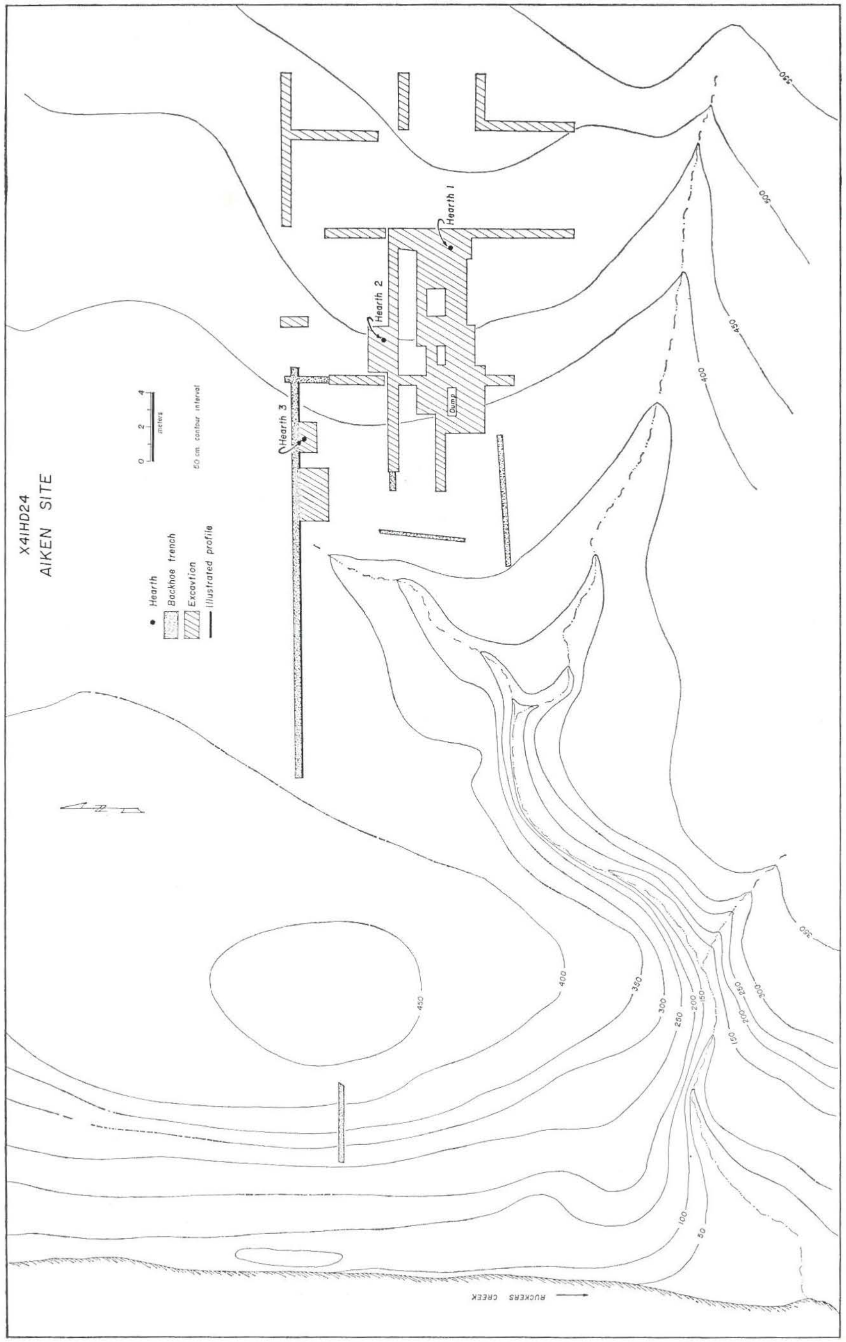


Fig. 22. Plan map of the Aiken site.

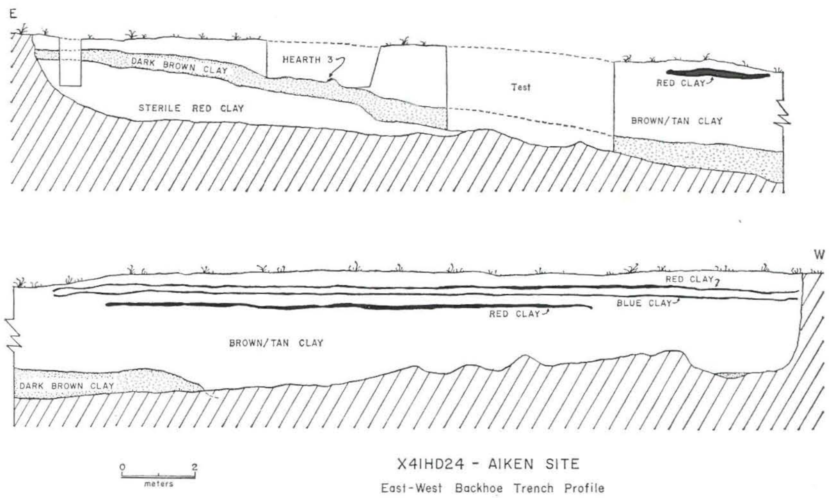


Fig. 23. Stratigraphic profile along east-west backhoe trench, Aiken site.

of hearth 3. A 25 centimeter thick plow zone is present over the entire surface of the site. The zone is a red-brown clay and is devoid of cultural materials except where plowing has cut into the dark brown clay zone. This disturbed top soil zone consists primarily of red clay derived from the underlying red clay zone upslope from the excavated area.

ARCHITECTURE FEATURES

Two limestone hearths and a fire pit mark the locations of three separate occupation areas (Fig. 22). A concentration of fresh-water mussel shells was located above one hearth and appeared to be a trash deposit which post-dated the use of the hearth. A trash dump which contained over 8,000 mussel shell valves and some 3,500 flint flakes was located near the western edge of the site.

HEARTH 1 LIVING AREA (Fig. 24, 25)

A basin-shaped arrangement of burned limestone slabs and chunks was found near the eastern edge of the site. Fragments of limestone and artifacts were on the occupation surface adjacent to the hearth.

The hearth is circular in plan, basin-shaped in cross-secion and about 1.15 meters in diameter. Ash staining occurs in the center of the hearth but no charcoal was present. The hearth had been constructed by lining the bottom and edges of a shallow excavated basin with limestone slabs. The hearth contained 53 limestone chunks,

FIG. 24. Hearth 1 looking westward prior to completion of excavation. Hearth in the center foreground is surrounded by small clusters of limestone chunks.

left in place when the hearth was abandoned. These ranged from 3.0 to 252.0 grams in weight and averaged 100.5 grams.

On the adjoining dark brown clay surface, numerous concentrations of limestone chunks, two concentrations of lithic debris, several tools and discarded mussel shells were recovered. The tools, tool debris and food remains are located on the north and northwest sides of the hearth. Cultural material is virtually non-existant more than 2.5 meters from the center of the hearth. Tools found on the living surface include a cobble hammerstone, a mano, 2 cores and 4 retouched pieces to the west, a graver to the south, 3 hammerstones to the southwest and fragments of Stage E bifaces to the north, west and east. There was not cultural material to the southeast and little to the east, south or southwest.

Chipping activity appears to have been located on the north side of the hearth and food remains are scattered in the same area. Based on the proximity of artifacts, it is suggested that activities associated with the hearth were conducted in this area. The presence of limestone concentrations and the absence of artifacts south of the hearth tend to substantiate this suggestion. It is further suggested that at least two different sets of activities, tool making and food preparation are represented.

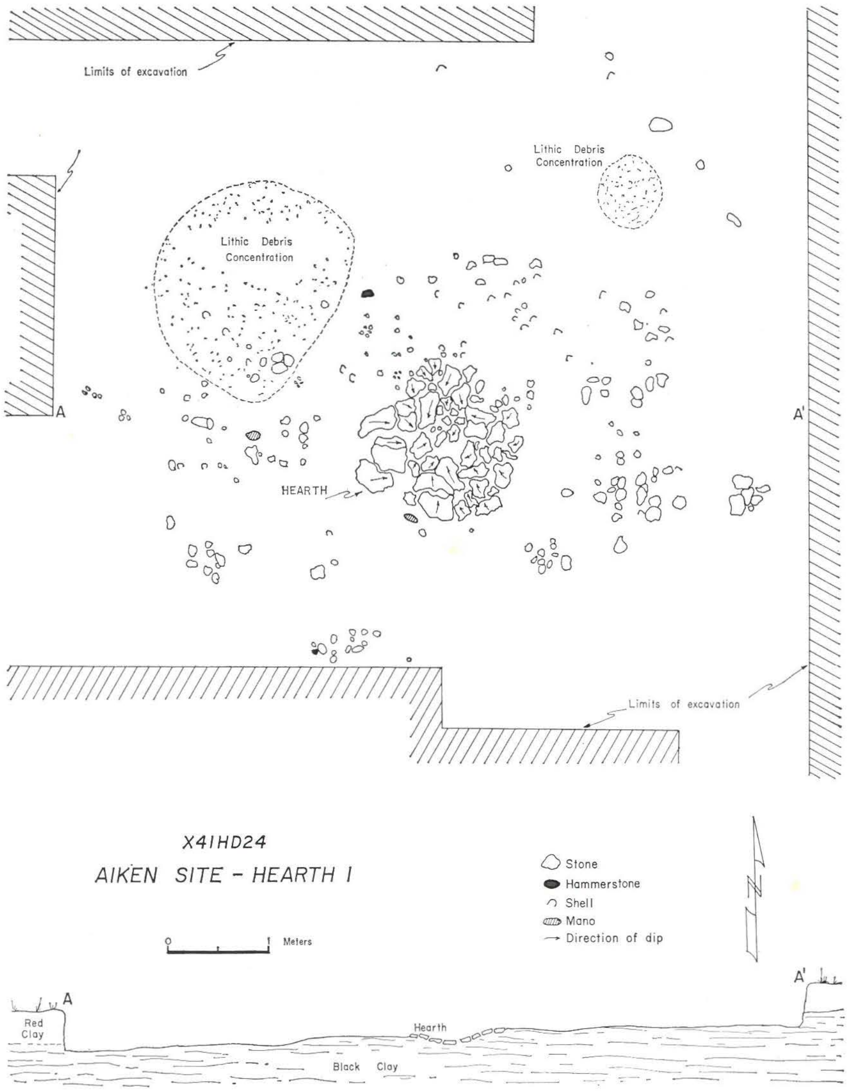


FIG. 25. Plan and profile of Hearth 1, Aiken site.

HEARTH 2 LIVING AREA

A circular arrangement of limestone rocks was exposed in a cleared area of 2 x 5 meters located near the center of the site. The stones were covered by a thin layer of fresh-water mussel shells which was concentrated over the stone and to the east.

FIREPIT 1 AND LIVING SURFACE

The east-west backhoe trench sectioned a fire pit and ash concentration which lay on the upper surface of the dark brown clay zone. These features were overlain by about a meter of the alluvial deposit which covers the black zone west of the site area.

The fire pit is oval in plan and had been excavated into the dark brown clay zone. The pit was not over 10 centimeters deep, 50 centimeters in length and 25 centimeters in width. It contained gray wood ash. A circular ash concentration was located on the surface of the dark brown clay 20 centimeters east of the fire pit.

Cultural materials were not found in the fire pit fill or the ashes, nor were "in situ" materials found on the adjacent surface. Material from the excavated area include 7 mussel valves, half a deer mandible, and a fragment of a large mammal long bone.

TRASH DUMP (Fig. 26)

A concentration of artifacts was exposed near the western edge of the excavation, adjacent to where the dark brown clay zone begins to dip sharply to the west. Artifacts consisted of fresh-water mussel shell valves, flint flakes, and chips, cores, hammerstones, grinding tools and unmodified mammal bones.

The concentration covered an area 9 meters east-west by 7 meters north-south and is lens-shaped in cross-section, about 20 centimeters thick in the center. Cultural material decreases to the north and south edges of the excavation as well as downslope (Table 3) to the west and upslope to the east. The cultural material was situated in the dark brown clay.

Material in the dump is thought to have been intentionally deposited over a short period of time. Mussel shell and flint debris were the dominant artifacts and were scattered throughout the deposit. Articulated shells were rare; all shells had been heated. Heating may be due to cooking or as a means to open the shells. Perforation of the shell and fracturing techniques used to open the shells in order to get at the meat occur, as well.

It is suggested that actual flint tool making was not carried out in the area of the dump; rather that the flint debris (including cores and bifaces) was gathered from knapping areas and intentionally discarded here. This is based on the fact that shatter chips and pressure retouch flakes were not present although flakes and chips were. A sample of midden soil was screened through quarter inch hardware cloth and then washed through a fine screen to test for the presence of the smaller pieces of flint which result during tool making and which would be hard to gather up after they had fallen to the ground. Parts of a single deer were present in the deposit; their occurrence throughout the deposit suggests that the occupation lasted no longer than was necessary to gather and consume the foods at a single period of time; that is, that the site is not a permanent camp.

The presence of broken grinding tools (4 manos, 1 metate) in the

FIG. 26. Plan and profile of trash dump, Aiken site.

deposit suggests that these tools were used elsewhere and discarded after breakage. In contrast, both broken (9) and complete (9) dart points were recovered in the deposit. The broken dart points are represented by nine bases which are interpreted as evidence of re-hafting activity. The presence of 9 complete points rather than 1 or 2 points suggests a patterned occurrence rather than an accidental loss.

Occupation at the Aiken site is situated on the surface of a westerly dipping clay level adjacent to a steep drop-off of the clay zone. The removal of fill over a part of the site disclosed the location of 3 separate living areas and a trash dump. It is suggested that the materials in the dump represent a short-term occupation. This interpretation is supported by the scanty amount of cultural remains associated with the 3 living areas and by the transient appearance of the hearths and firepit. The Aiken site appears to be an example of a short-term and repeatedly visited campsite where hunting and mussel gathering were carried out.

Artifact Assemblage

The assemblage (Fig. 27) consists of chipped stone debris (cores, bifaces, flakes, chips), chipped stone tools, pecked and ground stone tools, fresh-water mussel shells and mammal bones. Provenience is listed in Table 3.

Chipped stone flakes/chips constitute 39.2% of the assemblage, cores/bifaces 0.5%, chipped stone tools 0.2%, pecked and ground tools 0.3%, fresh-water mussel shells 54.5% and animal bone 4.7%. The promi-

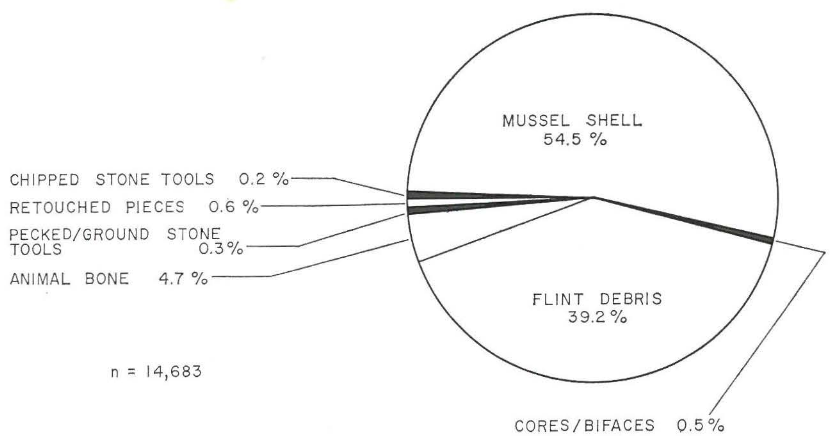


Fig. 27. Diagram of artifact assemblage composition, Aiken site.

TABLE 3. ARTIFACT PROVENIENCE, AIKEN SITE (X41HD24)

	SURFACE	*GEN. EXCAV.*	*HEARTHS 1*	*HEARTHS 2*	*TRASH DUMP*	*DOWN-SLOPE*	*UPSLOPE*	*TOTAL*
FLAKES								
Primary	15	22	20	14	80	1	7	159
Secondary	77	157	95	74	521	21	30	975
Interior	37	70	46	33	211	6	21	424
Lipped	4	22	18	12	137	9	8	210
CHIPS								
Primary	1	13	10	5	31	----	2	62
Secondary	38	198	222	139	1209	22	56	1884
Interior	44	184	293	122	1341	10	45	2039
CORES	----	3	2	1	11	----	1	18
CORE FRAGS.	----	4	----	1	2	----	----	7
BIFACE STAGE								
B	----	2	----	----	2	1	----	5
C	----	1	----	----	2	----	----	3
D	----	2	2	1	2	----	1	8
E	----	6	1	1	23	1	----	32
F	----	----	----	----	3	----	----	3
DART POINTS								
Yarbrough	----	2	----	----	9	----	1	12
Darl	----	----	----	----	2	----	----	2
Godley	----	----	----	----	1	----	----	1
Misc.	----	2	----	----	5	----	----	7
ARROWPOINTS	----	3	----	----	1	----	----	4
GRAVERS	----	----	----	----	4	----	----	4
RETOUCHED PIECES	3	12	4	7	63	4	2	95
HAMMERSTONES	4	9	4	1	23	1	2	44
METATE	----	----	----	----	1	----	----	1
MANO	----	1	1	----	3	1	----	6
PITTED STONE	----	----	----	----	1	----	----	1
WORKED BONE	----	----	----	----	1	----	----	1
BONE	----	120	16	1	484	40	7	668
SHELL	----	970	203	1247	5237	221	130	8008
TOTAL	223	1803	937	1659	9410	338	313	14683

nence of food remains (shell and bone) is unusual in light of the archaeological evidences from other sites reported herein. This is due in part to the situation of the site in a location where bone is preserved and because of this preservation, it is suggested that the archaeological remains at the Aiken site better represent the activities carried out by the prehistoric occupants of the site.

DEBRIS

A total of 5,753 flakes and chips were collected at the site. Flakes make up about 31% of this number and chips comprise the remainder. Lipped flakes constitute 3.7% of the assemblage. Secondary debris (flakes/chips) makes up 49.7% of the assemblage, interior debris 42.8% and primary debris 3.8%. Sixty-two percent of the debris collected is from the trash dump. The percentage of interior flakes/chips is slightly higher than expected in a tributary stream site and may be due to the finishing of projectile points.

Eighteen cores and 7 core fragments were collected from the site. These include 12 multiple or single cortex platform cores, 2 multiple platform cores having prepared and cortex platforms and 4 single prepared platform cores. In all instances, the circumference or a flat surface was used as the initial platform. Flint core weights range from 45 to 119 and have a mean weight of 83.2 grams. A single core of chert weighs 219 grams.

The biface sample (Fig. 28) contains 51 specimens of which 9 are complete, 18 are represented by bases, 18 by tips and 6 by medial fragments. Stages B-F are represented by the following number of examples: Stage B-5 (9.18%), Stage C-3 (5.8%), Stage D-8 (15.6%), Stage E-32 (62.7%) and Stage F-3 (5.8%). Breakage and unremovable knots were the two major causes for biface discard. Fragments (Fig. 28 c, e, h) constitute 83% of the bifaces represented and 3% of the 9 complete specimens were broken but have been restored. These 3 are illustrated (Fig. 28 d, f, j) and represent Stages B, D, and E. Inability to be thinned is illustrated (Fig. 28 b, d) and unremovable knots or prominences of stone are illustrated (Fig. 28 g, i).

DART POINTS (Table 4)

YARBROUGH (Fig. 29): Eight complete, and the bases of four broken projectile points which conform to the description of Yarbrough (Suhm and Jelks 1962: 261) were recovered. Basal grinding occurs on 11 of the specimens and alternative edge beveling is present on 4. Two size classes are represented; large and small. The large class is represented by six complete and two fragmentary projectile points which have a weight range of 5.4 to 8.1 grams. This group is longer

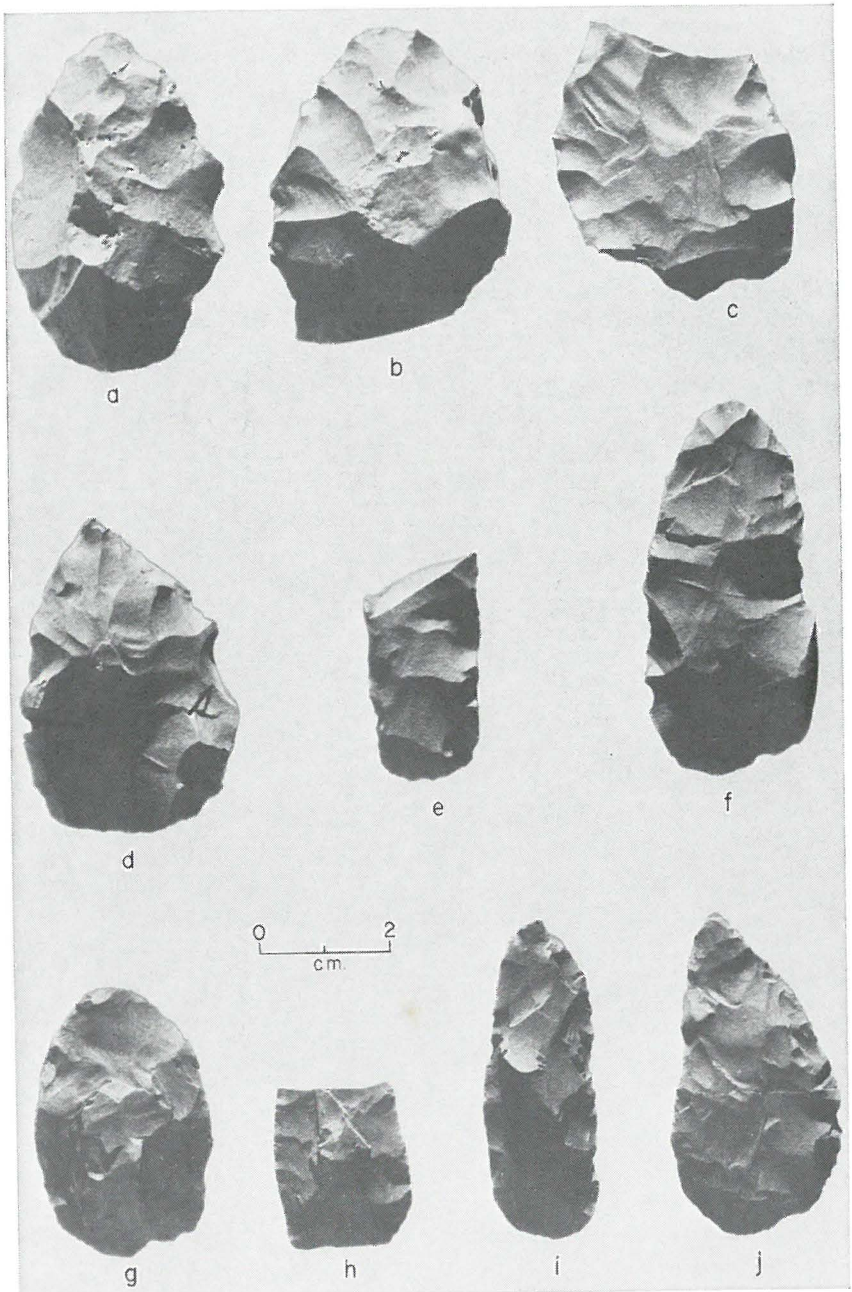


FIG. 28. Aiken site biface sample. a-d, Stage B; e-f, Stage D; g-i, Stage E.

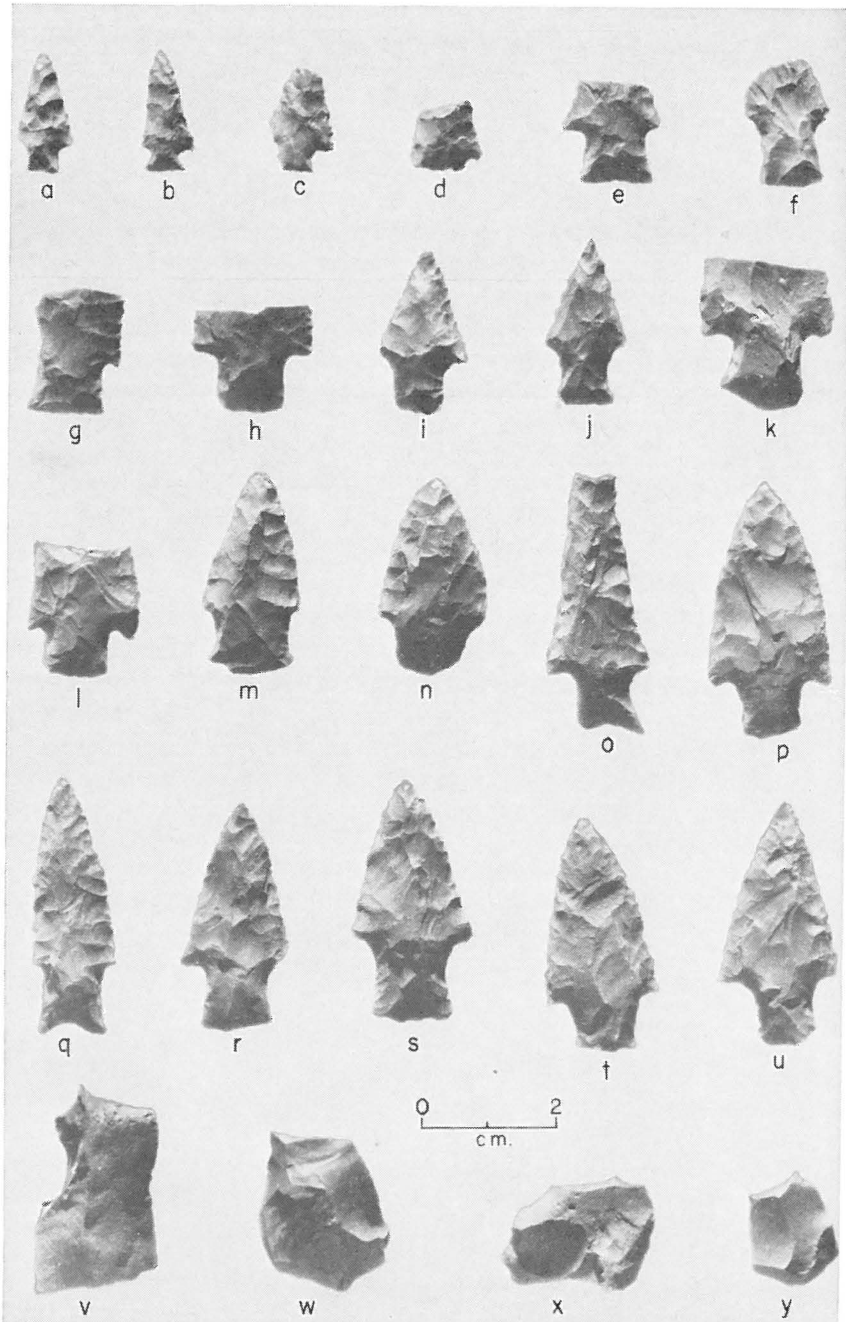


FIG. 29. Aiken site tools. a-d, arrowpoints; e-u, dart points; v-y, gravers.

and wider than the second group and tends to have a wider stem. The second group is shorter in length and narrower in width and there are 2 complete and 2 broken examples. Weights are 2.8 and 3.0 grams and stem width is 1.1 centimeter. Although the samples are small, it is suggested that the size differences as noted by weight, linear dimensions and stem width reflect purposeful selection of two point sizes, large and small.

DARL: Two specimens (Fig. 29 o, q) conform to this description of this type (Suhm and Jelks 1962: 179). Steep alternate beveling has narrowed and twisted the form of the body of one specimen. The tip was broken by impact and the projectile point was not resharpened. Both specimens have the edges of the base ground smooth.

GODLEY: The base of one point, (Fig. 29 k) conforms to the description of Godley (Jelks 1962: 40). Alternative beveling occurs on both edges of the body and the right edge of the base is ground smooth.

TABLE 4
Dimensions of Dart Points, Aiken Site

Fig.	*L*	*W*	*T*	*SW*	*Wt*	*Type*
29 r	4.6	2.2	0.5	1.3	5.4 gr.	Large Yarbrough
29 t	4.7	2.3	0.5	1.2	6.3	
29 u	4.8	2.5	0.5	1.1	6.7	
29 s	4.8	2.5	0.6	1.5	8.1	
29 p	5.2	2.5	0.5	1.3	7.6	
–	4.6	2.1	0.6	1.4	7.0	
29 l	–	2.3	0.5	1.3	4.5+	
29 g	–	–	–	1.3	3.4+	
29 j	3.4	1.7	0.5	1.1	2.8	Small Yarbrough
29 i	3.3	1.9	0.4	1.1	3.0	
29 e	–	2.1	0.5	1.2	2.5+	
29 f	–	–	–	1.2	2.5+	
29 o	–	2.1	0.6	1.1	7.7+	Darl
29 q	5.2	1.8	0.4	1.2	5.4	
29 k	–	2.8	0.6	1.4	6.5+	Godley
29 m	4.0	2.0	0.5	1.5	5.1	X Unidentified
29 n	3.9	2.3	0.7	1.5	6.7	
29 h	–	2.5	0.6	1.3	3.8+	

OTHER: Two unidentified projectile points (Fig. 29 m, n), three unidentifiable bases (Fig. 29 h) and two tip fragments were collected. Both of the complete projectile points are little more than a variation of Yarbrough. The second (Fig. 29 n) is thick (0.7 centimeters) for its size and appears to be the remains of a larger projectile point which was reduced to its present size after breakage.

Seventeen of the 22 dart points are from the trash dump and these include both bases and finished "perfect" examples. The presence of bases probably represents rehafting of shafts after point breakage; the complete points may represent a similar activity.

ARROWPOINTS

A finished Scallorn point was recovered from the trash dump and 3 preforms, 2 of them Scallorn, were recovered from general excavation. All four specimens are triangular in shape; 3 are corner-notched and are classified as Scallorn points. The 3 preforms were discarded or broken prior to pressure retouch of the lateral edges of the body. Dimensions are given in Table 5.

TABLE 5

Dimensions of Arrowpoints, Aiken site

Fig.	*L*	*W*	*T*	*SW*	*Wt*	*Type*	
29 a	2.5	1.2	0.3	0.6	1.0	Scallorn	(dump)
29 b	2.5	1.1	0.3	0.7	1.1	Scallorn	
29 c	–	1.4	0.3	0.7	1.3+	Scallorn	
29 d	–	1.5	0.4	–	–	?	

GRAVERS

Three secondary chips and an interior flake, all flint, were made into gravers. Two of the gravers were made on natural corners located at the distal end of the respective flakes. Two adjacent notches defined the 2 mm. long graver on one of these natural corner gravers. A single pointed graver was retouched on the center of the distal edge by two notches. The graver point is 1 mm. long. Two graver points (1 and 2 mm. long respectively) were retouched on the left lateral edge of a secondary chip. The points are 8 mm. apart.

RETOUCHED PIECES

Secondary flakes (36) and chips (11), interior flakes (25) and chips (12) and lipped flakes (11) of various sizes and shapes were retouched. Most of the retouch is obverse and there was no apparent location patterning noted. There appears to have been some selection for lipped flakes to be retouched although secondary debris is the most commonly used material. This pattern agrees with the pattern of unaltered debris recovered.

HAMMERSTONES

Flint and quartzite cobbles (44) were used for battering; crushing is evident at various places on the cobbles. The cobble weights range from 77 to 336 grams with a mean weight of 182 grams. Mean weight approximates the modal tendency of the hammerstone weights which are evenly distributed on either side of mode. Therefore, it is suggested that there is no obvious selection of cobbles for special purposes which were related to the weight of the tool.

Quartzite cobbles constitute 36% of the sample while the remainder is flint cobbles (64%). The cobbles range from circular to rectangular in shape. Approximately 50% of both the flint and quartzite cobble hammerstones are represented by broken fragments. The weight range of quartzite hammerstones is similar to that of flint hammerstones.

Battering is common at the ends or on pointed prominences on the cobbles and varies from heavy (resulting in extensive crushing) to light (a few scattered pecking marks). There is no apparent correlation between amount of crushing and either location on a cobble or of cobble material.

Based on these data, the hammerstones appear to represent a uniform class within which selection for materials does not seem to relate to specific use as reflected by breakage, battering or weight.

METATE

About a quarter of a unifacial basin metate was found in the trash dump. The metate was made of a sandstone slab, roughly chipped to an oval plan shape and then pecked to prepare the grinding surface. The grinding surface was polished from grinding. The cause of breakage is uncertain but may be due to pecking in order to prepare the grinding surface. This is seen in pecking marks on the grinding surface which have not been ground down.

MANOS (Fig. 30 b-d)

Six specimens, made of sandstone, are represented by one complete mano (11.8 x 7.7 x 2.1 centimeter), parts of 3 rectangular manos and spalls from the grinding surface of two other manos. Grinding wear patterns suggest back and forth grinding; all but the complete specimen are unifacially ground. They are roughly rectangular in plan and are rectangular in transverse cross-section. Width measurements range from 8.0 to 5.0 centimeters and thickness from 2.1 to 4.0. The complete specimen is from the dump.

PITTED STONE (Fig. 30 a)

A flat oval quartzite cobble has a circular depression pecked in the center of each face. Only half of the cobble is present and is broken across the short axis of the cobble through the middle of the

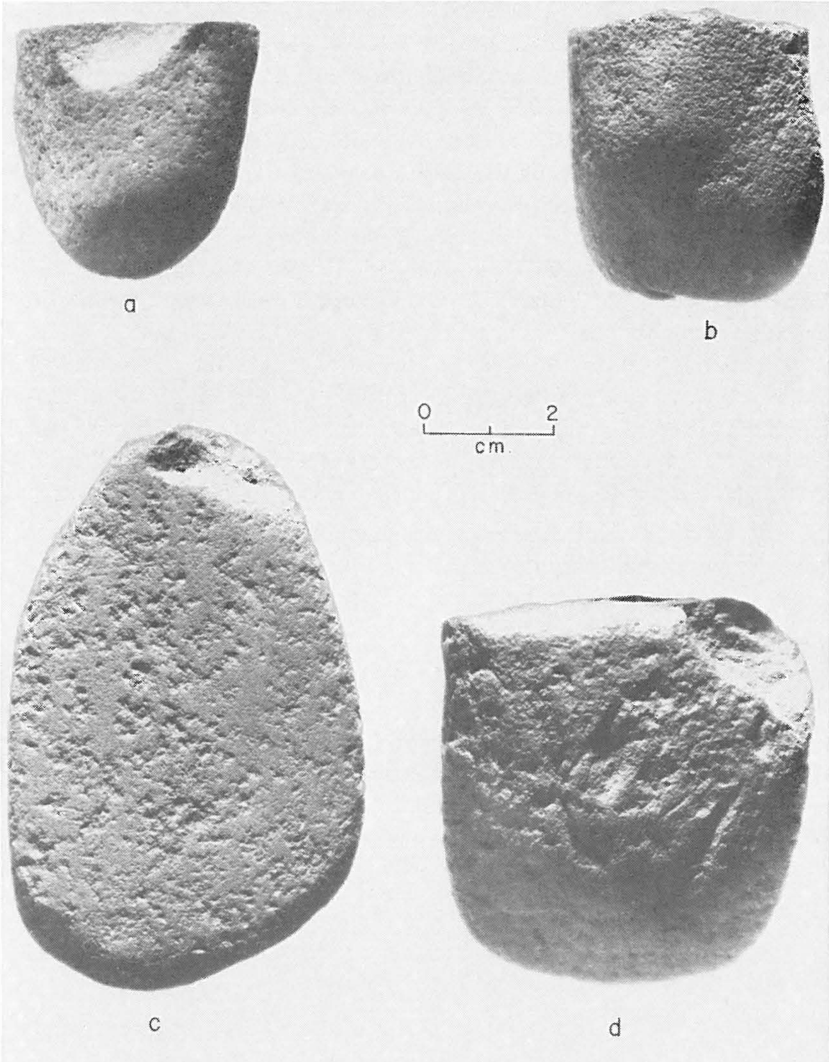


FIG. 30. Aiken site ground stone tools. a, pitted stone; b-d, manos.

two depressions. The depressions were about 2.0 and 2.5 centimeters in diameter and 0.2 and 0.3 centimeters deep respectively and are off center. Pecking is concentrated at three spots on the distal circumference and a blow on the lateral edge of the cobble caused the breakage. The cobble is 2.5 centimeters thick, 5.3 centimeters wide and 5.5 centimeters long.

FRESH-WATER MUSSEL SHELLS (Fig. 31)

Shells range in size from 15 to 65 mm. and 78% of the measurable specimens (13% of total sample) fall within the 26 to 45 mm. size range; 16% are between 15-25 mm. and 6% are between 46-65 mm. in size. The measurement is computed as a line drawn perpendicular to the hinge. Based on the number of hinges present, 51% of the shells are right valves, the remainder are left valves. Eighty-eight percent of the shells are unaltered or were too fragmentary to determine any mechanical alteration. Alteration was evidenced by perforation (2%) and fracturing (10%). These two forms of modification served as ways in which shells were opened. Performations were always from the outside and were circular holes ranging from 1 to 5 mm. in diameter. The perforation tool is uncertain. Facturing was done by breaking or crushing the thin wall of the valve near the hinge. Fractures and perforations of the right valve were always on the left half of the valve adjacent to the hinge and just the opposite for left valves. It is suggested that the purpose of this modification was to enable the Indian to expose the hinge mussel in order to cut it.

Mussels are available in the Brazos River at any time during a year (Cheatum, p.c.) and are not useful for seasonal specification based either on availability or upon maturation as noted by shell size.

ANIMAL BONE

Bone was well preserved at the Aiken site and over 72% of the bone was recovered from the dump area. The numbers listed in Table 3 under bone represent pieces of bone, many of which were unidentifiable medial fragments of large mammal long bones are the most common class of bone. Analysis of the complete bones shows that the bones attributed to large mammals are those of white tail deer (*Odocoileus virginianus*) and that the only other identifiable animals include one raccoon (*Procyon lotor*), a box turtle (*Terrapene*) and a fish.

The proximal section of a deer(?) metatarsal has grinding on the posterior side of the bone. Grinding runs parallel to the bone and has removed about half of the bone; thus resulting in a V-shaped cross-section. This may have been an awl but the fragmentary condition does not allow the application of a formal descriptive name.

The artifact sample from the Aiken site is composed of 2 large artifact groups plus other smaller classes. Faunal remains, fresh-water mussel shell and mammal bone is the largest artifact group. Preserved bone allows the recognition of the kinds of animals hunted;

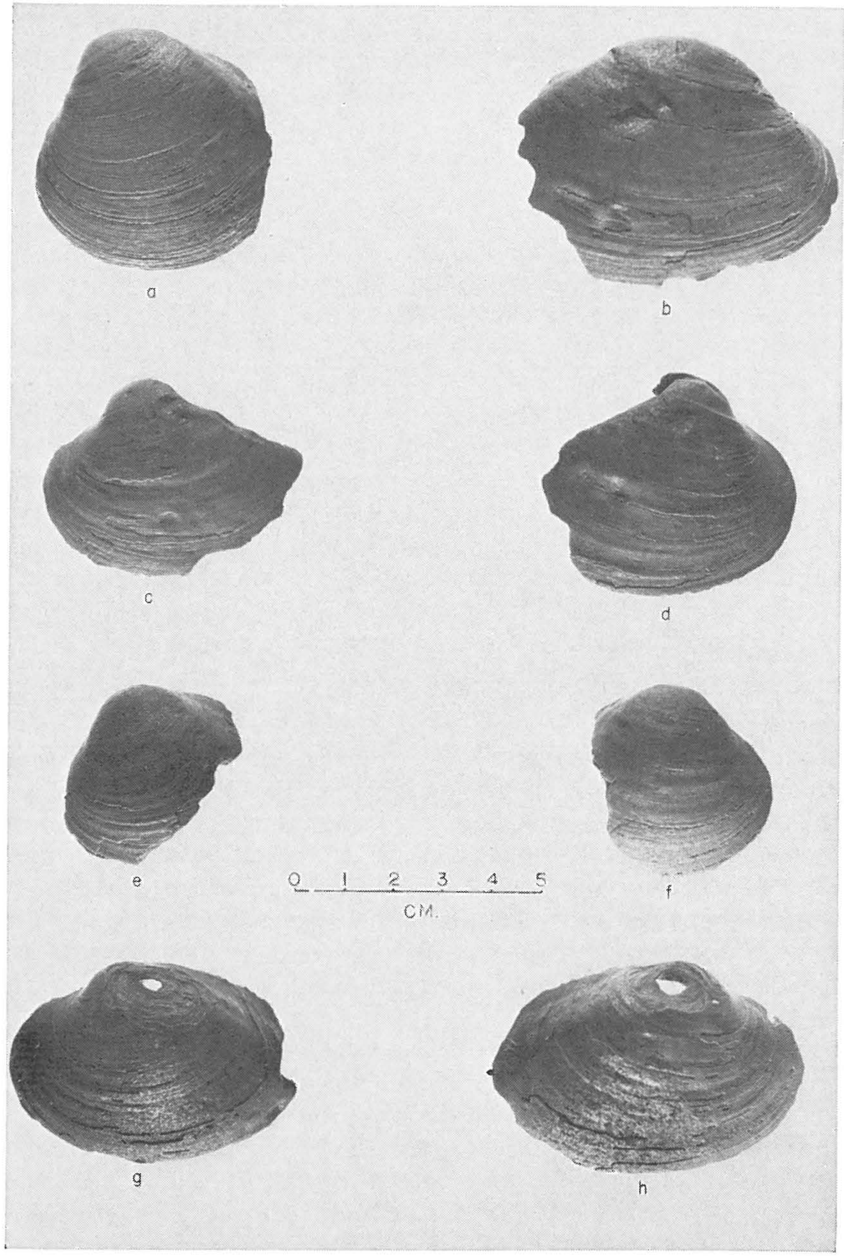


Fig. 31. Aiken site mussel shells. a, c, e, g, left valves; b, d, f, h, right valves; a-b, e-f, limited edge fracturing of large and small shells; c-d, fracturing from the umbo and around the periphery; g-h, perforation of the shell wall adjacent to the umbo.

such material is generally not preserved in sites at De Cordova Bend. Tool making is the other activity represented in the collection. This activity included the collection of raw materials, reduction of cores to useable bifaces and the preparation of new tools to replace those broken during hunting.

The time range A.D. 500-1000 includes the estimated dates for the named projectile points found. Darl is dated A.D. 1-1000 and Scallorn is dated A.D. 500-1200 (Suhm and Jelks 1962). Godley is attributed to the Austin Focus which is dated at the same time period (Jelks 1962: 98). Based on the association of dart points and a Scallorn point in the trash dump, it is suggested that this occupation was during the early part of this time period.

Summary

Excavation of a part of the Aiken site exposed 3 spatially separated living areas and a trash dump, all of which were located near the bank of a creek drainage. This location on a clay base zone allowed for the preservation of animal bone which had been left by the prehistoric occupants. Moreover, the thin layer of the occupational zone allowed the isolation of activity areas within the area of excavation.

Hearth 1 represents the best example of a living area. Adjacent to the hearth are two lithic concentrations where flint was being worked; a few other tools and several mussel shells were found in the same area. Activities were concentrated on the north side of the hearth and the total area of occupation, based on tool scatter, is less than 20 square meters. Smaller use areas are suggested for the other 2 living areas. Based on the area size and amount of materials associated in them, it is suggested that they represent short-term occupations. Each hearth probably represents separate occupations, possibly revisits.

ZWEIFEL SITE (X41HD39)

Introduction

The Zweifel site is situated in the tributary stream microenvironment on a westerly sloping surface covered with scattered grass, juniper and oak (Fig. 32). The limestone slope and bluff occur to the north and west and Eden Branch is located a quarter of a mile downslope to the east. Surface evidence consisted of a localized scattering of chipped stone debris covering an overall area of fifty meters (N-S) by thirty meters (E-W) and recognizably concentrated in an area approximately twenty meters in diameter. The artifact

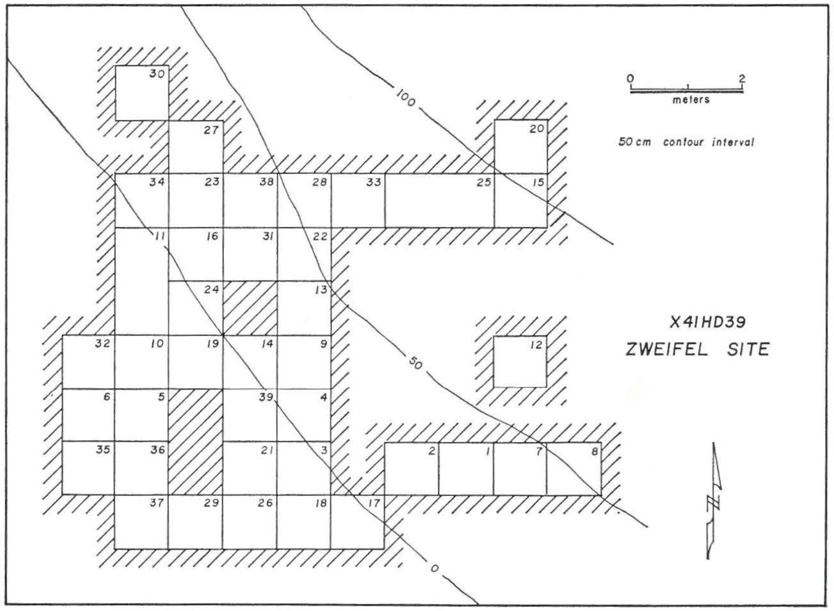


FIG. 32. Plan map of Zweifel site.

assemblage included hammerstones, flint debris, and a large number of cores and bifaces. The percentage of primary (8.1%) and secondary (75.0%) flakes is higher than similar categories at the Bluebonnet site (X41HD26), a nearby site located within the same microenvironment. At the conclusion of the survey it was suggested that the Zweifel site was a chipping station. The situation of a chipping station in this zone does not conform to the general location of such sites. Therefore, excavation was conducted to determine the activities represented at the site and to provide data for comparison with other sites.

EXCAVATION

A north-south oriented grid system was imposed on the surface of the site. A two meter square was the unit of excavation, except for squares 11 and 25. The deposit was excavated in twenty centimeter levels and all fill was screened through quarter-inch mesh to allow the recovery of a large artifact sample.

Excavation revealed that the deposit extended to a maximum depth of twenty centimeters, generally not deeper than ten centimeters. Architectural features were not found. The cultural deposit was too shallow and uniform to allow for the separation of artifacts by recognizable vertical levels. Due to the lack of vertical stratigraphy, the occupation(s) represented had to be horizontally separated in order to determine the area(s) and period(s) of occupation. Horizontal separation required the recognition and isolation of varying tool kits (functional or temporal) or artifact assemblages on the basis of morphological and/or technological characteristics.

Site Arrangement

Evidence of the prehistoric occupation at the Zweifel site consists solely of stone artifacts concentrated in an area about 100 meters square. The north, east and southern edges of the area have been

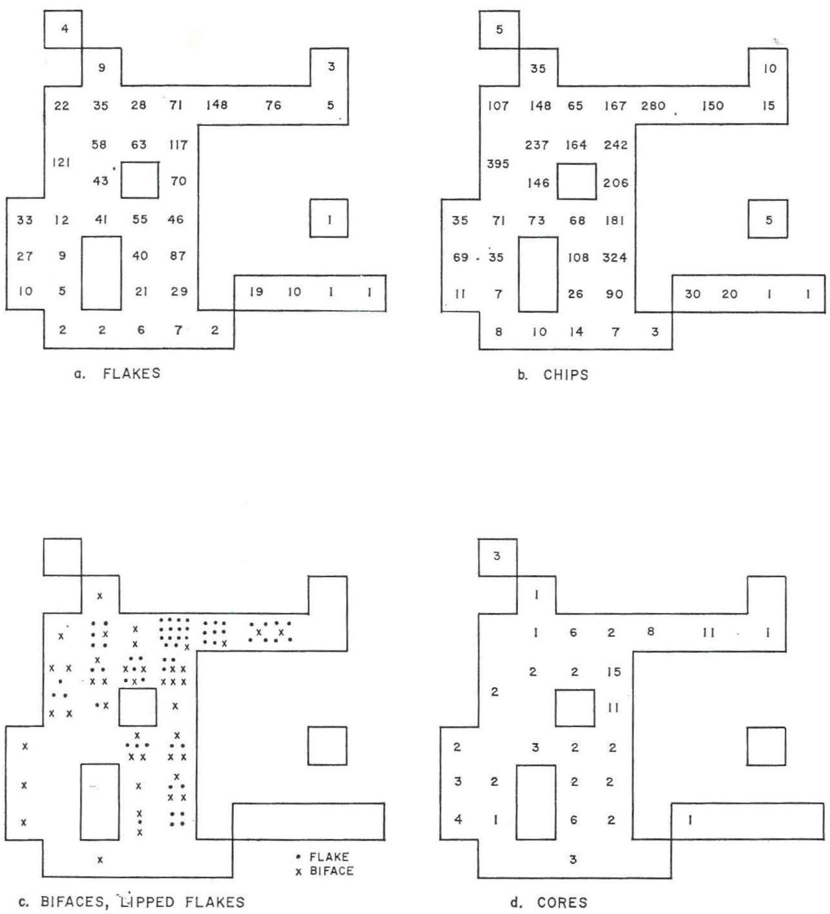


FIG. 33. Horizontal distribution of lithic debris. a, flake distribution; b, chip distribution; c, biface-lipped flake distribution; d, core distribution.

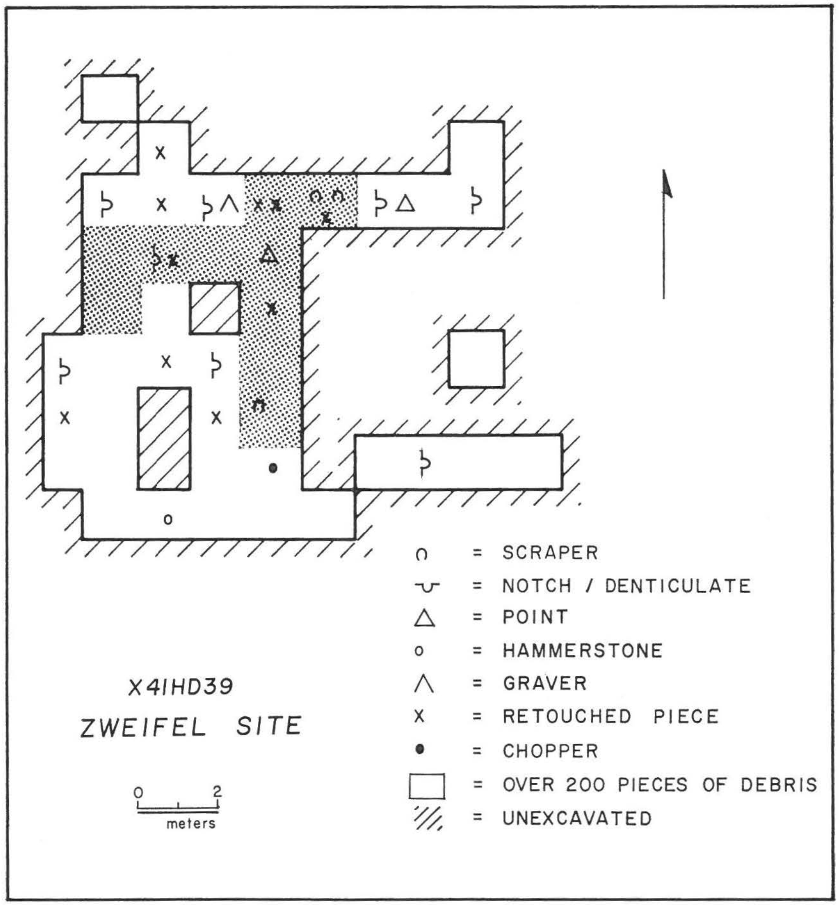


FIG. 34. Horizontal distribution of tools and lithic debris.

defined and the western limits are uncertain. The horizontal distribution of lithic debris is plotted in Figures 33 and 34. As indicated in the figures, two overlapping concentrations of lithic materials are outlined, one centered in squares 22 and 33 and the second centered in square 4. Cores (Fig. 33 d) cluster in the center of the north concentration (squares 13, 22, 33) and otherwise are scattered throughout the excavated area. Bifaces (Fig. 33 c) cluster in two areas (squares 16, 31, 22 and squares 14, 9, 4)) which do not exactly correspond to areas of lipped flakes (squares 28, 31, 33 on the north and square 3 on the south). Tools cluster (Fig. 34) near the northern edge of the site (squares 8, 28, 33) in the vicinity of the core concentration and otherwise are scattered about in the deposit. On the basis of the horizontal distribution, two areas of intense activity are outlined; the northern one represents either more activity at one time or through time than the southern one. Based on the absence of hearths and other domestic remains, it is suggested that the site was occupied primarily for the purpose of cobble cortex removal as indicated by the high percentage of primary and secondary flakes and the numbers of cores, of initially trimmed and discarded bifaces, and the small number of tools. The intensity of occupation as measured by the size of the work group(s) and the length of occupation periods was not determined by excavation.

Artifact Assemblage

The assemblage consists entirely of stone artifacts. Provenience is listed in Table 6. Tools make up less than one percent of the assemblage while cores and bifaces comprise about four percent. Unutilized flakes and chips constitute the remainder and dominant part of the artifact assemblage. It is suggested that the assemblage composition which is dominated by cortex flakes and chips is indicative of preparation of roughly shaped bifaces. Moreover, the composition of the assemblage is representative of the importance of this activity at the site.

DEBRIS

A total of 5,110 flakes and chips of flint were collected at the site (Fig. 35). Flakes make up 28% of this number and chips comprise the remainder. Four percent of the flake category are lipped flakes of which one percent is secondary and the remainder, interior flakes. All other flakes are hard hammer percussion flakes. Approximately 2% of the debris is burned. Burning appears to have occurred after the flakes were detached from a core; the scattered occurrence throughout the deposit shows that these materials are not localized in any area.

Two hundred and seven cores and bifaces were recovered. Cores are the first attempt at the reduction of cobbles for the production of core based bifacial tools. Cores and biface stages A and B represent the first steps of cobble reduction in which a hard hammer percussion technique is used to remove the cobble cortex and these steps are well represented. A decreasing number of Stage C-F specimens occur. The smaller number might be due to the removal of completely trimmed bifaces or roughly trimmed bifaces for completion elsewhere.

On the basis of flake category composition (see Fig. 35), the

TABLE 6. DISTRIBUTION OF ARTIFACTS AT THE ZWEIFEL SITE (X41HD39).

		FLAKES				*CHIPS*				*BIFACE STAGES*													
		P	S	*I*	*L*	*P*	S	*I*	*CORES*	*A*	*B*	*C*	*D*	*E*	*Scrapers*	*Notches*	*Denticulates*	*Retouched Pieces*	*Gravers*	*Chopper*	*Projectiles*	*Hammerstone*	*T.*
Surface		16	50	9	—	7	38	22	42	8	9	4	—	2	—	—	—	5	1	—	—	2	215
Square	1	2	6	2	—	2	16	2		—	—	—	—	—	—	1	—	—	—	—	—	—	31
	2	7	9	3	—	2	24	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	50
	3	5	19	5	4	5	54	31	2	—	—	—	—	—	—	—	—	—	—	1	—	—	126
	4	17	44	26	2	7	204	113	2	1	—	1	1	—	1	—	—	—	—	—	—	—	419
	5	2	4	3	—	—	29	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	43
	6	8	16	3	—	1	48	21	3	—	1	—	—	—	—	—	—	1	—	—	—	—	102
	7	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
	8	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
	9	10	26	10	2	3	115	63	2	—	—	1	1	1	—	—	—	—	—	—	—	—	234
	10	1	10	1	—	2	35	34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	83
	11	14	63	44	2	2	237	156	2	—	3	1	—	—	—	—	—	—	—	—	—	—	524
	12	—	1	—	—	—	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
	13	12	46	12	—	—	144	62	11	—	1	—	—	—	—	—	—	1	—	—	—	—	289
	14	12	26	17	3	8	31	29	2	—	1	1	1	—	—	1	—	—	—	—	—	—	132
	15	—	5	—	—	1	3	11	1	—	—	—	—	—	—	1	—	—	—	—	—	—	22
	16	14	24	20	2	1	147	89	2	—	2	—	1	—	—	1	—	1	—	—	—	—	304
	17	—	1	1	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
	18	2	4	1	—	—	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14

	19	5	20	16	----	9	48	26	3	----	----	----	----	----	----	----	----	1	----	----	----	----	128
	20	----	1	2	----	2	5	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	13
	21	4	12	5	1	4	14	8	6	1	----	1	----	----	----	----	----	----	----	----	----	----	56
	22	14	75	28	3	3	155	84	15	2	1	1	1	----	----	----	----	----	----	----	1	----	383
	23	4	17	14	5	2	87	51	1	----	----	1	----	----	----	----	----	1	----	----	----	----	183
Square	24	8	20	15	1	13	91	41	1	1	----	----	----	----	----	----	----	----	----	----	----	----	191
	25	18	39	19	8	17	80	53	11	1	----	1	----	----	----	1	----	----	----	----	1	----	249
	26	3	2	1	----	2	5	7	3	----	----	----	----	----	----	----	----	----	----	----	----	----	23
	27	1	7	1	----	----	24	11	1	----	1	----	----	----	----	----	----	1	----	----	----	----	47
	28	10	41	20	14	11	72	84	2	----	----	----	----	1	----	----	----	2	----	----	----	----	257
	29	----	2	----	----	----	7	3	----	----	----	----	1	----	----	----	----	----	----	----	----	1	14
	30	----	3	1	----	1	4	----	3	----	----	----	----	----	----	----	----	----	----	----	----	----	12
	31	13	27	23	5	3	90	71	2	----	1	----	1	1	----	----	----	----	----	----	----	----	237
	32	3	25	5	----	----	22	13	2	1	----	----	----	----	----	1	----	----	----	----	----	----	72
	33	30	82	36	8	9	150	121	8	----	1	----	----	----	2	----	----	1	----	----	----	----	448
	34	8	7	7	----	6	62	39	----	----	----	----	----	1	----	----	1	----	----	----	----	----	131
	35	4	4	2	----	2	5	4	4	----	----	1	----	----	----	----	----	----	----	----	----	----	26
	36	1	3	1	----	----	5	2	1	----	----	----	----	----	----	----	----	----	----	----	----	----	13
	37	----	1	1	----	----	5	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	10
	38	10	15	3	----	6	40	19	6	2	----	----	----	----	----	1	----	----	1	----	----	----	103
	39	8	25	7	----	4	68	36	2	----	----	----	1	----	----	----	----	1	----	----	----	----	152
TOTALS:		266	784	364	60	135	2178	1323	142	17	21	13	8	6	3	7	1	15	2	1	2	3	5351

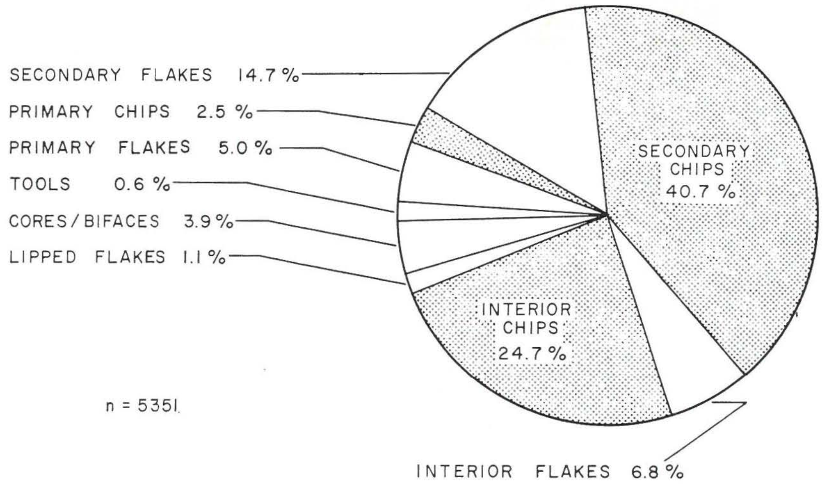


Fig. 35. Diagram of artifact assemblage composition, Zweifel site.

predominance of cortex flakes (primary and secondary) and the small amount of lipped flakes which derive from biface thinning, it is suggested that few bifaces were completely thinned at the Zweifel site. Rather, roughly trimmed bifaces were prepared and then removed to some other location for final completion.

NOTCHES

Notches (7) and denticulates (1) make up the largest tool class. The denticulate and four notches were made on secondary flakes by obverse retouch on one side of the flake. The notch on the other three specimens was created by a single hard blow to the edge of the flake. One of the single blow notches is on a primary flake; the other two are on secondary flakes. Notches fall into two weight classes; heavy (includes weights 50.5 and 67.5 grams) and light (weights 4.0, 4.8, 5.5, 7.0 and 15.5 grams).

SCRAPERS

The scraper category consists of three specimens. The first is an end and side scraper on an interior flake (Fig. 36 b) from square 4. A sinuous scraper on a secondary flake (Fig. 36 f) is from square 33. Obverse retouch is steep along the left edge of the flake; the flake was shaped prior to removal from a core. A side scraper on a twisted secondary flake (Fig. 36 a) is from squares 33 and 25. The distal end is broken off. The bulb of percussion was retouched off the ventral surface and there is additional inverse retouch on the distal half of the right edge. Obverse retouch occurs along the right and left edges of the flake.

GRAVERS

Two gravers are made on secondary flakes by retouching a naturally pointed corner.

CHOPPER

The chopper (Fig 36 g) is on a flint cobble which weighs 173.0

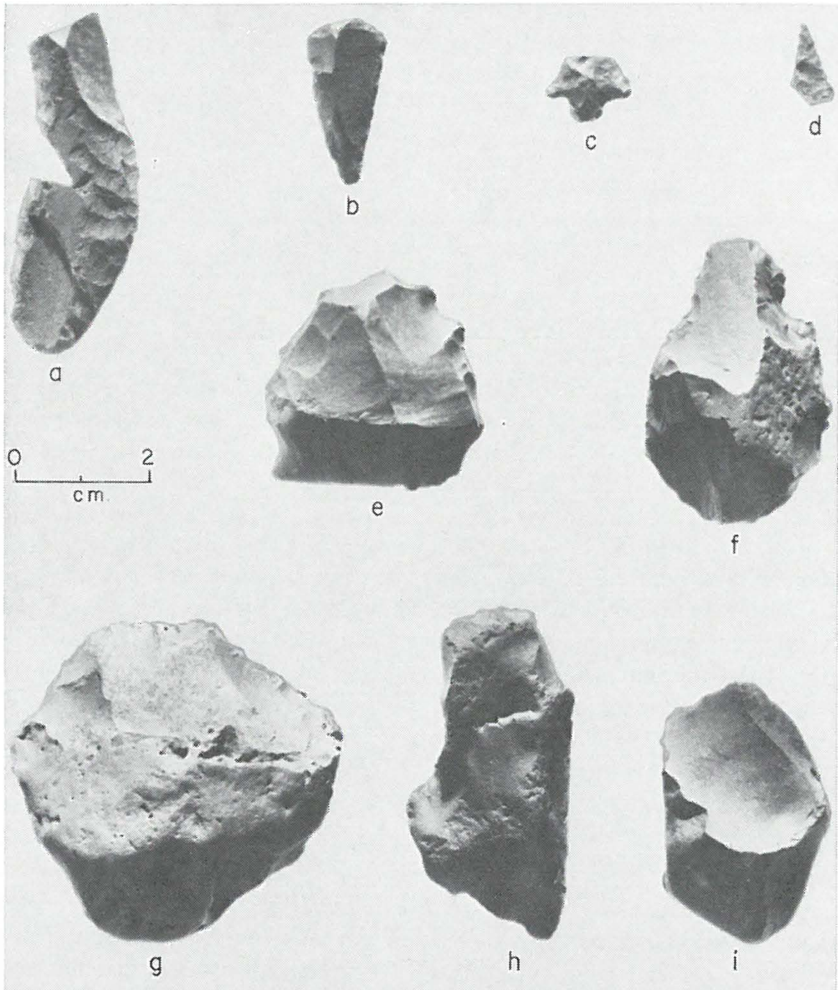


Fig. 36. Zweifel site tools. a, side-scraper; b, end and side-scraper; c-d, fragmentary projectiles; e, denticulate; f, side-scraper; g, chopper; h-i, notches.

grams. Half of the cobble perimeter has been roughly bifacially flaked and a sinuous edge resulted. Battering on this prepared edge resulted in the removal of small chips from both faces and the subsequent dulling of the edge.

PROJECTILE POINTS

Parts of two points made on flint flakes were recovered from squares 22 and 25. The first (Fig. 36 c) has been roughly shaped to the barbed, parallel convex based shape, but was not retouched due to breakage. The second point is represented by the tip of a previously completed point.

RETOUCHED PIECES

Flakes (12) and chips (3) were intentionally retouched. Two are primary and two are interior flakes; the remainder are secondary flakes and chips. Obverse retouch is located laterally and distally on the retouched pieces. Specimens fall into two categories; heavy (5.0 to 24.5 grams) and light (1.5 to 3.5 grams).

HAMMERSTONES

Two quartzite hammerstones have battering localized at the narrow end of the oval shaped cobbles. The larger specimen (539 grams) was discarded after a flake broke off the pecked end. A quartzite flake represents the third specimen. The flake was removed or broke off after battering rendered the striking area too broad for directed blows.

The sample of tools from the Zweifel site is small and there are no localized clusters of any particular tool or of a tool kit within any single square. Notches, retouched pieces and scrapers are located in adjacent squares (see Fig. 34) within the excavated area and may constitute a tool kit used at this site for the collection and preparation of wooden shafts or handles. The absence of larger numbers of hammerstones seems surprising with regards to the primary activity, cobble reduction, represented at the site.

The two points are typologically dated to the period A.D. 1 to 1200 (Suhm and Jelks 1962: 263) and the end and side scraper is typologically late in the prehistoric sequence. These specimens are located in adjacent squares 22, 33 and 25 and are attributed to an occupation in the northern part of the site. On a technological basis, these materials are made on flakes while the lithic debris from the site is aimed at the production of core tools rather than flake tools. These two technologies reflect different periods of occupation or contemporaneous occupation for different purposes.

Summary

Excavation of the Zweifel site has provided information on the activity at the site, the localization of this activity within the site and on the utilization of the site by peoples with two technologically distinct ways of working stone.

Roughing out of flint cobbles to make crude bifaces was the primary activity carried out at the site. Cobbles were not quarried at this location as unmodified materials are not present, therefore, the materials present were gathered elsewhere for further modification.

Another activity at the site may have been the collection and preparation of wooden shafts as inferred from the scraper-notch-retouched piece tool kit. As these tools cluster within the limits of the excavated area, it is suggested that this activity was carried out concomitant with cobble reduction.

As mentioned earlier, the typologically late points and scrapers are technologically distinct from the remainder of the deposit. These materials are located at the same spot as the largest amount of lithic debris and may represent a brief utilization of previously discarded materials. This is further substantiated by the broken but uncompleted point and the broken and discarded point tip.

The horizontal extent of the cultural deposit was delimited on the north, east and south sides and is absent just to the west of the excavated area. Thus, the deposit covers an area of not more than 500 square meters. Two occupation areas were distinguished within this area on the basis of the location of lithic debris. The areas are not spatially or technologically separated and therefore it cannot be determined whether they were used contemporaneously. If they were contemporaneous, it would be suggested that the work group consisted of two people who were carrying out the same activity in adjacent areas. There may also be other smaller but overlapping concentrations within the excavated area which were not isolated. Based on the limited area and the number of discarded cores and bifaces, it is suggested that the site may have been repeatedly revisited.

PIRATE SITE (X41HD36, 54)

Introduction

The Pirate site is situated in the limestone bluff microenvironment on the east side of the Brazos River less than half a mile north of Eden Branch (Fig. 4). The bluff drops off gradually to the south and east and rises to the north. A steep slope on the western edge of the site drops off to the river some 90 feet below. The surface of the limestone is covered with a shallow layer of soil, held in place by scattered clumps of grass located in the open areas between the dense juniper cover.

Clusters of chipped stone debris were scattered over the bluff in areas which ranged in size from about 10 to 70 square meters in area. A selected sample of artifacts was collected from four of the clusters (A, B, C, H) prior to excavation. The samples from Areas A, B, and C were collected as single units which were assumed to be representative of the activity in the area. Area H (X41HD54) however, was collected as two separate areas (east and west) as there appeared to be two clusters represented. Collections were not made from Areas D-G as they appeared to be smaller and the collection of surface materials might have destroyed the associational patterns present. The artifact assemblage from the site included hammerstones, flint debris, unfinished bifaces and chipped stone tools. A sandstone mano and fresh water mussel shells were also collected from Area C.

Due to the presence of recognizable concentrations of chipped stone debris, absence of downslope erosion and the equal exposure of the surface of the bluff, it was assumed that these clusters represented essentially undisturbed areas of prehistoric activity. Based on the survey, it was suggested that the Pirate site was a chipping station typical of this class of sites. Therefore, excavation was carried out to determine the formal arrangement of the site and activities conducted therein. In addition, excavation would provide data for intersite comparison.

Excavation Procedure

A north-south base line was established along the eastern edge of the site and excavation units of 2 x 2, 2 x 3 and 3 x 3 meters were imposed upon the surface of the concentrations depending upon the size, exposure and access to the areas. Surface material was collected from within each square and the fill was screened through quarter-inch mesh. Depth of fill ranged from zero to a maximum of twenty centimeters and this was excavated as a single level. Architectural features were not found. The varying sizes of excavation units makes square to square comparison of artifact density difficult. Consequently, the artifact concentration, which is composed of two or more excavation squares, is used as the unit for intra-site comparison. These units are described below as Areas A to H. The total excavated area is 303 square meters distributed as follows:

Area A=51 square meters	Area E=12 square meters
Area B=36 square meters	Area F=40 square meters
Area C=68 square meters	Area G=20 square meters
Area D=12 square meters	Area H=64 square meters

In addition to the horizontal distribution of debris, the size of a concentration and the number of tool classes collected therein were expected to yield information on the type and intensity of activity carried on within any single concentration. The concentrations are described individually below and are compared on the basis of the total pattern of each concentration.

Excavation Units

Area A covers an excavated area 51 meters square (Fig. 37) and was one of the three areas collected from during the survey, at that time, 342 pieces of lithic debris, 30 cores, 19 hammerstones, 8 bifaces, 7 notches, 3 gravers, 45 retouched pieces, and 3 scrapers were collected. The horizontal distribution of excavated lithic debris, cores and bifaces is plotted in Fig. 38 a and the tool distribution is illustrated in Fig. 38 b.

The major clustering of artifacts including flake debris, cores, bifaces and tools is in the northwest quarter of the excavated area. Notches, the most common tool type, are scattered throughout the deposit.

The horizontal distribution of lithic debris and tools for Area B is plotted in Figures 39 a, b. Survey collections from the area include 443 pieces of flake debris, 26 cores, 16 bifaces, 23 notches, 5 gravers, 2 scrapers, 114 retouched pieces and 1 hammerstone.

One major cluster of tools is located in the southern two-thirds of the excavated area; this generally coincides with the concentration of lithic debris including cores and bifaces. Notches and gravers occur together in the same squares although notches are more frequent. On the basis of the horizontal distribution of artifacts, one primary activity area is suggested.

Area C is located on the southern edge of this site on a relatively level shelf of the bluff about 3.5 meters below the level of Areas A and B. The initial survey collection includes 149 pieces of debris, 80 retouched pieces, 50 cores, 8 bifaces, 9 hammerstones, 8 gravers, 7 notches, 2 dart points, 1 arrowpoint preform, 1 mano and shells from 3 fresh water mussels.

The horizontal distribution of artifacts (Fig. 40 a, b) shows that tools and cores/bifaces do not cluster in the same area as the largest

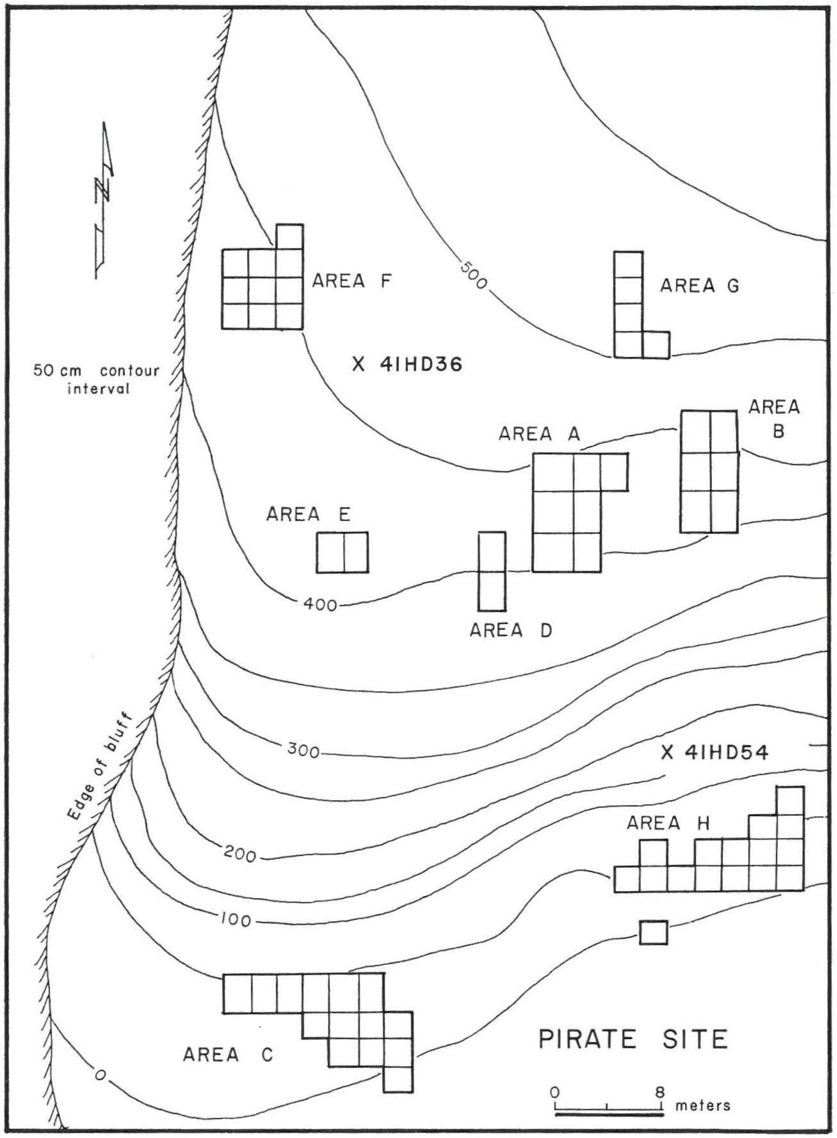


FIG. 37. Overall plan map of the Pirate site. Outlined areas are excavation units which denote concentrations of flint debris prior to excavation.

amount of chipped stone debris. The excavated area covers 86 square meters but the amount of lithic debris is more widely scattered and not as abundant as in Areas A and B. In contrast, the number of

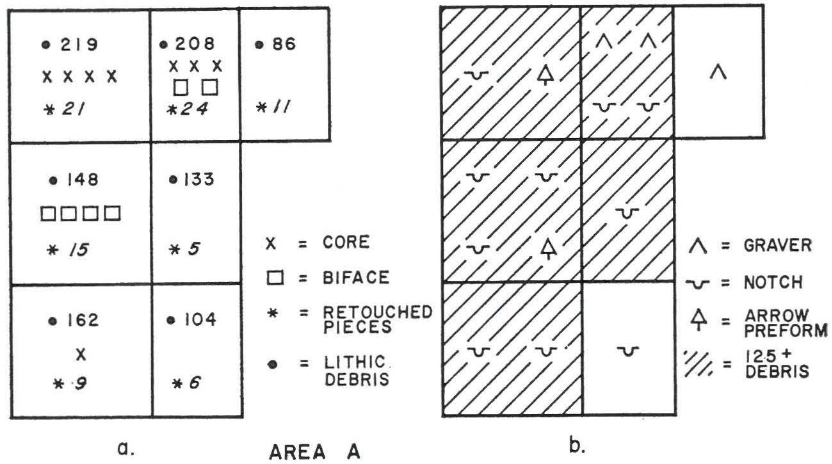


FIG. 38. Area A, horizontal distribution of lithic debris and tools.

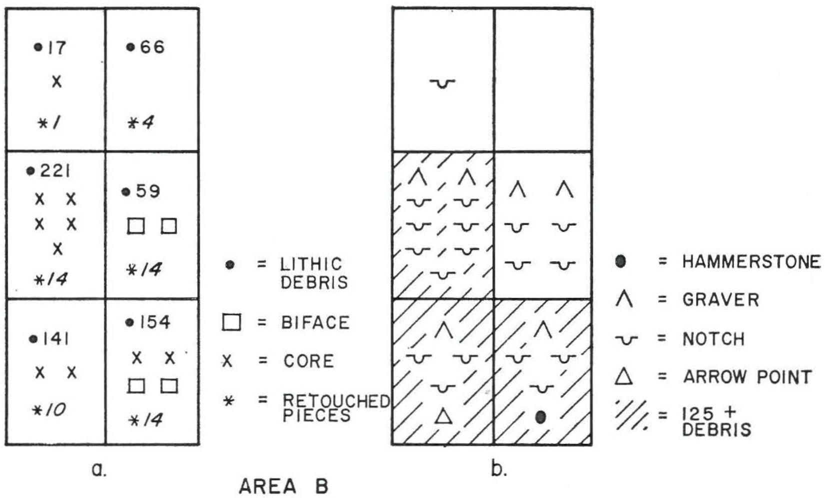


Fig. 39. Area B, horizontal distribution of lithic debris and tools.

cores is greater than in either of these two areas. Notches are the most common tool form and are found scattered throughout the deposit. Although chipping activity in the area was not as intense as in Areas A and B, it was more evenly spread and it is suggested that activity here was more continuous and involved other activities, food preparation or consumption, than in Areas A and B.

Area D is located near the center of the site and covers an area

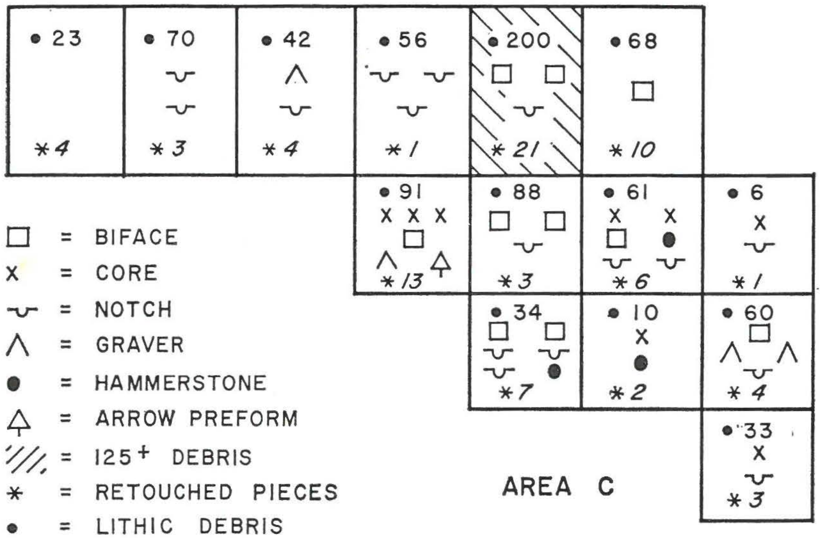


FIG. 40. Area C, horizontal distribution of lithic debris and tools.

of 12 square meters. Surface materials were not collected from the area prior to excavation.

This excavated area is a single concentration (Fig. 41 a, b) which has a larger amount of flint debris, including flakes, chips, cores and bifaces, as well as a higher number of notches.

Area E is located west of Area D and is of an identical size. Surface materials were not collected here and excavated artifacts (Fig. 42 a, b) are representative of the localized activity.

Area E varies from Area D in having fewer bifaces and cores

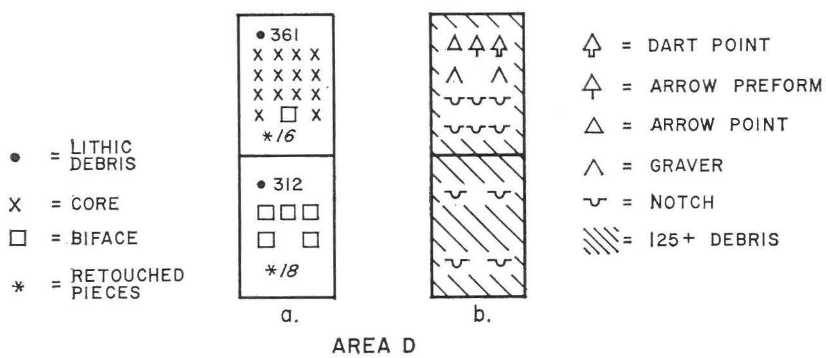


Fig. 41. Area D, horizontal distribution of lithic debris and tools.

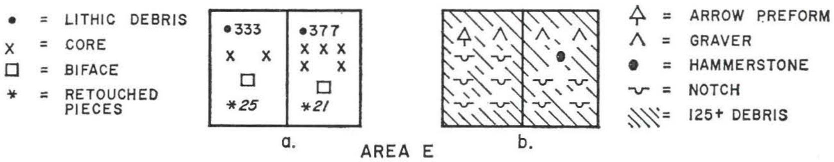


FIG. 42. Area E, horizontal distribution of lithic debris and tools.

present but has about the same number of flakes. Gravers and notches are also present within both squares.

Area F is located adjacent to the bluff edge in the north west corner of the site. The area covers 40 square meters and upon initial inspection, appeared as a distinct cluster with a few artifacts observed on the surface and in the thin soil cover.

The numbers and distribution (Fig. 43 a, b) of lithic debris provide no delineation of a concentration except for the obvious increase in materials to the south. This may represent a disturbed deposit or may be at the edge of a concentration that is located to the south. There was, however, no evidence of this, rather the excavation area appears to be the main area of the deposit.

Area G covers 20 square meters and is located at the northern limits of the site. The concentration appeared to be small but distinct on the surface and materials had not been disturbed by previous collecting.

Lithic debris is uniformly distributed (Fig. 44 a, b) throughout Area G and the distribution of cores is of little aid in isolating an area of intense activity. A single notch and 8 retouched pieces likewise are scattered and based on the evidence, it is suggested that little knapping went on within the excavated area.

Area H (X41HD54) covers an excavated area 64 meters square

FIG. 43. Area F, horizontal distribution of lithic debris and tools.

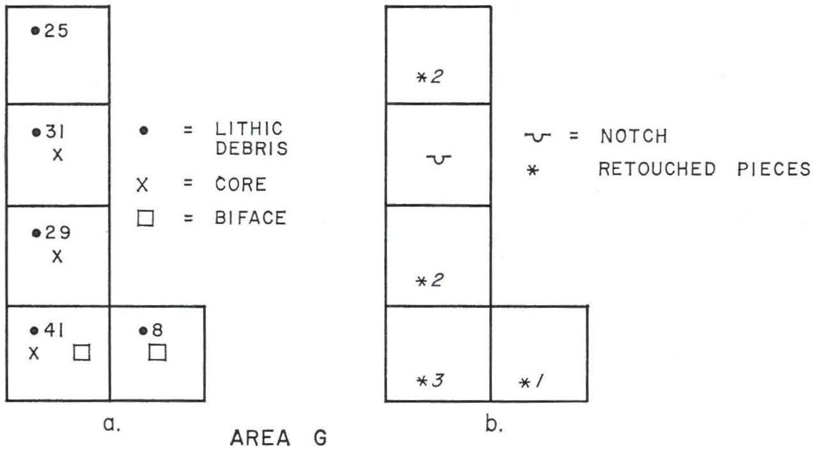


FIG. 44. Area G, horizontal distribution of lithic debris and tools.

(Fig. 45) and surface collections were made in two units. The west area includes squares 12-15, the eastern area includes squares 1-9; cultural material was not exposed in the area of squares 10 and 11. This area is located at the southeastern corner of the Pirate site and at about the same level as Area C. The survey collection from the eastern area included 82 pieces of debris, 7 cores, 9 bifaces, 1 graver,

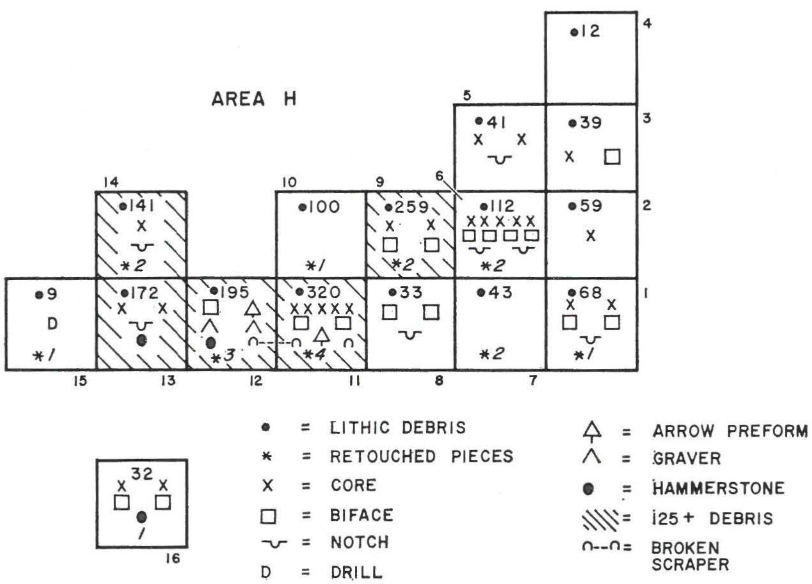


FIG. 45. Area H, horizontal distribution of lithic debris and tools.

1 retouched piece and 1 hammerstone; the collection from the west included 60 pieces of debris, 2 cores, 2 bifaces, 1 dart point and 1 arrowpoint tip.

The horizontal distribution (Fig. 45) of tools (points, scrapers, notches, retouched pieces, hammerstones, etc.) shows that tools cluster in squares 9, 11-14 which corresponds to the area which contains the main concentration of lithic debris. Cores and bifaces occur predominantly in this area although there is a distinct concentration in square 6 with other materials in peripheral squares 1-5. Based on the survey and excavated samples, it is suggested that one area of flint working is represented as a concentration in the area of squares 9, 11 and 12, and that the materials collected from the east area and the core-biface cluster in square 6 represent materials discarded beyond or at the edge of the primary knapping area.

Eight concentrations of lithic debris and tools mark the locations of separate activity areas within the limits of the Pirate site. Based on the number and high percentage of primary and secondary cortex flakes, of initially trimmed and discarded cores and bifaces, the few tools and general absence of domestic tools, it is suggested that the site was occupied primarily for the purpose of removing cortex from cobbles and the preparation of roughly trimmed bifaces. The relative importance of this basic activity can be inferred from Figure 46 which shows where lithic debris is concentrated and the amounts present. The ratio of amount to area provides a measurement of this intensity. Areas F and G are not included within the high intensity area, although flint knapping was done there. Area C is an anomaly in that lithic debris occurs over the entire area but is concentrated only in one square. This apparent anomaly may be due to the fact that additional activities food preparation and comsumption (as indicated by mussel shells and a mano), are represented in Area C. Notches, gravers and retouched pieces occur together in almost every area and in similar ratios, although varying numbers. They increase in numbers with an increase in amounts of debris. It is suggested that they represent a tool kit used in the collection or preparation of wooden shafts and that this activity is associated with cobble cortex removal at the same time and place.

Artifact Assemblage

Stone artifacts comprise over 99.9% of the assemblage; artifact provenience is listed by excavation area in Table 7. The relative proportion of assemblage from each of the areas is shown in Figure 47. Areas A, B, C and H constitute relatively equal amounts and contribute well over three fourths of the artifact sample. Areas D and

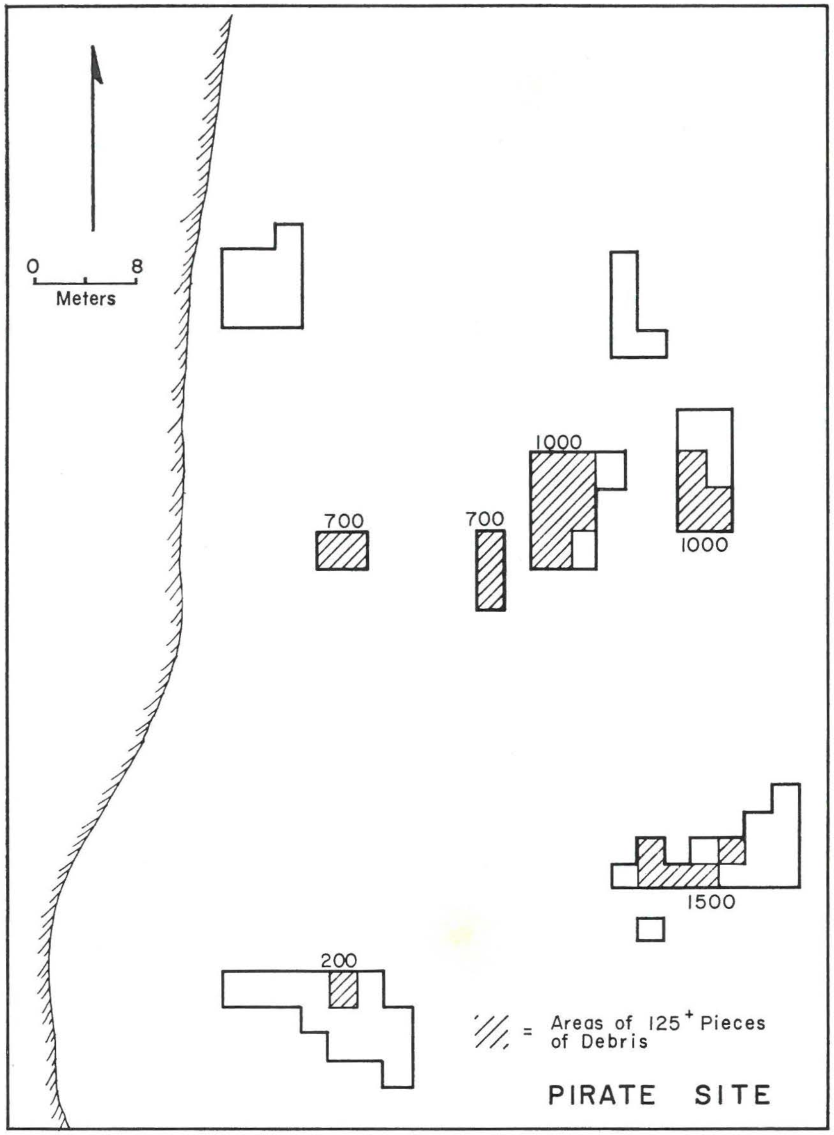


Fig. 46. Plan map showing excavated squares which contain more than 125 pieces of debris. Number indicates amount of lithic debris rounded to nearest hundred.

TABLE 7. ARTIFACT PROVENIENCE, PIRATE SITE (X41HD36,54).

	EXCAVATION AREAS								
FLAKES	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*TOTAL*
Primary	59	63	77	18	28	7	4	159	415
Secondary	391	322	372	142	126	22	49	254	1678
Interior	133	92	90	45	64	7	10	84	525
Lipped	5	7	12	4	4	1	2	40	75
CHIPS									
Primary	28	47	24	5	5	15	1	97	222
Secondary	504	383	429	291	300	42	47	615	2611
Interior	282	185	238	168	179	16	18	527	1613
CORES	23	22	32	4	3	2		30	116
CORE FRAGS.	19	15	26	9	5	1	4	10	89
BIFACE STAGE									
A	----	1	1	----	----	----	----	2	4
B	6	11	8	1	1	2	1	5	35
C	----	1	1	----	----	2	----	5	9
D	----	1	1	1	----	1	----	1	5
E	4	----	3	----	----	----	----	----	7
DART POINTS	----	----	2	1	----	----	----	1	4
ARROW PREFORMS	2	----	2	1	----	----	----	4	10
ARROW POINTS	----	1	----	1	----	----	----	2	4
SCRAPERS	3	2	----	----	----	----	----	2	7
NOTCHES	17	41	23	10	10	1	1	6	109
GRAVERS	6	11	12	2	3	1	----	1	36
DRILLS	----	----	----	----	----	----	----	1	1
RETOUCHED PIECES	136	171	162	34	46	16	8	20	593
HAMMERSTONES	19	2	12	----	1	3	----	4	41
MANOS	----	----	1	----	----	----	----	----	1
SHELL	----	----	4	----	----	----	----	----	4
TOTAL	1637	1378	1531	737	766	139	145	1871	8213

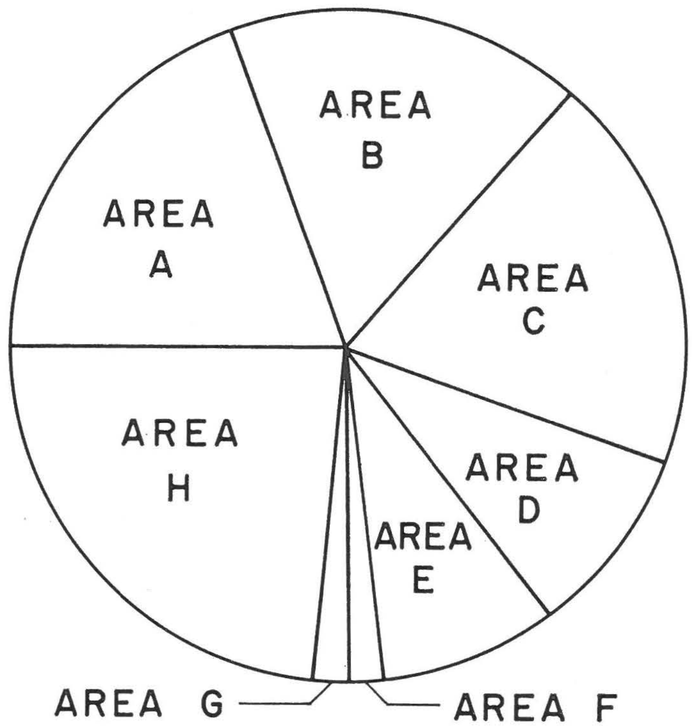


FIG. 47. Relative contribution of separate excavation areas to artifact assemblage, Pirate site.

E constitute about the same amount and Areas F and G make up the remainder.

As discussed previously, similar activities, biface preparation and shaft preparation are represented in the excavated areas, although there is a variation in intensity of activity reflected by the disproportionate composition of the site assemblage. Therefore, the artifacts are treated as a unit rather than by excavation area or by excavation units (squares or collection area).

Chipped stone artifacts constitute 99.6% of the assemblage and of this category, unutilized flakes and chips make up 86.8%; cores and bifaces 3.2%; utilized flakes/chips 7.2% and chipped stone tools and preforms 2.2% (Fig. 48). Hammerstones, a mano and parts of three fresh water mussels make up the remaining 0.6% of the assemblage.

DEBRIS

A total of 7,139 flakes and chips of flint were collected from the various areas of the site. Over 37% of this number are flakes; the

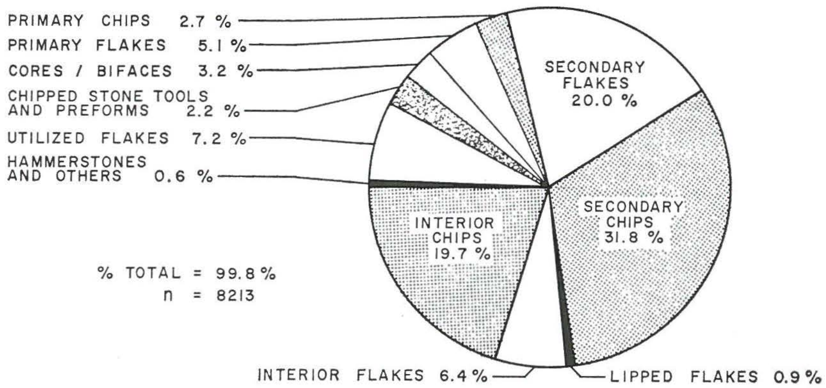


FIG. 48. Composition of the artifact assemblage at the Pirate site.

remainder are chips. One percent of the flakes are lipped and all of these are interior flakes. Secondary debris constitutes 60% of the debris, 9% is primary, and interior debris is 31%. Based on the predominance of primary and secondary flakes, it appears that cortex removal is the main activity indicated by the flake debris.

Two hundred and sixty-five cores and bifaces were recovered. Natural cortex platforms and prepared platform cores are the most frequent and generally, flakes were removed from around the circumference of a cobble either on one face or on both faces. Many of the unifacially flaked cobbles have natural cortex over one face and had been flaked around the circumference after the cobble had been split in half as the first step of cobble reduction. This work was done using a hard hammer and resulted in the production of almost all the flake debris represented in the collection.

Unaltered cobbles were not recovered during excavation and consequently, the exact dimensions of cobbles were not recorded. However, note was made of the reliability of weights with regard to the amount of cortex removed and it is felt that the weights of those cores considered to be close to the original represent the weight range although being slightly low. Core weights range from 27 to 2050 grams and the mean weight is 93.5 grams if the 2050 gram specimen is excluded.

Bifaces are represented by only 60 specimens and over half of these are Stage B bifaces. Stage F is not represented and the examples of Stages C, D, and E are fragmentary. The bifaces do not represent a good biface sequence and therefore it is suggested that usable blanks were transported elsewhere for further reduction. The high percentage of cortex flakes and chips and the small number of lipped biface thinning flakes support the idea that bifaces were roughly trimmed at the Pirate site but generally were not made into tools here.

DART POINTS

Four stemmed points of which only 1 is complete, were collected at the site. The complete specimen (Fig. 49 b) is a Yarbrough point (Suhm and Jelks 1962: 261). The stem edges are ground smooth and the edges have been alternately retouched in order to sharpen the point. This retouching procedure resulted in numerous steep hinge scars along one edge near the tip. This may be the reason for its having been discarded.

The base of a dart point found in Area C has a wide, straight stem and a convex base. A projectile point broken in manufacture is represented by a roughly shaped straight stemmed base. Both projectile points are unidentified as to type.

An almost complete point (Fig. 49 a) was collected from the surface just west of Area H. The tip is missing and may have been broken by impact as indicated by the lipped break (see Shiner 1970: 30-31). The stem expands near the base and the base is straight. All stem edges are ground smooth. The body is steeply alternately beveled and the original shape of the point is uncertain. The projectile point does not conform to any type description.

Dimensions of the projectile points are listed below:

L	*W*	*Th*	*SW*	*Wt*	*Area*
4.6	2.4	0.5	1.1	6.7	C
2.9+	2.4	0.5	1.7	6.1+	C
–	2.4	0.6	1.3	–	D
4.6+	1.9	0.7	1.3	6.0+	H

ARROWPOINTS

Arrowpoints are made on flakes; all but one specimen were made on interior flakes. As discussed earlier, the presence of a relatively smooth flake scar on the ventral surface of the flake enables the roughing out of points on flakes by unifacial retouch of the dorsal surface using the edge of the ventral surface as a platform. The arrowpoints represented in this collection include bases, tips and mid-sections of preforms and the bases of finished points.

Fragments of three different shaped arrowhead preforms are represented. There are two examples of the first form which has a rectangular shaped base and no stem. The second form conforms to the description of a Cliffton point (Suhm and Jelks 1962: 269-270) except that this specimen (Fig. 49 c) is a preform that was broken in

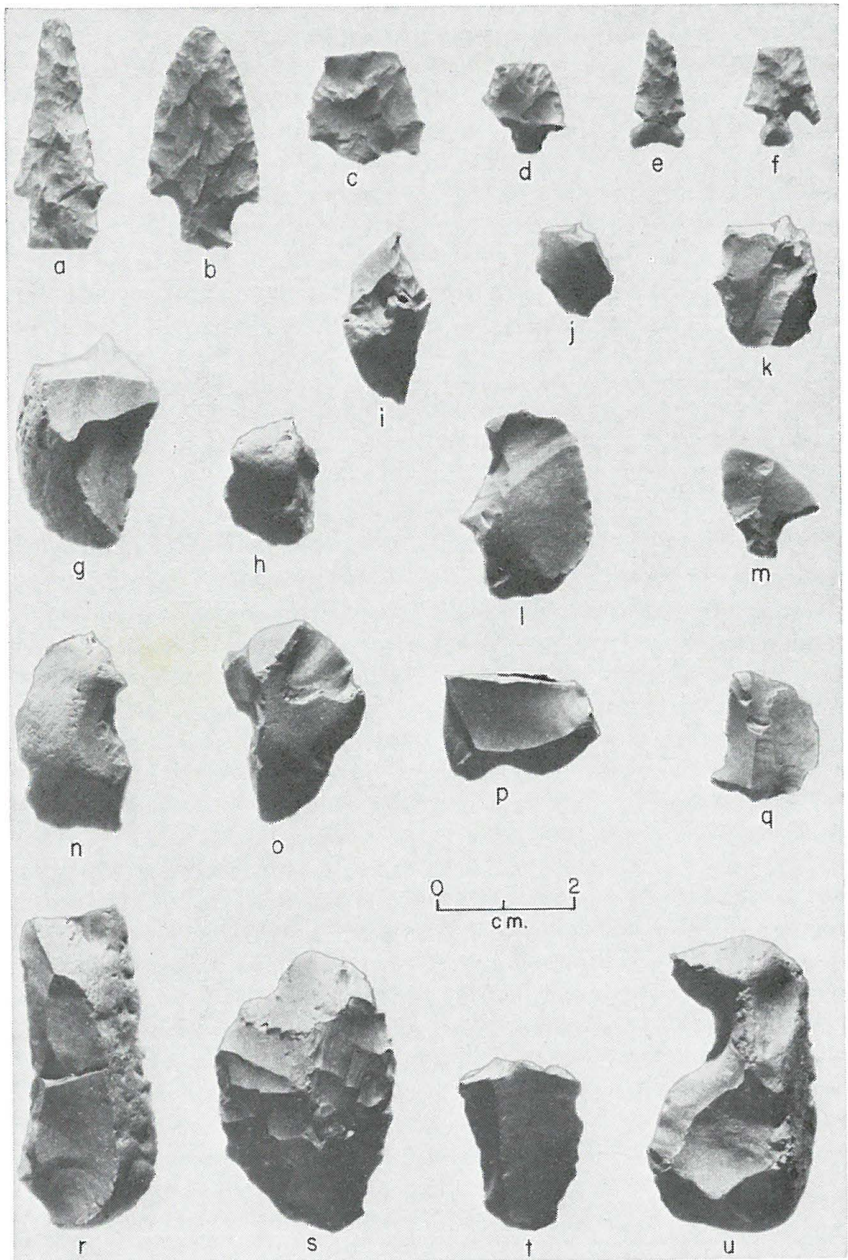


FIG. 49. Pirate site tools. a-b, dart points; c-f, arrowpoints; g-l, gravers; m, drill; n-q, u, notches; r-t, scrapers.

manufacture. The edges of the preform were roughly thinned and the base had not been retouched. A more pronounced contracting stem form (Perdiz?) is represented by two bases (Fig. 49 d). Both have been worked on only the dorsal surface as the ventral surface is a smooth flake scar. Other unfinished points are represented by two tips and three mid-sections.

Four completed arrowpoints are identifiable from the form of their bases. One side-notched point, Harrell (Fig. 49 e) has had the tip broken by impact. A corner-notched Scallorn (Fig. 49 f) is also lacking the tip as well as a barb. A Perdiz point is lacking the base and the tip. The fourth point is represented by a contracting stem which may be from a Perdiz point. Measurements are inadequate for description but in no case would these points have weighed more than 1.5 grams when complete.

The presence of unfinished points indicates that arrowpoints were being manufactured at the site, probably to replace points which were broken and are evidenced by the four bases mentioned.

SCRAPERS

Tools within this category included end-scrapers (5), a side scraper and a shouldered scraper. The fragmentary bit of one end-scraper appears to be on a blade while all the other specimens are on secondary flakes. All of the end-scrapers fall into a weight class between 4.3 and 8.5 grams while the shouldered and the side scrapers weigh 36.9 and 27.4 grams respectively. All specimens except for the end-scraper bit are complete and have the general appearance of having been made with as little care as possible.

The four complete end-scrapers on secondary flakes have shallow retouch which is continuous along the distal edge but which was done in a manner that left an irregular edge. One specimen was resharpened by three hard blows along the edge which resulted in a sinuous edge and shallow hinge fractures on the face of the edge.

One shouldered scraper (Fig. 49 s) on a secondary flake was recovered from Area B. A notch on the left edge of the flake created the shouldered effect. Obverse edge retouch occurs around the entire circumference of the flake and is shallow and not steep. A side-scraper on a secondary flake (Fig. 49 r) is from Area H (Squares 11-12). Retouch is along the left edge, is obverse and shallow. Except for retouch on the edges of both scrapers, there is no other modification such as bulb removal.

NOTCHES

A total 109 notches were collected from the site, about a third are from surface collection, the remainder were recovered by excavation. Notches were made on the flake edges by retouching (Fig. 49 n) or by a single hard blow which was not retouched (Fig. 49 o). Inverse retouch or blows are present on 22 of the specimens. Notches are present on primary flakes (13.7%), secondary flakes (45.8%), and interior chips (3.7%). Notch width ranges from 3-20 mm. but clusters between 6-10 mm. Depth ranges from 1-3 mm. with a single specimen from Area H (Fig. 49 u) having a depth of 7 mm. The latter specimen appears to be of heavier duty than the remainder. Variation in linear dimensions was too wide to allow comparison without complicated statistical manipulation and tool weights were plotted in order to compare samples. Weights range from 1.2 grams to 30.0 grams and the mean weight is 8.12 grams. However, two weight groups were recognized as meaningful in terms of tool size. One group (98 specimens) ranges in weight from 1-2 to 17.5 grams and average 6.36 grams. The second group (11 specimens) ranges from 19.2 to 30.0 grams and averages 23.85 grams. Five of the heavier specimens, including the one mentioned above, are from Area H and it is suggested that some type of heavy working which required larger and more massive notches was carried out at this location. Broken notches were not found and it appears that these tools did not undergo heavy wear and also were discarded after they were used.

GRAVERS

Gravers were made on secondary flakes (19) and chips (10); this constitutes the largest group (80.5%) of gravers. Three gravers are on primary flakes, 3 on interior flakes and 1 on a primary chip. Half of the gravers were made by using the sharp corners of the debris as the graver tip and retouching a notch on either side of this natural projection (Fig. 49 i). The graver points created in this manner range from 1-6 mm. in length and tend to be longer than notches retouched along the center of a lateral or distal edge. Gravers on retouched edges (Fig. 49 j) constitute the other half of this tool category. Length of the point on edge gravers ranges from 1-2 and 4 mm. long but 13 of the 18 in this category have graver tips 1 mm. in length. Thirty-two of the specimens are complete and the points were present on all but two of the gravers on sharp corners. Gravers weights range from 1.2 to 34.6 grams. Corner gravers range from 2.0 to 34.6 and their mean weight is 9.2 grams. Edge gravers are smaller with weights ranging from 1.2 to 16.8 grams and a mean average of 5.4 grams.

DRILL

The base of a drill was recovered from Square 15 of Area H. A broad drill point, 7 x 3m. at the base had been bifacially retouched on the distal end of this snapped interior chip of flint. The length of the drill is uncertain but it appears to have snapped off due to pressure. There is no modification to the bulb of the flake.

RETOUCHED PIECES

Primary (27), secondary (425) and interior (141) flakes and chips have irregular retouched pressure flakes removed from the lateral or distal edges. No patterns of location were noted. Retouch is generally obverse but rarely are flakes regularly retouched along one edge. About 80% (469) of the collection is from Areas A, B, and C and the ratio of debris to utilized flakes as illustrated in Area H suggests that activity or activities with which these tools were associated were not carried out or were carried out to a minimum in Area H. The relative percentages of primary (4.5%) to secondary (71.7%) to interior (23.8%) flaking debris is similar to that of the unutilized flakes/chips from the site and it is suggested that there was no selection for or manufacture of a particular type of flake for use as retouched pieces, rather that the available flakes were utilized.

HAMMERSTONES

Cobbles of quartzite (34), granular flint (6) and sandstone (1) are represented in the collections. Twenty-three of the 41 cobbles are represented by flakes which were broken off of the cobble hammerstone. Of the 23 flakes, 17 are quartzite, 5 are flint and 1 is sandstone. The one complete flint cobble weighs 471 grams. Weight of the quartzite cobbles ranges from 84 to 236 grams and averages 156 grams. Based on the predominance of quartzite, it is suggested that this material was selected for use as a hard hammer because of its internal structure; moreover, cobbles were selected with regard to weight as well as material and quartzite cobbles collected were selected to be used in cortex removal because of their weights.

MANO

This specimen is made of sandstone and is rectangular in plan shape. The longitudinal cross-section is rectangular as is the transverse cross-section. Both faces of the mano are ground and the edges are pecked. Grinding was in a back and forth manner which resulted in an even wear pattern on both faces. The shape of the resource material is undetermined. The present size of the mano is 14.2 x 8.3 x 5.0 cm. and weight is 720.0 grams.

SHELL

The right valves of two small fresh water mussels and the right and left valves of a large fresh water mussel, were collected from the surface of Area C. The shells are unaltered and the presence of other shells was not recorded in the deposit of Area C nor in any of the other excavated areas.

The artifact assemblage from the Pirate site consists primarily of residue, in the form of flakes, chips, cores, bifaces, etc., which resulted in the removal of cortex from flint cobbles. A tool kit composed of notches, gravers and retouched pieces was recovered from every area, except Area G where no graver was found. It is suggested that the activity associated with the tool kit was carried out by the same peoples who were trimming flint cobbles and at the same time.

Projectile points from the Pirate site are dated to the period 500 B.C. to A.D. 1500 (Suhm and Jelks 1962). Dart points occur in Areas C, D and H and represent a core tool technique of manufacture. Arrowpoints and preforms are present in Areas A, B, C, D, E and H with the largest number in Area H. In contrast to the dart points, arrowpoints are made on flakes, although no evidence of a flake technology, based on flake cores, was recognized. These two technologies may reflect different periods of occupation but this can not be demonstrated by their horizontal distribution at the Pirate site.

Summary

Collection and excavation of 8 separate occupation areas at the Pirate site has provided information on the activities at the site, the tool kits associated with the various activities, the intensity of occupation and on the occupation or reoccupation of the site areas by people with different technological methods of working stone.

The manufacture of roughly shaped bifaces was the principle activity carried out at the site. Cobbles were not quarried in the site area and limited testing of the limestone/claystone exposures on the slope west of the site, in the site area and upslope to the north did not reveal any possible source for the flint cobbles. However, it is possible that the cobbles represent the remains of a conglomerate zone which was in the limestone and from which the matrix was weathered away. The cobbles were then deflated onto the present surface and were used as a source of material over a period which appears not to have exceeded 2000 years. After the completion of cortex removal and biface preparation, the bifaces were taken elsewhere for further modification.

The activity of collection and preparation of wooden shafts is inferred based on the notch, graver, retouched piece tool kit. Because the number of pieces of the tool kit covaries directly with the amount of lithic debris in any particular area, that is the number of tools increases with an increase in the amount of lithic debris, it is suggested that cobble reduction and wooden shaft preparation were carried out at the same time by the same people, either by members of a work party or by one individual.

Intensity of activity within the excavation areas can be measured by the relative amounts of lithic debris represented. Thus, it can be stated that activity was intense in Areas A, B, D, E and H. However, we have no data to suggest that these areas were used once or repeatedly nor to infer the size of the work groups represented. Based on the chronological placements of the various projectile points, it is suggested that several of the areas were revisited at different times by peoples having a flake tool technology.

Excavation of the Pirate site has shown that the survey sample was representative of the main activity carried out there, that of the removal of cortex from flint cobbles and the making of roughly shaped bifaces. Other activities represented include wooden shaft preparation, inferred from the notch/graver/retouched piece tool kit, and food preparation and consumption, suggested by the shells and mano in Area C. Occupation of the site occurred during a period of 2000 years with the principle occupation attributed to a group or groups of people using a core tool technology. A later reoccupation of the site is evidenced by scattered tools and preforms made by people with a flake tool technology.

SUMMARY

Archaeological Methodology in Central Texas

Although workers dealing with the archaeology of central Texas have been aware of the presence of contemporaneous and functionally distinct prehistoric sites within the area (Suhm 1960), the general trend has been to look at aboriginal sites as useful for the establishment and discussion of chronological sequences and not to relate them in a functional way within an area of study. In part, due to limitations imposed by insufficient funding, the emphasis is derived out of "culture-area" theory where a basic concern is with inter-area chronological comparisons (Sorrow, Shafer and Ross 1967; Johnson, Suhm and Tunnell 1962) and area-wide comparisons of site types (for example, Greer 1965) rather than at intra-area comparison of activity through time and space. We now have relative chronological control based on carbon 14 dates and on vertical stratigraphy at the Smith, Williams, Collins and McCann sites and at sites in Stillhouse Hollow Reservoir, Canyon Reservoir, and Whitney Reservoir, and can shift emphasis to the anaylsis of prehistoric settlement and subsistence systems. Studies of this nature are being carried out at Robert Lee Reservoir (Shafer 1969) and at Lake Palestine Reservoir (Anderson 1971).

A brief review of the literature shows variation in the explanation of inter-site differences in both functional and temporal terms. In a definition of the Edwards Plateau Aspect (Archaic Stage) of central Texas, it is suggested that " . . . the sites (large and seemingly sedentary) were not inhabited the year round, but that each small band wandered over the surrounding area in search of plant and animal food, returning to the central location for part of the year (Suhm, Krieger and Jelks 1954: 103)". In a symposium, the following year, Edwards Plateau Aspect groups were included as examples of a "central-based wandering community (Beardsley and others 1956: 139)".

The population dynamics of the central-based wanderer community in seasonal or activity sub-division and regrouping are illustrated in figure 50. The figure reads from left to right. Families which have resided at Community Base A, a base camp, disperse to separate family camps during a specific season or for a specific maintenance activity. Families will subsequently regroup at base camps; this regrouping may involve one or all of the recombinations shown. They may return to their original base (A), may move to a new base at which all the families from Community Base A live (B) or

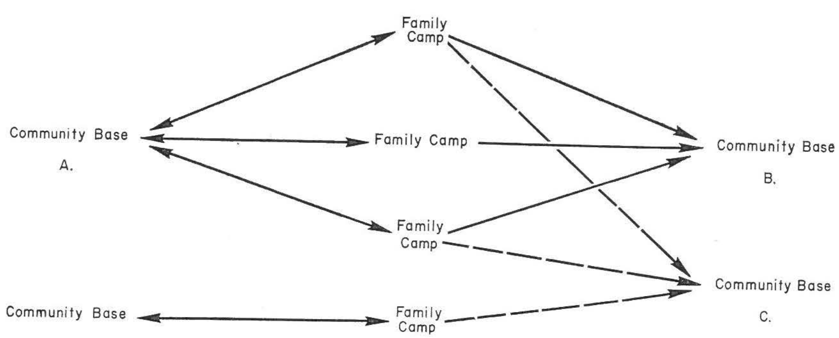


FIG. 50. Model showing the subdivisions of Community Base A families into separate camps and then the possible regrouping at original base (A) or all at a new base (B) or a joining of one or all families with new families at Base C.

some of the families may move to third base (C) where they will have to be integrated into a new social unit (village).

If we apply this model to central Texas, we should then expect to find at least two different size living sites, the larger one being the central base which was inhabited by many families and the smaller ones having been occupied by nuclear or extended families on a seasonal or activity specific basis. All these sites would be within an area recognized as their own by the peoples.

In a general summary of central Texas archaeology, it is stated that habitation sites are the most important type of site, although not the only type present (Suhm 1960: 72). Such habitation sites " . . . are considered to be of a more or less temporary nature, as opposed to the village sites of sedentary groups (Suhm 1955: 51)", but I have been unable to find a discussion of the different habitation sites which would fit the central-based wanderer model. Although a distinction is made between burnt-rock middens and other sites on the alluvial terraces, both are considered to be habitation sites. The temporary nature of the Central Texas Aspect is explained as due to the fact that the " . . . campsites seem to have been occupied by hunting-gathering, semi-nomadic bands that moved frequently in order best to exploit the available food supply . . . (Jelks 1962: 92)". Jelks (1962: 92) points out that at this same period, there are several relatively large open sites in central Texas which he suggests may mark the locations of sedentary villages, these include the Chupek and the Ubantke sites. This conclusion is based on the presence of Caddoan pottery and rich, extensive middens; occupation intensity is attributed to reliance upon agriculture. Although the two types of sites (large/extensive and temporary/ephemeral) have the same types of artifacts, including pottery, the inter-site differences are explained as representing different means of adapting to the environment rather than cases which serve to illustrate the central-based wanderer model as proposed by Krieger. Another view of the Central Texas Aspect suggests that new ethnic groups displaced but did not replace the earlier Edwards Plateau Aspect peoples (Kelley 1959: 281) and that the groups who relied on agriculture were the former while the nomadic groups were the hanging-on Archaic peoples. However, this would not explain the occurrence of identical tool collections. Moreover, evidence for farming is minimal prior to the ethnohistoric period. Most authors agree that there is good evidence for a cultural continuity from the Archaic to the Neo-American and that there was no invasion (Suhm 1955: 50; Suhm 1960: 85; Jelks 1962: 91; Long 1961: 249; Stephenson 1970: 245, 276).

Therefore, the concept of contemporaneous but ethnically different peoples living side by side is not supported and there is little evidence to argue that the site variation is due to the differences between hunting/gathering vs. hunting/gathering/marginal agriculture subsistence bases. This is not to deny the possibility of agriculture but as the above authors argue, the same sort of hunting/gathering subsistence practices continue from the late Archaic into the Neo-American period. Thus, it is argued here that the two types of habitation sites are examples of a central-based wanderer pattern which is present during the entire time period (Archaic and Neo-American); it is further suggested that inter-site variation can be explained as due to differential use of the natural resources, variations in length of occupation period, group composition, and activity structure.

Suhm (1960: 72) points out that the other site types include quarry stations, isolated burials, pictographs and mortar holes. Quarry or chipping station sites have generally not received much attention since the 1940's. Workshops have been described for Dallas County (Hatzenbuehler 1942) and in Hamilton, Comanche, Bosque, Coryell and Nolan Counties (Kirkland 1938, 1940; Kirkland and Kirkland 1941; Runkles 1936). Kirkland has noted that such sites often have a high number of spokeshaves (herein called notches), that blanks or crude blades (bifaces) are common and that there is no evidence of camping nearby. Hatzenbuehler's (1942: 30) interpretation is that " . . . these sites were workshops where the Indians found the desired material, broke it in convenient sizes, and carried it to their camps to make the finished artifacts." Emphasis has not been placed upon the excavation of such workshop sites because they are shallow in depth and are rarely stratified vertically, rarely yield large tool samples and in some cases are beyond the limit of a reservoir flood pool. Nevertheless, they hold the key to an important part of the prehistoric lifeway and need to be studied along with other activity specific, seasonal, or multiple activity settlements.

The problem of functionally different sites in central Texas is beginning to be studied more rigorously. Archaeological salvage work at Robert Lee Reservoir (Shafer 1969) has resulted in a concern with intra-site activity areas and inter-area site variation. Although due in part to the absence of deep stratified deposits, the initial results show the potential of clearing large areas and excavating shallow in situ deposits. Suhm (1959) delineates different occupations through the use of intra-site horizontal stratigraphy at the Williams site. The High Bluff site (Flinn and Flinn 1968) is an illustration of a shallow and intermittently occupied hunting/gathering camp. The Britton site (Story and Shafer 1965: 76-135) with a combination of rapid deposition and relatively light occupation, provides a glimpse of an aboriginal camp. The composition of base camps has not been discussed by most authors but it is suggested that some of the extensive burned rock middens and alluvial terrace sites may have served in this capacity. It is suggested that the Oblate Site at Canyon Reservoir is a base camp. This suggestion is based on the number of projectile point bases, the number of manos, the number and density of other flint tools (scrapers, gravers, drills, etc.), the faunal remains and by comparison with the other excavated sites at Canyon Reservoir. However, this conclusion is suspect because sufficient settlement data, based on an analysis of prehistoric activity in the area, are not available.

It is suggested here that intra-site and inter-site differences through time reflect change and continuity of activity, settlement and subsistence. By using the total artifact assemblage rather than relying upon tools, particularly projectile point style changes, we can describe the prehistoric utilization of a study area.

Methodology of Artifact Analysis

Analysis of the artifacts recovered from the survey and excavations was done in a relatively traditional manner with regard to most tool classes. Considerable emphasis has been placed upon lithic debris, unutilized flakes, chips, cores and bifaces as evidence of the specific stages or steps in stone tool manufacture at any site.

A shift in analytical emphasis from projectiles to other tools and debris has recently been emphasized by workers in Texas who have a background in the analysis of Old World stone artifacts (Honea 1965, 1966; Epstein 1963, 1964; Shiner 1969). These authors have made certain modifications of the typological schemes of Bordes (1962) and Tixier (1963) in order to adapt the typology to New World materials. Other authors Johnson (1967; Johnson, Suhm and Tunnell 1962), Shafer (1969) and Tunnell and Jensen (1969), have further altered Old World systems in attempts to develop better descriptive categories for Texas remains. The followers of several of these workers use these new categories as refined slots, i.e., more "scientific" pigeonholes, rather than arriving at a synthetic, processual description of stone working based on their analysis. The development of new schemes is in line with a statement made a quarter of a century ago by J. O. Brew (1946) who stated that we need more, not fewer classifications in order to solve different problems.

Such problems go beyond pure description, although the importance of description should not be minimized, and it is for the purpose of arriving at a description of flint working that the classificatory scheme used in this report was developed. Additional parameters of flake size, either using metric or weight measurements, platform type and frequency of whole *vs.* fragmentary flakes would be useful but were not elicited due to a limitation of time. It is also suggested that weight of tools should be used in conjunction with linear dimensions in order to allow for inter-site comparison of projectile points and other artifacts. This method was proposed by Fenenga (1953) and, although occasionally employed (Suhm 1959; Johnson, Suhm and Tunnell 1962; Stephenson 1970) for descriptive purposes, has not been widely accepted.

Various approaches will continue to be used and will result in problems of inter-site comparison until the problems to be dealt with have been decided upon. However, I do not envision the day when *everyone* is willing to accept a set of "universal categories" or a "handbook" which will answer all possible questions. A single classificatory scheme cannot serve to provide the solution of every problem.

Summary of De Cordova Bend Archaeology

The archaeological survey of the De Cordova Bend Reservoir recorded 51 prehistoric sites, 5 of which were subsequently excavated prior to filling of the reservoir. From the survey data, 5 microenvironments were recognized and are described. Sites occurred in only 3 of these zones. On the basis of tool kits, lithic debris, site size and associated microenvironment, it was suggested that 3 types of settlements were represented and that the activity at each settlement could be directly related to the present-day resource potentials of the zone. The activities represented in the sites suggested that a complete yearly cycle of maintenance activities of a hunting/gathering subsistence-based society is represented. Based on these assumptions, the settlement classes were defined as including a base camp or settlement, seasonal hunting/gathering camps and chipping stations.

Prehistoric occupation within the De Cordova Bend Reservoir area spans the period from Paleo-Indian as represented by a Clovis fluted point (Skinner and Rash 1969) and by late Paleo-Indian materials from the Acton Site (Blaine, Crook, Harris and Shiner 1969) through the Archaic and Neo-American periods. A shorter time period is represented by the surveyed sites and the excavated sites.

This time period, as indicated by the more prominent projectile point types, Darl and Yarbrough, may begin as early as 500 B.C. based on work elsewhere in central Texas (Sorrow, Shafer and Ross

1967; Johnson 1967; Johnson, Suhm and Tunnell 1962), and termed Late to Transitional Archaic. A date of ca. A.D. 1500 is the end date attributed to projectile types Perdiz and Cliffton. As discussed earlier, the most easily recognized changes during this period of 2000 years are in projectile point technology and style. It is during this period that the bow and arrow were introduced and we observe a shift from a core to a flake technology. Evidence of the co-occurrence of dart and arrowpoints at the Kyle site and other sites in central Texas suggests that the adoption of the bow and loss of the atlatl did not occur simultaneously.

From the survey data, examples of each of the settlement types were selected for excavation. The base camp settlement is represented by the Lowden site and those other sites located on the alluvial terrace of the Brazos River. Seasonal/hunting/gathering sites include the Bluebonnet site, the Aiken site and other sites situated adjacent to tributary streams. Chipping stations are represented by the Pirate site and the Zweifel site, as well as those sites located on the limestone bluff. It is not suggested that these were the only activities carried out in these respective areas but that these site types do represent modal tendencies which taken together represent the macro-structure (Chang 1968: 7) during the period of occupation represented. Moreover, we do not control for the prehistoric utilization of the upland area beyond the reservoir limits except to note that there are "base settlements" located at the upper end of intermittent tributaries where permanent springs do occur.

The excavation and analysis of materials from 5 prehistoric sites located within the area of the De Cordova Bend Reservoir has shown that the size of occupation areas and their architectural features differ from site to site. Analysis of the artifactual materials shows that several different sets of tools are represented at each site and that these sets, or tool kits, relate to the activities carried out there.

The Lowden site is a semi-permanent habitation site and there are such sites in the immediate area (see Fig. 5). Settlement size is the largest of the 3 classes of sites and a more intense occupation is represented by the deep and extensive midden. Architectural remains include a hearth and an occupation area. The occupation area covered ca. 38.5 square meters and was centered around a hearth. The development of a heavily charcoal stained midden within definite limits and of a large artifact sample are attributed to a long-term occupation of this restricted area. In addition, it is suggested that the work force consisted of men and women as the activities represented include hunting, tool making, food processing and food consumption.

Seasonal hunting/gathering camps include the Aiken and Bluebonnet sites. Both sites show evidence of intermittent re-occupation by small work groups likely composed of men and women. Activity at both sites was centered around limestone hearths, but artifactual materials are not heavily concentrated in these areas as they are in the case of the longer occupied living area at the Lowden site. In contrast, materials are scattered widely(at Bluebonnet) or are scattered and concentrated (as at Aiken). Hunting and mussel gathering were practiced at both sites while plant gathering, as evidenced by grinding tools is only well represented at the Aiken site. The complete process of projectile making was carried out at the Aiken site but core trimming was the primary lithic activity at the Bluebonnet site.

The Pirate and Zweifel sites are examples of chipping stations. Eight lithic concentrations at the Pirate site mark the locations of flint working areas. Two overlapping concentrations of lithic debris occur at the Zweifel site. Flint knapping is the main activity at these sites and it involved the roughing out of bifaces by the removal of cortex. It has been suggested that the tool kit composed of notches, gravers and retouched pieces, represent wooden shaft preparation as an ancillary activity to biface preparation. Food preparation is evidenced only in Area C of the Pirate site although the presence of projectile point bases and preforms suggests hunting. The hunting, however, is attributed to re-occupation of the sites.

Prehistoric sites in the De Cordova Bend Reservoir occur in 3 different locations, herein termed microenvironments, and the activities at these locations is related to the potential natural resources. These involve availability and diversity of foodstuffs, presence and reliability of water, suitable living conditions and material resources. Availability and use of these resources relates directly to the size and composition of the social unit present and to the activities practiced.

Survey and excavation support the interpretation that sites on the alluvial terrace were semi-permanent settlements occupied over a long span of time and for most of any single year. Sites situated adjacent to tributaries represent short-term camps, occupied and re-occupied in order to gather and hunt. Chipping stations on the bluff were visited intermittently by small work groups (Fig. 51). It seems likely that other types of sites, e.g., fishing, kill/butchering, burial, were utilized by the prehistoric inhabitants of the area, nevertheless, we have no data on these activities and will not propose a model based on negative evidence. It is suggested that the sum total of activities represented includes the majority of activities needed to maintain a social unit, probably a band. This is not to say that these sites were

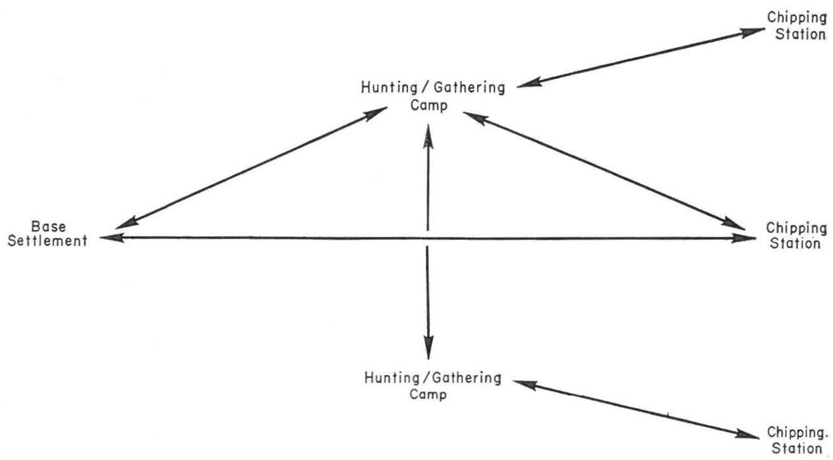


FIG. 51. Diagram showing the suggested relationships between sites, activity and location. Arrows indicate direction of movement between sites.

all used by the same group of people, rather that the inhabitants of the area recognized these various activities as necessary parts of a maintenance cycle. The duration of the cycle may represent one or more seasons, possibly a complete annual cycle. Based on the potential resources, on the site situations within the reservoir, and on the archaeological sites located outside of the study area, we suggest that this maintenance cycle reflects a full year, however, this will have to be tested by future work.

In conclusion, it has been suggested that the prehistoric inhabitants of the De Cordova Bend area utilized different areas and resources for the various activities needed to maintain their society. This utilization resulted in the patterned occurrence of activity-specific sites in microenvironments where available resources maximized the completion of certain activities. These sites are termed chipping stations, seasonal hunting/gathering camps and base settlements. They have been correlated with microenvironments, limestone bluff, tributary stream, and alluvial terrace, respectively. By viewing archaeological remains as evidence of the processual steps involved in tool making and of activities carried out by work groups of different composition, an explanation of the technology and nature of activities has been proposed.

The use of a clearly defined model seems to be implicit in much of the archaeological literature on central Texas and the model varies from "restricted wanderer" to "central-based wanderer." It is argued here that the evidence on hand from the area of several reservoirs in central Texas is suggestive of both patterns. Sites within Canyon Reservoir (Johnson, Suhm and Tunnell 1962) are differentiated on the basis of three variables. These are: 1) location and site type (burned rock midden, alluvial terrace midden and rock shelter), 2) midden extent and style of deposition and 3) artifact assemblage. As discussed earlier, it is suggested that the Oblate site is a base camp and that the Footbridge and Wunderlick sites are intermittent activity-specific sites, probably primarily hunting camps as suggested by Johnson. In the area of Whitney Reservoir, during the period of the Central Texas Aspect, at least 3 site types occur, "sedentary" villages, rockshelters and open campsites at various locations (Jelks 1962: 92). It is suggested here that the sedentary villages were base camps occupied by the indigenous peoples and that the use of rockshelters and small open campsites was on an intermittent short-term basis and that they were re-occupied during a certain part or parts of the year. A similar pattern can be seen in the Waco Reservoir (Story and Shafer 1965; Watt 1967) where the sites: Baylor, Britton and Lookout Point are seen as reflecting intermittent short-term occupations. Although no base camp is reported by these authors, its presence is suggested by the absence of grinding tools and the short occupations suggested for the sites mentioned. Archaeological work at Robert Lee Reservoir (Shafer 1967; 1969) suggests that different maintenance activities are related to specific resource areas, as reflected by locations, tool assemblages and flake types, but that there is little evidence to single out a specific location or site type to be deemed a base camp. On this basis, it is suggested that this may be evidence of a "restricted wanderer" community pattern which contrasts with the "central-based wandering" model herein described. In summary, it has been suggested that a model based on the concept of "central-based wanderer" is applicable in the areas of the Canyon, Whitney, Waco and De Cordova Bend Reservoirs and that a "restricted wanderer" model may be more applicable at Robert Lee Reservoir in west central Texas.

BIBLIOGRAPHY

Anderson, Keith M.

1971 Archaeological Survey of Lake Palestine Reservoir. Manuscript in preparation.

Beardsley, Richard K., Preston Holder, Alex D. Krieger, Betty J. Meggers, John B. Rinaldo, and Paul Kutschie

1956 Functional and Evolutionary Implications of Community Patterning. In "Seminars in Archaeology: 1955" edited by Robert Wauchope, pp. 129-157, *Memoirs of the Society for American Archaeology*, No. 11.

Bell, Robert E.
1958 Guide to the Identification of Certain American Indian Projectile Points. *Oklahoma Anthropological Society, Special Bulletin* No. 1.
Belo Corporation, A. H.
1970 *Texas Almanac and State Industrial Guide,* 1970-1971. A. H. Belo Corporation.
Blaine, Jay C., R. K. Harris, Wilson W. Crook, Jr. and Joel L. Shiner
1968 The Acton Site: Hood County, Texas. *Bulletin of the Texas Archeological Society,* Vol. 39, pp. 45-94.
Blair, W. Frank
1950 The Biotic Provinces of Texas. *The Texas Journal of Science,* Vol. 2, No. 1, pp. 93-117.
Bordes, F.
1961 Typoligie du Paléolithique Ancien et Moyen. *Publications de l'Institut de Préhistoire de l'Universite de Bordeaux, Mémoire* No. 1.
Brew, John Otis
1946 The Use and Abuse of Taxonomy. *In* "The Archaeology of Alkali Ridge, Southeastern Utah." *Papers of the Peabody Museum of American Archaeology and Ethnology,* Harvard University, Vol. 21, pp. 44-66.
Carter W. T.
1931 The Soils of Texas. *Texas Agricultural Experiment Station Bulletin,* No. 431.
Chang, K. C.
1968 Toward a Science of Prehistoric Society. In *Settlement Archaeology,* pp. 1-9, National Press Books, Palo Alto.
Coe, Michael D. and Kent V. Flannery
1964 Microenvironments and Mesoamerican Prehistory. *Science,* Vol. 143, No. 3607, pp. 650-654.
Crook, W. W., Jr., and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society,* Vol. 23, pp. 7-38.
Epstein, J. F.
1963 Centipede and Camp Caves: Excavations in Val Verde County, Texas, 1958. *Bulletin of the Texas Archeological Society,* Vol. 33, pp. 1-129.
1964 Towards the Systematic Description of Chipped Stone. *Congreso Internacional de Americanistas, Mexico,* 1962, *Actas y Memorias,* No. 1, pp. 155-169.
Fenenga, Franklin
1953 The Weights of Chipped Stone Points: A Clue to Their Functions. *Southwestern Journal of Anthropology,* Vol. 9, No. 3, pp. 309-323.
Flinn, Richard and Judy Flinn
1968 The High Bluff Site on the Clear Fork of the Brazos River. *Bulletin of the Texas Archeological Society,* Vol. 38, pp. 93-125.
Gould, F. W.
1962 *Texas Plants—A Checklist and Ecological Summary.* Texas Agricultural Experiment Station, MP-585.
Greer, John W.
1965 A Typology of Midden Circles and Mescal Pits. *Southwestern Lore,* Vol. 31, No. 3, pp. 41-55.
Gwin, Thomas B.
1941 An Interesting Type of Indian Artifact from Dallas and Ellis County. *The Record,* Vol. 2, No. 9, pp. 41-43.

Hatzenbuehler, Robert
1942 Some Interesting Indian Workshops in Dallas County. *The Record*, Vol. 3, No. 5, pp. 28-31.

Hendricks, Leo
1957 Geology of Parker County, Texas. *The University of Texas Publications*, No. 5724.

Honea, Kenneth
1965 A Morphology of Scrapers and Their Methods of Production. *Southwestern Lore*, Vol. 31, No. 2, pp. 25-40.
1966 Prehistoric Flaking Technologies in Texas. *VI Congresso Internazionale delle Scienze Preistoriche e Protostoriche*, pp. 260-267.

Jelks, Edward B.
1954 Appraisal of the Archeological Resources of De Cordova Bend, Inspiration Point, and Turkey Creek Reservoirs. Report prepared by the River Basin Surveys, National Park Service.
1962 The Kyle Site, A Stratified Central Texas Aspect Site in Hill County, Texas. *The University of Texas, Department of Anthropology, Archaeology Series*, No. 5.

Johnson, Leroy, Jr.
1967 Toward a Statistical Overview of the Archaic Cultures of Central and Southwestern Texas. *Texas Memorial Museum Bulletin*, No. 12.

Johnson, Leroy, Jr., Dee Ann Suhm and Curtis D. Tunnell
1962 Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge and Oblate Sites. *Texas Museum Bulletin*, No. 5.

Kelley, J. Charles
1959 The Desert Cultures and the Balcones Phase: Archaic Manifestations in the Southwest and Texas. *American Antiquity*, Vol. 24, No. 3, pp. 276-288.

Kirkland, Forrest
1938 An Archaeological Survey of the Cranfills Gap Area. *Central Texas Archeologist*, No. 4, pp. 71-84.
1940 An Interesting Indian Workshop in Coryell County, Texas. *The Record*, Vol. 2, No. 3, pp. 15-17.

Kirkland, Forrest and Lula Kirkland
1941 Clear Fork Culture Artifacts from an Extensive Workshop in Nolan County, Texas. *The Record*, Vol. 3, No. 2, pp. 6-11.

Long, Joseph K., III
1961 Three Central Texas Aspect Sites in Hill County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 30, pp. 223-252.

Lorrain, Dessamae H.
1967 Notes on Archeological Survey of the De Cordova Bend Reservoir. Manuscript on file at Southern Methodist University.

Lorrain, Dessamae and Norma Hoffrichter
1968 Archeological Survey and Excavation at Pat Mayse Reservoir, Texas. Report submitted to the National Park Service.

Mason, Johnson and Associates
1963 Geology, Foundation and Soils Investigation, De Cordova Bend Dam and Hydroelectric Plant Sites, Brazos River, Hood County, Texas. Report submitted to the Brazos River Authority.

Nunley, Parker
1969 Systematic Typology as a Tool in Interpretation of Archeological Material. Paper presented at the Annual Meeting of the Texas Archeological Society.

Redman, Charles L. and Patty Jo Watson
1970 Systematic, Intensive Surface Collection, *American Antiquity*, Vol. 35, No. 3, pp. 279-291.

Runkles, Frank A.
1936 Indian Artifacts of Comanche County, Texas. *Bulletin of the Central Texas Archeological Society*, Vol. 2, pp. 70-73.

Sellards, E. H., W. S. Adkins and F. B. Plummer
1932 The Geology of Texas, Vol. 1, Stratigraphy. *The University of Texas Bulletin*, No. 3232.

Shafer, Harry J.
1967 An Archeological Survey of Robert Lee Reservoir, Coke County, Texas. *Texas Archeological Salvage Project Survey Reports*, No. 4.
1969 Archeological Investigations in the Robert Lee Reservoir Basin, West Central Texas. *Papers of the Texas Archeological Salvage Project* No. 17.

Shiner, Joel L.
1969 Component Analysis for Archaic Sites. *Bulletin of the Texas Archeological Society*, Vol. 40, pp. 215-229.
1970 Activity Analysis of a Prehistoric Site. *Bulletin of the Texas Archeological Society*, Vol. 41, pp. 25-35.

Skinner, S. Alan
1968 An Archaeological Survey of the De Cordova Bend Reservoir, Hood County, Texas. Report submitted to the National Park Service.

Skinner, S. Alan and Randle Rash
1969 A Clovis Fluted Point from Hood County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 40, pp. 1-2.

Sorrow, William M., Harry J. Shafer and Richard E. Ross
1967 Excavations at Stillhouse Hollow Reservoir. *Papers of the Texas Archeological Salvage Project*, No. 11.

Stephenson, Robert L.
1970 Archeological Investigations in the Whitney Reservoir Area, Central Texas. *Bulletin of the Texas Archeological Society*, Vol. 41, pp. 37-257.

Story, Dee Ann and Harry J. Shafer
1965 1964 Excavations at Waco Reservoir, McLennan County, Texas: The Baylor and Britton Sites. *Texas Archeological Salvage Project, Miscellaneous Papers*, No. 6.

Struever, Stuart
1967 Problems, Methods and Organization: A Disparity in the Growth of Archeology. In *Anthropological Archeology in the Americas*, edited by Betty J. Meggers, pp. 131-151, Anthropological Society of Washington.

Stricklin, Fred L., Jr.
1961 Degradational Stream Deposits of the Brazos River, Central Texas. *Geological Society of America, Bulletin Vol.* 72, pp. 19-36.

Suhm, Dee Ann
1955 Excavations at the Collins Site, Travis County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 26, pp. 7-54.
1957 Excavations at the Smith Rockshelter, Travis County, Texas. *Texas Journal of Science*, Vol. 9, No. 1, pp. 26-58.
1959 The Williams Site and Central Texas Archeology. *The Texas Journal of Science*, Vol. 11, No. 2, pp. 218-250.
1960 A Review of Central Texas Archeology. *Bulletin of the Texas Archeological Society*, Vol. 29, pp. 63-107.

Suhm, Dee Ann and Edward B. Jelks
1962 Handbook of Texas Archeology: Type Descriptions. *Texas Archeological Society, Special Publication* No. 1 and *Texas Memorial Museum, Bulletin* No. 4.

Suhm, Dee Ann, Alex D. Kreiger and E. B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society*, Vol. 25.

Tixier, J.
1963 Typologie de l Epipaléolithique du Maghreb. *Memoires du Centre de Recherches Anthropologiques Préhistoriques et Ethnographiques*, Vol. II.

Tunnell, Curtis D. and Harald P. Jensen, Jr.
1969 Archeological Excavations in Lyndon B. Johnson State Park, Summer, 1968. *Texas State Building Commission, Archeological Program, Report* No. 17.

Watt, Frank H.
1967 Lookout Point, Lake Waco. *Central Texas Archeologist*, Number 8, pp. 27-39.

Southern Methodist University
Dallas, Texas

The Dunlap Complex in Western Central Crockett County, Texas

James H. Word

ABSTRACT

The 1966 Texas Archeological Society Field School was held in western central Crockett County June 18th through June 26th. Two middens designated as Midden No. 1 and Midden No. 2 and the Red Mill Shelter comprise the Dunlap Complex.

Middens No. 1 and No. 2 are located on the alluvial valley below the Red Mill Shelter. Features consisting of slab-lined basins and bedrock mortars were found. Diagnostic artifacts were few and indicate a late Archaic to Neo-American occupation. Radio carbon dates suggest an occupation principally in the 14th century.

The Red Mill Shelter gave indication of occupation from mid-Archaic to Neo-American. Unfortunately much of the deposits were despoiled by "pothunters." Features consisted of a large roof spall with awl sharpening grooves, bedrock mortars, and a large fire hearth.

There is an indication of an affinity with the Trans Pecos Region and the Archaic period possibly extending into the 14th century.

INTRODUCTION

The Texas Archeological Society holds its annual field school during the summer. In 1966 the field school committee was instructed to locate a site in the vicinity of Crockett County that would fulfill the varied and distinctive requirement of an archeological exercise in demonstration and participation. Among the several requirements were a variety of archeological problems as well as space for approximately 150 persons to work and facilities for reasonably comfortable camping.

The Dunlap Complex consisting of a rock shelter and two open middens appeared to fit the requirements. Because it was later discovered that "pothunting" had caused considerable disturbance in the rock shelter, some of the field data lost a certain amount of significance in regard to their stratigraphic position.

Any field school is to an extent a compromise, but it should never result in the sacrifice of proper scientific controls in order to facilitate the teaching of techniques. At the Dunlap Complex quite the opposite occurred. Vertical and horizontal controls and careful recording of specimens was maintained even though it was clear that particular portions of the deposits had been disturbed. The result was not a loss of data but actually an accumulation of "facts" which are of dubious significance. In the following report, many of the questionable data have been omitted. They are however, available in the form of tables of distribution retained by the Author. Thus, controls were not relaxed to facilitate teaching, they were instead maintained beyond normal field practice.

The committee in charge of the initial survey consisted of Mr. and Mrs. James Word of Floydada, Mr. Cecil Calhoun of Port Lavaca, Mr. Burney McClurkan of Austin, Mrs. Anne Fox of San Antonio, Mr. Francis Stickney of Midland, and Mr. Dalton King of Midland. Mr. Gene Williams, Mr. "Cap" West and Sheriff Billy Mills, all of Crockett County, acted as guides.

A number of committees and individuals made outstanding contributions to the organization and operation of the three main phases of the school, namely, the teaching, the camp and the recording of the data. The school is indebted to the following persons:

Burney and Nancy McClurken for organization of field parties, archeological *savoir faire*;

Cecil Calhoun, Dessamae Lorrain and James Word for supervision of the three geographical areas of work;

Norma Hoffrichter for her work on mapping among other things;

Kathleen Gilmore for the thankless task of cleaning and cataloguing artifacts;

Anne Fox for keeping records and helping communications;

E. Mott Davis for advice and help when it was needed;

Louis Fullen for the survey of the two shelters on the Owens property;

Mr. Basil Dunlap of Ozona and Mr. Jeff Owens of Iraan, owners of the two properties, are due a special thanks for permitting the school to work there;

The hospitality of all of the people of Crockett County is to be commended;

Sheriff Billy Mills, Gene and Byron Williamson and "Cap" West particularly evoke pleasant memories of barbecued goat and frijoli beans;

Gerald K. Humphrys, Southern Methodist University, for the artifact photography.

Last, but not least, appreciation is given to the dedicated members of the Society who tolerated hot suns and gusty winds in order to improve their own techniques and contribute to the knowledge of Crockett County prehistory.

ENVIRONMENT OF THE DUNLAP COMPLEX

The Dunlap Complex is located north of U. S. Highway 290 and about 25 miles west of Ozona, Texas. More specifically the site is situated in the west central portion of the Edwards Plateau and just to the northeast of the Stockton Plateau.

Cretaceous limestone of the Comanchean Series (Texas Almanac, 1959:139) is the prominent geological feature of this area.

The central western portion of the Edwards Plateau is disected by numerous steep-walled canyons. Many shelters are found in the canyon walls. Of the shelters observed in Crockett County, most do not exceed fifty feet across the mouth and from the edge of the overhang to the rear-most portion they have a depth seldom exceeding thirty-five feet.

Surface water is scarce with the Pecos River and Live Oak Creek (a tributary of the Pecos River) on the western edge of Crockett County providing most of the live water. Most of the canyons are dry and carry water only during periods of rain, but the larger and deeper potholes contain water for sometime after periods of excessive rainfall.

The Texas Almanac (1959:549) states that Crockett County is semi-arid with an average rainfall of 19.5 inches annually. The temperature averages 48° in January and 81° in July with an annual average of 65°. Crockett County has a variation in elevation from 1500 feet to 2800 feet.

Vegetation (Fig. 1) is a composite of the Sotol Country (Gould, 1962:12). The fauna is in general associated with the Edwards Plateau Region.

SITE DESCRIPTIONS

This report will deal with each portion of the Dunlap Complex (Midden No. 1, Midden No. 2, and the Red Mill Shelter) and an addendum will include the two shelters surveyed (Owens No. 1 and Owens No. 2).

Midden No. 1

Midden No. 1 of the Dunlap Complex is located (Fig. 2) on a low terrace just to the northeast of a short, rapidly expanding deep sided draw. In the upper reaches of the draw the walls are steep but as the valley widens the walls become more sloping. The floor of this valley is bisected by a dry wash which is a part of the Live Oak Creek drainage. The widening of the draw results in the creation of a relatively flat valley floor. The soil is composed of alluvial material which was washed from the sides of the bordering slopes and from up stream.

There is scant surface evidence of Midden No. 1. Only on the north-

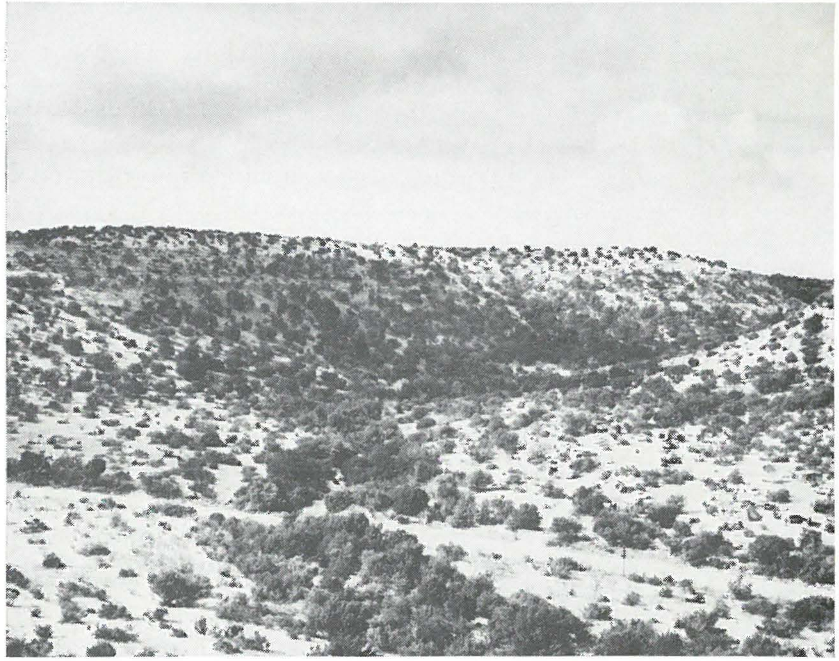


FIG. 1. Dunlap Complex.

ern or lower edge of the site is evidence of the buried midden noted where two irregular semicircles of fire fractured rocks are exposed. A Cursory examination of the site did not reveal the depth or nature of the midden. It was hoped that by excavating one of the middens its structure could be determined and also if any relationship existed between the midden and the Red Mill Shelter. Later excavation revealed the midden to be of Greer's Type IA (Greer, 1965:43-44).

The surface of the area was carefully searched prior to excavation for occupational material and was kept separately.

A datum stake was placed on the southern edge of the area of exposed fire cracked rocks and given a designation of S-100 and W-100. From this point a north-south line was established 10 feet to the south and 40 feet to the north. Parallel lines were established 5 feet from the base line establishing an area to be trenched. This area was divided into 5 feet squares. Additional five feet squares were added when and where it was deemed expedient. Two post holes were sunk S-150 and S-160 on the W-100 line to test the depth and content of the southern extremity of the site.

The entire test area was dug in arbitrary half foot levels. All the excavated material was passed through a screen of ½″ mesh. The cultural material and artifacts were placed in paper sacks labeled by square and level.

It was found that three zones were present with one of these showing evidence of human occupation.

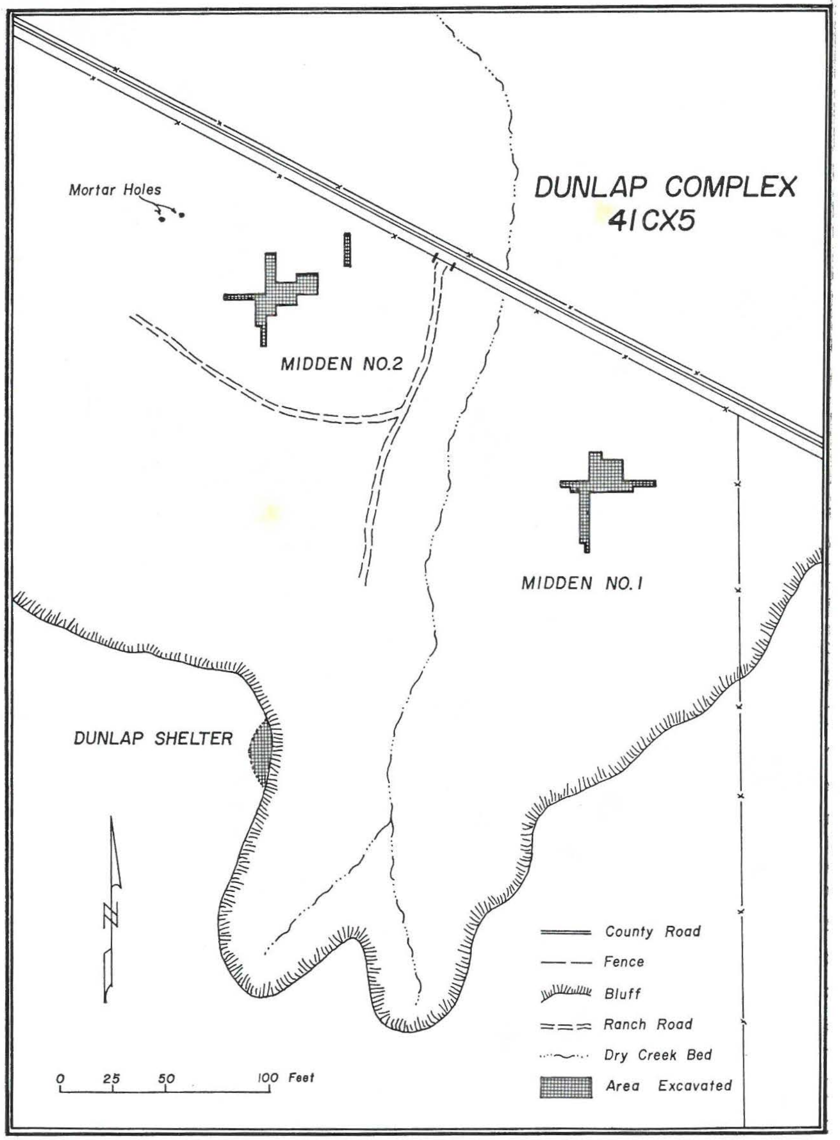


FIG. 2. Dunlap Complex showing location of excavations.

Zone No. 1 is the base on which the occupational material was deposited. It consists of a sterile alluvium of approximately 50% limestone gravel. The line of demarcation between Zone No. 1 and Zone No. 2 is distinct.

Zone No. 2 is in general a thick cultural zone varying from .5 feet to 1.9 feet in thickness. Zone No. 2 varies from one location in the site to another. In general sub-zonal variations are noted by varying concentrations of fire fractured rock, ash, and charcoal.

Zone No. 2A consists of a dark gray, ashy material impregnated with charcoal flecks with an occasional fire cracked limestone fragment. Infrequently in Zone No. 2A are found lenses of ash and clay mixed with limestone gravel from Zone No. 1. It is possible that this mixture was the result of aboriginal construction of hearths. Later action of elements and humans filled and scattered the excavated material.

The separation between Zones No. 2A and No. 2B is not as prominent as between Zones No. 1 and No. 2A. Zone No. 2B consists of a dark gray ash and charcoal matrix with many small to medium sized limestone gravels, varying from .5 inch to 2.0 inches in maximum size. Zone No. 2B is lighter in color and contains lessor amounts of limestone fragments in the upper part of Zone 2B. The content of charcoal and ash diminishes resulting in a lighter color. Thus the concentration of ash, charcoal, and fire fractured rock gradually diminishes from the lower portion of Zone 2B to its upper parts.

Zone No. 3 consists of a light tan mixture of clay and humus. This zone forms the surface of the site.

Throughout Zone No. 2 was found occasional charred and uncharred bone most of which had been fractured. A few fragments of fresh water bivalves were found. Flint chips were the most commonly found evidence of human occupation excepting ash and charcoal. Tools were uncommon.

The depth of the deposits vary from one location in the site to another. It appears that originally the area was a natural irregular shallow depression. Small fire pits were dug into the sterile alluvium and the excavated material thrown about the edges of the pits. The action of the elements tended to level the excavated material. Subsequent use of the site continued to build the midden. Throughout this time the construction of cooking pits tended to mix the matrix. Animals burrowing in the midden further displaced the soil. After the site was no longer in use rain and wind action covered the site with a thin mantle of alluvium.

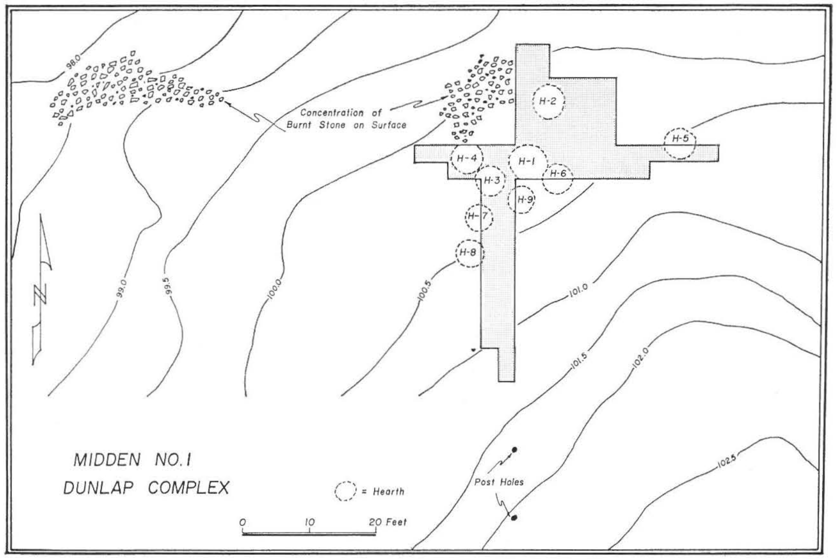


FIG. 3. Plan of Midden No. 1, Dunlap Complex.

FEATURES

Nine features were exposed during excavation (Fig. 3). All of the features were slab lined hearths. Since there is a similarity between all of them, only two will be described and illustrated. Unlined hearths were probably present and not recognized by the excavators. Notations of ash and charcoal concentrations in the field notes tend to substantiate this possibility; however, none are defined in the profiles.

The first (Fig. 4) is a hearth or cooking pit found in square S-105 to 110 and W-95 to 100. It was nearly centrally located in this square. The outer edge was discovered at a depth of approximately 1.35 feet below the surface. It is nearly circular in outline (Fig. 4). The outer edge is the highest part of the cooking pit with a depressed center approximately 2.45 feet below the surface (1.1 feet lower than the outer edge). Limestone slabs were placed in a previously dug shallow pit. The slabs appear to have been fractured from the intense heat of fires built to preheat the cooking pit. Consequently the original slab size is indeterminable. The nearest tabular limestone is located in the adjacent hillside so it is assumed that the builders of the cooking pit availed themselves of this supply.

Three weeks after the Field School a party returned to the site for the specific purpose of gathering charcoal for a Carbon 14 sample. Three carbon samples were taken from the hearth area (Fig. 4) and the following data was provided by the University of Texas Radiocarbon Laboratory (University of Texas Radiocarbon Dates VI). Tx-310 taken from among rocks in the north west fourth of the large slab

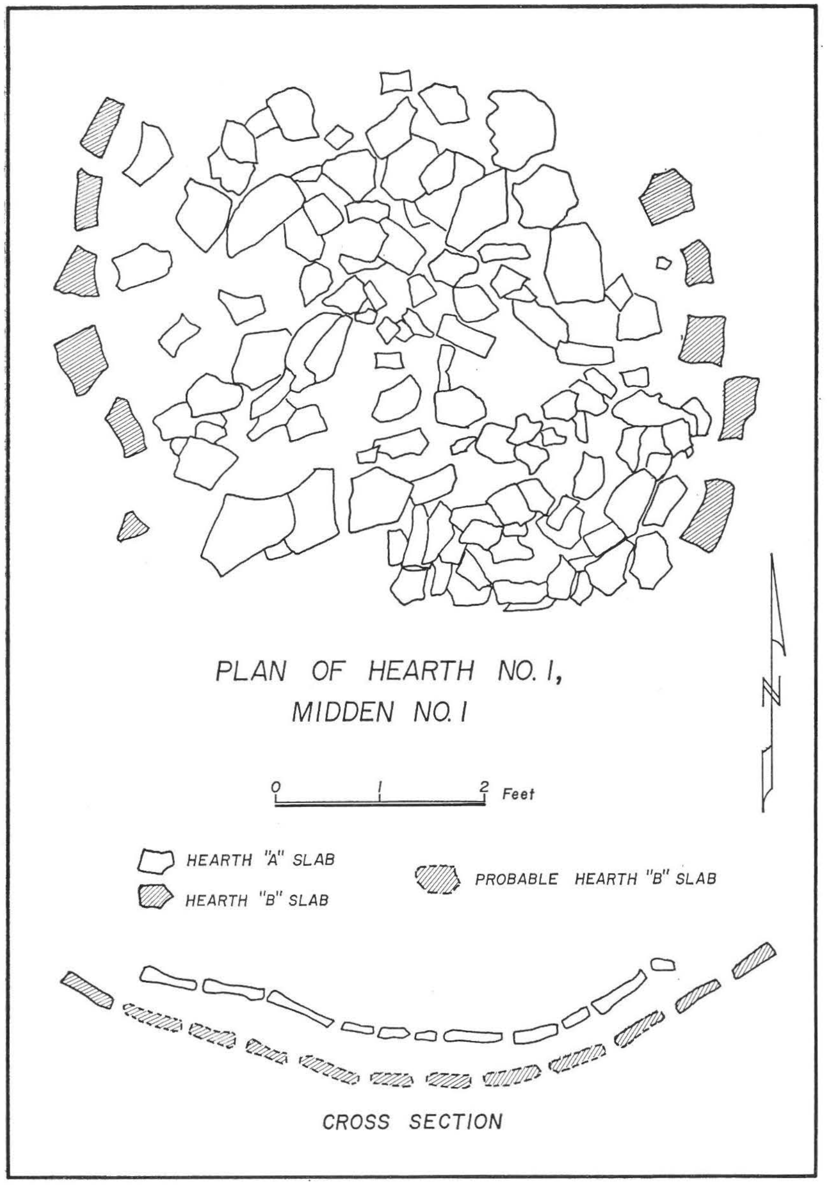


FIG. 4. Plan of Hearth No. 1.

lined basin gave a date of 940 ± 120, A.D. 1010. Tx-357 taken from among stones in another part of the basin gave a date of 630 ± 90, A.D. 1320. Tx-358 taken from dark stratum just above the north east rim of the basin gave a date of 540 ± 80, A.D. 1410.

In the process of securing the sample it was discovered that there was a slightly larger hearth or cooking pit directly below (Fig. 4). The lower or older hearth seems to have been about two feet greater in diameter. The upper hearth was not removed, so the contour of the lower hearth remains undetermined.

The second was discovered in the profile of the west wall of the trench along a north-south axis of S-95 to S-105 and W-95 (Fig. 5). This feature is a series of cooking pits. The hearths were given alphabetical designation in the order it appears that they were constructed.

Hearth "A" was built first. It is saucer shaped in cross section with the lowest part resting on sterile alluvium (Zone No. 1). This hearth is two feet in diameter, but was probably larger when in use. It is .2 feet lower in the center than at the outer edge. Hearth "A" was abandoned and at a later date Hearth "B" was constructed. In the process of constructing Hearth "B" the southern edge of Hearth "A" was destroyed. Hearth "B" was constructed by digging down through occupational material to the sterile alluvium. Hearth "B" is 2.8 feet in diameter and is depressed .5 feet in the center. Hearth "C" is nearly

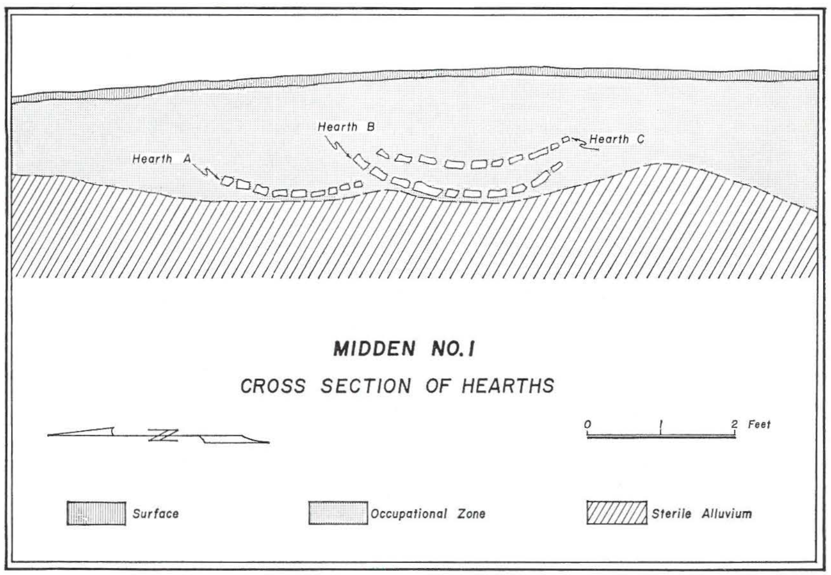


FIG. 5. Cross section of Hearth, Midden No. 1.

superimposed on Hearth "B" but is slightly off-center to the south by .1 feet. It is saucer shaped in cross section and is .3 feet lower in the center. There is a separation between Hearth "B" and Hearth "C" varying from .2 feet at the edges of the hearths to as much as .3 feet in the center.

Thus, it is assumed that Hearth "A" was constructed first and at a later date Hearth "B" was built and slightly overlapped Hearth "A". After Hearth "B" had been abandoned for an undetermined time Hearth "C" was built in the occupational debris and nearly directly over Hearth "B".

Two carbon samples were taken from the fill between Hearths "B" and "C" (Fig. 5). Analysis was done by the Radiocarbon Laboratory at the University of Texas, Austin (University of Texas at Austin Radiocarbon Dates VI). Tx-351 dating 670 ± 80, A.D. 1280 and Tx-359 dating 570 ± 100, A.D. 1380 were the results.

Ross (1965:21) briefly mentions a slab lined hearth in Eagle Cave. No detailed description or illustration is provided, so no comparison is possible. Greer (1965:49) described conical slab lined mortared hearths from the Hohokam area of six to eight feet in diameter and up to eight feet deep. However, Greer (personal communication) states "The midden could be Type IA midden circle in the center of which was a series of slab-lined basin hearths. As the rocks from the hearths fractured from the excessive heat, they were thrown back in a circle away from the cooking area. This would leave the stones in a ring and the ash in the depressed central portion of the midden. This midden could also be the result of a number of sub-surface cooking pits. . . . Originally a shallow pit was scooped out of the silt-caliche and lined with limestone slabs. The pit was scooped out, depositing the used stone material around the hearth area. For the next cooking, a new pit was scooped out (this time partially from the remaining ash) and again lined with stone slabs. The process continued, with pits dug in places other than original location. The result would be a midden with a stone ring surrounding an ashy central area."

Midden No. 2

Midden No. 2 of the Dunlap Complex is located approximately 200 yards to the west of Midden No. 1 and at the base of the northern slope of the hill containing the Red Mill Shelter (Fig. 2). As the slope levels out a flat bench is formed. The foundation of this bench is a limestone outcropping overlaid by an alluvial gravel. It is on this bench that the midden is located. There is an erosional break in the bench to the north, east and west which terminates the midden. The midden extends 45 feet east-west and 40 feet north-south.

The surface of the midden was recognized by the exposure of occasional fire cracked limestone fragments, flint chips, and a dark discoloration of the soil. To the north northwest are two bedrock mortar holes.

The surface of Midden No. 2 was carefully searched for artifacts and sacked separately.

The midden was staked out in such a manner that the area to be initially excavated would fall in the northeast quadrant. This area is bounded on the south by the line N-125 and on the west by the line W-100. Initially five squares were excavated in this quadrant and later additional squares were added. Before the excavations ceased only the northwest quadrant remained untested.

The site was excavated in arbitrary six inch levels. Not all material was screened. However, sufficient screening was done to secure an adequate sample of the materials from the midden.

It was found that three zones made up the site with two of them occupational zones. The site was laid on limestone bedrock and is not considered as a zone.

Zone No. 1 was not consistent throughout the site. It was recognizable by the decaying limestone resulting from extreme heat. This zone rested on the bedrock.

Zone No. 2 was the major occupational zone varying in thickness from .1 feet at W-75 to a maximum thickness of 2.5 feet at W-102.5. This zone was very heavily impregnated with fire cracked limestone intersticed by a dark charcoal stained soil. Zone No. 2 contained all the artifacts found in the Midden No. 2 deposits. Lenses of caliche, probably from nearby deposits, were found within this zone.

Zone No. 3 made up the surface of the site. It overlaid the midden and consisted of alluvial gravel and humus. Occasionally fire cracked rock from Zone No. 2 was observed in Zone No. 3 probably the result of successive periods of erosion followed by periods when alluvial deposits were laid over the site. Such action would result in some occupational material being deposited downslope from the southern edges of the site and becoming mixed with the surface material. This would also expose to a slight degree the deposits in erosional areas of the site.

There is no distinct separation between Zones No. 1 and No. 2, but Zone No. 2 has a fairly distinct separation from Zone No. 3.

While no record was made of features within Midden No. 2, it is probable that two features were contained in the midden. Both were of such a massive nature that they were not recognized at the time of excavation. Neither was excavated completely. Both are probably the remnants of massive fire hearths. The largest is located in the center of the midden. The central area of this feature was probably subjected to intense heat and is characterized by an area of decomposed limestone which is fairly free of fire cracked rock. This area is surrounded by a larger area of undetermined size with a high concentration of fire cracked rock. A greater concentration of ash is found in the central part of the hearth. A heavy concentration of fire spalled bedrock was found on the bedrock. The area of decomposed limestone is approximately 7.5 feet in diameter. The area of concentrated fire cracked rock covers an area approximately fifteen feet wide to the south. A lesser concentration of hearth material is located to the east and west for a distance of approximately five feet. Greer (1966, 65-67) excavated the Louden Site in southeastern Colorado which is a site of a similar nature. In the Louden Site a natural pit in the bedrock was utilized. No such feature was recognized in Midden No. 2.

A second area with similar characteristics was observed in the notes of the northeast quadrant of the site (N-125 - N-135 and W-75 - W-85). However, not enough of this area was excavated to determine the size of the hearth.

It is surmized that edible plants were placed on the bedrock and covered with plant trimmings and stones. A fire was built over the mass. Assuming that the outer edges cooled first, this portion was opened first. Consequently, the center, which was opened last, would be more free of hearth stones.

Northwest of Midden No. 2, two elliptical bedrock mortars were found. Both were outside the midden area proper but since they were only 54 feet and 62 feet respectively northwest of the N-125 and W-115 stake it is assumed that they are associated with Midden No. 2. Mortar No. 1 is slightly elliptical and measures .65 feet by .82 feet in diameter. Mortar No. 2 measures .51 feet by .57 feet.

Red Mill Shelter

The Red Mill Shelter is located near the top of a steep hillside facing in an easterly direction. Midden No. 1 is located about 900 feet east northeast and Midden No. 2 is located about 600 feet north.

The long axis of the shelter is 55° west of magnetic north. It has a length of 62.5 feet about one third back from the overhang. The opening of the shelter is 51.65 feet long. Thus, the shelter is slightly bell shaped. From the overhang to the most extreme back the shelter has a depth of 45.83 feet.

The surface of the shelter shows evidence of occupation by the presence of flint chips, fibrous material, and occasional bits of charcoal. The most common characteristic is great quantities of sheep and goat dung and roof spall varying from less than an inch in size to as large as six feet. The roof of the shelter is from seven to eight feet high at the mouth of the shelter and tapers downward toward the back of the shelter where the roof meets the rising floor. The rearmost portion of the floor is exposed from eighteen to thirty-six inches. The surface of the deposits rises only three feet from the point of the overhang to the back (Fig. 6). Just inside the overhang there is a rise of approximately one foot which appears to be the result of screenings of pot hunters.

When the Red Mill Shelter was first observed, three pot hunters' holes were evident.

Prior to laying out a grid system the entire surface was cleared of all loose material with the exception of the larger roof spalls. All of this material was screened and all the occupational material such as obvious artifacts, seeds, fibrous matter, and flint chips were placed in bags marked "surface".

A base line was set up on a line parallel to the long axis of the shelter with a designation of N-5. Steel stakes were driven into the deposits at five foot intervals. At 90° angles a series of steel stakes were set at five foot intervals which intersected the base line. Thus, the entire surface of the shelter was marked into a grid of five foot squares.

It appeared that an undisturbed area fairly free of large roof spalls was located at S-10 to S-15 and W-5 to W-30. This area was selected as trench No. 1. It was hoped that this trench would reveal the stratigraphy existing and subsequent trenches could be dug by occupational levels. Trench No. 1 was dug in arbitrary six inch levels in order to accomplish this purpose. Two squares were begun and stratigraphy was noted (Fig. 6).

Trench No. 2 was then located in the southern part of the shelter. Digging by strata was abandoned when no similarity was noted in the strata of trench No. 1 and trench No. 2. The remainder of this trench was dug by arbitrary six inch levels.

The discovery of recent historic disturbances such as vertical bedding of plant remains, firecrackers, tin can wrappers, paper towels, cigarette butts, and broken shovel handles precluded the establishment of any natural stratigraphy. Therefore, descriptions of soils are irrelevant and are omitted.

There were four interesting phenomena found in the Red Mill Shelter. The first of these was found in the central rear portion of the shelter and consists of a large, triangular roof spall with five awl sharpening grooves on its upward facing surface. It appears that, either

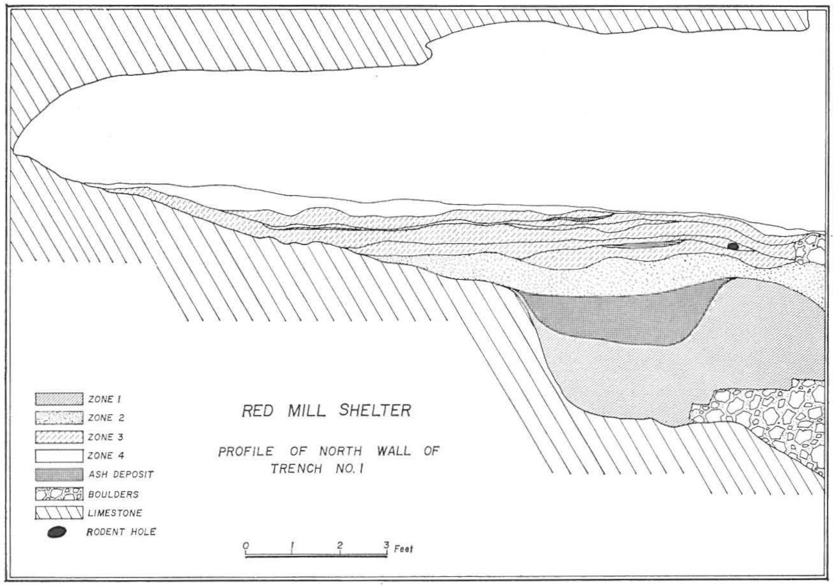


FIG. 6. Profile of Trench No. 1 from Red Mill Shelter.

prior to prehistoric occupation or during the time the shelter was occupied, a roof spall fell to the surface of the shelter. The upward surface faced the mouth of the shelter.

Groove "A" is a shallow and "v" shaped with a length of 3.0 inches.

Groove "B" is 1.6 inches long. It is faint and apparently was little used. It is a shallow "v" in cross section.

Groove "C" is 3.8 inches long. It is .32 inches wide and .19 inches deep. It shows a high polish along the sides of the "v".

Groove "D" is 3.2 inches long and is a shallow "u" in cross section. It is .25 inches wide.

Groove "E" is faint and thus it is presumed that it had just been started. It is 1.6 inches long.

The second consists of two small, shallow mortars found in a large roof spall at the north end of the shelter near the overhang. Both are circular with diameters of 4.5 inches. They have a depth of only .75 inches.

The fourth is a large fire hearth. It was not recognized as a feature at the time it was exposed . . . it was noted when the wind swept the profile clean and in the recording of the profile of the north wall of Trench No. 1 (Fig. 6) the last day of the dig. The fire pit is 6.2 feet long. Its width is undertermined. The contents of the pit consists of a very high percentage of ash and fine charcoal. Bone and snail shells were abundant. Percolation of moisture from the floor of the shelter caused decomposition of most of the fiber content of the feature, however, some fragments of decomposed fibers of either sotol or lechugilla were noted.

Greer (1965:45) described the various kinds of mescal pits and this feature conforms to his type IV. Greer further states that this type is found in the mouths or just inside the mouths of shelters. Feature No. 4 conforms to the location and description of Greer's typology of this type of cooking pit.

ARTIFACTS

Artifacts will be divided into catagories as follows: chipped stone, rubbed to ground stone, ceramics, shell and bone, and vegetal.

Unless otherwise noted chipped stone tools are made from native cherts. The projectile point typology and nomenclature use in this report is that outlined in "An Introductory Handbook of Texas Archeology" (Sumn, Krieger, and Jelks, 1954). In some instances it is difficult to separate one type from another as they tend to grade into each other. In instances such as these the final decision is based on the judgment of the author.

Midden No. 1

BIFACES

Ten fragmentary and complete bifaces were found either on the surface or in the course of excavation. Of this number four are sufficiently complete for identification and all of these are classed as projectile points. One is classified as a drill, and the remaining five are of such fragmentary nature that it can not be determined if they are portions of projectile points or other bifaces.

ARROW POINTS

PERDIZ. One incomplete arrow point was found in the course of excavating the midden. It has an estimated length of 2.8 cm. with a width of 2.3 cm. The finely serrated edges are concave and flare widely at the shoulders. The concave stem was fashioned by chipping in from the corners and the base is pointed. At the Doss Site (Nunley, Duffield, and Jelks, 1965:30) three points with similar characteristics were found and given the designation "Provisional Type A". This arrow point was found in the 1.0 feet to 1.5 feet level.

DART POINTS

ENSOR. A broken Ensor point of light gray chert is of particular interest. The tip of the point and one corner of the base are missing. The complete point was approximately 5.0 cm. long and 2.5 cm. wide at the base. The edges are nearly straight. Open notches near the base are typical of this type, and the base is slightly concave. At Centipede and Damp Caves, Epstein (1963:45-46) subdivided the Ensor type into three sub-types. Type "C" is described by Epstein as having notching that is shallow and tends to be confluent with the base of the point. This point fits this classification quite well. It was found in the .0 feet to .5 feet level. Perhaps the most interesting feature of this point is that the broken basal corner was rechipped to form a gouge-like edge.

The proximal half of a point tentatively identified as Ensor was found in the .5 feet to 1.0 feet level. There is not enough of the projectile point remaining to give an estimated length, but it is widest at the shoulders where it is 2.6 cm. Notching is from the side and is prominent. The notching produces a strongly expanding stem. The base of the stem is slightly concave. While the classic Ensor is widest at the base, this point does not have this characteristic. It has a faint resemblance to the Martindale but the Martindale is most commonly barbed by notching from the corner rather than from the side. As previously noted Epstein has subdivided the Ensor and this specimen appears to be Type "A" which Epstein describes as follows: "comparatively broad triangular point having deep side-notching above the base. This point is often widest at the shoulder."

"ZORRA". A surface specimen with one side and the tip broken was found. The edges are strongly convex, the weak shoulders are formed by open notches producing an expanding stem, and the base is concave. The complete specimen was approximately 5.0 cm. to 5.3 cm. long and 2.4 cm. wide. No similar type is shown by Suhm, Jelks and Krieger (1954) but Johnson (1964:45, Fig. No. 13) reports a similar type at the Devils Mouth Site which he has given a tentative type name of "Zorra". This point is similar to the Pandale point except that it does not have the typical twisting of the stem and body.

DRILL

A surface find is classed as a drill. It is 4.8 cm. long with a width of 1.9 cm. The widest point is 2.2 cm. from the base. The "bit" is gently concave on one edge and is relatively straight on the other edge. From the widest point the stem reduces convexly to form a rounding base. Thus, we have a lozenge shaped artifact in outline with the "bit" end of the drill slightly longer than the basal portion. The bit of the drill has been rechipped and is diamond shaped in cross section. There is slight evidence of smoothing along the edges probably from use. The tip is blunt which suggests that this tool was used as a reamer more than as a drill. This artifact could have been made from an Abasolo point.

Several drills of this type have been reported. Epstein reports one similar from Centipede Cave (1963:58, Fig. No. 9 I) which he states is made from an Abasolo point. Nunley, Duffield and Jelks reported one very similar at Coontail Spin Site (1965:77). Seven were found at Eagle Cave (Ross, 1965:92, Fig. No. 21) and it is speculated that the broad base might have been used for hafting.

The single drill found in Midden No. 1 is more massive than most of the specimens found in the Devil's River and Pecos River area. The authors do not mention the smoothing along the bit of these drills, but there is a strong resemblance.

UNIFACES (39 specimens)

The category of unifaces includes a number of diverse artifacts. Within it are four real tools and a number of flakes that were used in the manner of tools without previous preparation.

SCRAPERS (2) A single specimen was complete and is a large discoid scraper 8.5 cm. long and 6.5 cm. wide. Scraper edges were formed by percussion and smoothed with fine retouch so that the edge angles range from 50° to 70°. The bulb has not been thinned and there is no evidence of hafting.

A second scraper is represented by a small fragment of what may be the working edge of an end scraper. What remains of the cutting edge is similar to that of the previous specimen.

DENTICULATES (1) The distal end of a large flake has been chipped to form a toothed edge which is slightly convex. This tool is 3.3 cm. long and 4.7 cm. wide. The bulb has not been thinned, there is no evidence of hafting and the chipping seems to have been accomplished considerably later than the production of the flake. A darker patina on both flake surfaces was penetrated by the chips that formed the working edge.

NOTCHES (1) A small (0.7 cm. diameter) notch was placed toward the distal end of a small flake. This sort of tool has been referred to as a "spokeshave" but no supporting evidence has been offered.

USE RETOUCH (35)

A number of flakes show evidence of use in the form of small irregularly placed nicks along one or more edges. This group can be characterized by a general lack of uniformity of size and shape. There is, however, the constant of each flake having one or more edges that are thin and sharp. These edges bear the brunt of the use retouch. Thirty-five artifacts with use retouch were catalogued from midden #1.

CORES (3)

The three specimens are so "used up" that it is difficult to determine any typological information from them. Just about every flat surface was used as a platform and considerable battering was done after the last flake had been removed. These edges cannot be mistaken for choppers since the battering scars are on only one face of each edge.

MANO

A mano was found in the .0′ to .5′ level. It is circular with a diameter of 13.3 cm. and a thickness of 2.3 cm. and is made from a fine grained sandstone. The grinding surface is nearly flat with a very slightly convex surface. There is no indication of the manner the mano was used, but the slightly convex surface indicates that it was pushed and pulled across a metate in a slight rocking motion with no preference for being held in any one position. Consequently, no faceted surface was formed but the edges were worn slightly more than the center which produced the slightly thickened middle portion. The mano was used on one surface only. The side opposite the grinding surface shows the naturally eroded surface of the parent piece from which it was taken.

PITTED STONE

A fragment of native limestone has three pits of various depths on one surface which may have served some functional purpose. The fragment appears to represent about one third of the complete artifact. It was probably shaped in its complete form as it is pecked about the edges indicating that it was formed in this fashion. The size of the complete artifact can not be determined but it has a thickness of 4.4 cm. There is one pit with a depth of 1.1 cm. that appears to have been pecked into the surface. Another pit is only .3 cm. deep and is worn quite smooth. A third pit was started by pecking and appears to be unused. The purpose of these pits is unknown but Johnson (1964:70) hints that manos with this feature may have been used for bipolar flaking. Honea (1965:264) suggests that pitting provides a firm base for cores in striking off flakes.

In the Fate Bell Shelter (1965:58) Parsons reports a fragmentary metate with a pecked depression. Ross (1965:98) reports waterworn cobbles with shallow pecked depressions from Eagle Cave. Pitted manos were reported at Centipede and Damp Caves (Epstein, 1963: 77-78). Nunley, Duffield, and Jelks report manos at Coontail Spin Site (1965:85) with pecked depressions.

METATE

Several large fragments of what appear to be a metate were found in the deposits of Midden No. 1. There is the indication that a large, thick limestone slab was used in unaltered form as a metate. A naturally formed and flat area has a smoothed surface with microscopic striations. This grinding surface is slightly depressed.

CERAMICS

One small sherd 1.4 cm. by 1.7 cm. in size was found on the surface of Midden No. 1. The sherd is heavily tempered with angular fragments of quartz. The outer surfaces have a reddish hue. The core of the sherd is black. The quartz tempering material is evident on both outer surfaces as erosion has removed the major portion of any slip that might have been present. Greer (1965:41) in his report on Midden Circles and Mescal Pits mentions that sherds are frequently found on sites of this type.

The sherd is friable and has the general appearance of one of the Brownwares found to the west and southwest.

SHELL AND BONE ARTIFACTS

Several fragments of shell probably from fresh water mussels were found in the midden deposit. Only one exhibited any use. This one specimen has a smoothed edge. There are reports of similar specimens by Nunley, Duffield, and Jelks (1965:105) at Coontail Spin Site.

No bone artifacts were found.

Midden No. 2

BIFACES

Twenty-eight fragmentary and complete bifaces were found on the surface and during excavation of Midden No. 2. Of this total fifteen are either complete or sufficiently complete for identification.

ARROW POINTS

ALBA. One nearly complete arrow point was found (Fig. 7 a) in Midden No. 2. The identification as Alba is only tentative. It is approximately 2.7 cm. in length and 2.3 cm. wide at the shoulders. The outline is triangular with one side slightly concave and the other slightly convex. It is not barbed but is strongly shouldered. The stem expands slightly and the base of the stem is rounded so that it has a slight bulbous appearance. This point was found in the .0′ to .5′ level.

DART POINTS

ABASOLO. Two Abasolo points were found in the deposits and one was found on the surface. The two excavated specimens were found in

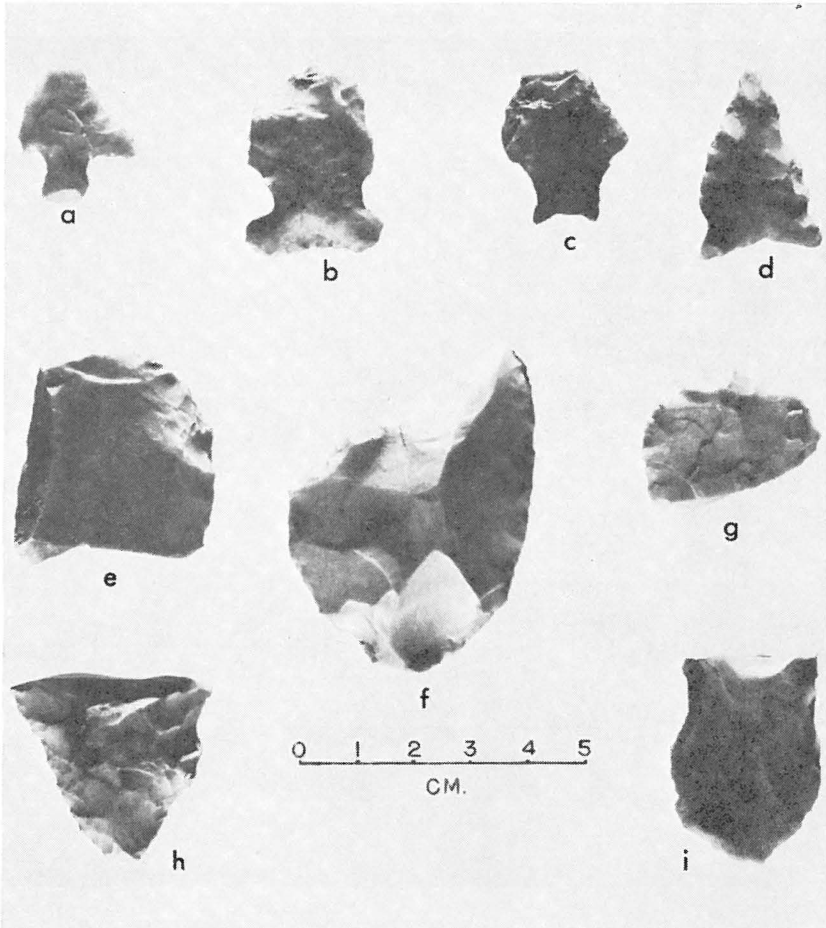


FIG. 7. Artifacts from Midden No. 2, a, Alba; b. Ensor; c. Langtry; d. Fairland; e. Side-scraper; f. Oblique side-scraper; g. Graver; h. Raclette; i. Side-scraper-notch.

the .0′ to .5′ level and the third specimen was excavated but the records are not consistent about its provenience. These points vary in length from 4.0 cm. to an estimated 5.5 cm. They are triangular in form with convex edges and bases. They are not beveled.

ENSOR. Ensor points (Fig. 7 b) were the most frequently found point. Two were found on the surface and one was found in the .0′ to .5′ level and the fourth was found in the .5′ to 1.0′ level. Only one specimen is sufficiently complete to give an approximate size. It is apparently 5 cm. in length and 2.5 cm. in width and the widest part is the base. All are notched from the side with bases that are slightly concave. The side notches on two are shallow while the notching is more prominent in the other two. Epstein (1963:47) subdivides the Ensor type into two types on the form of the base and the depth of the notches. Three appear to fall into Epstein's Type B (shallow notches and straight or slightly concave base) and one is Type A (deep side notches).

LANGTRY. The Langtry type has been a "catch-all" type for the Trans Pecos area for some time. Schuetz (1956:138) suggests that the Langtry type should be subdivided. Epstein (1963:36-38) refined division of this point type to a greater extent. The single specimen of Langtry found in Midden No. 2 appears to fit into Epstein's Type D (1963:37, Fig. No. 8), however, the specimen found is smaller than those described by Epstein. This specimen (Fig. 7 c) is approximately 4.0 cm. long and 2.4 cm. wide at the shoulders. The shoulders are not strong and are formed by a contracting stem that expands slightly from the lowest portion of the base to the blade. The stem is slightly concave. Its exact provenience is unknown.

MARSHALL. Two Marshall points were found on the surface of Midden No. 2. The stems are short and broad, and the base of the stem is straight. The barbs are broken so it can not be determined how strongly barbed the points were. The edges are convex and one specimen appears to be resharpened.

FAIRLAND. One of this type (Fig. 7 d) was found on the surface and the other was found in the .0′ to .5′ level. Both are small for the type in general, but they retain the proper configuration. The edges are slightly convex, and are weakly notched close to the base which is the widest part of the point. The central indentation of the base is formed by two convex arcs from the sides to the center. The larger specimen is 3.5 cm. long and is 2.2 cm. wide at the base.

UNCLASSIFIED. This fragmentary point was found in Midden No. 2 but of unknown provenience. It does not fit any described type. No length can be given but it is 1.8 cm. wide at the shoulders. Its weak shoulders and wide, short, concave stem make it an unusual specimen. The base of the stem is concave. The edges that remain appear to be nearly straight or very slightly convex.

A large, crudely made biface was found in the deepest portion of Midden No. 2. It is percussion flaked with some retouching along the stem. It has weak shoulders and the stem contracts sharply. The edges are strongly convex. Although the tip is broken, this specimen measures approximately 8.0 cm. long and 5.0 cm. wide at the shoulders. The proximal portion of the stem bears evidence of the original cortex. This point almost fits into the Almagre catagory. In all probability, this specimen is really an early step in the process of manufacture.

UNIFACES

The artifacts from Midden No. 2 are no more numerous than those from Midden No. 1 but the finished tools are more frequent and more varied in forms.

SCRAPERS (7) Four specimens are side-scrapers as they are usually conceived; steep retouch along one edge more or less parallel to the main axis of the flake. One specimen has retouch on both edges (Fig. 7 e). Another is an oblique side-scraper (Fig. 7 f) with an adjacent edge retouched to a raclette while another combination has a side-scraper on one edge and a notch (Fig. 7 i) on the other.

RACLETTES (8) These tools are characterized by flat retouch on thin, acute angle edges (Fig. 7 h). One of the eight specimens has a notch on an adjacent edge, but the others are essentially single retouched edges of various shaped flakes.

DENTICULATES (4) While these tools appear to be deliberately retouched, there is no evidence that the makers went to much trouble in selecting the very best flakes, nor did they strive for even spacing of the "teeth". One of the specimens had the bulb removed by steep truncation, possibly to permit hafting. The latter is symmetrical and shows good workmanship.

NOTCHES (2) These tools are simple semi-circular notches made by removing several small chips from a thin edge of a flake. They are all close to 0.7 cm. in diameter, one specimen has a single notch, one specimen has two notches on the same edge.

GRAVERS (5) Gravers (Fig. 7 g) from all portions of the site were made by chipping the equivalent of two intersecting notches along a convex edge.

BURINS (1) A single burin was created by the distal truncation of a flake, followed by striking a spall from that platform parallel to the major axis of the flake.

USE RETOUCH (21)

If we interpret these correctly, none of them are real typological tools. The retouch appears to be irregular and weak, the result of use rather than of prior intent. Patterns were not discerned since many kinds of motion on any number of materials might produce this wear.

TECHNOLOGICAL ATTRIBUTES

CORES (6) One specimen has prepared (faceted) platforms at opposite ends of the flint pebble. It, like the other examples, had been practically "used up", and thus it is difficult to study the flaking processes.

BIFACE THINNING FLAKES (1) The single specimen has all of the attributes of a flake removed from a partially formed biface by a soft hammer.

RUBBED OR GROUND STONE ARTIFACTS

Of the six ground stone artifacts found in Midden No. 2 all came from the deposits and were fairly evenly distributed throughout. All appear to have been made from a large limestone cobble. The grinding surfaces are not distinct, but in one specimen it seems that a slightly depressed area was produced. Without microscopic examination the grinding motion used can not be determined, but in the single specimen with the depressed grinding surface it appears that a circular motion was probably used.

Red Mill Shelter

BIFACES

One hundred fifty-four bifacial tools were found on the talus slope, on the surface, and in the deposits of the Red Mill Shelter.

ARROW POINTS

CLIFTON. Only one specimen of this type was found (Fig. 8 a) and it appeared while screening surface material. It has an approximate length of 3.0 cm. and a width of 2.1 cm. The greatest width is located at the shoulders. The stem is .5 cm. in width. One of the serrated edges is slightly convex and the other concave.

FRESNO. A single specimen of the Fresno type was found in screening the surface material. It is complete except for one corner of the base. It is 2.9 cm. in length and 1.4 cm. in width. The widest point is at the base and the edges are slightly convex.

HARRELL. A single Harrell point was found on the talus slope in front of the shelter (Fig. 8 b). The outline is triangular with lateral notches on each side. The notches are rounding "v's" located just below the midsection of the point. Below the notches the stem is vertical. The base is straight. This point has an overall length of 2.0 cm. and a width of 1.4 cm. at the base of the triangle.

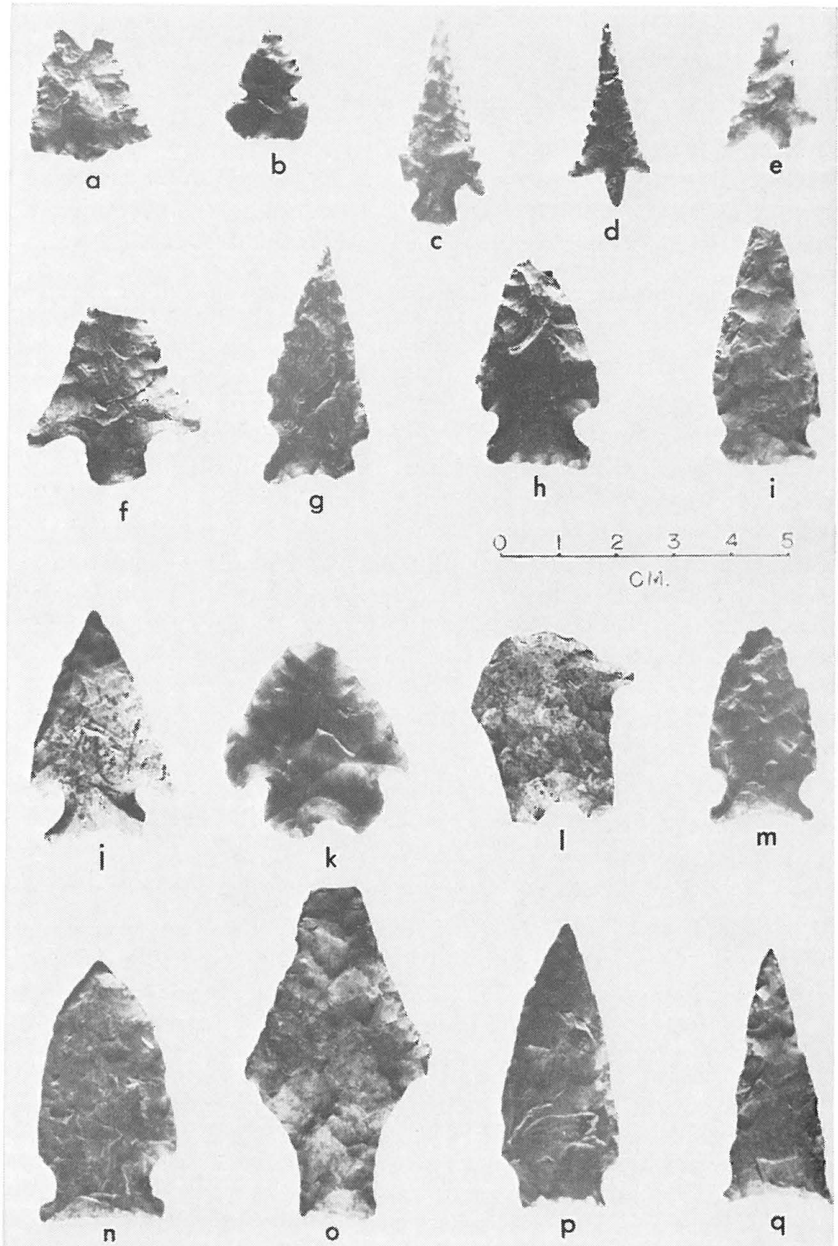


FIG. 8. Projectiles from Red Mill Shelter: a. Clifton; b. Harrell; c. Unclassified; d. Perdiz; e. Livermore; f. Shumla; g. Uvalde; h. Ellis; i. Darl; j. Martindale; k. Montell; l. Pedernales; m. Ensor, concave base; n. Ensor, straight base; o. Langtry; p. Val Verde; q. Paisano.

LIVERMORE. Of the three Livermore points (Fig. 8 e) found in the Red Mill Shelter, one was found while cleaning a pot-hunter hole. The other two were found in the deposits in the .0′ to .05′ level. None are complete. The edges are slightly concave to extremely concave. The concave edges result in a flaring of the lower portion. One is slightly barbed and the other two are shouldered as opposed to barbed. Only one has a complete base and it has a bulbar stem. The other two would seem to have more pointed bases. Two are asymetrical. These points vary in length from 2.5 cm. to 2.8 cm. with a width variation of 1.1 cm. to 2.1 cm. The edges are all serrated.

PERDIZ. This type is the most common arrow point found in the Red Mill Shelter (Fig. 8 d). There is a great variation in this group. The Perdiz has a triangular body with edges usually quite straight but sometimes slightly convex or concave. Shoulders are sometimes at right angles to the stem but usually they are well barbed. Stems contracted often quite sharply at the base, but may be somewhat rounded. There is more variation in size and proportions than in most arrow point types in Texas. These examples are similar to the single specimens found in Midden No. 1. Three of the specimens were found in the cleaning of pot-hunters holes. Four were found in the deposits. The ones complete enough to provide a size range indicate a length varying from 2.2 cm. and 1.4 cm. to 1.9 cm. in width.

UNCLASSIFIED GROUP I. These points were the second most frequently found. They have a similarity to the Scallorn point and the Scallorn *eddy* variant (Jelks, 1962: Fig. No. 13 M-R) in particular. They have moderately expanding stems, triangular bodies, and are barbed. One (Fig. 8 c) has serrated edges. They vary in length from 2.8 cm. to 3.5 cm. They are widest at the lowest part of the barbs varying from 1.5 cm. to 2.0 cm.

UNCLASSIFIED GROUP II. A single arrow point that does not fall into any known type was found. It is 3.2 cm. long and 1.6 cm. wide at the shoulders. It has a triangular body with one side slightly convex and the other straight. Shoulders and the stem are formed by wide, shallow side notching. The base is rounding. It is flaked primarily on only one surface from a thick flake.

DART POINTS

ABASOLO. The Abasolo point is one of the dominant point types found in the Red Mill Shelter. They are all leaf shaped with convex edges. The bases are rounding from slightly convex to nearly a semi-circle. Five of the specimens are well made showing care in the chipping with secondary flaking along the edges. The other two are formed by percussion flaking with no secondary flaking. These last two are arbitrarily classed as Abasolo points. The ones sufficiently complete to determine size fall well within the size range. None are beveled. Two were found in the cleaning of pot-hunter holes and the balance were found as single specimens in the deposits.

CATAN. Only two of this type were found. They are leaf shaped with rounding bases and formed by percussion with secondary chipping along the edges which are not beveled. One specimen was found on the talus slope and the other while cleaning a pot-hunters hole. They fall within the range of size for the type varying from an estimated 3.7 cm. to 4.1 cm. in length and 2.2 cm. in width.

DARL. The Darl point is described as having a long triangular body. Beveling is not found on the edges but is present on the stems, alternately, on the right side when the point is orientated with the base toward the viewer (Fig. 8 i). The two specimens complete enough to give a size range are 4.4 cm. and 4.7 cm. in length and are widest at the shoulders with a width of 2.0 cm. The stems expand very slightly and the shoulders are formed by notching from the side to form a very open "U" shaped notch. One has a slightly concave base and the other two have slightly convex bases.

ELLIS. This type (Fig. 8 h) is characterized by having a short, triangular body which is straight to slightly convex. The stem expands toward the base and is formed by notching from the basal corner. The bases are straight with one exception and it is slightly convex. The two larger ones are broken and can not be measured. The size range of the remaining four varies from 3.4 cm. to 4.0 cm. in length. The Ellis point was fairly evenly distributed in the deposits.

ENSOR, concave base. This group (Fig. 8 m) is separated from the rest of the Ensors because all have a decidedly concave base. Several are small enough to be classed as large arrow points. This sub-class is the second most commonly found point with a representation of twelve specimens. The smallest is 3.1 cm. in length and the largest complete enough for measurement is 4.8 cm. They vary in width from 2.0 cm. to 3.0 cm. However, one represented by only a basal fragment is without question larger. The notches range from very slight to prominent. Those with deeply concave bases and prominent notches approach the Frio Point in outline. Five were found on the talus slope, surface or while cleaning out pot-hunter holes.

ENSOR, straight base. These points are the classic Ensor (Fig. 8 n). They have triangular bodies with side notching varying from slight to quite prominent. All are widest at the base except for one specimen which is slightly wider at the shoulders. One is small for the type as it is only 2.5 cm. in length. However, this small specimen is thick for its length and was possibly resharpened from a broken point. The longest is an estimated 5.7 cm. and the width varies from 1.8 to 2.5 cm. Seven are very slightly concave at the base and the remaining fifteen have straight bases. They fall within the size range of the type except for the small specimen noted above. They are also fairly evenly distributed throughout the deposit.

FRIO. This point type grades into the Ensor, concave base and the division is arbitrary. Of the four found only two were found in the deposit with one in the .5′ to 1.0′ level and the other in the 1.0′ to 1.5′ level. They have slightly convex, triangular bodies. The notching is done from varying angles from the corner. This produces a strongly expanding stem. The notches on some of the bases are more prominent than on others. All the Frio points found in the Red Mill Shelter are small for the type and varying from 3.0 cm. to 3.8 cm. in length. In all instances the bases are as wide or wider than the shoulders.

LANGE. No length can be given for this type found in the Red Mill Shelter since all are fragmentary. They all appear to have had large bodies. The identification was made primarily from the basal portions. Their stems were formed by notching more from the base than the corner which results in a straight stem. The barbed shoulders are not prominent. The stems are concave to a slight degree. One was found in the .0′ to .5′ level and the other two were found in the 1.5′ to 2.0′ level.

LANGTRY. Three Langtry points were found on the talus slope or while cleaning out pot-hunters holes. The other five were found in the deposit. There is such a diversity in this type that we have used Epstein's classification (1963: 36-38) as outlined in the subdivision of this type from the Centipede and Damp Caves. Langtry points have straight, concave, convex to recurved edges. Shoulders are generally prominent but unbarbed and the stems usually contract.

LANGTRY (Type A). Epstein described this sub-type as having a "comparatively long and narrow contracting stem and a straight base." Two of this type were found in the Red Mill Shelter (Fig. 8 o).

LANGTRY (Type B). One specimen of this variation by Epstein was found. They are characterized by having a broader contracting stem with a slightly concave base. Length can not be estimated but its width is 2.7 cm. at the shoulders.

LANGTRY (Type D). This type is described by Epstein as having "contracting stems with convex to pointed bases." Two of this variety were found. Only one is sufficiently complete to determine its length and it is approximately 6.0 cm. long. Width varies from 2.7 cm. to 3.7 cm.

LANGTRY (Type E). Epstein described this Langtry variation as having short stems and straight bases. Two of this classification were found in the Red Mill Shelter. The single fairly complete specimen is 4.6 cm. long but the width can not be determined since one side is broken from the shoulder toward the distal tip.

VAL VERDE. A distinctive variation of the Langtry is the Val Verde (Fig. 8 p) which was first described by Schuetz (1956:141). Schuetz described this point as follows: "stems of this group are flared at the base tips and, in addition, are beveled, usually on the right side." The single specimen found in the Red Mill Shelter has a shorter stem than the classic Val Verde variation but the stem is expanding and is beveled on the right side. It is 4.8 cm. long and 2.0 cm. wide.

MARTINDALE. This point (Fig. 8 j) is described as having a triangular body usually convex with prominent to well barbed shoulders. The stems expand. The base is formed by two convex curves meeting in the center producing a "fish-tail" appearance. Four of this type were found but only two are complete enough to give a size range. The smaller is 4.0 cm. long and 2.6 cm. wide at the barbs. The other is approximately 5.6 cm. long and 3.2 cm. wide at the barbs which fits well within the size range for this type.

MATAMOROS. Only two of this type were found. They are triangular in outline and the edges are slightly convex. They are 3.3 cm. and 3.8 cm. long respectively.

MONTELL. The Montell point (Fig. 8 k) has a slightly convex triangular body. It varies from shouldered and unbarbed to barbed. The stem may vary from straight to expanding. The most prominent feature is the "v" shaped notch in the center of the base. The most complete specimen is stubby for the type and was probably resharpened. All three seem to have been percussion flaked with retouching along the edges. The "v" notch in the center of the base appears to have been formed by notching upward from the center of the base. None have the deep basal notch of the classic Montell.

PAISANO. The separation of the Ensor types and the Paisano (Fig. 8 q) is arbitrary and based on the judgment of the author. The characteristics of the Paisano point are convex edges often serrated and shallow side notches with a concave to deeply indented base. The notches vary from fairly prominent to barely discernable. There is a considerable size range in the ones found in the Red Mill Shelter. The smallest is 2.5 cm. long and the largest is 4.5 cm. in length. The smallest is below the size range normally associated with the type, but it fits the overall characteristics. This is the third most frequently found point and only the Ensor group is more commonly found.

PEDERNALES. The single specimen (Fig. 8 l) was badly burned and broken to a degree that size can not be given. It has a single, small barb. The stem is straight and the base has the typical open "U" shaped notch in the center.

SHUMLA. Only one of this type (Fig. 8 f) was found in the Red Mill Shelter. Approximately one-third of the distal portion of the body is broken. An estimated length of 4.0 cm. and a width of 2.9 cm. at the barbs is judged to be the approximate size. It is gently concave and is barbed but not as strongly as some examples of this type and is flaked from the corner to form a wide, open notch. The stem is short and parallel with a rounding base.

TORTUGAS. These points are triangular and stemless. The edges vary from straight to convex. The bases vary from straight to slightly concave but none are beveled. All are smaller than the norm given for the Tortugas but are large for the Matamores. The lack of beveling appears to be a trait of this point in the Trans Pecos area. All are generally well made with secondary flaking along the edges. With one exception all the bases are thinned. The length varies from 3.6 cm. to 4.5 cm. and the width varies from 1.7 cm. to 2.4 cm.

TRAVIS. The single Travis point is small for the type. It is only 4.0 cm. long and 2.0 cm. wide at the shoulders. One edge is straight and the other edge and base are slightly concave. In general it has the configuration of this type.

TRINITY. Trinity points are triangular with edges varying from straight to convex. They have wide stems and the bases are strongly convex. They are within the size range given for this point but more on the small side. The three found vary from 3.4 cm. to 4.5 cm. in length and are 2.3 cm. wide.

UVALDE. Two of this type were found in the Red Mill Shelter (Fig.

8 g) and only one is sufficiently complete to determine its size. It is 4.3 cm. long and 1.7 cm. wide. The second specimen was identified from the basal fragment. This specimen is triangular with slightly convex edges. The shoulders are prominent on the fragmentary specimen but not on the other. Both are corner notched to form an expanding stem with the base as wide as the body. The bases are strongly concave, forming an outline that is unmistakenly Uvalde.

UNCLASSIFIED. This point has a short, stubby body and expanding stem which is longer than the body giving the impression that it was resharpened after it was broken. The edges are concave. The stem is formed by notching more from the base than from the corner and it has distinctive pointed barbs. The base is straight and is 2.6 cm. long and 1.8 cm. wide at the barbs. The stem is approximately 60% of the entire length of the point. It is thick in cross section adding to the impression that it was resharpened.

INCOMPLETE BIFACES (27) This group of artifacts are those which represent the stages of manufacture of unfinished tools which were abandoned for one reason or another. Three are simply initial biface preparation on a pebble. Five of the fragments appear to have broken at the thinning stage. Twelve appear to have broken at the percussion stage.

DRILLS (2) Two artifacts are classified as drills. The first conforms to what others have called a drill in that it is bifacially flaked and pointed. The second, appears to have at one time been an old patinated biface, perhaps even a point. It has been retouched at the distal end to produce a tip which could be characterized as "drill-like".

UNIFACES

SCRAPERS (8) Of the eight scrapers, one (Fig. 9 e) is an apparent end-scraper with considerable flat retouch which cuts through the patina. The purpose of the recent retouch is not known.

Another is a transverse side-scraper (Fig. 9 f) on a cortex flake. Note that the scraper edge is on the proximal end of the flake.

Three are multiple edge scrapers, two sides and one end. One of these (Fig. 9 g) has had the bulb reduced by flat retouch. Another (Fig. 9 i) has been made from a flat pebble. The third, not pictured, shows heavy use polish on the end.

Three are side-scrapers (Fig. 9 h) and all have had the bulb reduced by flat retouch. One has been fire broken and the distal end is missing. All three have scraper edges on two sides.

RACLETTES (2) One of the two raclettes (Fig. 9 d) shows inverse re-

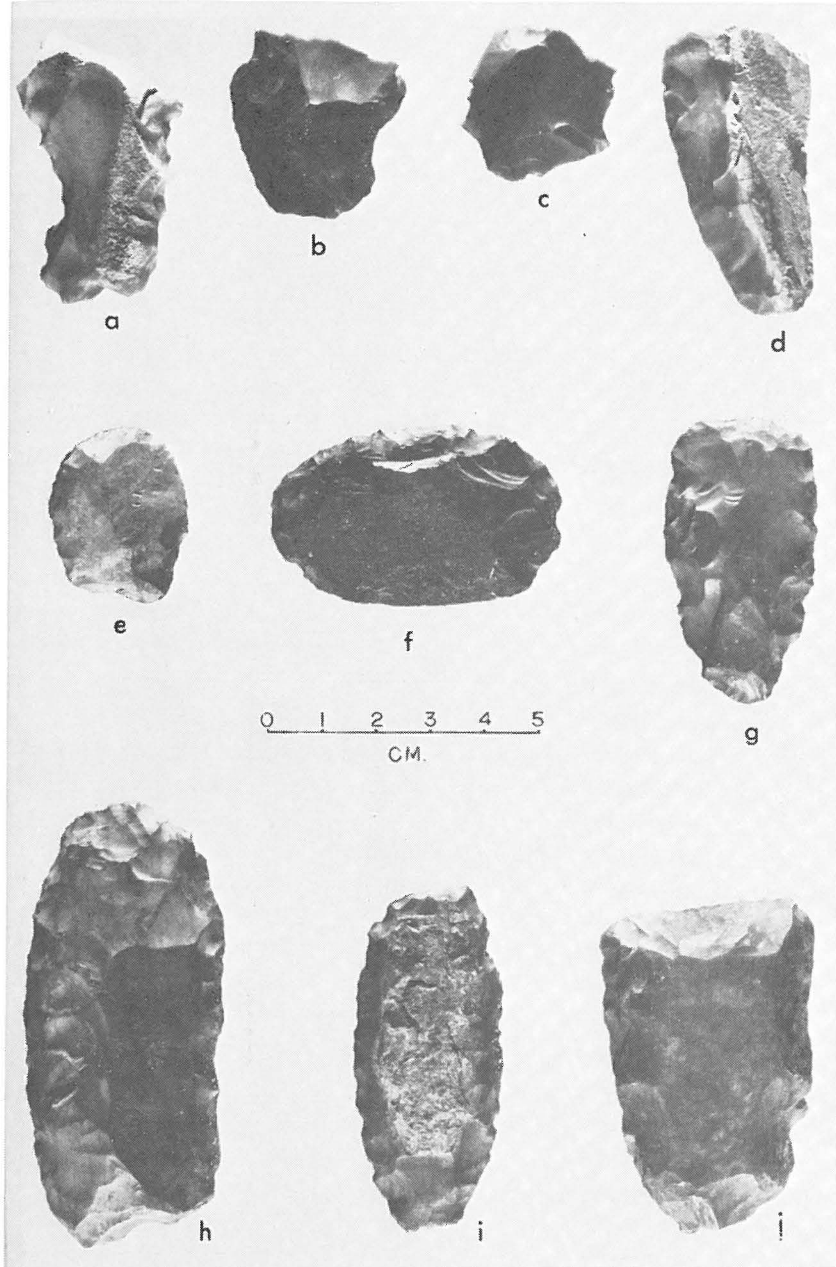


FIG. 9. Stone Artifacts from Red Mill Shelter: a. Denticulate; b. Multiple mixed burin; c. Raclette; d. End-scraper; e. Multiple burin, transverse; f. Transverse side-scraper; g, i, Multiple-edge scraper; h. Side-scraper; j. Gouge.

touch on its characteristically acute cutting edge, and the bulb has been reduced by flat retouch. The second has a thinned bulb and was made on an older flake.

DENTICULATES (2) The first of the denticulates (Fig. 9 a) has two straight edges and one concave. The bulb has been reduced by flat retouch. The second also is two sided. The distal end shows heavy battering. Here again the flake used is much older than the retouch since the retouch cuts through the patina.

GOUGE (1) The one gouge from the Red Mill Shelter (Fig. 9 j) shows rows of tiny hinge scars on the end and two sides suggesting use like that of a scraper. The bulb has been reduced by flat retouch.

VARIA (1) This single specimen has one edge that is a raclette and one edge that shows flat retouch.

BURINS (5) Two of the burins were transverse. One of these (Fig. 9 b) was multiple. Another multiple burin (Fig. 9 c) was made on a truncation. One burin was made on a snapped flake, and the flake shows some bifacial retouch. Also, on the same flake, the maker attempted a burin on truncation at right angles to the successful burin blow. The final one is a single blow burin.

RETOUCHED FLAKES. Description of this group of flakes is difficult because the intent of the maker can not be known. Three of the group show only use retouch.

One, a cortex flake, has steep retouch on two edges. The distal end is broken off and this fracture resembles that made by a burin blow. It may be a broken end-scraper.

Another looks as if it had been taken from a beveled preform. It is possible the maker was attempting to produce a biface.

One retouched flake was seriously fire-pocked. The remnant could have been the beginning of a point or a series of graver tips.

Another badly fire-pocked flake appears to be what is left of an end-scraper. The bulb was reduced by a burin-like blow.

CHOPPER (1)

One chopper made from a cobble was found and it shows considerable battering.

HAMMERSTONES (2)

The two specimens are bifacially chipped. The edges are blunt and are heavily battered. Possibly, the chipping resulted from use as hammers.

CORES (3)

Of the three recognizable cores, one has a single platform. The others are reduced to small remnants.

MANOS AND METATES

These tools are lumped together because one will not function without the other. It would appear that these artifacts were pecked in shaping. The single complete metate and mano are a matched set found in situ. The mano was found on one end of the metate. The entire surface of both have been pecked. The metate is an elongated stone 38.6 cm. long, 20.4 cm. wide and 5.9 cm. thick. Only one face has been slightly used. The matching mano is 15.8 cm. long, 11.0 cm. wide, and 3.4 cm. thick. It is oval in outline and only one surface was used. The grinding surface is perfectly flat and the opposite side is half of an ellipse. The material is sandstone.

Four fragments of shaped manos were found. Two are of native limestone and the other two are native sandstone. Two of the fragments are too small to give any indication of size, shape, or the manner in which they were used. One, ovate in outline, has been used on only one face. The back of this fragment is pecked as are the sides. Both surfaces appear to have been extensively used. It can not be determined if this fragment was wedge or diamond shaped in cross section. The portion at hand is thin on the end and thicker toward the midsection.

Only one fragment of an unshaped mano was found. No size or shape can be given but it appears that a handy, unshaped limestone cobble was used. The remaining five fragments represent portions of metates. Three are of very fine grained sandstone. Actually it is difficult to determine with certainty whether these are from shaped metates or not, but the fragments at hand do not have the typical pecking that shaped metates have. Two have worked surfaces on both faces and one has a grinding surface on only one face. The fourth and fifth fragments are of native limestone. The grinding surfaces are not as prominent as in the sandstone specimens. It would appear that a piece of tabular limestone was used but only to the degree that the naturally rough surface was slightly smoothed.

AWL SHARPENING STONE

A fragment of limestone with two "v" shaped grooves was found in the Red Mill Shelter. One groove is wider and deeper than the other. This groove is 1.3 cm. wide at the widest point and .3 cm. deep. The entire length of the grooves cannot be determined but the larger groove is 5.4 cm. long and the smaller is 2.5 cm. long.

PIGMENT

Five fragments of pigment were found fairly evenly distributed throughout the deposits. Two are lumps of pigment consisting of a sandy or gritty material without facets or indication that they had been used. The other three pieces of pigment are of finer consistency and are faceted indicating that they may have been rubbed or ground, probably to produce a powder. Of the three of finer consistency one has scratch marks on one face in addition to the faceted surface.

The writer is not familiar with the chemical composition of the pigment. It varies from a yellow-orange to a brown-red. The red-brown color could have been produced from exposure to heat and these fragments appear to be burned.

The specimens were submitted to Dr. William R. Muehlberger of the Geology Department, The University of Texas. Dr. Muelberger (personal communication) stated that two of the fragments of pigment appear to be an iron cement-limonitic or hematitic (these are the gritty, non-faceted specimens). The three smaller faceted specimens appear to be a soapstone cemented with a limonitic cement. Dr. Muehlberger does not suggest a source of these materials.

BONE ARTIFACTS

The only utilized bone material found in the Red Mill Shelter appears to be awls. No beads were found. One complete awl and eighteen fragments were found.

The complete awl (Fig. 10 d) is the splint bone of a deer. The naturally pointed end opposite the articulated or joint end provided a point that needed no alternation to become a useful tool. Word (1970: 92-93) found a similar artifact in the Baker Shelter in Val Verde County. There is a slight polish from use. This awl is 2.8 cm. long.

The eighteen fragments are four butts or bases, five working ends, and nine mid-sections.

The bases are of two varieties. One is seemingly a fragment of a splinter awl. Splinter awls are seldom found in the shelter deposits of the Trans Pecos Region. It is split lengthwise as well as broken 2.7 cm. below the base. The base is rounded. The second variety is typical of the Trans Pecos Region and they were made from split long bones with the joint end smoothed to a slight degree.

The tips of points appear to be from the second variety of awl which is the type that is made from the long bones being split lengthwise (Fig. 10 g). The cancellous or inner portion of the bone has been removed. These fragments vary from 1.8 cm. to 5.9 cm. in length.

In all but two midsections it is apparent that these fragments are portions of awls made from split long bones with the inner cell structure removed. The two exceptions appear to have been made from a large bone of a bird and of a small animal. Johnson (1964:73) mentions an awl made from a small animal bone from the Devil's Mouth Site.

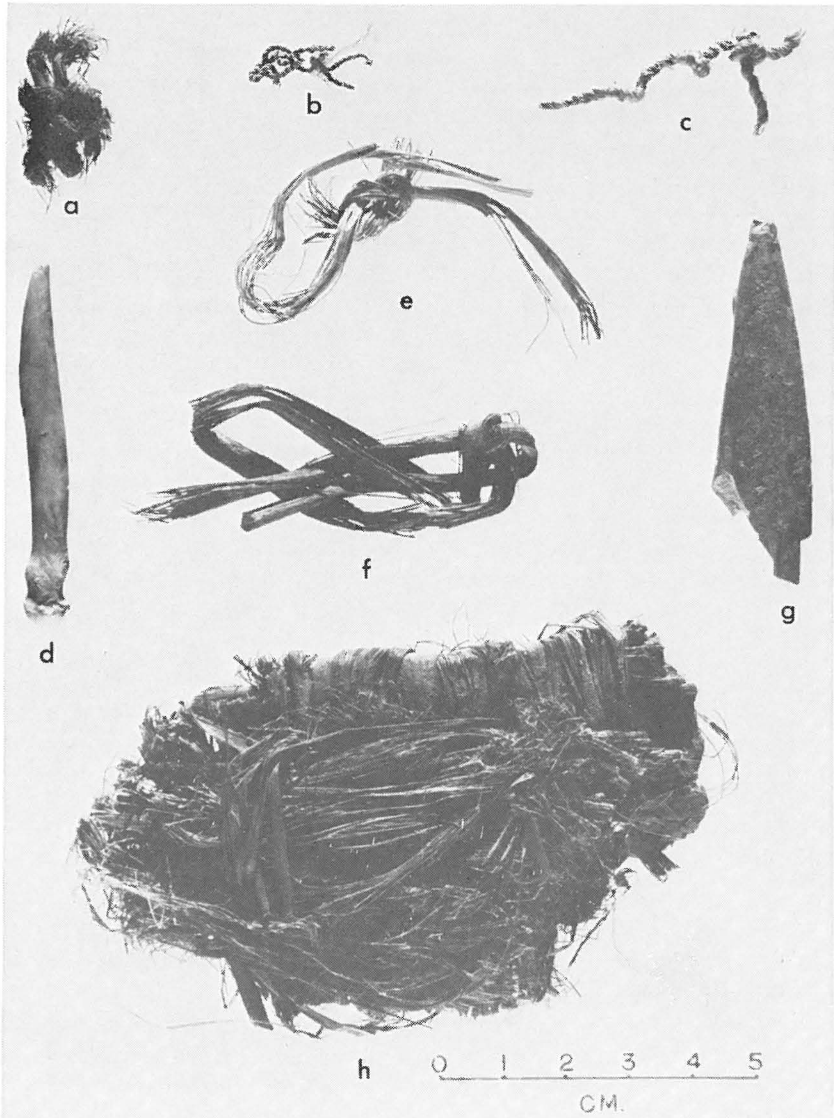


FIG. 10. Bone and Perishables from Red Mill Shelter.

Eleven of the fragments have fine striations or scratched marks running the length of the bone. The other eight do not exhibit this characteristic. Perhaps a different function was performed which results in the difference.

SHELL ARTIFACTS

No shell artifacts were found in the Red Mill Shelter; however, the refuse from the manufacture of shell articles was found. Seven fragments of shell were found. All appear to be from large fresh water bi-valves. The author has broken fresh water bi-valve shells to observe the cleavage characteristics. When broken across the growth rings, the fracture is irregular and tends to shatter on the surface opposite the point of pressure. Broken along the axis of the growth rings, the fracture tends to follow the arc of the growth ring. In any event the fresh water bi-valve shells broken by the author do not fracture in a straight line. Two fragments have straight and unshattered edges indicating that the shell was sawed. The other five fragments are shattered on all edges.

PERISHABLES

CUT STICKS. Two examples of cut sticks were found in the deposits. One is a fragment of a Sotol flower stalk. It was girded by cutting to a depth of .15 cm. and then snapped off. The other end is burned and it can not be determined if this is a portion of an artifact or the waste material from the manufacture of an artifact. The second example is a fragment of wood that has been chopped to a depth of .5 cm. and then broken.

CUT LEAVES. Fragments of cut leaves of the Sacahuisti and Lechugilla and Sotol were found. They are cut at an angle across the leaf probably in harvesting. All the specimens of cut leaves were found in Zones 3 and 4.

SANDAL. A fragment of a sandal insufficient in size to give a clue to its type (Fig. 10 h). It is made from the split leaves of the Lechugilla.

STRING. Nine small pieces of string were found and they vary in length from 2.2 cm. to 6.5 cm. and in thickness from .1 cm. to .3 cm. Two are single "Z" twisted yarn while the other seven are of two yarns. Six of the seven two yarn strings are "Z" twisted of "S" twisted string. One of the strings is actually two short strings tied together with a sheet bend. This specimen is possibly a fragment of netting. Nets have been found that were formed by tieing with sheet bends. Schuetz (1963:137-139) describes nets made by securing the mesh by the larkshead knot, however, personal examination of such a bag displayed in the Witte Museum reveals that it was tied with the sheet bend and not the larkshead knot.

MATTING. The unraveled fragments of a fragment of matting were found in the Red Mill Shelter. Sotol leaves were split into strands of .3 cm. to .6 cm. then woven into a checker pattern mat.

KNOTS. Eleven knots tied from split Sotol and Lechugilla are represented in the collection of artifacts from the Red Mill Shelter. All are of such fragmentary nature that the use of these knots can not be determined. Seven square knots, three overhand knots, and one sheet bend (in addition to the sheet bend found joining the two pieces of string) are the total representation of knotted leaves.

LEATHER. One leather thong 17.8 cm. in length was recovered. It is irregular along the edges varying in width from .4 cm. to .6 cm. It is surprisingly soft and pliable. It has the appearance of tanned buckskin.

QUIDS. There are two varieties of quids found. Type I is a wad of fibrous material similar to the discarded tobacco quid of modern man. These were the most common type found. Type II are chewed on only one end with little evidence of the other end being chewed. All are in such a state of decay that the plant chewed to form the quids can not be determined for a certainty. However, Type II appears to be chewed Sotol leaves. Nunley, Duffield and Jelks (1965:120-121) stated that a majority of the heavily masticated quids were of Lechugilla and those with only the ends chewed were primarily the tender, lower portions of Sotol.

SUMMARY AND CONCLUSIONS

Based on projectile points it would appear Midden No. 1 was utilized late in the Archaic Period to Mid-Neo-American. Midden No. 2 was constructed from Mid-Archaic to early Neo-American. The Red Mill Shelter on the other hand appears to have been occupied for a longer period time and overlapped the occupation of Midden No. 1 and Midden No. 2. Whether there is a direct association between the middens and the shelter is moot, but it is felt that there is a strong probability that a relationship exists.

It would appear that the occupants of the Red Mill Shelter and the builders of the middens were primarily food gatherers of edible plants and supplemented their diet by the products of the hunter. There is no way of determining the number of people the shelter could accommodate, but ten to fifteen individuals could have comfortably occupied the shelter at one time.

It would seem probable that cooking quantities of food for a group of ten to fifteen people would tend to cause crowding in a shelter the size of the Red Mill Shelter. Cooking elsewhere during favorable weather conditions would facilitate normal activities and functions of the family group occupying the shelter. On this basis it is assumed that there is an association between the middens and the shelter.

It is interesting to note that the two middens give evidence of two methods of cooking. Midden No. 1 produced slab lined hearths and Midden No. 2 utilized a natural (limestone ledge) base for the hearth. This suggests either a change of cooking technique or that the site was occupied by at least two peoples simultaneously with different methods of cooking. Either or both possibilities could be correct. Unfortunately no Carbon 14 samples were taken from Midden No. 2 to determine if it was used simultaneously or earlier or later.

From the point assemblage little can be gained to prove a theory. However, Midden No. 1 produced only late Archaic to Neo-American point types (Ensor, Perdiz and the Zorra which was a surface find) and the Carbon 14 dates of 630±90, 670±80 and 570±100 before present suggests a late occupation for Midden No. 1. Johnson's Zorra type is not established in time well enough to be diagnostic.

Midden No. 2 produced a greater quantity of points, therefore an approximation of the period the midden was used can be determined with a greater degree of confidence. The occurrence of the Alba point indicates a possibility of an earlier Neo-American occupation than that producing the Perdiz point in Midden No. 1.

There were fourteen identifiable dart point found on the surface or in the deposits in Midden No. 2. There is a greater time span indicated. Abasolo, Marshall, and Langtry types indicate a fairly early Archaic occupation, and the Ensor points indicate a later Archaic occupation perhaps overlapping the earliest period of Midden No. 1.

It is assumed that Midden No. 2 was constructed out of the cooking efforts of the earlier occupants of the site. The presence of a limestone ledge provided a natural and convenient base for an oven. Large quantities of Lechugilla and Sotol were placed on the rock base and covered with leaves or trimmings from these plants. Rock was next added and a large fire was built on top of the mound. When the mass cooled, the cover was removed by throwing the covering rocks away from the cooked food. The intense heat produced a highly burned area in the bedrock and the uncovering of the cooked food produced an area fairly free of fractured rock.

In the early stages of the construction of Midden No. 1 there is a possibility that shallow basins were scooped out in the alluvial deposits forming the base of the midden. Subsequent activities of a similar nature tended to obscure these earlier cooking basins. Later, pits were dug in the rubble of earlier hearths and lined with slabs of native limestone. It is possible that the lining of the pits with slabs could have served a dual purpose. A more effective oven could have resulted and the production of food containing lesser amounts of trash could be the second possibility.

Culturally, the western-central portion of Crockett County indicates a strong affinity with the Trans Pecos Region during Archaic times. Sandals, matting, and cordage accompanied by broad bone awls are strikingly similar to the lower Pecos-Devils River areas. The presence of the Langtry point variations included in the Pecos Series of Ross (1965:34-39); the Shumla of the Devils Series of Ross (1965:41-42); and the Rio Bravo Series (Ross, 1965:45-48) consisting of Ensor, Paisano, and Frio points corroborates this cultural affiliation.

The Paisano point is more common in the western portion of the Trans Pecos Region as is the Livermore point. Kelly and Smith (1963: 171-187) and Kelly (1963:203-205) found these two types to be predominant in Reagan Canyon and Roark Cave. The Perdiz points found in Midden No. 1 and the Red Mill Shelter are similar to the Perdiz-Livermore point of Kelly and Smith (ibid). Thus, there is an indication of an influence from this area but to a lessor degree.

The presence of Clifton and Harrell arrow points; Darl, Ellis, Lange, Martindale, Montell, Pedernales, Travis, Trinity, and Uvalde dart points suggest an eastern influence.

Thus, it appears that the strongest influence is from the lower Pecos-Devils River area with lesser influences from the areas to the southwest, east, and southeast.

This particular area should be extensively surveyed and tested in order to clarify cultural affiliations. This archeological area is rapidly being despoiled by unknowledgeable amateurs and pot hunters, so it is hoped this area will be surveyed and tested as quickly as possible.

REFERENCES CITED

Epstein, Jeremiah F.
1963. Centipede and Damp Caves: Excavations in Val Verde County, Texas, 1958. *Bulletin of the Texas Archeological Society*, Vol. 33 (for 1962): 1-129.

Gould, F. W.
1962. *Texas Plants and Ecological Summary*. The Agricultural and Mechanical College of Texas. Texas Agricultural Experiment Station.

Greer, John W.
1965. A Typology of Midden Circles and Mescal Pits. *Southwestern Lore*, Vol. 31, No. 3: 41-55.

1966. The Louden Site (CO-1), Los Animas County, Colorado. *Southwestern Lore*, Vol. 32, No. 3: 57-65.

Honea, Kenneth H.

1965. The Bipolar Flaking Technique in Texas and New Mexico. *Bulletin of the Texas Archeological Society*, Vol. 36: 259-267.

Jelks, Edward B.

1962. The Kyle Site, A Stratified Central Texas Aspect Site in Hill County, Texas. The University of Texas, Department of Anthropology; *Archaeological Series* No. 5.

Johnson, Leroy, Jr.

1964. The Devil's Mouth Site. A Stratified Campsite at Amistad Reservoir, Val Verde County, Texas. Department of Anthropology, *Archaeology Series*, No. 6.

Kelly, Thomas C.

1963. Archeological Investigations at Roark Cave, Brewster County, Texas. *Bulletin of the Texas Archeological Society*. Vol. 33: 191-227.

Kelly, Thomas C. and Harvey P. Smith, Jr.

1963. An Investigation of Archeological Sites in Reagan Canyon, Brewster County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 33: 167-190.

Nunley, John P., Lathel F. Duffield and Edward B. Jelks

1965. Excavations at Amistad Reservoir: 1962 Season. *Miscellaneous Papers*, No. 3. Texas Archeological Salvage Project.

Parson, Mark L.

1965. Test Excavations at Fate Bell Shelter. *Miscellaneous Papers*, No. 4. Texas Archeological Salvage Project.

Ross, Richard E.

1965. The Archeology of Eagle Cave. *Papers of the Texas Archeological Salvage Project*, No. 7.

Schuetz, Mardith K.

1956. An Analysis of Val Verde County Cave Material. *Bulletin of the Texas Archeological Society*, Vol. 27: 129-160.

1963. An Analysis of Val Verde County Cave Material: Part III. *Bulletin of the Texas Archeological Society*, Vol. 33 (For 1962): 131-165.

Suhm, Dee Ann, Alex D. Krieger and Edward B. Jelks

1954. An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society*. Vol. 25.

Texas Almanac

1958-1959. A. H. Belo Corporation.

Word, James H. and Charles L. Douglas

1970. Excavations at Baker Cave, Val Verde County, Texas. *Bulletin No. 16: Texas Memorial Museum*, University of Texas, Austin.

SURVEYS OF OWENS NO. 1 (41CX-6) AND OWENS NO. 2 (41CX-7)

In order to accommodate the large number of Field School participants it was decided to organize two survey parties. The survey crews were in charge of Lou Fullen.

Owens No. 1 (41CX-6)

The Owens No. 1 Site (Fig. 1) is located approximately 2.5 miles west northwest of the Dunlap Complex in Crockett County, Texas. More specifically, it is located in the south face of a steep hillside adjacent to an abandoned oil well. Two shelters comprise this site. Only the larger of the two was tested. The smaller shelter is west of the larger one. The tested shelter is approximately 20 feet wide and has a maximum depth of 10.5 feet from the overhang to the rear wall. It has a maximum height of seven feet about midway of the shelter from the overhang to the rear wall. From this maximum height the shelter slopes down in a gentle arc to the sides.

Below the shelter is a prominent talus slope consisting of fire fractured rock, charocal stained soil, flint debris, and an occasional tool.

On the right wall is found red stains that probably represent crude pictographs. These stains are faint and no form or shape can be determined. Similar red stains are also noted in the small shelter to the west of the larger shelter.

In the back of the tested shelter on a shelf is a bed rock mortar. This mortar is slightly elliptical. It has a maximum diameter of ten inches. It is 18 inches deep with inward sloping walls to form a rounding bottom. A "notch" is noted on the lip of the mortar toward the front of the shelter. No mention is made in the notes whether the notch was broken out or pecked.

Directly above the mortar hole is a large crack that extends through the roof of the shelter. It was surmised that the location of the mortar hole could have served as a catch basin for water dripping or running through the crack. Such an identification is tenuous.

The floor of Owens No. 1 was covered with sheep and goat dung. Vegetal material consisting of fragments of fiber and flint chips were observed.

The talus slope and surface of the shelter were searched for artifacts and all artifactual material was bagged in appropriately marked sacks.

The western portion of the shelter appeared to be undisturbed (Fig. 2), so this area was selected for a test trench. A datum point was established on the rear wall and a line was extended south 15 feet and approximately 3.5 feet past the overhang. A parallel line was laid three feet east of the base line. At intervals of three feet, stakes were set forming three foot squares. The rearmost square was dug first and successive squares were dug toward the mouth of the shelter until a trench was formed from the rear to front of the shelter.

Three zones were distinguishable. The surface zone (Zone A) varies from .75 foot to .9 foot thickness (Fig. 2). This zone extends from the

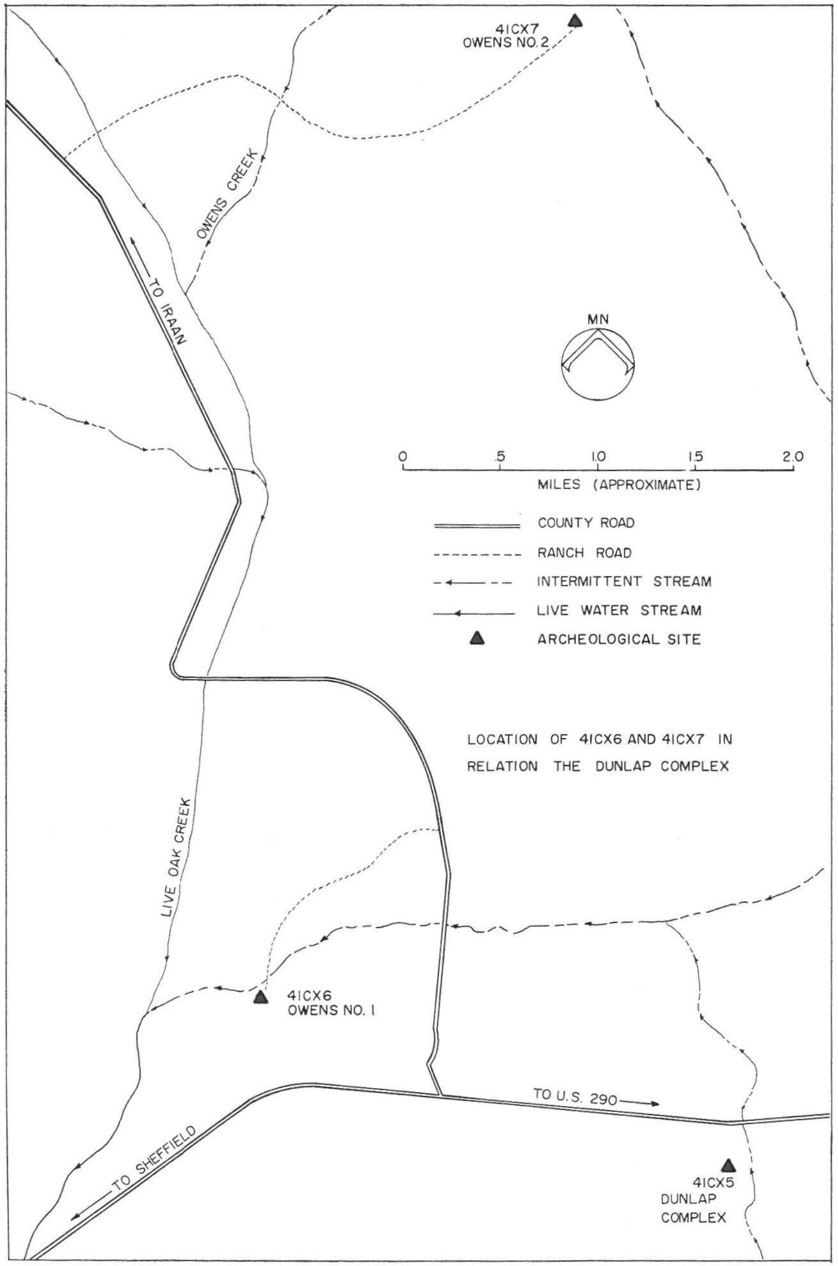


FIG. 1. Relation of the Owens Sites to the Dunlap Complex.

rear of the shelter for a distance of ten feet toward the overhang where it feathers out. Zone A consists of goat and sheep dung, and soil impregnated with pulverized dung, rock, and ash.

Zone B (Fig. 2) underlies Zone A and consists of rock, charcoal stained soil, and ash. This zone is deepest at the edge of the overhang where it is three feet thick. It is thinnest at the rear wall where it gradually thickens from zero thickness to 2.5 feet in thickness toward the mouth of the shelter. Zone B rests on the floor of the shelter 12.5 feet from the back of the shelter. At this point the floor dips perceptively and rests on Zone C.

Zone C rests on the floor of the shelter from 12.5 feet from the rear of the shelter to 18.5 feet from the back. This zone consists of rock and charcoal stained soil and is darker in color. It has a maximum depth of 1.75 feet at the extreme northern edge of the test trench.

A lens beginning at South 11′ and continuing to South 14.5 is marked by heavily burned soil and is quite easily outlined in the profile. No note was made whether this burned area or lens is the remnant of a pot hole or an aboriginal feature. It is probably not a part of Zone A but constitutes a portion of Zone B. In profile it has the appearance of a pot hole. This lens is bowl shaped in cross section with a maximum depth of 1.12′ at the center.

ARTIFACTS

Artifacts from Owens No. 1 Site consist of chipped stone, ground stone, and bone. No shell or fiber artifactual material was found. There were 119 artifacts recovered. Sixty-four (54%) were found on the surface of the shelter or on the talus slope. Diagnostic artifacts such as projectile points were scarce in the deposits and represent only 33% of the total assemblage. While the deposits appear to have been disturbed to a slight degree, there was no major disturbance and additional testing should reveal cultural sequences.

Abasolo, Ensor, Paisano, and Pandale points were the only projectile point types found.

The most frequent artifact recovered was the scraper. Fifty scrapers were found with 24 recovered in the deposits.

Utilized flakes were frequently found. Twelve were found scattered through the deposits. The total count of this artifact is 25.

Concave scrapers (spokeshaves), a denticulated flake (saw?), graver, cores and choppers represented the balance of the chipped stone artifacts.

In contrast to the chipped stone artifacts a majority of the ground stone artifacts were recovered from the deposits. Sixty-two percent of

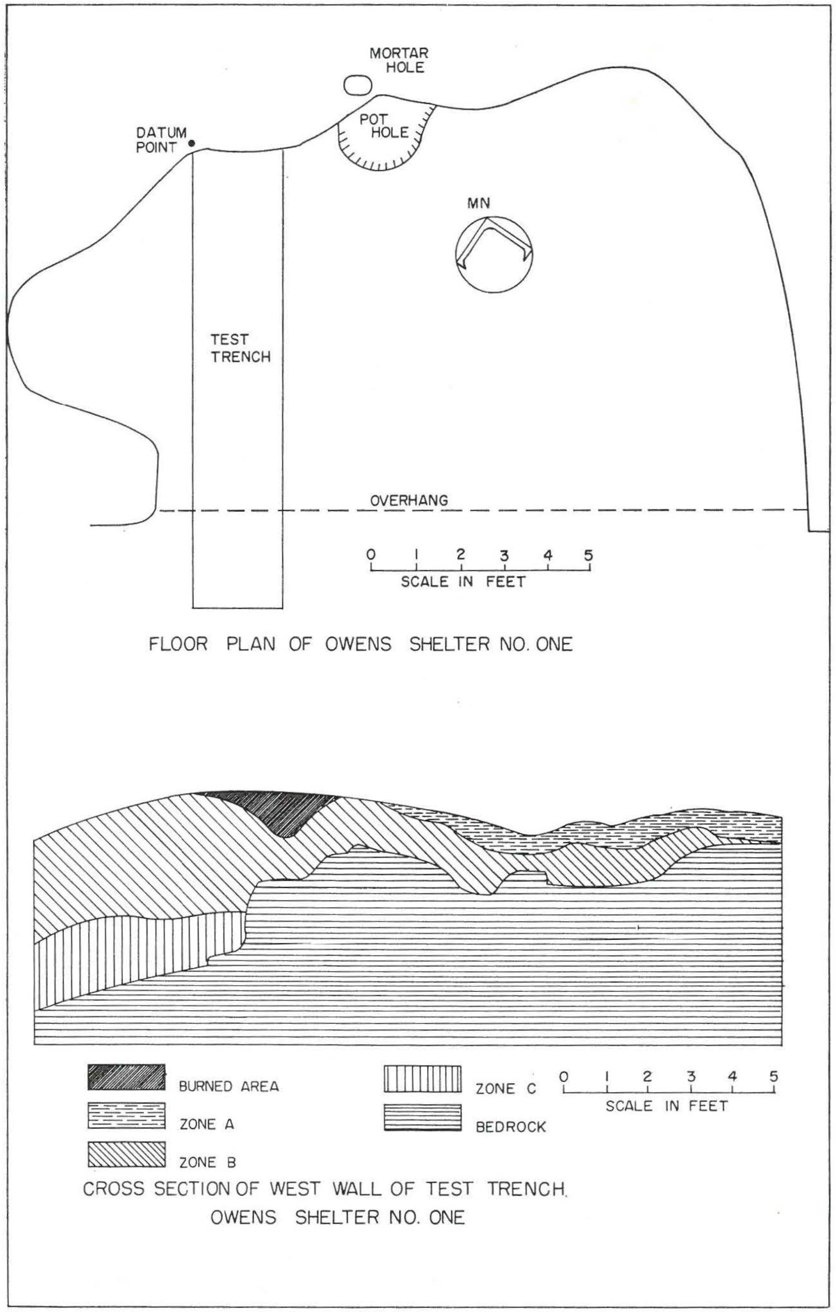


FIG. 2. Owens Shelter No. One, Floor Plan and Trench Cross Section.

the total were found in the deposits. Of the eight artifacts of smoothed stone from the Owens No. 1 Site, six represent fragments of metates and manos. One artifact of smoothed stone bears particular mention. This artifact is made from a metallic gray slate-like material. It is 4.2 cm. long, 1.8 cm. wide and .6 cm. in thickness with one edge smoothed. It was a surface find and no guess can be made regarding its use.

TABLE NO. I

Provenience of Artifacts From Owens No. 1 (41CX-6)

Type of Artifact	*Surface & Talus*	*0" to 6"*	*6" to 12"*	*12" to 18"*	*18" to 24"*	*24" to 30"*	*30" to 36"*	*36" to 60"*	*Total*
Points									
Abasolo	1				1				2
Ensor	1			1					2
Paisano	1								1
Pandale					1				1
Frags.	5					1			6
Knives	2		1	1	1	1			6
Scrapers	26	1	11	3	2	6		1	50
Ut. Flake	13	1	6	1	1	2		1	25
Notch	2					1			3
Denticu.					1				1
Graver	1								1
Cores	5		1						6
Chopper	4					1			5
Mano					1		1		2
Metate	2			2					4
Sm. Stone						1			1
Sm. Edge	1								1
Bone Art.			2						2

Two fragments of polished bone were found. The fragments are insufficient in size to give an indication of the use of the original artifact.

In summary it would appear that Owens No. 1 Site represents an Archaic occupation. It is surmised that this period is represented from Mid-Archaic to Late Archaic.

Cultural affiliation is difficult to assign with any certainty, but there appears to be an affinity with the Trans Pecos Region.

It is hoped that additional testing of this shelter will be performed in the future. The depth of the deposits promises rewarding information.

Owens No. 2 (41CX-7)

Owens Site No. 2 is located about 6.0 miles north of the Dunlap Complex. It is situated near the top of a steep hill on the southern extremity of a hill. A dry, unnamed tributary of Live Oak Creek lies to the east of the shelter. The shelter faces in a southwesterly direction. It is approximately 37 feet wide and from the overhang to the rear wall has a depth of some 20 feet. The ceiling is only five feet above the deposits at the mouth. The shelter roof declines toward the rear of the shelter and as a consequence the open space between the roof and the deposits lessens considerably as one progresses to the rear of the shelter. A large rock obstructs a portion of the mouth of the shelter. This rock is in reality a large roof spall that fell from the original ceiling. In the eastern portion of the shelter a shallow pot hole (Fig. No. 3) is in evidence. It is irregular in outline with a long axis of approximately 22.5 feet and 10 feet on the short axis.

A prominent talus slope below the shelter bears evidence that the shelter was occupied extensively. It consists of fire fractured rock, charcoal impregnated soil, and flint debris.

The floor of the shelter was sparsely covered with sheep and goat manure. Twigs and plant remains of a fibrous nature were noted. Small roof spalls were scattered about on the surface. Occupational debris was common on the surface of the shelter.

Prior to excavation the surface of the shelter and the talus slope was surveyed for occupational material and artifacts were sacked in properly marked bags.

A datum point was set in the western portion of the shelter in the left wall as one faces the back of the shelter. A line was run at right angles to the long axis of the shelter ten feet in a southerly direction

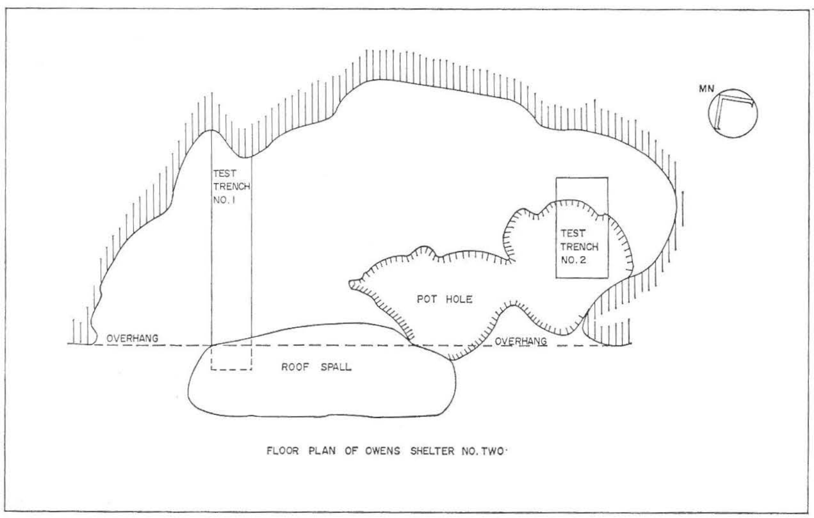


Fig. 3. Floor Plan of Owens Shelter No. Two.

and eight feet in a northerly direction resulting in an 18 foot line (Fig. No. 3). Paralleling this line at a distance of three feet another line was set. This three foot trench was divided into four foot sections for testing. The southernmost two feet was under the previously mentioned large roof spall.

A second test area consisting of two four foot squares was placed in the eastern portion of the shelter and intersected the shallow pot hole previously mentioned (Fig. No. 3).

Time did not permit a cross sectional drawing of either of the tested areas. The deposits were more productive in relation to Owens Site No. 1 and reached a maximum depth of 5.5 feet. The soil comprising the deposits were not noted in any detail so soil descriptions can not be given. It was noted, however, that the soil consisted primarily of a dark, charcoal stained soil that was dry in the upper portions and damp in the lower portions.

ARTIFACTS

A greater variety of artifactual material was found, some of it of perishable materials. The following is a list of the artifacts recovered.

Points

Harrell	1	Bifaces	13
Livermore	2	Choppers	2
Abasolo	2	Scrapers	118
Ellis	1	Graver	1
Ensor	6	Notch	1
Frio	2	Utilized Flake	11
Langtry	6	Mano	6
Marshall	1	Metate	1
Nolan	1	Shell	3
Paisano	1	Awls	3
Pandale	2	Square Knot	1
Tortugas	2	String	1
Travis	1	Pendant	1
Fragments	16		

In contrast to Owens No. 1, arrow points such as Harrell and Livermore were recovered. Dart points constituted the majority of the projectile points found. Ensor and Langtry points were the most frequent with a representation of six each. Two each of Abasolo, Frio, Pandale, and Tortugas were found, and the least frequent dart points were Ellis, Marshall, Nolan, Paisano, and Travis. Fragments of twelve bifaces and one complete biface were found. Scrapers were the most numerous artifact with 118 complete and fragmentary specimens noted. Utilized flakes were relatively scarce with a representation of only eleven specimens. The scarcity of utilized flakes could possibly be the result of the survey crew's failure to recognize this minutely flaked artifact. One notch and one graver was found.

Two core tools classed as choppers were noted among the assemblage.

Artifacts of smoothed stone consisted of six mano fragments and one metate and a fragment of a possible pendant.

Three shell scrapers formed from fresh water mussels are present. All have battered and chipped edges. Two fragmentary awls and one complete awl constitute the total of the bone artifacts. The complete awl was made by splitting the long bone of a large animal, possibly a leg bone of a deer. The joint end has been smoothed and the opposite end has been ground to form a blunt point. Its entire surface is highly polished. This specimen is 11.0 cm. in length. It is wide and similar to awls found in the Trans Pecos Region.

Perishables consisted of a fragment of string and a knotted fragment of a split Lechugilla leaf.

The presence of perishable material and the wide assortment of point types warrants further excavation if possible. Shallow potting presents a problem but not of a significant nature. The depth of the deposits, at least for shelters in this area, adds to the importance of this site.

In summary it can be stated that Owens No. 2 in spite of the shallow disturbance was quite productive of cultural material. The presence of arrow points as well as dart points could indicate a fairly long period of occupation. It would appear that the occupation extended from the Archaic to the Neo-American.

Based on artifacts, Owens Site No. 2 shows a strong cultural similarity with the Red Mill Shelter.

108 W. Missouri
Floydada, Tx.

Notes on the Archeology of the Happy Patch Site, San Saba County, Texas

L. M. Green

ABSTRACT

An open occupation site on the Colorado River, San Saba County, Texas, is reported. A number of shell accumulations were recorded at the site. The artifact assemblage includes specimens of chipped and ground stone. It is suggested that the site was occupied intermittently during Middle and Late Archaic, and Neo-American times.

INTRODUCTION

There are few published accounts of archeological sites along the middle and upper portions of the Colorado River. A. T. Jackson (1938) reported on some sites in southeastern San Saba County, while in 1969 the investigations in the Robert Lee Reservoir area (Shafer, 1969) were published. The writer has been unable to find any published material concerning site investigations along the middle and upper Colorado River between those areas studied by Jackson and Shafer.

The present paper reports a terrace site in northwestern San Saba County, central Texas (Fig. 1). It is based primarily on surface investigations. The site has been badly disturbed by earth moving machinery and much of the evidence of prehistoric occupation is scattered and destroyed.

Artifacts recovered were exposed either by the plow or other earth moving equipment. The artifact inventory from the site includes arrow points, dart points, thin bifaces, thick bifaces, scrapers, gravers, blades, manos, and a perforator fragment. Several small concentrations of burnt rock fragments were exposed but were so badly scattered by the machinery that no data concerning them could be recovered. Numerous small concentrations of shells were unearthed and spread about. Two were left relatively intact. The size and depth of these were determined by digging test holes through the accumulations at approximately two-foot intervals. One bone accumulation was unearthed and scattered. The fragments were too poorly preserved to allow identification.

THE ENVIRONMENT

In the vicinity of the Happy Patch Site, three distinct microenvironments are present. The first is essentially riverine in character

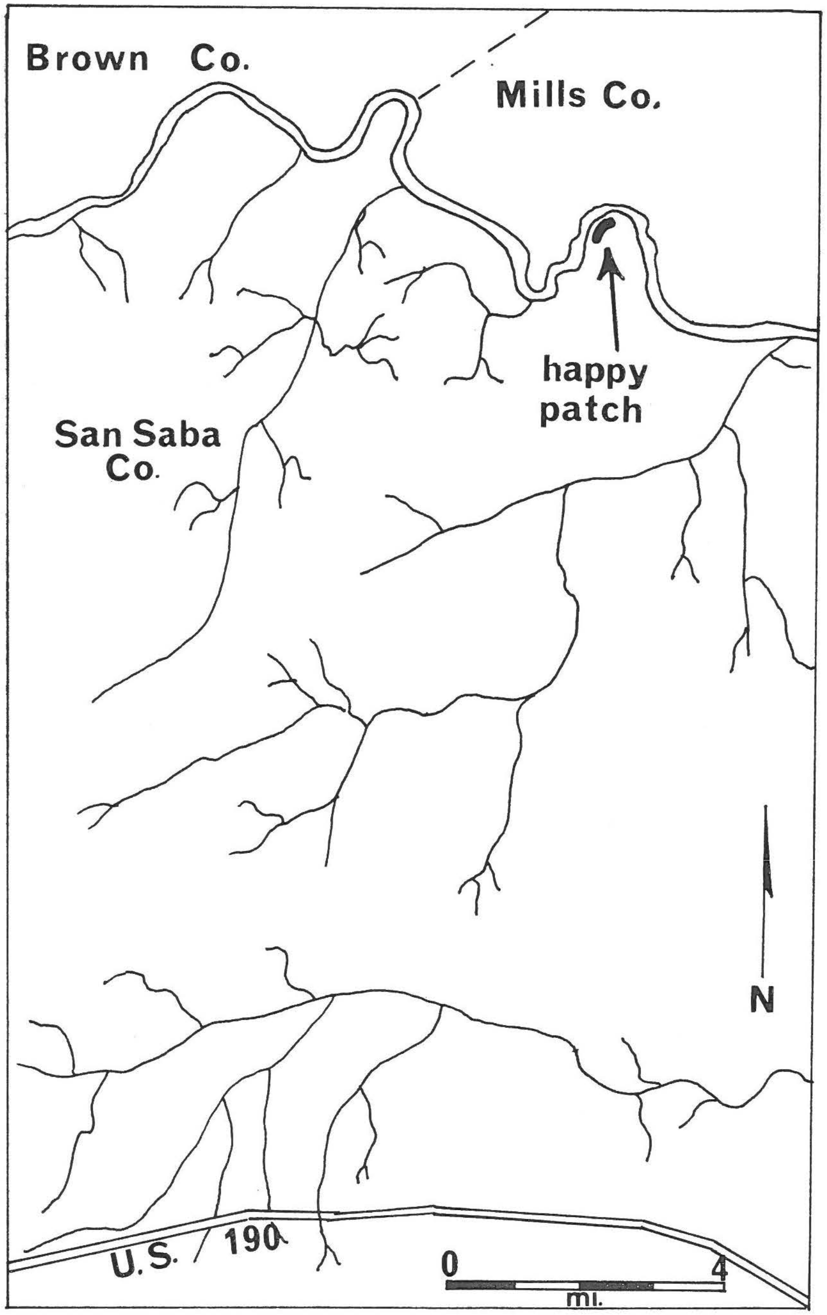


FIG. 1. Location of the Happy Patch Site. Map shows northwestern San Saba County. Colorado River and major tributaries are indicated.

(Fig. 2); it consists of the Colorado River and a narrow strip along both sides of the channel. Vegetation includes pecan, liveoak, elm, willow, and mesquite. The river supports catfish, sunfish, bass, fresh-water drum, turtle, water snakes of several kinds, mussel, and cray-fish. In the winter, migratory waterfowl visit the stream; occasional colonies of beaver can also be seen. The second microenvironment is that of the "valley" (Fig. 2), and includes the Colorado River flood-plain and low terraces (including the area in which the Happy Patch Site is situated). Where uncultivated this microenvironment supports a growth of native grasses, brush, cacti, and several varieties of oaks, mesquite and a few elm. Soil types in the "valley" are mainly of the Norwood-Miller series (Soil Conservation Service, 1961). Dams and other flood-control structures have ended the serious flooding which occured in this microenvironment in the past; the last major flood was in 1938 (personal communication with area residents). The uplands constitute the third microenvironment distinguished in the site area (Fig. 2). Common fauna in this microenvironment, as well as in the "valley", include whitetail deer, red squirrel, cottontail rabbit, jack-rabbit, raccoon, fox, wild turkey, quail, dove, hawk, owl and a variety of small birds. The western diamond back rattlesnake is the best known of several species of snakes in the vicinity. The upland soils are chiefly Owens-Renfrow-Darnell (Soil Conservation Service, 1961). Much of the uplands is stony (primarily sandstone). Cobbles and peb-bles of dense limestone, flint and quartzite abound. Upland vegetation is similar to that described by Blair (1950:112); common varieties of grasses are mesquite, three awn, bluestem, and windmill.

Each of the microenvironments had certain resources which bene-fited the area's prehistoric inhabitants. The major concentrations of wildlife and vegetational resources were in the riverine and "valley" microenvironments. The uplands could be used for hunting and as a source of raw materials for flint-knapping. The Happy Patch Site is situated so that its inhabitants could best exploit all three of these microenvironments. Today, farming is practiced in the valley area, and stock-grazing predominates in the uplands.

THE SITE

Happy Patch Site (Fig. 2), is located in the northwestern part of San Saba County, 12 miles north of the town of Richland Springs, on the property of Mrs. John Harrison. Access to the site was provided by Mr. E. M. (Malcolm) Mask. The main body of the site lies along the edge of a terrace in a bend of the river. In places it extends some 60-100 yards into an adjoining field. The relatively level terrace does

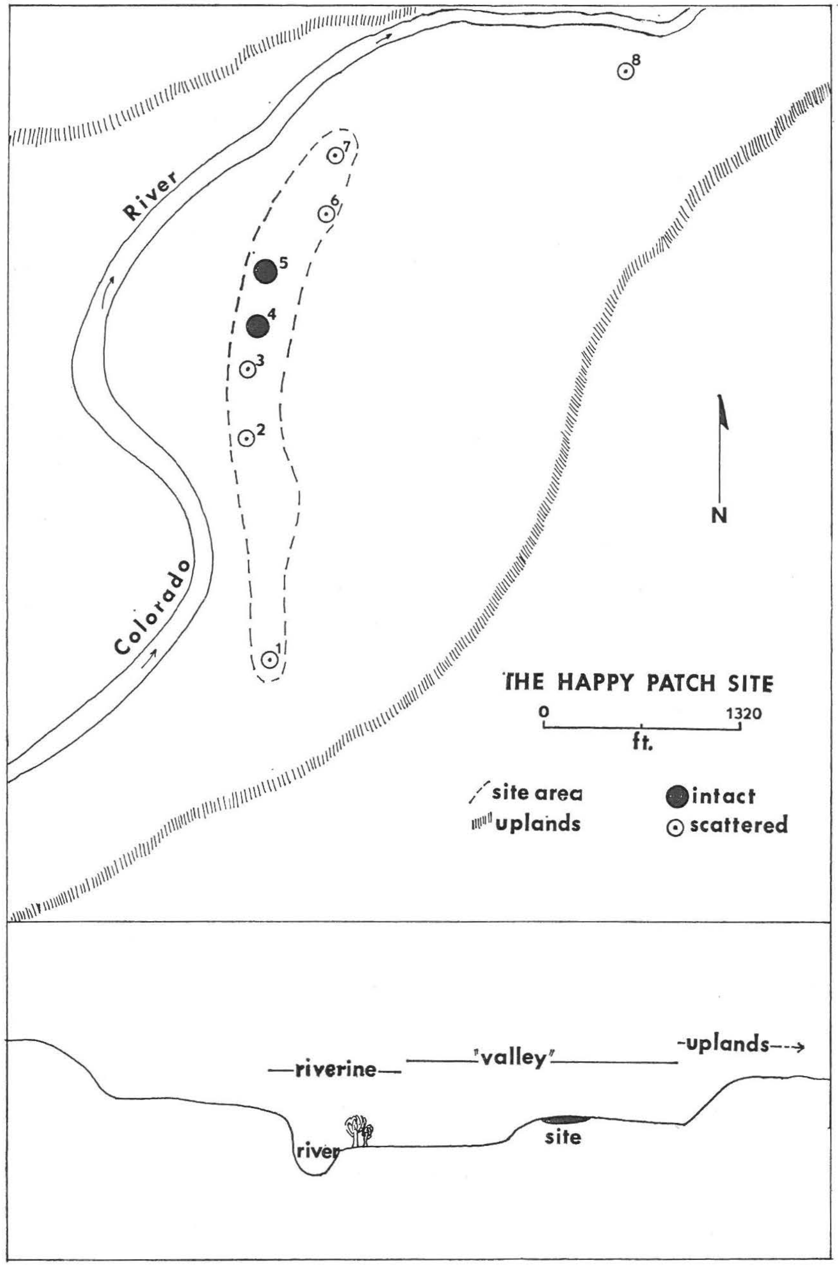


FIG. 2. The Happy Patch Site. Upper portion of figure is a sketch map of site, with intact and scattered shell accumulations indicated. A schematic cross section of the site area (looking downstream) is shown below. Extent of the three recognized microenvironments is indicated.

not directly follow the curve of the river, but runs in a general north-south direction for perhaps .8 miles before veering to an east-west direction. Most of the evidence of prehistoric occupation occurs along the north-south distance of the terrace.

To the east and south, a row of hills, (the uplands) rise up at the back of the terrace. Upstream, rocky brush-covered hills come down to the edge of the terrace, closing it off in that direction. Across the river, to the west and north, the flatlands narrow and the hills rise up abruptly near the stream (Fig. 2).

Characteristics of the site include eight shell accumulations (Fig. 2), a scarcity of lithic debris and artifacts, and the absence of any sizeable burnt rock accumulations. Even though the sometimes steep terrace face was cut down as much as three feet in places, investigations to date have revealed no burnt rock middens. The terrace has been plowed, but formerly supported large trees. Today, oats, vetch and clover grow on all of the surfaces, including the middens.

The Shell Accumulations (Fig. 2)

In all cases, the shells are so dense in the soil that the extent of each midden can easily be seen. They are not, however, "packed" together.

No. 1 is near the south end of the site. It is a small accumulation of mussel shells which have been scattered by the plow. No flint or other stone artifacts were found in the vicinity of this accumulation. Probing revealed no underground concentration of shells.

No. 2, another scattered shell accumulation, lies about .4 miles north of accumulation #1. Only surface material was found. No artifacts of stone were recovered here.

No. 3 is situated about .1 mile north of accumulation #2. Here again the shells were scattered. Most artifacts recovered from the site to date, (see below) were found in the vicinity of this shell accumulation.

No. 4 is a short distance north of #3. It is a shallow shell midden where only about one inch of the surface accumulation was removed by machinery. This shell concentration is approximately six inches in depth at the center, becoming shallower toward the edges. It is oval in outline and measures approximately 12′ by 18′. A few flint chips and blades (Fig. 7, B-C) were recovered in the vicinity of this midden.

No. 5 is a small shell midden similar to accumulation #4, but smaller in size, measuring approximately 6′ by 12′. A few flint chips were found in the area of this midden but no finished stone artifacts were recovered.

No. 6, another shell concentration, lies in the field where the shells have been strewn about by the plow. The field is covered with a heavy growth of wheat and thorough investigation was impossible. However, one flint arrow point, (Fig. 3D) was recovered from among the shells here.

No. 7 is located on the slope of the terrace. Here the bulldozer unearthed some shells and a concentration of bone fragments which were scattered up and down the slope. A small concentration of burnt stone fragments, (possibly a hearth) was unearthed and strewn about. The basal portion of a large, thin biface was also recovered here.

No. 8 is in the field some .4 miles east of the previously described accumulations. Here the shells were turned up by deep plowing of the field. The shells are scattered about on the surface. No testing was attempted to determine the depth of the accumulation since this feature is covered by a growing crop.

The Artifacts

Only lithic artifacts were found (Fig. 3-7). None of the shells showed any recognizable modification. An interesting feature of the flint artifacts is their color. All are made of light to dark shades of brown, tan or gray local flints. Projectile point classification is based on the work of Suhm and Jelks (1962). Measurements are given in centimeters and the following abbreviations are used: *L*—Maximum length, *W*—Maximum width, *T*—Maximum thickness. In the artifact illustrations (Fig. 3-7) projectile points are oriented with the stem downward, bifaces with the base downward, and scrapers and blades with the bulbar end downward. On broken artifacts the measurements are estimated. These measurements are followed by an asterisk (*).

BIFACES

ARROW POINTS (Fig. 3 A-D). None of these specimens is complete. Their outstanding characteristic is their overall thinness and good workmanship. Specimens A, B, and C have strong barbs while D is barbless. Specimens A and C were made from thin flakes and still retain the original flake scar on one surface. Both have been trimmed along the lateral edges and at the distal tip. B and C are thinned on both faces.

L	*W*	*T*	*Type*	*Fig.*
2.9*	1.9	.3	Scallorn	3A
3.2	2.3	.3	Unknown	3B
3.3*	2.0	.3	Unknown	3C
3.7	2.5*	.5	Fresno	3D

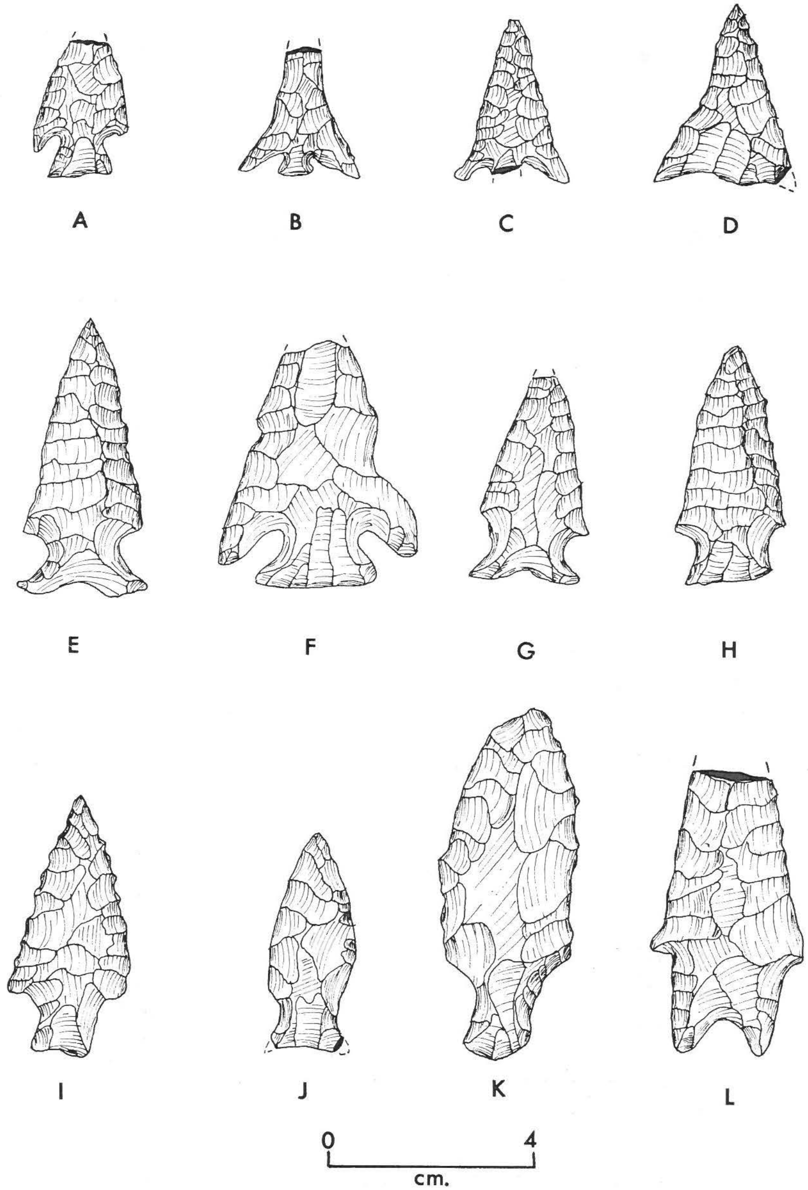


FIG. 3. Projectile Points from Happy Patch Site. A, Scallorn; B, C, unclassified; D, Fresno; E, Frio; F, Marcos; G, Frio; H-J, Yarbrough; K, unclassified; L, Pedernales.

DART POINTS (Fig. 3 E-I). The dart points are small to medium in size. All have essentially triangular bodies with the exception of K which is leaf-shaped. Edges are straight to slightly convex. Five specimens (E, G-J) are steeply beveled on the right edge of both faces. All specimens with exception of J and K have barbs, with F being strongly barbed. Stems are strongly to slightly expanding with exception of L which has a rectangular stem. The distal tip is missing on specimens F and L.

L	*W*	*T*	*Type*	*Fig.*
5.7	2.3	.6	Frio	3E
5.8*	3.8	.5	Marcos	3F
4.7	2.1	.6	Frio	3G
4.6	2.1	.5	Yarbrough	3H
5.0	2.8	.6	Yarbrough	3I
4.2	1.75	.5	Yarbrough	3J
6.8	2.6	.8	Unclassified	3K
6.4	3.0	.9	Pedernales	3L

THIN BIFACES (Fig. 4 A-F). These bifaces are triangular to trianguloid with the exception of specimens B and D which are bi-pointed. All specimens show some pressure flake trimming along lateral edges. Edges are slightly to strongly convex. Specimen A has a straight base while specimens C, E, F, have slightly convex bases. Specimen B is strongly beveled on the left edge of both faces on the distal portion and slightly beveled on the right edge of both faces on the proximal end.

L	*W*	*T*	*Fig.*
9.1	3.7	.8	4A
12.3	4.0	1.0	4B
7.8	4.7	.9	4C
10.1	4.3	1.1	4D
7.7	4.4	.8	4E
8.8	4.5*	1.0	4F

THICK BIFACES (Fig. 5 A-D, F). All of these specimens were fashioned from flint by percussion flaking. Specimens B and F show a bit of trimming along the lateral edges. Specimen A is trianguloid in shape. B and F are asymmetrical, C triangular, and D ovate. Specimen B shows extensive use—wear dulling along one lateral edge. Two graver beaks have been trimmed out on one lateral edge. One is near the basal corner and the other near the distal tip. Specimen C has one basal corner missing.

L	*W*	*T*	*Fig.*
8.2	5.9	1.8	5A
8.1	4.4	1.2	5B
10.5	5.8*	1.7	5C
11.6	6.8	1.6	5D
9.3	4.3	1.7	5F

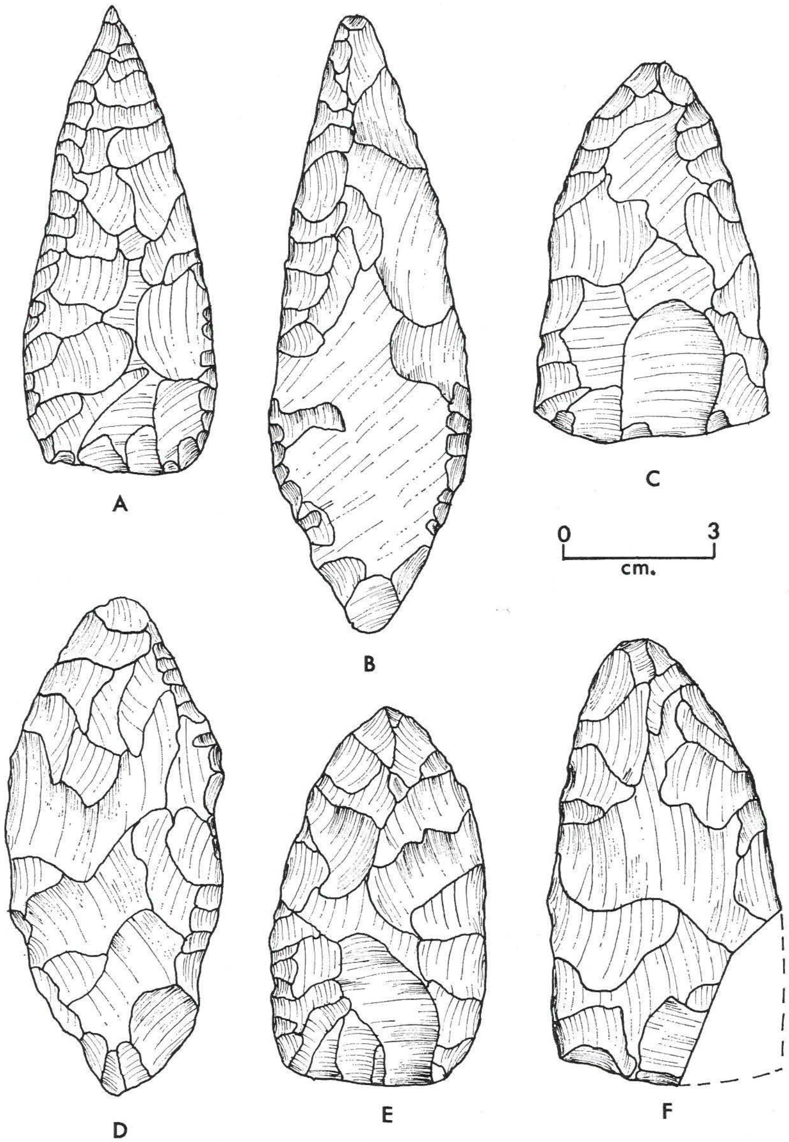


FIG. 4. Bifaces from Happy Patch Site. A-F, thin bifaces.

PERFORATOR (Fig. 5 E). The shaft of this perforator is broken. It has a diamond-shaped cross-section. The oval-shaped base is trimmed around the edges, and edges on both faces are steeply beveled. The base measures 4 x 2.6 cm. At the point of breakage the shaft is .5 cm. thick. Estimated total length is 7.4 cm.

UNIFACES

SCRAPERS (Fig. 6 C, D). These two multiple-edged scrapers were both trimmed along the lateral edges of the dorsal surfaces. Specimen C has a long transverse scar across the width of the convex distal end which thinned that portion of the tool. This specimen retains the bulb of percussion while on specimen D the bulb has been trimmed away. On specimen D the distal tip has been trimmed to a point. The broadest portion of this scraper is at the proximal end. A long flake scar is present on the dorsal surface.

L	*W*	*T*	*Fig.*
8.4	6.9	1.2	6C
5.9	2.9	.8	6D

BLADES (Fig. 7 B-D). Specimens B and D were struck from the interior of cores. Specimen C retains a patch of cortex at the distal tip. Each of the specimens has one or more dorsal ridges extending almost the length of the dorsal surface. A few flakes were removed at the proximal end of each, probably prior to being struck from the cores. The bulb of percussion on specimen B is intact while the bulbs on specimens C and D have been trimmed. Specimen B has been trimmed along a portion of one lateral edge and at the distal tip.

L	*W*	*T*	*Fig.*
7.6	1.4	1.7	7B
7.7	2.2	.7	7C
6.8	1.9	.45	7D

GRAVER (Fig. 7 A). This small graver was made on a flint flake. The dorsal surface was thinned by the removal of four relatively large flakes, and the proximal end was trimmed by pressure flaking. The graver beak was formed at the distal end. Total length is 3.4 cm. long.

GROUND STONE ARTIFACTS

MANOS (Fig. 6 A, B). The two manos are elliptical in shape and both are manufactured from dense limestone containing tiny flecks of mica. Specimen A is faceted on both faces and shows more wear than speci-

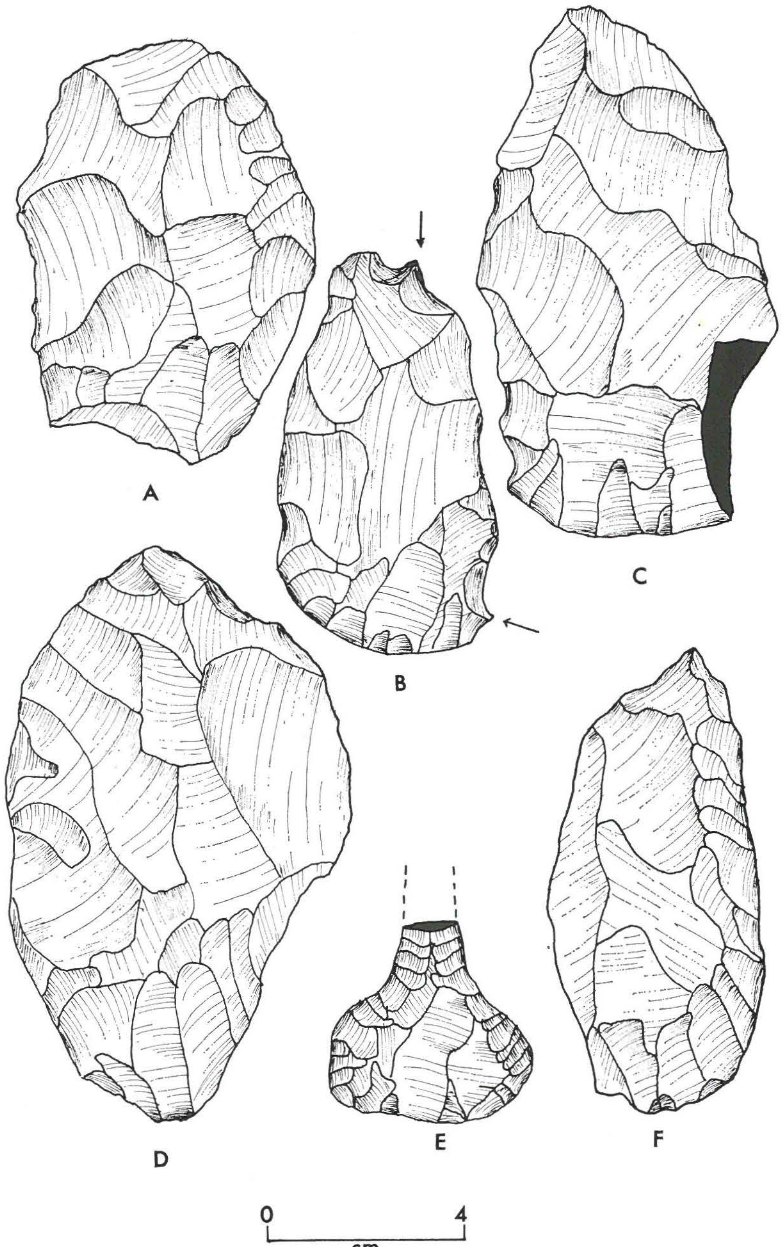


FIG. 5. Bifaces from Happy Patch Site. A-D, F, thick bifaces (arrow indicates graver beaks on B); E, perforator.

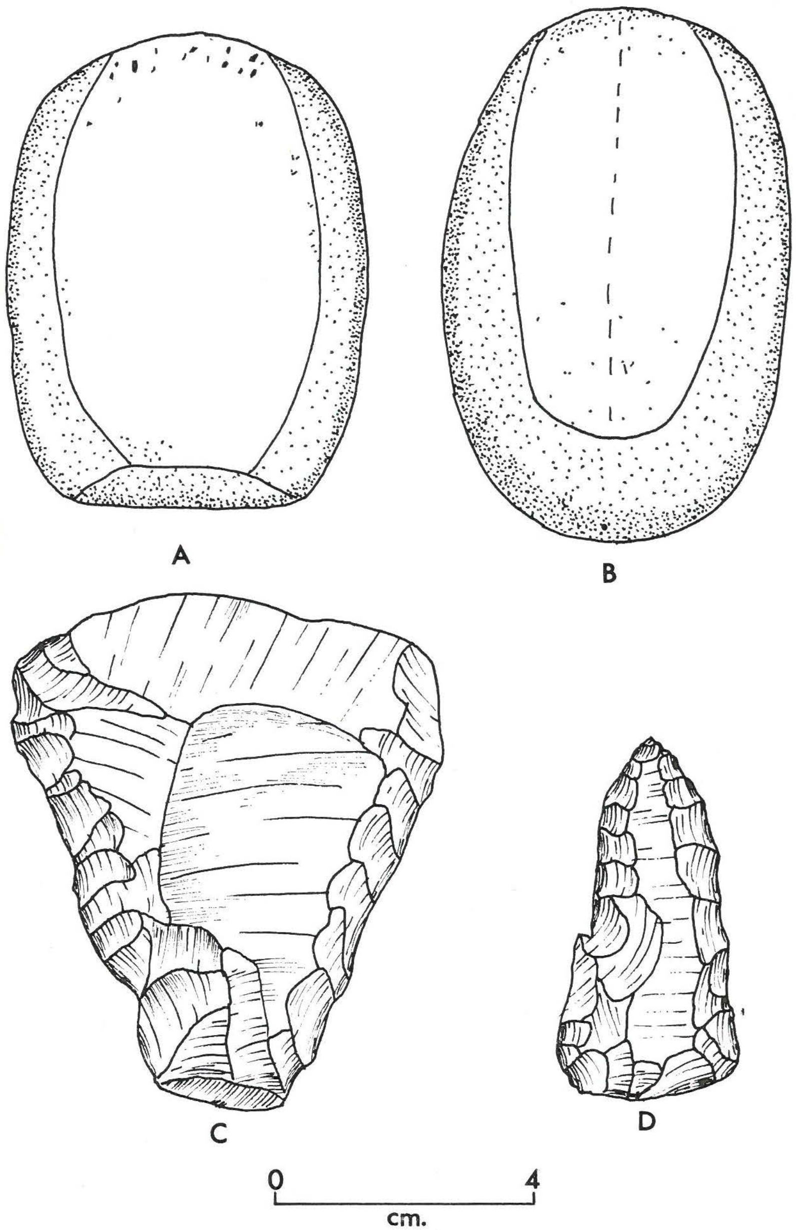


FIG. 6 Artifacts from Happy Patch Site. A, B, manos (not to scale); C, D, scrapers.

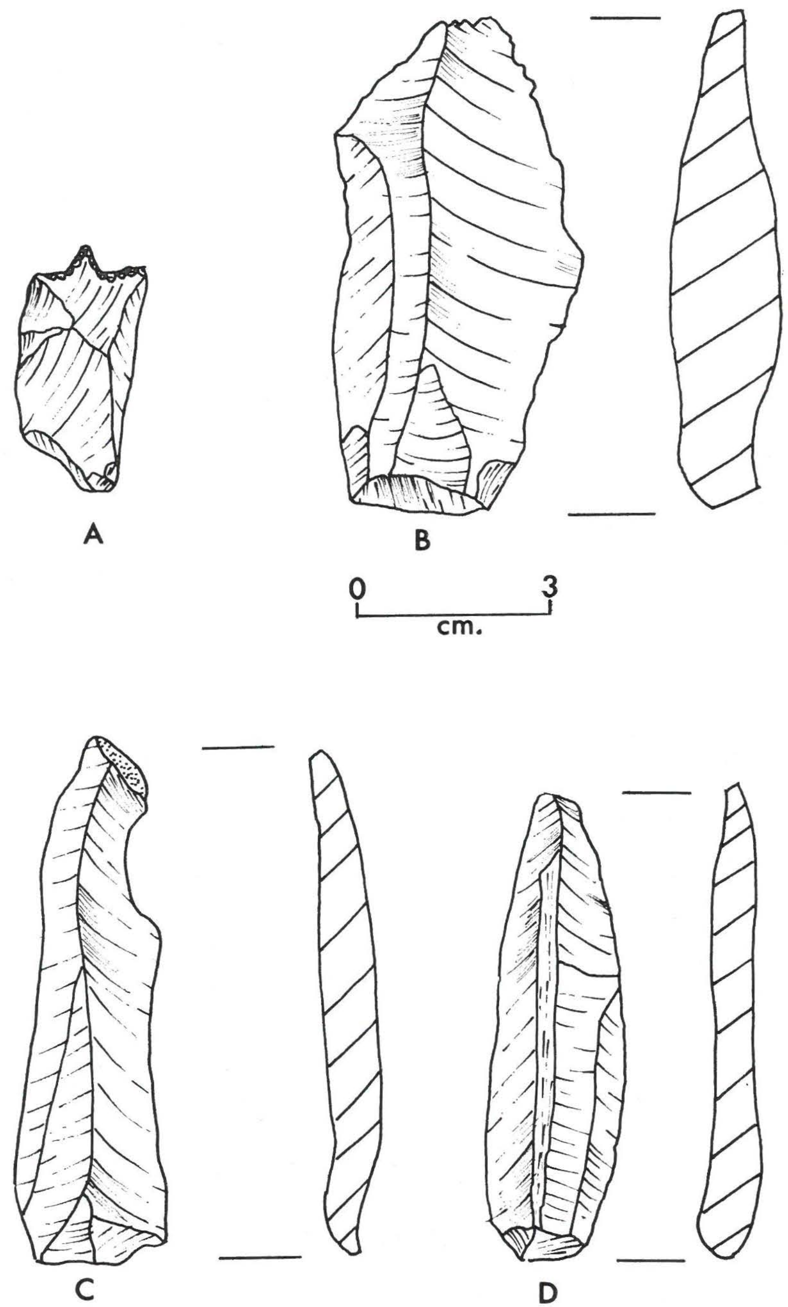


FIG. 7. Unifaces from Happy Patch Site. A, graver; B-D, blades.

men B. Specimen B shows the beginning of two grinding facets on one face while there is one on the opposite. Both specimens show pecking. Peck marks on specimen B are deeper and more numerous than those on specimen A. A small portion of one end is broken from specimen A.

L	*W*	*T*	*Weight*	*Fig.*
11.1*	8.5	3.8	1¼ lb.	6A
11.6	7.5	5.5	1½ lb.	6B

SUMMARY AND CONCLUSIONS

This paper has presented data salvaged at the Happy Patch Archeological Site, on the Colorado River, San Saba County, Texas. Much of the archeological material at the site has been scattered and/or destroyed by recent extensive earth moving operations. Only two of the mussel shell concentrations described earlier remain essentially intact. Despite the disturbed condition, enough evidence of prehistoric occupation remains to make the site study feasible. Several aspects of the site set it apart from most sites in the area, Green (1970:1). Notable are the mussel shell concentrations, the absence of burnt rock middens, and the scarcity of chipped and ground stone artifacts and other lithic debris (abundant flint and other stone are available in the nearby hills).

Any conclusions arrived at from a surface investigation of the Happy Patch Site would, of necessity, be somewhat speculative. According to residents of the area, the terrace on which the site is located has been flooded several times during this century. Alluvial deposition probably covered the prehistoric cultural remains from time to time, never permitting the building of thick midden deposits. Flood water could have also scattered and washed materials downstream.

The artifact collections from the site includes classifiable arrow points (Scallorn, Fresno) and dart points (Pedernales, Marcos, Ensor, Frio, and Yarbrough). Based on projectile point data presented by Johnson, Suhm, and Tunnell (1962:Fig. 45) and Sorrow, Shafer and Ross (1967:Fig. 72), it appears that use of the site began during the Middle and Late Archaic periods, and continued into the Neo-American (late prehistoric) era.

Data gathered by the investigations at the site suggest that small groups of people camped there on an intermittent basis. It is possible that people from neighboring sites a short distance upstream, where a number of midden accumulations are present (personal investigations by the author), camped at the Happy Patch Site during the warm summer months. The site area may have been a brief stop for local aboriginal groups practicing a roving pattern of hunting and gathering. At the Happy Patch Site, the accumulations of mussel shell suggest that exploitation of the Colorado River might have been the primary activity carried out there. The position of the site is such that the resources of any of the three recognized microenvironments could be readily utilized. Manos at the site indicate food-gathering and milling operations, while the projectile points and bone fragments suggest that hunting was also done by the occupants.

This paper is intended only as a beginning study of sites of this sort. Mussel shell accumulations such as those at Happy Patch undoubtedly result from short-term activities, perhaps representing a few meals of a small group. Scientifically controlled investigations at simliar, but undisturbed, sites would be ideal for the study of single component (local group) occupations.

Acknowledgments

The author wishes to express his gratitude to Mr. E. M. (Malcolm) Mask of Richland Springs. He informed me of the Happy Patch Site, granted me free access to it, and permitted me to use all artifacts which he had recovered from it. Without his assistance, investigation of the site would have been impossible. Also, I want to give special thanks to Mr. Thomas Roy Hester of The University of California at Berkeley, for his help in the preparation of this paper.

References Cited

Blair, W. Frank
1950. The Biotic Provinces of Texas. *Texas Journal of Science*, Vol. 2, No. 1:93-116.

Green, L. M.
1970. *South Plains Archeological Society Bulletin* No. 1.

Jackson, A. T.
1938. The Fall Creek Sites. *University of Texas Publications*, No. 3802.

Johnson, Leroy Jr., Dee Ann Suhm, and Curtis Tunnell
1962. Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge, and Oblate Sites. *Texas Memorial Museum Bulletin* No. 5.

Shafer, Harry J.
1969. Archeological Investigations in the Robert Lee Reservoir Basin. *Papers of the Texas Archeological Salvage Project*, No. 17.

Suhm, Dee Ann and Edward B. Jelks
1962. Handbook of Texas Archeology: Type Descriptions. *Texas Archeoological Society Special Publication* No. 1, and *The Texas Memorial Museum Bulletin* No. 4.

Soil Conservation Service
1961. Generalized Soil Map of San Saba County. (U. S. Dept. of Agriculture) and Texas Agricultural Experiment Station.

Box 84
Richland Springs, Texas

The Fullen Site, 41 HR 82

Michael O'Brien

with an appendix

Quaternary Geologic History of the Clear Lake Area

Dr. Robert Lankford

ABSTRACT

The excavation of a small coastal shell midden raises questions concerning relationship of technology and economy to the environmental setting.

INTRODUCTION

The Fullen Site, 41 HR 82, is about 1.5 miles northeast of El Lago, Texas in Harris County on the east bank of Middle Bayou one-half mile north of Nasa Road 1 (Fig. 1, 2). Middle Bayou starts eighteen miles to the north of the site at the approximate location of Pasadena Blvd. in Pasadena, and flows a meandering course almost due south to its junction with Horsepen Bayou and Big Island Slough, just south of Bay Area Blvd. Galveston Bay tides and strong coastal winds greatly affect the level of the bayou. The water, though polluted, varies from fresh to saline depending on the rainfall. A full description of the Quaternary Geology of the area by Dr. Robert Lankford, is appended to this report.

The site was originally found by Lou Fullen, Dick Gramley and Jay Sharp while surveying the Middle Bayou-Mud Lake area. They made a surface collection and Louis and Margie Fullen and Jay Sharp briefly tested the site. In January of 1969, the site was turned over to Mary McCutcheon, a student at Rice University, through the courtesy of the Houston Archeological Society and Friendswood Development Company. Mr. George Meriwether III, District Manager for Friendswood insured the site against vandalism and took an active interest in digging.

Miss McCutcheon along with Drs. Robert Eisenberg and Robert Lankford, of the Rice Faculty made the excavation a class project in *Gulf Coast Archeology*, a course that they had jointly organized. This was a college course sponsored by Brown College of Rice University, outside the normal departmental offerings, and open to all students as a "free elective." Thirteen students took part in the excavation and

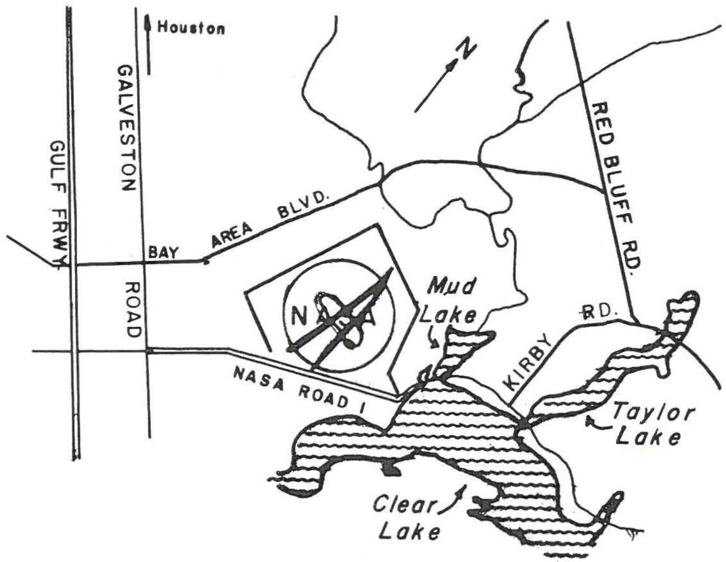


FIG. 1. Location of Fullen Site—Harris County, Texas.

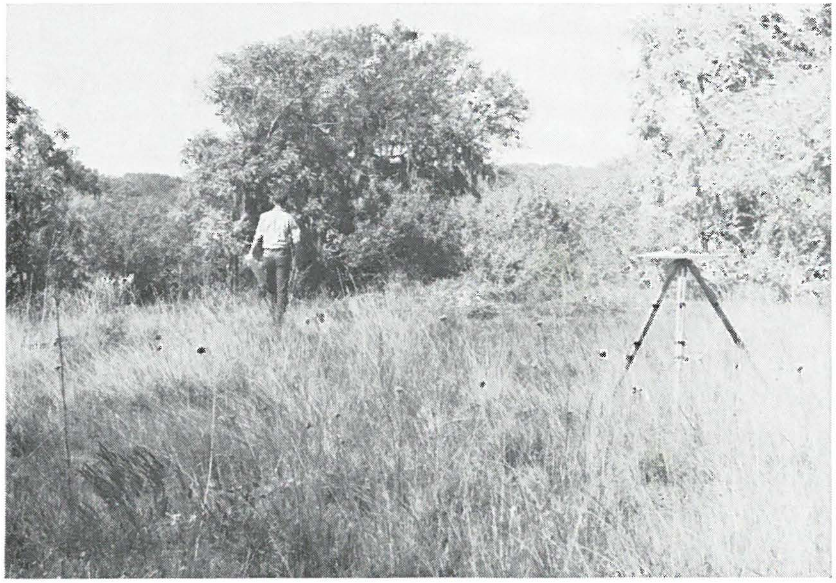


FIG. 2. View of Fullen Site, looking north.

preliminary analysis of the artifacts but the author of this report took charge of the final analysis and writing.

EXCAVATION

The limited excavation was begun in January of 1969 and continued until mid-April of the same year. A datum point, designated ON-OE (zero north, zero east), was established in approximately the middle of the mound. A grid composed of five foot squares was extended in the four cardinal directions from the central datum. Before laying the grid, cores were taken to delineate the lateral extremes of the midden, thereby limiting the number of squares to 181 (Fig. 3).

All squares were dug in three inch levels, except for the first twelve inches of square 1S-1W, which was dug in six inch levels. Each artifact was marked with the exact depth at which it was found, starting from ground zero.

Owing to limits of time and personnel, a complete excavation could not be accomplished; therefore a set of squares was chosen which would expose as much of the surface of the site as possible. In all, 11 squares were worked and 275 square feet of occupation area were uncovered.

No stratigraphic zones were found that ran throughout the midden, although each square revealed lenses of clam and oyster shells that

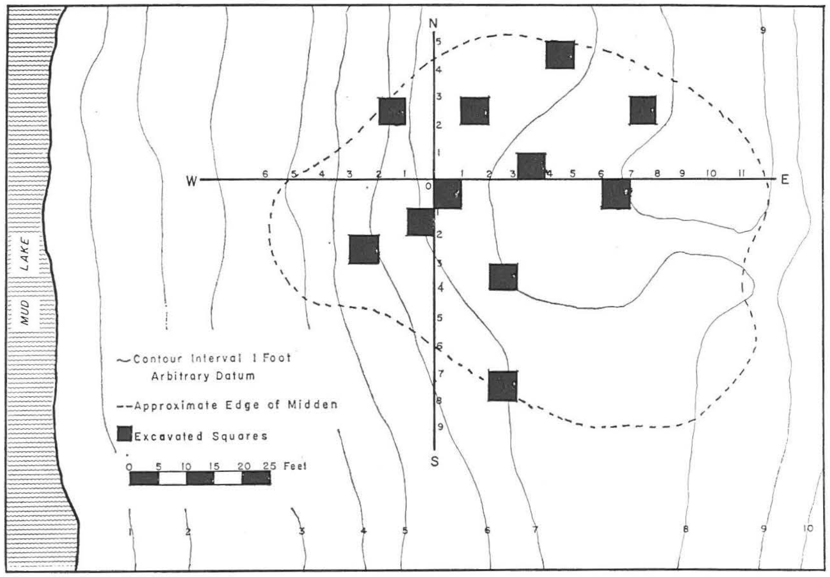


FIG. 3. Map of Fullen Site showing contours and plan of excavation.

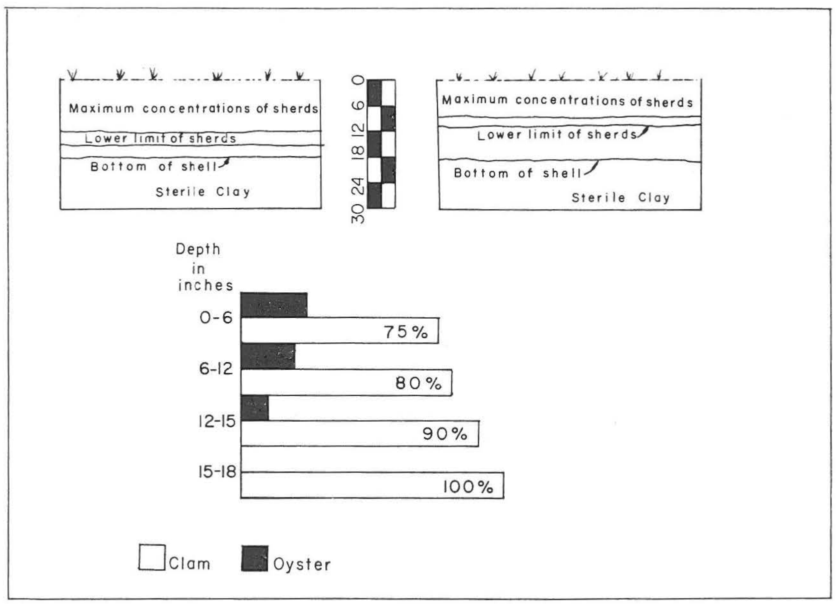


FIG. 4. a, Stratigraphy of grid 3S2E, north profile; b, Stratigraphy of grid 0N6E, west profile; c, Average accumulation of shell over site by level.

varied in thickness and compactness from square to square. No correlation could be made of these lenses because they pinched out before they reached the next profile. In general, however, the stratigraphy showed an upper zone of sterile top soil followed by zones of shell and pottery directly followed by an artifact-void zone consisting primarily of *Ragia* shell (Fig. 4 c). Underlying the cultural layers is a bed of sterile Pleistocene Beaumont Clay.

ARTIFACTS

A total of 2,078 artifacts were catalogued from the Fullen Site, including artifacts found by the Fullens and Sharp in their test pits (1S-1W and 00). Of these, 2,044 were pottery sherds (Table 1). Over 5,000 pieces of pottery were excavated and washed, but any piece that was smaller than 2.5 centimeters in maximum dimension was not classified. Artifacts were sorted into three main groups—pottery, objects of stone and objects of bone. Within these general groups, a number of functional categories (bone awls, arrowpoints, etc.) were recognized which were further subdivided into stylistic varieties and types.

TABLE 1

Distribution of Sherds by Square and Level

Depth in Inches	*0-0*	*ON-6E*	*1N 3E*	*3N 1E*	*3N 2W*	*5N 4E*	*1S 1W*	*3S 2E*	*2S 3W*	*3N 7E*	*Unk.*	*Total*
0-6	68	424	107	78	48	6	94	273	24	119	11	1252
6-12		305	211	20	4		88	16		14		658
12-18		86	23				23					132
18-24							2					2
Totals	68	815	341	98	52	6	207	289	24	133	11	2044

POTTERY ANALYSIS

The pottery was divided into three main groups on the basis of tempering material: sand, sherd, and vegetable. These categories were further broken down into incised or plain ware. Bases of vessels were separated into noded, flat, rounded or concave categories. Each sherd was given a fresh break and then examined by eye. Any piece in which the tempering agent was doubtful was examined under 10X magnification. The examination was done completely by the author so as to insure consistency.

It was evident from the outset of the project that the classification of pottery could be approached from several different angles; however, it seemed doubtful that it would be worthwhile to spend much time examining differences in temper, especially sand, because other work in the area shows that sand tempering has a long temporal span (Wheat, 1953:244; Suhm, Krieger and Jelks, 1962:55). Nevertheless, the pottery from the Fullen Site was separated into different tempering groups because it was felt that the information might be of assistance to those who prefer to work with tempering agents. The sherd count on the basis of temper is shown in Table 2.

Since 1954, the pottery of this area has been divided into Goose Creek Plain and Goose Creek Incised, but it is becoming evident that this division is not refined enough to accommodate all of the pottery assigned to it. Following R. B. Worthington's suggeston, Lawrence Aten has defined the new types, San Jacinto Plain and San Jacinto Incised; types which are tempered with pieces of crushed sherd (Aten: 1966 ms.). In view of the confusion over the defining attributes of types and their spatial and temporal distributions in the Gulf Coast area, the pottery identified in this report will only be described by its attributes, type names will be used only when referring to other reports where the type Goose Creek is used for sand tempered pottery and San Jacinto for sherd tempered pottery.

Examination of the distribution of sherds (Table 2) revealed that no rim sherds of sherd-tempered pottery occurred although there were 164 body sherds of this ware. This raised the question of whether vessels were actually constructed solely of sherd-tempered paste. In view of the construction techniques which involved coiling and probably building sections of the body separately over a period of some days, it seemed possible that different mixes of clay were used at different times during the construction of one vessel and perhaps even that the makers found it useful habitually to make different parts of the same vessels with different tempering materials. Without a much larger series of sherds than are available from this excavation we can only speculate about such possibilities; however, it is possible to run a simple statistical test (Students t-test) to determine whether the lack of rim sherds of sherd-tempered paste was statistically significant. The results are shown in Table 3. The t-test thus shows that in less than one time out of twenty would we expect to have found no rim sherds of sherd-tempered pottery if sampling variability were the only factor operating. In other words, the test shows results that are significant at a .05 level of confidence. We tentatively conclude therefore that some cultural factors, rather than sampling error might account for the lack of sherd-tempered rims. It must be mentioned in this

TABLE 2

Distribution of Sherds by Level

Percentage of Each Type to Total in Level is Shown

	Depth in inches				
	0 - 6	*6 - 12*	*12 - 18*	*18 - 24*	*Total*
Sand Tempered					
Plain body	1036 (94.0%)	573 (92.0%)	123 (92.0%)	2 (100%)	1734
Plain rim	42 (4.0%)	13 (2.0%)	8 (6.0%)		63
Incised body	3 (.3%)	15 (2.0%)			18
Incised rim	10 (.9%)	20 (1.4%)	1 (.8%)		31
Punctated	1 (.1%)	4 (.6%)			5
Round base	1 (.1%)				1
Flat base		4 (.6%)			4
Noded base	4 (.4%)	4 (.6%)	1 (.8%)		9
Concave base		1 (.2%)			1
Total	1097 (99.8%)	634 (99.4%)	133 (99.6%)	2 (100%)	1866
Sherd Tempered					
Plain body	122 (98.3%)	42 (97.7%)			164
Plain rim					
Incised body					
Incised rim					
Punctated					
Round base		1 (2.3%)			1
Flat base					
Noded base	2 (1.6%)				2
Concave base					
Total	124 (100%)	43 (100%)			167
Other					
Vegetable tempered plain body	2 (84.6%)				2
Unknown	11 (15.4%)				11
Total	13 (100%)				13
Grand Total	1234	677	133	2	2046

regard, however, that Aten (1967) reports finding a few sherd-tempered rim sherds at the Jamison Site.

TABLE 3

A t-test of the distribution of sand and sherd tempered sherds shows that by chance we should expect to find no new sherds of sherd tempered ware only one time out of 20.

SAND TEMPERED

Level	rim Sherds	total Sherds	$\frac{rim}{total}$ (xi)	$\frac{rim}{total} - \bar{x}$ 2	$\left(\frac{rim}{total} - \bar{x}\right)^2$
0-6	63	1112	.06	.0083	.00006889
6-12	22	618	.035	.0167	.00027900
12-18	8	132	.06	.0083	.00006889
			$\sum \frac{.155}{n} =$		$\sum \frac{.00041678}{n-1} =$
			$\bar{X}_1 = .0517$		$S_1^2 = .00020839$

SHERD TEMPERED

Level	rim Sherds	total Sherds	$\frac{rim}{total}$ (xi)	$\frac{rim}{total} - \bar{x}$ 2	$\left(\frac{rim}{total} - \bar{x}\right)^2$
0-6	0	122	.00	.00	.00
6-12	0	42	.00	.00	.00
12-18	0	0	.00	.00	.00
			$\sum \frac{0}{n} =$		$\sum \frac{0}{n-1} =$
			$\bar{X}_2 = .00$		$S_2^2 = 0$

$$\bar{x} = \frac{\sum xi}{n}$$

$$s^2 = \sum \frac{(xi-\bar{x})^2}{n-1}$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n-1)\, s_1^2 + (n-1)\, s_2^2}{n_1 + n_2 - 2}} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$t = 6.21$

No true bone or shell-tempered sherds were found, and only two sherds tempered with vegetable matter were identified. These have the characteristic tiny voids in the paste where the organic matter was burned out. Quite a few other sherds were found with charred remains in the inner wall of the sherd, but these are probably the result of scraping the vessel with a handful of grass. There is no reason to assume that this indicates vegetable tempering.

DESCRIPTION OF POTTERY

MANUFACTURING TECHNIQUES: Almost all of the sherds examined show coiling in that the vessels broke along coil junctures. As Ambler has mentioned (1967:32-33), the coil junctures slope downward from the exterior to the interior, indicating, a lapping process. The sherds also exhibited smoothing on the inside, probably as a result of having been scraped by coarse grass or twigs. The uneven finish and scratching on the exterior of some sherds suggests that the sherds were given their final form and surface texture by use of the paddle and anvil followed by rough smoothing.

FORM: Four vessels were sufficiently restored to show what the vessel

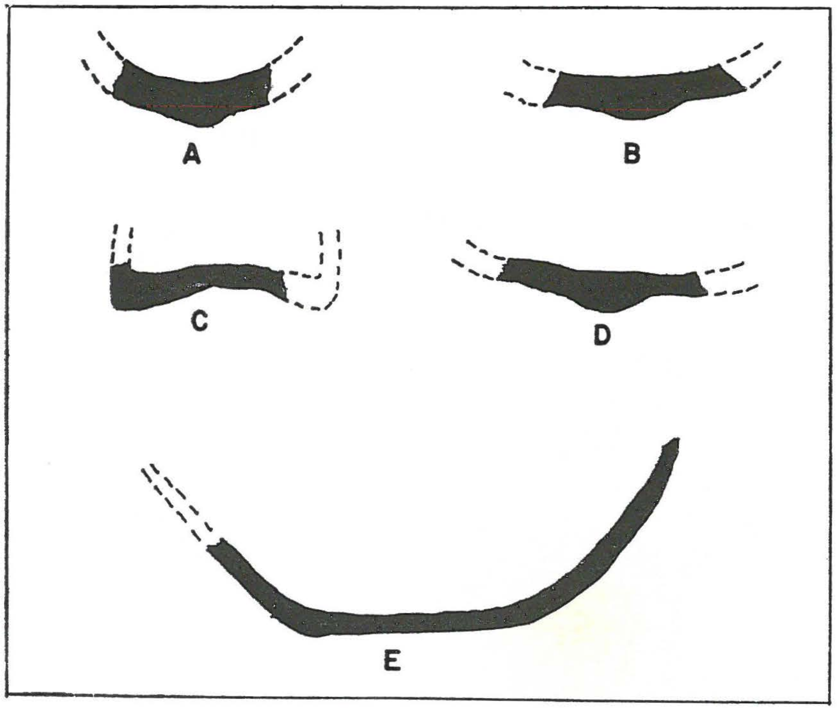


FIG. 5. Base shapes of vessels from Fullen Site. a, b, d, convex, noded bases; c concave base; e, flat base.

looked like. Two are what Ambler (1967:33) calls deep bowls, with much greater rim diameters in relation to body height. The other two resemble what he calls jars, with deep bodies compared to rim diameter. Some of the sherds in the collection are probably from shallower bowls, but no positive proof is available other than the sloping appearance of some of the rim sherds. Most of the rims are rather flat and have nicks on them, but they may be sharp, scalloped or outturned.

The bases are usually thickened, accounting for the node. Other bases are flat, rounded, and one is concave (Table 4); the concave base is unique (Fig. 5 c). This sherd has sand temper and is light tan in color, with a maximum concavity of about .5 cm. Considering that no other concave-base vessels have been reported from Galveston Bay area sites, it is possible that this sherd is from a vessel that was traded into the region.

TABLE 4

	Depth in Inches				*Total*	
	0-6	*6-12*	*12-18*	*18-24*		
Sand Tempered						
Flat based	—	4	—	—	4	
Round based	—	—	—	—	—	
Concave based	1	—	—	—	1	
Noded based	4	3	1	—	8	
Total	5	7	1	—	13	13
Sherd Tempered						
Flat based	—	—	—	—	—	
Round based	1	—	—	—	1	
Concave based	—	1	—	—	1	
Noded based	2	—	—	—	2	
Total	3	1	—	—	4	4
Grand Total						17

DECORATION: Of 96 rim sherds recovered, 43 were decorated with incisions or punctations (Table 5). This total includes three or four pieces that did not actually have a rim connected but appeared to have come from the rim area. This number does not include any nicked, unincised rims and includes only designs which extend down the body wall. This is in keeping with the requirements set up by Suhm, Krieger and Jelks (1962:57) where they state that Goose Creek Plain (sand-tempered ware) may or may not have lip notching, because it is known to occur on both plain and incised vessels. The notches usually go completely across the lip and are on an average 2 to 4 mm. apart. They may be at right angles to the wall of the vessel or may be diagonal nicks encircling the lip. The incising usually consists of a series of more or less equally spaced horizontal lines. Other design motifs include pendants, triangles and hatching.

TABLE 5
Distribution of Design Elements on Sherds by Level

Depth in inches	HORIZONTAL LINES							PUNCTATIONS			
0-6			2	2	2	6	1		1		
6-12	1	2	3	1	7	5		1	1	1	1
12-											

	LADDERING			TRIANGLES AND PENDANTS						WAVY LINES	
0-6								1			
6-12	2	2		1	1	3	1		4	1	1
12-			1								

Because of the variety of designs and incisions on pot sherds it may be possible to establish a time sequence based on different styles of design. In published reports, it is apparent that the different designs follow a common pattern. The same pattern of design elements (or slightly altered ones) recurs on different vessels at different sites. Suhm and Jelks state:

> In all known cases, the decoration is confined to the rim zone. The most common design consists of from one to six parallel horizontal lines just below the lip, beneath which a single row of punctations occasionally occurs. Pendant triangles filled with diagonal lines or punctations may occur below the bottom line. Other elements include diagonal ladders, ticking on border lines, crossed diagonals and diamonds filled with crosshatching. (Suhm et al. 1962:55).

The designs found at the Fullen Site conform to the usual patterns. In general, horizontal lines make up the majority of designs, with three, four or five lines being most popular.

Meeting these horizontal lines may be one to five parallel lines radiating downward at approximately 45 degrees. In at least two cases these slanting lines are not well lined-up and are not really parallel (Fig. 6 a). In Figure 8 f, the small, angled hatched lines are well drawn and are evenly spaced. In one specimen, eight lines are drawn with intricate care, each one equidistant from the adjacent two lines (Fig. 6 f). This is true with two other sherds (Fig. 6 d, 7 a) which show that care was taken in making the incisions. The cordmarking technique was employed on three specimens; on one it was used on all the lines (Fig. 6 g) whereas on another, cordmarking was used on two of the four lines (Fig. 7 b). Both specimens have wavy banding; Figure 8 b is completely wavy, and Figure 6 g has alternating wavy and straight lines. On another sherd, (Fig. 7 c) a dual banding of cordmarking is found.

The use of linear decoration may or may not be related to time and clearly not all vessels at any one time were decorated. The use of cordmarking was probably a later innovation, coming in well after the introduction of incising.

Comparing our samples with those gathered by others, a pattern of re-occurring designs is evident. Again, this may or may not be related to time; but it is clearly evident that the same design motifs were used at different sites. Plate 28 in the Handbook shows a selected sampling of Goose Creek Incised pottery from various coastal collections. Patterns, B, D, F, K, M, P, R, S, occur at The Fullen Site. The ones that do not occur are mainly those types that exhibit punctations below or in between the horizontal bands. Only five pieces of punctated pottery were recovered from the Fullen Site (Table 2). The majority of the patterns that do occur and which are illustrated in the Handbook are those with two or more horizontally spaced lines. Many of these Goose Creek designs appear on other pottery types, such as those of the Coles Creek and Plaquemine Periods. Aten and Bollich (1969:245) report the presence of a sherd in the Sabine Lake area that highly resembles Harrison Bayou Incised (Plaquemine Period). This sherd, as they state, may be a "stylistic innovation" that later became a part of Goose Creek style. They also recognize that many of the Goose Creek Incised designs, while still belonging to the Coles Creek-Plaquemine tradition, combine design elements into styles not common to the Coles Creek and Plaquemine Periods.

PROJECTILE POINTS

The points were subdivided in the usual manner: large (unstemmed) points, dart points and arrow points.

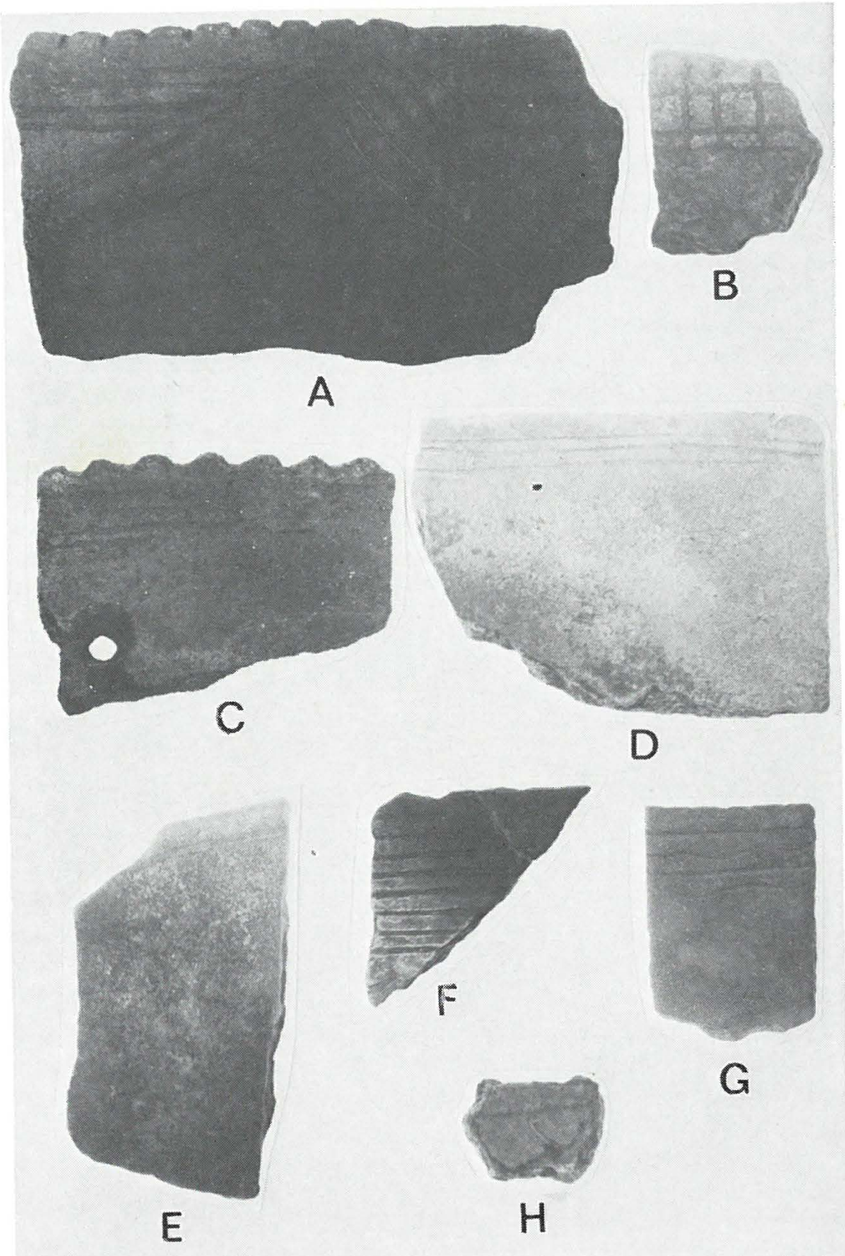


FIG. 6. Design elements on rim and body sherds.

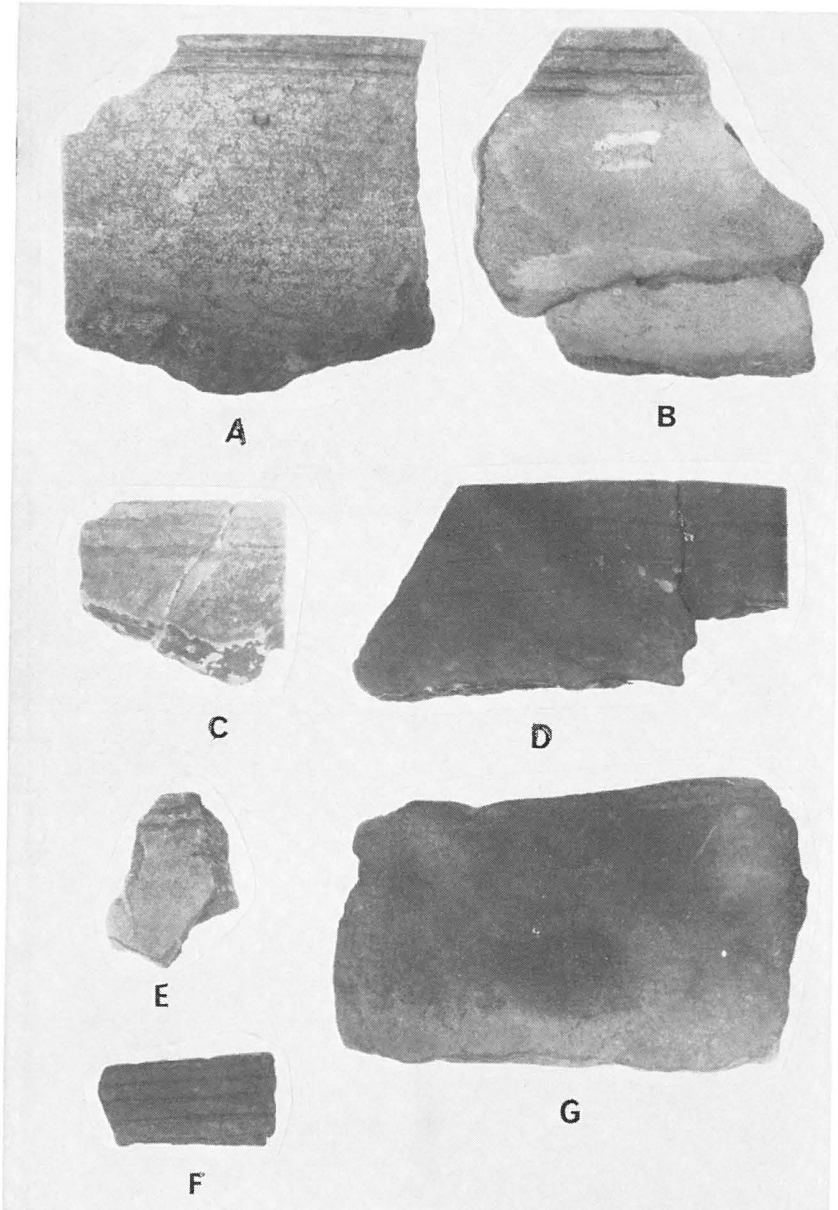


FIG. 7. Design elements on rim sherds.

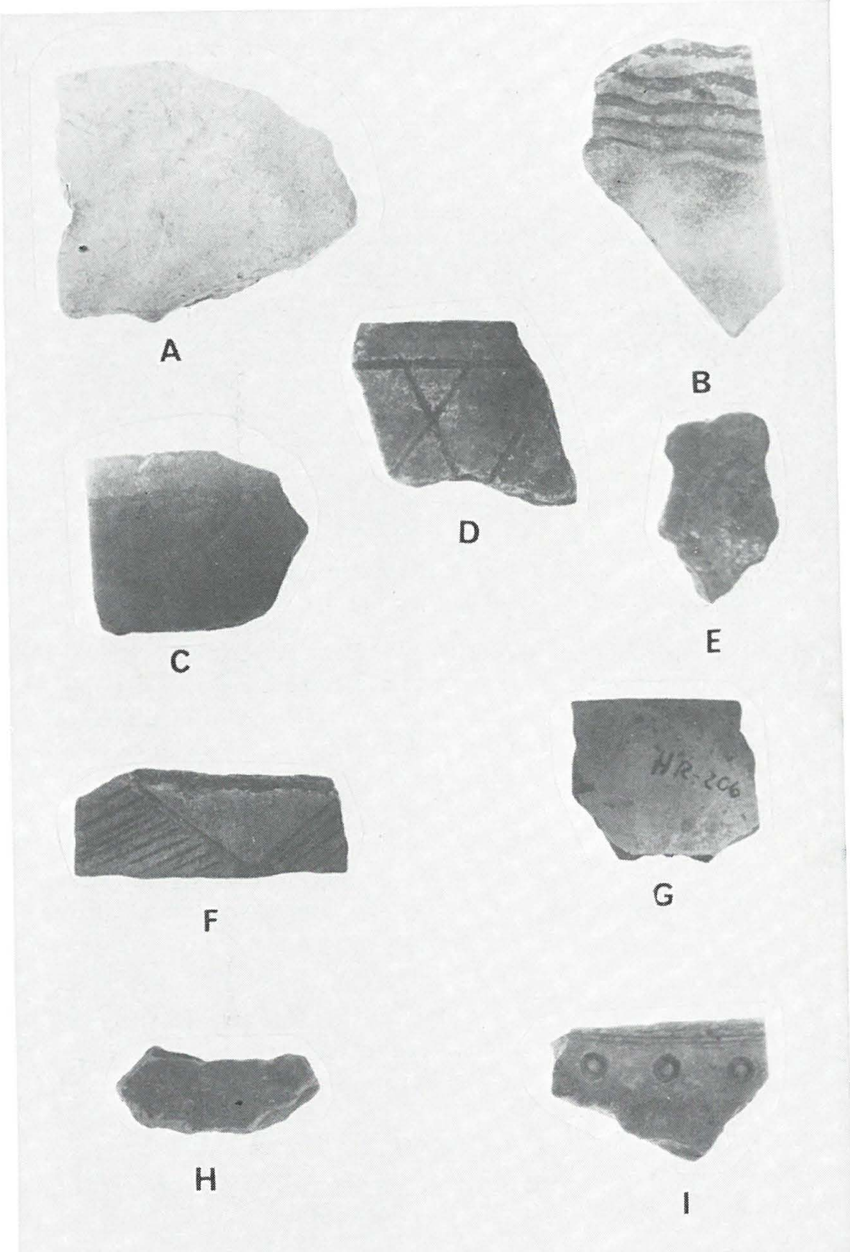


FIG. 8. Design elements on rim and body sherds.

LARGE UNSTEMMED POINT (Fig. 9 a). This point whose workmanship is unusually good, is from square 3N 2W where it was found four inches below the surface. Its appearance was a total surprise; nothing like it had been found previously and nothing else like it was found later. The point is of a gray banded flint with deep red and white stripes and speckles in it; similar to flint found at the Alibates quarry in the Texas Panhandle. The point, 12 cm. long and 2.5 cm. wide at the base, somewhat resembles an Angostura point from Baytown (Ambler 1967:63); however it is *not* an Angostura. It has a semi-flute on one side, which has been caused by the removal of a large flake. The thinness of the point and the basal grinding made the proximal section almost translucent. Secondary chipping makes the edges slightly serrated.

DART POINTS

KENT (Fig. 10 a-c). Three points were classified as Kent (Suhm, Krieger and Jelks plate 100). On two of these crude points the bases were not finished. Sizes range from 3.25 to 5 cm. in length and from 2 to 2.5 cm. in width. One point is made of tan petrified wood and the other two are made of chert—one orange in color, the other dull pink.

CATÁN (Fig. 10 d, e). Only two specimens were found which could fit this category. The more slender of the two seems to also fit the type Nodena, but since the distribution of the latter type is confined mainly to the Arkansas-Missouri area (Bell 1958:69), it was thought best to include the specimen in the Catán category (Suhm, Krieger and Jelks 1962:Plate 88). The thicker, cruder specimen is 4.25 cm. long and 2.5 cm. wide and is made of yellow chert. Half of one side is unchipped; the cortex still remains on the point. It is possible that this is a preform. The other specimen is 4.5 cm. long and 2 cm. wide and made of tan chert.

ARROW POINTS

PERDIZ (Fig. 10 f-h). Three points fit this category (Suhm, Krieger and Jelks, 1962:Plate 142). The sizes range from 2 to 2.5 cm. in length and 1.5 to 2 cm. in width. Two of the specimens have wide flaring and small, stubby bases formed by contracting stems. The third specimen has small, downpointing shoulders and a wider stem. All three points are made of tan chert. It is interesting to note that Perdiz points are used in the Central Texas Aspect to define the Toyah Focus. The significance of the preceding statement will become evident below.

SCALLORN (Fig. 10 i, j). Two Scallorn points were found, one 2 cm. long and 1.25 cm. wide and made of white chert (Suhm, Krieger and

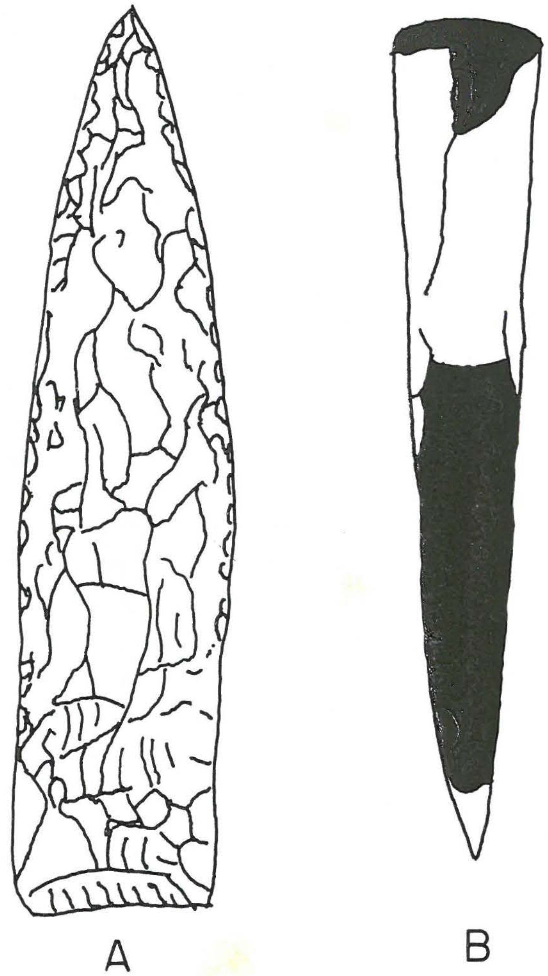


FIG. 9. A. Large unstemmed point; B. Bone awl or socketed projectile point.

Jelks, 1962:Plate 143); the other broken and made of pink chert. In the Galveston Bay areas, Scallorn points have only been reported previously at the Addicks Dam site (Wheat, 1953:Plate 34) where ten were described (five under the Eddy category). In Central Texas, Scallorn points are characteristic of the Austin Focus (Kelley, 1947a, Suhm 1958). As mentioned above, the Toyah Focus, which is more recent than the Austin Focus, has only Perdiz points (Sollberger 1967).

It is interesting to note that the two Scallorn points were both excavated by the author at a depth of ten inches. The three Perdiz points

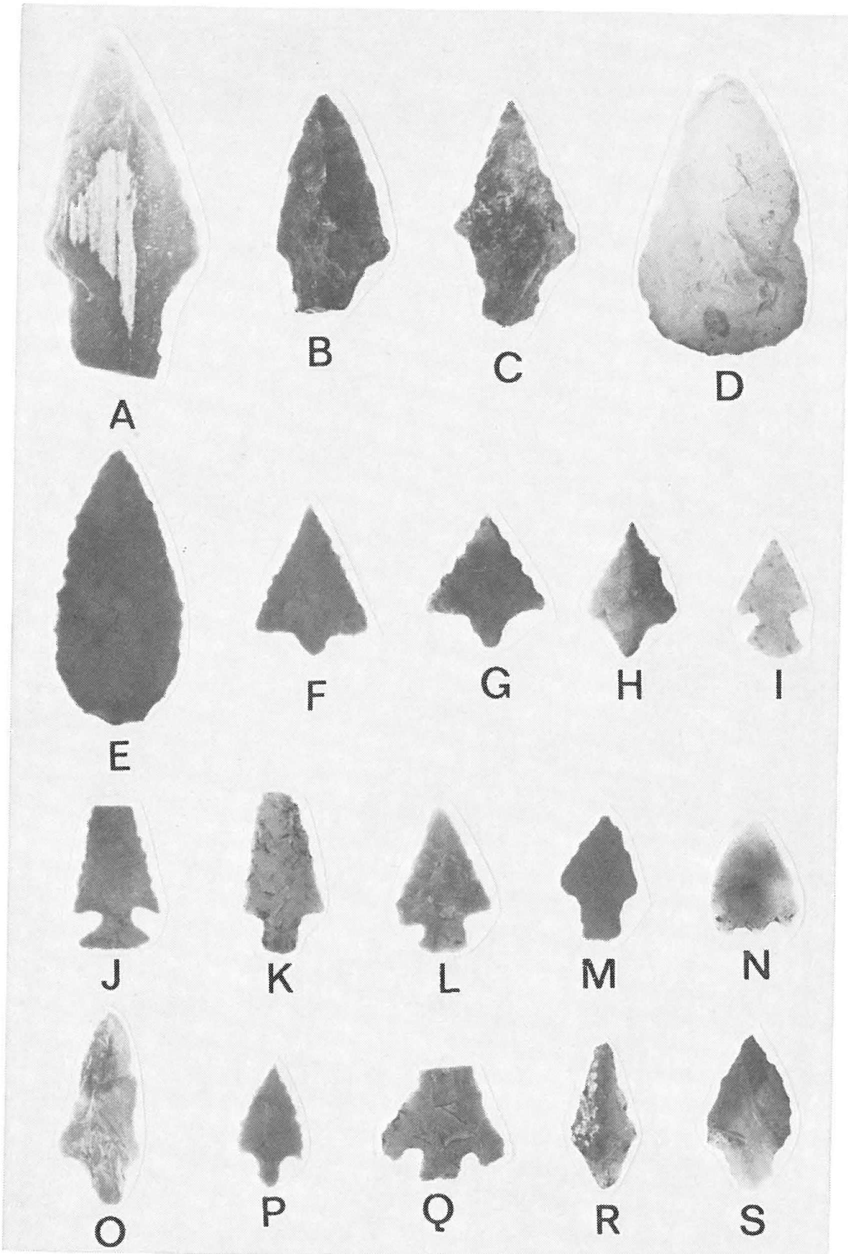


FIG. 10. Projectile points: a-c, Kent; d, e, Catan; f-h, Perdiz; i, j, Scallorn; k-m, Alba; n, Bassett; o, Sinner; p, Bonham; q, Catahoula; r, s, Unidentified.

all came from the eight inch level. This finding seems to generally support the Central Texas findings. However, at Addicks, Wheat found the Scallorn and Eddy to occur stratigraphically later than the Perdiz (Wheat, 1953:202).

ALBA (Fig. 10 k-m). Three points designated as Alba (Suhm, Krieger and Jelks, 1962:Plate 132) were excavated. The longest specimen was broken on the stem but intact it would have measured about 3 cm. long and 1.25 cm. wide. It is made of light tan chert. The other two are each 1.5 cm. long and approximately 1.25 cm. wide. One is made of deep red chert and the other is tan chert.

BASSETT (Fig. 10 n). Only one Bassett point (Suhm, Krieger and Jelks, 1962:Plate 133) was found. It is made of brown chert, measures 1.75 cm. long and 1.25 cm. wide and is chipped only on one side.

BONHAM (Fig. 10 p). The single example of a Bonham point is made of white chert and measures 2 cm. long and 1 cm. wide (Suhm, Krieger and Jelks, 1962:Plate 134). Like the Bassett point, it too is chipped on only one face.

CATAHOULA (Fig. 10 q). Only one example of a Catahoula point was found. This brown chert point is broken on the blade, but would have measured approximately 2.5 cm. long had it been whole. This type is described by Bell (1960:Plate 8) and was named by C. H. Webb from examples found near Catahoula Lake, Louisiana. Bell mentions that the age of the Catahoula point is uncertain but that it appears to be associated with Plaquemine materials in Louisiana, which may indicate an age of 1200-1600 A. D. as compared with the span of 1000-1500 A. D. for the Perdiz point (Suhm, Krieger and Jelks, 1962:283).

SINNER (Fig. 10 o). One crude point was found which may be a Sinner, a type first proposed by Gregory and Webb and discussed by Webb in his Resch Site Report (Webb et al., 1969:52). The specimen is of red and yellow chert and is 3 cm. long and 1.25 cm. wide. The two notches are on the strong-shouldered side. The stem is slightly contracting and the base is slightly thinned.

UNIDENTIFIED (Fig. 10 r, s). Two small points, both having contracting stems and slight, unifacial chipping, could not be typed. Both are of tan chert; one measures 2.25 cm. by 1 cm. and the other 2.25 cm. by 1.25 cm.

OTHER STONE TOOLS

There are many problems encountered when setting up a classification of chipped stone tools; however, it was thought best to use the conventional method of classifying them on the basis of size and shape.

UTILIZED FLAKE (Fig. 11 b). One pointed flake of tan chert, perhaps a projectile point, measured 3.5 by 2 cm., and appeared at the 12-15 inch level.

ELONGATE KNIFE (Fig. 11 c). A long unifacially chipped knife or scraper, measuring 7.25 cm. long, 2.25 cm. wide and .75 cm. thick, has a quarter twist to it and was formed by the removal of flakes from both sides of a steep medial ridge on its back. This piece is made of olive chert and still has the original cortex on its distal end. It and the following two specimens were found in the 6-12 inch level.

STEMMED SCRAPER (Fig. 11 d). One small knife or scraper, measuring 2 by 2.25 cm., is made of tan chert and has a thinned base.

SMALL BIFACE (Fig. 11 e). This small rectangular object of mottled gray chert measured 3 by 2 cm. and is 1.25 cm. thick at its widest end. The other end is thinned down to a fine edge by the removal of large wedge-shaped chips.

NET SINKER (Fig. 11 a). A piece strongly resembling a fish net sinker has been ground and has a semi-circle of pecked holes around its mid-section. A hole near the tapered end has been added to facilitate tying. It is made of a gray sandstone and is 7.5 cm. long and 3.5 cm. wide.

OBJECTS OF BONE

Two large awls were recovered along with seven other pieces of worked bone. One (Fig. 9 b) tapers to a sharp point, having been polished along its entire length. The other (Fig. 12 ee') is smaller and exhibits the same general workmanship. The two artifacts are labelled bone awls; however, they may have served as socketed projectile points. No trace of asphaltum was found on them. Both were made from deer metapodials. One ulna awl was found with the distal end ground to a blunt point (Fig. 12 a).

MISCELLANEOUS OCCUPATIONAL REFUSE

DEER BONES. A total of over 200 deer teeth and mandible fragments were found scattered throughout the occupational level. Many teeth were still in place in the jaw and included incisors and molars.

In addition to the teeth and jaw fragments, excavations recovered over 10,000 fragments of recognizable mammal bone—most of which are assumed to be deer bones. The bones seem to have been cracked open for marrow, apparently by pounding, since they are badly splin-

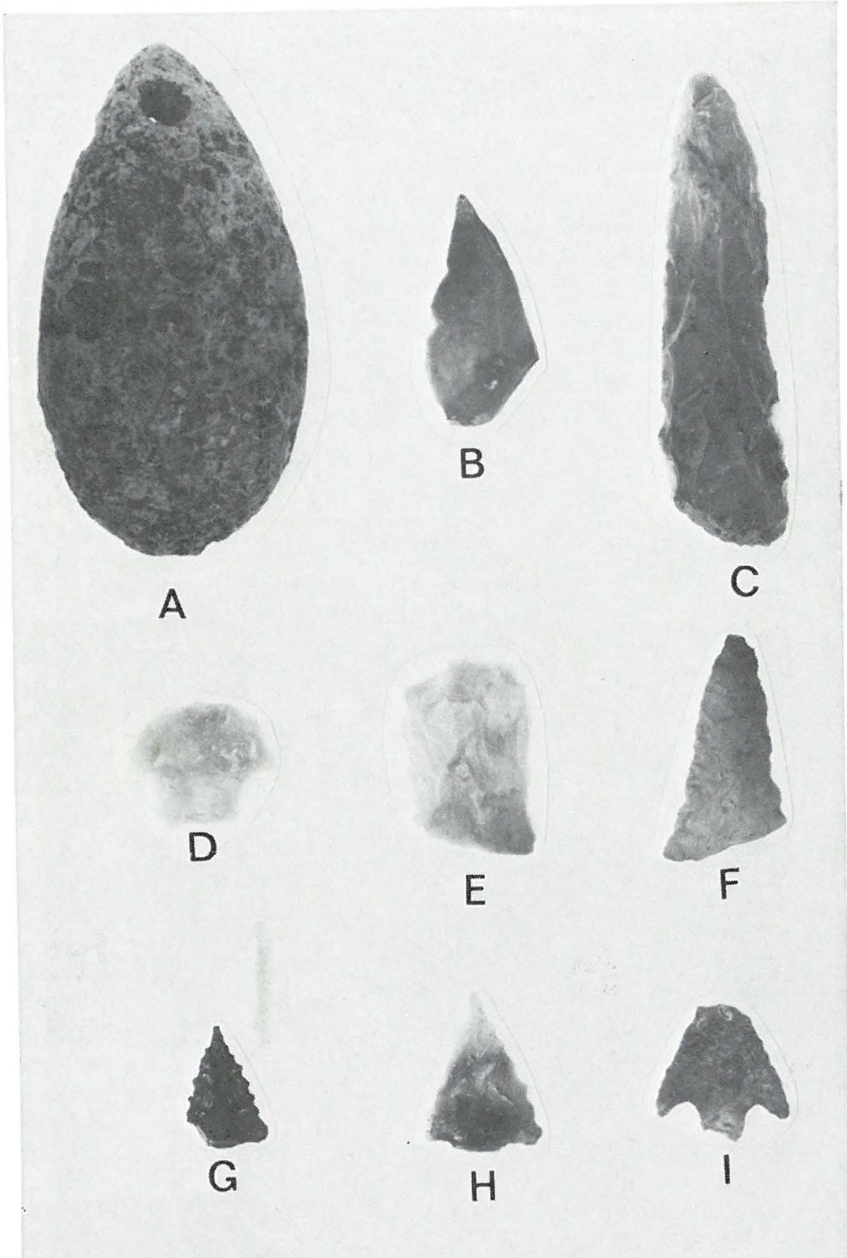


FIG. 11. Tools: a, Weight; b, Utilized flake; c, Elongate knife; d, Stemmed scraper; e, Small biface; f-i, Broken projectile points.

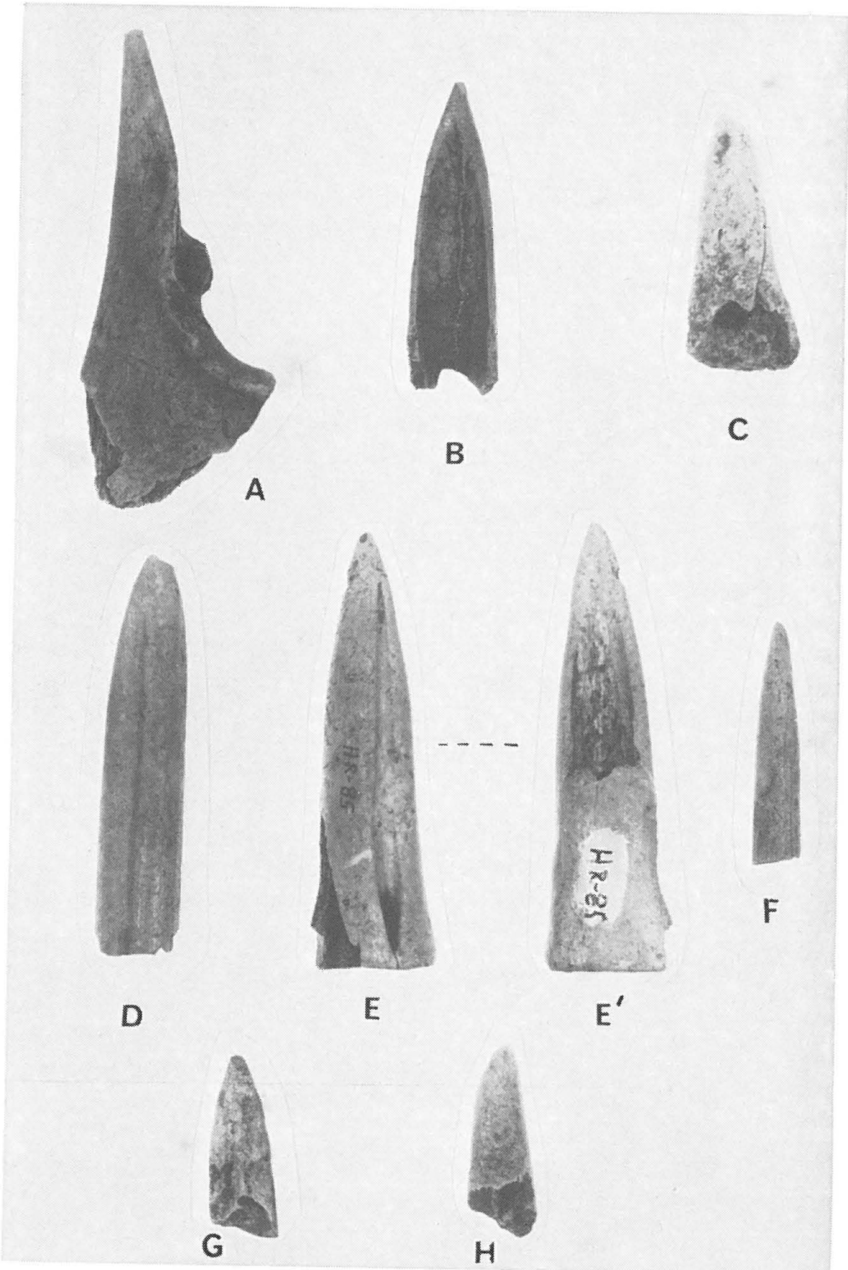


FIG. 12. Artifacts of Bone: a, Ulna awl; b-f, Awls or socketed projectile points; g, h, Worked antler tines.

tered. Sixteen pieces exhibit cutting and scratching, presumably by flint knives and scrapers.

TURTLE CARAPACE. Several hundred fragments of turtle carapace (probably land terrapin) were found. The species has not yet been identified.

RODENT BONES. Several rodent bones were recovered, including an intact mouse jaw-bone and teeth.

GAR SCALES. Four hundred and eight gar scales were collected (estimate), the size ranging from .5 to 3 cm. in length. The exact species (speces) is not known.

BISON BONES. What appears to be an astragalus from a bison was found along with a large tooth. The astragalus was from the 0-6 inch level while the tooth's provenience is not known.

Cultral Stratigraphy

Because the lower part of the shell midden contains no artifacts it suggests a pre-pottery occupation. Only two small sherds were found below the fifteen inch level and these may have worked down among the shells or may have been buried. Every point was found on levels with pottery, except for one Kent, which was found sixteen inches deep. The five dart points found were from twelve to sixteen inches deep along with some amount of pottery. The deepest tool found was a long, ridged scraper (see Fig. 11 c) which was taken from square ON 6E at a depth of ten inches.

If dates from the earliest pottery horizon at Wallisville (Aten, 1967) can be applied here, the lowest level in which pottery occurs somewhat regularly should be about the second century A.D. Anything below this level must ante-date that period.

The use of incised pottery seems to begin somewhere in the middle of the sequence. Table 2 bears this out. The lowest level in which incised pieces occur is twelve inches (except for one piece found at thirteen inches). Most of it occurs in the 0-6 inch level. Dates at Wallisville have shown that from 150 A.D., pottery is undecorated and flat based. At the Wright Site (Ambler, 1967:75) decorated pottery occurs as deeply as any pottery, so the earliest pottery making period as found at Wallisville is not found there. It must be remembered that decorated pottery as described in Ambler's report may or may not include lip-notching. Ambler points out that at the Wright Site "lip nicking, incised decorations, and noded bases are present in the earliest pottery assemblage and that these attributes precede the use of crushed sherds as a tempering agent" (Ambler, 1967:75).

In the Fullen Site noded bases occurred at the beginning of the pottery phase and continued throughout (Table 4). Flat bases appear to come in later in the sequence and were fairly short-lived. It should be noted, however that the paucity of bases from the lower pottery levels makes this assessment inconclusive. The small number of round bases come in about the same time as flat-based vessels and continue up through the sequence. The one concave based specimen was from the upper level; it appears along with noded bases.

SUMMARY AND CONCLUSIONS

The Fullen Site is a small campsite which has yielded 2,000 pieces of pottery, 10,000 pieces of bone and a handful of tools. It has strong suggestions of stratigraphy of pottery, both sand and sherd-tempered and plain and incised vessels. This may be its biggest asset. It in some ways matches other *Rangia* middens dug in the area while at the same time it does not match others.

The stratigraphic sequence is:

1. At the bottom of the midden there is a suggestion of a pre-pottery horizon that contains bone and shell and dart points. Shell here ranges from 100% *Rangia cuneata* at twenty-four inches to 100% *Crassostrea virginica* at twenty-one inches (Grid IS IW). Figure 4 c gives the general percents of shell over the site. A few potsherds were found here, probably as a result of having worked their way down through the soil.

2. The next natural level is about sixteen inches (a little lower in some grids) where the actual pottery horizon starts. In this level only one incised sherd was found and no sherd-tempered pieces were recovered. The one base from this level was noded. Shell in this level is mostly Rangia. Three dart points were the only projectiles found.

3. The third level starts at about thirteen inches and is almost completely *Rangia*. With this level comes the introduction of worked bone and arrow points, though dart points are still present. Sherd-tempered pottery starts here as does incised ware. The bases range from rounded to flat to noded. The flat bases, not seen in the previous level, give out near the six inch mark while the noded bases seem to gain strength over the one found in the previous level.

4. In the uppermost level, the three arrow points were the only projectiles found, there were no dart points. *Rangia* is still the predominant shellfish and vessels (sherd and sand-tempered) have noded bases. Rounded bases are still rare and there is one occurrence of a concave-type base.

As a unit, the artifacts and bone which comprise the non-shell part of the midden strongly suggest an economy of hunting.

The major source of food for the inhabitants of the site seems to have been clams (*Rangia cuneata*) and oysters (*Crassostrea virginica*). *Rangia* prefer low salinity while oysters prefer higher salinity and probably lived further off-shore than the clams did. These two shellfish are indicative of their environment although some overlap may be found. Fluctuation in rainfall then, would cause the rise and decline of populations of clams and oyster.

Not only were fish and shellfish easily obtainable, but the land resources were also plentiful. Looking at the collection of bones extracted from the midden, it is obvious that deer and many other animals were eaten. The environment, thus, was similar to todays for deer, rabbits, squirrels, rats, raccoons, turtles and snakes are still seen along with occasional garfish and bobcats.

While investigating this site, the two questions that occurred and re-occurred in everyone's mind were—"what kind of encampment was this," and "why were there apparent changes in the technology of the inhabitants and in the environment which resulted in stratigraphic changes in the midden?" Was this a summer camp where the Indians might have come to collect shellfish? Was it a permanent encampment? If so, why do we find sporadic piles of refuse placed here and there? It is almost as if the Indians camped on one spot of the midden for awhile, left, came back and lived on another part of the midden for a while. This is probably why one finds discontinuous piles of garbage on sites such as this one. After looking at this midden and at shell middens in general, one gets the idea that they were not too well protected from the elements. They are usually situated on points of land, barren of trees and vegetation and are usually the highest elevation around. It stands to reason that the inhabitants would not stay here and battle the cold, when, by moving up the bayous into what is now the Houston area, they were afforded better protection from the elements. This pattern of seasonal movements seems to explain the discontinuous stratigraphy and also the fact that similar pottery and stratigraphic sequences are found quite far away from one another.

Acknowledgments

The course offered in Gulf Coast Archeology was originally organized by Miss Mary McCutcheon with the assistance of Drs. Robert Eisenberg and Robert Lankford, both of Rice University. The original group of excavators included Ted Henderson, Mike Pewitt, Bonnie Laird, Allison Hill, Phyllis Schwethelm, Larry Flournoy, Carolyn

Tallent, Jim Eakins, Jim Wickberg, John Caldwell, Rick Suggs, Ginger Young, Mary McCutcheon and Mike O'Brien.

Dr. Lankford supplied the data on the geology of the area and its effect on the surrounding ecology.

The author would like to thank Mr. and Mrs. W. L. Fullen of Deer Park, Texas, for obtaining the site from Friendswood Development Co., through the Houston Archeological Society. Mr. George Meriwether III, of Friendswood Development has the author's deep appreciation for his interest and protection of the site. Finally a debt of gratitude is owed to Dr. Frank Hole, also of Rice, who gave advice on the preparation of this report.

References Cited

Ambler, J. Richard

1967. Three Prehistoric Sites near Cedar Bayou, Galveston Bay Area. *State Building Commission, Archaeology Program,* Report No. 8.

Aten, Lawrence E.

1966. Pottery Types of the Lower Trinity River Area, Texas. Mimeographed manuscript.

1967. *Excavations at the Jamison Site* (41LB2) Liberty County, Texas. Report No. 1 of the Houston Archeological Society.

Aten, Lawrence E. and Charles N. Bollich

1969. A Preliminary Report on the Development of a Ceramic Chronology for the Sabine Lake Area of Texas and Louisiana, *Bulletin of the Texas Archeological Society,* Vol. 40.

Bell, Robert E.

1960. Guide to the Identification of Certain American Indian Projectile Points. *Special Bulletin No. 2, Oklahoma Anthropological Society.*

Kelley, J. Charles

1947a The Lehmann Rock Shelter: A Stratified Site of the Toyah, Uvalde and Round Rock Foci. *Bulletin of the Texas Archeological and Paleontology Society,* Vol. 18.

Suhm, Dee Ann

1958. A Review of Central Texas Archeology. *Bulletin of the Texas Archeological Society,* Vol. 29.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks

1962. *Handbook of Texas Archeology: Type Descriptions.* Texas Archeological Society Special Publication, No. 1 and Texas Memorial Museum Bulletin No. 4.

Sollberger, J. B.

1967. A New Type of Arrow Point with Speculation as to its Origin. *The Record.* Vol. 23, Dallas, Texas.

Webb, Clarence H., Forrest E. Murphy, Wesley G. Ellis and H. Roland Green

1969. The Resch Site 41 HS 16, Harrison County, Texas. *Bulletin of the Texas Archeological Society,* Vol. 40.

Wheat, Joe Ben
1953. An Archeological Survey of the Addicks Dam Basin, Southeast Texas. *Bureau of American Ethnology, Bulletin* 154.

Rice University
Houston, Texas

Appendix

QUATERNARY GEOLOGIC HISTORY OF THE CLEAR LAKE AREA

The study area is located near the westside of Galveston Bay and approximately twenty-five miles inland from the Gulf of Mexico shoreline at Galveston, Texas. The regional topography is a nearly featureless coastal plain which slopes gently toward the Gulf with an average dip of about 1.2 feet per mile. In the study area, the coastal plain is formed by the surface of the Beaumont formation, the youngest of the sedimentary subdivisions of the Pleistocene recognized in the upper Texas coast (Bernard and LeBlanc, 1965).

The Beaumont formation is composed of a laterally variable complex of poorly-consolidated sediments—gravels, sands, silts and clays—deposited in a variety of terrestrial and nearshore environments as sea level was lowered during the last (Wisconsin) glaciation (Bernard, 1950; Henry, 1956). During lowered sea level, the sediments of the Beaumont formation were extensively altered by subareal weathering and soil forming processes. Surficial soil characteristics today include evidence of dehydration, leaching and oxidation phenomena and the accumulation of pedocal soil layers with a dark, humic A Zone and, significantly, the precipitation of nodular caliche (calcium carbonate) in the light colored B Zone. The caliche identifies the soil as a pedocal and as having been formed in an arid climate in which evaporation exceeded precipitation. Today, precipitation exceeds evaporation in the study area. Soils actively forming in the present humid climatic environment are defined as pedalfers characterized by the presence of ferruginous nodules and a brown-to-red B Zone. Such iron nodules are relatively common, although rather small (1 to 4 mm. in diameter), within the thin soil of the midden and indicate that essential modern climatic conditions existed when the site was occupied.

In addition to the soil characteristics, other factors of the geology bear directly on the archeological interpretations. The local topography is secondarily developed on the gently dipping coastal plain surface described above. The glacially controlled lower sea level resulted in stream erosion of the previously deposited Beaumont formation and the creation of incised river and stream valleys (Fig. 1). The major

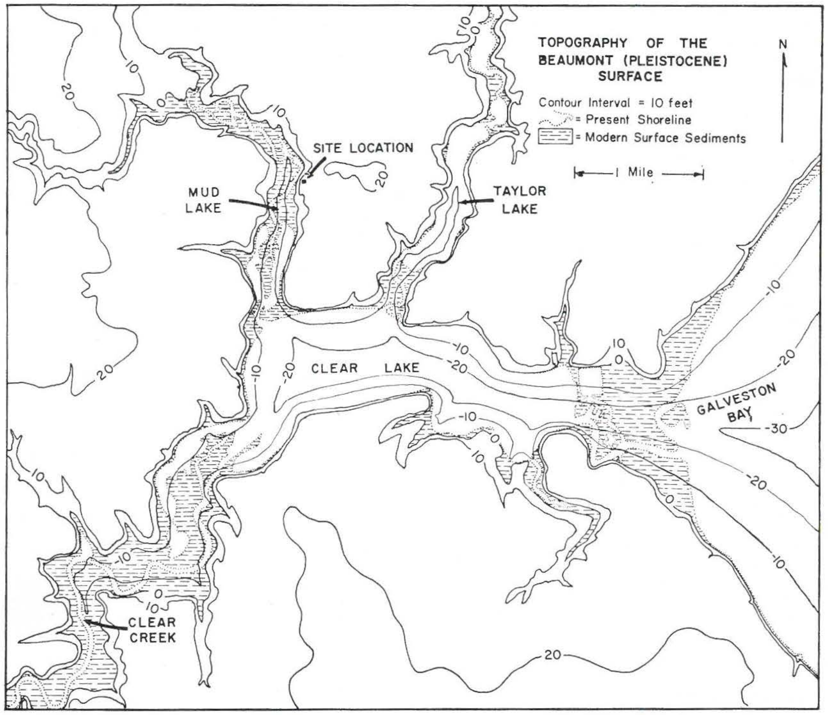


FIG. 1. Inferred topography of the surface of the Beaumont formation (Late Pleistocene) showing depth of stream valley erosion. Surface data are from U.S. Geological Survey, topographic map, League City, Texas quadrangle. Subsurface data are extrapolated from core hole and seismic information in Galveston Bay (Rehkemper, 1969).

drainage system in the Houston-Galveston area was the Trinity River and its tributaries, including Clear Creek and its feeder streams. The rise of sea level following the wane of Wisconsin glaciation resulted in the inundation of the incised valleys. Today Galveston and Trinity bays are the flooded remnants of the ancient Trinity valley. Locally Clear Lake, Mud Lake and Taylor Lake are flooded tributary and feeder valleys west of the main drainage system.

Significant modifications have occurred in these various estuaries since sea level reached its present stand about 4000 years ago (Rehkemper, 1969). Within the last 4000 years, locally derived sediments have infilled much of Clear Lake, Mud Lake and Taylor Lake and it would appear that the process of sedimentation has continued to the present. In addition, the mouths of Mud Lake and Taylor Lake are almost completely barred from Clear Lake and Clear Lake itself now has only very restricted communication with Galveston Bay (Fig. 1). The formation of bars or barriers across the mouths of embayments such as Clear Lake or Mud Lake is a result of longshore transportation and the trapping of sediments by fringing marshes. Like sedimentation infilling, this also is a process which has continued to the present.

The combined effects of initial flooding of the valleys followed by sedimentation infilling and barring of the embayments has resulted in a continuous change in the environmental characteristics of the Clear Lake area and consequently a change in its *Rangia* and *Crassostrea* faunas. Extrapolating from data and conclusions given by Rehkemper (1969) from adjacent Galveston Bay, the following is a proposed history of environmental change for the Clear Lake area:

STAGE 1. Saline waters accompanying the last rise of sea level first entered the lower Clear Lake estuary about 6500 years ago. The initial intermixing of salt water and discharge from Clear Creek would have produced a weakly brackish water environment similar to that occurring in modern upper Trinity Bay adjacent to the Trinity River delta. The pelecypod, *Rangia*, would have flourished in Clear Lake.

STAGE 2. Sea level rapidly rose about twenty feet and attained approximately its present level during the next 2500 years thus forming a relatively deep and more saline embayment than had previously existed. Increased salinity shifted the *Rangia* environment toward the head ends of the Clear Lake estuary and locally the oyster, *Crassostrea*, colonized the higher salinity areas.

STAGE 3. Once rising sea level stabilized and attained its present stand about 4000 years ago, the processes of sedimentation infilling and barring of the embayments resulted in restricted communication with Galveston Bay and a decrease in salinity throughout the Clear Lake area. As a consequence, the *Crassostrea* reefs would have gradually diminished to be replaced by extensive *Rangia* beds.

According to T. E. Pulley (personal communication), the present-day Clear Lake area is predominantly a *Rangia* environment. There are, however, intermittant occurrences of *Crassostrea* geographically restricted to a small area near the inlet which connects Clear Lake with Galveston Bay. During prolonged periods (2 to 3 years or more) of decreased rainfall, the bottom water salinity near the inlet will increase and small oyster reefs will grow until the drought ends and salinity declines.

Summary

The geologic history of the area has direct bearing on the type, quantity and proximity of shellfish, principally *Rangia* and *Crassostrea*, available to the Indian inhabitants. Since these two pelecypods have separate ecologic requirements and the ecology of the area has changed with time, it is possible to relate the midden shell stratigraphy to the environmental history and thus fix the period of occupation.

The vertical succession of shell debris in the midden changes through successive layers from a basal unit of pure *Rangia* to a surface unit consisting of 75% *Rangia* - 25% *Crassostrea*. This sequence quite possibly documents a period of increasing salinity in the Clear Lake area. The geologic history outlined above has two periods in which the salinity increased: 1) the period shortly after initial flooding of the estuary (Stage 1), 2) the modern period which contains an unknown number of salinity increases due to drought (Stage 3).

The fresh appearance and relatively unleached nature of the midden shell essentially precludes the first and older possibility, i.e., that the site is from 5000 to 6500 years old. It seems more likely that Stage 3 events would satisfactorily explain the midden shell succession.

In an attempt to set limiting dates for the occupation during Stage 3, the following is proposed: The basal midden unit consisting of 100% *Rangia* would document a weakly brackish environment which would post-date the formation of the barrier across the mouth of Clear Lake. The barrier could not have been initiated until after sea level reached its present stand about 4000 years ago; the *Rangia* environment most likely was not created until the barrier formation was completed. With admittedly all too few data on barrier growth rates, it is estimated that the Clear Lake barrier required from 1500 to 2000 years to form and consequently the *Rangia* environment is not older than about 2500 years. The subsequent occurrences of *Crassostrea* most likely represent short-term, drought-induced occurrences of higher salinities and, as yet, cannot be fixed in time.

References Cited

Bernard, H. A., and Le Blanc, R. J.
1965. "Resume of the Quaternary Geology of the Northwestern Gulf of Mexico," *in* Wright, H. E. Jr., and D. G. Frey, eds. *The Quaternary of the United States,* Princeton University Press, p. 137-186.

Henry, V. J.
1956. "Investigation of Shoreline-like Features in the Galveston Bay Region, Texas." Texas Agr. & Mech. Coll., Dept. Oceanography, Tech. Rept., Proj. 24, 76p.

Rehkemper, L. J.
1969. "Sedimentology of Holocene Estuarine Deposits, Galveston Bay". *in Holocene Geology of the Galveston Bay Area*, compiled by Lankford, R. R. and J. J. W. Rogers, Houston Geological Society, p. 12-52.

Rice University
Houston, Texas

An "Eolith" From Lower Pleistocene Deposits of Southern Texas

Thomas Roy Hester

ABSTRACT

A flint object was found in association with Pleistocene fauna in Duval County, Texas (Fig. 1) in 1888. It has been referred to as an artifact in at least two publications. Recent studies of the piece have established that it is not the result of human manufacture.

ACKNOWLEDGMENTS

I would like to thank Dr. Clifford Evans of the U.S. National Museum of Natural History (Smithsonian Institution) for making the specimen available for study and for granting permission to publish this note. Thanks are also due to Drs. Robert F. Heizer and J. Desmond Clark (Department of Anthropology, University of California, Berkeley) for examining the specimen.

INTRODUCTION

In the Annual Report of the United States National Museum for 1888, the following statement by Thomas Wilson (1890) appears:

> "Another accession (21181, Catalogue No. 139817) which may prove of importance is a flint implement of the rudest type, being merely chipped to a point, or with an edge not more than an inch in width, which was discovered by Mr. William Taylor, of San Diego, Texas, in San Diego Creek, one-half mile from the town of San Diego. It was found by him 3 or 4 or more feet under the surface in undisturbed layers. Mr. Taylor has found several other implements of the same kind, showing that this was not a solitary or isolated case. This implement becomes important from the fact that it was found near the top of the equus beds of that district, which have become celebrated in the palentology and geology of our country. The Mylodon, Glypdoton, Elephas and three species of Equus, all extinct animals, have been found fossilized in these beds, and it seems agreed among scientist that these beds belonged to the Tertiary geologic period" (Wilson, 1890:116-127).

This report received no attention until a number of years later when it was cited by E. H. Sellards during his studies in the Beeville area:

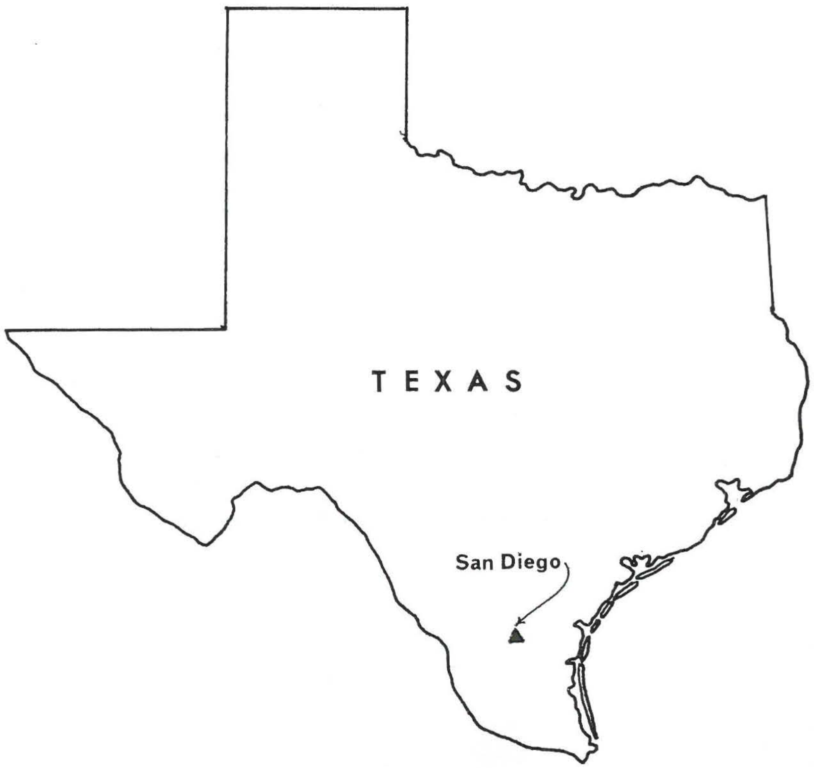


FIG. 1. Location of the San Diego Locality, Duval County, Texas.

> ". . . it is known that a William Taylor lived in San Diego, Duval County, Texas, and made a collection of fossils on San Diego Creek about 1888. It is believed, therefore, that the type locality of *Equus giganteus* is on San Diego Creek, Duval County, Texas, which is only about 70 miles from the Beeville locality. It is noteworthy that Taylor reports artifacts associated with the fossils collected by him near San Diego" (Sellards, 1940:1633).

Thus in the papers of Wilson (1890) and Sellards (1940), it assumed that the lithic materials collected by Taylor on San Diego Creek were indeed man-made, and in association with extinct mammals. The "equus beds" mentioned by Taylor are now included in the Lissie formation (Duessen, 1914;1924:108). The Lissie is attributed to the lower, or early, Pleistocene (Doering, 1956:1822). Both Duessen and Weeks (1933:460-461) have noted the paleontological remains of the Lissie; in addition, they have commented on the presence of flint, chert, quartz, orthoclase, limestone and other gravels in the formation. These gravels are often small, from 1/4 to 3 inches in diameter, though larger cobbles do occur. Duessen (1924:108) notes: "They are generally well-rounded and waterworn, giving evidence of transportation for considerable distance".

THE SPECIMEN

After examining the Wilson (1890) and Sellards (1940) references, I felt that it would be worthwhile to re-study the specimen collected by Taylor some 82 years ago. The possibility of an artifact occurring in lower Pleistocene deposits was quite intriguing. The study was made possible through a loan of the specimen from the U. S. National Museum of Natural History.

The specimen (Fig. 2 A-B') is a pointed, ovoid piece of flint. Recent breaks at one end reveal that the flint is gray, although it now bears a uniform patina 1 mm. thick. The longitudinal cross section is tabular; the distal tip is wedge-shaped, and the basal edge is flat. Length is 107 mm., maximum width is 55 mm., and maximum thickness is 40 mm.

The piece is badly pitted on both faces and along the lateral edges. Both faces and the lateral edges are heavily battered and dulled, with the whole specimen having an extremely worn appearance, and the flake scars almost totally obliterated. The flake scars are randomly placed, usually emanating from the edges and exhibiting flat, diffuse negative bulbs of percussion. From my examination, and that of Drs. Robert F. Heizer and J. Desmond Clark (University of California, Berkeley), it is felt that the specimen is not an artifact. Dr. Clark has suggested (personal communication) that the piece was flaked by fortuitous concussion while in a scree and was subsequently stream-rolled (see also Barnes, 1939:106-107).

CONCLUSION

Though this specimen from San Diego Creek, Duval County, Texas, has been previously ascribed to artifact status, it can now be stated that it is definitely not the result of human manufacture. The specimen is a flint gravel flaked by natural forces; only by chance was it associated with fossil fauna in the Lissie formation of southern Texas. The piece is reminiscent of European "eoliths", lithic objects once thought to be of great antiquity, but which have been demonstrated to be the result of various natural agencies (Barnes, 1939; Oakley, 1964:9-19).

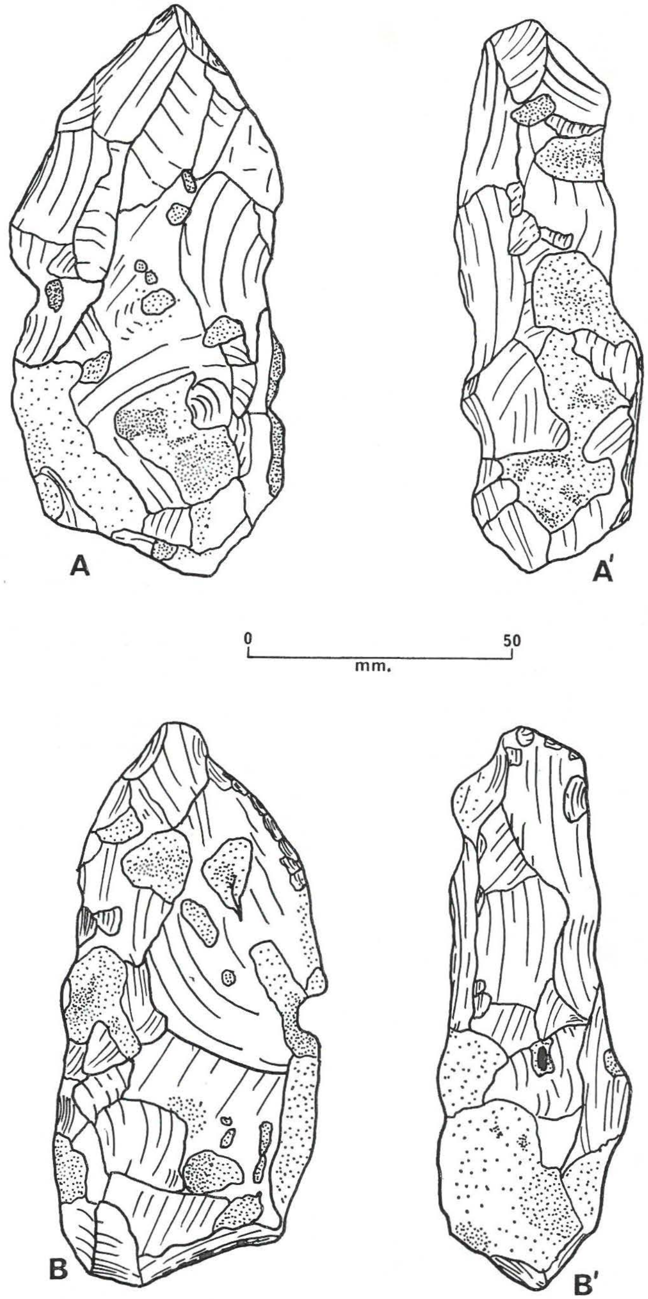


FIG. 2. Flint Object from Lower Pleistocene Deposits, Duval County, Texas. A,A', B,B', views of both surfaces and of the sides.

REFERENCES CITED

Barnes, Alfred S.
1939. The Difference Between Natural and Human Flaking on Prehistoric Fint Implements. *American Anthropologist,* Vol. 41, No. 1, pp. 99-112.

Doering, John A.
1956. Review of Quaternary Surface Formations of Gulf Coast Region. *Bulletin, American Association of Petroleum Geologists,* Vol. 40, No. 8, pp. 1816-1862.

Duessen, Alexander
1914. Geology and Underground Waters of the Southeastern Part of the Texas Coastal Plain. *U.S.G.S. Water Supply Papers,* No. 335.
1924. Geology of the Coastal Plain of Texas West of Brazos River. *U.S.G.S. Professional Papers,* No. 126.

Oakley, K. P.
1964. *Man the Tool-Maker.* Phoenix Books. University of Chicago Press.

Sellards, E. H.
1940. Pleistocene Artifacts and Associated Fossils from Bee County, Texas. *Bulletin, Geological Society of America,* Vol. 51, pp. 1627-1657.

Weeks, Albert W.
1933. Lissie, Reynosa and Upland Terrace Deposits of the Coastal Plain of Texas Between Brazos River and Rio Grande. *Bulletin, American Association of Petroleum Geologists,* Vol. 17, No. 5, pp. 453-487.

Wilson, Thomas
1890. Report on the Department of Prehistoric Anthropology in the United States National Museum. *Report, United States National Museum,* for 1888, pp. 126-127.

Department of Anthropology
Univ. of California, Berkeley

Book Review

Lithic Analysis and Cultural Inference: A Paleo-Indian Case. Edwin N. Wilmsen. Anthropological Papers of the University of Arizona, No. 16, University of Arizona Press, Tucson, 1970. xi + 87 pp., 31 figs. 26 tables. $6.00

This monograph presents a formalized system for analyzing lithic artifacts and defining artifact classes on the basis of statistically significant attribute covariation. It is assumed that artifact types are real and that after their discovery, comparisons will allow the identification of cross-cultural regularities in lithic inventories. Parts of the report, which was Wilmsen's dissertation, are available in three separate articles published in 1968 (Paleo-Indian Site Utilization. In "Anthropological Archeology in the Americas"; Functional Analysis of Flaked Stone Artifacts. American Antiquity, Vol. 33, No. 2, pp. 156-161; Lithic Analysis and Paleoanthropology. Science, Vol. 161, No. 3845, pp. 982-987). The complete dissertation presents data relevant to the articles and substantiates the conclusions presented in them.

This report exemplified a theoretical shift which was operationalized during the sixties; the shift as pointed out by Wilmsen is away from purely taxonomic devices and time/space considerations to what has been called "Anthropological Archaeology". Since about 1960, studies have been oriented toward an understanding of the environmental adaptation of Early Man. Notable among such articles are those by Wendorf and Hester (1962), Fitting, Visscher and Wahla (1966), Wheat (1967), Binford (1968) and several others. It is the general concensus of these authors that the elicitation of cultural processes, be they tool making, subsistence activities, integrative mechanisms, etc., is important and can be coupled with the earlier emphasis upon culture history.

Another significant breakthrough is that Wilmsen has shown that data which were collected under a culture history framework can be used for more than simply taxonomic studies. In a sense, this is a form of salvage archaeology as Wilmsen attempts to recover information on Paleo-Indians by restudying materials from Paleo-Indian sites which include Lindenmeier, Blackwater Draw, Horner, Levi, Shoop, Williamson and Quad. Use of these sites, however, has lead to the necessity of a broad definition for the term Paleo-Indian.

Wilmsen argues for a holistic theory of culture which must be general and formal and must recognize the systematic structure of culture. A culture is viewed as "... a specific subset of adaptive mechanisms that are demonstrably distinct from other such subsets that are articulated by a particular social unit (p. 2)". After selecting several Paleo-Indian *stage* sites for analysis, the collections were sampled and a large body of observations, measurements and angles were collected for each specimen and recorded on punch cards. These data were presented in proportional frequency diagrams and compared through the use of intersite correlations. The observable patterns are interpreted and tool types established. The intersite variations in lithic technology and function are discussed and inferences made about site activities and the structure of Paleo-Indian *culture*.

The selected sites cover a wide area of time and space and are assumed to be relatable to a primary subsistence activity of big game hunting. There was an attempt not to select a better defined time period, e.g., Clovis or Folsom, or to limit the study of a locale or region (Dawson and Judge 1969). It would appear to be the unformulated hypothesis of the study that the Paleo-Indian *stage* does, in fact, represent *a culture* and that the formal variation between sites is a reflection of intersite activity differences regardless of the time/space variation represented by the sites. However, this is an explanatory model or hypothesis which best explains the data but did not serve as the basis for its collection.

The basis for site selection is unclear in several respects. Elida, a Folsom site in New Mexico (Warnica 1961) was rejected because the number of specimens in the collection was too few (Hester 1962, describes 573 artifacts from the site), but Blackwater (224 artifacts from the Clovis level) and Horner (610 artifacts) were used. Two spatially separated components were detected at the Vernon site (Longacre 1963), one of which was a Folsom occupation, the other a Concho Complex occupation. The Concho occupation is dated about 1550 B.C. (Martin and others 1964: 222). Wilmsen selected his artifact sample from the southern part of the site which is where the Concho materials are localized according to Longacre. Martin and others consider the Concho Complex to represent a food collector adaptation which is not temporally equivalent to the Folsom occupation. It is also hard to accept the interpretation that Zone IV at the Levi site in central Texas represents a single, brief occupation or a few reoccupations over a short period of time.

Selection of the variables which make up the attribute set design was not completed until after the Elida and Blackwater samples were studied (pg. 11). Reasons are not given as to why specific variables were chosen and it is suggested here that the inductive selection of parameters is not methodologically different from previous approaches, although these parameters do lend themselves to more sophisticated statistical manipulations.

The interpretive section of the report includes a discussion of artifact production in terms of technological and functional variation. These variations are integrated with data from the specific sites and a synthesis of site activities is proposed. The report concludes with a summary of the structure in Paleo-Indian culture. A discussion of localization of groups (presumed to be bands) and of the variation in maintenance activities is similar to that of Wendorf and Hester (1962), but more thoroughly worked out. However, this reviewer finds it very unlikely to accept the concept that there is *a* single Paleo-Indian cultural systems (p.83) rather, it seems that Wilmsen has articulated functionally distinct parts of several temporally and spatially separated cultural system into a model which may be similar for a large area and time, but is composed of parts which do not in reality articulate. It is suggested that a similar study might be done using sites occupied during the Archaic stage but that the Archaic culture which might be defined would reflect a level of socio-cultural integration operationalized by many separate social groups.

In summary, the report presents a systematic approach to lithic description and analysis which allows for the evaluation of intersite similarities. Although the deductive logic behind the system is not discussed in detail, this paper is an example of an anthropological approach to archaeology which is concerned with an explanation of intersite variation in lithic technology, activity and social integration.

S. Alan Skinner
Southern Methodist University

A Comparison of Formative Cultures in the Americas, Diffusion or the Psychic Unity of Man. James A. Ford. Smithsonian Contributions to Anthropology, Vol. 11, Washington, 1969. xvi + 211 pp., 32 illustrations, 13 tables, 22 charts. $7.75.

In a monumental volume, the late James A. Ford has compiled and integrated an overwhelming corpus of data bearing on the historical development of Formative cultures in the Americas. Working from first-hand knowledge of most of the geographic areas, he has outlined 15 chronological sequences from Ohio, Illinois, Georgia, Florida, Alabama, Louisiana, Veracruz, Valley of Mexico, Tehuacán, Chipas, Colombia, Ecuador, and Peru by selecting the "best" dates from over 400 radiocarbon assays. Ford was cognizant of the possibility that the liberties he was taking with the data would: ". . . set the teeth of the area specialists on edge." (p. 9). I rather strongly doubt that such alignments will disturb too many specialists; for, although they were fabricated in support of Ford's major thesis, they do appear to comprise the most appropriate selection in terms of materials dated, corroborating runs, and other critical criteria.

The major part of the work is then devoted to a detailed exposition on the chronological and geographical distribution of traits which Ford considers important in defining the Formative; items such as core and blade industry, lapidary industry, reamers, axes and celts, grinding stones, earspools, mirrors, finger rings, combs, figurines, pipes, stamps, bark beaters, vessel form, vessel decorations and community and settlement patterns. This list is done in typical Fordian style, as anyone who has had occasion to sit through its oral presentation at the Natchitoches and Avery Island conferences will testify. Its magnitude is simply overpowering, leaving one almost excited with the awareness of a few data that Ford somehow missed. Even then, one has the distinct impression that these are simply things that Ford has forgotten or has deemed unimportant.

Ford then proceeds to discuss and compare the Formative "phases" of the Americas, almost entirely in terms of their ceramics. Surely, this will meet with some criticism, as have most of his earlier works centering on pottery ("Measurements of Some Prehistoric Design Developments in the Southeastern States", *Anthro. Papers, Am. Mus. Nat. Hist.*, Vol. 44, Pt. 3, 1952; "Greenhouse, A. Troyville-Coles Creek Period Site in Avoyelles Parish, Louisiana", *Anthro. Papers, Am. Mus. Nat. Hist.*, Vol. 44, Pt. 1, 1951.) There are however numerous statements in defense of this emphasis and strong criticism will not come from this corner. The pottery complexes figured here include Valdivia and

Machalilla of coastal Ecuador; Puerto Hormiga of coastal Colombia; Monagrillo and Sarigua of Panama; San Juan, Negritos, Paita and Guañape of coastal Peru and Kotosh of highland Peru; Stallings Island of coastal Georgia, Orange of coastal Florida, Bayou La Batre of coastal Alabama, Poverty Point of Louisiana, and Fourche Maline of Oklahoma. The only protest that I can raise is that the accompanying illustrations would have been more useful if the potsherds to be compared had been horizontally aligned. If they have been been horizontally aligned, then let me apologize to the artist and admit to the fact that, in some cases, I simply cannot see the resemblances. Admittedly, the failure to visualize some of the correspondences is due to an odd habit of mine, that of simultaneously looking at both design motif and technique of application and not exclusively at one or the other. Figures 22-32 do, however, match up very well using both of these criteria. Let me hasten to add that I wholeheartedly concur with Ford's statement in the introduction (p. 6) that: ". . . archaeologists have not agreed upon a quantitative [nor a qualitative] criterion by which one may judge whether the evidence is sufficient. . . ." Since criticisms generated on this level of analysis are generally evaluated on the basis of the strength and character of the personality making the assertions (R. Thompson, "The Subjective Element in Archaeological Inference," *Southwest. Jour. Anthro.*, Vol. 12, No. 3, pp. 327-32, 1956), I prefer not to be drawn into such an unequal match.

Emergent from these comparisons is Ford's bold theme of Formative diffusion in the Americas. Ford sees this diffusion as emanating initially from the Valdivia and Machalilla phases of coastal Ecuador by a series of relayed voyages of sea-faring peoples. The earlier ventures (3000-1500 B.C.) were, according to Ford, for the purpose of establishing colonies in remote coastal areas and were ". . . not only intentional, but . . . were repeated and . . . continued" (p. 151). In each of the colonies, only a selection of the original range of ceramic styles was present, presumably because the initial boatloads of migrants were acquainted with only a portion of the total spectrum of design motifs and techniques in the donor complex. Why this should be so is guessed by Ford to be due to family specialization. A few other general suppositions have been made on these pioneering settlements. One is that there was a gradual decline in esthetic and technological quality of ceramics and correspondingly an attempt on the part of neighboring peoples to copy the new art from colonists but who, for some unexplicated reason, made only rudimentary plainwares. Secondly, the colonial ceramic complexes appear to have incorporated vessel forms foreign to the original complex and Ford, quite out of line with his thesis, suggests that these represent pottery duplicates of stone or wooden containers. This momentary logical slip by Ford would appear to have still left a crack in the door leading to the independent invention of ceramics in the New World; a crack which I am sure will be filled shoulder-to-shoulder by anti-diffusionists whose "missed-the-boat" crys for "absolute proof" have recently appeared in pages of *American Antiquity* (J. Rowe, "Diffusion and Archaeology," Vol. 31, No. 3, Pt. 1, pp. 334-7, 1966; P. O'Brian, "Doctrinaire Diffusionism and Acts of Faith," Vol. 33, No. 3, pp. 386-8, 1968). Into this din of polemics, I would like to inject a personal observational stance on this controversy in particular and on archaeology in general. The quest for origins that has so dominated traditional archaeography has yet to provide results commensurate with the actual and mental labor expended in its behalf. Neither diffusion nor independent invention are capable of supplying answers to questions of this nature, because both fall into the realm of historical "explanation" and can be validated only by *objective* observation of the linked events. Since our discipline has not properly phrased its methodology to evaluate such problems, I would suggest that archaeologists, in order to become more useful students of man, ought to turn their attention onto more fruitful avenues of endeavor. At least one of these profitable courses lies in generating *scientific* explanations for cultural variability.

With the tone of this review set thusly, I would like to beg off retracing Ford's detailed outline of Colonial Formative diffusion under the excuse that the cursory treatment required here would do grave injustice to his grandiose reconstruction. I hope the reader will pardon this deviation from normal review procedure and will instead gorge himself on the food for thought in Ford's chapters on *Colonial Formative Diffusion in the Americas, The Theocratic Formative* and *A Historical Reconstruction* (pp. 150-194).

Before turning our attention to examining the anthropological import of some of Ford's ideas, perhaps a word on the unfinished chapter on *The Theocratic Formative* might be appropriate. In this section, Ford was to have considered some of the major archaeological "enigmas" in the Americas—Poverty Point, Olmec, Chavin, and Hopewell; but, unfortunately, was able to complete only the discussion on Poverty Point ceramics. Ford employed the classificatory device, "Theocratic Formative", to describe the initial, widely-separated appearances (1500-200 B.C.) of cultural systems which seem to have had at their bases a religio-political integrative mechanism, quite different than those of the preceding egalatarian colonial era. It is out of these systems that "suddenly" emerged, ". . . monumental mound structures, large stone carvings, a lapidary industry for personal adornment, and the distinctive art styles . . ." (p. 180). Quite in keeping with the diffusionist tone, the rise of these units is considered to be interconnected with Olmec providing the initial spark.

To attack Ford's thesis on empirical grounds would be analogous to excavating the gigantic Poverty Point mound one grain at a time with a microscopic trowel. Never has there been in American archaeology an equal accounting in terms of the number of data being controlled—surely a lasting testimony to the mental powers of one of America's premier archaeologists.

To attack Ford's thesis from the same, but opposite-ended conceptual plane (anti-diffusion position) would constructively accomplish nothing. It would only serve to broaden the already wide chasm between the two rival intellectual camps who, because of professional color-blindness, have only been able to distinguish black and white or, at best, various shades of gray. Worst of all, this position would throw the burden of "proof" into the lap of the audience whose mental decision to accept or reject the assertion would be synonymous with "proof."

Nevertheless, there is a weak link in Ford's chain of defense. That weak spot is the confusion of historical "explanation" and scientific "explanation." This same problem has received the brunt of recent verbal attacks by Binford ("Some Comments on Historical Versus Processual Archaeology," *Southwest. Jour. Anthro.*, Vol. 24, No. 3, pp. 267-75, 1968) on Sabloff and Willeys' invasion hypothesis of Maya decline, and by Flannery ("Culture History V. Cultural Process: A Debate in American Archaeology," *Sci. Amer.* Vo. 217, pp. 119-22, 1967) in a review of Willey's, *An Introduction to American Archaeology*. Their arguments can be marshalled in support of the present one. The setting forth of taxonomic units or historical events in sequential order is not the same as explaining the units or events. Ford, however, has gone a bit further and has hypothetically outlined a linkage or regularity among Formative ceramic packages. The linkage is colonial diffusion of a rather specific nature (boatloads of migrants). The main anthropological concepts behind Ford's model appear to be Wissler's "age-area" and Steward's "levels of socio-cultural integration." These concepts have provided suggestions as to the direction of movement of specific traits. When coupled with Ford's Whiteian conceptualization of culture as a flow of ideas that is both quantifiable and predictable, little room is left for specifiable hypotheses about the underlying socio-cultural milieu in which environment, material culture, and processual and historical factors all play important roles.

Archaeology would do well to throw off some of these leg irons that have held back its intellectual strides for three or more decades. To sum up this rather divergent critique is to say that Ford has not successfully demonstrated the relationship of the archaeological record to the cultural matrix which produced it and has certainly not explained it: But then I'm not sure he intended to.

There is little doubt in my mind that Ford has not presented us with a truly messianic insight into the movements of peoples, ideas, and things in the three millennia prior to the Christian era. There is even less doubt that one day, we will be able to objectively evaluate Ford's model in terms of the roles that diffusion has played in cultural development in the Americas. And there is no doubt whatsoever that *A Comparison of Formative Cultures in The Americas* will stand for many years as one of the most significant contributions ever to emerge from traditional American archaeography.

Jon L. Gibson
Department of Social Studies
University of Southwestern Louisiana
Lafayette, Louisiana
March, 1970

Letter to the Editor

This letter is in reply to the book review of *Louisiana's Ancients of Man, A Study of Changing Characteristics of Louisiana Indian Cultures*, published in the *Bulletin of the Texas Archeological Society*, Volume 41, 1970.

The book reviewer referred to statements in the book about Poverty Point as an example of the author not checking sources to catch rather "gross misinterpretations." The statement used by the author was taken directly from an article by Dr. Clarence H. Webb, as stated in the footnote. The reviewer was criticizing the use of certain terms and descriptions applying to Poverty Point by Dr. Webb. If the reviewer had read on further, he would have seen the use of the terms he preferred, in some respect, in a reference taken from Ford and Webb (1956). The author took the reference to house patterns from Dr. Webb's work, which was also used as the basis for the "Poverty Point Indian Village Diorama" in the Louisiana State Exhibit Museum, Shreveport, La., a picture of which is shown on page 125 in the book.

The book reviewer continued by stating that the author "also manages, with traditional southeastern zeal, to bind him (the archeologist) to potsherds and history" (p. 146). This statement is taken from Haag, concerning the value of potsherds when they occur at a site, as a means of identifying the group of people of a particular time and place. Similar statements made by Ford and Gagliano were referred to on the same page. The book reviewer went on to state, ". . . one wonders that (the author) managed to mention the aceramic manifestations in Louisiana . . ." Prior to the above statement quoted, the author quoted Ford (p. 92) by saying: "Ford continues to say that Northwestern Louisiana (sites) are generally found on the tops of fairly high, red, sandy ridges overlooking small streams or on lakes that connect with Red River." Then, afterwards the following statement was made, "However, as was pointed out earlier by Gagliano and Gregory, most Paleo-Indian projectile point finds have come from this northwestern hill area." On page 100 the author states: "The foreign material in the Clovis series indicates strong occupation of Louisiana, possibly seasonal, by these early pole [should read Paleo] hunters, states Gagliano and Gregory." An entire section of the book, referred to earlier, dealt with the Paleo-Indian and Archaic Periods, including references to North Louisiana pre-ceramic occupation.

The book reviewer is also critical of the author's "narrow view" of archeology in general. He quotes a statement on page 80 as though it were the only viewpoint expressed by the author. The author tried to use as many sources as available for definitions of each term. There was no attempt to evaluate these definitions. It was left to the reader and student to evaluate these for themselves, without comment from the author.

In the book review the criticism was made that the author is "tying the archaeologist to prehistoric sites" by not including more references to historic site archeology and the historic complexes of Louisiana Indians. Discussion of the historic cultures in the book covered pages 179 through 187 and pages 215 through 218. Listed in the bibliography were 45 reference sources dealing with historic cultures. On the pages covering the historic cultures were 25 footnotes.

The reviewer was critical of the number of primary references used by the author, and his acquaintance with these sources. It was not the author's intention to make the book a professional depth study of all the works of these authorities, but to present to the student those sources most widely available and which have provided a background for an overview of the study of Louisiana Indians. However, in response to the question about the author's acquaintance with the work of Ford (1936) it will be noted that there are 18 footnotes used for references to this work. In addition an entire section from the book by Phillips, Ford and Griffin (1951) was used.

The reviewer seemed to criticize the references in the bibliography. The author used 656 footnotes from references in the bibliography. All bibliographic references were not used in the book, but were provided for students to use for further information.

The statement made by the reviewer that the author ". . . heartily advises his (sic.) the use of his book as a text for teaching of Louisiana archaeology" is a misstatement of fact. What was stated on p. 226 was: "It is recommended that this study be used to train and encourage students to make a *further study* of Louisiana Indians as a basis for learning about and understanding other cultures of mankind."

If there is any "misinformation" contained in the book, it is not intentional, since the author followed closely the writings of the authorities used for references.

The author has only made a beginning to interest young people in the Indian heritage of Louisiana by furnishing them with information from the best authorities in the state. If professional archeologists are going to set the standards for writing in this field, for public school use, let them write their books and state their ideas. Their works will speak for themselves. History and the users will judge the merits of the books and the authors.

J. Ashley Sibley, Jr.
Baton Rouge, Louisiana

Information and Contributors

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

Manuscripts should be typed on 8½ by 11 inch sheets of white paper, and ALL MATERIAL should be double spaced. Footnotes should be avoided or kept to a minimum.

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

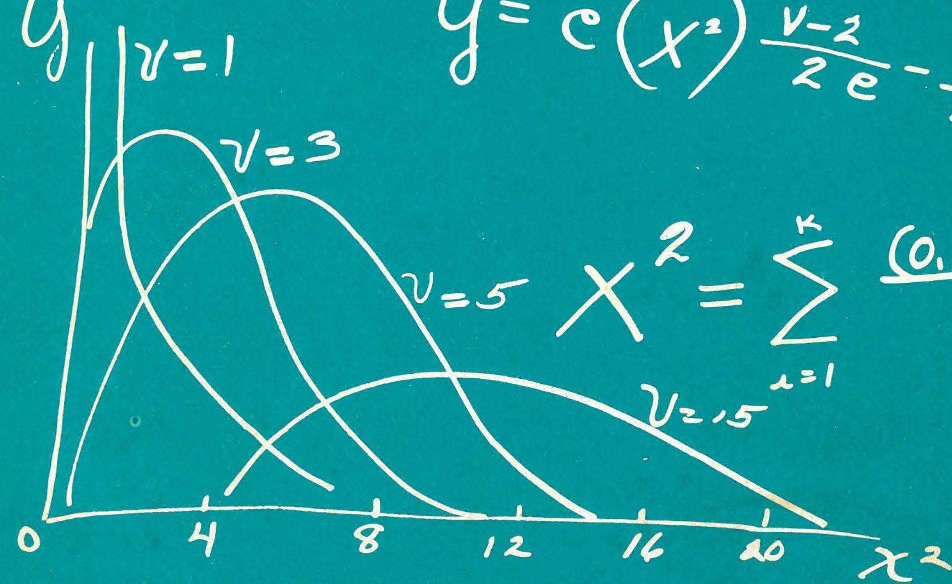
The proportions of full-page illustrations (picture or drawing plus caption) should be suitable for reduction to the effective Bulletin page size of 4 5/16 x 7 inches. Plates may be printed either horizontally or vertically, but be sure to allow for the caption to be printed the same direction as the plate. Captions for illustrations should be listed in numerical order and placed behind the list of references cited.

Each paper must be accompanied by an abstract (one or two paragraphs summarizing the main points of the paper). The abstract should be submitted as the first part of your paper.

Manuscripts should be sent to David Dibble, Balcones Research Center, Route 4 Box 189, Austin, Texas 78757.

$$S = \sqrt{\frac{n}{n-1}}\,\hat{s} = \sqrt{\frac{n}{n-1}}\,\sqrt{\frac{\Sigma(X-\bar{X})^2}{n}}$$

$$y = c(\chi^2)^{\frac{\nu-2}{2}}\,e^{-\frac{\chi^2}{2}}$$



$$\chi^2 = \sum_{i=1}^{k} \frac{(o_i - e_i}{e_i}$$

$$\hat{S}^2 = \frac{n-1}{n}S^2 \qquad \sqrt{\frac{n}{n-1}}\,\hat{s}$$

$$S_{\bar{x}} = \frac{s}{\sqrt{n}} \qquad S = \sqrt{\frac{\Sigma(X-X)^2}{n-1}}$$