BULLETIN

of the

TEXAS ARCHEOLOGICAL SOCIETY

VOLUME 36

Editor: Dee Ann Story

Assistant Editors:

Harry J. Shafer

Marsha F. Jackson

Published by the Society at Austin, Texas, 1965

Table of Contents

Articles

Book Reviews

Anderson's Mill (41 TV 130): A Historic Site in Travis County, Texas

E. PAUL DURRENBERGER

ABSTRACT

Working intermittently on week ends from the fall of 1963 to the fall of 1964, members of The University of Texas Archeological Society carried out small scale excavations at Anderson's Mill, a historic mill and house site apparently built in the early 1860's. The history of the mill and the structural remains are briefly noted; the main part of the paper is devoted to a description of the artifacts recovered from the surface and the excavations.

INTRODUCTION

Anderson's Mill is the site of a mill and house dating from the early 1860's to possibly as late as the 1920's. In this paper a description of the structural features and artifacts recovered from the site are presented. The main emphasis, however, is placed on the artifacts, as little remained of the structures. Moreover, the artifact analysis provides a general picture of what might be found at other historic sites of the same period. While structures may vary widely in function (for instance, forts, houses, trading posts, missions, mills) many of the same kinds of specimens (for example, dishes, nails, bottles, etc.) can be recovered from them.

HISTORICAL BACKGROUND

Having traveled through Virginia from Pennsylvania, Thomas Anderson arrived in Texas in 1859 (Upton, 1941: 3), bringing with him some furnishings such as china, silver, and linens (Anderson, 1959: 2). Shortly after reaching Texas, Anderson built a log dwelling to house his family while he and others constructed a mill. When the mill was finished—apparently in 1862 or 1863—he built a more comfortable house which had a basement where many jams, jellies, pickles, and preserves were stored. The house had a wide central hall with a fireplace on either side. Around the house area Anderson built a rock wall with front, back, and side gates. Somewhat later he added an irrigation system which consisted in part of a stone tank on high ground and which furnished water for a garden behind the house (Anderson, 1959).

The purpose for which the mill proper was erected is not entirely clear, as some (Anderson, 1959; McDonald, 1959) state that it served initially as a grist mill, while others (Upton, 1941; Brown, n.d.) indicate that it was built expressedly to manufacture gun powder for the Confederacy. Regardless, it seems certain that by 1863, under the direction of the Texas State Military Board, the mill was producing gun powder for the Confederate cause in Texas and not until after the Civil War was the mill used extensively to grind corn. Still later, apparently in the 1870's, Mr. Anderson began ginning cotton. According to Upton (1941: 3):

> In the early seventies the hill people began raising cotton, and Mr. Anderson built a gin. This building was made of native stone and its walls still stand. The grist mill ran on certain days of the week and the gin on the others. A large belt connected the mill-wheel with each mill.

The subsequent history is poorly documented, but after Mr. Anderson's death his family moved to Austin and the mill and house fell into decay. In about 1942 much of what remained of the mill was razed by the Lower Colorado River Authority in preparation for the rising waters of Lake Travis. Then, in 1964, a road was constructed in the area, destroying most of the structural remnants of Anderson's house.

THE SITE

Anderson's mill and house were built on Cypress Creek—a small northern tributary of the Colorado River—which flows approximately south in a valley surrounded by gently rolling hills (Fig. 1). The valley is about two miles north of Mansfield Dam and about 17 miles northwest of Austin. The valley floor, now occasionally flooded by the waters of Lake Travis, is covered with short grass and weeds, while the surrounding hills support scrub brush and small trees.

Three low (*ca.* one foot high) stone walls which form an open rectangle are situated on the west bank of Cypress Creek (Fig. 1). They are oriented the same way as two early photographs of the mill show the then-standing mill walls (Fig. 2). Since there are no other evidences of a structure near the creek for a distance of about one half a mile in either direction, these must be the remains of the mill.

Historic references indicate that a house was situated somewhere on the east side of the creek and, indeed, about 720 feet north and east of the mill three rock walls were located (Figs. 1, 3, B). These walls lie

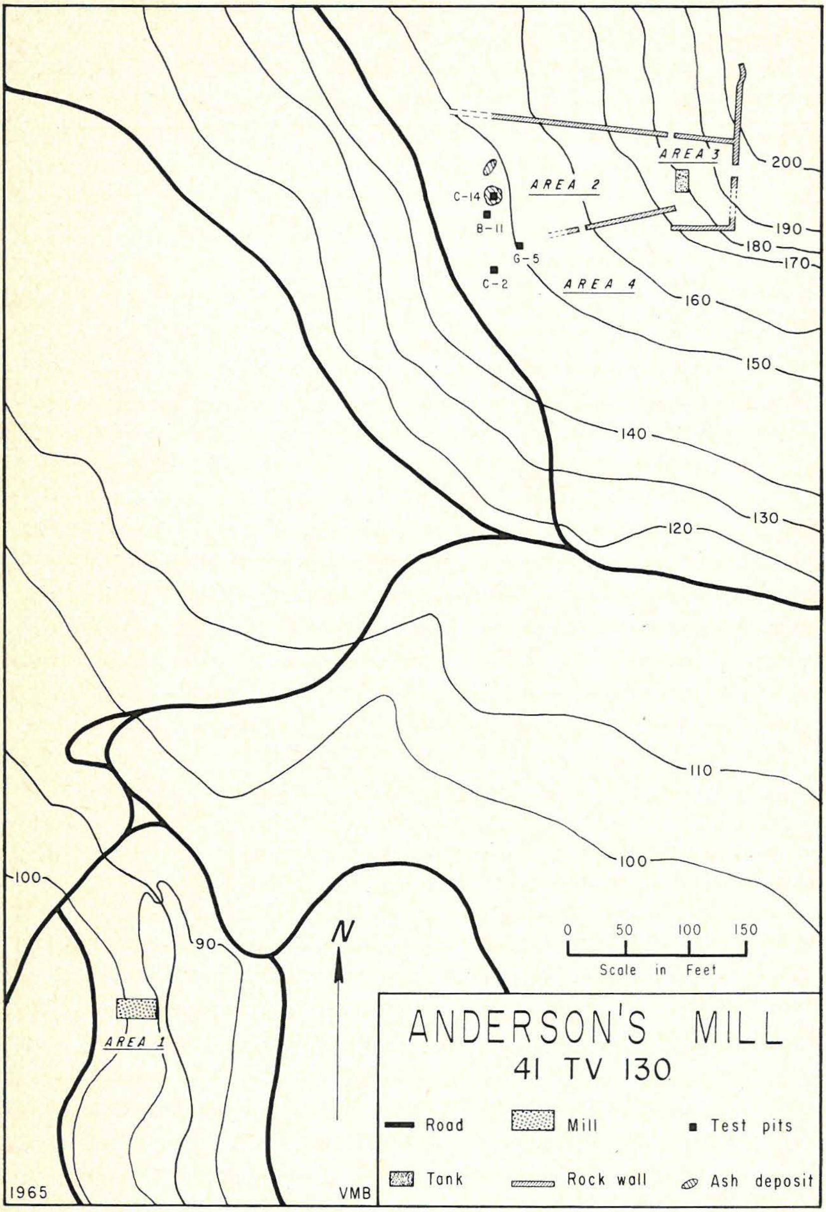


Fig. 1. Map of Anderson's Mill (41 TV 130) showing features, areas excavated, and contours.

at the foot of a hill that slopes upward to the east of the valley floor. Within their confines were found a cement-lined stone tank (Fig. 3, A) and a concentration of limestone boulders. The former is likely part of Mr. Anderson's irrigation system, and the latter residue from the fireplaces alluded to in the historic accounts. Both serve to fix the locus of the main house.

The Excavations

The site fell readily into three (at first it was thought four) rather distinct areas (Fig. 1). That lying to the west of the creek and marked by the structural remnants of the mill complex was designated as Area 1. To the east of creek, where the documents record both the log cabin and the main home, were found house remains. What was initially thought to have been the older of these (the limestone boulder concentration) was labeled Area 2, while what appears to be the later house, to the east of Area 2, was designed as Area 3. The limestone boulders, it was assumed, were the remains of the chimney of the log cabin. It was later discovered that Areas 2 and 3 were both associated with the later house; the initial designations, however, were retained (Fig. 1). In addition to these areas, surface material was collected from a large region, designated as Area 4, to the south of 2 and 3.

Work at the site was begun by making extensive surface collections at the above-mentioned areas. This was followed by two excavations made in Area 1. One of these explored an extension which appeared along portions of the northern wall of the mill and which had been observed on the surface. This still unidentified structural remnant was labeled Feature 1. The second excavation consisted of a 2-foot wide by approximately 15.5-foot long trench dug along the outside of the southern wall. Called Feature 2, this trench was dug to bedrock, which was encountered from 6 to 18 inches below the surface.

A grid system oriented on an approximate magnetic north line was superimposed over Area 2. The north-south base line was marked off at five-foot intervals which were numbered 1, 2, 3, 4, etc., from south to north. The approximate east-west line was also divided into five-foot segments lettered A, B, C, D, etc., from east to west. The designation of the southeast corner of a square (such as A-1, B-2, etc.) named that square. No vertical controls were maintained for most of the excavations, since the first three units dug made it quite obvious that there was only one component at the site.

While the archeological investigations were in progress, the concentration of limestone boulders situated roughly in the center of Area 2 was bulldozed in preparation for a road. This bulldozing exposed two ash deposits and thereby confirmed the hypothesis that the boulders were the remains of fireplaces. The artifacts exposed by the road construction were treated as a surface collection.

Squares C-2, G-5, B-11, and C-14, in Area 2 (Fig. 1) were excavated to bedrock, which varied from 8 to 25 inches below the surface. As it was removed from a square, the dirt was screened through a quarter-inch mesh hardware cloth.

The digging, mapping, and other field work was done by members of The University of Texas Archeological Society on week ends, under the direction of the author. All investigations took place during the period October 20, 1963 to October 10, 1964, exclusive of the summer months. I should like to thank John Clark, Elton Prewitt, Emory Whipple, and Charles R. Nance for their assistance in the field work; and Dorothy Burr for her help in both the field and the laboratory. My thanks also to Dr. E. Mott Davis who offered many valuable suggestions.

Structural Features

The Mill

The mortared stone walls of the mill were standing to a height of from 4 to 14 inches when work at the site was initiated. A trench (Feature 2) dug along the outside of the southern wall of the mill revealed that this wall now stands a maximum of from 7 to 16.5 inches high (top to bedrock). This and the other two remaining walls are from 15 to 17 inches thick and were constructed of roughly shaped, generally rectangular, limestone blocks.

The mill as it exists at the present (Fig. 2) measures 18 feet wide from north to south and 20 feet long from east to west. Surrounding the outside of the north, south, and west walls are mounds of rubble formed when the walls of the mill collapsed. The eastern end of the structure fades out into a talus slope and no wall was located there. The present floor of the mill consists of limestone bedrock which descends toward the creek in three steep, step-like ledges (Fig. 2). The bottom ledge grades into the rock talus that extends to the creek edge. This bedrock foundation was probably originally floored with wood to give a level surface.

Extending to the north of the eastern end of the northern wall were a number of irregularly-shaped limestone blocks set in a matrix of gray mortar (Feature 1). The smooth bedrock floor enclosed on three sides by this wall (?) measures 37 by 50 inches, while the wall itself

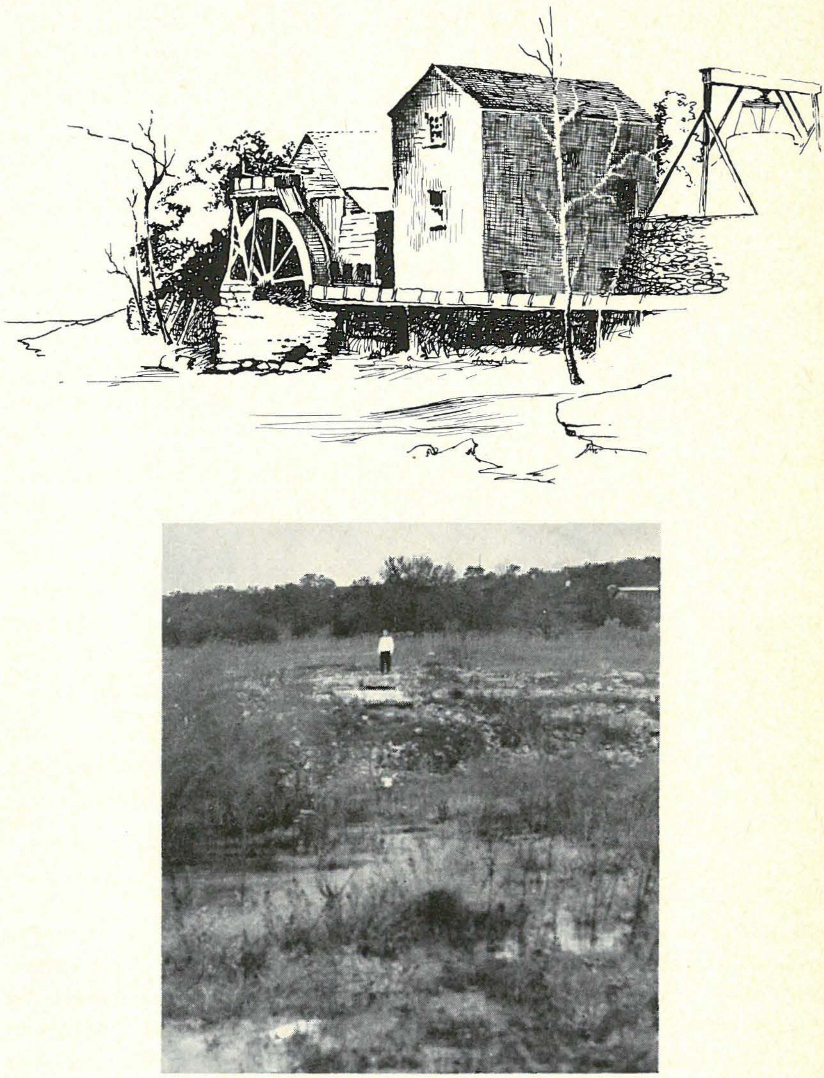


Fig. 2. Anderson's Mill. Above, Mill as it appeared shortly after construction (sketch adapted from photograph in Travis County Collection, Austin Public Library). Below, Mill site as it appeared in 1964.

is from 6 to 8 inches high. The eastern end of Feature 2 is unwalled and extends downward to a mass of talus debris.

Associated with the mill were pieces of wood and glass, as well as a few fragments of light gray, powdery mortar.

The House Complex

The house complex (Areas 2 and 3) includes the rock wall or fence, tank, and house proper situated to the east of the mill, well above the creek. The wall is about 2 feet thick, a maximum of 3.5 feet high, and is composed of unquarried limestone boulders piled without mortar (Fig. 3, B). The partially enclosed area is now roughly trapezoidal in shape. The eastern wall is about 145 feet long, the northern wall approximately 205 feet long, and the southern wall roughly 140 feet long; no western wall was found. There is a poorly delineated opening about midway in each wall.

Approximately 36 feet to the west of the eastern rock wall is a cement-linked tank made of quarried limestone blocks which are mortared together (Fig. 3, A). The tank is 9.2 feet east-west, 15 feet north-south, and 2.8 feet high; its walls are 1.8 feet thick. This tank is almost certainly part of Anderson's irrigation works.

About 200 feet to the west of the eastern rock wall were located two deposits of ash, one about 20 feet south of the other (Fig. 1). The southernmost ash deposit is about 15 feet across and the northern one is about 10 feet across. Several large quarried limestone blocks were found in this area, but their relationships to the ash deposits did not seem to be meaningful. It is thought, nonetheless, that the ash deposits represent fireplaces and that the limestone boulders thickly strewn over this area very probably are remains from the chimneys and hearths. Most of the cultural material from the site was found in this area.

THE ARTIFACTS

Each of the four areas from which surface collections were made, as well as each feature and square excavated, was assigned a lot number, and all artifacts from each of these proveniences were labeled accordingly. When the specimens were examined in the laboratory, however, it was obvious that there were few significant differences in their distributions and, hence, there is no need to present these data here. The one exception is the nails: round nails were found about the house but not the mill.

Most of the objects recovered from the site can be conveniently sorted into four broad categories: ceramics, glass, metal, and miscellaneous (rubber, shell, etc.). The only exception to this scheme is the metal jar lids which are discussed with the glass jar parts to preserve functional continuity. Each of the major categories has been further divided into a number of subgroups, some of which serve purely de-

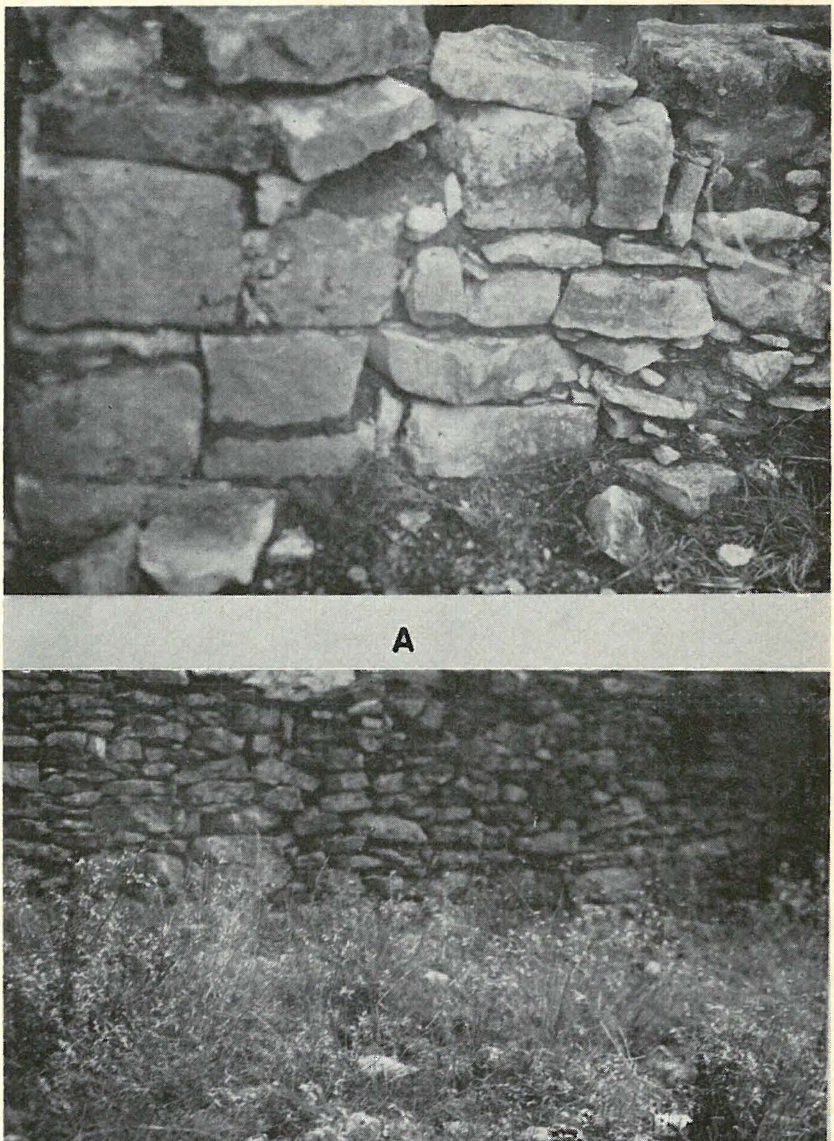


Fig. 3. A, Section of cement-lined tank. B, Portions of one of the walls that surround the house complex.

scriptive ends, while others (especially the ceramics, pressed glass, and nails) are of both descriptive and chronologic value.

CERAMICS

Two major criteria have been used to classify the ceramics: 1) certain physical properties of the paste, and 2) the techniques by which the surfaces were decorated. On the basis of the paste the following groups are recognized:

1. *Earthenware.* These ceramics are distinguished most readily by the porosity of their paste (it sticks to the tongue when licked) and, as a result, permeability. They absorb a relatively high volume of liquid, generally 4 to 10 per cent (Norton, 1956: 208–218). The earthenware from Anderson's Mill shows a considerable range and can be further sorted into two subgroups: soft-paste and hard-paste (the latter is also sometimes referred to as semi-porcelain).

2. *Stoneware.* The paste of this group is harder and more compact than the above. It absorbs relatively little moisture (generally between 1 and 6 per cent) and will not stick to the tongue (*ibid.*).

3. *Porcelain.* Like the stoneware, the paste of porcelain is impermeable to liquids, absorption being less than 3 per cent. In addition, the paste is typically smooth, quite compact, white, and, especially in the case of the thinner pieces, translucent. Porcelain is often referred to as china or chinaware.

These categories may be seen primarily as progressions in the firing temperature, with the absorption decreasing as the temperature increases. They are, of course, not always sharply defined (as indicated by the overlap in percentage of absorption), and the classification of some specimens is perhaps arbitrary. Most, however, can be placed into the appropriate group with a minimum of difficulty.

The techniques of decoration are: transfer printing, decalcomania, gilding, respoussé, and painting. Transfer printing is a process for transferring a design to a vessel. The design is etched onto a copper plate which in turn is inked with a pigment in a suspension of oil. The inked plate is pressed on a thin piece of linen paper, which is placed on the surface of the biscuit or once-fired vessel to be decorated. The back of the paper is rubbed with a piece of flannel cloth to make the pigment adhere to the surface of the biscuit, then the paper is removed, leaving the design on the vessel. The vessel is heated to drive off the oil base of the pigment, glazed, and refired. Because of the rubbing process and the removal of the paper, the transfer printed designs do not often retain their sharpness. Another inherent limitation is in the number of colors that can be used due to the problem of aligning the different sheets that bear the designs (Binns, 1930: 222–224).

With the invention of lithography several colors could be printed on one surface. The technique of making decalcomanias (decals) was developed in the mid-19th century (Encyclopedia Americana, 1963: 553). It was but a short step from the development of multi-colored decalcomanias to the application of these to pottery. A design is printed on a layer of thin tissue paper which is backed with heavier paper. The tissue paper is then coated with an adhesive. The unit can be dampened and the decal slid off onto the surface to be adorned—in this case the glazed vessel. With the decalcomania technique many colors can be used and there is no chance of smearing the lines. Another distinguishing feature between the decalcomania and the transfer printed vessels is that the former is applied over the glaze, so when a sherd is held up to the light, the surrounding areas appear more glossy than the decorated area (Encyclopedia Americana, 1963: 553). By contrast, the glaze is applied over the transfer printed designs and the surface is uniformily glossy (Nichols, 1878: 72).

Gilding is the process of applying gold in some medium of suspension, then heating it to a relatively low temperature to drive off the suspending medium, but not so as to vaporize the metallic gold (Binns, 1930: 263). This technique was often used in conjunction with one or more of the others, but in the present collection it occurs only with repoussé and decalcomania.

Repoussé decoration is a method of making a relief design by use of a mold (Nichols, 1878: 75), while painting here refers to the application of paints by some means other than transfer printing.

In addition to the obviously decorative techniques mentioned above, all of the ceramics are covered with a glaze. It is consistently present on the exterior surfaces and common on the interiors. In the case of the permeable earthenwares, this coating undoubtedly made the vessels more serviceable as containers for liquids. Secondarily, it may have enhanced their appearance, since the glaze on some of the soft-paste the hard-paste earthenwares, the stonewares, and the porcelain—the glaze gives the surfaces an attractive, clean-looking shine. Jelks (1958) in his discussion of the ceramics found at Jamestown has summarized the various techniques of glazing. Since his statements seem germane to the Anderson's Mill material they are repeated here:

> Glazes are applied to ceramic objects by three basic methods: (1) by coating the object with ground glass before firing, (2) by coating the object with the unfused ingredients of glass prior to firing (for example, red oxide of lead, ground to a powder

and mixed in water with sand or other silicious material, was frequently employed in England for this kind of glaze), or (3) by coating the object with a flux which combines with silica from the body of the clay object itself to form the glaze under the heat of firing. The most common fluxes used in the latter process (with special reference to the ceramics found at Jamestown) were sulfide of lead (PbS)—usually in the form of powdered galena—and sodium chloride (NaCl), or common table salt. The powdered lead sulfide was dusted on the clay body before it was put into the kiln, sometimes with the addition of copper salts which imparted a greenish cast to the otherwise amber lead glaze, or occasionally with manganese salts which rendered it black or brown-black and sometimes almost completely opaque.

The customary way of applying sodium chloride glaze is to bring the molded clay objects to a white heat, then to cast a quantity of salt through the kiln door directly onto the fire. The heat vaporizes the salt and the vapor sticks to the hot clay in a thin film which acts as a flux and combines with silica from the clay to form the transparent glaze. Salt glazes are clear and thin, but have an uneven pitted surface resembling the surface of an orange peel (Jelks, 1958: 202).

Earthenware

SOFT-PASTE (79 Sherds)

All of the specimens comprising this group have a relatively soft and quite porous paste which varies in color from almost white to shades of tan and gray. Temper particles are sometimes visible, but none of these has been identified. Virtually all of the soft-paste sherds are thicker (between 6 and 13 mm.) than the other ceramics from the site. Throwing rings (Fig. 4, C) and other wheel marks are frequently found on the interior surfaces. Most appear to represent rather heavy utility vessels, especially large cylindrical jars or crocks with flat bottoms (Fig. 4, A) and thickened rims (Fig. 4, B). All have been glazed on at least the exterior surfaces, and many are glazed on the interiors. The identification of the type of glazing, however, is often difficult and is only tentatively indicated in the section which follows. The soft-paste earthenware sherds show some variation, particularly in the color and placement of the glaze. They include:

Brown Exterior and Interior. Twenty-two of the soft-paste fragments have a heavy, very dark brown glaze on both the exterior and interior surfaces (Fig. 4, A, B). The glaze appears to have been produced by dusting lead sulfide onto the vessel, while the color was possibly achieved by the addition of manganese salts. Wheel marks and faint throwing rings are frequently present on the interiors. Two, possibly three, large cylindrical vessels are represented.

Gray Exterior/Brown Interior. Twenty-eight sherds from one or possibly two large crocks are distinguished by a gray exterior and a chocolate brown interior. The base of the vessel (or vessels), how-

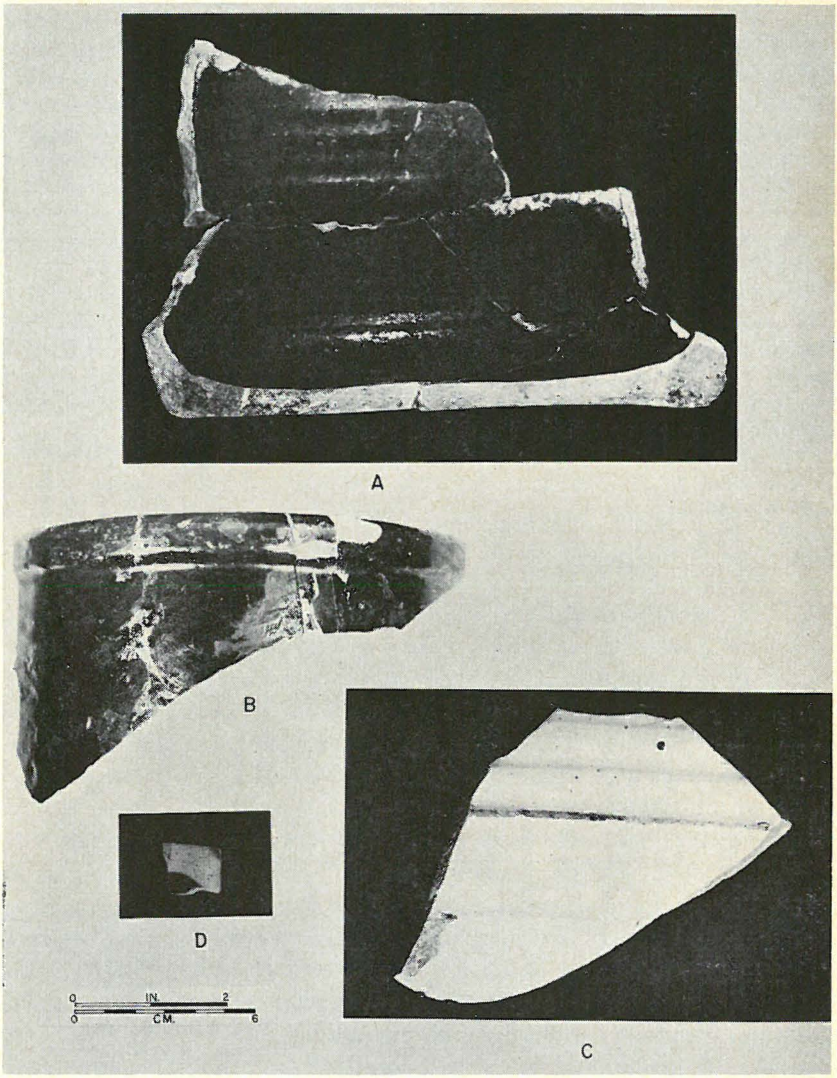


Fig. 4. Soft-Paste Earthenware. A, Base sherd. B, Rim sherd. C, Interior of body sherd showing throwing rings. D, Painted body sherd.

ever, was unglazed. The exterior surfaces have a rather pitty texture and are covered with what appears to be a naturally gray salt glaze. The insides of the sherds, by contrast, are quite smooth (throwing rings nonetheless are prominent) and have been coated with the dark brown lead glaze noted above.

Cream Exterior/Brown Interior. One fairly small sherd has a cream-colored lead glaze on the exterior surface and a rich, chocolate-colored lead glaze on the interior surface. An appliqued strip, possibly part of a handle, appears over much of the outside surface.

White Exterior and Interior. An easily distinguished group of 14 specimens has a white to slightly gray glaze applied on both surfaces of the vessel walls but not on the base (Fig. 4, C). Although it is difficult to be certain, the exterior appears to have been salt glazed and the interior lead glazed. Throwing rings are present on three sherds, and one sherd is a fragment of a large loop handle. Two large cylindrical vessels, or crocks, are represented.

Olive Green Exterior and Interior. A small group of four sherds—all from the same vessel—are coated on both wall surfaces (but not the base) with a greenish-brown salt glaze. A thin, almost purple line appears in the paste of each sherd, near the surfaces, and probably represents improper or incomplete firing.

Glazed Exterior/Unglazed Interior. Nine sherds are glazed on only the outside surface, six with a brown lead glaze and three with a grayish-white salt glaze. Most of these may be from narrow-mouthed vessels, although one is clearly a fragment of large crock lid.

Painted Exterior/Brown Interior. The most unusual soft-paste earthenware sherd is a small body fragment (Fig. 4, D) which has a dark brown, lead-glazed interior and a painted and salt-glazed exterior. The design motif cannot be reconstructed, but it is a duochrome, with the natural gray of the salt glaze contrasting with the rich blue (cobalt blue) on the painted decoration.

HARD-PASTE (363 Sherds)

The specimens comprising this, the single most numerous group of sherds, have a somewhat porous paste which sticks to the tongue when licked. They are slightly harder and less porous than the soft-paste earthenware. In addition, most, if not all, appear to be covered on the exterior and interior with either a white slip and a clear glaze, or a white glaze. Surfaces are typically quite smooth, lacking throwing rings and wheel marks, but they are frequently crazed. Sherds are generally thinner than the soft-paste earthenware fragments, ranging from 3 to 9 mm. in thickness. In view of their relative abundance at Anderson's Mill it seems likely that the hard-paste earthenware represents the everyday dishes—the plates, cups, saucers, and serving bowls. On the basis of variations in the treatment of the surface, these ceramics can be sorted into a number of subgroups, each of which is briefly described below.

Decalcomania. Twenty-three of the sherds have been decorated by means of the decalcomania technique. Six of these, probably from one plate or a set of plates, are distinguished by a green and white decal applied to the interior or upper surface (Fig. 5, A, B). The design appears to have covered much of the plate, the central part consisting of a stylized floral pattern and the rim or border area containing a geometric motif composed of a dashed line inside of which are a wavy line and numerous small dots.

Five other sherds represent a deep bowl which is decorated with a single recurring flower pattern in dark green, light green, red, yellow, pink, and black (Fig. 5, C, D). The rim of the vessel and one panel of the decal design are decorated with a repoussé basket-like pattern. An additional two fragments from a single plate or saucer have a vine pattern which divides the vessel into a series of panels (Fig. 5, E, F). Clusters of small flowers in blue, green, yellow, red, and pink appear in and around these panels. Polychrome floral motifs occur on the remaining 10 sherds, all of which are too small to reveal details about design layout (Fig. 5, G), although one (Fig. 5, H, H′) has traces of a maker's mark.

Transfer Printed. The five specimens decorated with transfer designs seem to represent a minimum of two vessels, possibly a plate and a cup or small bowl. The two plate fragments (Fig. 5, I, J) have a rather poorly preserved green floral pattern, a gently scalloped lip, and a faint repoussé vine design; while the cup (?) fragments have a blue dentile pattern (Fig. 5, K) on the rim exterior. One of the latter sherds also contains portions of a green and blue leaf (?) design just below the dentile decoration.

Painted. The painted sherds include one specimen with a dark blue exterior and a white (undecorated) interior, as well as six specimens from a bowl which had a narrow aquamarine-colored band encircling the interior of the rim. The dark blue painted sherd also has a repoussé pattern of indeterminate nature.

Gilded. Five sherds have traces of gilded decorations. Included is one fragment of a plate rim which contains two encircling vine-like lines and, between these, the partially complete letters *OV* (Fig. 5, L). Among the remaining sherds is a small rim piece with a gilt band on the interior near the lip (Fig. 5, M), two rim fragments with what appear to be stylized floral designs (one has the design on the exterior surface, the other—Fig. 5, N— on the interior surface), and, lastly, a tiny rim sherd with only traces of gilt on the interior surface.

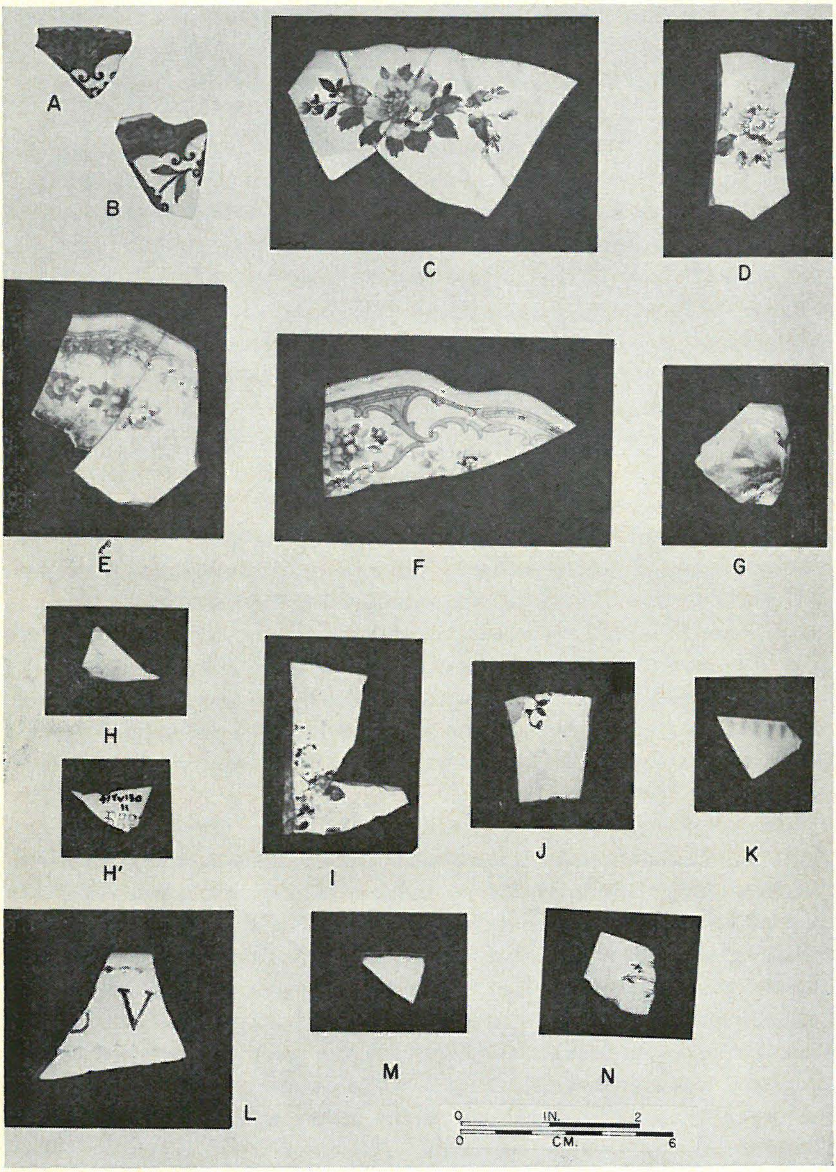


Fig. 5. Decorated Hard-Paste Earthenware Sherds. A–H, Decal. H′, Maker's mark. I–K, Transfer printed. L–N, Gilded.

Repoussé. Twenty-two sherds of hard-paste earthenware have only repoussé decoration. Included are 13 rim pieces, six body fragments, two basal pieces, and a cup handle fragment. The repoussé designs

(Fig. 6, A-C) occur on the exterior of some sherds and interior of others, and include floral and geometric (fluted and radial largely) motifs. One of the basal sherds contains an incomplete and indecipherable maker's mark on the exterior (Fig. 6, D).

Plain. Sherds from either plain white vessels or from undecorated vessel areas are by far the most common type (300 specimens) of hard-paste earthenware. Shapes are not particularly distinctive with cups, bowls, plates, and saucers being well represented. Four basal fragments (Fig. 6, E-H) do, however, contain maker's marks on their exterior surfaces. Only one of these (Fig. 6, G) can be identified. It is the mark of Johannes Lehman who in about 1830 operated a pottery factory at Tyler's Port, Pennsylvania (Thorn, 1947: 134).

Stoneware (6 Sherds)

This small group of sherds is characterized by a hard, compact paste which appears to be impermeable (i.e., it does not stick to the tongue when licked). The color of the paste varies from grayish-white to dark gray and the wall thickness is uniform, from 4 to 5 mm. All exterior surfaces were evidently painted and then glazed, although it is possible that the glaze was mixed with pigment. In addition to the all-over painted decoration, the outside surface of three specimens have repoussé fluted or radial designs (Fig. 6, I). The interiors of all but one, a possible ginger beer bottle fragment, are glazed. Three, however, are lighter on the interior and none has a repoussé design on the inside. Jars and vases appear to be the most common vessel form.

Porcelain (57 Sherds)

The second type of impermeable ceramics, the porcelain or chinaware, is distinguished by a very hard and compact white paste which can frequently be penetrated by light. Most specimens are relatively thin, about 5mm. in thickness on the average. On the basis of variations in the treatment of the surface the porcelain can be broken into a number of subgroups, each of which is briefly described below.

Decalcomania. Eight of the procelain sherds are adorned with a decal floral pattern. One of these (Fig. 7, A), a partially restored saucer estimated to have been roughly 15 cm. in diameter, has, in addition to the decals, two gilt bands. One of the bands appears on the lip, the other around the center depression. The colors of the decal are blue, pink, coral, maroon, yellow, and black.

Six of the remaining sherds—three basal pieces and three body fragments—have prominent polychrome flowers in green, yellow, pink, and red (Fig. 7, B-D). On four of these (three bases and one body fragment) the decoration is on the interior; on the other two it appears on the exterior.

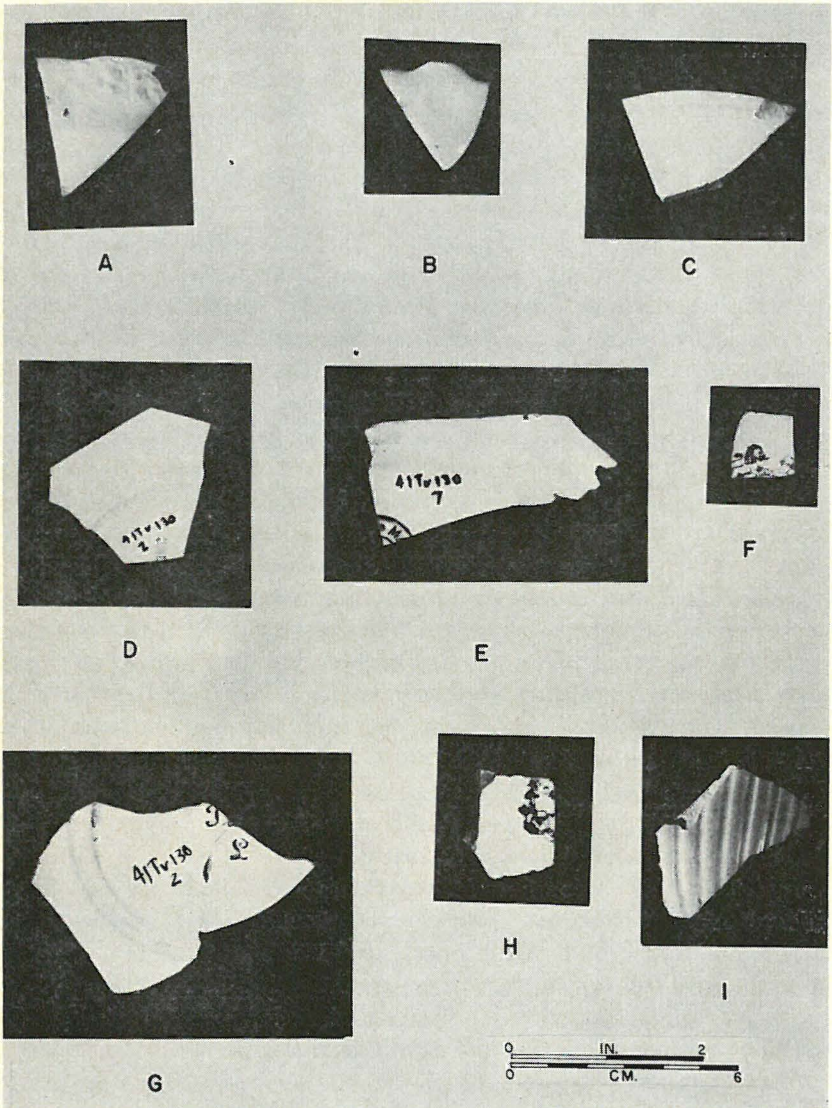


Fig. 6. Hard-Paste Earthenware and Stoneware Sherds. A–C, Repoussé, hard-paste earthenware. D–H, Maker's marks, hard-paste eathenware. I, Stoneware.

A final sherd (Fig. 7, E) in this group, possibly from a small mug or pitcher, contains both a decal and a repoussé decoration on the exterior surface. The repoussé design, a highly stylized vine and dot pattern, appears just below the lip; while the polychrome decal is immediately beneath this—indeed, it partially overlaps the repoussé pattern.

Transfer Printed. Each of the five transfer printed porcelain sherds is monochrome. Two of these bear delicate Chinese or Japanese naturalistic (landscape and figure) designs in brown (Fig. 7, F, G), and a third (Fig. 7, H) is decorated with a scalloped blue band around the inside of the rim. This band is not unlike that often combined with the more delicate naturalistic patterns. The remaining two sherds (Fig. 7, I, J) are rather small and are decorated on the interior with a green floral design. It is likely that they are from the same plate.

Painted. Five sherds are painted on one surface only, three on the exterior and one on the interior. Two are lavender colored and appear to be from the same set of dishes. One of these, a probable saucer fragment, has a wide band around the inside of the rim; the other, possibly from a cup, appears to have been painted over much (or perhaps all) of the exterior surface. The two remaining sherds are unusual in form and are very likely from the face of a doll. Both are pink and one (Fig. 8, A) has traces of small brown lines, evidently eyelashes.

Gilded. Included in this group are four fragments decorated with one or more straight to slightly wavy lines (Fig. 8, B-E), and one sherd with a stylized floral or vine design (Fig. 8, F). Two are from plate rims, two from thick cups or mugs, and one from the base of a possible shaving mug. One of the rim fragments has portions (Fig. 8, D) of a handle and could be from the same vessel as the base sherd. In addition to the gilded decoration, one of the plate rims (Fig. 8, F) has a geometric repoussé design and one of the cup fragments (Fig. 8, E) has portions of green floral decal (?).

Repoussé. Eight specimens—three rim and five body sherds—have only repoussé decorations, most of which are geometric patterns. Included are fluted and radial lines, as well as curvilinear (possibly stylized floral) designs. Most sherds are small and difficult to orient properly, but the decoration appears to be on the outside surface of two pieces and on the inside surface of the other six.

Plain. The 26 specimens comprising the undecorated porcelain include four rim fragments, eight basal sherds, and 16 body pieces. Cups and small bowls appear to be most common forms represented. One of the basal sherds (Fig. 8, G) has an unidentified maker's mark which reads *rmany*.

Miscellaneous Ceramic Objects (6 Specimens)

Included in this group are one complete (Fig. 8, H) and two fragmentary door knobs, a wire insulator (Fig. 8, I) a baked but unglazed marble (Fig. 8, J), and a thick, unidentifiable piece of glazed porce-

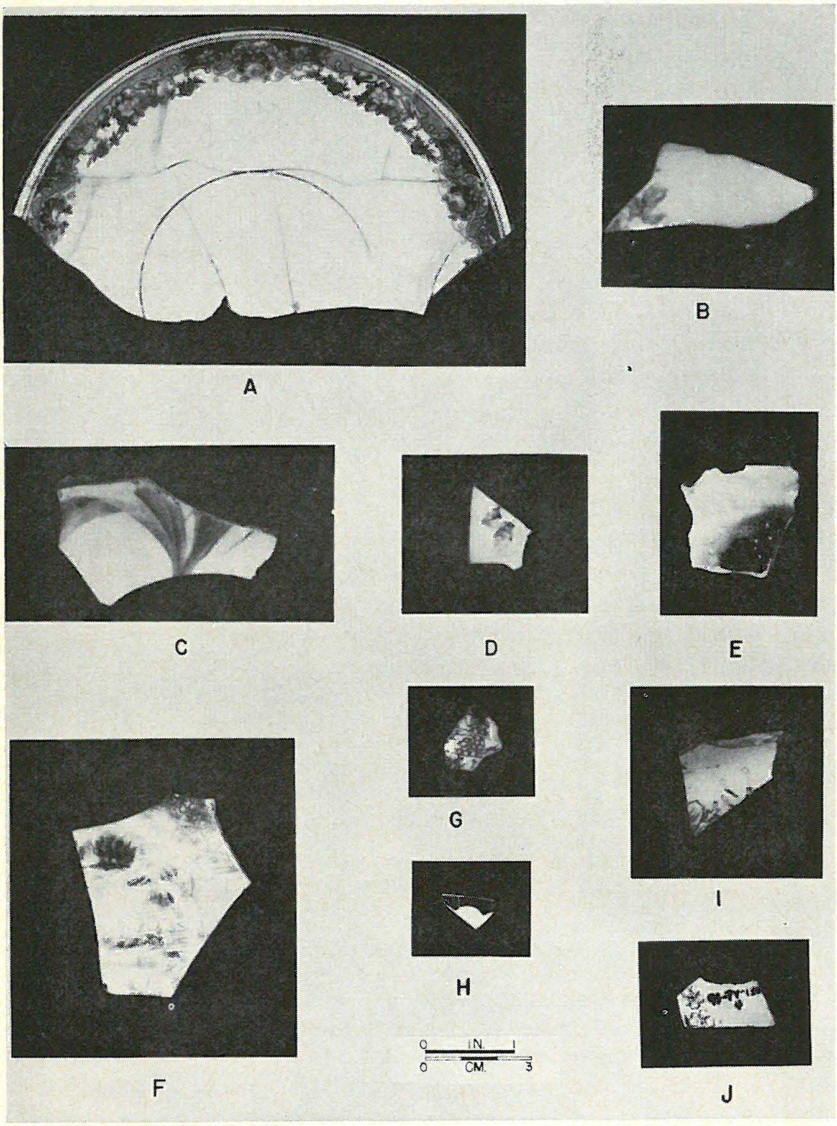


Fig. 7. Decorated Porcelain Sherds. A–D, Decal. E, Decal and repoussé. F–J, Transfer printed.

lain. The door knobs are of glazed, opaque porcelain, with the complete specimen measuring 5.6 cm. in diameter and 2.6 cm. in thickness. The insulator, also of glazed porcelain, is constricted in the middle and has a central perforation. It is 4.2 cm. high and has a maximum diam-

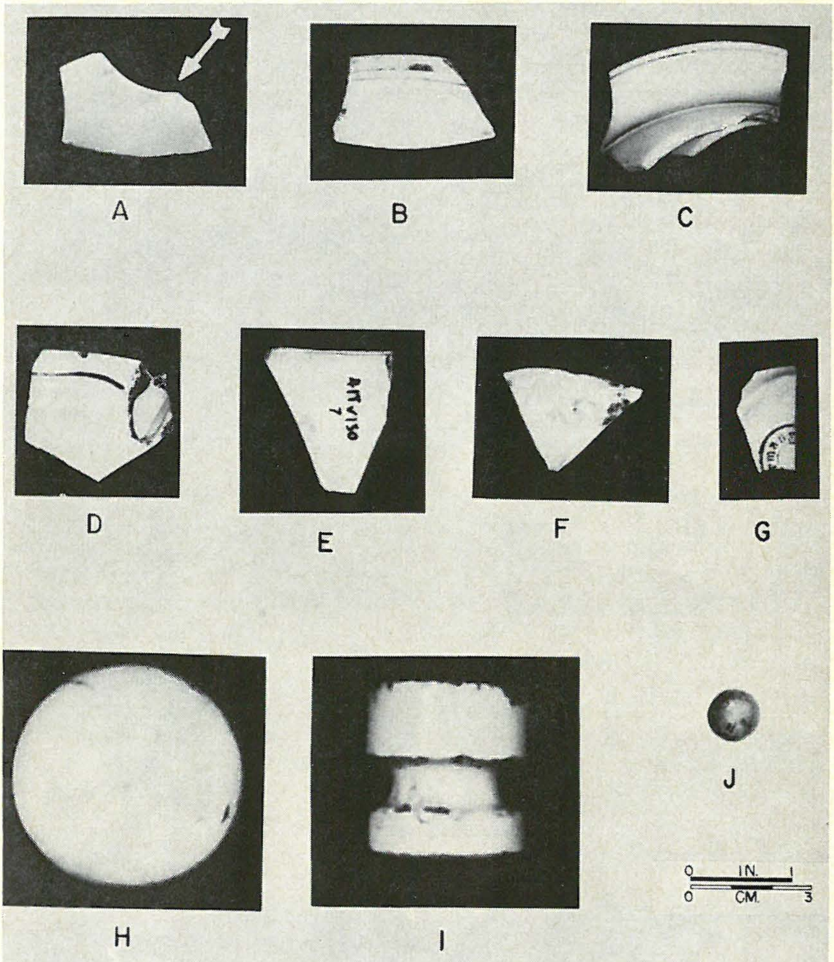


Fig. 8. Porcelain and Miscellaneous Ceramic Objects. A, Painted sherd from doll face; arrow points to traces of eyelashes. B–F, Gilded. G, Basal sherd with portions of maker's mark. H, Door knob. I, Wire insulator. J, Marble.

eter of 4 cm. and a minimum diameter of 2.6 cm. The central perforation is 8 mm. in diameter. The marble appears to have been home made and measures 1.3 cm. in diameter.

Interpretations

In doing correlative studies which would help to place the Anderson's Mill ceramics into a broader picture I have been faced with the perplexing problem of differing terminologies. Terms such as china, ironstone, semiporcelain, whiteware, and the like are often used but generally not adequately defined. Fortunately, however, the most important features for this study are not the characteristics of the paste, but rather the techniques of decoration. Both the styles and methods of decoration are somewhat better defined and their histories a bit better known.

Up to 1865 American potters had produced only an insignificant amount of ceramics, and what few were being manufactured were largely copies of European (mostly English) wares (Ramsay, 1947: 95–96). Since few of the domestic pieces were of good quality, most ceramics were imported from Europe, chiefly from England. The source of the Anderson's Mill ceramics is, of course, not known (the one identifiable maker's mark was from a Pennsylvania factory), but it is possible that they were, at least in part, imported.

During the first half of the 19th century English potters were producing large quantities of transfer printed (especially in blue) vessels with pseudo-romantic oriental scenes copied from Chinese and Japanese wares (such as shown in Fig. 7, F, G) being quite popular (Ramsay, 1947: 106–115; Camehl, 1916: xi-xii). About 1850, however, a number of new varieties of whitewares, known variously as semiporcelain, White Granite, Ironstone, etc., began to be introduced. Referred to herein as hard-paste earthenware and stoneware, these ceramics were often undecorated (Ramsay, 1947: 106–115), although designs of wheat or grapes were occasionally applied in low relief (*ibid.*). About the same time (1850), the process of decalcomania was developed by Minton's pottery in England.

In light of the developments briefly outlined above, the frequency of decalcomania, transfer printed, repoussé, gilded, and plain hard-paste earthenware is presented below. The figures on the left of the slash are the sherd counts, while those on the right indicate the minimum number of vessels represented.

	Decalcomania	Transfer printed	Painted	Repoussé	Gilded	Plain
Hard-paste earthenware	23/12	5/2	7/2	22/14	5/4	300/?
Porcelain	8/8	5/5	4/2	8/6	6/6	26/?

The preponderance of the decalcomania vessels over the transfer printed ones and the number of repoussé decorated pieces indicate that most of the porcelain and the hard-paste earthenware from Anderson's Mill date after 1850. Allowing even for the possibility that many of the plain sherds are from undecorated vessel areas, their frequency of occurrence also suggests a post-1850 date. The transfer printed sherds—especially those with oriental-inspired designs—could date from an earlier period, but it is possible that these motifs and transfer printing were retained for some time after the introduction of decalcomania. It is also possible that they were vessels long in the possession of the Anderson family.

Glass

The glass artifacts have been divided into three large groups—bottles, jars, and pressed glass—on the basis of their morphological characteristics.

Bottles

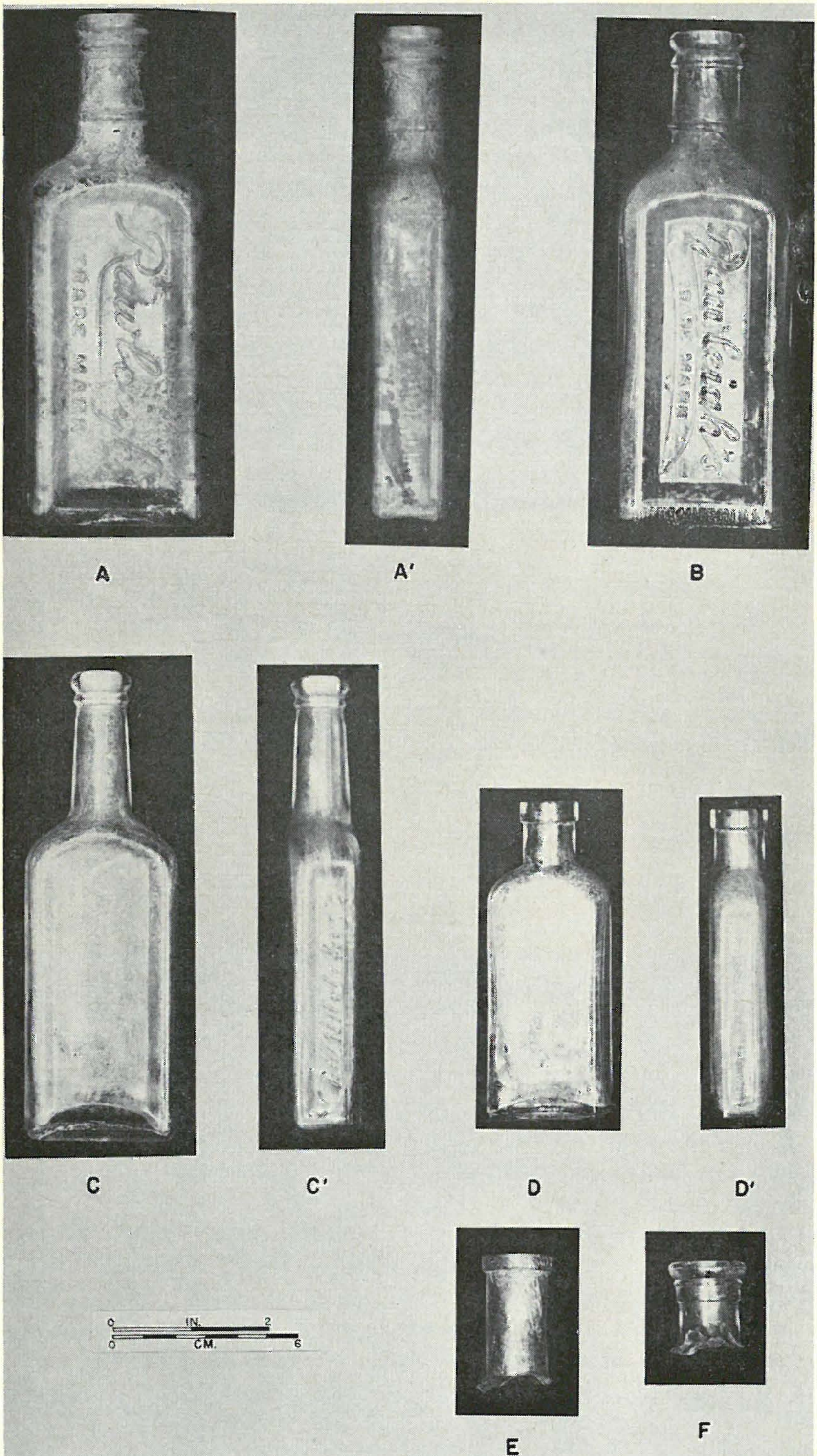
For descriptive purposes the bottles have been classified into panel bottles, snuff bottles, and miscellaneous bottles. The last-named category is further sorted into bottle necks and bottle bottoms.

PANEL BOTTLES (48 Specimens)

Included in this group are bottles that have rectangular panels recessed into their fronts, backs, and/or sides (Fig. 9). Each is rectangular in cross section on a plane parallel to the base. The longer sides in this sectional view are referred to as the faces, the shorter as the sides. The panels usually bear low relief letters that indicate the maker and/or the product.

At least five Rawleigh's medicine bottles are represented in the collection. These are of two types. One type (Fig. 9, A, A′) has the word *Rawleigh's* in script on one face and below this the words *trade mark* in upper case Roman letters, no inscription on the other face, the words *Freeport, Ill.* in upper case Roman letters on one side, and the words *W. T. Rawleigh Co.* in upper case Roman letters on the opposite side. The second type (Fig. 9, B) has the word *Rawleigh's* in script on one face with the words *trade mark* in upper case Roman letters within the space formed by two lines of the tail of the *R* which underscores the rest of the word *Rawleigh's*. On the basal part of the same face below the panel are the words *Made in U.S.A.* in upper case Roman letters. There are no panels or words on the sides or the other face. There is one complete bottle and one fragment of the first type, and one complete bottle and one fragment of the second type, as well as one untyped neck fragment and one unlettered panel. There are two different

Fig. 9. Panel Bottles. A, A′, Type 1 Rawleigh bottle. B, Type 2 Rawleigh bottle. C, C′, Fletcher's Castoria bottle. D, D′, Three-In-One Oil bottle. E, Hand finished neck. F, Machine finished neck.


A
A'
B
C
C'
D
D'
E
F
0 IN. 2
0 CM. 6

sizes represented. The two complete specimens and one of the fragments are 15.9 cm. tall, 2.8 cm. thick, and 5.7 cm. wide. Their necks are 2.1 cm. in diameter and 4.5 cm. tall. The panel fragments are from bottles that were somewhat larger, but they are too incomplete to obtain the exact dimensions. The three necks are machine finished.

One bottle (Fig. 9, C, C′) is 14.2 cm. tall, 2.4 cm. thick, 4.45 cm. wide and has a neck 4.6 cm. tall, 2.2 cm. in diameter at the shoulders tapering to 1.6 cm. at the point below the thickened portion. It has two unlettered face panels and two side panels one of which has *Castoria* in upper case Roman letters, the other *Cha. H. Fletcher's* in script. The neck is machine finished.

Another complete bottle (Fig. 9, D, D′) has no panels on its faces, but one on either side lettered *THREE IN ONE* and *3-in-ONE OIL COMPANY*.

One of the bottle fragments has a panel on both its face and side. The one on the face is lettered:

. . . Y & HOREHOUND

URES
COLDS, CROUP.

Another sixteen inscribed panel bottle fragments were recovered. They are inscribed as follows:

ELIXR ER	CO. AL.	DR FS	PRE DICIN
AR	YRUP	OIS.	CO
EW S	DR UST	ALD ER	EDI LO
	HAM		
	WIZAR	*CHATTAN*	

All of the above are printed in Roman letters except *CHATTAN* which is in upper case italics. Eighteen unlettered body fragments of panel are also in the collection, but are too incomplete for further description.

Of the seven necks recovered two are hand finished (Fig. 9, E), two machine finished (Fig. 9, F), and three too incomplete to determine the method used. Both of the hand finished necks are 2 cm. in diameter; one is 4 cm. tall; the other 4.5 cm. tall. The machine finished necks are 2.45 and 2.35 cm. in diameter, but of indeterminable height.

SNUFF BOTTLES (25 specimens)

The snuff bottles are square in cross section on a plane parallel with that of the base and, more importantly, lack necks (Fig. 10, A-C). The mouths project about .7 cm. above the shoulders. The complete

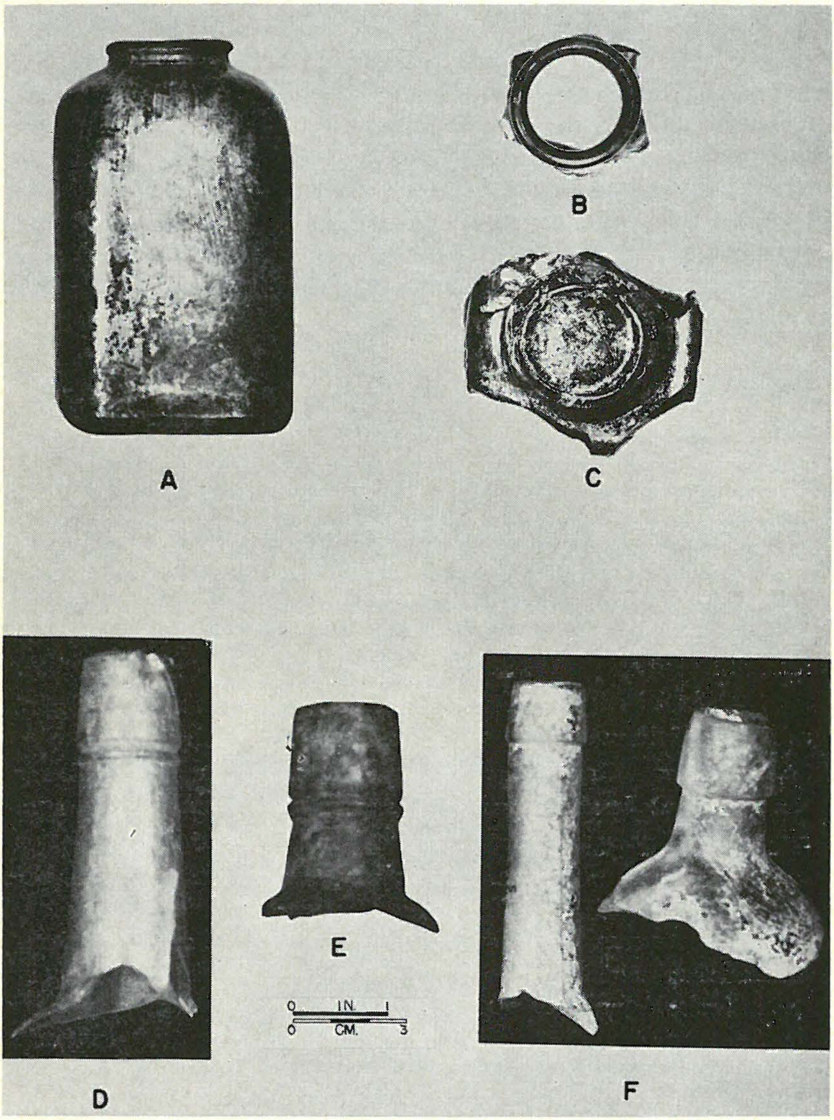


Fig. 10. Snuff Bottle and Bottle Necks. A, Complete snuff bottle. B, Snuff bottle neck. C, Snuff bottle base. D, E, Group I bottle necks. F, Group II bottle necks.

example (and probably most or all those represented by fragments) is 11 cm. high and 6.15 cm. wide; the outside diameter of the mouth is 3.45 cm. The six bottom sherds and the one complete specimen indicate that at least 7 bottles are included in the collection.

MISCELLANEOUS BOTTLE NECKS (22 Specimens)

Three criteria have been used in grouping these specimens: 1) presence or absence of wire rim, 2) size of the mouth orifice and neck diameter relative to the probable height of the bottle, and 3) general configuration of the thickened upper area of the neck just below the mouth. The wire rim is the ledge or rim that protrudes from the neck just under the thickened portion of the neck. The characteristic of being hand finished or machine finished is not considered as a criterion for descriptive classification; however, it has been taken into account as it is important for dating the bottles.

Group I (Fig. 10, D, E)

Number of specimens: 5
Color: Clear
Wire rim: Present
Inside diameters of mouths: 1.45 to 2.2 cm.
Diameter of necks measured below wire rim: 2.1 to 3.1 cm.
General configuration of thickened area: The wire rim is rounded and protrudes only slightly (not more than .5 cm.). Above the wire rim the neck expands slightly to form a thickened area that does not extend laterally (on a plane parallel to the base) beyond the rim. This thickened portion tapers toward the center of the mouth. The outer sides of the tapered portion are straight.
Height of the thickened area from the bottom (nearest the base of the bottle) of the wire rim to the rim of the mouth: 2.3 to 3.2 cm.
Over-all height of neck: 3.7 to 10.2 cm. (intermediary ones are 8.1 and 5.7 cm.; the other is indeterminable).

Group II (Fig. 10, F)

Number of specimens: 3
Color: Clear (2) and amber (1)
Wire rim: Absent
Inside diameters of mouths: 1.4, 1.5, and 1.7 cm.
Diameters of necks below thickened portion: 2.1, 2.2., and 2.5 cm.
General configuration of thickened area: Similar to Group I except that they lack wire rims. One specimen has slightly curved sides.
Over-all height of necks: 4.1, 3.1, and 9.25 cm.
General configuration of bottles: All three specimens have pronounced seam marks. One appears to have had a cylindrical body; another a rectangular body. All of the necks were hand finished.

Group III (Fig. 11, A)

Number of specimens: 1
Color: Clear
Wire rim: Present
Inside diameter of mouth: 1.6 cm.
Diameter of neck below thickened portion: 2.4 cm.
General configuration of thickened area: Wire rim is edged or diamond-shaped in cross section. Above the wire rim the thickened area is rounded or roughly semi-circular in cross section. The neck was hand finished.
Over-all height of neck: 4.25 cm.

Group IV (Fig. 11, B)

Number of specimens: 1
Color: Amber
Wire rim: Present
Inside diameter of mouth: 2 cm.
Diameter of neck below wire rim: 2.85 cm.
General configuration of thickened area: Rounded wire rim as in Group I. Area above the wire is trapezoidal in cross section. The trapezoidal area is 1.15 cm. tall.
Over-all height of neck: More than 4.1 cm.
General configuration of neck: Striations run at a slight angle to an axis perpendicular to the base of the bottle. Neck is probably hand finished.

Group V (Fig. 11, C)

Number of specimens: 1
Color: Amber
Wire rim: Absent
Inside diameter of mouth: Indeterminable
Diameter of neck: Indeterminable
General configuration of thickened area: Roughly semi-circular in cross section
General configuration of neck: Hand finished

Group VI (Fig. 11, D, E)

Number of specimens: 5
Color: Clear
Wire rim: Absent
Inside diameters of mouths: *ca.* 4.25 cm., greater than 3.1 cm., and indeterminable
Diameters of necks below thickened portions: 5 cm., and indeterminable
General configuration of thickened area: One fragment has a stippled band 1.45 cm. wide around the neck below the thickened area. The neck juts straight out for a distance of about .4 cm. and slants toward the mouth at an angle of about 45°. One fragment has a thickened area 1.45 cm. in height that is roughly semi-circular in cross section. The third piece has a thickened portion that is rectangular in cross section and is .7 cm. across the long side (height of the thickened area). Above the thickened portion is a rim that goes straight up to the mouth for .35

cm. The mouth orifices are large relative to the size of the bottle. Two necks are hand finished, one is machine finished.

Over-all height of necks: 3.45 and 2.2 cm., and indeterminable.

General configuration of the bottles: Probably wide mouth jars not adapted to take screw on lids.

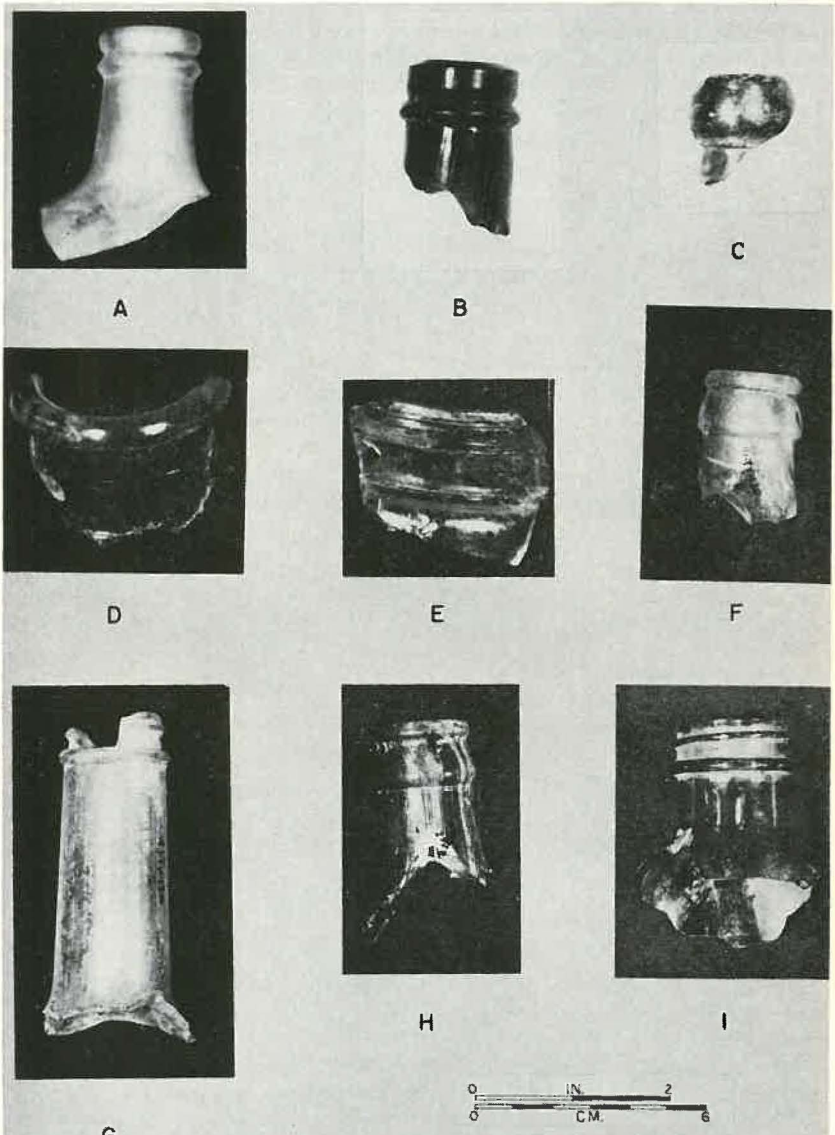


Fig. 11. Bottle Necks. A, Group III. B, Group IV. C, Group V. D, E, Group VI. F, H, Group VII. G, Group VIII. I, Group IX.

Group VII (Fig. 11, F, H)

Number of specimens: 3
Color: Clear
Wire rim: Absent
Inside diameters of mouths: 1.7 cm. and indeterminable
Diameter of neck below thickened portion: 2.45 cm. and indeterminable
General configuration of thickened areas: Like the thickened areas of modern soda water bottles.
Over-all height of necks: Indeterminable
General configuration of necks: They were made to take crown cap closures. One is hand finished, one incomplete, and one machine finished.

Group VIII (Fig. 11, G)

Number of specimens: 2
Color: Clear and amber
Wire rim: Absent
Inside diameters of mouths: .35 and 2.4 cm.
Diameter of necks below thickened portions: 1.7 and 2.95 cm.
General configurations of thickened areas: These two fragments have only one characteristic in common that separates them from the other bottle necks: they are made to take screw caps. The one with the smaller mouth appears to be from a flavor extract bottle. Both are machine finished.

Group IX (Fig. 11, I)

Number of specimens: 1
Color: Clear
Wire rim: Present
Diameter of neck below thickened portion: 2.75 cm.
General configuration: Neck for a screw on cap

MISCELLANEOUS BOTTLE BOTTOMS (48 Specimens)

The bottle bottoms are sorted into two large classes according to their shapes. The first group, those with round bottoms, are further divided into specimens: 1) with no markings, 2) with simple markings, and 3) with complex markings. The second large class, those lacking round bottoms, were divided into finer groups according to the shape of the base. All of these categories are purely descriptive.

The following bottles have round bottoms:

Group I (Fig. 12, A, B)

Number of specimens: 8
Type of marking: None
Description: One bottom (Fig. 12, A) has a very slightly conically-indented base which forms a kick-up of about 1.2 cm. This bottom appears to be one made with a snap case (a device for grasping the bottom of the bottle during the finishing process). The lower portion of the body (not the bottom) has words *CONTENTS 4/5 QUART* in low relief, suggesting this piece is probably a fragment of a spirits or wine bottle. It is 7.8 cm. in diameter.

Another bottle bottom has a slightly indented base which is not conical but rather is slightly curved. A heavy seam encircles the basal part of the body about .95 cm. above the bottom. The bottom is 8 cm. in diameter. A third fragment has a slightly incurved bottom and a heavy seam which encircles the basal part of the body about .4 cm. above the bottom. The bottom is 7 cm. in diameter. There is a ring around the base of the fourth bottom sherd. The center is downcurved or convex, and the bottom is 6.5 cm. in diameter.

The last four sherds in this group are of the same type. The bottoms are slightly upcurved or concave to form a kick-up of about 1 cm. The surfaces are irregular, and at about the center is a circle in low relief which appears to be a result of the manufacturing method rather than an intentional mark. The one complete example is 10.2 cm. in diameter.

Group II (Fig. 12, C, D)

Number of specimens: 12
Type of marking: Numerals in low relief
Description: Seven of these sherds are of the same type. The kick-up varies from .3 to .6 cm., and all except two have circles which contain numbers approximately at their centers. The circles are 2.2 cm. in diameter; and the numbers are 1.2 cm. high in all cases except one which is 1.6 cm. All of the surfaces are slightly irregular. The one complete bottom (Fig. 12, D) has a diameter of 11.5 cm. The two sherds with portions of the body have seams around the basal part of the body.

The remaining five specimens in this group have slightly concave bottoms. Their dimensions are as follows:

Diameter	*Height of number*	*Possible basal body seam*
4.15 cm.	.40 cm.	yes
7.8 cm.	.45 cm.	yes
?	.3 cm.	no
?	.3 cm.	no
4.5 cm.	.3 cm.	no

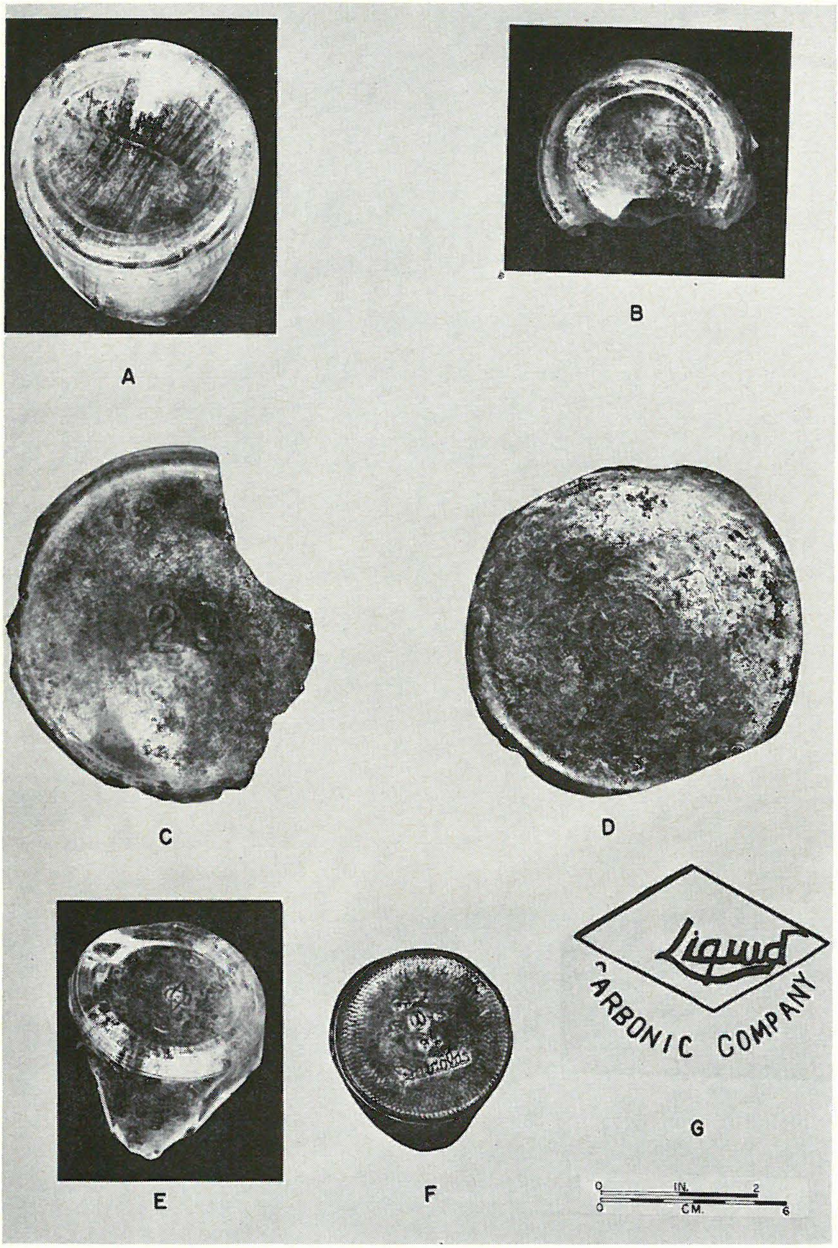


Fig. 12. Round Bottle Bottoms. A, B, Group I. C, D, Group II. E–G, Group III.

Group III (Fig. 12, E-G)

Number of specimens: 14
Type of marking: Complex
Description:

Diameter	*Symbol*	*Possible basal body seam*	*Color*
?	14 circle-diamond 3	no	amber
14.4 cm.	1 circle-diamond 3	no	amber
	4		
14.3	Diamond containing letter I	yes	amber
?	D 2 3		
	65-S circle-diamond	?	clear
9.1	3 Rivers		
	32		
	6	yes	clear
8.0	A		
	MG Co		
	8	no	amber
?	See Fig. 12, G	?	frosted
?	Dr. S.B.H.		
	PR. O	no	clear
ca. 6.5	AB		
	16	yes	amber
8.2	9-B -383	no	clear
6.25	68-7		
	15 circle 8		
	9-		
	Duraglas (Fig. 12, F)	no	amber
ca. 6.2	F	yes	amber
5.85	0-1217		
	4	no	clear
6.2	12 circle-diamond 9		
	10		
	(Fig. 12, E)	yes	clear

The following groups of bottle bottoms are rectangular, oblong, square, or hexagonal:

Group IV (Fig. 13, A)

Number of specimens: 1

Description: Several sherds have been reconstructed to form the better part of a bottle which has an oblong base and parallel panels on each side which are 2.25 cm. wide and run the length of the bottle. The neck has threads to take a screw cap. The bottle is blue in color and was probably a milk of magnesia container. The short axis of the base is 6.05 cm. long; the long axis, 8.45 cm. The neck is 3.1 cm. in diameter and 3.5 cm. high.

The total height of the bottle is indeterminable.

Group V (Fig. 13, B-E)

Number of specimens: 11 (includes one complete bottle)

Description: In this group are specimens which have rectangular or near rectangular bases but which cannot be classed as panel bottles (Fig. 13, B). Three of the 10 base sherds are straight on one side and have curved ends and one curved side (Fig. 13, C). One of these is marked on the bottom with a diamond and, inside this, an *I*; the other two are unmarked. The marked fragment also has the letters

. . . ESS
. . . ED BY
. . . C.

in low relief on the flat face. This piece is 3.5 cm. wide; the others, 2.8 cm. and indeterminable.

Four bottle bottoms are quite fragmentary, but appear to have had straight sides and curved ends. None is marked and the only one complete enough to measure is 4.15 cm. by 2.15 cm.

An eighth bottom sherd is rectangular in shape, but the sides are slightly curved. On the bottom there is an equilateral triangle enclosing the letters *W* and *T* in low relief. Below the apex of the triangle are letters *U. S. A.* To the right of the triangle is the letter *J.* This base was more than 9 cm. long and greater than 6.5 cm. wide.

Another bottle bottom (Fig. 13, D) is hexagonal in shape. The bottom is marked with a Heinz 57-like shield within which is the letter *J.* To the right of this symbol are the numbers 4 and 50. One other sherd of the same general shape has the letters *J. B. W. Co.* and the numbers *1 18 2* on its base in low relief.

In addition to the above fragments, one complete bottle (Fig. 13, E) is included with this group because it has a rectangular base and is marked with a diamond and, inside this, an *I.* The neck, however, looks like the necks of the panel bottles. The bottle is 14.7 cm. high, 3.1 cm. wide, and 5.4 cm. long; the neck is 4.4 cm. high and 1.9 cm. in diameter. The base of the neck on one face has *3 iv* in low relief.

Group VI (Fig. 13, F)

Number of specimens: 2

Description: Both of these are square bottoms. One (Fig. 13, F) looks rather like the base of a snuff bottle, but it is clear, not amber, and is too incomplete to determine the size of the bottle. The other fragment is also clear and has the letter *H* near its center in low relief. The bottle it is from was over 8 cm. wide.

Jars

The jar parts are here considered under four headings: rims, lid liners, tops, and miscellaneous.

JAR RIMS (27 Specimens)

The characteristics used to separate the jar rim sherds into a number of descriptive groups include: the shape of the shoulder, the presence

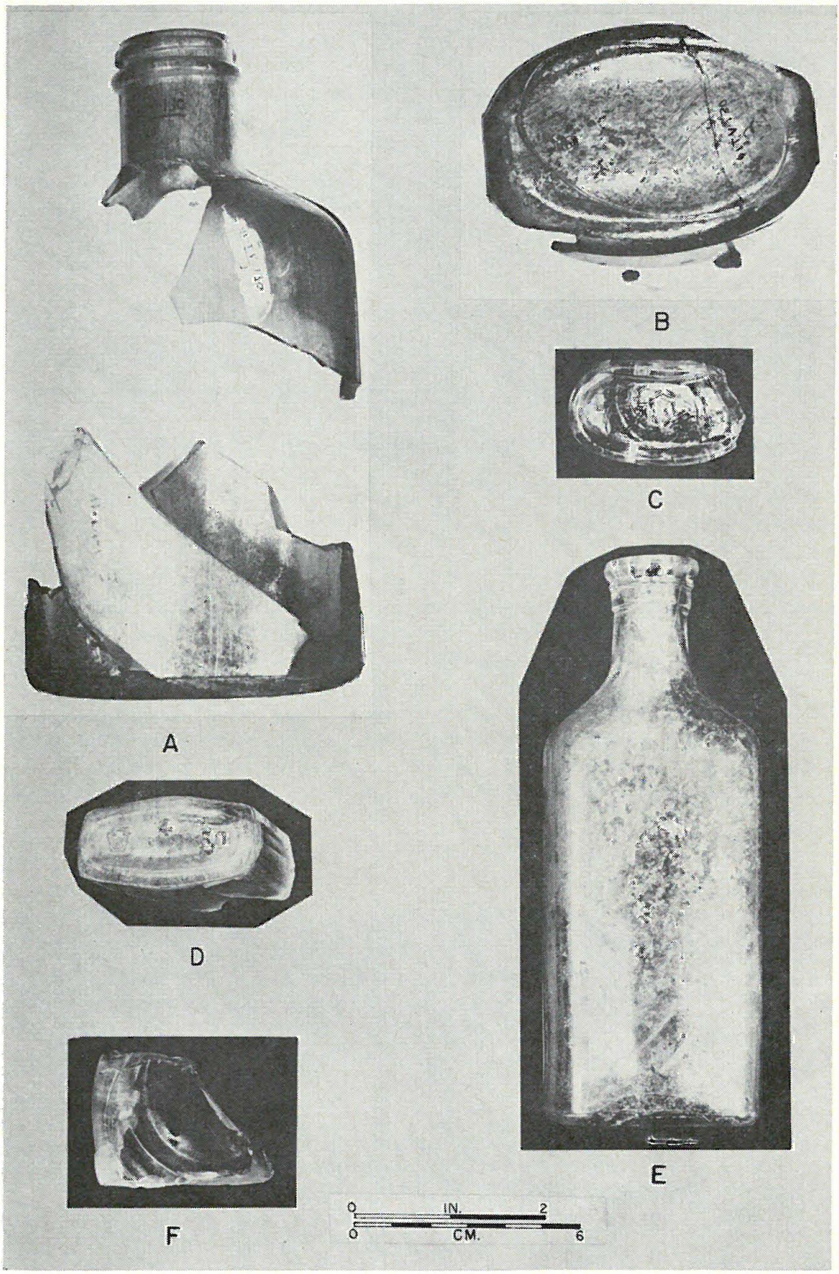


Fig. 13. Miscellaneous Bottle Bottoms. A, Group IV. B–E, Group V. F, Group VI.

or absence of a wire rim, the shape of the wire rim when it is present, and the shape of the lip.

Group I (Fig. 14, A)

Number of specimens: 5
Wire rim: Absent
Shape of shoulders: Square
Dimensions: Height of constricted area from shoulder to mouth: 1.7 cm. Outside diameter of mouth: 6.2 cm. Thickness of glass at rim: from .4 to .5 cm.
Rim shape: Rounded, but ridges remain on the outside—the rounded part is centered on the rim's surface leaving a ledge on either side.

Group II (Fig. 14, B)

Number of specimens: 1
Wire rim: Absent
Shape of shoulders: Squared
Dimensions: Height of constricted area from shoulder to mouth: 1.5 cm. Outside diameter of mouth: indeterminable. Thickness of glass at rim: .35 cm.
Rim shape: Squared

Group III (Fig. 14, C)

Number of specimens: 1
Wire rim: Present; protrudes .7 cm.
Shape of shoulders: Squared
Dimensions: Height of constricted area from shoulder to mouth: 2.55 cm. Outside diameter of mouth: indeterminable. Thickness of glass at rim: .35 cm.
Rim shape: Squared

Group IV (Fig. 14, D, E)

Number of specimens: 5
Wire rim: Present; protrudes .55 cm.
Shape of shoulders: Rounded
Dimensions: Height of constricted area from shoulder to mouth: 2.55 cm. Outside diameter of mouth: about 6.4 cm. Thickness of glass at rim: .3 cm.
Rim shape: Slightly rounded and beveled

Group V

Number of specimens: 2
Wire rim: Present; protrudes about .3 cm.
Shape of shoulders: Rounded
Dimensions: Height of constricted area from shoulder to mouth: 2.3 cm. Outside diameter of mouth: indeterminable. Thickness of glass at rim: .35 cm.
Rim shape: Rounded

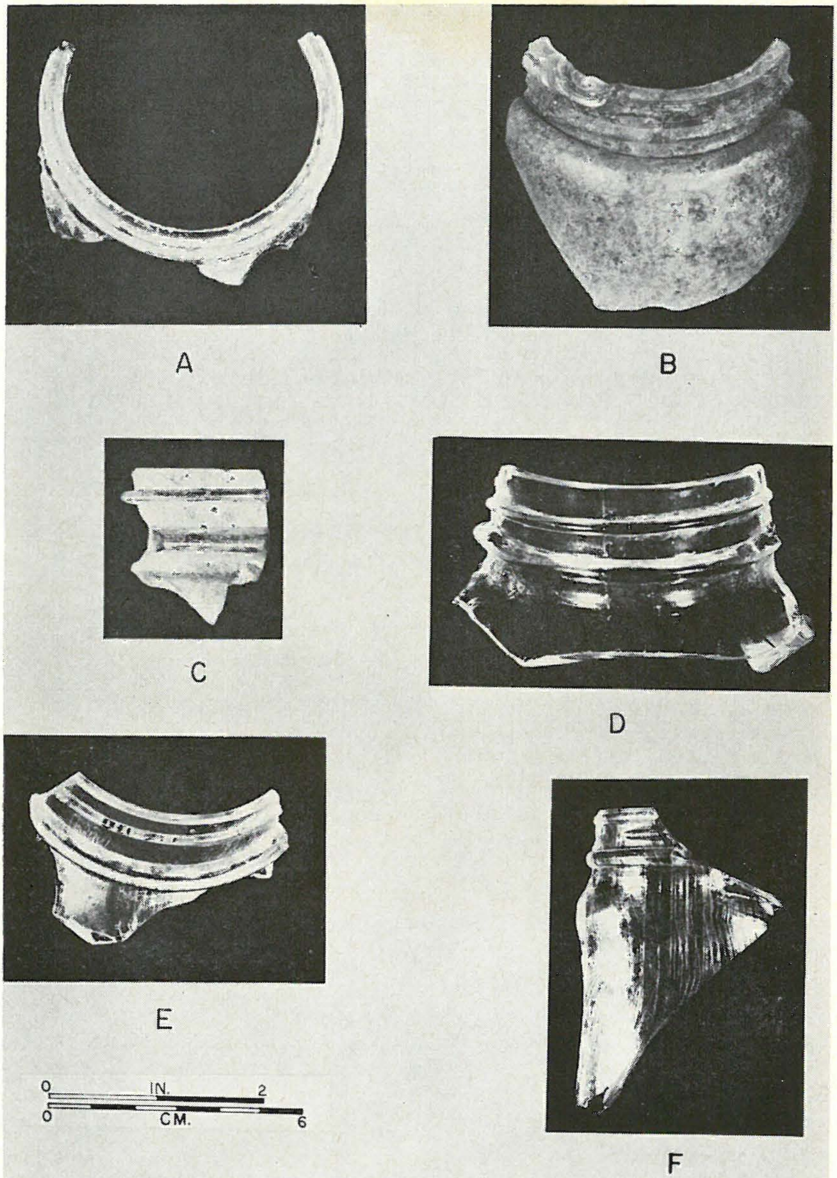


Fig. 14. Jar Rims. A, Group I. B, Group II. C, Group III. D, E, Group IV. F, Miscellaneous.

Two sherds may belong to either Group II or III. Their rims are squared, but they are not large enough to ascertain the presence or absence of a wire rim. Ten other sherds have the necks or restricted areas of the jars made for screw lids, but are too incomplete to classify. One additional rim fragment (Fig. 14, F) is from a jar with no shoulders. The threads for the cap on this piece are on the rim of the straight sides.

JAR LID LINERS (47 Specimens)

Jar lid liners (Fig. 15) are discs of white glass that fit into the tops of screw tops for wide mouth jars. They have been divided into five groups on the basis of what is written on their surfaces, or, in one case, an absence of any wording.

Group I

Number of specimens: 8
Diameter: 6.65 cm.
Thickness at center: .35 cm.
General features: A set of two concentric circles in relief is placed in the center. The words *GENUINE BOYD* appear in low relief around the outside of the liner, on the rim. One specimen has *56 BOYD'S* in that position.

Group II

Number of specimens: 4
Diameter: *ca.* 6.4 cm.
Thickness: .35 to .45 cm.
General features: The words *Celain lined* occur on the outside edges of one; . . . *UINE PORC* . . . on another.

Group III

Number of specimens: 2
Diameter: 6.4 and 6.5 cm.
General features: Two concentric circles in the center which contain no wording. Both liners were found inside screw on tin caps.

Group IV

Number of specimens: 3
Diameter: Indeterminable
General features: Words *FOR M* . . . on one; *FOR MA* . . . on the second; and *MASON JAR CAP* on the third. The words are around the outer edges of the discs.

Group V

Number of specimens: 1
Diameter: Indeterminable
Thickness at center: *ca.* 5.0 cm.

General features: Words . . . *AR CAP NN* . . . around the edge, inside rim. Number *2* toward the center of the disc in low relief.

An additional twenty-nine lid lines sherds are too incomplete to classify.

JAR TOPS (15 Specimens)

Although the jar tops are of metal, they are discussed here in order to maintain the continuity of the jar parts. Fourteen of the lids and lid fragments are of tin and one is of iron. The iron specimen, a disc-shaped piece, represents the top part of a compound lid. The missing part, a threaded rim section, fits over this piece and is screwed onto the mouth of a jar. The disc is about 8 cm. in diameter and is inscribed with *KERR WIDE MOUTH MASON PAT. *–31–. . .*

The remaining 14 lids are one piece tin lids which were used with the jar lid liners (Fig. 15). One is inscribed *GENUINE BOYD CAP MASON JAR* around the top of its rim. All of the six complete lids are about 6.5 cm. in diameter. At least ten lids are represented by the fragmentary and whole specimens.

Miscellaneous Jar Parts (6 Specimens)

In addition to the above, there are two glass jar bases and four glass jar body sherds. Each of the bases is 9.2 cm. in diameter and contains the words *KERR GLASS MFG COM SAND SPRINGS, OKLA* around the outside, and *PAT AUG 3, 1915* in the center.

Three of the body fragments, all probably from Ball jars, are inscribed in upper case script: one has . . . *ALL*, and two have *BAL* . . . The one remaining piece is decorated with intersecting lines (a grid-like pattern) done in low relief and placed .6 cm. apart from one another. This sherd is probably from a pickle jar.

Pressed Glass

The criterion for the classification of the pressed glass (i.e., glass pressed into a mold while still plastic) has been the design. The terminology has been taken primarily from Lee (1933).

IDENTIFIED PATTERNS (50 Specimens)

Crystal (Fig. 16, A)

Number of specimens: 2
Color: Clear
Design: Included in this group are a large rim sherd (Fig. 16, A) and a small body

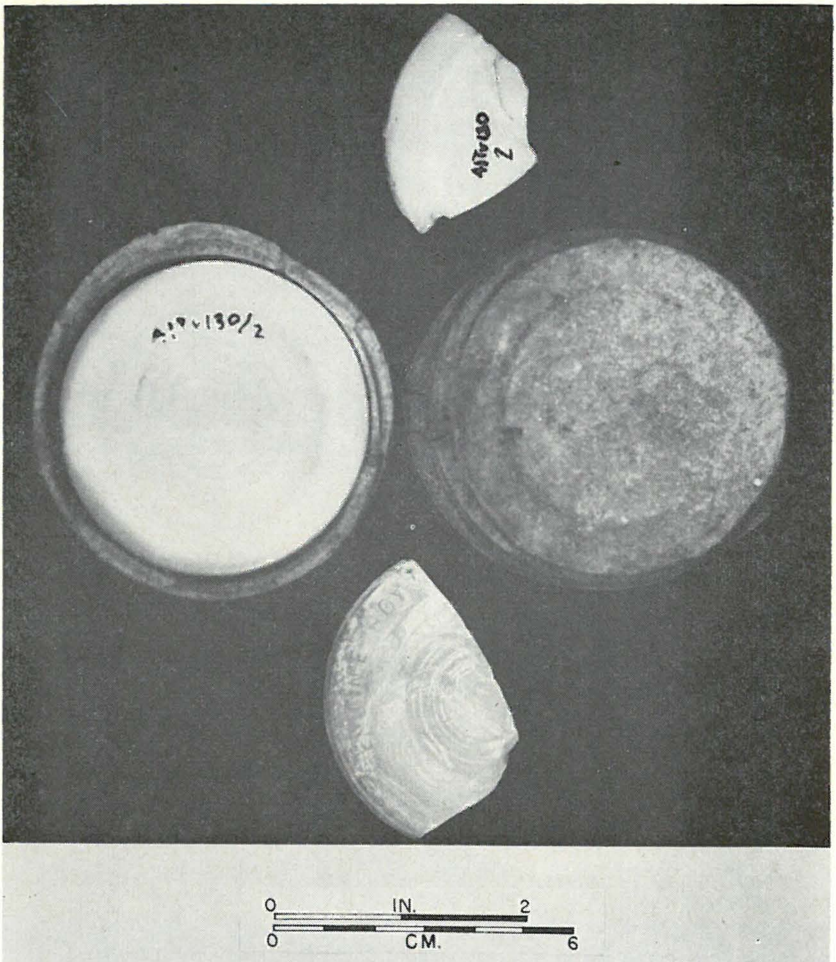


Fig. 15. Jar Lids and Liners.

fragment, both of which have on the exterior surface a series of rather broadly-spaced (maximum of 2.7 cm.), raised vertical lines. On the rim piece the lines begin at indentations formed by a scalloped lip and continue toward the base of the vessel, becoming more closely-spaced (i.e., somewhat converging).

Vessel form: Probably a small bowl

Daisy and Button (Fig. 16, B, C)

Number of specimens: 5

Color: Clear

Design: The design on each of these specimens consists of a geometric figure, usually an octagon or a hexagon, composed of a number of wedge-shaped segments done in high relief. One of the sherds has the octagon divided into 12 wedge-shaped segments, and 2 others have patterns in which hexagons are divided into 6 segments. In the classic daisy and button pattern the stylized "daisies" (the wedged geometric figures) are interspersed with smaller geometric elements which may or may not be subdivided by wedges. The sherd that is decorated with the octagonal stylized daisies has one "button" that is an octagon in high relief and is surrounded by four daisies. On the two sherds having hexagonal daisies, there are equilateral triangles whose bases are sides of the hexagons between the daisies. The over-all effect of this pattern is that of a set of interlocking, six-pointed stars. These two sherds have been considered in this group because they seem to represent a set. The wedges of another sherd are ranged in a circle about a central daisy that has a round button in the middle of it. The two remaining pieces exhibit the daisy pattern, but are too incomplete to determine the exact style of decoration.

Vessel form: One sherd is a rim from what appears to have been a steep-sided vessel, while another fragment is probably from the top or lid of a vessel. The similarity of the patterns on these two sherds suggests that they belong to a set. The other pieces are too incomplete to yield particulars about form, but they appear to represent 3 different vessels.

Pressed Block (Fig. 16, D)

Number of specimens: 1
Color: Clear
Design: The pressed block design consists of a number of truncated pyramid-shaped elements placed side by side, row upon row.
Vessel form: Unknown

Ribbed (Fig. 16, E)

Number of specimens: 1
Color: Amethystine
Design: Ribs in high relief radiate from a raised central circle (*ca.* 3 cm. in diameter and .6 cm. high) which appears to be a knob for lifting.
Vessel form: Probably a bowl lid

Fine Cut (Fig. 16, F)

Number of specimens: 1
Color: Pale, clear yellow-green
Design: Four-sided pyramid-shaped projections cover the face (exterior) of the vessel. The apex of each pyramid is truncated and has an indented cross, the arms of which are perpendicular to the basal sides of the pyramid. The bases of the pyramids are about .5 cm. square.
Vessel form: Probably a rim of a glass, cup, or goblet

Grape (Fig. 16, G)

Number of specimens: 1
Color: Clear
Design: A bunch of grapes and two leaves are represented in high relief on the

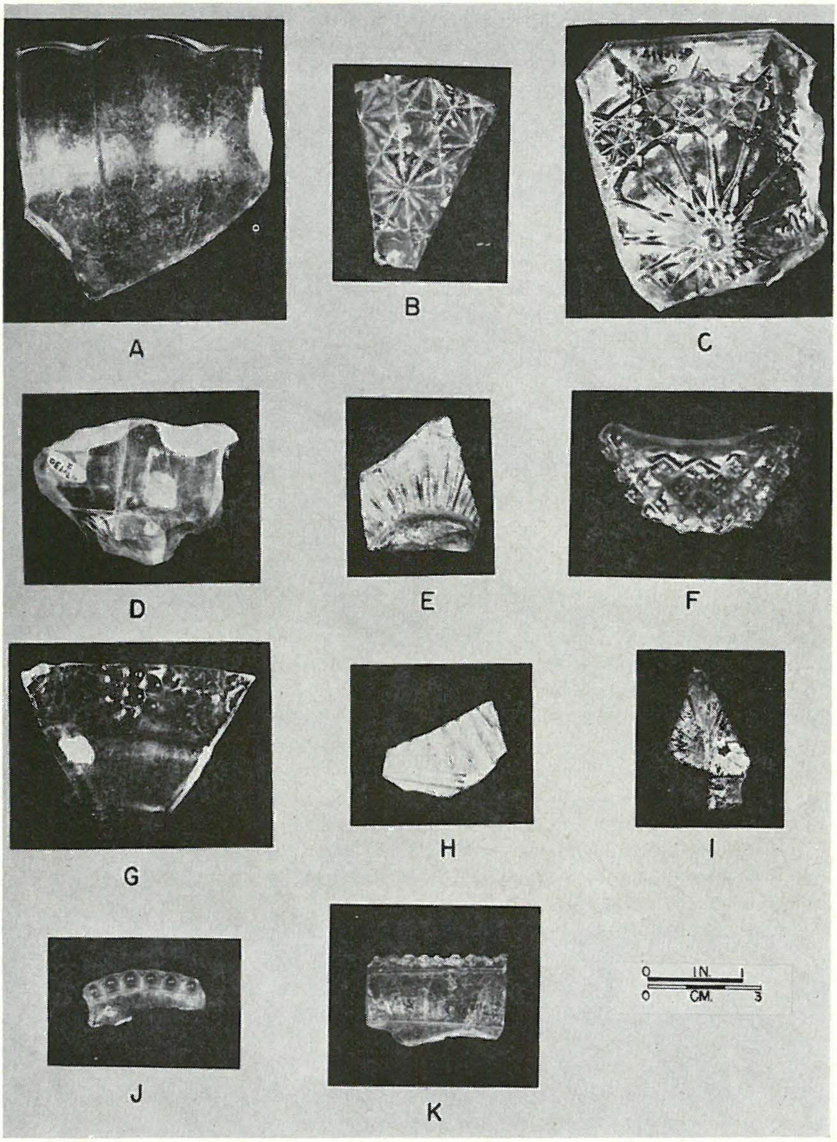


Fig. 16. Pressed Glass. A, Crystal. B, C, Daisy and button. D, Pressed block. E, Ribbed. F, Fine cut. G, Grape. H, I, Bellflower ribbed. J, K, Hobnail.

exterior. A vertical line in low relief appears just below the grapes, and may be one of a set that divided the vessel into panels. If this were the case, the sherd would be of the paneled grape type.

Vessel form: Unknown

Bellflower Ribbed (Fig. 16, H, I)

Number of specimens: 5
Color: Clear (1) and amethystine (4)
Design: Characterized by raised ribs which radiate from a central point or circle. These ribs differ from those of the above-mentioned ribbed type in that they are pointed on the ends, are in lower relief, and are more triangular in cross section (the ribs of the ribbed type are nearly square in cross section).
Vessel form: Unknown, but at least 4 vessels are represented.

Pointed Hobnail (Fig. 16, J, K)

Number of specimens: 5
Color: Clear (4) and amethystine (1)
Design: All of these sherds are from rims, each of which has been thickened and indentations made to achieve the effect of a scalloped edge. On three of the pieces the indentations are on a plane that is probably parallel to the base, but on one the indentations are on a plane that appears to be perpendicular to the base.
Vessel form: Unknown, but at least 4 vessels are represented.

Bull's Eye (Fig. 17, A-C)

Number of specimens: 6
Color: Clear
Design. One sherd exhibits a pattern composed of partially contiguous rings (*ca.* 1.5 cm. in diameter) in high relief. In the center of each ring is a raised hemisphere. The area between the inside of the ring and the outside of the hemisphere —as well as the space between each ring—is stippled. Four other sherds exhibit the classic bull's eye pattern of a rounded circle in high relief inside an indented circle (Fig. 17, A, B). The one remaining specimen (Fig. 17, C) is decorated with a pattern that may be a variation of the bull's eye style. On this piece a slightly elliptical-shaped area in high relief is outlined by two crescents, one above and one below the ellipse. The surface of the ellipse is decorated in diamond point, while the surfaces of the crescents are scored.
Vessel form: Unknown; at least 3 vessels are present in the collection.

Icicle (Fig. 17, D, E)

Number of specimens: 3
Color: Clear
Design: Two of these pieces have long, parallel indentations or lines which are pointed (Fig. 17, D, E); the third has the lines (also indented) radiating from a point.
Vessel form: Probably drinking glasses.

White Glass (Fig. 17, F-I)

Number of specimens: 20
Color: White ("milk" glass)
Design: Primarily floral, with both naturalistic (Fig. 17, F, G; 3 sherds) and styl-

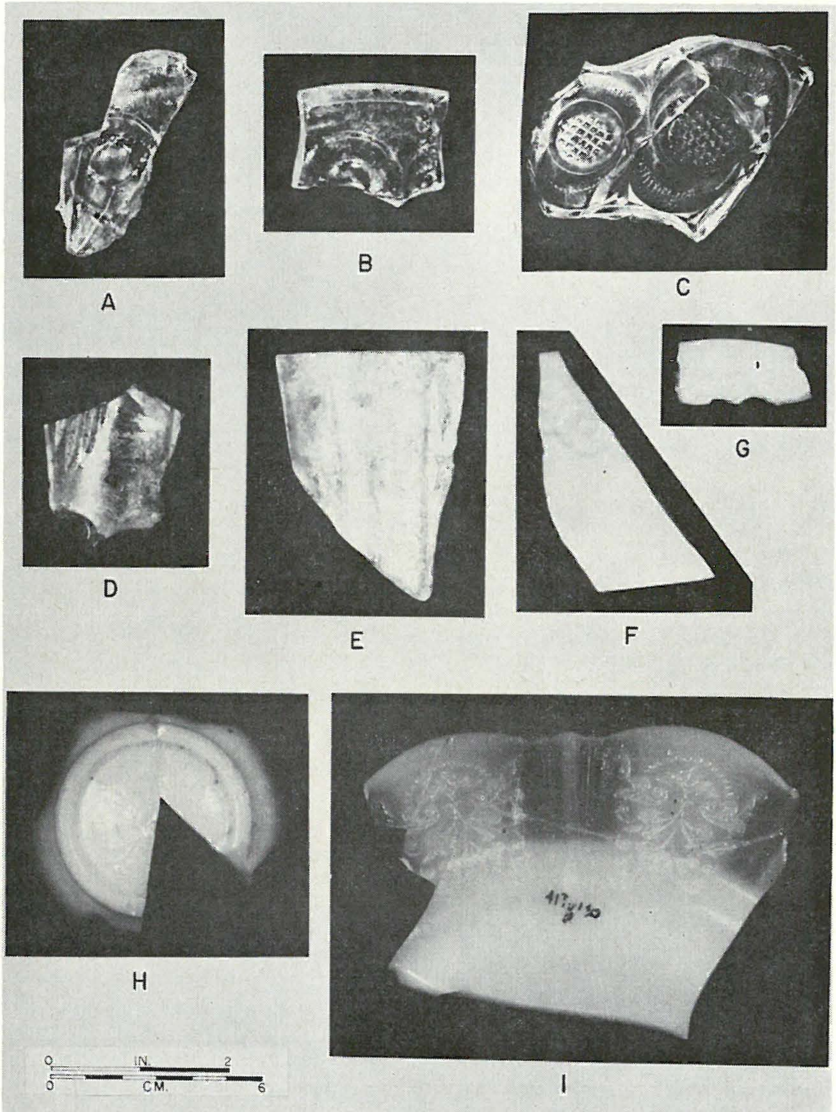


Fig. 17. Pressed Glass. A–C, Bull's eye. D, E, Icicle. F–I, White glass.

ized (Fig. 17, H, I; 4 sherds) patterns recognizable. Eight specimens, including a handle fragment, are undecorated; and one—a plate fragment—is painted on its interior surface.

Vessel form: Those with floral designs represent 2 plates, those with a stylized floral pattern a plate and a cup. The painted sherd is from a plate.

UNIDENTIFIED PATTERNS (31 Specimens)

Stylized Floral (Fig. 18, A, B)

Number of specimens: 4
Color: Clear, light green
Design: A stylized floral pattern appears on the exterior surfaces.
Vessel form: Two vessels are represented. One is a small, footed bowl, 4.85 cm. high and a minimum of 5.25 cm. in diameter. The other vessel has a similar design, but appears to be from a vase or decanter which was more than 6.15 cm. high and had a minimum diameter of 4.2 cm.

Floral

Number of specimens: 1
Color: Amethystine
Design: Sherd is too small to determine any details.
Vessel form: Unknown

Panel (Fig. 18, C)

Number of specimens: 4
Color: Clear
Design: A number of contiguous, rectanguloid panels
Vessel form: Three of the sherds appear to be from bottle shoulders; a minimum of 3 vessels are represented.

Circular (Fig. 18, D)

Number of specimens: 2
Color: Amethystine
Design: Each sherd contains portions of large raised circle.
Vessel form: Unknown, but both pieces may be from the same vessel.

Octagonal (Fig. 18, E, E′)

Number of specimens: 1
Color: Amethystine
Design: Appears on the interior surface and consists of a central octagon which contains an 8 pointed star composed of wedge-shaped triangles. Numerous small triangles surround this central motif.
Vessel form: Possibly a lid or decanter top, as a long stem having a hexagonal cross section projects from the exterior surface.

Striated (Fig. 18, F)

Number of specimens: 2
Color: Clear
Design: Short, closely-spaced vertical striations (or ticked lines) appear just below the rim. On the larger piece the upper portions of two panels are visible.
Vessel form: Unknown

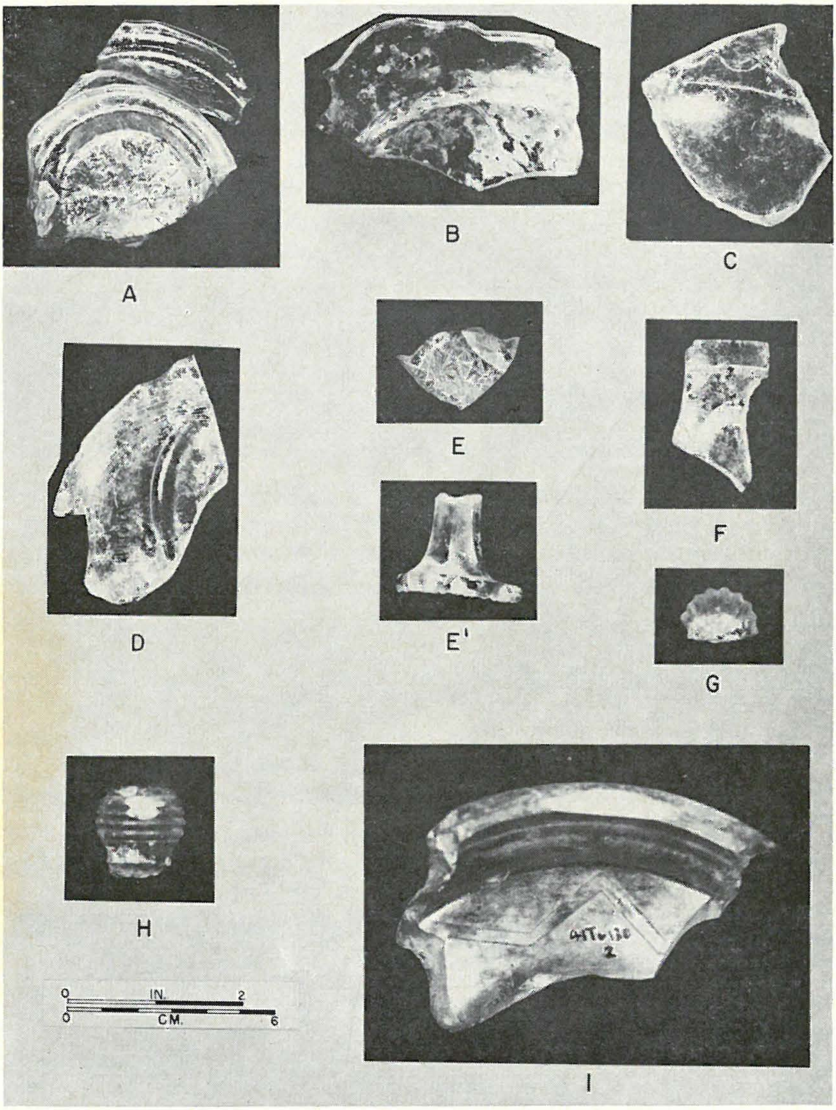


Fig. 18. Pressed Glass. A, B, Stylized floral. C, Panel. D, Circular. E, E′, Octagonal. F, Striated. G, Radiating lines. H, Concentric circles. I, Multi-pointed star.

Radiating Lines (Fig. 18, G)

Number of specimens: 1
Color: Amethystine
Design: Done in high relief on both the exterior and interior, and consists of lines

which radiate from a central point. The lines from each surface converge at the edge and produce a sawtooth-like rim.

Vessel form: This specimen is solid and was elliptical in cross section. It was an estimated 2.2 cm. in diameter and is 1.15 cm. in maximum thickness. It is probably part of a lid knob.

Concentric Circles (Fig. 18, H)

Number of specimens: 1
Color: Amethystine
Design: A series of horizontal, concentric circles
Vessel form: This piece is a complete knob, 2.2 cm. high and 2.4 cm. in maximum diameter.

Multi-Pointed Star (Fig. 18, I)

Number of specimens: 1
Color: Amethystine
Design: Incomplete, but appears to have a multi-pointed star.
Vessel form: Apparently a shallow, wide-mouth vessel of thick (.75 cm.) glass.

In addition to the above, there are 16 pieces of pressed glass which are so small that their design elements cannot be accurately ascertained.

Miscellaneous Glass Objects

Included in this category are:

1) One hundred and twelve fragments of window glass (Fig. 19, A, B). These range from .15 to .3 cm. in thickness, and are coated with flecks of gold and blue, as a result of corrosion.

2) A flat fragment of glass with a smooth, wavy edge (Fig. 19, C). It is possible that this piece is from a glass table top cover.

3) Nine pieces of very thin (.05 to .1 cm.) glass, probably from lamp chimneys (Fig. 19, D, E).

4) Three fragments of white, opaque glass possibly from a cosmetic (cold cream?) container (Fig. 19, F).

5) Two beads, one of which is a molded red bead with a geometric design. The other is a plain, spheroid-shaped blue bead. The red one is 1.5 cm. long and .7 cm. in diameter; the blue one is .55 cm. in diameter.

6) A basal fragment (Fig. 19, G) of a small salt bowl. The diameter of the base is 2.65 cm. and the maximum thickness is .45 cm.

7) Three buttons, each with four holes. One (Fig. 19, I) is 2.3 cm. in diameter and two (Fig. 19, H) are 1.1 cm. in diameter.

8) Fragments of what appear to be a faceted bottle (Fig. 19, J), possibly a perfume container.

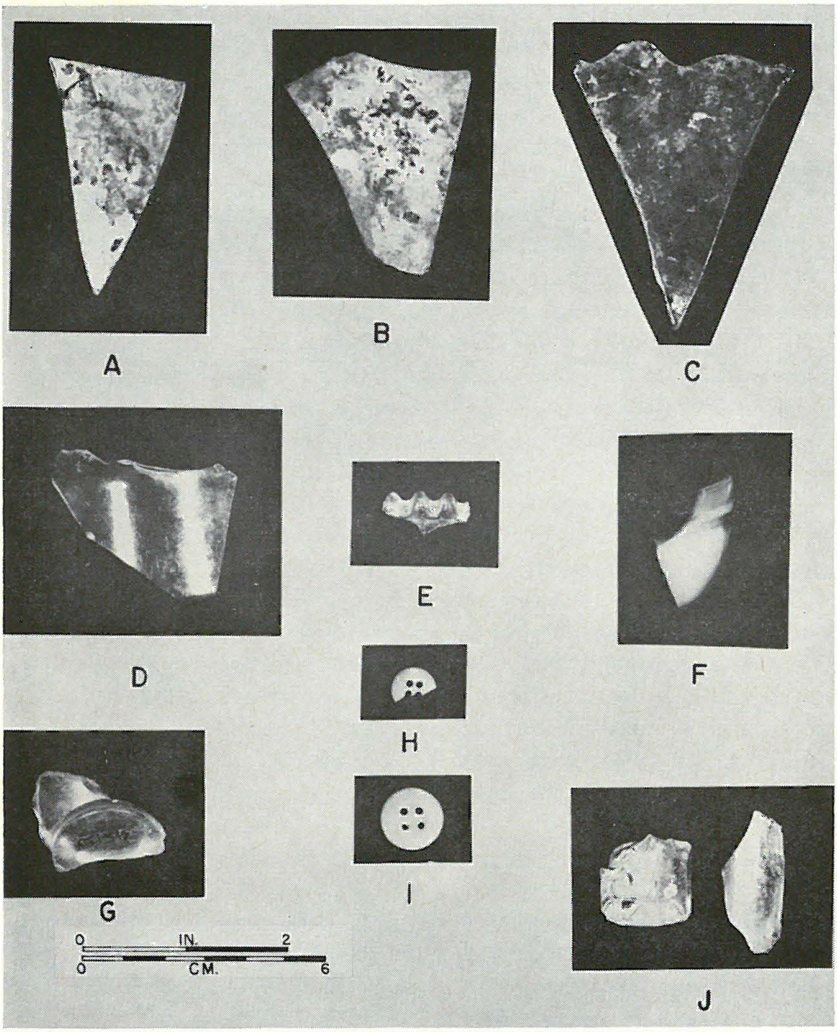


Fig. 19. Miscellaneous Glass. A, B, Window glass fragments. C, Table top cover (?) fragment. D, E, Fragments of lamp chimneys. F, Fragment of cosmetic container. G, Basal fragment of possible salt bowl. H, I, Buttons. J, Fragments of faceted perfume (?) bottles.

Interpretations

BOTTLES

Hand blowing of bottles—the earliest technique of bottle making known—consisted of 1) gathering a glob of molten glass on the end of a metal blowing tube or blowpipe, 2) roughly shaping the viscous glass by rolling it on a hard, flat surface (marvelling), 3) blowing the bottle to its desired size, 4) attaching a punty rod to the incipient bottle at the end opposite that where the blowpipe was attached, 5) detaching the blowpipe by cutting the glass with shears, and shaping the neck and body with hand tools while another workman rotated the bottle with the punty rod, and 6) breaking off the punty rod and annealing the bottle. The characteristics of a bottle produced by this method are as follows: there are no seams or mold marks, the surface is irregular, and there is a pontil mark (sharp scar of broken glass) on the bottom where the punty rod was broken off (Knittle, 1929: 22–24).

By the beginning of the 19th century, molds which aided in the shaping of bottles had come into use. After the glass had been gathered on the end of the blowpipe and marvelled, the bottle was shaped with the assistance of a wooden or clay mold. The mold formed only the base and body of the bottle, so the neck had to be drawn out and finished by hand. Diagnostic characteristics of bottles produced in this type of mold are seams on the sides of the body, but not on the neck, and the pontil mark on the base (Scoville, 1948: 18).

Shortly after 1800 the two-piece hinged mold came into common use. This mold formed all but the mouth of the bottle. The bottle, after it had been extracted from the mold was attached to a punty rod so that it could be manipulated while the mouth was formed. Bottles produced in this fashion have seams along both the sides and the neck, but not on the upper portions of the neck and the mouth, which were hand finished as the bottle was rotated by the punty rod. The point of attachment is marked by a pontil mark (Scoville, 1948: 16–17).

As early as 1820, three and four piece molds were in use. The earliest ones were made of hardwoods, but these were replaced later with brass, copper, and, particularly, cast iron molds. The upper portions of the necks still had to be hand finished. These bottles have as many seams as there were pieces in the mold, pontil marks on their bases, and smooth (unseamed) upper necks and mouths (*ibid.:* 17).

Between 1850 and 1860 the snap case was introduced. The snap case fitted around the basal portion of the bottle and enabled the workman to manipulate the bottle without using a punty rod. Bottles made with snap cases have no pontil marks, but rather they have smooth, hollow bases (Van Rensselaer, 1926: 10).

Chilled iron molds began to be employed immediately after the Civil War. They gave the bottles more regular surfaces than the older types of molds; this characteristic, however, is difficult to recognize (Van Rensselaer, 1926: 12).

In 1881 a process was invented that mechanically finished the mouths of bottles. Viscous glass was dropped into a "blank mold" that gave the glob of glass a shape somewhat like that of the bottle to be produced. After the glass was placed in the blank mold, a plunger was pressed down to press the glass up around the portions of the mold that would form the mouth. The second, or "blowing" mold was put in place of the blank mold and compressed air was forced through the formed mouth. This method was first used successfully in 1892 when Dos Taylor began to make wide mouth ware at his plant in Huntington, West Virginia. In 1892 C. L. Flaccus started production of wide mouth Vaseline jars at the Enterprise Glass Co. at Beaver Falls, Pennsylvania. These first jars that were completely machine formed have seams that run the entire height of the vessel. They also have rough, sharp edges along their mouths (Scoville, 1948: 329). Before 1900, however, refinements had been made in the basic idea of machine jars and their quality improved (*ibid.:* 325).

By 1903 this general principle had been adapted to bottle making at the Owens Bottle Co. Improved machines were designed and sold by Mr. Owens in 1909, 1911, 1912, and 1917. About the time of the First World War the machines were widespread. Bottles produced on these machines have seams that extend the whole length of the bottle and neck, and no pontil marks (Scoville, 1948: 324–329).

None of the bottles from Anderson's Mill has a pontil mark on it; therefore, they all must date after 1860. One of the bottle bottoms was finished in a snap case, so it dates from between 1860 and 1914. The other bottle bottoms may have been finished with snap cases, but I am not sure that they were.

The 13 bottle necks that were hand finished date from the period between the invention of the two piece mold (early 1800's) and the first use of machinery to finish bottle necks in 1914. One of the hand finished necks (Group VII) was made to accommodate a crown cap closure. This type of closure (same as used on modern beer and soda water bottles) was introduced in 1907 (Fontana and Greenleaf, 1962: 73); therefore, this neck dates from between 1907 and 1914.

All but two of the panel bottles are machine finished; therefore, most of them date from after 1914. The two exceptions date from before 1914. Rawleigh's products were first introduced into Texas in 1904 (Milton Babcock, personal communication) so the five Rawleigh's bottles date from 1904 at least, and the two complete ones (with machine finished necks) date from after 1914. The first lettered panel bottles began to be produced about 1867 (Moore, 1924: 255–256) so the other lettered panel bottle fragments date from around 1867 at the earliest. None of the Rawleigh's bottle necks from the site were made for screw caps. Presently-used Rawleigh's bottles do have screw caps, but it is not known when they were first introduced.

JARS

The Mason wide mouth jar with the screw cap was patented in 1858 (Glass Containers, 1963). No other meaningful dates could be obtained for the jars.

PRESSED GLASS

The first experiments with pressed glass were carried out in New England in the 1820's (Lee, 1933: 4; Watkins, 1950: 84–87). As the processes and machinery were perfected, more and more plants for pressing glass were founded, until by 1840 there were factories in several states (Lee, 1933: 5). Before 1850 the vessel forms and designs used seem to have been rather limited, but after this date changing styles and greater demand for different sorts of vessels led to a number of innovations (*ibid.:* 6). The production of pressed white or milk white glass was probably begun between 1830 and 1850, but it was not produced commercially for a large market until 1870 (*ibid.:* 614–615).

The pressed glass from Anderson's Mill has been compared with illustrations and descriptions in several texts. Most of the nomenclature and chronology, however, have been taken from Lee (1933). It is realized that dates based on design alone are not as accurate as could be desired, largely because they sometimes refer to the first date of manufacture, and other times to the period during which the pattern was in vogue. In the latter case, a particular vessel could have been purchased either before, after, or during the period indicated. In the former case, the vessel could have been purchased at any time after the first date of manufacture. Some of these patterns can still be purchased today. The dates presented, then, give only a general idea of the age of a particular vessel or design, although in some instances fairly good dates have been obtained. The arrangement presented below is on the basis of the age that has been indicated (Lee, 1933) for the particular design, going from the earliest to latest:

The bellflower ribbed pattern was popular from the 1830's to the 1850's;

The pressed block designed vessels probably do not date much before 1853;

Vessels of the crystal patterns are listed in the 1859 and 1868 catalogues of the M'Kee Bros. Co. of Pittsburg;

The fine cut pattern probably dates from the 1870's;

The pointed hobnail pattern was popular in the late 1870's and the 1880's;

In the early 1880's the daisy and button pattern came into vogue. Several examples of this style are illustrated in the 1888 catalogue of Otto Young & Co.;

Production of the paneled grape design was begun in the 1890's;

The bull's eye pattern and its variants were produced from the 1850's to the 1880's;

The icicle pattern dates from the 1870's.

The above suggest that the pressed glass from Anderson's Mill date from the 1830's to the 1890's.

Metal

A wide range of metal artifacts was found at the site. Only a relatively few of these (expanded cartridges, nails, tin cans, and lids), however, are similar enough to each other to warrant classification. The other, more diverse, specimens are lumped and briefly discussed individually under the heading of miscellaneous metal artifacts.

Expended cartridges

Twelve metallic cartridges and three metal shotgun shell cases (or paper cartridges) were recovered. Two (Fig. 20, A,B) are Winchester Repeating Arms Co. .30–.30 cartridges. The primer of one of these (Fig. 20, B) has been removed, and the mouth of the case is compressed and wrinkled in such a manner as to suggest that a fairly uniform pressure had been exerted against it—possibly the result of an accident in reloading the expended case.

Two Union Metallic Cartridge Co. cases are in the collection: one (Fig. 20, D) for a Colt .45 and one (a metal base and primer) for a 12 gauge shotgun. The shotgun shell has the words *NEW CLUB* inscribed on it. Another shotgun base is from a Remington-Union Metallic Cartridge Co. 16 gauge shotgun shell; while a second 12 gauge shotgun shell base (Fig. 20, C) is inscribed *WESTERN FIELD.*

Six of the cartridge cases are .22 long (Fig. 20, E), four of which have the word *SUPER* inscribed on their bases; one has *U*, and another has *H*. The *U* indicates that the shell was produced either by the Union Metallic Cartridge Co., or by the Remington-Union Metallic Cartridge Co. Another expended cartridge is a .22 short (Fig. 20, F) with the letter *N* inscribed on its base.

A rim fire brass cartridge (Fig. 20, G) is badly bent and there is no inscription on the base. It is probably a 59, 60, or 61 caliber cartridge. It is 2.3 cm. high.

One center fire metallic cartridge is a .30 caliber shell that represents military ammunition of a late date. Its base is inscribed with *F A 34*, indicating that it was produced in 1934.

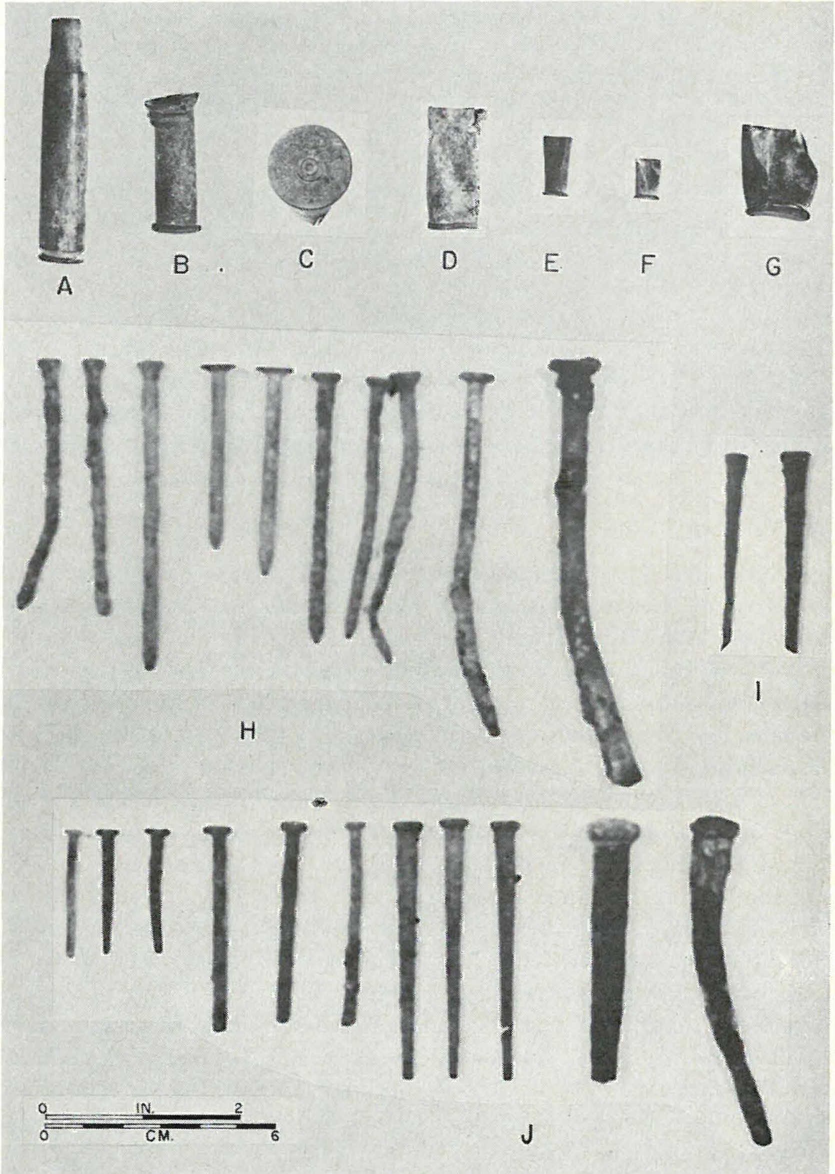


Fig. 20. Cartridges and Nails. A, B, Winchester .30–.30. C, Western Field 12 gauge shotgun shell base. D, Colt .45. E, .22 long. F, .22 short. G, Unidentified cartridge. H, Wire nails. I, Thin headed cut nails. J, Thick headed cut nails.

Nails

All of the nails from Anderson's Mill are either cut nails or wire nails (Fig. 20, H); no hand wrought nails were found. There are two types of cut nails: 1) those with thin, irregular heads (Fig. 20, I), and 2) those with more regular, thick square heads (Fig. 20, J). Horseshoe nails (Fig. 21, A-E) and wire staples (Fig. 21, F-H) were also recovered. The distribution of the nails and staples is presented in the chart below.

	Staples	Cut thin heads	Cut thick heads	Wire	Horseshoe
Associated with house	7	6	164	81	7
Associated with mill	0	34	54	1	0

It is significant to note that there are few thin headed cut nails from the house, but there are many from the mill; conversely, there are a negligible number of wire nails from the mill, but there are many from the house.

Tin Cans

The 15 tin cans and can fragments can be divided into three groups: soldered, crimped, and flat tobacco.

Soldered (Fig. 21, I-K)

Number of specimens: 5

Description: Side seams are crimped and lightly soldered, while the tops and bottoms have rims which are fitted over the ends of the body of the can and soldered but not crimped. Small holes in the tops of the cans have been sealed with a drop of solder.

Dimensions: Three specimens, two complete cans and a top, are approximately the size of modern, medium-sized condensed milk cans, measuring 6.3 cm. in diameter and 6.95 cm. tall (Fig. 21, I). The one other measurable specimen (Fig. 21, K) is 7.3 cm. in diameter, and was greater than 9.5 cm. tall.

Remarks: One of the complete small cans and the small lid piece have been opened by punching two small holes in the top, while the other small can (Fig. 21, J) was opened by making two diagonal cuts across the top and lifting up one of the wedge-shaped segments thus formed.

Crimped (Fig. 22, A)

Number of specimens: 8

Description: Four of the five fragments that have part of the top attached had their lids crimped on with no use of solder. The fifth fragment is quite incomplete,

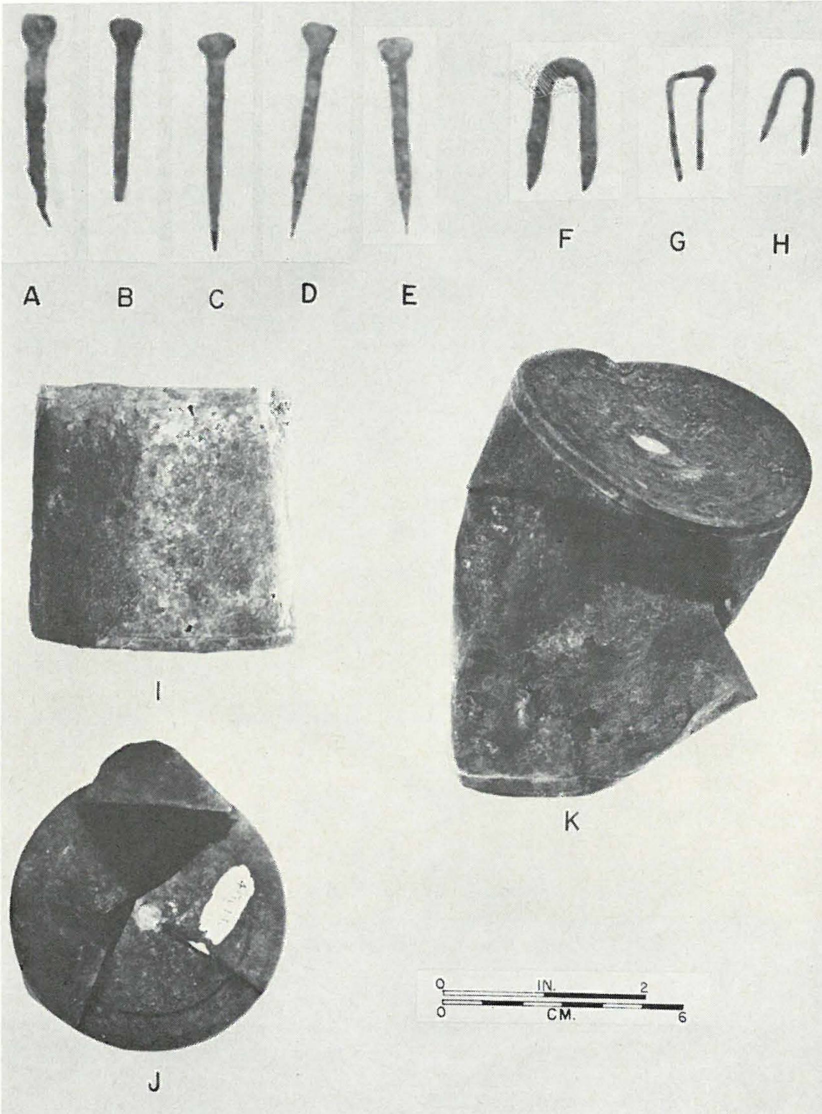


Fig. 21. Nails, Staples, and Tin Cans. A–E, Horseshoe nails. F–H, Staples. I–K, Soldered cans.

but perhaps had the top crimped on over a thin band of solder that was later heated. Five body fragments indicate that side seams were crimped without the use of solder.

Dimensions: Indeterminable

Remarks: At least five cans appear to be represented.

Flat Tobacco (Fig. 22, B)

Number of specimens: 2

Description: These are tobacco cans with hinged lids, crimped seams, and rectangular cross sections. One (Fig. 22, B) has a partially preserved yellow and black label which reads *PRINCE ALBERT CRIMP CUT*. Between the words *PRINCE ALBERT* and *CRIMP CUT* is a faintly visible standing figure. The bottoms of both cans are lettered in low relief with *PRINCE ALBERT*.

Dimensions: Height, 10.9 cm.; thickness, 2.25; width, 7.65 cm.

Lids

The thirteen metal lids (exclusive of the jar lids described earlier) recovered from the site represent four different types of closures: friction or slip-on, snap, crown, and screw. Each of the eight friction type lids is made from thin sheet metal and is designed to slip on over the top of a container. Seven have circular outlines, and one has a rectangular outline. Four of the former are baking can lids (Fig. 22, C) which are inscribed as follows:

CLABBER GIRL DOUBLE ACTING BAKING POWDER
(2 specimens)
. . . *KC BAKING POWDER* . . .
KC BAKING POWDER SAME PR . . . *TODAY 45 YEARS AGO*

None of the other friction lids bears any marks. The circular specimens are between 3 and 12.75 cm. in diameter; the rectangular one is 3 cm. by 7 cm.

One of the two snap lids is circular, measuring 5.2 cm. in diameter; the other is rectangular and measures 4.5 cm. by 3.5 cm. The crown cap (Fig. 22, E) is identical to those used on modern soda water and beer bottles. The two screw caps are, of course, circular, one (Fig. 22, D) 5.2 cm. in diameter, the other 4.3 cm. in diameter.

Miscellaneous Metal

Itemized below are a number of metal objects which do not lend themselves to detailed classification. They are briefly described individually below and include:

1) A spring holder for a wagon (Fig. 23, A, A′). This piece is flat on one side and has two unthreaded lugs protruding from that side; on the opposite face there is a slot that extends across the short axis (Fig. 23, A′). A perforation appears in the center of the holder.

2) A lock washer with wings that are bent downward.

3) A probable coffee grinder handle (Fig. 23, B).

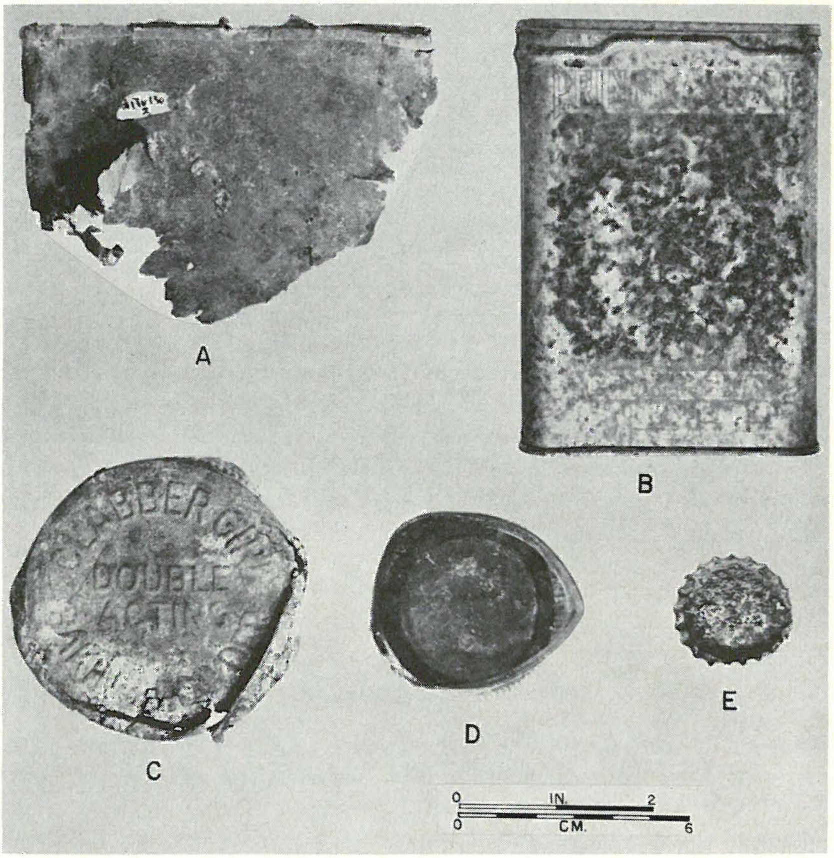


Fig. 22. Cans and Lids. A, Crimped can. B, Tobacco can. C, Clabber Girl baking can lid. D, Screw lid. E, Crown cap lid.

4) A right angle iron brace with four screw attachment holes.

5) A nearly complete Ford Model T tail light (Fig. 23, C).

6) A fine, round screen filter for a gas tank or a gas funnel.

7) A possible thumb knob plate (Baldwin Co., 1891: 555)—a sheet metal object engraved with a scroll-like pattern (Fig. 23, D).

8) A common carriage bolt. The head is round, 2.6 cm. in diameter, and the total length is estimated to have been approximately 13.25 cm. (Fig. 23, E).

9) A bolt with a hexagonal head and a lock nut. The lock nut has slots around its base which permit use of a cotter key.

10) Two machine bolts. The head is broken off of one, but it has a square nut which is 2.65 cm. on a side and 1.85 cm. thick. This bolt

is 1.55 cm. in diameter. The other specimen has an octagonal head which is 2.3 cm. in diameter and 1.0 cm. thick. This bolt is 1.25 cm. in diameter and 7.55 cm. long (it may, however, be broken).

11) Three other bolts are fragmentary. Included is one with a hexagonal head, one with an octagonal head, and one (Fig. 23, F) with a thin, flat, rectangular head.

12) A U-shaped iron bolt (?) that resembles a beam clip illustrated

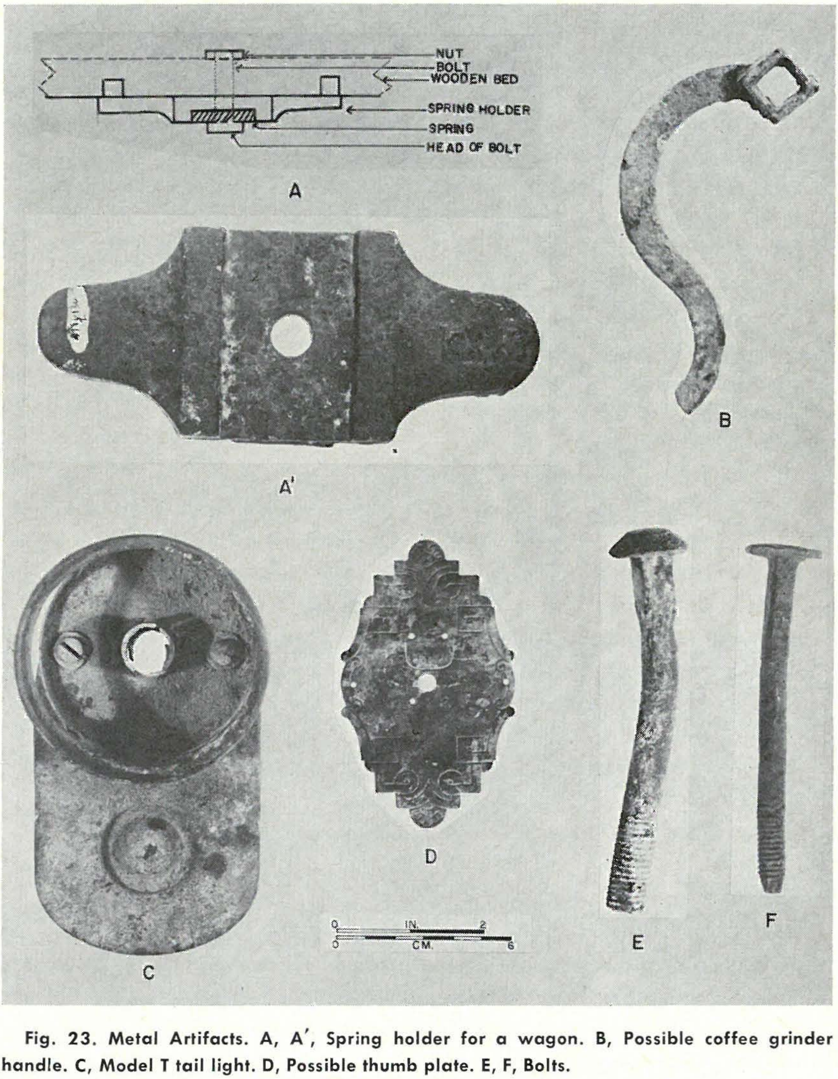


Fig. 23. Metal Artifacts. A, A′, Spring holder for a wagon. B, Possible coffee grinder handle. C, Model T tail light. D, Possible thumb plate. E, F, Bolts.

in the 1893–94 Mansur & Tebbets Implement Co. catalogue. It measures 4.25 cm. long and 4.25 cm. wide (Fig. 24, A).

13) A Twitchel pneumatic tire pressure gauge (Fig. 24, B).

14) An iron object (Fig. 24, C) which is rectangular with rounded ends. Tapered holes are present at either end, and a rectangular opening appears in the center. This was perhaps used to support a set of box springs or a platform to support box springs. It resembles a specimen which the 1891 Baldwin & Co. catalogue (page 463) illustrates as a "bedstead fastener."

15) A brace lacking the wooden handle and knob. At the distal end is an orifice to receive a bit and a sleeve to secure the bit.

16) Four metal handles, including a U-shaped one still riveted onto part of an iron vessel. Two of the other handles are of wire; the third appears to be a drawer pull.

17) A cast iron poker handle (Fig. 24, D) which may have belonged to a fireplace set.

18) Twenty-nine iron stove parts, including 3 round grill fragments and a grill lifter handle.

19) A clothespin spring.

20) A fragment of rake prong.

21) A horseshoe fragment.

22) A tin stove pipe fragment.

23) A pipe fitting.

24) A tire valve anchor (Fig. 24, E).

25) A copper object (Fig. 24, F) which may have been a top to a pill or snuff box. It is decorated with a stylized floral pattern inside a narrow band that encircles the rim. This piece is 4 cm. in diameter.

26) A spring hinge.

27) Three pieces of barbed wire.

28) A fragment of sheet tin.

29) A segment of iron pipe, 2.75 cm. in diameter.

30) Portions of a bolt type door latch (Fig. 24, G).

31) Two spoon handles, one (Fig. 24, I) of pewter, one (Fig. 24, H) silver plated.

32) A fragment (Fig. 24, J) of what appears to be a cast iron wheel from a toy.

33) A spiral bedspring.

34) Two round washers.

35) A clock gear, probably for a minute hand.

36) Two parts of a foot-operated sewing machine frame.

37) Four vest or suspender buckles (Fig. 24, L), according to Fontana and Greenleaf (1962: 87).

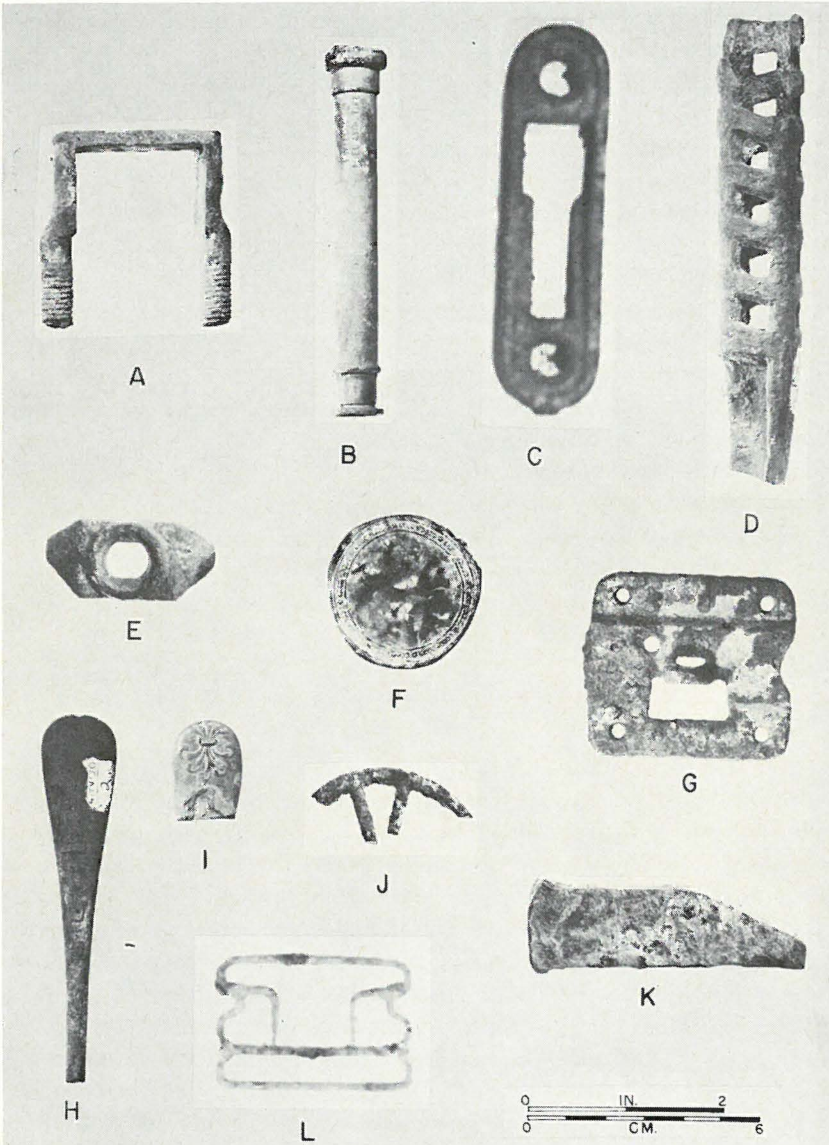


Fig. 24. Metal Artifacts. A, Possible beam clip. B, Pressure gauge. C, Possible bed spring fastener. D, Poker handle. E, Valve anchor. F, Possible snuff or pill box lid. G, Part of a bolt type door latch. H, I, Spoon handles. J, Wheel for a toy. K, Upper jaw of monkey wrench. L, Vest or suspender buckle.

38) Upper jaw of monkey wrench (Fig. 24, K).

39) Three iron chain links.

40) A cuff link (Fig. 25, A).

41) A snap.

42) A rivet type button for work clothes.

43) Eleven shoe eyes.

44) Two metal buttons.

45) Two (Fig. 25, B) spur strap buckles (Baldwin Co., 1891: 619).

46) A square sheet copper object (Fig. 25, C) 4.6 cm. on a side. It is stamped with an image of a bird.

47) A screw.

48) An iron ring, outside diameter 2.5 cm.

49) A fragment of flexible tubing, possibly part of an electrical conduit; approximately .4 cm. in diameter.

50) A fragment of a large iron magnet.

51) Part of a chain-type bed spring (Fig. 25, E).

52) A ball bearing cage (Fig. 25, D).

53) Approximately 50 unidentifiable metal objects, many of which are fragmentary.

Interpretations

EXPENDED CARTRIDGES

The two .30–.30's made by the Winchester Repeating Arms Co. were produced for use in the Winchester Lever Action Model 1894 rifle, the first sporting rifle adapted for use of smokeless powder ammunition. The Winchester Repeating Arms Co. began production of the ammunition for this rifle in 1895 (Williamson, 1952: 450). The rifle is still being produced and is Winchester's most popular model (*ibid.*: 161–162). These data simply indicate that the two Winchester Center Fire .30–.30 cartridge cases that were found at the site date after 1895. It is one of these cases that has had the primer removed and the mouth compressed, suggesting that an attempt had been made to reload the expended cartridge. There are reloading equipment sets listed in Baldwin's 1891 catalogue that may have, if carelessly handled, caused a cartridge case to be so deformed.

The Union Metallic Cartridge Company began production in 1867 and merged with Remington in 1910 to form the Remington-UMC Co. Any cartridge marked UMC would, then, date from the period between 1867 and 1910 (Fontana and Greenleaf, 1962: 80). One of the UMC products recovered is a .45 cartridge for a Colt weapon. The earliest such weapon was the Colt Frontier, introduced in 1873. A double action Colt .45 was introduced in 1877, but it was not very popular. The cartridge was probably used in the 1873 model Frontier; if so, this case would date from the period between 1873 and 1910.

The other UMC product from the site is a 12 gauge shotgun shell base which is marked *NEW CLUB*. UMC Club shotgun shells are listed in Baldwin & Co.'s 1891 catalogue, but no New Club shells are listed. It is possible that the New Club was a development of the Club shell that came later, or that the Baldwin Co. did not carry the New Club shells. At any rate, the shotgun shell base surely dates from between 1867 and 1910, and perhaps from after 1891 to 1910.

The 16 gauge Remington-UMC shotgun shell base dates from after 1910, and the large caliber rimfire cartridge probably dates from the Civil War period. It is interesting to note that a cartridge case identical to the Winchester Repeating Arms Co.'s .30–.30 case recovered from Anderson's Mill was reported from the Johnny Ward Ranch (Fontana and Greenleaf, 1962: 80). The Johnny Ward Ranch Site dates from 1859 to 1903. It would be expected that cartridge cases from the popular Winchester Model '94 would be widespread. A cartridge from a Colt Frontier (.45) was also reported from the Johnny Ward Ranch (*ibid.:* 81). Again, from the popularity of the model Colt revolver one would expect cartridges from it to be widely distributed.

NAILS

Before 1825 machine cut nails were headed by hand. They were placed in a vise and struck with a hammer to flatten the end of the nail and thus produce the head. This manufacturing process resulted in nails with thin, irregularly-shaped heads. About 1825 water-powered machinery came into use that would cut and head the nails. Until 1830 or 1840, however, the nail heads continued to be thin and somewhat irregular. By 1840 processes had been perfected that resulted in thicker and more uniform heads on nails. In 1855 the technique of manufacturing wire or round nails was invented, but the wire nails did not outnumber the square cut ones until about 1890 (Fontana and Greenleaf, 1962: 46–55).

Three time periods are represented by the nails from Anderson's Mill: before 1840, between 1840 and 1890, and after 1890. I think, however, that these dates—especially the 1840 one—should not be taken too seriously. It is quite possible that the suppliers kept stocks of earlier types of nails on hand until they could be sold, or that some naileries continued to make the earlier type for a while after the thick

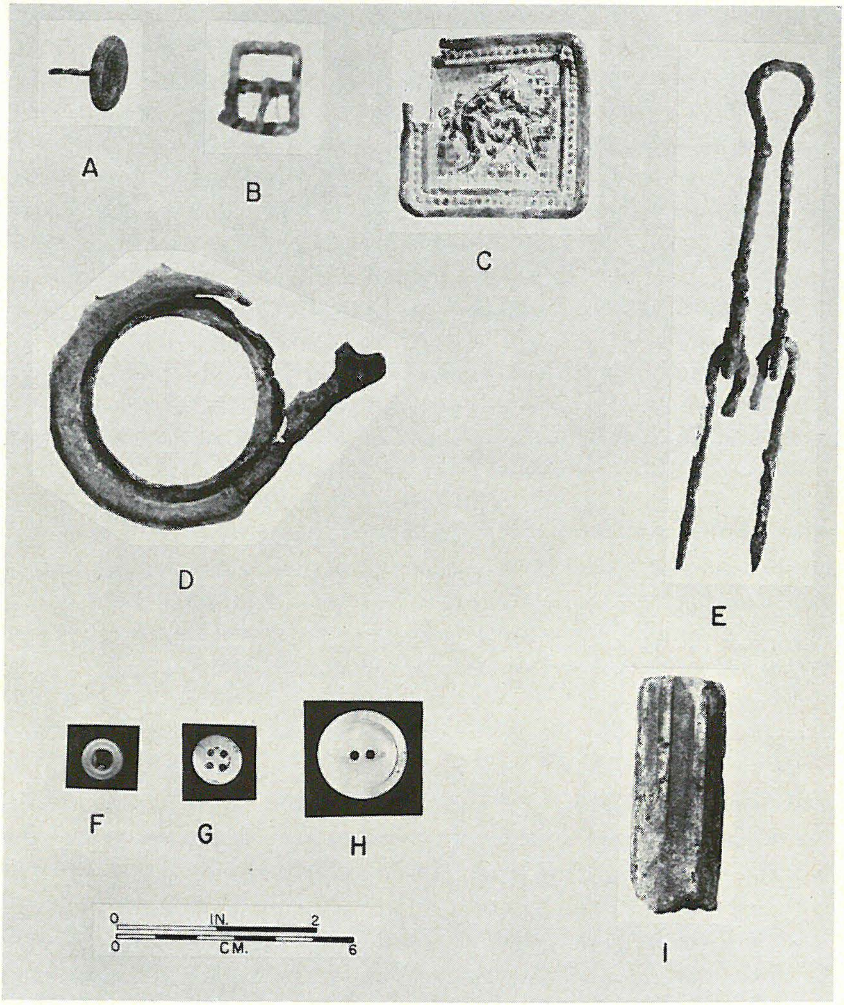


Fig. 25. Metal Artifacts. A, Cuff link. B, Spur buckle. C, Unidentified copper object. D, Ball bearing cage. E, Possible bed spring fragment. F–H, Shell buttons. I, Carbon rod.

headed ones had become widespread. It is useful, nonetheless, to have an estimation of their dates of manufacture.

The sequence of construction of the structures at Anderson's Mill was as follows: 1) a log cabin (unlocated), 2) the mill, and 3) the main house. Anderson probably obtained the thin headed nails that were used in constructing the mill from a supplier that had them on hand either because they were still being made, or because he had them in stock. Thick headed nails were also used in the mill, but only one wire nail was recovered from the mill area.

At the house site few (six) thin headed nail were found, but many thick headed cut and wire nails were recovered. This would be expected considering the later date of the main house. The presence of the wire nails probably indicates that the occupation and construction (or repair) lasted into the 1890's.

The relatively small number of thick headed cut nails and the absence of wire nails at the mill confirm its earlier date of construction.

TIN CANS

The three small, soldered cans were probably condensed milk containers. Since this type has been made in the same fashion from Civil War times (they were not, however, widely marketed until about 1898) until the present (Fontana and Greenleaf, 1962: 74), not much can be said about their age except that they probably postdate 1898. The process of crimping all of the seams came into use about the time of World War I, while the process by which the can's side seams could be lightly mechanically soldered was introduced in the 1880's. A diagnostic trait of these cans is the slotting of the four sides where they came together to form which would be the side seam (Fontana and Greenleaf, 1962: 71). The larger soldered can from the site does not have these notches, so it was not made in that manner. As early as 1859, however, a machine was in use to lap solder cans (Fontana and Greenleaf, 1962: 71). At any rate, the large soldered can probably predates the World War I; at least if it is like the one Hunt (1959: 9) illustrates.

If the one fragmentary crimped lid does have solder within the crimped top seam, it probably dates from between 1860 and 1890 (Fontana and Greenleaf, 1962: 72). All of the other fragments of this type have crimped seams and therefore date from about 1914 (*ibid.*: 73; Hunt, 1959: 9).

Fragments of at least two hinged lid tobacco cans similar to the ones from Anderson's Mill were found at the Johnny Ward Ranch (Fontana and Greenleaf, 1962: 77). However, the same sort of can is in use today.

OTHER ARTIFACTS

Leather

Objects of leather include four shoe sole fragments, two fragments from the upper portions of shoes, one boot top, two heel fragments, a possible visor from a cap, and eight small, unidentifiable pieces of leather.

Rubber

Two small, unidentifiable fragments of rubber were recovered from the site.

Shell

The only artifacts of shell are three buttons (Fig. 25, F-H) which are: 1) 2.2 cm. in diameter with two holes, 2) 1.2 cm. in diameter with four holes, and 3) 1 cm. in diameter with four holes. A button quite similar to No. 2 above was found at the Johnny Ward Ranch.

Miscellaneous

Included in this group are a cloth fragment and two carbon rods, possibly from old batteries. One of these rods (Fig. 25, I) is 2.3 cm. in diameter and has ridges running its length; the other is 2.2 cm. in diameter and has a smooth exterior. Neither specimen is complete.

CHRONOLOGY

Sherds from an estimated 20 vessels are decorated by the decalcomania method, and at least another 20 vessels are adorned by means of repoussé. Both of these decorative techniques became popular after 1850. Sherds representing an estimated 10 vessels are gilded, while seven are transfer printed. These techniques were in use before 1850, and persisted after this period only in diminishing quantities. One sherd bears a maker's mark that probably dates from the 1830's. No meaningful dates could be obtained for the stoneware or the soft-paste earthenware. The ceramics indicate that the site could have been occupied as early as 1830. On the other hand, most of the material suggests a later date and it is perhaps reasonable to assume that the earlier pottery was obtained before the site was occupied.

The pressed glass from Anderson's Mill falls between the 1830's and the 1890's, with most the dates clustering between the 1850's and the 1880's. It has, however, been dated on the basis of the time periods when certain patterns were popular, a method not as precise as might be desired.

The 48 panel bottle specimens probably date from after 1867. Five of them, the Rawleigh's bottles, date from 1904 at the earliest, and more probably from after 1914. Two of the panel bottle necks are hand finished, so they date from before 1914. None of the bottle bottoms has a pontil mark, so all of them fall after the invention of the snap case (1850–1860). Thirteen of the miscellaneous bottle necks are hand finished and 13 are machine finished. Therefore, it appears that half of the bottle necks predate 1914 and half postdate 1914. Since all of the bottle bottoms date from after 1850, it is probably a good guess to say that the hand finished necks date from between 1850 and 1914. The most significant point is that the bottle necks indicate that the occupation extended until sometime after 1914.

The absence of round nails from the mill structure reveals that it was constructed before 1890, just as the presence of round nails at the house indicates that it was occupied after 1890. The square nails used on the house and the mill are mostly of a type introduced after 1840. The nails, then, provide evidence suggesting that the occupation took place after 1840 and lasted until 1890.

The earliest cartridge case is one that can be assigned to the Civil War period; while the latest associated with the occupation dates after 1910. There are several cartridges that date from period in between these two.

The archeological materials as a whole present a picture of an occupation that lasted from the 1850's to after 1914.

SUMMARY AND CONCLUSIONS

Anderson's Mill is a historic site consisting of two major structural components, the mill and the house. Limited excavations were carried out at each of the areas. On the basis of the archeological materials recovered from the site (principally ceramics, bottles, pressed glass, nails, and expended cartridges), it is concluded that the occupation extended from the mid-1800's to sometime after 1914. These dates confirm the historical accounts that state Anderson established himself at the site in the mid-1800's.

The archeological materials confirm other statements about the Anderson household. The fact that many jar parts were found indicates that the occupants were indeed doing home canning. The fact that two ash deposits were located evidence that there were two fireplaces. The statement that there was an irrigation system was verified by the location of a tank on high ground (so that there would be sufficient water pressure).

In addition to revealing certain details about the lifeways of the occupants, the analysis of the cultural refuse indicates that the artifacts clearly reflect the vogues of that time. Several articles that are listed in late 19th century trade catalogues (1888 catalogue of the Otto Young & Co.; 1891 catalogue of the Baldwin Co.) were found at the site. Pressed glass fragments of patterns that Lee (1933) states date from the mid-19th century to the early 20th century were found, as were types of pottery that are said to have been popular (decalcomania, repoussé) from the mid-19th century (Eberlein and Ramsdell, 1925; Ramsay, 1947; Spargo, 1926). Kinds of bottles that Knittle (1929) and Van Rensselaer (1926) state were being made after the mid-19th century (hand finished necks, no pontil marks) were also recovered. The archeological findings, in general, reveal a picture quite in keeping with the times.

Finally, it might be noted that the materials from Anderson's Mill also correlate well with the specimens reported from other historic sites of the same general time period—such sites as the Johnny Ward Ranch, Fort Lookout (Miller, 1960), Ft. Pierre II (Smith, 1960a), and Ft. Stevenson (Smith, 1960b).

BIBLIOGRAPHY

Anderson, W. D.
1959. Kingdom in the Hills. Pamphlet published by the Anderson's Mill Garden Club.

Babcock, Milton
1964. Letters dated October 6 and October 29 from the advertising department of the W. T. Rawleigh Company, 223 E. Main St., Freeport, Illinois.

Baldwin Company
1891. Trade catalogue by firm of this name.

Barkley, Mary Starr
1963. History of Travis County and Austin, 1839–1899. The Texian Press.

Beard, F. R.
1937. 5000 Years of Glass. Frederick Stokes Co.

Binns, Charles F.
1930. The Story of the Potter. Hodder & Stroughton.

Brown, Frank
n.d. Annals of Travis County and of the City of Austin. Manuscript in Travis County Collection, Austin Public Library.

Camehl, A. W.
1916. The Blue China Book. Crown Publishers.

Cochran, Thomas C.
1948. The Pabst Brewing Company. New York University Press.

Combes, J. D.
1964. Excavations at Spokane House-Fort Spokane Historic Site. Laboratory of Anthropology, Washington State University.

Cox, Warren E.
1953. The Book of Pottery and Porcelain, Vols. I and II. Crown Publishers.

Dyer, Walter A.
1928. Stoneware for the Collector. Arts and Decoration. July issue, pp. 58–59, 88, 101.

Eberlein, H. D., and R. W. Ramsdell
1925. The Practical Book of Chinaware. J. B. Lippincott Co.

Encyclopedia Americana
1963. Decalcomania. Encyclopedia Americana, Vol. 8, p. 553.

Fisher, S. W.
1945. The Decoration of English Porcelain. D. Verschoyle.

Fontana, Bernard L., and J. Cameron Greenleaf
1962. Johnny Ward's Ranch: A Study in Historic Archaeology. The Kiva, Vol. 28, Nos. 1–2. Arizona Archaeological and Historical Society.

Gaines, Edith
1961. Dictionary of American Glass. Woman's Day, August issue, pp. 19–34.
1962. Dictionary of Pottery and Porcelain. Woman's Day, August issue, pp. 19–34.

Glass Containers, 1963
n.d. Pamphlet published by the Glass Container Manufacturers, Inc.

Hunt, C. B.
1959. Dating of Mining Camps With Tin Cans and Bottles. Geo Times, Vol. 3, No. 8. American Geological Institute.

Jelks, Edward B.
1958. Appendix A: Ceramics from Jamestown. *In* Archeological Excavations at Jamestown, Virginia, by John L. Cotter. Archeological Research Series No. 4, National Park Service, U. S. Department of Interior.

Knittle, Rhea Mansfield
1929. Early American Glass. The Century Company.

Lee, R. W.
1933. Early American Pressed Glass. Framingham Centre, Mass.

Mansur and Tebbets Implement Co.
1893–94. Trade Catalogue by firm of this name.

McDonald, Mrs. Robert E.
1959. Kingdom in the Hills. Pamphlet prepared by the Anderson Mill Gardeners for the Austin Area Garden Center Flower Show, April 18–19, 1959.

McKearin, George S., and Helen McKearin
1941. American Glass. Crown Publishers.

M'Kee Bros. of Pittsburg
1859 and 1868. Trade catalogue by firm of this name.

Miller, C. F.
1960. The Excavation and Investigation of Fort Lookout Trading Post II (39LM57) in the Fort Randall Reservoir, South Dakota. River Basin Surveys Papers, No. 17. Bureau of American Ethnology, Bulletin 176.

Moore, N. Hudson
1924. Old Glass, European and American. Hodder and Stoughton, Ltd.

Nichols, George W.
1878. Pottery, How it is Made. Putnam's Sons.

Northend, Mary H.
1926. American Glass. Dodd, Mead & Company.

Norton, F. H.
1956. Ceramics for the Artist Potter. Addison-Wesley Publishing Co., Inc.

Otto Young & Co.
1888. Trade catalogue by firm of this name.

Phillips, Charles J.
1941. Glass: The Miracle Maker. Pitman Publishing Corp.
1950. Get Acquainted with Glass. Pitman Publishing Corp.

Powell, B. Bruce
1962. Classification of Ceramics from Historic American Sites. Newsletter of the Southeastern Archaeological Conference, Vol. 9, No. 1, pp. 34–45.

Prescott, Samuel C., and Bernard E. Proctor
1937. Food Technology. McGraw Hill.

Ramsay, John
1947. American Potters and Pottery. Tudor Publishing Company.

Scoville, Warren C.
1948. Revolution in Glassmaking. Harvard University Press.

Smith, G. Hubert
1960a. Fort Pierre II (39ST217), A Historic Trading Post in the Oahe Dam Area, South Dakota. River Basin Surveys Papers, No. 18. Bureau of American Ethnology, Bulletin No. 176.
1960b. Archeological Investigations at the Site of Fort Stevenson (32ML1), Garrison Reservoir, North Dakota. River Basin Surveys Papers, No. 19. Bureau of American Ethnology, Bulletin, No. 176.

Spargo, John
1926. Early American Pottery and China. The Century Company.

Thorn, C. Jordan
1947. Handbook of Old Pottery and Porcelain Marks. Tudor Publishing Company.

Upton, Elsie
1941. Article in Austin Daily Tribune, August 17, p. 3.

Van Rensselaer, Stephen
1926. Early American Bottles and Flasks. Transcript Printing Co.

Von Loesecke, Harry W.
1942. Outlines of Food Technology. Reinhold Publishing Co.

Vulte, Hermann T., and Sadie B. Vanderbilt
1916. Food Industries. The Chemical Publishing Company.

Watkins, Laura
1950. American Glass and Glassmaking. Chanticleer Press.

Williamson, Harold F.
1952. Winchester: The Gun That Won the West. A Sportsman's Press Book. Combat Forces Press.

Woolworth, Alan R., and W. Raymond Wood
1960. The Archeology of a Small Trading Post (Kipps Post, 32MN1) in the Garrison Reservoir, North Dakota. River Basin Surveys Papers, No. 20. Bureau of American Ethnology, Bulletin No. 176.

Washington State University
Pullman, Washington

The Granite Beach Site, Llano County, Texas

DAYMOND D. CRAWFORD

ABSTRACT

Between the summer of 1962 and the winter of 1964, when the level of Lake Buchanan was far below normal, a number of archeological sites were exposed. One of these, the Granite Beach Site, proved to be of special interest, as it yielded a number of dart points which suggest occupation during Paleo-Indian and early Archaic times. This locality and materials collected or observed on the surface are briefly described.

INTRODUCTION

At normal pool level, approximately 1020 feet above sea level, Lake Buchanan in Burnet and Llano counties, Texas, covers an area roughly 32 miles long and a maximum of eight miles wide. However, in the summer of 1962 through the winter of 1964, the level of the lake was reduced to as low as 986 feet above sea level, temporarily exposing many acres of land. In the early part of June, 1962, the writer made an archeological survey of portions of the exposed area at the southern end of Lake Buchanan. Several previously unrecorded Indian sites (Jackson and Woolsey, 1938) were located, but only one, the Granite Beach Site (41 LL 2) appeared to be of special interest. Here artifacts were fairly numerous and, even more importantly, many of the more diagnostic specimens—the dart points—seemed to be affiliated with the Paleo-Indian Stage (Suhm, *et al.*, 1954: 16–18). Because of the obvious importance of the site, it was frequently visited by the writer and surface collections were made from the summer of 1962 to the winter of 1964, when portions of the area of occupation were last exposed.

The following report briefly describes the Granite Beach Site, the extent of the investigations, the occupational features recorded, and the specimens collected from the surface. In carrying out this study, the author is indebted to Lathel F. Duffield, formerly with the Texas Archeological Salvage Project, The University of Texas, and Curtis D. Tunnell, Curator of Anthropology, the Texas Memorial Museum. Both of these persons gave freely of their time and information, and without their assistance this report would have been impossible to complete.

DESCRIPTION OF THE SITE

The Granite Beach Site, usually inundated by the waters of Lake Buchanan, lies on the western shore of the lake, about half of a mile southwest of the former Colorado River channel. At its maximum exposure, when the lake level was at an elevation of approximately 986 feet, the site extended over about 180 by 120 feet of a gentle slope, now a beach formed by wave action (Fig. 1). To judge from tree stumps in the immediate vicinity, erosion has removed six to 12 inches of topsoil, uncovering artifacts and other evidence of occupation. Hearth and several unusual concentrations of stones have been exposed, while many, if not all, of the artifacts seem to have been let down onto the surface. Indications are that, before the lake was created, the site was covered with post oak and juniper. A small, spring-fed stream which once ran just to the northeast of the site probably served as a source of water for the inhabitants.

As there was no apparent depth to the occupation, all artifacts and features are from the surface. The artifacts, as well as the occupational features, were found on the surface and by wading along the shallow shores of the lake. Approximately 70 percent of the specimens collected are from the exposed part of the site; the remainder are from the then-existing margins of the lake.

OCCUPATIONAL FEATURES

Hearths

The Granite Beach Site contained the remains of at least 51 hearths (Fig. 1), all of which seemed to be of the same general type. They consisted of roughly circular to oblong concentrations of hearthstone, and averaged about 48 inches in diameter (Fig. 2, A). One, however, was 72 inches by 48 inches, while another measured only 14 by 18 inches (consult Table 1 for other dimensions). None of the hearths was excavated, so the thickness and the method of construction remain undetermined. They were simply recorded as surface features, having been exposed to various degrees by wave action.

Locally-obtained, pink granite rocks were used as hearthstones, with the individual stones varying in size from small fragments only two to three inches in maximum dimensions, to fairly large pieces that were six to eight inches across and from four to five inches thick. Many of the hearthstones had been cracked by exposure to heat, and the soil in and about the hearths was typically light gray in color, possibly stained by ash and charcoal (no actual flecks of charcoal, however,

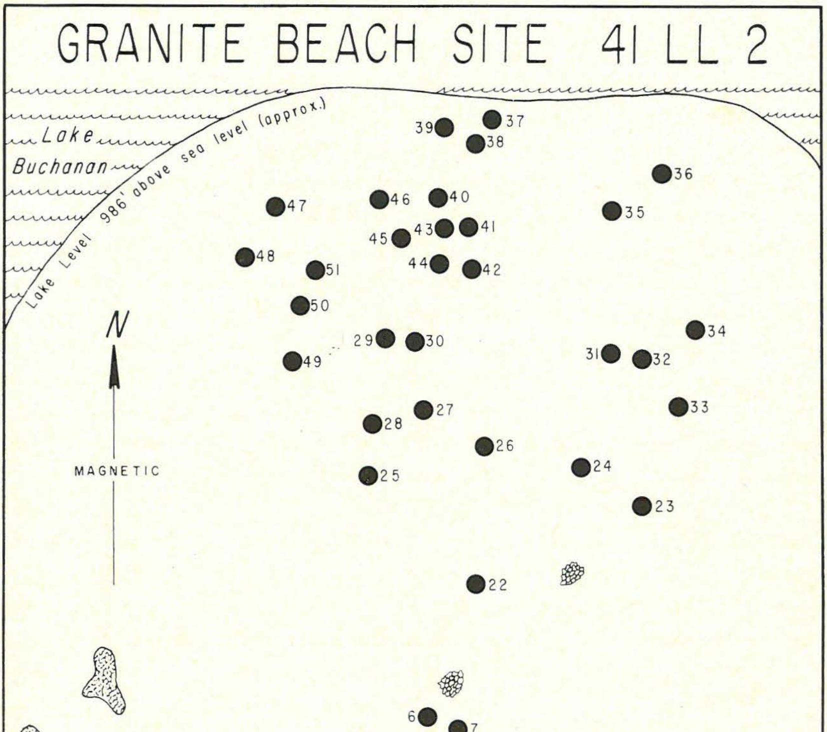


Fig. 1. Sketch map of the Granite Beach Site showing shoreline of Lake Buchanan at 986 elevation and the distribution of occupational features.

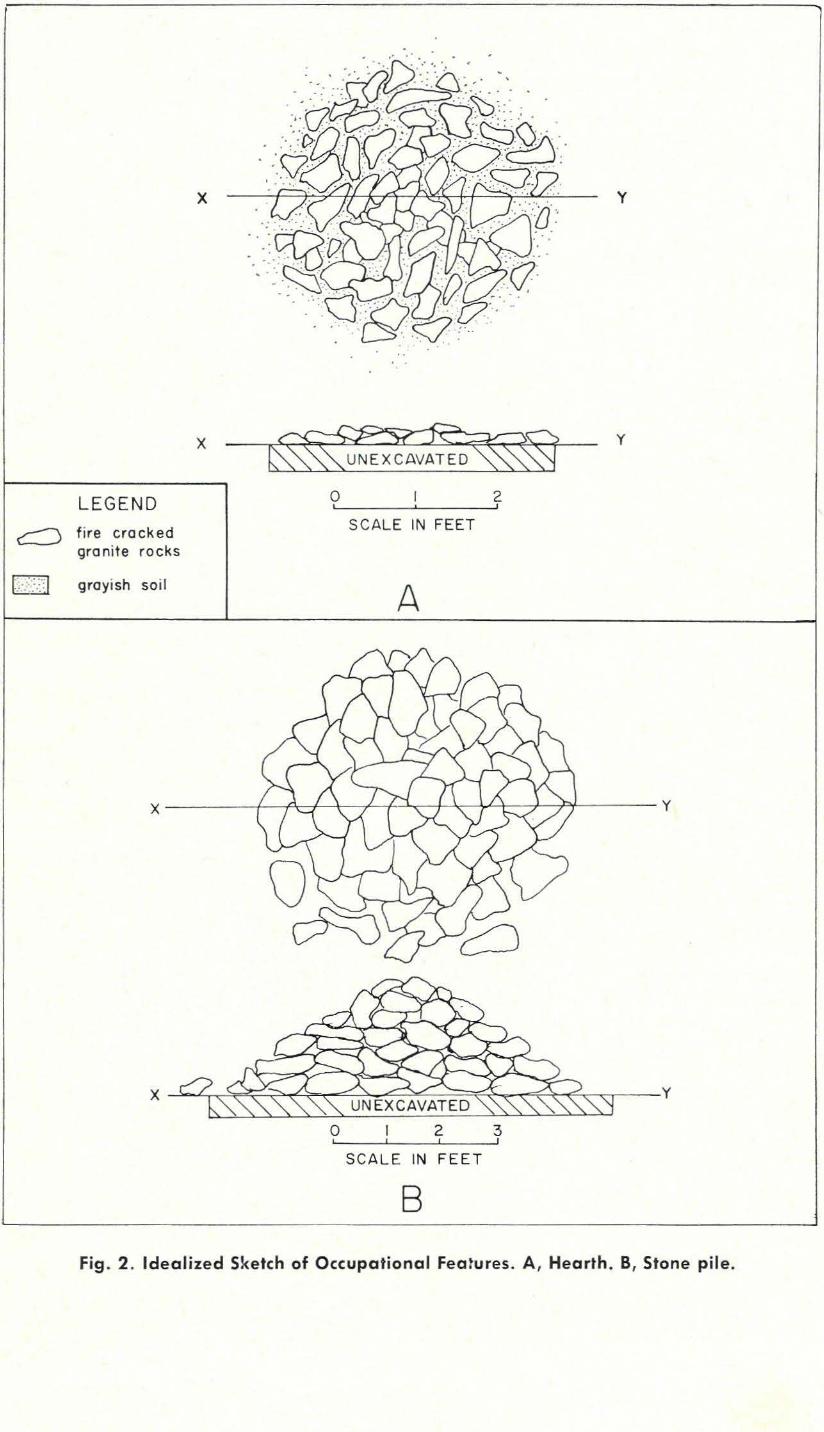


Fig. 2. Idealized Sketch of Occupational Features. A, Hearth. B, Stone pile.

TABLE 1

Maximum surface dimensions of hearths, in inches

Hearth No.	*North–South*	*East–West*	*Hearth No.*	*North–South*	*East–West*
1	60	36	27	43	36
2	36	24	28	27	28
3	36	24	29	36	36
4	48	48	30	24	48
5	36	24	31	19	24
6	48	24	32	48	24
7	48	24	33	48	26
8	48	36	34	48	28
9	36	36	35	24	28
10	48	36	36	36	36
11	60	36	37	72	64
12	48	36	38	48	48
13	60	36	39	42	42
14	24	24	40	18	36
15	24	24	41	42	48
16	36	24	42	42	48
17	48	36	43	44	48
18	72	48	44	26	26
19	32	28	45	19	19
20	24	28	46	36	36
21	14	28	47	69	54
22	42	42	48	72	72
23	26	42	49	42	48
24	28	28	50	14	18
25	18	64	51	15	24
26	42	36			

were noted). This matrix contained a few flint chips but no mussel shells or animal bones.

While the lack of detailed information prohibits close comparison, it is possible that the Granite Beach hearths are structurally similar to those recorded at a nearby Lake Buchanan site, B-3, found by the author and briefly described by Tunnell and Newcomb (1962). The artifacts collected from B-3 are quite different from those found at the Granite Beach Site and would seem to indicate that B-3 dates primarily from the late Archaic period. This raises the important, but unanswerable, question as to the exact cultural affiliations of the Granite Beach hearths.

Burned Stone Concentration

In the southern part of the site a large, somewhat crescent-shaped concentration of burned granite rocks was observed (Fig. 1). This feature seemed clearly to have been man-made and it is differentiated from the hearths chiefly because of its larger size. It was generally about 36 inches wide and a maximum of roughly 10 feet long. The soil within and around the concentration was gray in color, and contained a few flint chips but no food refuse. The thickness of this concentration was not determined.

Stone Piles

Also found at the site were two roughly circular accumulations of granite rocks (Figs. 1 and 2, B). Each of these was approximately 72 inches across and extended about 30 inches above the ground surface. Stones comprising the piles were a maximum of 10 to 15 inches across and six to eight inches in thickness. Neither the stones nor the soil about them showed evidence of fire. These features were not systematically excavated and their purpose is problematical—they may postdate the Indian occuption, or they have served as stock piles for hearthstones.

DESCRIPTION OF THE SPECIMENS

Eighty-one artifacts, all of stone, were collected from the Granite Beach Site by the author. Included are 73 recognizable dart points and dart point fragments, four apparently rechipped dart points, two scrapers, a grooved piece of sandstone, and a grinding slab. In the section which follows all of the specimens are described, although only the dart points have been sorted into a number of finer groups. Each of these has been given a numerical designation (labeled I–XI), even though many of them compare rather favorably with established typologies. It is felt that this approach conveniently and accurately describes the dart points, as well as calls attention to the difficulties encountered in attempting to use existing types.

Dart Points

Group I (Figs. 3, A-L′ and 4, A-B′)

No. of specimens: 14 (8 complete and 6 nearly complete).

Outline form: Each of these specimens can be described as a generally short, broad point with a triangular blade, a roughly rectangular stem, and a deeply-indented base. The blade has straight to slightly convex or concave lateral edges and weak (Fig. 3, H-I′) to pronounced, but only rarely barbed (Fig. 3, G), shoulders. Lateral edges

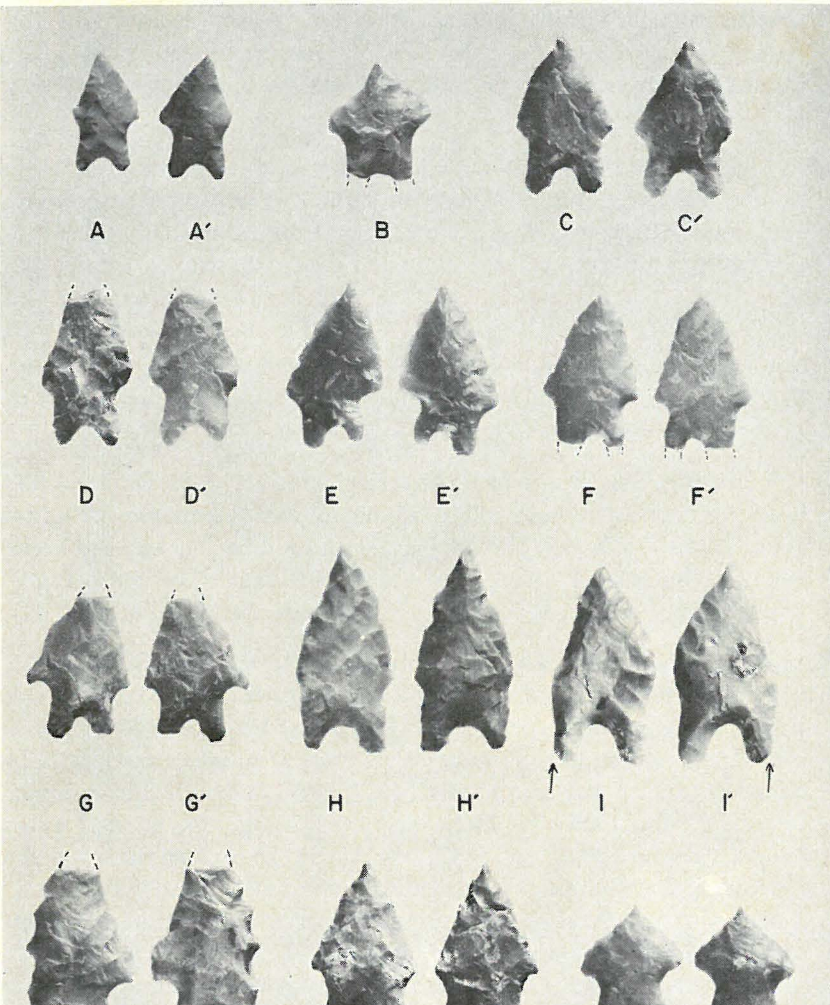


Fig. 3. Group I Dart Points. Arrows indicate burin blows.

of the blade are typically beveled, seven to the right and five to the left. The bases on all specimens have a deep, roughly U-shaped concavity, while the lateral edges of the stem vary from parallel to slightly expanding. On at least four specimens there is some suggestion of very light smoothing along the edges of the stem. The corners of the stem vary from rounded (such as Fig. 3, I) to sharply pointed (such as Fig. 4, B) and are frequently asymmetrical (Fig. 3, D-L′).

Dimensions: Total length, 3 to 5 cm.; stem length, 1.6 to 1.9 cm.; width across shoulders, 1.8 to 3 cm.; width across base, 1.4 to 2.4 cm.; maximum thickness, .5 to .8 cm.; maximum depth of basal concavity, .4 to 1.1 cm.

Weight: 2.8 to 10.4 grams.

Material: Group I points have been fashioned from fine-grained flint or, more commonly, chert with an occasional impurity; colors range from cream through brown to blue-gray.

Workmanship: The chipping is generally rather crudely done, though long, oblique flake scars often appear across the blade. Marginal retouching is poor and served mainly to produce the beveled blade edges. Remnants of large, crescent-shaped flake scars consistently appear along the basal concavity (especially clear in Fig. 3, I, I′).

Remarks: These points are very similar to the tentative new *Gower* type as well as some of the *Gower* variants (Shafer, 1963: 64–65, Fig. 7, A-E); Group I specimens differ from *Gower* only in that they are slightly larger and usually have more prominent shoulders. In addition, one of the points (Fig. 3, A, A′) is much like a small, stemmed point found in the deepest occupation zone at the Devil's Mouth Site (Johnson, 1964: 55, Fig. 17, J). In outline form, Group I points also resemble the *Pedernales* type (Suhm and Jelks, 1962: 235, Pls. 118 and 119) but are cruder, tend to be smaller, and more often have beveled blades.

One of the points (Fig. 3, I, I′) has a possible burin along the proximal portion of a lateral edge; it extends from the corner of the base to 2.4 cm. toward the distal end.

Group II (Fig. 4, C-D′)

No. of specimens: 2 (both complete).

Outline form: These are rather slender points with expanding stems and concave bases. The blade is long and triangular and has straight to slightly convex lateral edges which are alternately beveled (to the right) on one specimen (Fig. 4, C, C′). Shoulders are present, but they are not prominent. The lateral edges of the stem are from

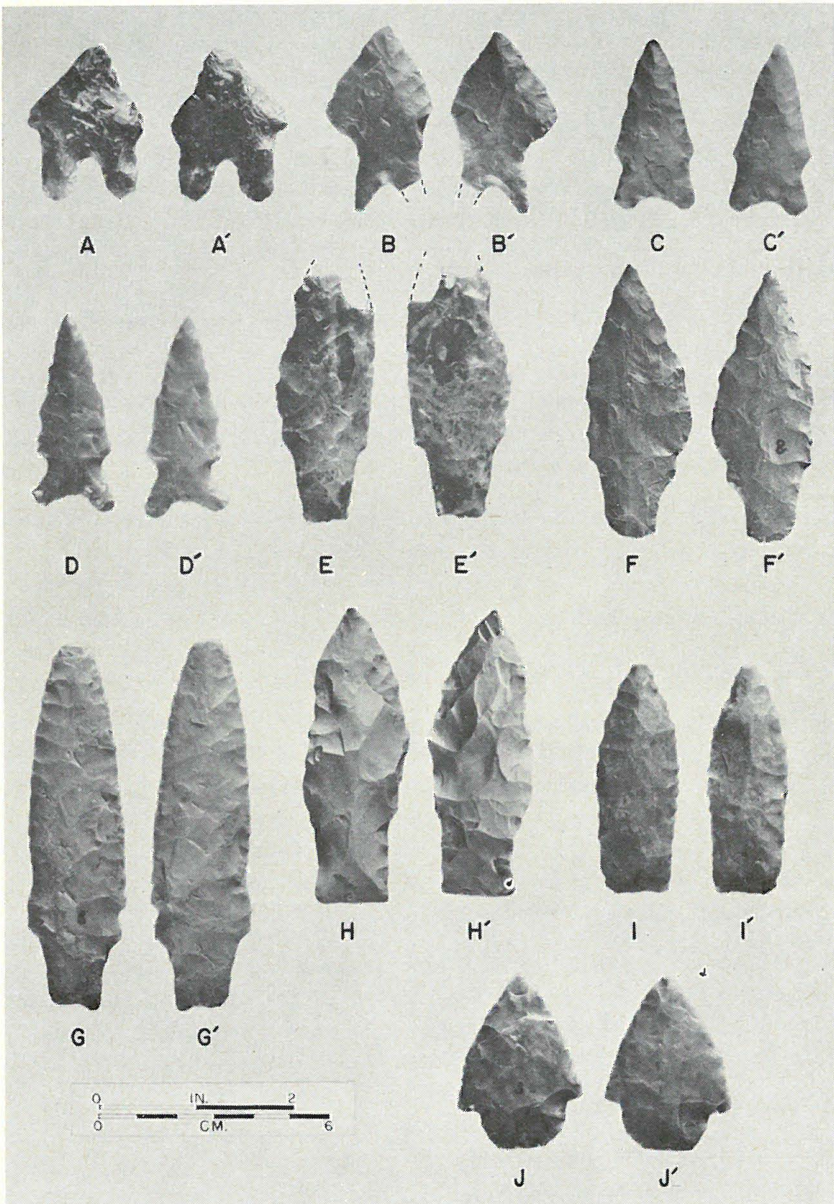


Fig. 4. Dart Points. A–B′, Group I. C–D′, Group II. E–G′, Group III. H–I′, Group VI. J, J′, Group V.

slightly (Fig. 4, C, C′) to markedly (Fig. 4, D, D′) flaring while the basal concavity is broad and fairly deep. On both specimens the lateral edges of the stem are faintly smoothed.

Dimensions: Total length, 4.3 and 5.1 cm.; stem length, 1.2 and 1.3 cm.; width across the shoulders, both 2 cm.; width across the base, 2 and 2.1 cm.; maximum depth of basal concavity, both .3 cm.; maximum thickness, .5 and .6 cm., respectively.

Weight: 5.4 and 5.8 grams.

Materials: Both specimens are made from locally-occurring cream to grayish chert.

Workmanship: In general these points are fairly well made, although the flake scars are typically short and narrow. Marginal retouching occurs on only one specimen (Fig. 4, C, C′).

Remarks: Of the recognized point types, these specimens are most similar to *Uvalde* (Suhm and Jelks, 1962: 255, Pl. 128).

Group III (Fig. 4, E-G′)

No. of specimens: 3 (2 complete, 1 fragmentary).

Outline form: Each of these long, slender points has weak shoulders and a faintly contracting stem. The edges of the blade are slightly (Fig. 4, G, G′) to markedly convex and tend to merge gently with the edges of the stem. The treatment of the base is variable, ranging from straight (Fig. 4, E, E′), to convex (Fig. 4, F, F′), to mildly concave (Fig. 4, G, G′). The edges of the stem and the base are lightly smoothed.

Dimensions: Total length (complete specimens only), 7 and 9.3 cm.; stem length, 1.4 to 1.7 cm.; width across the shoulders, 2.2 to 2.6 cm.; width across the base, 1.2 to 1.4 cm.; maximum thickness, .6 to .8 cm.; depth of basal concavity (one specimen only), .1 cm.

Weight: 12.2 and 22.3 grams.

Material: All are apparently fashioned from locally-obtained cherts and/or very fine-grained quartzite varying in color from cream to brown and brownish-gray.

Workmanship: On the whole the chipping is good, with regular, obliquely-parallel flake scars appearing across two specimens. On the third point (Fig. 4, F, F′) the flake scars tend to be broader and somewhat more irregular. All edges have been marginally retouched.

Remarks: Two (Fig. 4, E, E′ and G, G′) of the Group II points fall within the range of the *Travis* type (Suhm and Jelks, 1962: 251, Pl. 126). The concave base of the third (Fig. 4, F, F′), however, excludes it from that type.

Group IV (Fig. 4, H-I′)

No. of specimens: 2 (both complete)

Outline form: Each of these specimens has a long, slender blade and very poorly differentiated, but roughly rectangular, stem. On one point (Fig. 4, H, H′) the shoulders are very weak, while on the other (Fig. 4, I, I′) no shoulders can be distinguished. The lateral edges of the blades on both points are gently convex, and in one case (Fig. 4, I, I′) serrated. The edges of the stem on one (Fig. 4, I, I′) are smoothed, while both bases are straight.

Dimensions: Total length, 7.5 and 5.7 cm,; stem length, 2 cm. and approximately 2.4 cm.; width across the shoulders, 2.4 and 2 cm.; width across the base of the stem, 1.8 and 1.7 cm.; maximum thickness, 1.2 and .8 cm.

Weight: 22.1 and 11.9 grams.

Material: Both of the Group IV have been chipped from cream-colored chert.

Workmanship: One (Fig. 4, H, H′) is quite crudely flaked, while the other is fairly well made and exhibits some marginal retouching. Both have a markedly plano-convex cross section.

Remarks: Neither of the Group IV points fits an established type, although their outline forms are generally reminiscent of *Travis* points. The stems, however, are too poorly differentiated from the blades to permit inclusion in that type.

Group V (Fig. 4, J, J′)

No. of specimens: 1 (complete).

Outline form: This unusual point has a broad, triangular blade with convex lateral edges and pronounced, but barbless, shoulders. The short, broad stem has noticeably rounded corners and a convex base.

Dimensions: Total length, 4.4 cm.; stem length, 1.1 cm.; width across the shoulders, 3.4 cm.; width across the base of the stem, 2.2 cm.; maximum thickness, .5 cm.

Weight: 8.6 grams.

Material: A good quality, grayish chert or flint was used in the manufacture of this specimen.

Workmanship: The flaking is quite skillfully done and several broad, shallow scars appear across both surfaces. Marginal edges show alternate retouching which gives the impression of narrow beveling.

Remarks: The roundness of the stem is suggestive of *Morhiss* points; however, this specimen is much too short, to be included in that type.

Group VI (Fig. 5, A-C′)

No. of specimens: 3 (1 complete, 1 essentially complete, 1 fragmentary).

Outline form: Each has a lanceolate outline with a markedly contracting proximal end. On two specimens (Fig. 5, A, B) the proximal end is almost pointed, while on the third (Fig. 5, C) it is more gently contracting. The base is very faintly concave on each point, and both lateral edges are mildly convex for the entire length of the point. The two complete examples have serrated blades, and all three have very slightly concave bases.

Dimensions (the complete and essentially complete specimens only): Total length, 12.7 cm. and an estimated 11.5 cm.; maximum width, 2.7 and 3.1 cm.; maximum thickness, .7 and 1 cm. respectively.

Weight: (complete specimen only) 26.6 grams.

Material: Two are of a grayish-brown chert, while the third (Fig. 5, C) is made from a very fine-grained quartzite.

Workmanship: Skillfully chipped, horizontal to slightly oblique flake scars appear across both surfaces, and all marginal edges are neatly retouched.

Remarks: The two examples with markedly contracting, proximal ends are reminiscent of the *Lerma* type (MacNeish, 1958: 62, Fig. 23, 22–27; Suhm and Jelks, 1962: 207, Pl. 104), but are better made than the typical *Lerma*. All three are similar to Agate Basin points

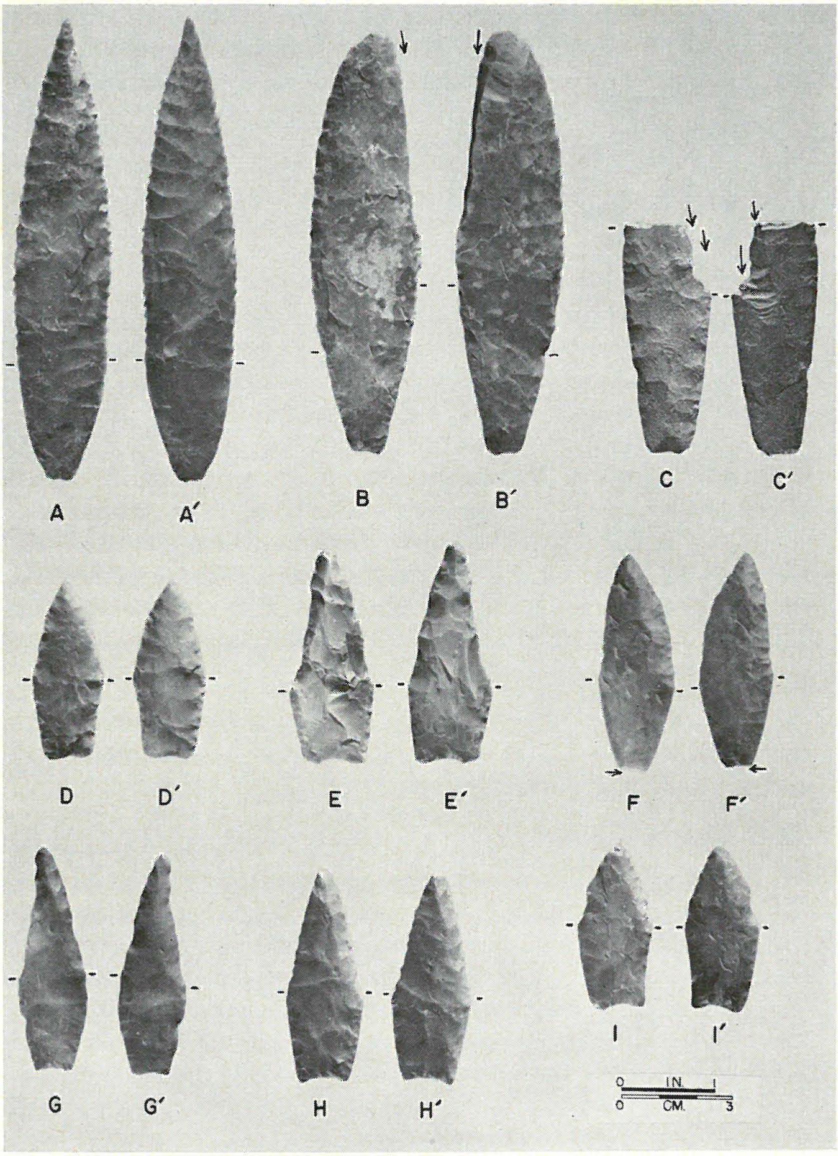


Fig. 5. Dart Points. A–C′, Group VI. D–I′, Group VII. Dashes indicate extent of lateral smoothing; arrows indicate burin blows.

(Wormington, 1957: 141 and 269, Fig. 7), in both workmanship and outline form.

One of the Group VI points (Fig. 5, B, B′) has a possible burin facet along one lateral edge. It extends from the tip toward the proximal end for a distance of 5.3 cm. There are no indications of resharpening, although the distal edge is perhaps smoothed from use.

Group VII (Figs. 5, D-I, and 6, A-E′)

No. of specimens: 11 (7 complete, 1 nearly complete, and 3 basal fragments).

Outline form: Each of these points has a somewhat lanceolate outline. The upper half the blade on the complete specimens, however, tends to be triangular in outline, while the lower half is generally contracting. The lateral edges vary from straight to slightly convex or concave. On one (Fig. 6, B, B′) the corners are slightly flaring, on the others they are essentially straight and are either sharply pointed or rounded. Of the eight examples with the distal portion of the blade intact, seven are alternately beveled, six to the right, one to the left. The bevel typically begins at the midsection—the widest point—and continues to the tip. The base is gently concave on each specimen, although on some (Fig. 5, F, G), the concavity is quite shallow. All proximal edges, including the concavity, are smoothed, often very heavily so.

Dimensions: Total length, 4.5 to 7 cm.; maximum width, 2 to 2.3 cm.; maximum thickness, .7 to 1 cm.; maximum depth of basal concavity, less than .1 to .2 cm.

Weight: 7.1 to 16.7 grams.

Material: These points are made from cream to brownish-gray, very fine-grained chert or flint.

Workmanship: As a group these points are well made and frequently exhibit long parallel, usually oblique, flake scars across the blade surface. The only exception (Fig. 5, E, E′) has numerous, irregular scars which have created marked relief. Marginal edges are consistently retouched and occasionally appear to be lightly serrated. The distal ends of two (Fig. 6, A, B) are somewhat blunted, one—possibly both—from rechipping.

Remarks: With the possible exception of the point that has slightly flaring basal corners, the outline form of these specimens falls within the range of the *Angostura* type. The high incidence of beveling, however, is not generally regarded as being typical of *Angostura* (Suhm and Jelks, 1962: 167, Pl. 84).

The bases of two of these points have burin facets, both of the

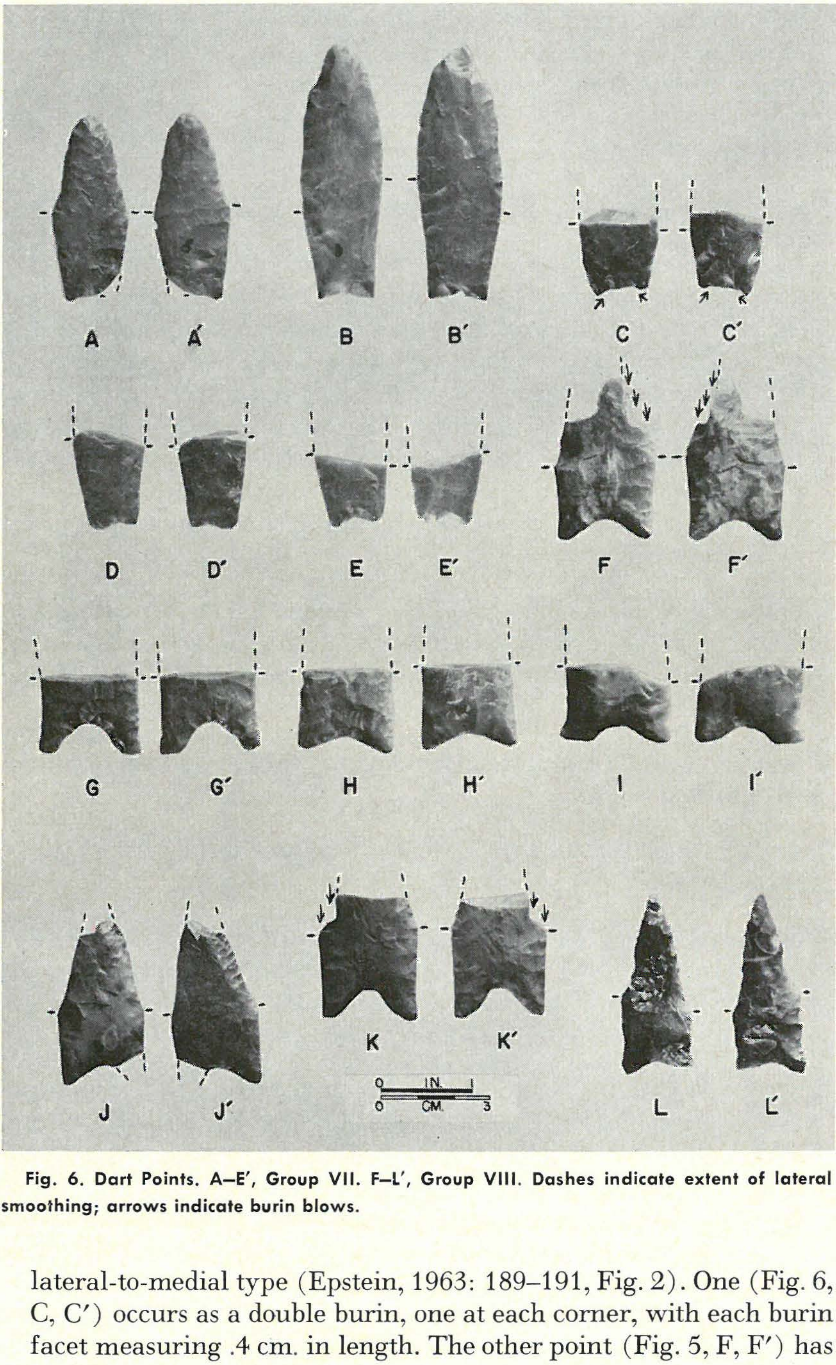


Fig. 6. Dart Points. A–E′, Group VII. F–L′, Group VIII. Dashes indicate extent of lateral smoothing; arrows indicate burin blows.

lateral-to-medial type (Epstein, 1963: 189–191, Fig. 2). One (Fig. 6, C, C′) occurs as a double burin, one at each corner, with each burin facet measuring .4 cm. in length. The other point (Fig. 5, F, F′) has a single burin facet which measures .5 cm. in length. In terms of smoothness and presence of minute flake scars, each of these burin facets shows extensive signs of use.

Group VIII (Fig. 6, F-L′)

No. of specimens: 7 (1 complete, 1 nearly complete, and 5 basal fragments).

Outline form: The most distinctive features of these points are their slightly concave proximal edges and usually pronounced basal concavity. All but one are rather wide. Three of the four examples (Fig. 6, J-L) having all or portions of the blade intact have lateral edges alternately beveled to the right. The others may also have been beveled, but they are too incomplete to be certain of either the presence or absence of this feature. The corners of the base tend to flare, sometimes rather markedly. Basal and lateral smoothing occurs on all examples.

Dimensions: Total length (complete specimen only), 4.8 cm.; maximum width (across the base), 1.9 to 3 cm.; maximum thickness, between .6 and .65 cm.; maximum depth of basal concavity, .3 to .8 cm.

Weight: (complete example only; it has, however, been badly thermal fractured) 5.5 grams.

Material: These points were apparently made from locally-obtained chert and flint.

Workmanship: Generally, the chipping is well done with regular flake scars predominating. Lateral edges are retouched and the base is thinned either by the removal of several long, narrow flakes, or more often, rather large, crescent-shaped flakes.

Remarks: In outline form these points resemble the *golondrina* variety of *Plainview* (Johnson, 1964: 46–52, Fig. 15, A-J). However, Group VIII specimens are typically better made and, at least some, are beveled. Both the beveling and outline form, on the other hand, are similar to the *Meserve* type (Suhm and Jelks, 1962: 218, Pl. 109).

Two of the Group VIII points (Fig. 6, F, K) have burin facets along the lateral edge of the distal end. Both seem to be incomplete, but it is possible that they were of simple angle type (Epstein, 1963: 189). One (Fig. 6, K) has evidence of two removals, the other (Fig.

6, F) has scars suggesting three removals. None is complete enough for meaningful measurements.

Group IX (Fig. 7, A-L′)

No. of specimens: 12 (3 complete, 1 rechipped, 2 nearly complete, and 6 basal fragments).

Outline form: The over-all outline is generally lanceolate with the lateral edges at the proximal end tending to be straight (such as Fig. 7, A) or slightly concave and flaring (such as Fig. 7, E). The widest part is typically just below midpoint or across the base. On the three complete examples the distal end is sharply pointed, being formed by gently curving edges. The upper portions of the blade on two of the points (Fig. 7, A, K) are alternately beveled to the right, while on a third (Fig. 7, C) the blade has been rather crudely rechipped. All bases are concave, usually markedly so. All lateral edges at the proximal ends are smoothed, and on four specimens (Fig. 7, D, E, H, L), the basal concavity is smoothed.

Dimensions: Total length (3 complete examples only), 3.4 (rechipped) to 7.4 cm.; maximum width, 1.7 to 2.2 cm.; maximum thickness, .5 to .7 cm.; maximum depth of basal concavity, .2 to .6 cm.

Weight: 5.6 to 12.4 grams.

Material: The specimens are made from locally-obtained flint or fine-grained cherts which are from cream to rather dark, grayish-brown in color.

Workmanship: Most of the Group IX exhibit excellent chipping, with long narrow, oblique flake scars often extending across the blade. The bases on all but two have been thinned by the removal of one or, more commonly, several longitudinal flakes which sometimes superficially resemble fluting. The two exceptions have been thinned by the removal of a large crescent-shaped flake, the scar of which has been rechipped, apparently to thin the base further. Fine marginal retouching is a common feature.

Remarks: The majority of these points conform fairly well to the *Plainview* type, although two (Fig. 7, K, L) are rather narrow—but similar specimens have been so classified (Baker, *et al.*, 1957, Pl. 1, D-X). Another two specimens (Fig. 7, F, J) which are less well made than the others in this group show some similarity with the

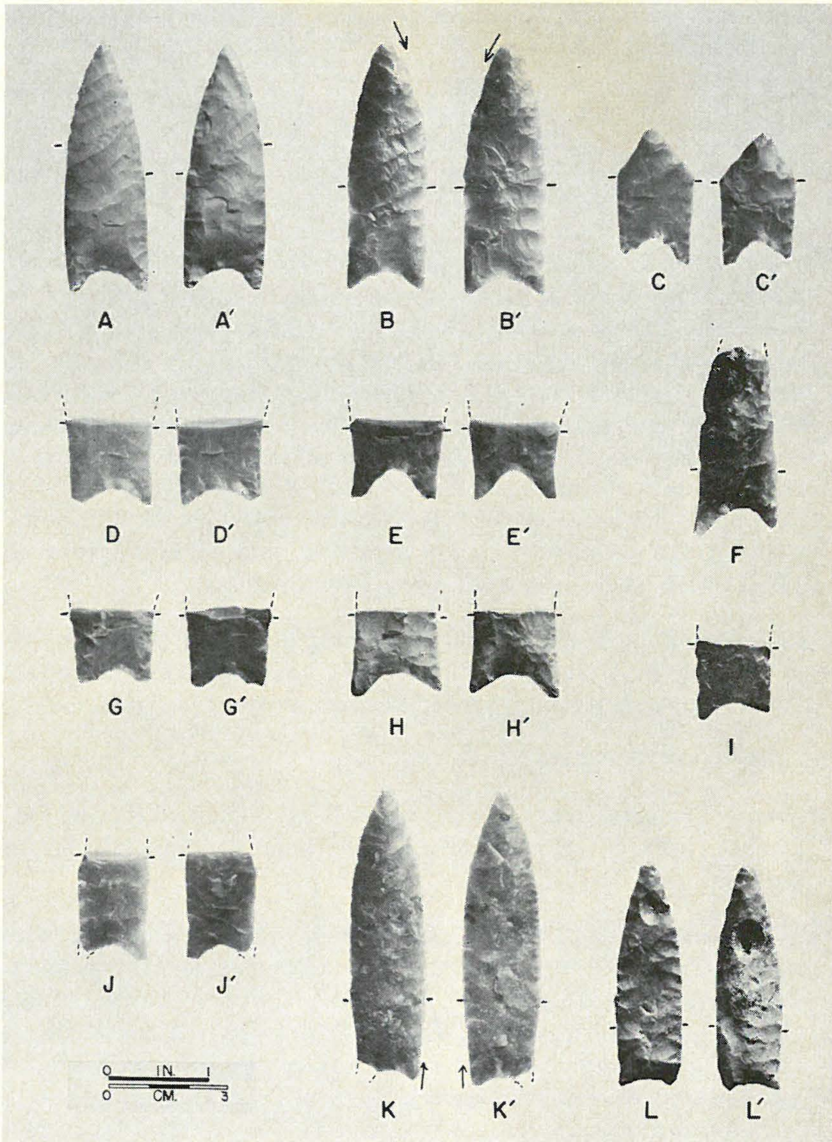


Fig. 7. Group IX Dart Points. Dashes indicate extent of lateral smoothing; arrows indicate burin blows.

Group X described below; however, unlike Group X specimens they do not tend to contract at the base.

Two of the Group IX points exhibit a single burin facet, each evidently having been produced by one blow. Both are on a lateral edge, one (1.45 cm. long) at the proximal end and the other (1.5 cm.) at the distal end. Minute flake scars, as well as suggestions of smoothing, evidence use.

Group X (Fig. 8, A-H′)

No. of specimens: 8 (all incomplete).

Outline form: Each of these specimens has straight to gently convex lateral edges which tend to contract slightly at the proximal end. The basal corners vary from rounded (Fig. 8, F) to pointed (Fig. 8, A, C, D, H) and are occasionally asymmetrical (Fig. 8, D). The basal concavity is usually pronounced and sometimes smoothed. Proximal portions of the lateral edges are smoothed on all specimens.

Dimensions: Total length, estimated at about 6.5 to 7.5 cm.; maximum width (roughly at the midsection), 1.8 to 3 cm.; maximum thickness, .5 to 1 cm.; maximum depth of basal concavity, .4 to .7 cm.

Weight: None complete enough to determine.

Material: The locally-obtained chert and flint from which these artifacts were produced vary in color from light tan to grayish-brown.

Workmanship: Although some specimens have long, narrow flake scars extending across the flat surfaces, the workmanship, on the whole, is only fair. Several have quite thick cross sections and marginal retouching is not a typical feature. The base has been thinned —often rather poorly—by the removal of small, roughly crescent-shaped flakes.

Remarks: Group X, points (especially those illustrated in Fig. 8, B, C, D) do not compare favorably with any established type, but they do in some respects resemble a tentative group that Shafer (1963: 65, Fig. 7, K) called *Gower*, Variant D. Another similar, though shorter point, came from the deepest stratum at the Devil's Mouth Site (Johnson, 1964: 54, Fig. 17, I).

Five of the eight examples of the group have burin facets and one also has a graver. Three of the burins appear along a lateral edge, two (Fig. 8, A, D) are at the distal end and are of the simple angle type. These measure 1.5 and 1.7 cm. in length. In addition, the blunt distal end of one of these specimens (Fig. 8, A, A′) appears to have served secondarily as a scraping or gouging tool—at least this end has a number of small, possible use-produced flake scars. The third

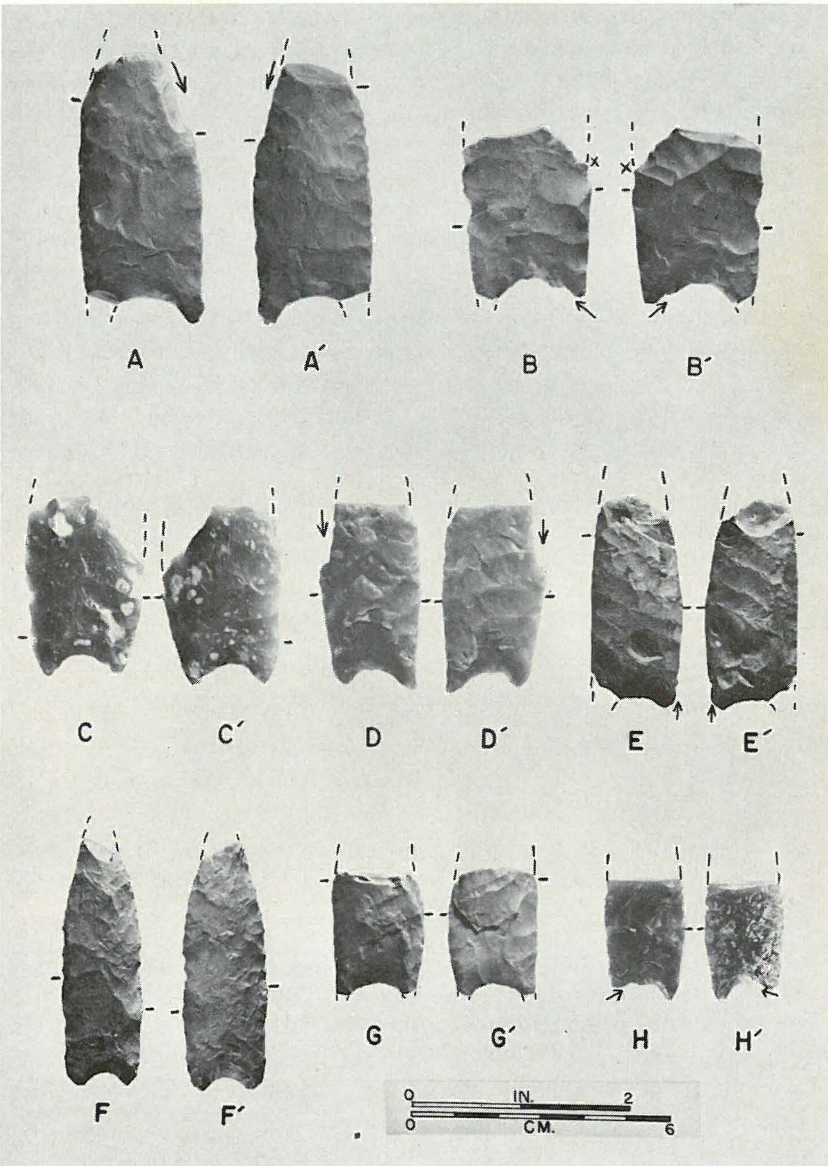


Fig. 8. Group X Dart Points. Dashes indicate extent of lateral smoothing; arrows indicate burin blows; and X indicates graver beak.

lateral burin facet (Fig. 8, E) is quite small, only .6 cm. long, and appears to have been formed by a single blow.

The two remaining burins also appear at the proximal end, but both are of the lateral-to-medial type. Each is .5 cm. long. Finally, it should be noted that, in addition to a burin facet, one of these specimens (Fig. 8, B, B′) has a very small graver projection at the juncture of a lateral edge and a diagonal medial fracture. The tiny beak (it projects approximately .2 cm.) has been produced by minute retouching and seems a bit smoothed, perhaps from use.

Group XI (Fig. 9, A-E′)

No. of specimens: 5 (none complete)

Outline form: Because of the incompleteness of these specimens, it is difficult to be sure of their exact form, although it is clear that each had essentially parallel lateral edges which extended from the base to approximately the midsection of the blade. Basal concavities are consistently broad and very shallow. The lower portions of all the lateral edges, and two of the basal concavities, are smoothed. On one example (Fig. 9, B, B′) the lateral smoothing is so extensive that it has produced suggestions of a definable stem.

Dimensions: Total length, none complete enough to estimate accurately; maximum width, 1.8 to 2.6 cm.; maximum thickness, .4 to .7 cm.; maximum depth of basal concavity, all are less than .3 cm.

Weight: Cannot be determined.

Material: The flint varies from tan to light, grayish-brown.

Workmanship: These are exceptionally well made points with long, obliquely-parallel flake scars being very common. Their cross sections are thin and flat, and the bases have been thinned by the removal of a number of small, longitudinal flakes.

Remarks: The rectangular nature of the proximal ends of Group XI points, as well as their thinness, are suggestive of *Milnesand* points (Sellards, 1955). However, most of *Milnesand* specimens have straight bases and points similar to Group XI points are often classed as *Plainview* (Sellards, *et al.*, 1947: Pl. 3, 4; Ochard and Campbell, 1954: Fig. 2, B).

Only one of these points exhibits a burin facet. It appears along a lateral edge at the proximal end, has been produced by a single blow, is .8 cm. long, and seems to have been dulled by use.

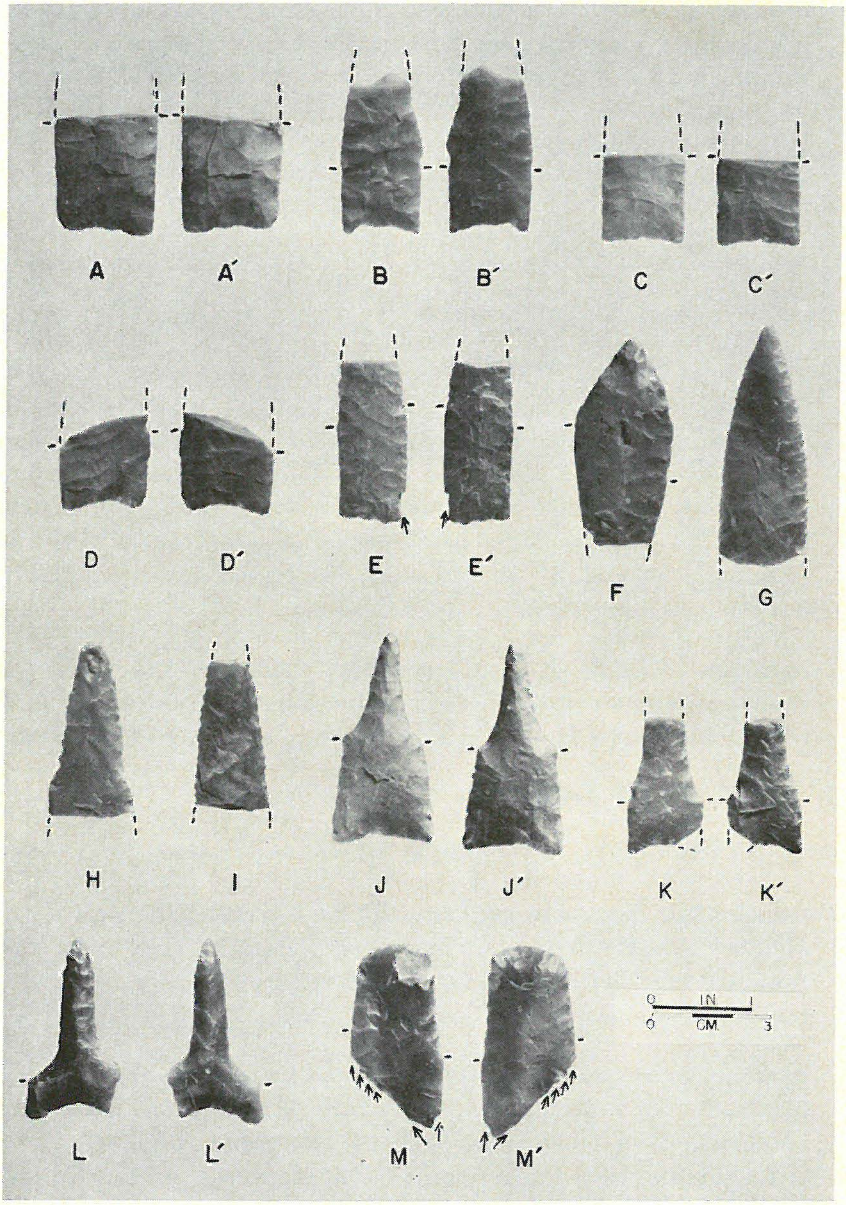


Fig. 9. Dart Points, Drills, and Gouge. A–E′, Group XI dart points. F–I, Unclassifiable dart point fragments. J–L′, Drills, probably reworked dart points. M, M′, Gouge-like tool rechipped from a dart point. Dashes indicate extent of lateral smoothing; arrows indicate burin blows.

Dart Point Fragments (Fig. 9, F-I)

No. of specimens: 5

Description: Each of these specimens represents better than half of a complete point, but none has retained the more diagnostic basal portion. As a group, they are quite well made and very probably are fragments from Paleo types. Two (Fig. 9, H, I) have lateral edges alternately beveled to the right, and three have (Fig. 9, G-I) fine marginal serrations.

Probable Reworked Dart Points (Fig. 9, J-M′)

No. of specimens: 4

Description: Included in this group are specimens which appear to have originally been dart points but which have intentionally been rechipped into other kinds of tools. Three (Fig. 9, J-L′) have long, narrow shafts and presumably served as drills. They are bifacially worked across both the shaft and the stem. On two (Fig. 9, J, L) the shaft is alternately beveled to the right, while on the third specimen (Fig. 9, K) the shaft has a lenticular cross section. The base is broadly concave in each case, and lateral edges of the stem are smoothed. The drills vary from 4.7 to 5.5 cm. in total length, 2.1 to 2.6 cm. in maximum width (across the base of the stem), and .7 to .9 cm. in maximum thickness; while the shafts are 2.7 and 3 cm. long.

The fourth specimen (Fig. 9, M, M′) is quite unusual in that the distal end of the blade has been steeply beveled to produce a scraping or gouging tool, and the proximal end exhibits at least six separate burin blows. Five of these are essentially of the lateral type, with the fifth and most recent burin facet, extending diagonally across most of the specimen. This facet is 1.9 cm. long. The small facet that appears immediately to the left of this one probably served to sharpen the burin edge.

Remarks: Although it is reasonably clear that these are reworked dart points, none of the flake scars resulting from rechipping are noticeably fresher than the initial flaking.

Scrapers (Fig. 10, A-B)

Two fairly large and well made flake scrapers represent the only unifacially-chipped stone artifacts recovered from the site. Both are plano-convex in cross section and have steep marginal retouching

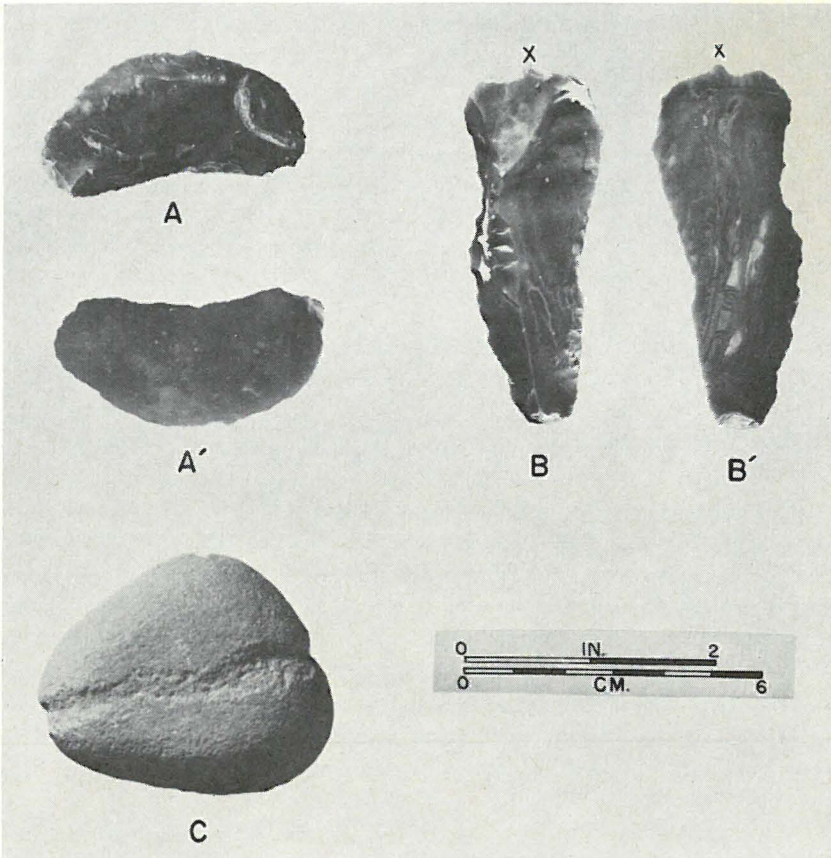


Fig. 10. Scrapers and Grooved Stone. A–B′, Scrapers. C, Grooved Stone. X indicates graver point.

along all, or nearly all, marginals. The flaking does not, however, extend across the entire convex face. The plano surface is unaltered and on one specimen (Fig. 10, B′) a prepared striking platform is still visible. The lack of a distinct bulb of percussion and the prominent lipping just below the striking platform suggest that the flake used to make this scraper was detached from the core by means of the billet percussion technique. Diagnostic flake scars are not present on the plano surface of the other scraper.

Only one (Fig. 10, A, A′) of these specimens appears to have been intentionally shaped, and has a distinct crescent-shaped outline. At one end of the other scraper there is a rather prominent graver which has been produced by chipping side-by-side two shallow concavities.

These scrapers are 5.4 and 7.3 cm. long, 2.5 and 2.8 cm. in maximum width, and .6 and .7 cm. in maximum thickness respectively. The graver beak projects .2 cm. One (Fig. 10, A) is made of honey-colored flint, the other (Fig. 10, B) of bluish-gray flint. The latter has a few traces of light-colored nodular cortex.

Grooved Stone (Fig. 10, C)

A flattish, somewhat naturally ovoid-shaped piece of fine-grained sandstone has a narrow groove pecked all around the long axis. Additional pecking scars are visible along one lateral edge and portions of one end—these are, however, too sparse to have significantly modified the natural shape of the stone. Both surfaces are lightly smoothed, perhaps from use. The groove is generally about .5 cm. wide and less than 2 cm. deep. The stone itself is 5.5 cm. long, a maximum of 5 cm. wide, and a maximum of 2.4 cm. thick. It weighs 88.4 grams.

Grinding Slab (not illustrated)

The only other specimen collected from the site is granite grinding slab with a shallow depression on each flat surface. This piece has, unfortunately, been lost and the only dimensions recorded are that it was 25 cm. long, 21.5 cm. wide, and 4 cm. thick.

SUMMARY

Although all from the surface, the artifacts—especially the dart points—from the Granite Beach Site comprise an unusual collection. They exhibit considerable morphological variation and, yet, fall within a significantly restricted range. In terms of outline form, workmanship, and the high incidence of lateral and basal smoothing, dart point Groups VI through XI are stylistically related to the Paleo-Indian tradition, particularly to types *Angostura*, *Plainview*, and *Meserve*. On the other hand, Groups I through V show affinity with the Archaic tradition in that they are generally less skillfully made, frequently have well defined, occasionally barbed shoulders, and their stems are not usually smoothed. Additionally, the occurrence of burins is much less frequent than in Groups VI-XI, supporting an earlier observation made by Epstein (1963: 191–194).

The data are still incomplete but it appears that most, if not all, of the Archaic dart points from the Granite Beach Site are—relatively speaking—early forms. Shafer (1963: 79–81) has reported specimens quite similar to Group I (his *Gower* type and *Gower* variants) as being stratigraphically below types *Wells*, *Morrill*, *Bulverde*, *Nolan*, and *Pedernales*. Another point somewhat similar to one of the Group I specimens (see Fig. 3, A, A′) was found at the Devil's Mouth Site, in the same stratum that yielded *Plainview golondrina* and other Paleo-Indian looking projectile points (Johnson, 1964: 46–58). Groups II-V are more difficult to place, but they could also be early Archaic styles.

The Granite Beach Site appears to have been a campsite rather than a killsite, as occupational features, especially hearths (see Table I) were numerous and chipping debris was observed but not collected. On the other hand, it must be admitted that the absence of certain kinds of tools, such as knives and choppers, as well as the unusually high incidence of dart points (73 of a total of 81 artifacts) is not the assemblage one might ordinarily expect to find at a campsite.

The diversity of dart points represented at the site suggests repeated occupation, extending perhaps from late Paleo-Indian times to the early Archaic period. Whether or not the hearths and stone piles also gradually accumulated over a comparable span of time is not known. None of these features were systematically investigated, nor were any of the artifacts found in direct association with them. Perhaps this and other problems which surround the site can be answered when Lake Buchanan again recedes.

REFERENCES CITED

Baker, William E., T. N. Campbell, and Glen L. Evans

1957. The Nall Site: Evidence of Early Man in the Oklahoma Panhandle. Bulletin of the Oklahoma Anthropological Society, Vol. V, pp. 1–20.

Epstein, Jeremiah F.

1963. The Burin-Faceted Projectile Point. American Antiquity, Vol. 29, No. 2, pp. 187–201.

Jackson, A. T., and Arthur M. Woolsey

1938. Annual Report of WPA and The University of Texas Archaeological Research, Lake Buchanan, 1936–1937. The University of Texas Publications, No. 3802.

Johnson, LeRoy, Jr.

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

MacNeish, Richard S.

1958. Preliminary Archaeological Investigations in the Sierra de Tamaulipas, Mexico. Transactions of the American Philosophical Society, Vol. 48, Pt. 6.

Orchard, C. D., and T. N. Campbell

1954. Evidence of Early Man from the Vicinity of San Antonio, Texas. The Texas Journal of Science, Vol. VI, No. 4, pp. 454–465.

Sellards, E. H.
1955. Fossil Bison and Associated Artifacts from Milnesand, New Mexico. American Antiquity, Vol. 20, No. 4, Pt. 1, pp. 336–344.

Sellards, E. H., Glen L. Evans, and Grayson E. Meade
1947. Fossil Bison and Associated Artifacts from Plainview, Texas. Bulletin of the Geological Society of America, Vol. 58, pp. 927–954.

Shafer, Harry J.
1963. Test Excavations at the Youngsport Site: A Stratified Terrace Site in Bell County, Texas. Bulletin of the Texas Archeological Society, Vol. 34, pp. 57–81.

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.

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.

Tunnell, Curtis D., and William W. Newcomb
1962. When the Waters Recede—A Mystery. The Mustang, Newsletter of the Texas Memorial Museum, Vol. 4, No. 6.

Wormington, H. M.
1957. Ancient Man in North America. Denver Museum of Natural History, Popular Series No. 4.

Starr Route 18
Buchanan Dam, Texas

Notes on the Clark Site, McLennan County, Texas

FRANK H. WATT

ABSTRACT

In the fall of 1955 members of the Central Texas Archeological Society made limited excavations at the Clark Site, a small midden buried in alluvial deposits of the Brazos River. Artifacts were not numerous, but those recovered suggest a possible relationship between the Toyah Focus of central Texas and the Sanders Focus of northeastern Texas. A radiocarbon date of A.D. 1277 ± 150 was obtained from a partially disturbed hearth, the only occupational feature encountered by the excavations.

INTRODUCTION

During the long annals of the Brazos River, from the late Pleistocene on down to the present, there have been many changes in the route taken from the river's original source in northeastern New Mexico to its journey's end at the Gulf of Mexico. The river has rushed along, carrying with it large amounts of sand and gravel picked up in its upper reaches, then wandered lazily downstream, dropping these materials far down its course. Along the more peaceful stretches of the Brazos, Indians must have found it pleasant to live on the soft deposits of sand, pursuing the daily routine of their lives and, when departing—willingly or otherwise—leaving behind some of their possessions for us to ponder over.

The Clark Site, located approximately six miles upstream from the northern city limits of Waco, provides evidence of such a stay along the river. This former Indian camp is on a small point of land buried in part of what appears to be a terrace remnant (Fig. 1). It is bound on the west by a narrow flood plain and, beyond this, the Brazos; while to the east is a normally-dry stream. Only a small, triangular-shaped section of the terrace remains intact, its survival evidently a result of protection afforded by a nearby (to the north) rock ledge or bluff. The original extent of the terrace may have always been fairly small, although there is no way of being certain of this. At present it is rather narrow, being a maximum of approximately 250 yards wide and roughly 25 feet above the normal level of the river.

Geologically speaking, the Clark Site lies on the same fault as the

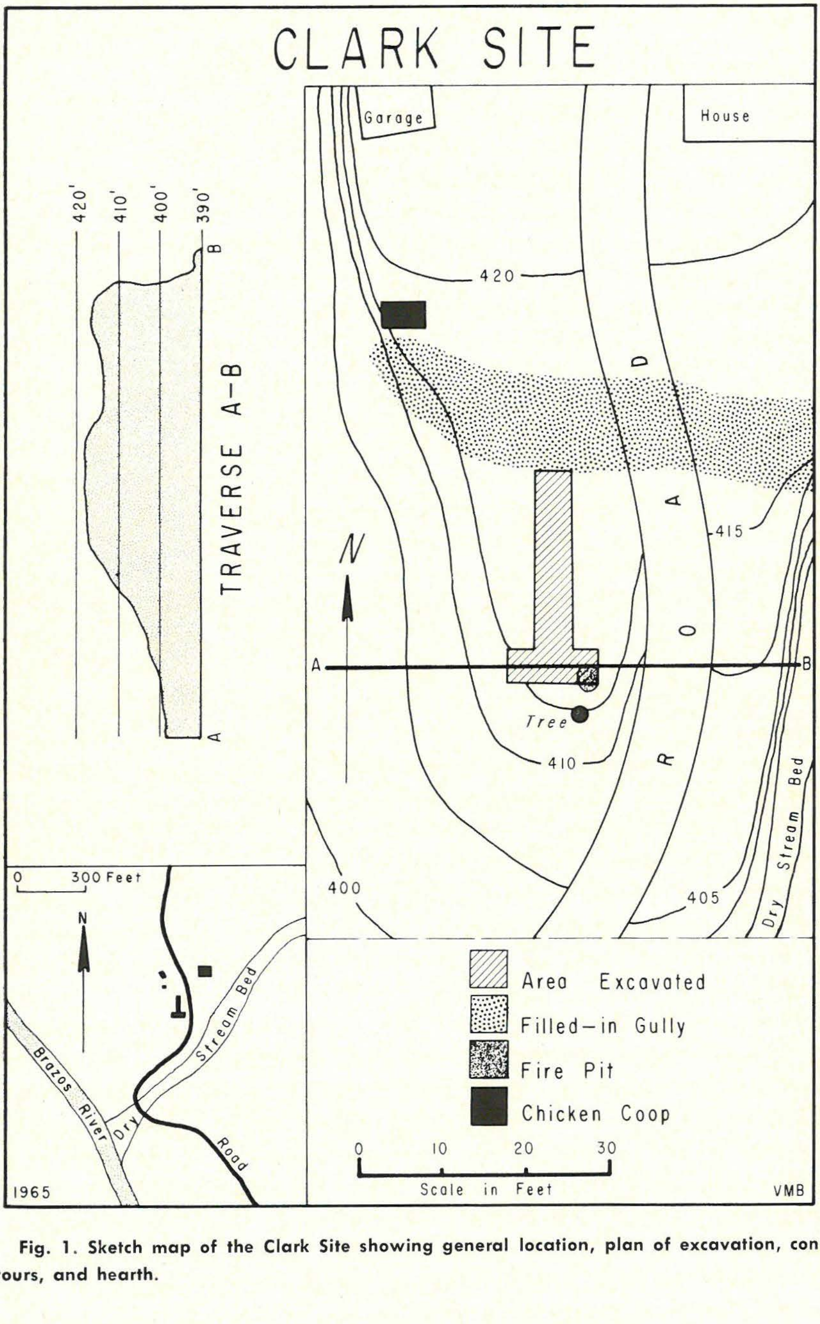


Fig. 1. Sketch map of the Clark Site showing general location, plan of excavation, contours, and hearth.

Buried Midden Site (Mason, 1936), but it is a mile farther upstream and on the opposite (east) side of the river. This fault, the one which has created the Balcones Escarpment, runs along the west bank of the Brazos at the Buried Midden Site, continues upstream for a short distance, then angles across the river and leaves the east bank just below the mouth of Aquilla Creek and about one-half a mile north of the Clark Site.

The Clark Site has been recorded as 41-39B9-25 in the old quadrangle system, and, more recently, as 41 ML 39 in the new county designation being employed by the Texas Archeological Research Laboratory, The University of Texas. It is only one of several buried sites reported for the general area. In addition to Buried Midden, these are the Tehuacana Creek Site (Bryan, 1935), the Cow Bayou Site (Bryan, 1935), and the three Asa Warner sites (Watt, 1956).

DISCOVERY AND INVESTIGATION

Discovery of the Clark Site came in 1941, when the author went to the area to investigate rumors of an Indian burial. At the time, a house, two barns (one of which has since been converted to a garage), and a chicken house were situated on the terrace. Since the surface sloped considerably toward the river, the erection of these buildings required a good deal of leveling (Figs. 1 and 2). Luckily, most of this had been done on the upper part of the terrace, and the only structure directly over the site was the chicken house. This building was lower than the others and was located on the riverside portion of the leveled-off area (Fig. 2). It was on the face of the dump just behind the chicken house that the first evidence of occupation—a few potsherds, a number of flint chips, some charcoal, and burned rock fragments—was observed. No concentrated midden deposit, however, was noted, nor were the rumors of the burial verified.

Then, during the summer of 1955, a visit was made to the site by Mr. Sam Langston and the writer. By this time the chicken house had been torn down, and some haphazard digging at its former location quickly exposed midden refuse at a depth of 12 to 24 inches below the surface. Additional cultural debris was observed along the edges of a road which had been graded across the terrace and extended down the point (i.e., the area between the confluence of the Brazos and the small stream to the east). These concentrations of refuse indicated that the site merited further investigation and, accordingly, another trip was made to test more systematically with a posthole digger. The posthole tests revealed an uppermost layer of sterile river sand, uniformly 16 to 20 inches thick, and, below this, a layer, 12 to 18 inches thick, of midden refuse. The midden zone was an ash-stained sand deposit with charcoal, flint chips, bone, and shell fragments. Immediately beneath the refuse layer was a grayish sand stratum, of undertermined thickness, which contained many fragmentary limestone rocks, but no cultural material. Tests were made to a maximum depth of five feet below the surface, and no artifacts or any other type of occupational detritus was found below a depth of 35 inches. The area of occupation was shown to be small and roughly triangular-shaped, extending northward from the point for approximately 35 feet, to a filled-in gully. The surface sloped slightly downward toward the river to the west and south (Fig. 1).

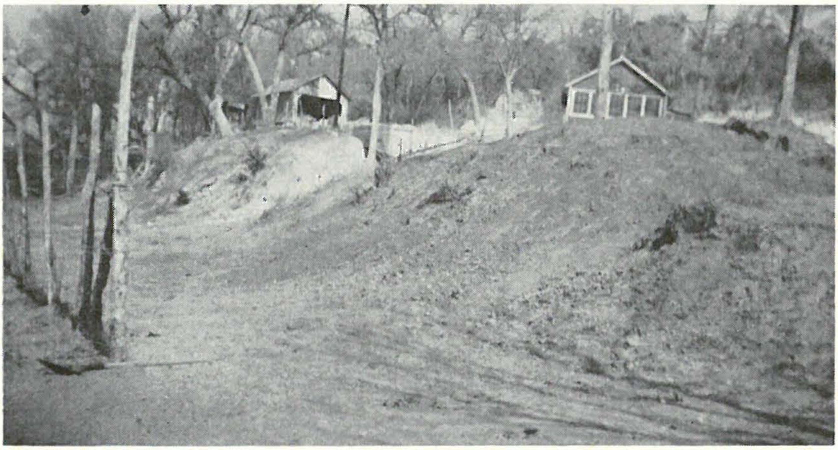


Fig. 2. View of Clark Site, looking northeast.

Encouraged by the results of the tests, the Central Texas Archeological Society decided to carry out limited excavations at the site. Permission for this work was obtained from the landowner, the late Mr. A. C. Clark of Waco, in October, 1955, and shortly thereafter, written notices were sent to all members of the Society (only seven were able to participate in the project). However, before excavation could get underway, Mr. Clark removed almost all of the sterile overburden with a scraper in order to obtain material to fill in washes which had developed in his road to the point. This saved the Society much time and labor and, fortunately, did not discernably damage the midden deposit. The only information lost was the exact thickness of the overburden.

Some previous digging by persons unknown had been done around a small oak tree standing at the tip of the point, and along the riverside slope. At the edge of these disturbances, some six feet removed from the oak tree, a trench five feet wide, 12 feet long, and three feet deep was excavated across the point. Using the tree as a reference point, a line was then extended to the filled-in gully and a second trench, five feet wide and 25 feet long, was laid out along this line (Fig. 1).

The midden deposit was generally well defined in the trench profiles, its point of contact with the little-remaining overburden being especially distinct. Even the loose ash and charcoal in the midden had not been disturbed or washed away. The base of the midden zone was somewhat less easily distinguished, largely because the grayish color of the layer below (perhaps imparted by seepage through the midden) did not form a sharp contrast.

Most of the excavations were confined to the midden layer, as the overburden had been largely removed, and the tests, as well as the first trench, indicated that nothing of archeological interest was to be found below this zone. No problem of stratification was present and the midden was not hard packed so that no pick work was necessary. Some, but not all, of the material was screened. Records were kept of the vertical occurrence of the artifacts, with most coming from the upper half of the midden. One day was required for the society to complete both trenches and to make a few small test pits.

THE FINDINGS

Only one occupational feature, a rather crude fire pit, was located. It had been partially uncovered by previous diggers and was re-exposed in the first trench excavated by the Society (Fig. 1). Although most of the upper portion was disturbed and the rocks scattered, it was evident that the pit had been lined with irregularly-shaped limestone rocks. The hearth could not be fully reconstructed, but enough remained to determine its approximate size and shape. It had been roughly circular in outline—measuring three feet in diameter and eight inches in depth—and had been dug into the gray soil, extending slightly below the midden. The basal portion was undisturbed and, in addition to what remained of the burned rock lining, there were ashes, charcoal, and eight large pieces of unworked deer bone. No artifacts were found in the pit, but most of the postsherds from the site were recovered in the nearby excavations. In 1957 the Magnolia Laboratories dated a charcoal sample (Sample FRL, No. RC-23) from the hearth at 680 ± 150 years ago (A.D. 1277 ± 150).

A total of 100 artifacts was recovered from the site by members of the Central Texas Archeological Society. Other specimens are known to have been collected, but none of these could be traced down and, hence, they are not included in this report. What follows is a listing and brief description of the objects found by the society, both from the surface and the excavations.

Arrow Points. The 20 arrow points from the Clark Site are all identifiable as the *Perdiz* type (Fig. 3, A-P). They conform in all particulars of size, shape, and manufacture to the description given by Suhm and Jelks (1962: 283, Pl. 142). No attempt has been made to compare them with the two varieties of *Perdiz* recently defined by Jelks (1962: 24–26, Fig. 12). In an earlier report (Watt, 1961) on the radiocarbon date from the Clark Site these points were erroneously identified as *Alba.* The *Perdiz* points are from 2.9 to 4 cm. long, 1.5 to 2.2 cm. wide across the shoulders, and .25 to .4 cm. in maximum thickness.

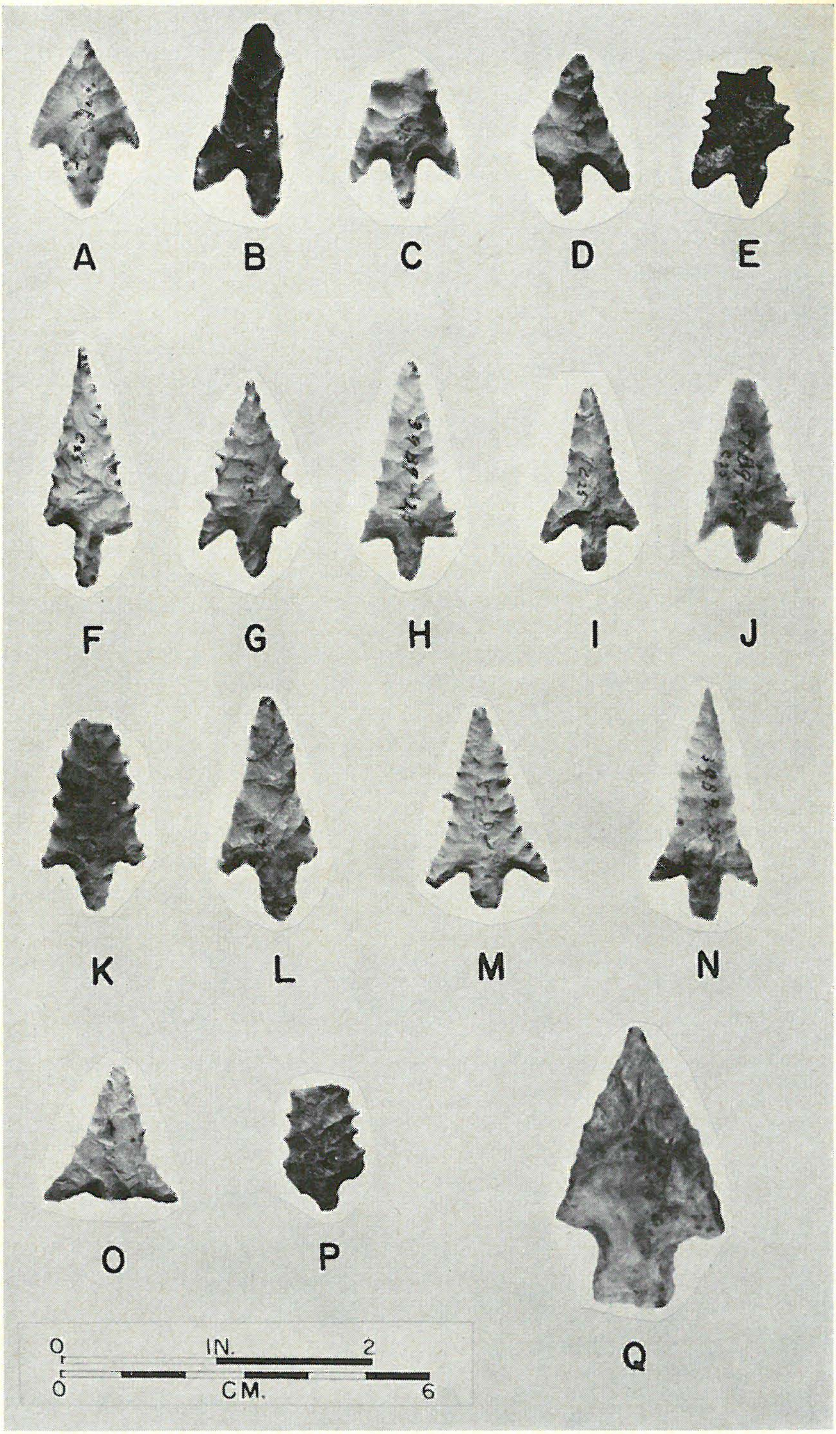
Dart Point. A single dart point (Fig. 3, Q), possibly of the *Yarbrough* type, was recovered. It may, however, be intrusive, having washed down from the nearby bluff where dart points are frequently found. This point is 4.5 cm. long, 2.8 cm. wide across the shoulders, and .7 cm. (maximum) thick.

Knives. The three knives from the site include one complete specimen and two basal fragments. All are well made and exhibit neat marginal retouching. The complete example (Fig. 4, A) has a moderately broad, ovate outline. It measures 7.5 cm. in length, 3.7 cm. in maximum width, and .6 cm. in maximum thickness. Each of the two fragmentary knives, one (Fig. 4, B) with a concave base and the other (Fig. 4, C) with a convex base, is estimated to have been roughly 10 cm. long.

Axe. This fist axe or chopper (Fig. 4, D) is made from a flat, waterworn nodule of greenish quartzite. Two lateral edges and the distal (blade) end have been flaked on one face, but only one lateral edge and the blade have been worked on the opposite side. The base is unworked and retains the nodular cortex. Workmanship is crude, with flakes apparently having been removed by means of the percussion technique. This axe is roughly triangular in outline, measuring 9 cm. long, 7.4 (maximum) wide, and 2.7 (maximum) thick.

Scrapers. This category consists of nine flakes, each of which has been lightly retouched along one or more marginal edges. The outlines are quite irregular and there is no evidence of intentional shaping

Fig. 3. Projectile Points. A–P, *Perdiz* arrow points. Q, Possible *Yarbrough* dart point.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
0 IN. 2
0 CM. 6

(Fig. 4, E-K). A typical specimen measures 5 cm. long, 2.1 cm. wide, and 1.1 cm. thick.

Rubbing Stone. This small, rounded quartzite pebble (Fig. 4, L) has been well smoothed on one side and may have served as a rubbing

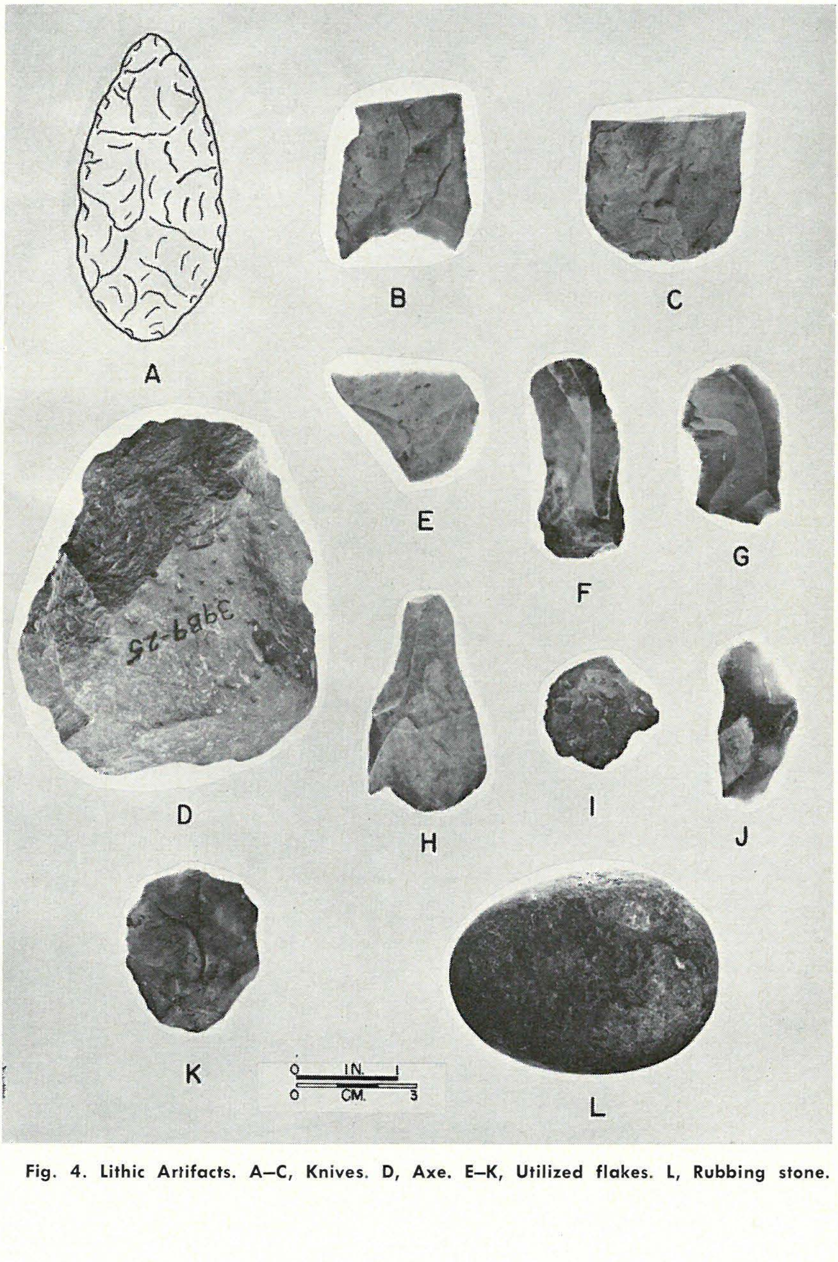


Fig. 4. Lithic Artifacts. A–C, Knives. D, Axe. E–K, Utilized flakes. L, Rubbing stone.

or polishing stone. In addition, one end shows possible pecking or battering scars, perhaps from secondary use as a hammerstone. This specimen is 7 cm. long, 5.2 cm. wide, and 3.1 cm. (maximum) thick.

Bone Tools. Two deer bones show signs of having been purposefully modified. One of these (Fig. 5, A, A′), an incomplete beamer fashioned from a metapodial (or cannon bone), has a deep, V-shaped groove cut into the posterior side of the shaft. This groove appears to have extended almost the entire length of the bone and is extensively worn along the lateral edges. Approximately one-half (the proximal half) is missing, but when complete this tool must have been approximately 18 cm. long (Fig. 5, A′ shows a reconstruction). Beaming tools are not common in central Texas, but have been found at the Horn Shelter in Bosque County (Frank Watt, unpublished manuscript) and at the Baylor Site in McLennan County (Dee Ann Story, personal communication). A very similar implement is illustrated for the Sanders Site (Krieger, 1946: Pl. 23, f).

The other bone implement (Fig. 5, B) has been manufactured from a deer ulna. Much of the distal end of the bone has been removed and the remaining tip has been smoothed into a convex shape. Virtually complete, this piece is 9.1 cm. long. Its use is unknown, although identical specimens are often referred to as flaking tools. Worked deer ulnae are widespread in central Texas and have been reported for both the Toyah and Austin foci of the Central Texas Aspect (Jelks, 1962: 63).

Pottery. Exclusive of a number of very tiny pieces not counted, a total of 63 sherds was collected at the Clark Site. Most of these came from the east-west trench, in the area near the fire pit. Others came from the surface of the slope near the chicken house. Thirteen of the sherds are from vessel rims, the others from body areas. All have bone and/or grit (largely sand) temper and a rather dark, gray-black paste. Three of the sherds bear decorations, two having diagonally incised lines (Fig. 5, C, E) and one (Fig. 5, D) having diagonally incised lines combined with punctations. None of the other pieces is decorated (Fig. 5, F-H) and at least one entirely plain vessel is indicated. Tentatively, the decorated sherds are identified as *Canton Incised* (similarities with *Maydelle Incised*, however, should be noted) and the undecorated ones, at least the rim sherds, as *Sanders Plain.* Earlier (Watt, 1961) one of the incised specimens was identified as *Sanders Engraved.* Both the decorated and the plain sherds are from .8 to 1.2 cm. in maximum thickness.

Besides the artifacts listed above, the site yielded numerous items of miscellaneous refuse, including unworked animal bones, fire-black-

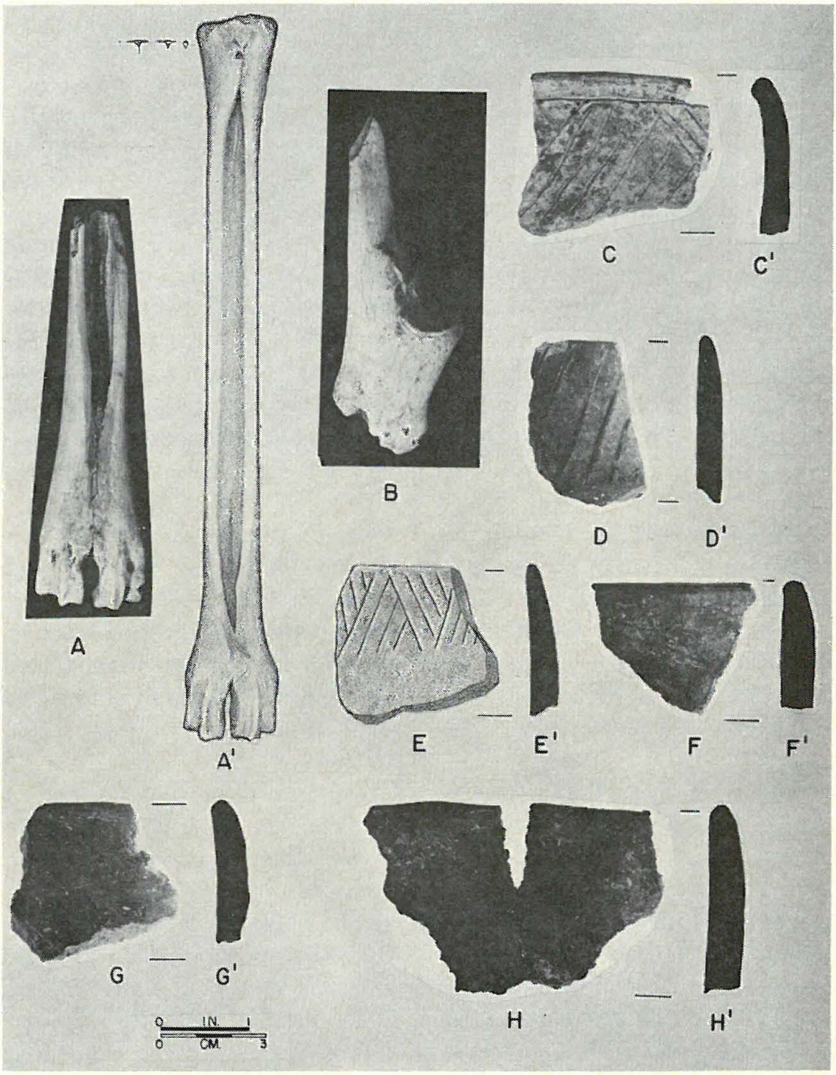


Fig. 5. Bone Tools and Pottery. A, A', Bone beamer. B, Worked deer ulna. C, C', E, E', Incised rim sherds. D, D', Punctated-incised rim sherd. F–H', Undecorated rim sherds. Exteriors to the right on all rim profiles.

ened rock fragments, flint flakes, and snail and mussel shells. Of these, only the bones and the shells have been examined. Identifications of the mammal bones were made by Bob H. Slaughter, Museum of Paleontology, Southern Methodist University; the mollusca were identified by Dr. Joseph Bequaert, Museum of Comparative Zoology, Harvard College.

Among the faunal remains there are:

- Deer (white-tailed, *Odocoileus virginianus*) remains which consist of 36 split leg bones, 19 joint bones, 7 vertebrae, 2 antler fragments, and 1 skull dome with a bud;
- 10 rodent mandible fragments;
- 1 land tortoise;
- 16 miscellaneous bones not identified.
- Snail shells, including:
  - Two species—*Bulimulus dealbatus*, Say and *Anguispira alternata Stronglades*, Pfi both of limited occurrence at the site but common in the area today.
- Mussel shells, including:
  - 10 specimens representing four species: *Obvaria reflexa*, Raf; *Elliptio tetralamus*, Say; *Proptera purpurata*, Lam; and *Credonta costata*, Raf. All of these are also typical of present-day fauna.

Since neither snail nor mussel shells were very abundant at the site, it appears that deer constituted the major food item. However, to judge from the proximity of the site to the Brazos River, it is possible that numerous fish were also consumed.

SUMMARY

The Clark Site consists of a small midden accumulation buried in alluvial deposits of the Brazos River. Limited excavations at the site did not recover a great many artifacts, but those found are of special interest. Among the more significant of the specimens is the bone beamer, a tool common to the Plains and the Mississippi drainage, but comparatively rare in central Texas. Only two other, recently excavated, sites in the central Brazos Valley (Horn Shelter and Baylor Site) have produced them. At the Horn Shelter, the beamer was recovered from Austin Focus context. No radiocarbon date has been obtained for the level from which it was found, but it seems possible that bone beamers could have been in use in the central Brazos Valley as early as about A.D. 500.

Perhaps of even greater importance is the association of the *Perdiz* arrow point type (a major trait of the Toyah Focus) and, tentatively, Sanders Focus pottery. The one radiocarbon date from the site, that of A.D. 1277 ± 150, agrees very well with those obtained for the Toyah

Focus occupation at the Kyle Site in Hill County (Jelks, 1962: 97–98), and should apply, in part, to the Sanders Focus.

REFERENCES CITED

Bryan, Frank

1935. Resume of Prehistoric Human Cultural Remains so far Discovered in Central Texas. Bulletin of the Central Texas Archeological Society, No. 1, pp. 8–9.

Jelks, Edward B.

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

Krieger, Alex D.

1946. Culture Complexes and Chronology in Northern Texas, with Extension of Puebloan Datings to the Mississippi Valley. The University of Texas Publication, No. 4640.

Mason, James K.

1936. Buried Midden on the Brazos. Bulletin of the Central Texas Archeological Society, No. 2, pp. 52–55.

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.

Watt, Frank H.

ms. The Horn Shelter, an Early American Site. Unpublished manuscript.

1956. Archeological Materials from the Asa Warner Sites. Central Texas Archeologist, No. 7, pp. 6–29.

1961. Two Radiocarbon Dates from the Central Brazos Valley. Bulletin of the Texas Archeological Society, Vol. 31 (for 1960), pp. 327–328.

Box 1176
Waco, Texas

Report on Materials from Brawley's Cave, Bosque County, Texas

DORRIS L. OLDS

ABSTRACT

This report describes archeological specimens from Brawley's Cave (41 BQ 20), a limestone rockshelter in Bosque County, Texas. The most important feature of the assemblage is the fact that perishable specimens from this area have survived in recognizable condition. Description of other types of materials is included. A late Edwards Plateau Aspect component and both the Austin and Toyah foci of the Central Texas Aspect are represented.

INTRODUCTION

Late in the fall of 1964, Dr. Edward B. Jelks, Director of the Texas Archeological Salvage Project, through the courtesy of Jesse J. Howard, brought a small collection of perishable materials to the Texas Archeological Research Laboratory for analysis and description. A note with these materials read "Found by George Anderson in a very dry cave between Clifton and Meridian, Texas. This is very rare stuff for Central Texas." It is indeed very unusual that such specimens have survived the damp central Texas climate, and it was thought that a report on them would be of special interest because of the rarity of such a find. Mr. Howard had obtained the collection from Gaines DeGraffenreid, who had bought part of the large Anderson accumulation of central Texas materials some years ago.

A search for more information about the perishables produced from the County Archeological files at The University of Texas a manuscript written by Frank E. Simmons entitled "Report on Prehistoric Relics and Skeletal Remains in the Bosque Basin," dated September, 1919. From this document it appeared that our specimens came from Brawley's Cave, Bosque County (41 BQ 20). Simmons' manuscript describes the location of the cave, which would be more accurately called a rockshelter, and gives an interesting account of the burials, artifacts, and other materials that he, with George Anderson and Jacob Olsen, discovered during excavations in 1917 and 1918. The original manuscript, slightly edited, follows this report as an addendum. A section dealing with another archeological site, Camp 5, has been omitted.

Anderson's collection from the cave was scattered after his death, but the specimens still in DeGraffenreid's possession and those in Simmons' own collection will be described in this paper. I should like to thank them both for their generous cooperation in allowing me to examine and photograph their artifacts. In addition to the perishables, specimens of stone, bone, and shell are included, along with a single potsherd. There are said to be additional materials from Brawley's Cave in the Jacob Olsen collection at the Clifton Museum, in Clifton, but I have not had an opportunity to see them.

I am deeply indebted to Mardith K. Schuetz, of the Witte Memorial Museum, for assistance in analyzing the fragments of basketry and cordage and for identification of some of the fibrous materials used in their construction; to Dr. Gerald K. Raun, of the Texas Memorial Museum, for identifying the faunal remains; and to Harry J. Shafer and David S. Dibble for photographing the specimens and helping me in the description and identification of a number of them. However, any errors in description, identification, and interpretation are mine.

Unless otherwise noted, the specimens described below are from the Jesse Howard collection.

DESCRIPTION OF THE SPECIMENS

Perishable Specimens

Specimens of Wood (6 specimens; Fig. 1, A-G)

Four of the six specimens of wood can definitely be considered artifacts. The material has not been identified.

1. Worked Stick (Fig. 1, A)
   Length: about 15 cm.
   Diameter: tapers from 6 mm. at one end to about 3 mm. at the other.

This is a slightly curved, cylindrical stick with a blunted point at one end. Although no tool marks are evident, the stick may have been rubbed to its slightly fuzzy smoothness.

Its function is not obvious, but it may be an arrow foreshaft which has hardened into a slightly warped curve and has not been modified for hafting. Another possible use could be as an awl or a basketry tool.

2. Worked Stick (Fig. 1, B)
   Length: 6 cm.
   Diameter: tapers from 4 mm. to 1 mm.

A small, cylindrical stick has been sharpened to a rough point at one end; it is slightly flattened and blunted at the other end, which is

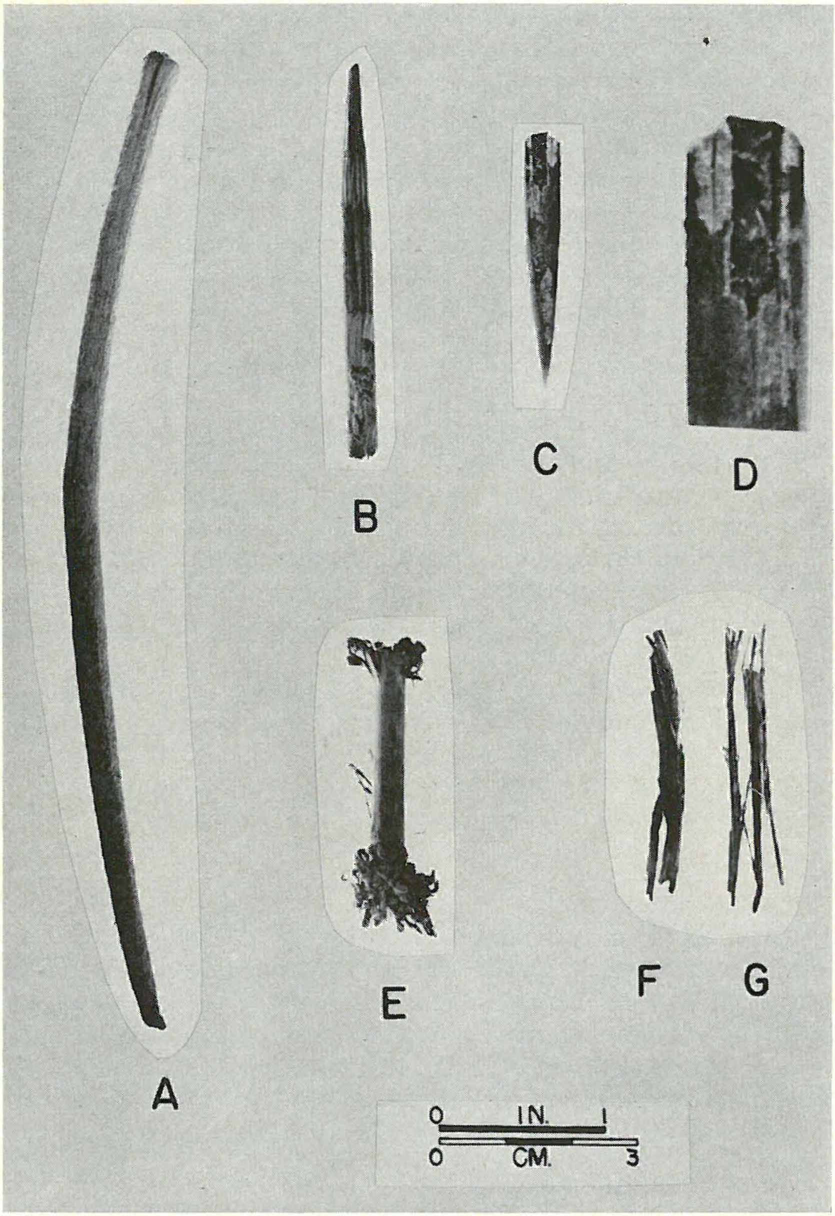


Fig. 1. Specimens of Wood. A, B, Worked sticks. C, D, Arrow foreshaft with stem of *Perdiz* point and enlargement (*D*) of distal end of foreshaft. E, Small, burred stick. F, G, Small sticks.

somewhat ragged. Longitudinal whittling marks can be seen along the entire surface. About 1.4 cm. from the wider end the stick has been thinned slightly to a spot where a tuft of short fibers curls. The small fibrous attachment extends from 4 mm. to 1 cm. from the blunt end.

Several possibilities for use are suggested: the specimen could be an arrow foreshaft, with the tuft of curled fibers intended for securing the arrow; it could be an unfinished foreshaft; it might be a complete wooden arrow; and it might also have been used as a basketry tool. Edward B. Jelks (1962: 70–71) has described a similar, but longer, specimen in his report of the Kyle rockshelter.

3. Worked Stick (Fig. 1, C, D)
   Length: 4.2 cm.
   Diameter: 5 mm. at one end, tapering to a point at the other.

This is another small, cylindrical, sharpened stick, apparently of the same material as No. 2. This one, however, is certainly the distal end of an arrow foreshaft. In the center of the straight, vertically cut end a narrow cleft, 7 mm. long, still holds the tiny, slender stem (3 mm. thick) of an arrow point. The size and shape of the contracting stem fragment indicates that it is from a *Perdiz whitney* point. This specimen is in DeGraffenreid's collection.

Simmons mentions (see Addendum) finding a foreshaft holding an arrow fragment but relates that a small piece of sinew was bound around it when it was discovered. Jelks (*ibid.*: 69–70) describes and illustrates a similar foreshaft—also holding a *Perdiz* point fragment—which gave evidence of having once been lashed with sinew.

4. Worked Stick (Fig. 1, E)
   Length: about 4.5 cm.
   Diameter: 5 mm. to 6 mm.

A short, cylindrical, smooth stick has been shredded at each end so that the fibers curl. No tool marks are visible. The tufted, shredded ends suggest a possible use as a paint brush, but there is no evidence of color particles. Schuetz (1961: 181) describes somewhat similar burred wood objects from the Shumla Cave in Val Verde County with "single ends split into thin strips that curl like paper ribbon."

5. Small Stick (Fig. 1, F)
   Length: 5 cm.
   Width: 5 mm. to 6 mm.

This very small, soft, slender stick is frayed at one end and notched or broken off about 8 mm. from the other end, leaving a fragment only 2 mm. wide. It is of such soft material that it yields to light finger pressure, and no tool marks are visible. Unless this is a badly decayed paint brush, it is difficult to see how it could have been used at all, and it is questionable whether it is an artifact.

6. Small, Broken Stick (Fig. 1, G)
   Length: about 5.2 cm.
   Width: about 3 mm. when the two pieces are together.

The soft, fragile, slender stick has been broken in two lengthwise. One end is split to a depth of about 1 cm.; the other end is broken into several fibrous lengths. There are no signs of its having been worked.

Specimens of Fiber and Grass (30 specimens)

The 30 specimens in this category are divided for descriptive purposes into cordage, basketry, and other artifacts of fiber and grass. Botanical identifications, where certain, were made by Mardith K. Schuetz.

CORDAGE (10 specimens; Fig. 2, A-H)

Terminology used in describing the cordage is based on an analysis by Douglas and Carolyn Osborne (1954: 1095–1099). *Fiber* thus refers to the fundamental unit used in making yarns and fabrics. *Yarn* is made by twisting sets of one or more fibers together to construct a stronger unit; it is a generic term which includes single yarn, plied yarn, cord, twine, sewing thread, and so forth. *Ply* is the term designating the yarn unit or units twisted together to make cordage, rope, and the like. The Osbornes say: "Twine is a plied yarn made from medium-twist single yarns with ply-twist in the opposite direction. Properly, most yarns called 'cordage' are twine. For the larger and more plied yarns, cords, and ropes, the changing of direction of twist determines the type of rope and its uses" (*ibid.*: 1099). However, as the term *cordage* is commonly used in the archeological literature, I employ it here for both *twine* and *cordage*. *Twist* refers to the direction of slope that the fibers and yarns make around their vertical axis: Z-twist means in a counterclockwise direction, S-twist in a clockwise direction. According to the Osbornes, when the fiber and the ply are twisted in opposite directions, the resulting construction is stronger and more easily handled than it would be if the same twist direction were used throughout. The number of twists to the inch and the angle of helix (angle of slope made by the twists to the vertical axis, as measured with a protractor) are used in analyzing the construction of the cordage.

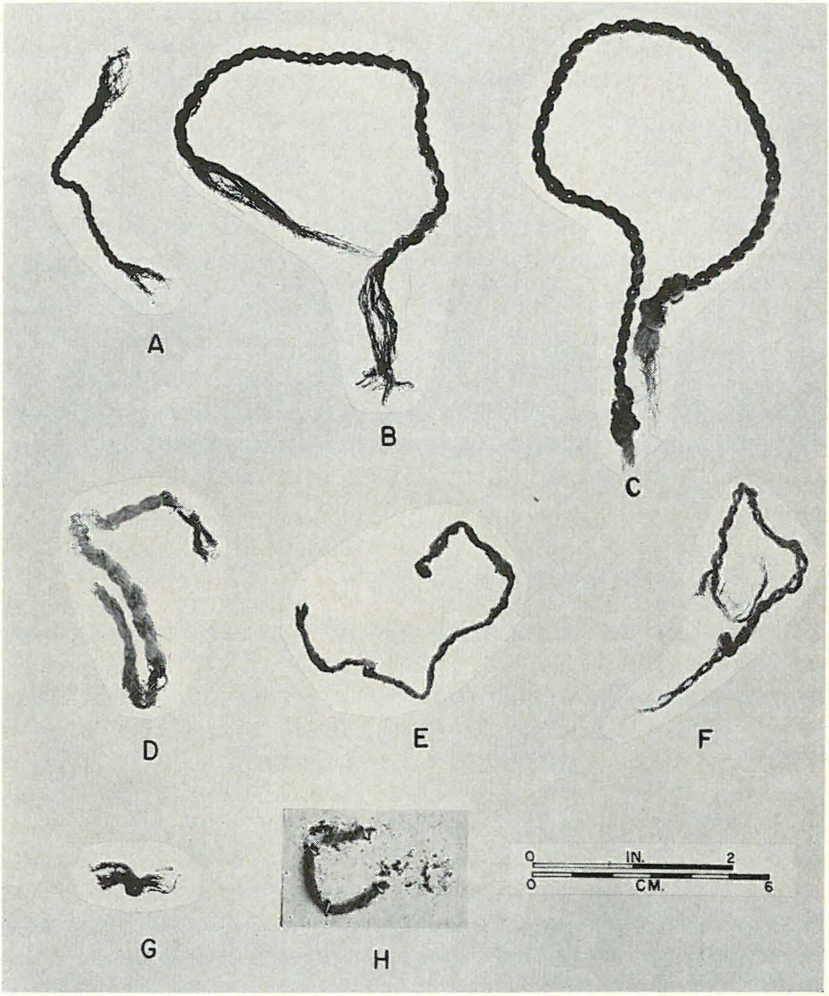


Fig. 2. Cordage. A–D, Z-twisted, 2 ply yarns, with S-twisted fibers. E–H, S-twisted, 2 ply yarns, with Z-twisted fibers. All are made of sotol but G, which is of sisal.

Of the 10 specimens of cordage, six are made of Z-twist, 2-ply yarns, with S-twist fibers, and the remaining four are S-twist, 2-ply yarns, with Z-twist fibers. One of the Z-twist fragments is tied around a twisted piece made of fur strips which will be described under miscellaneous specimens later. Seven cordage specimens are constructed of sotol and one of sisal. Two have not been definitely identified (Table 1, No. 2 and Table 2, No. 4) but appear to be of sotol. The sotol is *Dasylirion texanum* Scheele, the only sotol species found as far north as

Bosque County (Parks, 1937: 13). The sisal, commonly known as Century Plant (*Agave americana* L.) is not native to Bosque County; its distribution is given as extending south and west of this area (*ibid.*: 16). Dimensions, material, an analysis of construction, and brief remarks concerning the individual specimens are given in Table 1 (Z-twist, 2-ply yarn, with S-twist fibers) and Table 2 (S-twist, 2-ply yarn, with Z-twist fibers). Many specimens are dry and brittle and contorted by loops and twists. Because of possible damage through the handling necessary to straighten them for measurement, approximate dimensions must be given in some instances.

BASKETRY (8 specimens; Fig. 3, A-H)

Of the eight examples of basketry, five are in sufficiently good condition to reveal the weaving technique used. In most instances small bundles of straight fibers were bound tightly, then the bound sections were woven together with non-interlocking weft bands of a flat, wider material. The three very loose and fragmentary specimens still suggest

TABLE 1

Six specimens of Z-twist, 2-ply yarn cordage, with S-twist fibers
(Dimensions are given in centimeters)

No.	Length	Dia.	Material	Construction	Remarks
1	2	.3	Sotol	3½ twists/inch Angle of helix not measured	Very small, exceedingly fragile, badly deteriorated. (Not illustrated)
2	Not measured	.3	Possibly sotol	*Ca.* 8 twists/inch Angle of helix not measured	Tied around fur fragment, ends knotted twice. One end broken off at an outer knot, the other end frayed. (Fig. 6,A)
3	*Ca.* 9	.2	Sotol	15 twist/inch Angle of helix *ca.* 45°	Well made, evenly twisted and in very good condition except for frayed ends. (Fig. 2,A)
4	*Ca.* 23.5	.3	Sotol	8 twists/inch Angle of helix *ca.* 55°	Good condition. (Fig. 2,B)
5	28	.4	Sotol	7 twists/inch Angle of helix 45°	Well made, evenly twisted, in excellent condition. Two overhand knots at one end, one behind the other, and a single knot at the other. Yarn frayed beyond the knots at both ends. (Fig. 2,C)
6	*Ca.* 14.5	.5	Sotol	4 twists/inch Angle of helix *ca.* 55°	Fair condition. (Fig. 2,D)

TABLE 2

Four specimens of S-twist, 2-ply yarn cordage, with Z-twist fibers
(Dimensions are given in centimeters)

No.	Length	Dia.	Material	Construction	Remarks
1	13	.2–.25	Sotol	*Ca.* 11 twists/inch Angle of helix *ca.* 45°	Tightly twisted, well made in good condition. (Fig. 2,E)
2	*Ca.* 16	.2	Sotol	*Ca.* 7 twists/inch Angle of helix *ca.* 55°–60°	Loosely twisted and badly frayed at ends; in poor condition. Accurate measurement difficult. (Fig. 2,F)
3	2.5	.8	Sisal	Not determined	Width taken at twist. Small, consists of a single twist of the 2 plies. Ends spread out and frayed. (Fig. 2,G)
4	6	.25	Probably sotol	*Ca.* 11 twists/inch Angle of helix not measured	Broken in two pieces but appears to be in fair condition. Evenly and tightly twisted. From Simmons collection. (Fig. 2,H)

a similar method of manufacture. In describing the fibrous materials the width is termed "fine" if the fibers are 1 mm. or less in diameter, "medium" up to 3 mm., and "coarse" over 3 mm. The materials have not been identified.

1. Basketry Fragment (Fig. 3, A)
   Length: about 5 cm.
   Width: 4 cm.

Lengths of fine-to-medium fibers are wrapped together into four bundles (plus a fragment of a fifth) about 5 mm. wide to make the warp foundation of an oval fragment. The individual bundles are then woven together with double strips of a flat fiber about 2 mm. wide in a non-interlocking coil technique.

2. Coiled Basketry Fragment (Fig. 3, B)
   Length: 8.6 cm.
   Width: 1.8 cm. to 2 cm.

This is one of the best examples of basketry in the collection and one of the best preserved as well. Flat strips of fiber have been used for binding together three bundles of fine fibers in a non-interlocking coil technique. Most of both surfaces are covered with the weft binding, making a compact piece about 8 mm. thick. The split-leaf weft stitches have been worked on a diagonal slanting to the left. The wrapping fibers are not twisted but make flat bands in units about 4 to 5 mm.

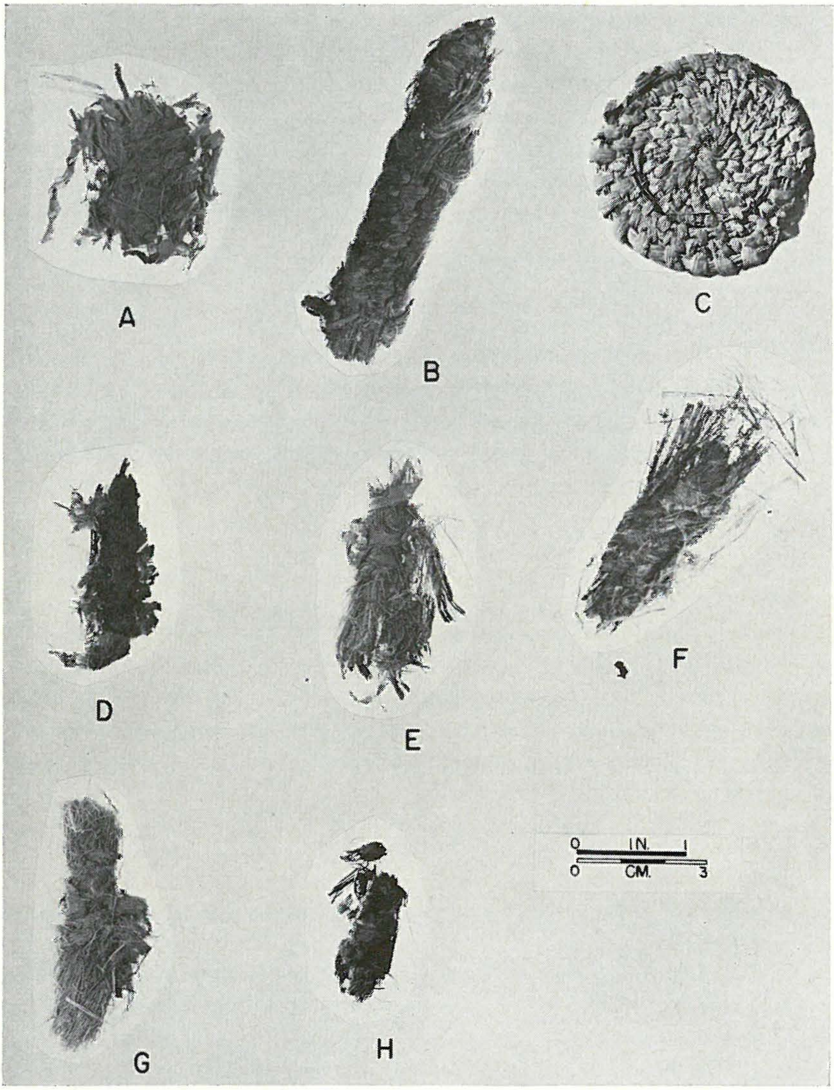


Fig. 3. Basketry Fragments. A, B, Fragments showing the non-interlocking weave. C, Center coil with split-stitch, non-interlocking weave. E–H, Small basketry fragments.

wide. The bound surface of one bundle has been worn off one side exposing an area of about 2 cm. which shows the longitudinal fibers underneath one end.

3. Coiled Basketry Fragment (Fig. 3, C)
   Diameter: 5 cm.

The center section of a piece of coiled basketry forms nearly a perfect circle. This specimen is in excellent condition and provides a good example of the non-interlocking, split-stitch weaving technique. There are six coils from the center to the perimeter. Stitches are very close together at the center, but they are spaced increasingly farther apart as the coils grow so that around the outer coil there are two stitches to the centimeter. The fragment is from the DeGraffenreid collection.

4. Basketry Fragment (Fig. 3, D)
   Length: about 5 cm.
   Width: 7 mm. to 1.8 cm.

This is a single bundle of untwisted fine fibers wrapped horizontally along most of its length with bands of flat fiber about 4 mm. wide. Enough weft elements protrude from the sides to show that the weave is similar to that of the other basketry bundle fragments, although this one is not tightly constructed.

5. Basketry Fragment (Fig. 3, E)
   Length: about 6 cm.
   Width: 2 cm. to 3 cm.

One bundle of fine-to-medium width fibers has been bound closely by a band of flat fiber 2 mm. to 3 mm. wide. The horizontal binding extends from 1.5 cm. below one end to 1 cm. from the other. The wider end has been slightly scorched. A few fragments of a similar bundle remain attached showing that the original construction was a non-interlocking weave.

6. Coiled Basketry Fragment (Fig. 3, F)
   Length: about 7 cm.
   Width: 1.2 cm. at one end, spreading out to about 4 cm. at the other.

This fragment consists of three sections of untwisted fiber, of fine-to-medium width. Each section is bound separately, then the three bundles are woven together by horizontal bands of split-leaf fibers bunched in strips about 5 mm. wide to make a non-interlocking weft construction. The narrow end is tightly secured, but the fibers and bundles have loosened and spread out at the other end.

7. Basketry Fragment (Fig. 3, G)
   Length: 6 cm.
   Width: 1.5 cm. to 2.5 cm.

Mixed fine-to-medium width fibers have been wrapped horizontally from the narrow end downward for about 2 cm. by a band of flat material about 3 mm. wide.

8. Basketry Fragment (Fig. 3, H)
   Length: 3.2 cm.
   Width: about 8 mm.

This small fragment is made of fine fibers that are wrapped most of their length with strips of flat material about 3 mm. wide.

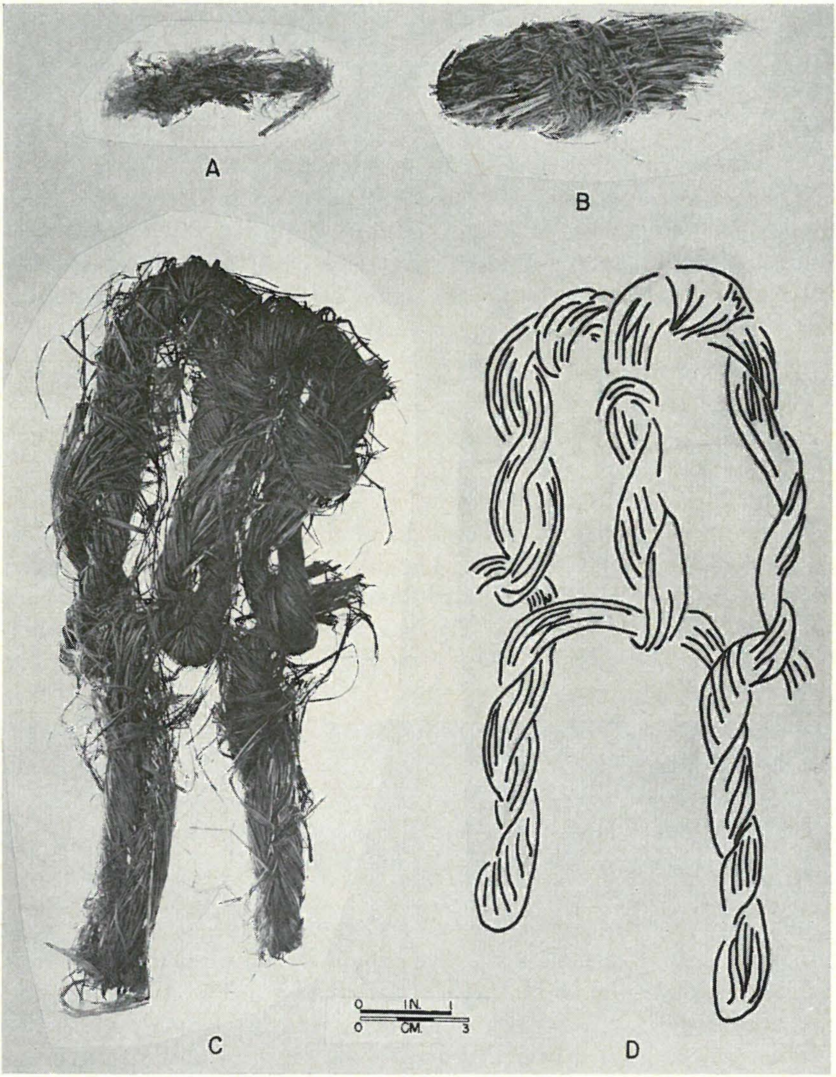


Fig. 4. Artifacts of Fiber and Grass. A, Possible basketry fragment. B, Bundle of wrapped fibers. C, Sandal made of grass bundles. D, Drawing by Mardith K. Schuetz showing details of sandal construction.

Other Artifacts of Fiber and Grass (12 specimens; Figs. 4, A-D; 5, A-H)

1. Fiber Bundle (Fig. 4, A)
   Length: 7 cm.
   Width: 2.2 cm.

A bundle of matted fibers has been wrapped loosely about the middle section by fibers of the same type. They appear to be a mixture of very fine-to-medium width fibers. This is probably a deteriorated basketry fragment, but identification is uncertain because of its condition.

2. Fragments of Fiber Bundles (Not illustrated)

There may be two or three bundles represented by these loose fragments. The similarity in length and the remnants of flat wrapping fibers present suggest that they were once parts of wrapped bundles used as warp foundations in the same manner as those previously described.

3. Bundle of Wrapped Fiber (Fig. 4, B)
   Length: about 9 cm.
   Width: about 2 cm. at each end, widening in the center to about 3.6 cm.
   Thickness: about 2.1 cm.

This bundle of fibers has been doubled over but not twisted. It is wrapped horizontally around the middle by similar fibers in a band about 2.3 cm. wide. On the reverse side the wrapping band disappears in a diagonal into the loop. The bundle has been slightly scorched on each end. This is probably a "storage bundle"—lengths of fiber packaged for later use. Schuetz (1963: 157) mentions bundles of this general type found among cave materials from Val Verde County.

4. Sandal (Fig 4, C, D)
   Length: about 18.5 cm.
   Width: lower loops 2 cm. and 1.5 cm. at the narrow (heel?) end, broadening to about 6.5 cm. at the wide (toe?) end.
   Material: coarse grass.

The specimen is loosely twined and shows no signs of wear. It is probably an unfinished sandal of a type that looks like a variation of Schuetz' "bi-parallel warp frame" construction (1956: 130–135).

Three lengths of S-twisted, single-ply coarse grass fiber bundles are looped over and twisted clockwise at the toe, then relooped in a figure-8 just below the middle of the sandal (10 cm. from the top). At the heel two lengths are looped in a figure-8, the upper ends passing through the lower loops of the top half. Crosswise bands of the same grass, about 1.5 cm. wide, reinforce the right edge about 4.5 cm. from the upper end and pass across the center loop about 3 cm. from the top. The sole does not appear to be especially designated for either foot.

Although it is made of material similar to that of the netting described below, there are no remnants of connecting elements that would suggest that it belongs to the netting. The ends and sides seem to be intact, and an identification as an unfinished sandal appears logical.

5. Fragment of Game Net (Fig. 5, A)
   Length: about 23 cm.
   Width: about 18 cm.
   Material: coarse grass mixed with some sotol.

The specimen is crudely made but in fair condition. The dimensions would be considerably greater if the netting were stretched out fully. S-twisted grass bundles are twisted again counterclockwise and looped to catch the lower loops in a figure-8, then worked into the adjoining upper loops, of which four are discernible. Reinforcing horizontal bands can be seen near the upper edge. Three unbroken, generally rectangular sections can be identified in the upper part and measure about 5.5 cm. on each side when they are pulled out. The lower sections are partly broken apart and the ends are loose. These ends have been charred all along the lower edge. The most tightly wound bundles are about 6 mm. in diameter; others have loosened to about 2.5 cm.

6. Twisted Loop of Grass (Fig. 5, B)
   Length: about 8 cm.
   Diameter of yarn: 1 cm.
   Width at twisted end: 2 cm.

A bundle of coarse grass has been S-twisted, then doubled over and twisted counterclockwise into a loop. The ends spread out to about 4 cm. These ends are scorched or charred in the same manner as the lower ends of the game netting, and this specimen appears to be a fragment broken from it.

Simmons' manuscript mentions "a few twists of grass folded and turned similar to 'dry twist tobacco'," which would describe this and the next two specimens very well.

7. Twisted Loop of Grass (Fig. 5, C)
   Length: 4 cm.
   Width: 2.5 cm.
   Diameter of yarn: about 1 cm.

The right end of this twisted loop crosses over the left to make an

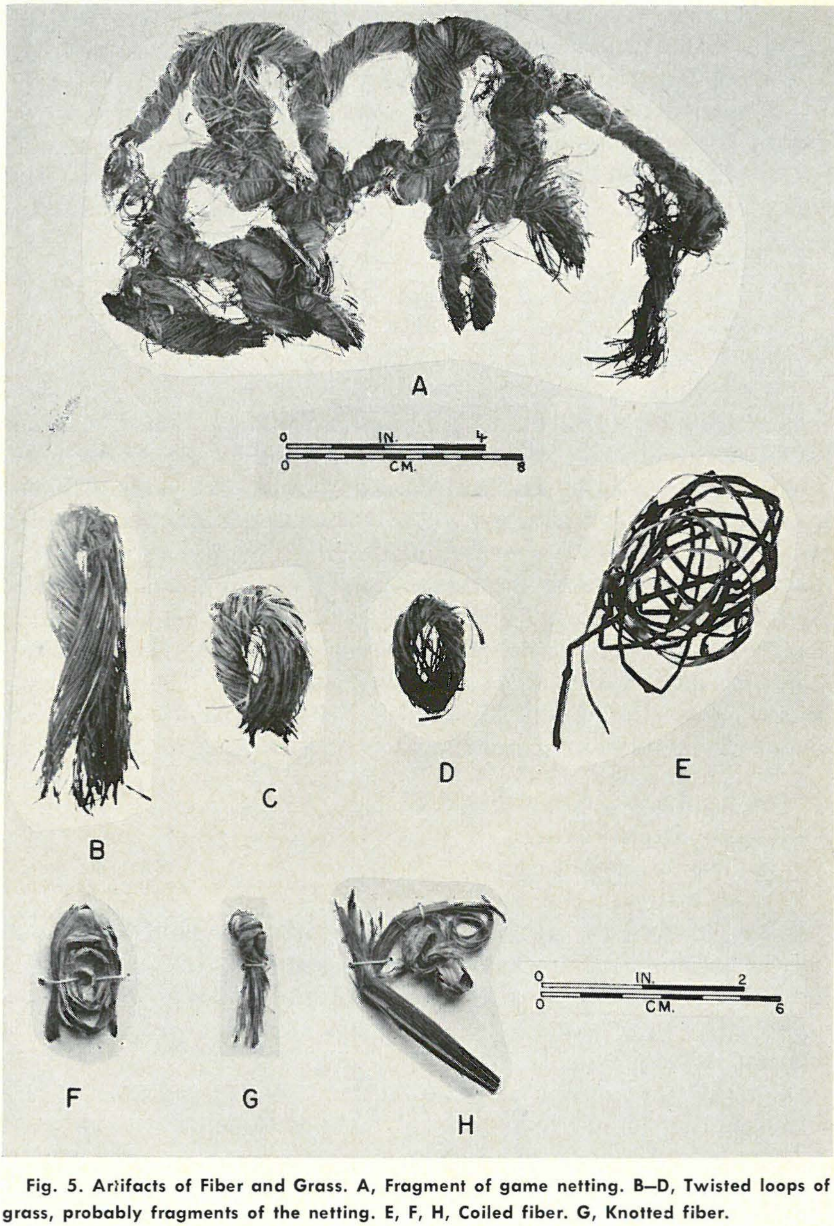


Fig. 5. Artifacts of Fiber and Grass. A, Fragment of game netting. B–D, Twisted loops of grass, probably fragments of the netting. E, F, H, Coiled fiber. G, Knotted fiber.

oval, and the ends are scorched at the crossing. This is probably another netting fragment, for similar loops can be seen intact on the netting.

8. Twisted Loop of Grass (Fig. 5, D)
   Length: 3 cm.
   Width: 2 cm.
   Diameter of yarn: about 5 mm.

This is just like the twisted loops described above except that it is smaller.

9. Coiled Fiber (Fig. 5, E)

Eight roughly circular loops of a gray, knotty, pliable stem, about 1 mm. in diameter, have been loosely fastened together by three additional coils of a flat fiber wound loosely around them and secured with an overhand knot. The construction makes a more or less oval coil measuring about 4 cm. by 6.5 cm.

These coiled materials may have been kept for use as fastening or lacing equipment. Epstein found similar specimens at Centipede and Damp caves (1963: 104; 105, F, G) and Schuetz (1963: 154, C; 158) says that they are common in the Val Verde County cave assemblages.

10. Coiled Fiber (Fig. 5, F)

This is a coil of fiber that starts with a central circle, around which three additional coils make an oval about 3.1 cm. long and 2 cm. wide. There are no fastening elements present. The material looks like sotol, but has not been definitely identified. The specimen is from the Simmons collection.

11. Knotted Fiber (Fig. 5, G)

A small bundle of fiber, 3.2 cm. long, has been tied with an overhand knot, making a neat finish at one end, with the other ends left free. The specimen is 7 mm. wide at the knot. The material is not identified, but looks like sotol. Jelks (1962: 74, F) illustrates a very similar bundle. This is from the Simmons collection.

12. Coiled Fiber (Fig. 5, H)

A length of fiber or wood shaving, with one straight end 4.3 cm. long, has been split into two parts at the other end, each terminating in tight curls. The specimen resembles the curled cedar shavings described by Jelks (*ibid.*: 73) which he suggests are probably waste materials resulting from wood scraping. The material of which this item from the Simmons collection is made has not been identified.

Miscellaneous Perishables (4 specimens; Fig. 6, A, B)

1. Fragment of Fur with Scrap of Cordage Attached (Fig. 6, A)

Two separate, narrow strips of skin-backed fur have been twisted together counterclockwise, then wrapped around once and tied with a piece of 2-ply, Z-twisted cordage (described in more detail in Table 1) about 3.9 cm. from the narrow end. The whole construction is about 10.6 cm. long and ranges in width from 1.2 cm. to 3 cm.

The dark gray to yellowish-tan fur has been identified as either rabbit or fox, with fox the more likely choice because of the color pattern. This is no doubt the "piece of mink skin" that Simmons mentions in his report.

2. Strands of Hair (Not illustrated)

Eighteen strands of extremely fine hair range in length from 2 to 11 cm. The longer ones are not completely straight—they even have a slight tendency to wave. The color is dark brown. Mardith Schuetz has identified them as human hair.

3. Tuft of Hair (Fig. 6, B)

This is a small mass of reddish-brown, soft hair about 7 cm. long and 2 cm. wide at its maximum. The ends spread out as individual strands of different lengths less than 1 mm. in diameter. This is probably the "tuft of buffalo hair" that Simmons reports; Raun says this identification could be correct, although it is not certain.

4. Feathers (Not illustrated)

A loose mass of matted feathers, white and gray-brown mixed, has been identified as the great blue heron, confirming Simmons' "bunch of feathers, apparently of the blue heron." Some of the feathers are quill-like, and others are short or broken. They are interspersed with a little down, bits of twigs, leaves, grass, and fiber fragments. No bones are present.

Specimens of Stone

Of the 37 stone specimens, eight are ground or pecked, 23 are chipped, and six are classified as miscellaneous stone objects. All are from the Simmons or DeGraffenreid collection.

Ground or Pecked Stone (8 specimens; Figs. 6, C-J; 7, A-D)

1. Boatstone (Fig. 6, C, D)

   Length: 7.9 cm.

   Width: 4 cm. at the center, 3.2 cm. at the beginning of the terminal curves.

   Depth: 1.7 cm. at the center.

   Material: Probably limestone, reddish colored, possibly fired.

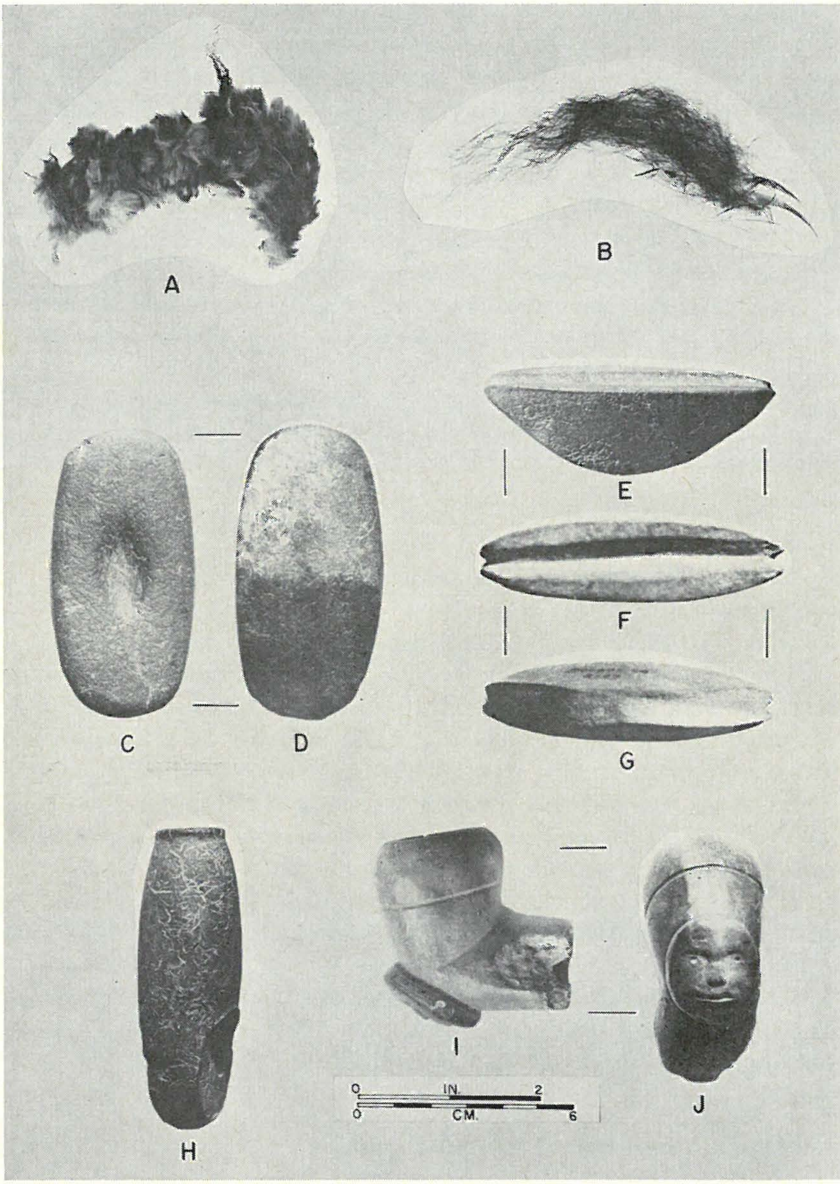


Fig. 6. Miscellaneous Perishables, Boatstones, and Pipes. A, Twisted fur strips tied with cordage. B, Tuft of hair, possibly buffalo. C, D, Unnotched boatstone, showing basal side with oval depression and convex side showing the transverse keel. E–G, Notched boatstone: side view, view of basal side with V-shaped groove, convex side with flat keel. H, Ground stone pipe, bowl broken off. I, J, Elbow pipe of soapstone (or steatite) with human effigy face: side view and frontal view.

This unnotched boatstone has been ground into an almost perfect ellipsoid shape and is very well made. A small broken spot and a few superficial scratches are the only marks on the base, or so-called upper, surface; the convex, or bottom, side is somewhat worn and shows a number of scratches. The end walls are smoothly sloped to meet at the smoothed ridge of the transverse keel, but the side walls slant outward a distance of 6 mm., then slope downward to the bottom, giving the side walls a convex appearance. From the side view the bottom surface makes a smooth curve from end to end.

In the center of the excavated base is a shallow, oval depression 2.3 cm. long, 1 cm. wide, and 35 mm. deep. The end walls are only 6 mm. thick.

This specimen seems to be the very common type which Patterson (1937: 38–40) calls Variety XXXII. This boatstone is from the DeGraffenreid collection.

2. Boatstone (Fig. 6, E-G)
   Length: 8 cm.
   Width: 2.3 cm. at center, tapering to 1 cm. at the ends.
   Depths: 3 cm. at the center.
   Material: Probably limestone, light gray-brown, possibly fired.

This is another smooth, symmetrically ground boatstone showing excellent workmanship, although the surface is somewhat nicked and scratched. The V-shaped notches at either end are about 2 mm. wide across the top and 2 mm. deep. A V-shaped groove, 5 mm. wide and 5 mm. deep, has been excavated from notch to notch along the base side, and the walls are 6 mm. wide on either side of the groove. Seen from the end in cross section, the walls are gently curved to meet the keel. The flat keel extends along the convex bottom from one end to the other; it is narrowest at the center (9 mm.), then widens to 1.5 cm. at the notches.

This boatstone, also from the DeGraffenreid collection, seems to belong in Patterson's (*ibid.*: 29, 31) Variety XXIV as it is similar in appearance, type of keel, and the nature of the excavated base.

3. Elbow Pipe (Fig. 6, H)
   Length: about 8.3 cm.
   Diameter: 2.9 cm. at the widest part.
   Material: probably limestone, possibly fired.

Although this ground stone pipe has a dull scratched surface now, it looks as though it had once been polished. The lower part of the bowl is broken off, leaving an oval aperture about 2 cm. long and 1 cm. wide, with the opening slanting downward into the stem tube. The inner surface is blackened. The outermost edge of the bowl opening is about 9 mm. from the closed end of the stem, and the angle of the break suggests that the bowl was set at an angle of less than 90°. An incised groove about 2.5 mm. wide makes a semi-circle around the opposite side of the tube from the bowl aperture, about 1.5 cm. from the closed end.

The stem opening terminates in a rounded flange about 2 mm. wide that is set off by a narrow groove encircling the tube. The mouth has an outside diameter of 1.6 cm., an inside diameter of 1.5 cm., and is beveled outward.

Fragments of similar pipes are found in the collection from the Harrell Site (Krieger, 1946: 36) in Young County.

4. Elbow Pipe with Human Effigy Face (Fig. 6, I, J)

This pipe is made of smooth, well polished gray soapstone (or steatite) and is cut all in one piece. The short, stubby bowl is set almost at right angles to the stem; opposite this angle the face, carved in low relief, looks outward. The pipe is in perfect condition except for a recent break in which some of the stone on the top and side of the stem orifice has been broken off.

The bowl is nearly circular, measuring 2.5 cm. by 3 cm., with a body thickness of 5 mm. The rim is smooth and flat. The inner side of the pipe bowl is gently convex to the angle formed at the juncture of the stem and bowl, but the outer side is convex only about 1.4 cm. down from the rim; at this point it becomes almost straight. At the point where the side wall straightens a narrow incised groove encircles the entire bowl. Bowl length, to the angle, is 2.5 cm., and width at this spot is 2.8 cm.

The stem is slightly oval in cross section, measuring 2.4 cm. by 1.6 cm., and is 2.5 cm. long from the orifice to the inside of the angle. Wall thickness is 6 mm. at the long axis of the opening and 5 mm. at the short axis.

The face is oval, measuring 2.2 cm. by 3 cm., and is set off from the body of the pipe by a narrow incised groove. The eyes are small, round holes set under clearly delineated curved eyebrows, and the nose is small, straight, and well shaped. The features can be recognized clearly on the profile (Fig. 6, I). The countenance looks very like some of the Olmec faces.

Elbow-shaped, human effigy stone pipes are rare in central Texas but are reported from the Spiro Mound in Oklahoma (Hamilton, 1952: 34–35) and from a number of sites in the southeastern states. Fundaburk and Foreman (1957: Pls. 99–102) illustrate examples of these, including a sandstone pipe from Lookout Mountain, Tennessee (*ibid.*: Pl. 101) that shows an interesting similarity of facial treatment with this pipe from the Simmons collection.

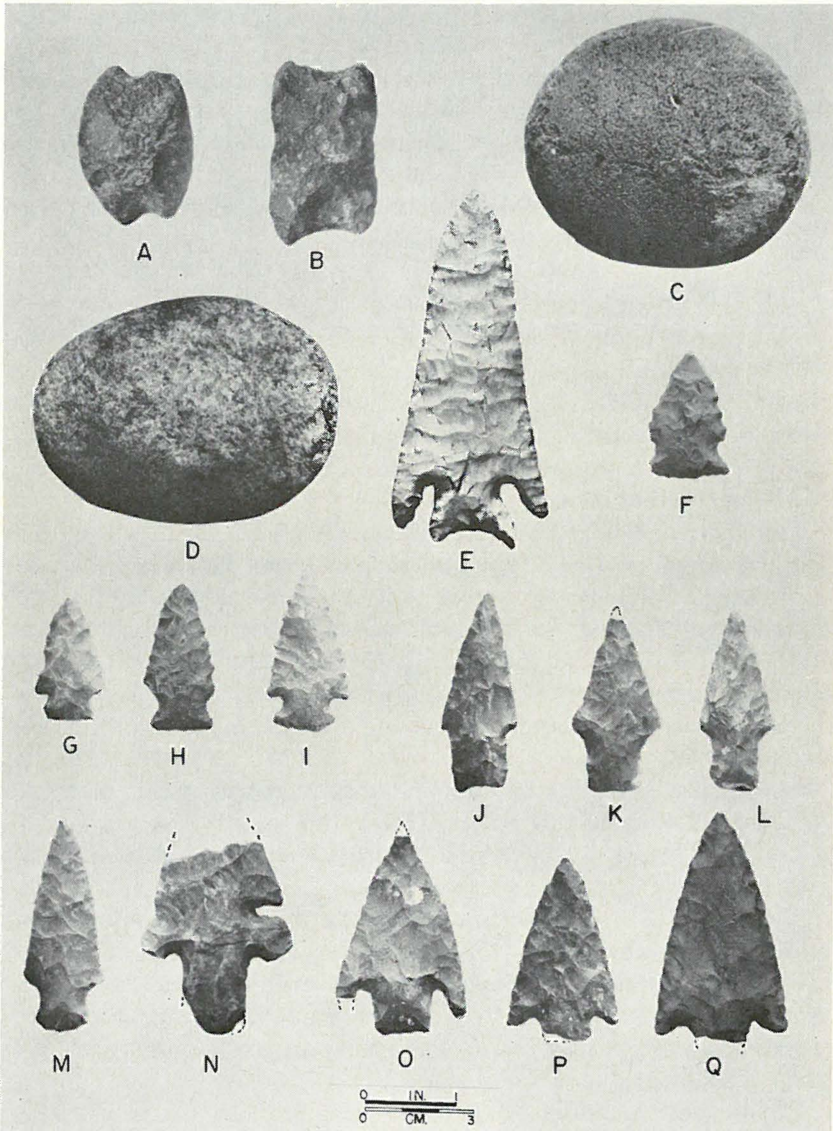


Fig. 7. Sinkers, Manos, and Dart Points. A, Waco sinker. B, Sinker. C, D, Quartzite manos. E, N, P, Q, Unclassified dart points. F, *Ensor* point. G–I, *Ensor* or *Ellis* points. J–L, Possible *Morrill* points. M, *Godley* point. O, *Marshall* point.

5. *Waco* Sinker (Fig. 7, A)
   Length: 4.2 cm. to 4.4 cm.
   Width: 3.2 cm. at center, 2 cm. and 2.3 cm. at the ends.
   Thickness: 2 cm. at center.
   Material: dark gray quartz.

The sinker appears to be made of an unevenly elliptical river pebble which has been notched at each end. It is roughly plano-convex and corresponds in size and shape fairly well with Watts' Type 5 (1938: 28). The notches are U-shaped and about 2 mm. deep, although one is a little wider than the other. The sinker's uneven and bumpy surface shows signs of battering. It is from the Simmons collection.

6. Sinker (Fig. 7, B)
   Length: about 5 cm. long on one side, 4.6 cm. on the other.
   Width: 2.7 cm. to 3 cm.
   Thickness: varies from about .9 cm. at the ends to 2 cm. at the center.
   Material: quartz, dark gray to reddish in color.

This bi-convex sinker is generally rectangular in shape, although not symmetrical. The long sides are slightly concave. At each end are wide, shallow notches, about 1.6 cm. long and 3 mm. deep. The corners are somewhat rounded off but not smoothed, and the sinker is crudely made. It is a part of the Simmons collection.

7. Mano (Fig. 7, C)
   Length: 8.8 cm.
   Width: 6.5 cm. at the center.
   Thickness: 4 cm.
   Material: probably quartzite.

The mano is one hand size, almost circular, nearly flat on one surface, and very slightly convex on the other. Both grinding facets are smooth. Side walls are straight and are pecked fairly smooth all the way around, except where the surface is slightly broken off at one end. No striations are visible. This specimen is from the Simmons collection.

8. Mano (Fig. 7, D)
   Length: 8.8 cm.
   Width: 6.5 cm. at the center.
   Thickness: 4 cm.
   Material: probably quartzite.

This is also a one hand mano and has been shaped by pecking into an oval. There are no scars or striations visible. It, too, is from the Simmons collection.

Chipped Stone (23 specimens)

The chipped stone artifacts are described under the following categories: dart points, knives, scrapers, and miscellaneous chipped stone tools. The first dart point listed is from the DeGraffenreid collection; all other chipped stone artifacts are from the Simmons collection.

DART POINT (13 specimens; Fig. 7, E-Q)

1. Unclassified Dart Point (Fig. 7, E)

This thin, beautifully chipped point of pinkish-tan flint is 9.7 cm. long and 4.2 cm. wide at the shoulders. It exhibits fine marginal chipping along all edges. The blade edges are recurved, being concave about ⅔ of their length, then becoming convex, terminating in a sharp point. Barbs are almost even with the thinned base.

2. *Ensor* Type (Fig. 7, F)

One dart point can be classified as *Ensor*. It is of a light beige flint and was found outside the overhang of the rockshelter. It is 3.3 cm. long, 2.1 cm. wide, and has convex lateral edges. The wide, expanding, straight-based stem is 8 mm. long and 2.1 cm. wide.

3–5. *Ensor-Ellis* Type (Fig. 7, G-I)

Three dart points, all of dark gray flint, fall into the general *Ensor-Ellis* classification but cannot be definitely ascribed to either. They have triangular blades and range in length from 3.5 cm. to 4.5 cm. Width at the shoulders is from 2 cm. to 2.2 cm. Two (G, H) have expanding stems and straight bases with the stems measuring 7 mm. and 8.5 mm. long, and 9 mm. and 1.6 cm. wide. These two are very like points described and illustrated by Shafer, Suhm, and Scurlock (1962: 14–16; Fig. 3, B, C, D). The third one of this group (Fig. 7, I) has serrated sides and a convex based stem which is 8 mm. long and 1.8 cm. wide.

6–8. Possible *Morrill* Type (Fig. 7, J-L)

Three points with fairly long, slightly expanding stems are similar to *Morrill* points (Suhm and Jelks, 1962: 223–224) but are not definitely identified as such. Sides are straight to very slightly convex. The example in Fig. 8, K has a broken tip and a slight flare at the shoulders. These specimens vary in length from 4.8 cm. to 5.4 cm. and in width at the shoulders from 2.1 cm. to 2.5 cm. Stem bases are straight to slightly concave with lengths of 1.5 cm. to 1.8 cm. and widths of 1.5 cm. to 1.6 cm. All are of dark gray flint.

9. *Godley klondike* Type (Fig. 7, M)

This dart point of dark gray flint can be tentatively identified as *Godley klondike* (Forrester, 1964: Plate 1, Fig. 20), although its dimensions exceed the maximum length and width given by Forrester for this type. It is thin and finely chipped. The blade is triangular, with slightly convex sides that flare out a little at the shoulders. The expanding, convex-based stem is 6 mm. long and 1.4 cm. wide. Overall length of the point is 6 cm., and width at the shoulders is 2.5 cm.

10. Unclassified Point (Fig. 7, N)

This unusual barbed point is broken in a slant across what appears to be roughly the center of blade. It is of highly patinated, dark gray flint. This may have been a *Bulverde* point that was notched on one side for use as a knife. The notch is about 1 cm. deep and lies just above one of the wide, rounded barbs. Width across the barbs is 4.2 cm. The thin stem is broken on both sides, but looks as though it had been rectangular in shape. The stem fragment is 1.9 cm. wide, and 2.3 cm. long.

11. *Marshall* Type (Fig. 7, O)

This dart point is also broken, in this instance at the tip and at the base of one of the barbs, but it is tentatively classified as a *Marshall* point. The blade edges are convex, and the specimen is finely chipped all the way around. It is 5.5 cm. long and 3.2 cm. wide at the barbs. The parallel-sided, straight-based stem is 8 mm. thick, 1.2 cm. long, and 8 mm. wide. The material is dark gray in color.

12. Unclassified Point (Fig. 7, P)

One corner of the stem of this dark gray, barbed point is broken. The specimen has fine marginal chipping and convex lateral edges. The length is incomplete but now measures about 5 cm., and the width at the barbs is 3.2 cm. The stem fragment is about 1.6 cm. wide.

13. Unclassified Point (Fig. 7, Q)

This is another dart point of dark gray flint with a broken stem. It is 6.5 cm. long and 3.3 cm. wide at the barbs. The lateral edges of the blade taper in a convex curve to the tip. The stem fragment is 1.7 cm. wide. The specimen is finely chipped all the way around to the break in the stem.

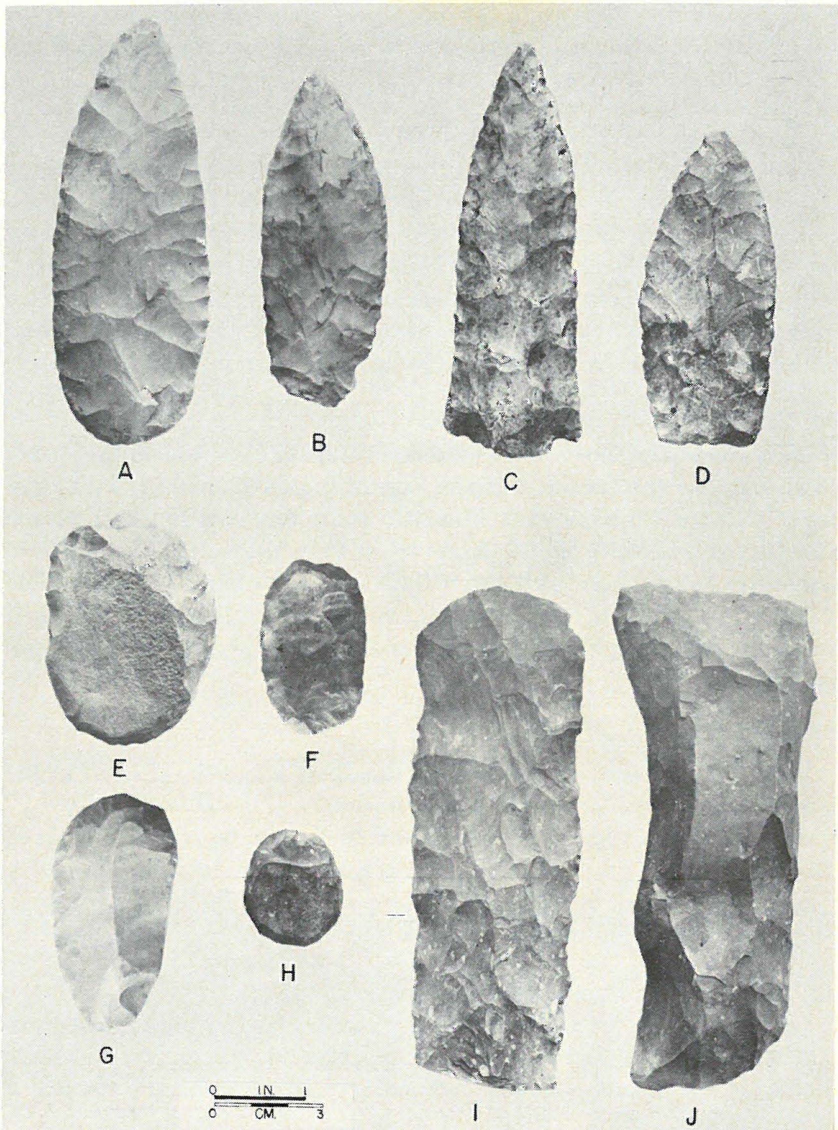


Fig. 8. Knives, Scrapers, and Bifacial Tools. A–D, Knives, E–H, Unifacial scrapers. I, Heavy bifacial tool. J, Gouge.

KNIVES (4 specimens; Fig. 8, A-D)

All four knives are bifacially worked.

1. This light gray flint knife (Fig. 8, A) is lanceolate in outline. The

base is rounded, and the edges are worked all the way around. It is 11.7 cm. long and has a maximum width of 4.5 cm. The sides are gently convex for about ⅔ of the length, but from that point begin to taper to the rounded tip.

2. The base of this asymmetrical, but essentially lanceolate-shaped, knife (Fig. 8, B) of gray flint has been broken on one side. A small notch is chipped on one lateral edge, 1 cm. above the unbroken side of the base. The knife is plano-convex and has been retouched along all edges. The over-all length is 9.3 cm., maximum width is 3.6 cm., and thickness is 9 mm.

3. This short-stemmed knife (Fig. 8, C) is made of light tan flint. It measures 11.5 cm. long, 3.9 cm. wide at the shoulders; the short, thick stem is 1.2 cm. thick, 2.5 cm. wide, and 5 mm. long. The lateral edges of the knife are recurved at the shoulders, concave for about half the length, and then become convex as they taper to the sharp tip. Retouching is confined to the margins of the blade.

4. The base of this knife (Fig. 8, D) of pinkish flint is fairly straight; otherwise, the specimen has a lanceolate shape with a rounded tip. The basal edge is thinned and all the edges have been retouched. When held lengthwise, the knife appears slightly twisted.

SCRAPERS (4 specimens; Fig. 8, E-H)

These are made of unifacially chipped flint flakes. The three ovoid ones are generally typical of the Toyah Focus of the Central Texas Aspect (Jelks, 1962: 50–51).

1. This dark gray flint scraper (Fig. 8, E) is roughly oval, measuring 6.5 cm. by 4.8 cm., and is 2 mm. to 1.5 cm. thick. It is chipped all the way around except for the striking platform, and has steeply beveled edges. The bulb of percussion can be seen on the unworked side.

2. Another ovoid scraper (Fig. 8, F) has steep, marginal chipping along most of its edges, leaving only the striking platform unworked. The bulb of percussion is visible on the unworked (plano) side. The scraper is of dark gray flint; its dimensions are about 5 cm. by 3 cm.

3. The third example (Fig. 8, G) is an elongated oval shape and is made of light tan flint. It, too, is chipped and beveled all around except for the striking platform, and, as in the others, the bulb of percussion can be seen on the reverse of the worked side. It is 6.5 cm. long and 3.2 cm. wide.

4. This small, nearly flat scraper (Fig. 8, H), another dark gray flint one, is almost circular, measuring 3.2 cm. by 2.8 cm. It is chipped all around the edges, but a negative bulb of percussion is visible on the unworked side.

MISCELLANEOUS CHIPPED STONE TOOLS (2 specimens; Fig. 8, I, J)

One of these is a plano-convex gouge (Fig. 8, J) of gray flint that has been bifacially chipped along the marginal edges. Its maximum length is 14 cm., and its width varies from 4 cm. to 5.6 cm., and its thickness is from 2.2 cm. to 2.6 cm.

The other specimen (Fig. 8, I) is a heavy, roughly chipped bifacial tool which is also of gray flint. It is convex on both faces and chipped around all the edges. One side looks slightly twisted. It is 13.5 cm. long and varies from 3.3 cm. to 4.3 cm. in width.

Other Stone Specimens (6 specimens; Fig. 9, A-F)

All of these are from the Simmons collection. They include:

A hammerstone (Fig. 9, A) of very irregular outline which shows flake scars and battering marks. It is made of reddish quartzite and measures about 5.7 cm. by 5.6 cm. in maximum dimensions.

Three specimens of hematite (Fig. 9, B-D): 1) a roughly oval-shaped piece about 3.6 cm. long and 2.8 cm. wide; 2) an almost perfect sphere, 2.2 cm. in diameter; and 3) a generally rectangular, flat stone that has been scored across both surfaces and measures 2 cm. by 2.5 cm.

There are two unworked quartz stones (Fig. 9, E, F), roughly rectangular in shape, measuring about 2 cm. by 2.5 cm., and 2.5 cm. by 2.6 cm.

SPECIMENS OF BONE (15 specimens; Figs. 9, G-O; 10, A-D)

The 15 bone specimens came from the Simmons and DeGraffenreid collections. All but one are fashioned of deer bone, while the remaining artifact is of bird bone. Following Jelks (1962: 61) I have divided them for descriptive purposes into three classes: pointed implements, spatulate implements, and miscellaneous bone objects.

Pointed Bone Implements (10 specimens)

1. (Fig. 9, G)
   Length: 12.9 cm.

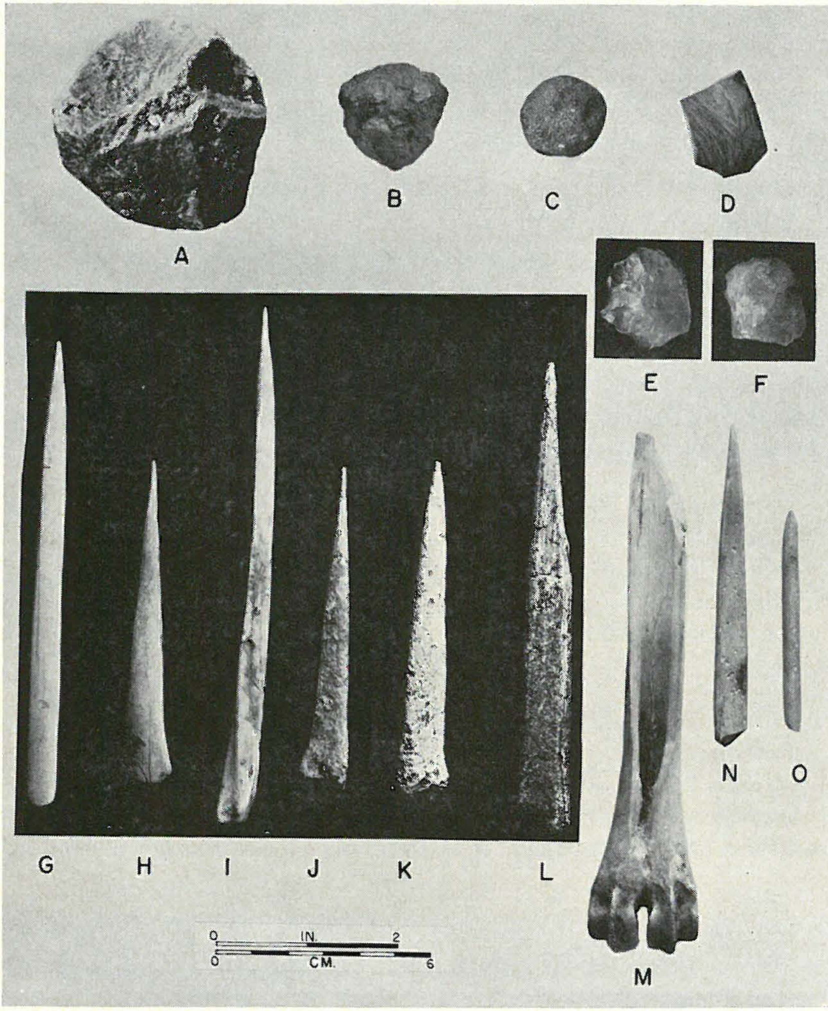


Fig. 9. Miscellaneous Stones and Bone Implements. A, Hammerstone. B–D, Hematite. E, F, Quartz pebbles. G–L, Pointed tools, probably awls or punches. M, Worked deer metapodial, possibly reworked beamer. N, O, Pointed bone implements.

Width: 9 mm. at the proximal end, tapering to a sharp point at the distal end.

The implement has been excellently smoothed and polished, and the rounded proximal end is well finished. A shallow concavity runs down most of the length on one side. The awl is creamy white in color and bears no scratches or scars of use. It is from the DeGraffenreid collection.

2. (Fig. 9, H)
   Length: 8.6 cm.
   Width: 1.3 cm. at the proximal end, tapering to a sharp point.

This awl is smooth but not polished. A deep cleft runs down one side, but the other side is rounded. It is in the DeGraffenreid collection.

3. (Fig. 9, I)
   Length: 14.3 cm.
   Width: 1 cm. near the proximal end, sharply pointed at the distal end.

This tool is made from a deer metapodial that has been smoothed and polished. One long side has a shallowly-concave curvature. The proximal end is well finished, and from it runs a small, natural groove about 2 cm. down the shaft. The implement comes from the DeGraffenreid collection.

4. (Fig. 9, J)
   Length: 9 cm.
   Width: 8 mm. at the widest part, tapering to a sharp point.

This is another awl made from a deer metapodial bone. The proximal end shows little modification. It also is from the DeGraffenreid collection.

5. (Fig. 9, K)
   Length: 8.3 cm.
   Width: 2.2 cm. at the distal end, tapering to a blunt point.

Another awl has been cut from a deer metapodial and fairly well smoothed but not polished. It is from the DeGraffenreid collection.

6. (Fig. 9, L)
   Length: 13 cm.
   Width: 1.6 cm. at the proximal end, tapering to a fairly blunt point of 2 mm.

The proximal end of this deer metapodial has been smoothed to some extent; a shallow depression runs along most of the shaft on both sides. The bone was once polished, but the surface is now eroded and darkened. It is in DeGraffenreid's collection.

7. (Fig. 9, M)
   Length: 15 cm., broken at the tip.
   Width: 3 cm. at the proximal end.

Deer metapodial furnishes the material from which this specimen, possibly a reworked beamer, has been fashioned. The distal end has been trimmed to a point (now broken off) with the narrowing beginning about 1 cm. from that end. The articulation has been left intact at the proximal end, from which a deep groove has been hollowed out the length of the shaft, leaving only thin, fairly well smoothed walls of bone. This is from the Simmons collection. It is interesting to compare this tool with the beamers described by Frank H. Watt (see this issue of the *Bulletin*).

8. (Fig. 9, N)
   Length: 9 cm.
   Width: 1 cm., tapering to a sharp point, with the extreme tip broken.

This is a flat tool made of split bone, 3 mm. thick. The proximal end is somewhat rough and slanted, but except for a little pitting the surfaces are smooth and polished. Its function is not known. The specimen is from the Simmons collection.

9. (Fig. 9, O)
   Length: 6.2 cm.
   Width: 4.5 mm., tapering to a sharp point.

This is a smooth, slender implement that has a very slight curve. It is in the Simmons collection.

10. (Not illustrated)
    Length: 4.2 cm., incomplete.
    Diameter: 6.5 cm., tapering to the broken point.

The proximal end of this cylindrical piece of bone has been broken off and is rough, as is the point. The surfaces are smooth except for a slight pitting. It is from the Simmons collection.

Spatulate Bone Implements (4 specimens; Fig. 10, A-C)

These implements are all made from deer ulnae and may have been used as flaking tools. They are from the Simmons collection.

1. (Not illustrated)
   Length: 7.2 cm.
   Width: 3 cm. at the widest part.

The proximal end and sides have been left unmodified except for a little smoothing. The distal end has a rounded curve about 3 mm. wide. One side is broken and shows signs of rodent chewing.

2. (Fig. 10, A)
   Length: 8 cm.
   Width: 3.2 cm. at the widest part.

The sides of this tool have been smoothed, and the distal end has been worked into a rounded curve about 6 mm. wide.

3. (Fig. 10, B)
   Length: 7.5 cm.
   Width: 3.3 cm. at the widest part.

The distal end is finished in a curve about 1.6 cm. wide. The edges have been smoothed all around the tool.

4. (Fig. 10, C)
   Length: 8.3 cm., incomplete.
   Width: 1.5 cm.

The curved proximal end is about 1.5 cm. wide; the distal end has been broken and is rough. About 3.2 cm. from the proximal end a section has been cut or broken out, it is about 3 mm. deep and extends for about 2.3 cm. along the side.

Miscellaneous Bone Objects (1 specimen; Fig. 10, D)

The only artifact that falls into this class is a cylindrical, hollow, slightly curved bird bone that has been cut off fairly evenly at both ends. These ends are not well smoothed. The tube is 5 cm. long and has a diameter of 8 mm. at each end. The curvature in the central part narrows the diameter there to 5 mm. Because of the unsmoothed ends, this is thought to be a bead rather than the mouth piece for a pipe. It is from the DeGraffenreid collection.

Specimens of Shell (4 specimens; Fig. 10, E-H)

There are only four artifacts in this group, a pendant made from a conch shell, and three mussel shell scrapers or knives.

The columella of a conch shell (Fig. 10, E) has been cut out and polished to make a pendant 7.2 cm. long and 1 cm. to 1.4 cm. in diameter. In each of the smoothed and rounded ends a hole 4 mm. in diameter has been drilled laterally, though the holes are not quite in the same plane. Two incised, parallel lines, about 5 mm. apart, form a band that crosses the pendant diagonally for a distance of 2.8 cm. on one side of each end. The band—perhaps a natural groove intentionally accentuated—commences above the right hand hole and extends downward and to the left in an angle of about 45 degrees. It appears on the reverse side below and to the left of the hole and extends upward the same distance to the right. The pendant is excellently finished and in good condition except for a small break at one end.

Three large mussel shells (Fig. 10, F-H) show use marks on the end opposite the hinge. One shell (Fig. 10, H) has been cut or notched on the side as well. Two shells (Fig. 10, F and H) are chipped along the edge, but the third one (Fig. 10, G) has been worked to a smooth, knife-like edge for a distance of about 3 cm.

SPECIMEN OF CLAY (1 specimen; Fig. 10, I)

In Simmons' collection is one small potsherd with pinkish surfaces and a brownish-gray core. The bone temper can readily be seen on both surfaces as well as in the core, and there may be a little sand mixed in the paste. The sherd measures about 2.5 cm. by 3 cm., with a thickness of 7 mm. One surface is slightly brushed and the other is smoothed. It resembles locally made central Texas pottery from the Leon River.

SUMMARY AND CONCLUSIONS

Brawley's Cave must once have been an extremely rich source of archeological materials, of which only a small sample is now available for study. We are indebted to Frank E. Simmons for the only records that have been kept on the site: its location, the nature of the burials, description of the skeletons, artifacts, and other materials that were discovered when it was excavated in 1917 and 1918 (see Addendum). Simmons tells us (personal communication) that he did not see all of the original Anderson collection. No attempt was made to distinguish different natural strata and no vertical or horizontal controls were used in the digging.

The cave remained unusually dry, and for that reason a considerable number of perishable specimens survived. These materials, along with those of stone, bone, shell, and pottery, were divided among the discoverers, although some had been removed by other visitors. Probably a great part of the specimens, especially the flint artifacts, have now been scattered and lost, but those that remain available, supplemented by Simmons' manuscript (see Addendum), make it possible to place the site into a broad cultural context.

Certain artifacts attributable to the Archaic Edwards Plateau Aspect (Suhm, *et al.*, 1954: 106–112; Suhm, 1958: 79–81) can be found in the Brawley's Cave assemblage, and give evidence of what appears to be the earliest occupation. These are: the stemmed knife, quartzite hammerstone, sinkers, deer ulna tools, disc-like scraper, and *Ensor, Ellis*, and *Godley* dart points. Moreover, Simmons' sketches (Figs. 11 and 12) show dart points that strongly resemble the *Marshall* type,

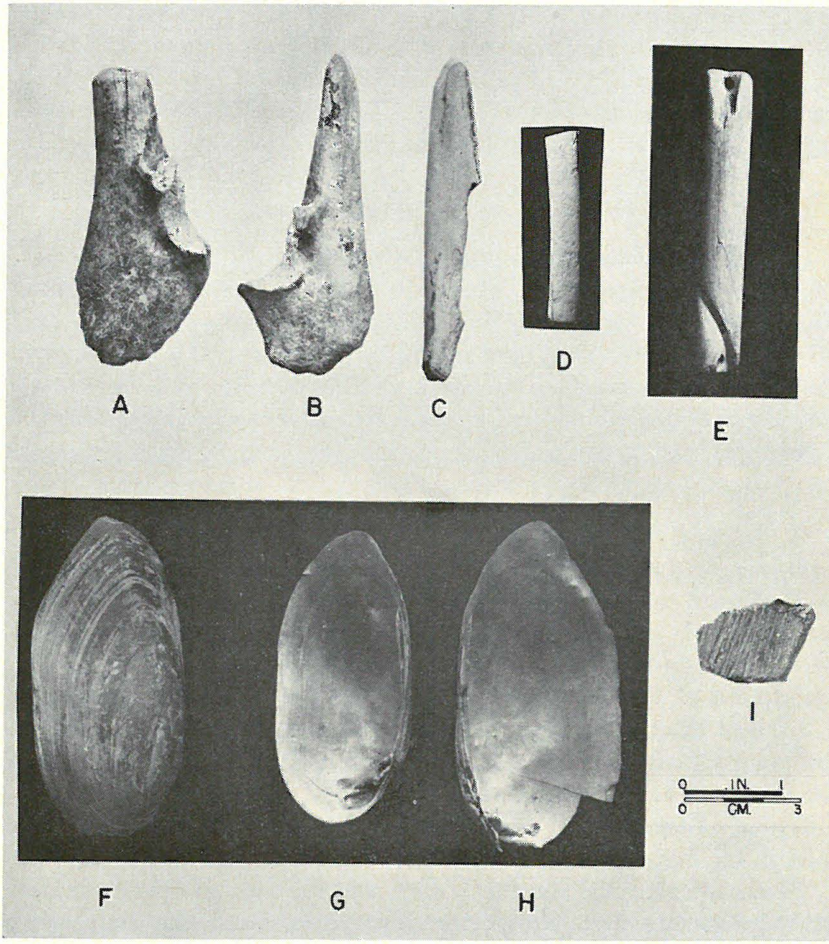


Fig. 10. Bone Implements, Shell Artifacts, and Potsherd. A–C, Spatulate implements of deer ulnae, possibly flaking tools. D, Bird bone bead. E, Conch shell pendant. F–H, Worked mussel shells. I, Bone-tempered potsherd.

drills, triangular knives, and curved, thin knives. These indirectly augment the list of Edwards Plateau Aspect traits that may be found among the Brawley's Cave materials. A number of Edwards Plateau traits, however, carry over into the Central Texas Aspect: use of rock-shelters as campsites, flexed burials with little or no grave goods, deer ulna and antler tools, bone awls, triangular-shaped knives, hematite pigment, and possibly the *Godley* point (Suhm, *et al.*, 1954: 112–117; Jelks, 1962: 86).

Jelks' report on the stratified Kyle Site (*ibid.*), in which he distinguishes two Central Texas Aspect foci (Austin and Toyah) in addition to the Edwards Plateau Aspect, offers the most useful source for a comparison with the cultures represented at Brawley's Cave. The specimens from this site parallel in many ways those from the Kyle rockshelter in the general range and type of artifacts, including the perishable items. To judge from Simmons' report, as well as from certain of the specimens described in the preceding sections, both the Austin Focus and the Toyah Focus are represented at Brawley's Cave. Toyah Focus artifacts—including *Perdiz* and *Cliffton* points (Fig. 11), steeply beveled snub-nosed scrapers, possible *Cleburne* knives, and the pottery—may, however, be more common than those of the Austin Focus. The perishables from the Kyle Site came from the Toyah Focus zone, while those from Brawley's Cave probably belong with the Central Texas Aspect but cannot be specifically attributed to either focus. Such exotic specimens as the shell pendant and the effigy pipe are very likely intrusive, but the broken elbow pipe has counterparts in the pipe fragments from the not too distant Harrell Site in north-central Texas (Krieger, 1946: 36).

Thus it appears that Brawley's Cave fits reasonably well into a time range extending from a late Edwards Plateau Aspect through both Austin and Toyah foci of the Central Texas Aspect, with no indication of a continuance into the historic period.

REFERENCES CITED

Epstein, Jeremiah F.

1963. Centipede and Damp Caves: Excavations in Val Verde County, 1958. Bulletin of the Texas Archeological Society, Vol. 33 (for 1962), pp. 1–129.

Forrester, Robert E.

1964. The Ham Creek Site. A Publication of the Tarrant County Archeological Society.

Fundaburk, Emma Lila, and Mary Douglas Foreman (editors)

1957. Sun Circles and Human Hands. Published by Emma Lila Fundaburk.

Hamilton, Henry W.

1952. The Spiro Mound, The Missouri Archaeologist, Vol. 14.

Jelks, Edward B.

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.

Krieger, Alex D.

1946. Culture Complexes and Chronology in Northern Texas. University of Texas Publication No. 4640.

Osborne, Douglas and Carolyn
1954. Twines and Terminologies. American Anthropologist, Vol. 56, pp. 1093–1100.

Parks, H. G.
1937. Valuable Plants Native to Texas. Texas Agricultural Experiment Station, Bulletin No. 551.

Patterson, J. T.
1937. Boat Shaped Artifacts of the Gulf Southwest States. University of Texas Bulletin No. 3732.

Schuetz, Mardith K.
1956. An Analysis of Val Verde County Cave Materials: Part I. Bulletin of the Texas Archeological and Paleontological Society, Vol. 27, pp. 129–160.
1961. An Analysis of Val Verde County Cave Material: Part II. Bulletin of the Texas Archeological Society, Vol. 31 (for 1960), pp. 167–205.
1963. An Analysis of Val Verde County Cave Material: Part III. Bulletin of the Texas Archeological Society, Vol. 33 (for 1962), pp. 121–165.

Shafer, Harry J., Dee Ann Suhm, and J. Dan Scurlock
1962. An Investigation and Appraisal of the Archeological Resources of Belton Reservoir, Bell and Coryell Counties, Texas: 1962. Texas Archeological Salvage Project, Miscellaneous Papers, No. 1.

Suhm, Dee Ann
1958. A Review of Central Texas Archeology. Bulletin of the Texas Archeological Society, Vol. 29, pp. 63–107.

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.

Suhm, Dee Ann, and Edward B. Jelks (editors)
1962. Handbook of Texas Archeology: Type Descriptions. Published jointly by the Texas Archeological Society (Special Publication No. 1), and the Texas Memorial Museum (Bulletin No. 4).

Watt, Frank H.
1938. The Waco Sinker. Central Texas Archeologist, No. 4, pp. 21–70.

Texas Memorial Museum
The University of Texas
Austin, Texas

ADDENDUM

REPORT ON PREHISTORIC RELICS AND SKELETAL REMAINS IN THE BOSQUE BASIN

Covering an area in the hill country lying west of the Bosque River and extending from Valley Mills to Hico, embracing an area of approximately 300 square miles.

Frank E. Simmons

BRAWLEY'S CAVE

One of the ancient habitations of primitive men found in this region is in a wild, gloomy canyon which nature has cut into the low mountains lying west of the Bosque River. It is some 4 miles south of the county seat, Meridian, and is known as Brawley's Cave.

The wall of the mountain has an altitude of about 200 feet above the river bed, and back of this wall is an undulating tableland covered with a scrubby growth of the species of oak common to the region and extensive brakes of scrubby cedar. Into this tableland nature has cut many deep, rugged canyons of varying lengths up to more than a mile. It is in the head of one of these deep, narrow canyons that Brawley's Cave is found. At a point in the canyon even with the cave the gulch is about 100 feet deep, some 200 yards from its head. At the bottom the width varies from 10 to 30 feet, while the crests of the opposing bluffs are 60 or 70 yards apart. On the rocky bluffs where some soil has accumulated is a scrubby growth of bushes of the common species.

In the face of the north cliff of this gloomy, lonesome hollow is Brawley's Cave, cut by nature into the solid rock to a depth of 10 to 30 feet, with overhanging roof 15 to 20 feet high. The floor varies from 12 to perhaps 24 or 25 feet above the bottom of the hollow. Thus nature provided a home where apparently many generations of primitive Americans lived and died. It is not probable that the floor of this cave has ever been thoroughly wet since the appearance of man here. No chilling north winds were felt by those who dwelt here. No destructive tornado ever disturbed their nightly slumbers, and no enemy armed with primitive weapons could assail them.

Here with her rude utensils of stone, bone, mussel shells, pottery, basketry, and so forth, the Indian wife performed her domestic duties. And here old men shaped wonderful flint artifacts to be lost in ash beds and dust accumulations from three to six or more feet deep and found again by the modern American, perhaps hundreds of years later—a record of the arts, industries, and culture of the people who anciently made their home in this place. Buried in the ash beds have been found a fine series of flint artifacts, broken pottery, broken mortars, stone hammers, bone and shell implements, fragments of mats, fragments of wood work, arrow shafts, basket stays, furs, feathers, paint, bark cordage, knotted grass, and a fine stone pipe. But we will here state that no stone axes, nor grooved hammers, nor any polished stones have been brought to light.

At intervals of leisure, during 1917–1918, we assisted in excavations that yielded a fine collection of such items as are mentioned above along with six skeletons or remains belonging to that number of human beings. At one point, the darkest and best protected in the cave, four skeletons were found buried one below another:

three adults and one child, apparently 10 years old, and one female skull. These were all folded, backs to the wall, heads to the east, and lying on the left side; the lowest cranium was discovered not over four feet down. A great many of the bones disintegrated on exposure. Three whole crania were saved, a pelvis, a number of long limb bones, and some mandibles and teeth. Most of the vertebrae were decayed, but many of the teeth were well preserved, though some were worn to the gums. In the east end of the cave, at a depth of 18 inches, was found an adult male of large size. He was buried extended, lying on his back, with his head to the east.

Not enough whole bones were found to reconstruct any individual; and not a single ornament, tool, or weapon was directly in either of the graves, although a good stone pipe was found in material that might have been thrown from the grave in the east end of the cave. The excavating was done very unsystematically and so we cannot be exact on all points. At all places in the ash and dust accumulations were found the bones of most animals common to the country, some bison ribs and large joints included. Acorns, walnuts, and pecans were also found promiscuously scattered.

Flint

The flint artifacts found here [Brawley's Cave] are of finer finish than any others found in this region.

The drills vary from 1 to 2½ inches long and are excellent. The triangular scrapers, up to 3 inches long, are extremely good specimens. The knives are also excellent and measure up to 4 inches in length. One fine spear is 5 inches long. The arrow points are superior to all. Varying in length up to 2 inches, they have fine, thin blades, long barbs chipped inside and out, and delicate, narrow stems. Many of the points are serrated.

A good percentage of the flint was broken and seemed to have been injured by fire. Yet these broken fragments, together with the whole specimens, furnish comparative material to show that the flint artifacts found here average superior in workmanship to those found on the open camps of the same region. It is regrettable that many specimens were carried away by curious people who cared little for them and only later fell into the hands of those who were interested in the work.

Pottery and Mortars

There is very little to be said of pottery and mortars. No whole specimens, so far as we can learn, have been found here—only broken fragments of pottery; but they are of an extra weight and thickness that is sufficient to guarantee the quality of the work. They are fairly shiny and black. The curvature of some fragments indicates vessels of considerable capacity and strength, as some pieces are ⅜ of an inch thick. This is much heavier and better than the fragments found on the open camps.

Many fragments of mortars, made of slabs of stone, were found. The hollow in many seemed to be shallow as if worn by the process of grinding. Some were pecked into shape. An examination of the fragments showed some to be severely burned as if they had been used for cooking vessels.

Hammers and Pestles

So far as we know no pestles, other than natural granite boulders, have been found in this cave, but plenty of granite boulders and pebbles and lumps of flint showing signs of wear were discovered. There were some oval-shaped sandstones (so-called "rubbing stones").

SHELLS

Other domestic utensils found here are the beautiful mussel shells, some of which are highly polished from long use. They were evidently household utensils used in the capacity of spoons or scrapers. The end farthest from the hinge is gradually worked to a point from both sides. Although most of them have been broken or injured by fire, there are some good specimens. A number of them do not appear to have been "worked" or used at all. The shells belong to the common species from the river a mile away. There were no shell ornaments reported.

MISCELLANEOUS

Among a varied assortment of specimens were: a bunch of feathers, apparently of the blue heron; a few twists of grass folded and turned, similar to "dry twist tobacco;" a fragment of a grass mat, which was the center coil, measuring about 3 inches across. This piece of mat was sufficient to show the development in mat weaving. It was necessary to handle it with the greatest care in order to preserve the specimen. Other items included a small tuft of buffalo hair, a piece of mink skin, and a small bit of skin dressed on the flesh side, leaving the hair on the opposite side. Another remarkable find was a quantity of red paint. One lump of this, weighing about 3 ounces, had a cup-like cavity in one side.

WOOD

There were a few pieces of well preserved wood. A section of arrow shaft still had the stem of a delicate flint projectile bound to it with a dry sinew. The "feather end" of an arrow shaft still shows the marks of the things which held the feathers in place. A basket stay 8 inches long is as good as when made. Another interesting specimen is a piece of cedar wood 2½ inches long, rounded on one side and flat on the other. The flat side, ¾ of an inch wide, has a groove running centrally end to end. One end has been burned off and the entire flat side is charred. There was also a pine shaft as large as one's little finger, 15 inches long, which had been slightly burned from end to end.

BONE AND HORN

A number of bone and horn tools were found. The horn artifacts, few in number, were all of antler and consisted of awls or punches 2 to 4 inches long.

The bone tools, with one exception, were of deer. The 20-odd awls or punches are made of the stiple [sic] bone taken from the deer. They are 3 to 6 inches long, and most of them have been injured by fire. There is one long needle-like bone 6 or more inches long and several smaller ones. Other discoveries included a bone object 6 inches long and over ½ an inch wide, flat with raised edges, and polished; and an excellent bone gouge, 6 inches long, with the point broken off. One minute round object, ¼ of an inch thick and as large as a ten cent piece, was bored through the center. This well preserved specimen was the only ornament found.

A scraper 2 inches long, rounded and worn to a polish on one end, was made of the wide section of a bison rib.

Bark Cordage

We found a piece of bark which had been wound tightly around a small stem but had slipped off; this had to be handled with much care to keep it whole. A piece of cord, the size of an eight-penny nail, consisted of two strands of what appeared to be cedar bark pulped and nicely twisted together. This was found under three feet of dust and ash accumulations. There were also some fragments of bark with about 2 inches of one end pulped; the other end was left in its natural state as if held in the fingers while working the pulped end to a fibrous stage. This was found near a piece of grass that had been looped and drawn to a hard knot.

Gourds

We found many fragments of the shell of the gourd commonly used for drinking dippers.

Projectile Points (Fig. 11)

The projectile point being by far the most common form found, we give it first consideration. There are a multitude of forms which may be brought under three heads: A, B, and C.

Class A (Fig. 11, A-C), the lozenge shape, neither shouldered nor barbed but similar to the outline shown, is represented by fairly numerous specimens.

Class B (Fig. 11, D-F), stemmed and shouldered but not barbed, has many variations.

Class C (Fig. 11, G-I), stemmed, shouldered, and barbed, presents the most beautiful specimens in the stone art.

There are many variations of forms which may be grouped with classes B and C and vary in size from a tiny "bird point" up to a spear 5 inches long.

In the many collections known to us in the Bosque Basin we can account for some 5000 points of all varieties. By far the greater number of these are rude, blunt, or clumsy, but there is a high percentage of excellent specimens. These are not all collected from old camps; but this being a country with an abundant supply of flint, we believe that most places where points are found were merely workshops, as most of the cruder forms come from them. The distinction in the mechanical execution of the work flint found on the old camps is quite above the worked specimens found on old workshops. There are many peculiar forms found in the Bosque Basin, all, however, being variations of the three great classes.

A listing and description of these peculiar forms (Fig. 11, J-V) follows:

J: Fairly common form. Usually heavy, large, and clumsy.

K, L: Not numerous. May be straight, concave, or convex at base. Usually small and well chipped.

M: Common. Varies in size from small to large. Has a bifurcated stem. There are many blunt, heavy forms, but some are excellent and barbed.

N: Stemmed and barbed points ranging up to 4 inches long. Nearly always excellent.

O, P: Stemmed and barbed bird points. Always excellent.

Q: The serrated point is almost always an excellent one. Sometimes they are stemmed and barbed, often only stemmed and shouldered.

R: Rarely found. Note base of stem is as wide as the base of the blade. Sometimes beveled.

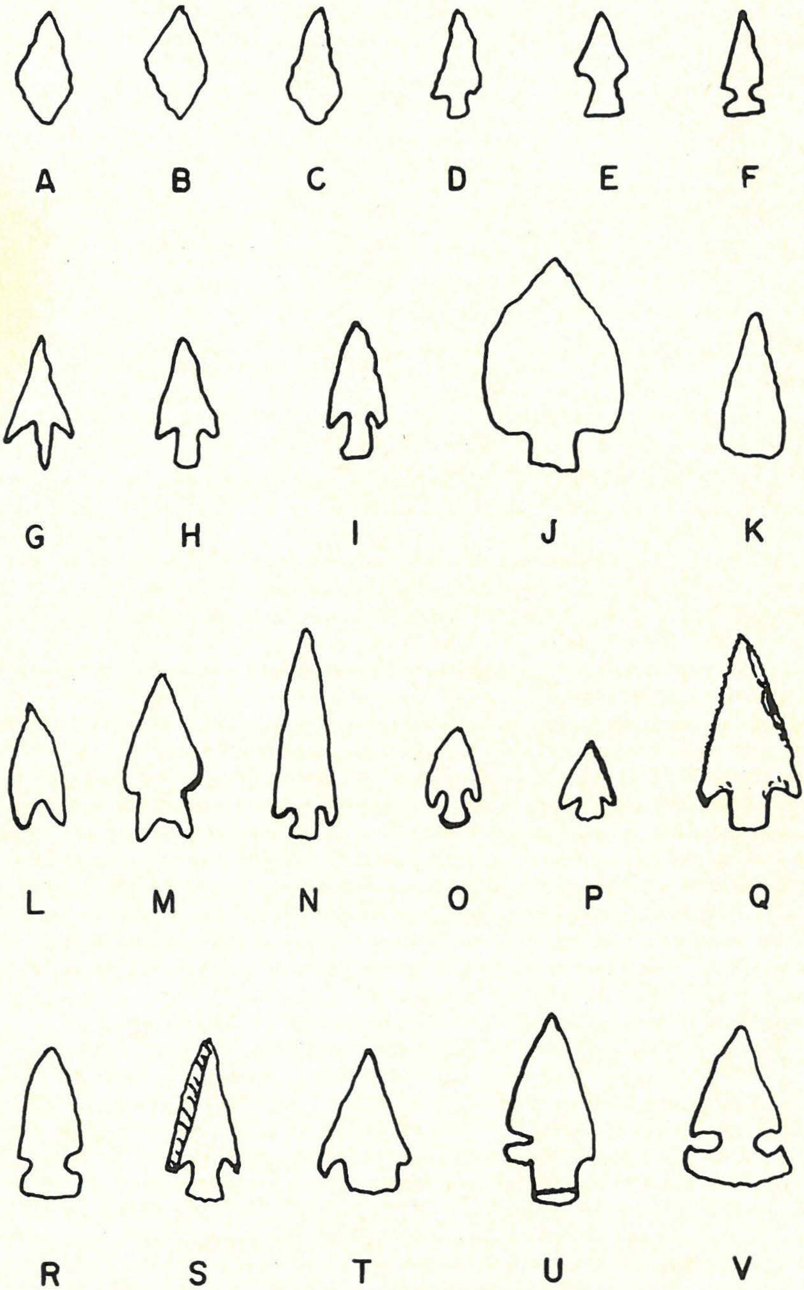


Fig. 11. Outline Drawings of Projectile Points. A–C, Class A. D–F, Class B. G–I, Class C. J–H, Projectile points with peculiar shapes. Drawings by Frank E. Simmons, not to scale.

S: Stemmed, barbed, and beveled.

T: Not very common. Usually broad and thin with only one barb. Some, though, are blunt and heavy.

U: Only two specimens seen like this. One is 3 inches long. Both are well finished. Note peculiar notch in one edge.

V: Only two specimens seen like this. Both finely finished. Note extremely broad base.

In addition to the unusual forms we have listed and described from our field notes, there is still another "flake point," of which we have found a few. These are made from a flint flake of such size and form that a few hammer strokes shaped it into a rude small point—though a sharp, keen-edged one.

Mr. G. A. Anderson made a very interesting find at Camp 5. It was an obsidian point, and would be a good specimen were the point not broken off. Personally, we have found only one chert point in the Bosque Basin, a rude specimen 2 inches long.

Spear points here are not very numerous. Of a collection of some 500 points, we have found half a dozen over 3 inches long that we felt safe to call spears, while there are some shorter than 3 inches that would seem too heavy for arrows. A few good specimens of spears up to 5 inches long have been found.

Knives, Scrapers, and Hoes (Fig. 12, a-h)

Of the flint implements used by primitive man none seems to have been of more universal use than the three named at the heading of this topic. And the forms of the three blend so readily together that it is hard to draw a line of demarcation except with the more distinctive forms. For instance, we know that the long, oval bladed, gracefully and symmetrically finished ones are knives. We know that the fine, triangular blades are scrapers. And we know that the heavy, thick spades or hoes could not have been other than digging tools, used in the field or at the flint quarry. But variations leading from one of these types to the other are many. Thus we find a great many of these diverse types whose proper classification we are not sure of and yet feel that they belong to one of the three general types. Individually many could have been used in several ways. Of the well defined types, the Bosque Basin has furnished some fine specimens of each—knife, scraper, and hoe. And we can better illustrate by drawn outlines than by long worded descriptions.

The knife illustrated in Fig. 12, A is the prevailing type. This specimen is 5 inches long.

The knife illustrated in Fig. 12, B is another fine knife, 4½ inches long.

The knife illustrated in Fig. 12, C is semi-lunar, 4½ inches long.

The knife illustrated in Fig. 12, D is beveled on both edges, giving a drill effect. It is made of blue flint, 5 inches long, and comes from the Jacob Olsen collection.

The knife illustrated in Fig. 12, E is also beveled on both edges, giving a drill effect, is 5 inches long, and made of blue flint. It is in the G. A. Anderson collection.

We find many large flint flakes that were struck off from the mass at one blow of the hammer. Some of them have one thick edge, while the other edge is very thin and sharp. The thick edge was chipped, and the sharp edge was left as it was struck off, thus making one of the best of flint knives.

The form of the scraper (Fig. 12, F-H) is triangular, or nearly so. The base may be somewhat rounded. The scrapers are seldom over 3 inches long and are very often shorter. Sometimes they are thin and finely chipped, but often they are thick

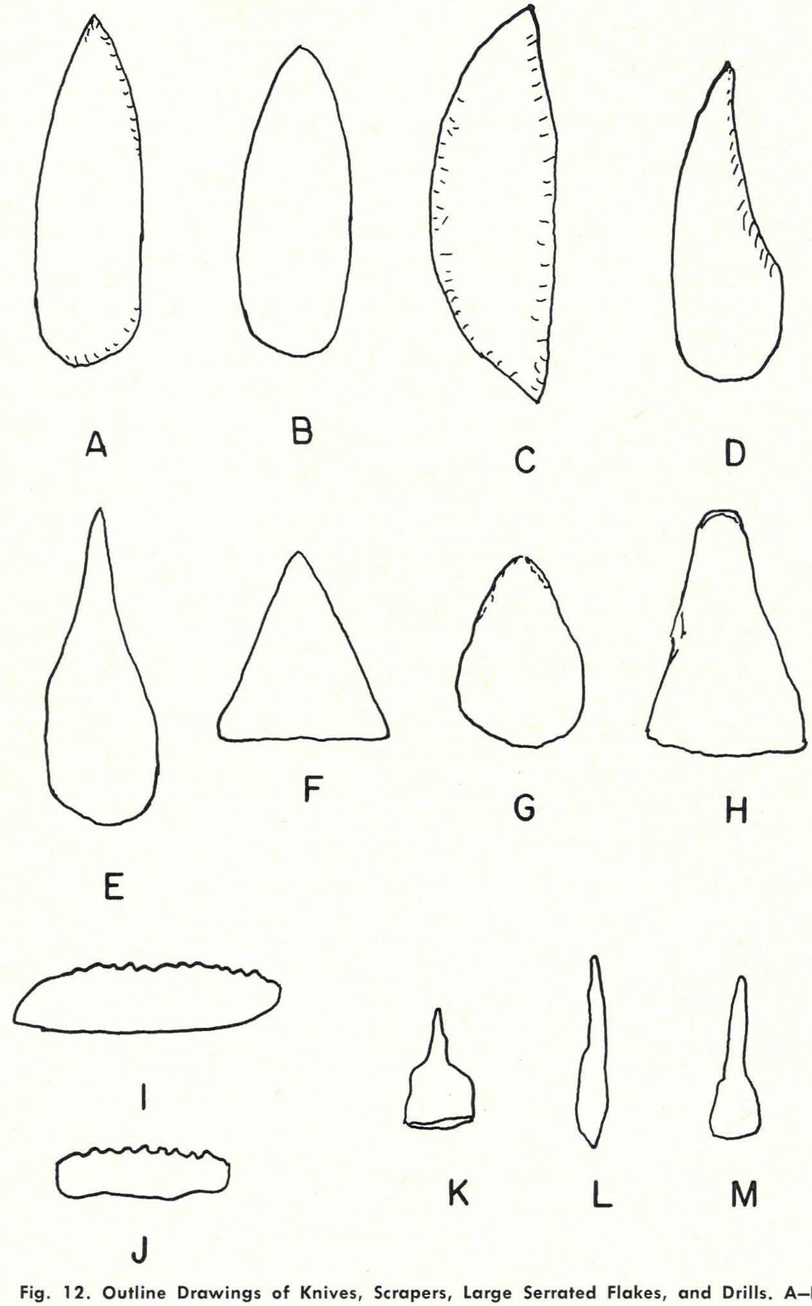


Fig. 12. Outline Drawings of Knives, Scrapers, Large Serrated Flakes, and Drills. A–E, Knives. F–H, Scrapers. I, J, Large Serrated Flakes. K–M, Drills. Drawings by Frank E. Simmons, not to scale.

and clumsy. We sometimes find them nearly round, 2 inches across, and thick. The most beautiful forms are those approaching the triangular.

The scraper in Fig. 12, F is of a distinct triangular form that is not numerous. It is 3 inches long, thin, and finely finished.

The scraper in Fig. 12, G is a very common type, often nicely chipped. This one is 2½ inches long.

The scraper in Fig. 12, H has a stem for attaching the handle. It is 3½ inches long.

Coming in this same general class is the flint hoe. Sometimes it is a beautifully finished blade 6 inches long and 3 or 4 inches wide, and sometimes it is a rude, heavy hoe struck out at a few blows of the hammer. The heavy, rude hoes are often found around old flint quarries and where land was cultivated. The finer ones are found around old camps and fields. We have two fine examples 6 inches long and 3½ inches wide. We also have some quarry spades of the same dimensions, except thicker transversally. Then there is the turtleback, which is quite common. This type ranges in length up to 5 inches, and some of the specimens are nicely finished.

A few large flakes (Fig. 12, I, J), 2 or more inches long, are usually thin and knife-like, but serrated on one edge. They seem to be scarce. We found one in Coryell County, 4 inches long by 2 inches broad, that was very finely serrated on one edge. What were they used for? The outline of these serrated flakes is similar to the outlines shown in the illustration.

Drills (Fig. 12, K-M) appear frequently. Some of them are excellent, but many are poorly finished. They, like flint projectiles, run through several variations as to form, and they range to more than 3 inches in length. The outlines will give a general idea of the variations in the more common forms. These are all well made and thin and come from Brawley's Cave. The drill illustrated in Fig. 12, K is 1½ inches long, L is 2¾ inches long, and that of Fig. 12, M is 2½ inches long.

There is another large implement made by chipping a slab of flint to a blunt edge. The edge is often battered as if used for hammering, perhaps for breaking wood or bones at camp. These are most often found at old flint quarries.

Many small flint hammers are found. They are usually about the size of an egg, with all corners and edges very much battered as if used for hammering.

Flint Quarries

There are numerous flint quarries, usually along the brow of the mountain where a stratum of flint is often found just under the cap rock. At some points flint was fairly extensively quarried. Comparisons of the flint found here and that found in eastern counties where there is no "native flint" would seem to indicate that flint was a commercial commodity between the tribes of this and the eastern counties.

Five Crania from the Jamaica Beach Site (41 GV 5), Galveston County, Texas

L. E. ATEN

ABSTRACT

Anthropometric and morphologic data are presented on three complete and two fragmentary skulls excavated from a site on Galveston Island which was occupied late in time (approximately A.D. 1500). The burial complex and skeletal materials at the site share traits with those of the Addicks Basin and Caplen sites, but the assessment of any relationship is hazardous at present.

This project was conceived as an effort to salvage anthropometric data on the five human crania from the Jamaica Beach Site which were housed at the Houston Museum of Natural Science during the period of the study, January through August, 1963. They were made available by Dr. T. E. Pulley, Director of the museum. The remains studied represent but a few of the total recovered (17 burials were unearthed), but they are, relative to those normally found in the Galveston Bay region, in an excellent state of preservation.

The Jamaica Beach Site, on Galveston Island, was excavated by members of the Houston Archeological Society for the Houston Museum of Natural Science, which lacked the facilities and personnel for such an undertaking. All artifacts, skeletal material and general responsibility for the site remain with the museum and the Jamaica Beach Corporation, the firm which first encountered the burials in the course of preparing the area for a housing development.

ARCHEOLOGICAL BACKGROUND

To summarize the cultural features of the burial area (from the writer's notes unless indicated otherwise), 17 flexed burials were excavated from an area approximately 20 feet square. Of these, 14 were placed on their dorsal (back) side and two were placed on their ventral (chest) side, all with the long axis of the body in an alignment ranging from east northeast-west southwest to east southeast-west northwest, with heads in a westerly direction. One burial was placed in almost the opposite orientation: on the dorsal side, aligned on an east southeast-west northwest axis with the head in an easterly direction. This burial, although not one of those examined at the museum, was measured for the two principal diameters of the skull vault, maximum length and breadth, while still in the ground and will be mentioned in the conclusion of this report. No preferential direction for placing the face was observed; most of the heads, however, were forced into a vertical plane with respect to the body. According to Ring (1963: 4), most of the burials were covered with a fairly compact layer of oyster shells. Burial accessories consisted solely of an arrangement of *Dosinia* sp. and *Dinocardium* sp. shells over a femur of Burial K. Other specimens, including some lithic pieces and bone artifacts, were recovered from the cemetery area, but they appeared to be incidental inclusions from nearby midden accumulations.

Radiocarbon analysis of *Dosinia* sp. shells associated with Burial K (Sample run by Shell Development Co.; Catalog No. 349-A) produced a date of 490 ± 100 B. P. (Ring, 1963: 5). This date agrees well with the other radiocarbon dates from the site, and may even be within the range acceptable for the European items possibly associated with the nearby Indian occupation. The cultural affiliations have not yet been fully determined, although the dominant native ceramics are apparently identifiable as Goose Creek wares. Readers desiring further information on this site are referred to Ring (1963).

DESCRIPTION OF THE CRANIA

The procedures for taking measurements and reporting morphological observations followed here are, with slight modification, those outlined by Hrdlicka (1952) but were undertaken without professional supervision. All age determinations were based on the extent of suture closure of the vault (Cornwall, 1960; Montagu, 1960), and the state of wear of the teeth (Hrdlicka, 1952: 52–53).

Measurements taken are presented in Table 1; indices computed therefrom are presented in Table 2; measurements of the teeth are presented in Table 3; and a tabulation of morphological observations is presented in Table 4.

The descriptions to be presented below represent summaries of some 55 measurements and 33 morphological observations possible on each skull.

Burial B: A partially restorable skull and lower jaw of a young adult male, approximately 30 years old. The posterior portion of the frontal bone and the anterior portion of the parietals are missing, thus making it impossible to take most of the usual measurements on the vault. No artificial deformation is evidenced.

The maxilla exhibits a healed fracture of the area anterior to a line

TABLE 1

Measurements

Measurements (in mm.)	Burial Males B	D	L	Female I	Average (Males)
Antero-posterior diameter, max.	...	191	186	170	188.5
Lateral diameter, max.	136*	139	142	127	138.2
Basion-bregma height	...	141	144*	136	141.7
Cranial capacity (cm^3)**	...	1520.3	1536.3	1270.1	1528.3
Thickness of left parietal	...	7–9	4–7	4–5*	5.5–8
Menton-nasion height	...	135*	...	117.5	135
Alveolar pt.-nasion height	. .	84	74	70	79
Bizygomatic diameter	...	144	139	120	141.5
Endobasion-nasion	...	110	111	99	110.5
Endobasion-subnasal pt.	...	100*	95	87	97.5
Endobasion-prealveolar pt.	...	110*	104	98	107
Facial angle (in degrees)	...	67.5*	75	70	71.3
Alveolar angle (in degrees)	...	62*	53	46.5	57.5
Minimum frontal diameter	...	91*	96	90	93.5
Orbits, height (average)	...	40*	37.3	34.5	38.6
Orbits, breadth (average)	...	38*	41.8	37	39.9
Nose height	...	57*	58	52	57.5
Nose breadth	...	25*	26	24	25.5
Lower jaw:					
Bigonial diameter	114	106	112	92	111
Height of symphysis	39	42	37	39	39.3
Length of lower jaw	92	96	93.5	89	93.8
Minimum breadth of ramus (average)	37.5	39.5	34	33	37
Thickness at second molar (average)	20	22	16	20.3	19.3
Upper alveolar arch:					
External length	59	64*	...	55	61.5
External breadth	67	74	...	63	70.5

* Close estimate

** Pearson's formulas:

Male cranial capacity $= 524.6 + [(2.66 \times 10^{-4})$ (length) (breadth) (basi-breg. height)]

Female cranial capacity $= 812.0 + [(1.56 \times 10^{-4})$ (length) (breadth) (basi-breg. height)]

drawn between the canines, resulting in a slight flattening of the anterior portion of the maxilla and possibly some deformation of the roots of the incisors and canines. Presumably a lesion in the palate behind the right second incisor and excessive wear of the incisors and canines relative to the premolars and molars is related to the fracture. All teeth are erupted and present. Wear is generally third degree (enamel entirely worn off masticating surface). The teeth are of

TABLE 2

Indices

Indices	Burial Males B	D	L	Female I	Average (Males)
Cranial index	. . .	72.8	76.4	74.8	74.6
Mean height index	. . .	85.4	87.8	91.6	86.6
Cranial module	. . .	157	157.3	144.3	157.1
Facial index, total	. . .	93.8*	. . .	97.9	93.8
Facial index, upper	. . .	58.4*	53.3	58.3	55.8
Orbital index	. . .	. . .	89.2	93.3	89.0
Nasal index	. . .	43.9*	44.9	46.2	44.4
Upper alveolar arch index	113.7	115.7	. . .	114.5	114.7

* At least one of the measurements used in computing index is a close estimate.

TABLE 3

Teeth Measurements

Measurement (mm.)*	Male Number	Male Average	Female (one individual)
Maxillary teeth:			
Length PM1 to M3	2	42.1	46.3
Length M1 to M3	2	29.5	33.0
Width of molars;			
M1	2	11.8	11.8
M2	2	10.7	12.0
M3	2	10.7	10.8
Mandibular teeth:			
Length PM1 to M3	3	46.2	51.0
Length M1 to M3	3	33.1	34.0
Width of molars;			
M1	3	11.2	11.3
M2	3	10.6	11.0
M3	3	10.2	11.8

* No corrections made for tooth wear.

medium size, with heaviest tooth wear diagonally on the upper lingual surface and on the lower buccal surface.

Burial D: A complete skull of a large, robust male in advanced middle age, approximately 40 to 50 years old at the time of death. No artificial deformation is evident, but natural lambdoid flattening† does

† The criteria used to recognize natural flattening are somewhat subjective. Here it refers to some degree (usually slight) of flattening in the area centered about lambda. The cause of this condition is not well known, although the locus of the flattening would seem to rule out cradle practices.

occur. The teeth are all erupted and present; they are of medium size and exhibit one possible cavity over the crown of the upper right second incisor. The heaviest tooth wear occurs diagonally on the lower buccal and upper lingual surfaces and is generally third degree (enamel worn entirely off).

Burial L: A reconstructed skull of a middle-aged male, approximately 35 to 40 years of age. No artificial flattening was indicated although natural lambdoid flattening does occur.

The upper dentition is seriously diseased and deformed. The only teeth remaining on the right side are the canine, second premolar, and the three molars; on the left side are the canine, and first and second molars. The two first incisors were apparently lost either shortly before death or after death. The right second premolar grew in a horizontal plane with the crown directed over the lingual surface of the alveolar process. The left second premolar was lost before death and the alveolus is partially absorbed.

The right and left first molars were contained by the surrounding teeth in such a manner as to cause them to grow in an elongate manner with the roots on the buccal side well outside the alveolar process. The left second molar also shows some elongation. The second and third molars on the right side appear normal. An abcess immediately behind the left second molar has reduced the alveolar process to a thin shell of bone about 2 mm. thick and exposed the root of the left second molar.

The lower dentition does not appear diseased, but is heavily worn. Wear, upper and lower, is fourth degree (crowns worn off markedly).

Burial I: A well preserved skull of a young adult female, approximately 20 to 25 years of age. No artificial deformation was seen, although natural lambdoid flattening does occur. This burial was the only one to show wormian bones: four in the lambdoid suture and one in the left temporo-parietal suture. The teeth are all erupted and present. They are of medium size, show no caries and exhibit second degree wear (dentine visible). The shovel-shaped concavities, common in the American Indian, are present on the upper incisors of this individual.

The fifth skull (no burial designation given) examined was one of the first found upon discovery of the site and was subsequently turned over to the Houston Museum of Natural Science by the Sheriff of Galveston County. Although precise provenience data are lacking, the approximate location of this burial is known. It consists only of the posterior half of the vault of what was possibly a young (20–30?

TABLE 4

Morphological observations

	Burials				
	Males			Females	
Observation*	B	D	L	I	Unex.**
Vault:					
Form					
Ovoid	...	X	...	X	...
Pentagonal	...	...	X	...	...
Brow ridge form					
Median	...	X	X	...	...
Divided	X	...	...	...	...
Supraorbital ridge					
Slight	...	...	X	X	...
Pronounced	X	...	...	...	...
Excessive	...	X	...	...	...
Mastoids					
Small	...	...	...	X	...
Submedium	X	...	...	...	X
Medium	...	...	X	...	...
Large	...	X	...	...	...
Forehead height					
Medium	...	X	X	X	...
Forehead slope					
Slight	...	...	...	X	...
Moderate	...	...	X	...	...
Frontal eminences					
Indistinct	...	X	X	...	...
Double	X	...	...	X	...
Metopic ridge					
Present	...	X	X	X	...
Absent	X	...	...	...	...
Sagittal region					
Oval	...	X	...	X	...
Moderate elevation	X	...	...	...	X
Marked elevation	...	...	X	...	...
Parietal eminences					
Indistinct	...	X	...	...	...
Medium	X	...	...	X	...
Prominent	...	...	X	...	X
Temporal bulge					
Medium	X	X	X	...	...
Bulging	...	...	...	X	...
Occiput					
Symmetrical	...	X	X	X	X
Asymmetrical	X	...	...	...	...
Lambdoid flattening					

Present	X	...	X	X	X
Absent	...	X	...	...	...
External occipital protuberance					
Moderate	X	...	...	X	X
Pronounced	...	X	...	...	...
Beaked process	...	...	X	...	...
Occipital form					
Convex	...	...	...	X	...
Moderate protrusion	X	X	X	...	X
Occipital crests					
Slight	...	...	...	X	X
Well developed	X	...	X	...	...
Pronounced	...	X	...	...	...
Face:					
Orbital shape					
Square	...	X	X	X	...
Orbital border					
Dull	X	X	...	...	...
Sharp	...	...	X	X	...
Malars size					
Submedium	...	...	...	X	...
Medium	X	...	X	...	...
Large	...	X	...	...	...
Malars protrusion					
Slight	...	X	...	X	...
Medium	X	...	X	...	...
Suborbital fossae					
Slight	X	...	...	X	...
Medium	...	X	X	...	...
Nasal spine					
Medium	X	...	...	X	...
Pronounced	...	X	...	...	...
Nasal shelves					
None	X	X	X	X	...
Borders of nasal aperture					
Dull	...	X	...	X	...
Sharp	X	...	X	...	...
Subnasal fossae					
Small	X	...	X	X	...
Palate form					
Near circular	...	X	...	...	...
Elliptical	...	...	X	X	...
Ovoid	X	...	...	...	...
Palate height					
Shallow	X	...	...	X	...
High	...	X	X	...	...
Intermaxillary suture					
Present	X	...	X	...	...
Absent	...	X	...	...	...

TABLE 4—Continued

	Burials				
	Males			Females	
Observation*	B	D	L	I	Unex.**
Lower jaw:					
Mandible size					
Medium	X	...	...	X	...
Large	...	X	X	...	...
Mandible strength					
Medium	...	...	X	X	...
Massive	X	X	...	...	...
Chin form					
Square	X	X	...	...	...
Rounded	...	...	X	X	...
Chin protrusion					
None	...	...	...	X	...
Medium	X	X	...	...	...
Marked	...	...	X	...	...
Rami					
Medium	...	...	X	X	...
Broad	X	X	...	...	...

* = Unrepresented types not included in table.
** = Unexcavated skull (see text, pp. 157, 160).

year old) female. Only one measurement and limited morphological observations were possible.

The area between lambda and the right parietal eminence, an area of approximately 4 by 6 cm., has been thinned to about 4 mm. thickness. Normal bone thickness in the corresponding position on the left parietal is nine millimeters. The central portion of the affected area exhibits a rough bony growth. The exact nature of this lesion is not known at this time.

CONCLUSION

The gross characteristics of the four crania upon which reasonably complete information is available, may be summarized as follows.

1. The males and one female skull are relatively long and narrow, giving rise to an average cranial index of 74.6, which is dolichocranic or long-headed. The one burial measured for maximum length and breadth while still in the ground, but not one of those studied at the

museum, had a cranial index of 81, which is brachycranic or round-headed.

2. The cranial capacity (computed) of the males averages 1505 cc., that of the female is 1270 cc.

3. The skulls are high-vaulted with a slender face in both the upper and over-all proportions. The noses are also very slender.

4. The orbital index shows the orbits of the males to be slightly elongated and the orbits of the female to be more nearly equi-dimensional.

5. In two of the skulls, the molar and premolar teeth are worn diagonally, with the maxillary teeth worn most heavily on the lingual surface and the mandibular teeth worn most heavily on the buccal surface.

6. Only in one skull are the incisors sufficiently unworn to show clearly shovel-shaped concavities.

7. Generally, the facial protrusion is on the order of 70 degrees, and the alveolar protrusion is as low as 53 degrees in the males and 46 degrees in the female.

8. With respect to the morphological observations, little pattern emerges in this small a sample and these characteristics can best be examined in tabular form (Table 4).

9. Comparisons of the measurements of the Jamaica Beach burials with those from the nearby sites of Oso and Caplen (Woodbury, 1937) and Addicks (Aten, 1964: 7; Newman, 1953: 259) reveals some apparent differences. However, we cannot expect the full range of morphological variation in the population of a site to be present in an unselected sample of five specimens; thus it is felt that any conclusions with respect to morphological similarity or dissimilarity at this time would be premature and hazardous.

10. The burial complex at Jamaica Beach shares some cultural traits with the Caplen Site on Bolivar Peninsula (Campbell, 1957: 468) and the Addicks Basin sites west of Houston (Wheat, 1953: 247). A trait list is presented below:

TRAIT	SITE		
	Addicks	Caplen	Jamaica Beach
Flexed and semiflexed burials	X	X	X
Burials placed on side and back	X	X	X; also rarely on front

Orientation—easterly or westerly	Both	Dominantly westerly, but also easterly	Dominantly westerly,but one easterly
Furniture (X = present)	?	X	Very rare

Especially intriguing here is the preoccupation with an easterly or westerly orientation of the remains. It is difficult, however, to assess any direct relationship, especially without considering a trait list for the midden portion of each site, which is lacking for Jamaica Beach.

REFERENCES CITED

Aten, L. E.
1964. A Human Crania from the Addicks Dam Basin, Harris County, Texas. Newsletter of the Houston Archeological Society, No. 11, June, pp. 6–7.

Campbell, T. N.
1957. Archeological Investigations at the Caplen Site, Galveston County, Texas. Texas Journal of Science, Vol. 9, No. 4, pp. 448–471.

Cornwall, I. W.
1960. Bones For the Archeologist. Phoenix House.

Hrdlicka, Ales
1952. Hrdlicka's Practical Anthropometry. Edited by T. D. Stewart. Fourth Edition. Wistar Institute of Anatomy and Biology.

Montagu, M. F.
1960. An Introduction to Physical Anthropology. Third Edition. Charles C. Thomas.

Newman, Marshall T.
1953. Indian Skeletal Remains from the Doering and Kobs Sites, Addicks Reservoir, Texas. River Basin Surveys Papers, No. 4, Pt. II, Bureau of American Ethnology, Bulletin 154.

Ring, E. Raymond
1963. Opened by Accident. Newsletter of the Houston Archeological Society, No. 10, June, pp. 1–7.

Wheat, Joe Ben
1953. An Archeological Survey of the Addicks Dam Basin, Southeast Texas. River Basin Surveys Paper, No. 4, Pt. I, Bureau of American Ethnology Bulletin 154.

Woodbury, George
1937. Notes on Some Skeletal Remains of Texas. University of Texas Publications, No. 3734, Anthropological Papers, Vol. 1, No. 5.

6514 Calhoun, Apt. 17
Houston, Texas

The Archeology of Cedar Creek Reservoir, Henderson and Kaufman Counties, Texas

DEE ANN STORY

ABSTRACT

During the spring of 1964 the Texas Archeological Salvage Project carried out limited excavations at three aboriginal sites in the proposed Cedar Creek Reservoir area. Each of the sites investigated appears to have been repeatedly, but probably intermittently, occupied by various small social groups whose material culture was gradually modified over a period of time. The major artifact changes that can be distinguished are tentatively assigned to five occupational periods which range in broad affiliations from Paleo-Indian (Period 1) to Archaic (Periods 2 and 3) to Neo-American (Periods 4 and 5). These periods are defined, and an attempt is made to relate them to culture complexes and stylistic developments that have been recognized in adjacent parts of Texas.

INTRODUCTION

From April 7 through May 14, 1964, the Texas Archeological Salvage Project (T.A.S.P.) conducted limited excavations at three Indian sites in Cedar Creek Reservoir. This work was carried out in partial fulfillment of Memorandum of Agreement No. 14–10–0333–1121 between The University of Texas and the National Park Service, in cooperation with the nationwide Inter-Agency Archeological Salvage Program. The field work was supervised by Fredrick A. Peterson, working under the general direction of the author.

Recently completed by the Tarrant County Water Control and Improvement District No. 1, Cedar Creek Dam lies in northwestern Henderson County, about two miles north of Trinidad. It spans Cedar Creek and, when full, will create a lake (to be known as Joe B. Hogsett) extending north-eastward into Kaufman County. Two of the sites investigated (Wild Bull and Lacy) are in Henderson County, while the third (Gossett Bottoms) is in Kaufman County (Fig. 1).

ENVIRONMENT

Cedar Creek heads in eastern Kaufman County and flows in a general southerly direction, emptying into the Trinity River about six miles below the dam. The area is fairly well-watered, with many small tributaries—including Kings, Lacy Fork, Prairie, Twin, Lynn,

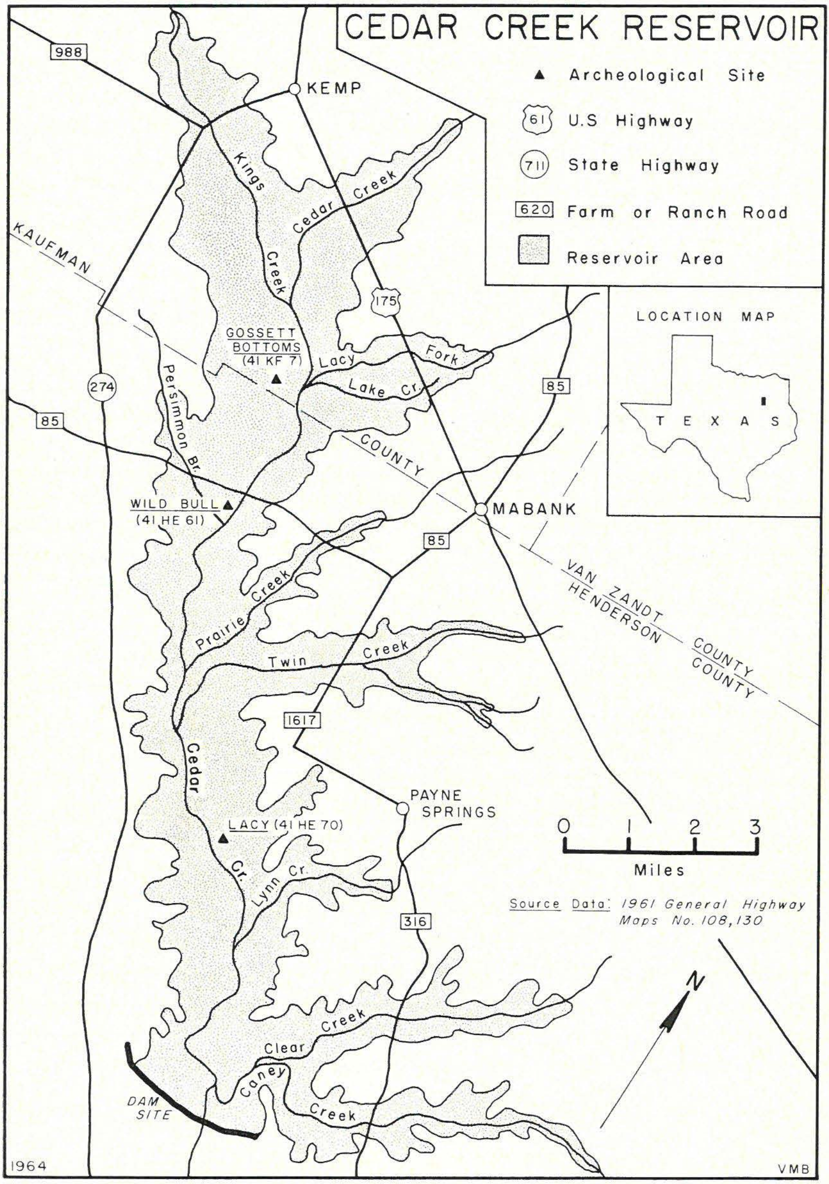


Fig. 1. Map showing the location of Cedar Creek Reservoir and the sites excavated.

Clear, and Caney—entering the Cedar Creek drainage. Largely because of these many streams the reservoir shoreline of 300 miles will be the most extensive within Texas.

The topography consists of sand-capped rolling hills and ridges with numerous gullies and broad valleys—features typical of the West Gulf Coastal Plain (Fenneman, 1938: 100–120). Unconsolidated gravels, sands, and clays are the most common deposits, with both Eocene and Cenozoic formations having been recognized (Sellards, *et al.*, 1954: 531–601). Having an average annual rainfall of approximately 39 inches (Texas Almanac, 1965: 230–238), the vegetation cover is moderately dense and represents a mixture of many species from the grasslands to the west and the forests to the east.

The area falls within the Texan Biotic Province (Blair, 1950: 100–102), and one generally finds the sandy soils supporting oak-hickory forests (rarely some pine) and the clay soils containing tall grasses. The fauna is rather diverse and also reflects interdigitation of eastern and western forms. Blair (1950: 101), for example, notes that:

> At least 49 species of mammals have occurred in the Texan province in recent times. Forty-one of these occur also in the Austroriparian [to the east], and many of these are characteristic species of that province. Eight species range into the Texan from the grasslands regions to the west, southwest or north and fail to extend beyond this province into the Austroriparian.

Among the common, present-day mammals are raccoon, opossum, fox, squirrel, Florida cottontail, swamp rabbit, black-tailed jack rabbit, mole, pocket gopher, and numerous smaller rodents. Deer occur in the area today, and the archeological record (see Table 2) suggests that they were once a major source of food. Reptiles are still abundant and include two species of terrapin, 16 species of lizards, and 39 species of snakes. Amphibians are represented by five species of newts and salamanders and by 18 species of frogs and toads (*ibid.*: 101–102).

The modern conditions and, even more importantly, the apparent site density (Davis, 1961) suggest that the area was favorable for aboriginal habitation. Hunting, gathering, and, probably only in later times, small-scale agriculture were very likely the main sources of livelihood.

Archeological Background

Apart from a survey carried out in 1961 by the Texas Archeological Salvage Project (Davis, 1961), only two finds of consequence have been reported for the immediate reservoir area. Perhaps the most significant of the two was the discovery of three large, crudely-carved stone heads near Malakoff. Each of these was unearthed during the course of gravel operations, one in 1929, one in 1935, and the last in 1939 (Sellards, 1941; 1952: 95–105). Found in Pleistocene gravel

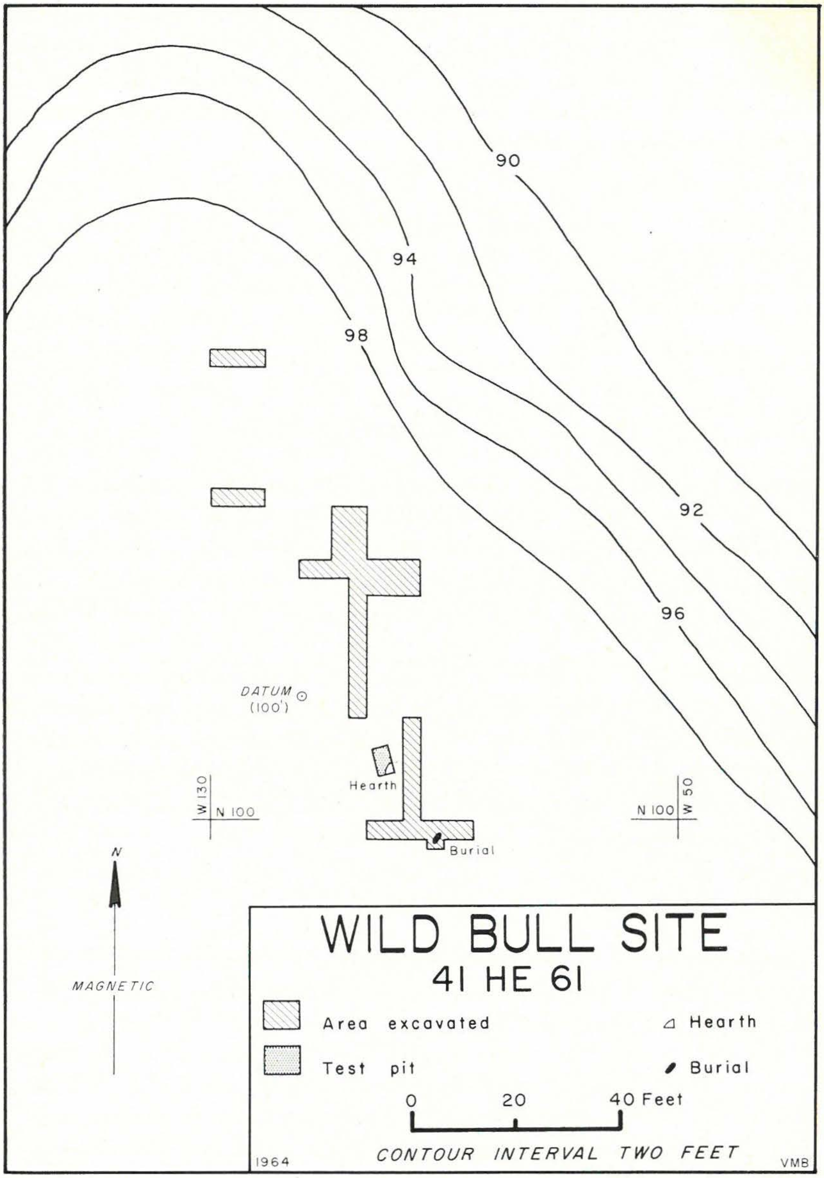


Fig. 2. Map of Wild Bull Site showing contours, features, and plan of excavation.

deposits, it is quite possible that these heads are among the oldest evidence of human habitation yet known for the Cedar Creek area. The second find consists of a series of straight line and simple geometric petroglyphs carved on the walls of a small rockshelter just east of the reservoir (Jackson, 1938: 299–302). Petroglyphs are exceedingly rare in the eastern part of the state, and neither this, nor the Malakoff heads, can be satisfactorily related to archeological materials recovered in the reservoir proper.

Much more work has been done in adjacent regions and it is from these areas that many similarities with the Cedar Creek material can be noted. Generally to the northeast are sites which have been classified as the Neo-American Wylie Focus (Stephenson, 1952) or as the Archaic Trinity Aspect (Crook and Harris, 1952; 1954); while to the east, northeast, southeast are Caddoan complexes (Krieger, 1946; Newell and Krieger, 1949) as well as Archaic remains which have been variously identified as East Texas Aspect (Suhm, *et al.*, 1954: 148–151), Red River Aspect (Davis and Davis, 1960), and La Harpe Aspect (Johnson, 1962). The areas to the east and southwest have been less systematically investigated, although the salvage project's excavations at the Strawn Creek Site in Navarro Mills Reservoir, approximately 40 miles to the southwest, showed evidence of strong influences from the Wylie Focus and the La Harpe Aspect (Duffield, 1963a).

The three sites—Wild Bull, Lacy, and Gossett Bottoms—excavated at Cedar Creek yielded remains of both Archaic and Neo-American occupations. In the sections which follow these three sites and the specimens recovered from them are described, artifact distributions are discussed, and an attempt is made at placing the material into a broad chronological and cultural context.

THE SITES

None of the three sites excavated was recorded by the T.A.S.P. survey of 1961 (Davis, 1961), but rather two were found in the fall of 1963 during the course of further reconnaissance, while the third was located by the excavation party. All three are situated on relatively low, sand-capped clay rises in the Cedar Creek bottoms. The Wild Bull Site (41 HE 61) is on the west or right-hand bank of the reservoir, a short distance above the confluence of Persimmon Branch and Cedar Creek (Fig. 1). The prominence on which it lies is bound on the east by a small slough and on all other sides by the Cedar Creek flood plain (Figs. 2 and 5, A). Surface indications of occupation were found over much of the rise, but most concentrated along the eastern edge, Although larger vegetation had been cut and bulldozed off the site, there were no indications that this resulted in serious disturbance to

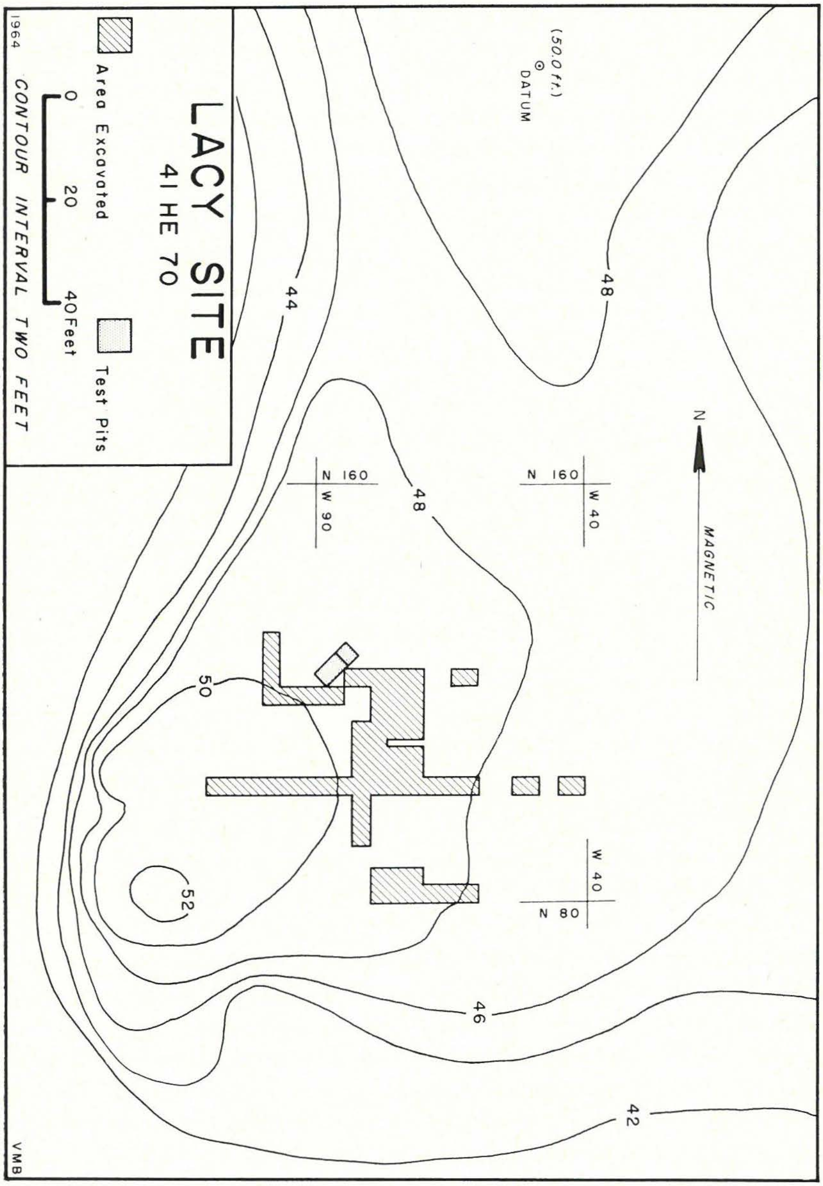


Fig. 3. Map of Lacy Site showing contours and plan of excavation.

the subsurface (i.e., below approximately the first six inches) cultural bearing deposit.

Situated much like the Wild Bull Site, the Lacy Site (41 HE 70) is on the left-hand side of the reservoir, roughly two miles upstream from the mouth of Lynn Creek (Fig. 1). At the Lacy Site occupational refuse was scattered over much of the surface of a crescent-shaped rise, but concentrated only in the southwestern portion (Figs. 3 and 6). Cedar Creek flows a short distance to the west and lateral erosion by that stream has produced a steep, vertical face revealing the internal structure of the rise (see below). To the northwest the rise descends rather abruptly to a small slough, while to the east and southeast it merges more gently with the Cedar Creek flood plain. The Lacy Site has also been cleared of major vegetation and, although it is difficult to measure precisely, there appears to have been relatively little serious damage.

The third site excavated, Gossett Bottoms (41 KF 7), is located at the upper end of the reservoir, approximately two miles west of Cedar Creek. It consists of cultural refuse buried in the upper part of a low, circular knoll (Figs. 4 and 5, B). A number of similar, though generally smaller, rises occur in the immediate vicinity, but the Gossett Bottoms Site appeared to contain the richest midden. To the north and east of the site are several sloughs and, beyond these, a drainage ditch. Unlike Wild Bull and Lacy, the Gossett Bottoms Site had not been cleared.

Excavation

Since the sites shared many features, the same excavation procedure could be followed at each. Before systematic investigations were begun, small test pits (usually 3 by 5 feet) were made primarily to determine the horizontal and vertical extent of occupation. Once this had been established reasonably well, a horizontal grid oriented in terms of the cardinal directions was set up (Figs. 2–4). In each case, the grid was laid out in such a manner as to confine the excavations to the northwest quadrant, thus simplifying the record-keeping. The actual units of horizontal control varied in size, but were most often three by five or three by ten foot trenches (Figs. 2–4).

Vertical control was maintained by establishing a datum and assigning it an arbitrary elevation, and by digging in six-inch levels. The maximum depth to which the excavation units were dug varied considerably and is summarized (in terms of cubic feet removed) in Table 1. For the most part, only the upper portions (the top 2.5 feet) of the sites were sampled well. The few deeper levels (below 2.5 feet) dug yield relatively little cultural refuse, and frequently encountered sterile clay.

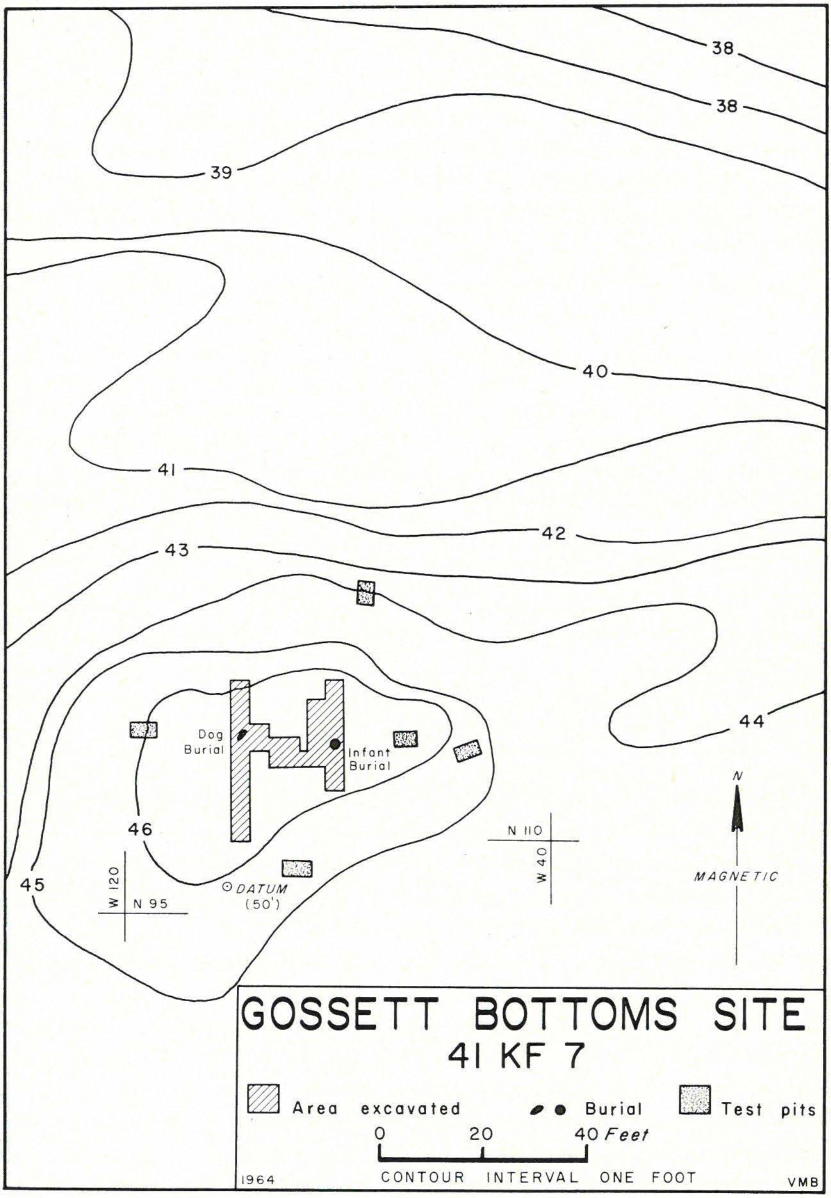


Fig. 4. Map of Gossett Bottoms Site showing contours, features, and plan of excavation.

All material was passed through either a quarter-inch mesh or, less often, a half-inch mesh screen. Most of the occupational debris was retained and placed in paper bags labeled according to site, excavation unit (such as N100/W90, 6–12 inch level), date, and excavators. These were later sent to the T.A.S.P. laboratory in Austin where they were washed and catalogued. A number of records were kept throughout the excavations, including a daily log, individual level reports, profiles, photographic data sheets, and topographic maps with plans of excavation. Both the records and the specimens will be permanently housed at the Texas Archeological Research Laboratory, The University of Texas.

TABLE 1

Summary of extent of excavation by level (in cubic feet)

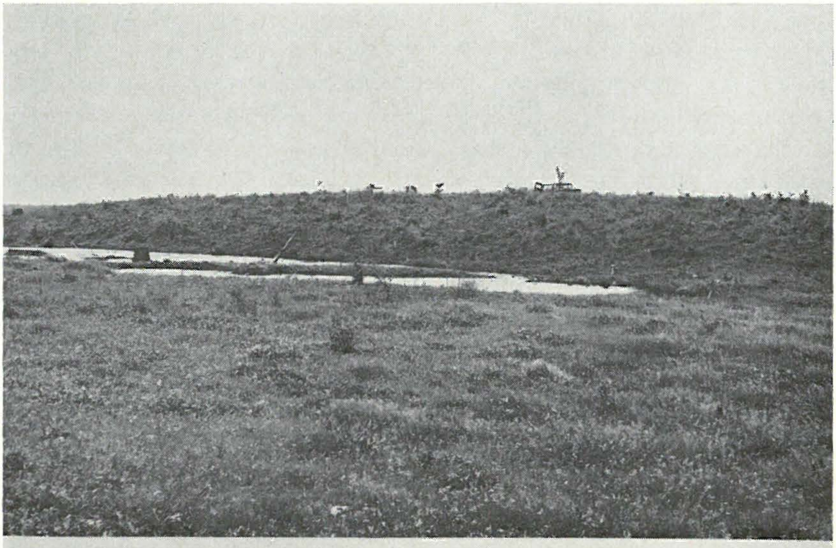
Site / Level	Level 1: 0.0'–0.5'	Level 2: 0.5'–1.0'	Level 3: 1.0'–1.5'	Level 4: 1.5'–2.0'	Level 5: 2.0'–2.5'	Level 6: 2.5'–3.0'	Level 7: 3.0'–3.5'	Level 8: 3.5'–4.0'	Total cu. ft excavated
Wild Bull (41 HE 61)	208.5	208.5	206.5	189	129	37.5	12	4.5	995.5
Lacy (41 HE 70)	314	258.5	178.5	90	45	4.5	0	0	893.5
Gossett Bottoms (41 KF 7)	158.5	156.5	152.6	126	87	40.5	7.5	0	728.6

Internal Structure

The matrix in which occupational refuse occurred at each of the sites was basically similar—a fairly loose sand underlain by sterile clay. By and large, this sand layer showed little variation and certainly no distinct zoning. At the Wild Bull Site and, perhaps to a lesser extent, at the Lacy Site, bulldozing had disturbed the uppermost, humus-stained portion of the sand zone, and at all sites rodent burrows were very much in evidence.

The sand zone at the Wild Bull Site varied from approximately one foot in thickness at the northern end of the excavations to about three feet in thickness in the central and southern portions. It was light to medium brown in color and tended gradually to become clayey, with the result that there was not a sharp break between the sand and the underlying yellow clay. Since none of the excavations penetrated very deeply into the clay, the thickness of this layer was undetermined.

Much the same stratigraphic picture prevailed at the Lacy Site, although here vertical exposures on the western and southern (Figs. 3 and 6, A) edges of the site revealed more information concerning the internal structure of the rise. As exposed in these erosional cuts



A

B

Fig. 5. A, Wild Bull Site, view looking southwest. B, Gossett Bottoms Site, view looking northeast.

and, to a lesser extent, in the excavations, the natural sequence of the major deposits at the Lacy Site is as follows:

The uppermost layer—the only artifact-producing zone—consisted of a sandy soil which varied in thickness from slightly less than one foot in the western portion of the site to at least three feet (the maximum depth of the excavation) in the eastern part. The top of this layer, where undisturbed, was humus-stained and brownish-gray in color, while the basal portion was generally a mottled tan and frequently contained some clay.

Immediately below the sand zone was a sterile clay which in the vertical faces reached a thickness of about five feet. It was reddish in color in the upper portion, turning yellowish toward the base.

Underlying the clay stratum was another sand layer, one which measured approximately four feet in thickness and which was a dark brown color. Like the clay, it contained no cultural refuse.

The deepest zone exposed was fairly coarse gravel of undetermined thickness. Perhaps this, or a similar deposit, provided the prehistoric inhabitants of the site with raw materials for the manufacture of chipped stone implements.

At the Gossett Bottoms Site the sand layer was somewhat darker in color and a bit more compact than at either Lacy or Wild Bull. Also, the clay substratum was more difficult to recognize, for the sand almost imperceptibly became lighter in color and more clayish in texture. Very few of the excavations at the Gossett Bottoms Site encountered the clay since the digging tended to cease when the artifacts became scant. In general, however, the sand was as much as three feet in thickness, and humus-stained in the upper portion.

Occupational Features

Surprisingly few occupational features were uncovered by the excavations at Cedar Creek and, moreover, those present were either in poor condition or only partially exposed. The Gossett Bottoms Site yielded an infant burial and a possible dog burial (Fig. 4), while the Wild Bull Site contained a stone hearth and probable remains of a much disturbed adult burial (Fig. 2). No occupational features were recognized at the Lacy Site, although the deeper levels were noted as having a number of scattered burned rocks. Wattle-impressed daub was obtained from all three sites, being particularly abundant at Gossett Bottoms, but no other definite remains of a structure (such as post holes, floors, etc.) were observed.

Turning in more detail to the features at the Gossett Bottoms Site, the infant burial was found at N128.4/W82.3, at a depth of approximately two feet below the surface. The skeleton had been badly damaged by the excavations and this—coupled with its inherently fragile nature—has obscured many of the particulars. The few surviving

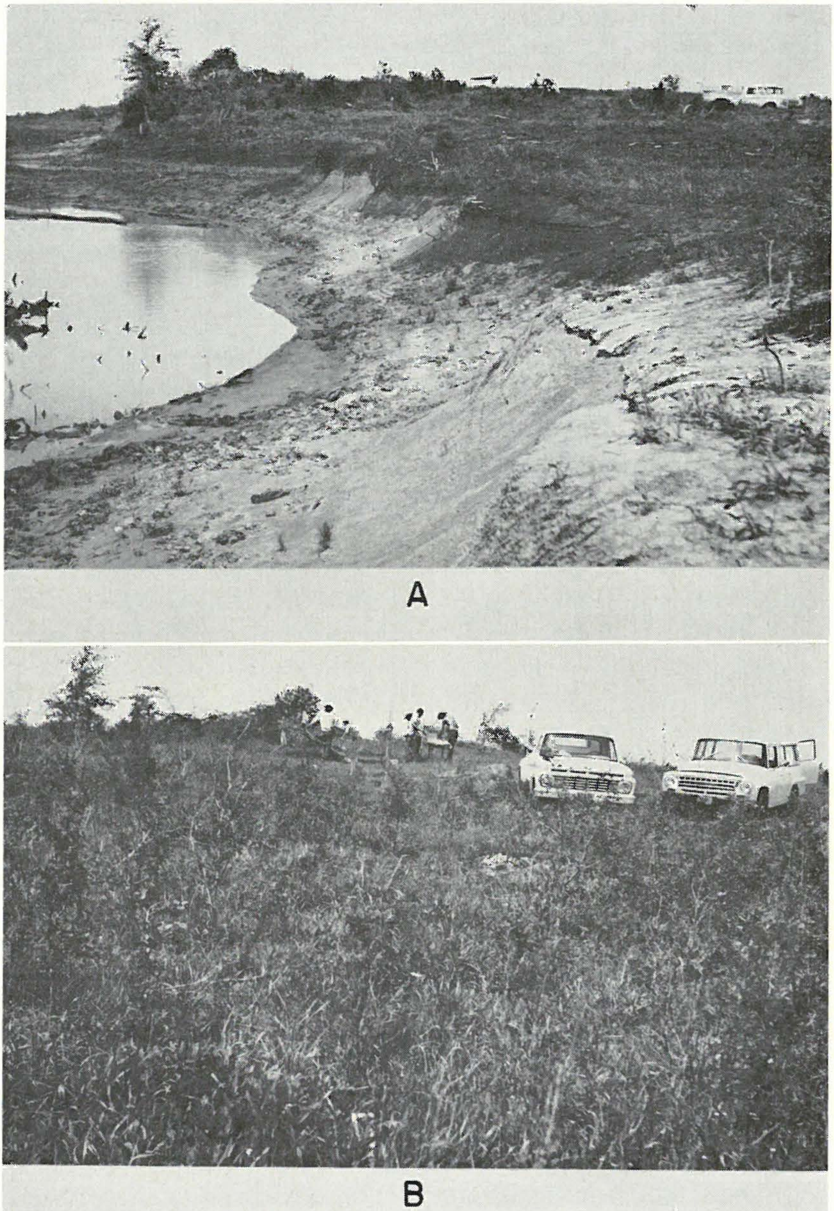


Fig. 6. Excavations in Progress at the Lacy Site. A, View looking northwest. B, View looking west.

parts of the skeleton (bits of the skull and rib fragments) suggest that the individual was about four years of age at the time of death (Thomas W. McKern, personal communication). No grave outline was recognized, but the field notes state that the burial was flexed on the right side, and that the skeleton was oriented east-west, with the skull to the west and facing the south. No artifacts were found in direct association, and the skeletal remains are too fragmentary to determine the sex of the individual.

The presumed dog burial from the Gossett Bottoms Site (Fig. 7, A) was also incomplete, but generally better preserved than the infant skeleton. No grave pit was discerned and the case for deliberate interment rests mainly upon the tightly flexed position of the bones and the occurrence of a similar domesticated dog burial (however, not conclusively established as aboriginal) at the Miller Site about 70 miles to the northeast (Johnson, 1962: 241, Fig. 28). The Gossett Bottoms dog, identified as domesticated by Ernest L. Lundelius of the Vertebrate Paleontology Laboratory of The University of Texas, was recovered at approximately N130/W95, at a depth of between 1.6 and 1.8 feet below the surface. The skeleton was oriented east-west, with the head to the east and facing north. Artifacts and miscellaneous cultural refuse were recovered from the immediate vicinity, but none of these items appeared to represent burial offerings. Remains of other domesticated dogs were found at the Gossett Bottoms Site and at the Lacy Site; however, only at the latter, where the bones were recovered from a rodent burrow, may there have possibly been an interment.

The first occupational feature, a hearth, discovered at the Wild Bull Site was found by Harry Shafer and James Corbin while carrying out preliminary tests in the winter of 1963. Not completely excavated, the exposed portions were located in the southeast corner of Test Pit 1 (Fig. 4), in the 1 to 1.5 foot level. The hearth consisted of a concentration of rounded, fire-cracked chert pebbles and burned clay, in a roughly oval arrangement. That part uncovered (Fig. 7, B) measured approximately 1 by 1.5 feet, and was apparently only one layer of rocks thick (depth measurements were not taken). Midden refuse occurred in the general area, but no specimens appeared to be in direct association with the hearth.

Possible remains of a much disturbed adult burial constitute the only other feature recognized at the Wild Bull Site. Found at grid location N98/W87.3, at a depth of between 1.95 and 2.2 feet below the surface, the only bones present were an incomplete femur and bits of another long bone, perhaps also a femur. The long axes of the bones were oriented north-south, but no meaningful statements on possible burial position can be inferred. No grave outline was recognized, nor were any artifacts found in association, although the field notes record (but do not describe) a small concentration of burned rocks lying just

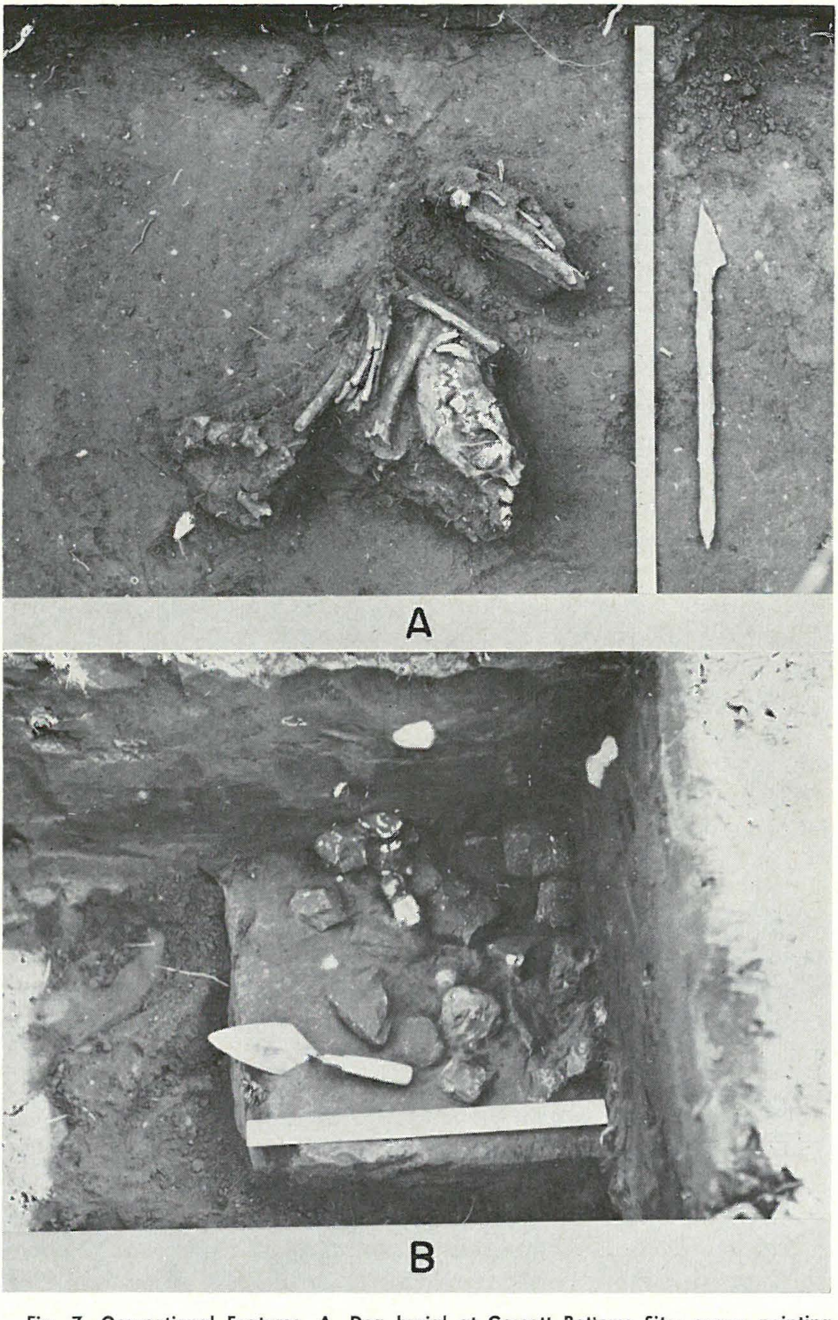


Fig. 7. Occupational Features. A, Dog burial at Gossett Bottoms Site; arrow pointing to the north. B, Hearth at the Wild Bull Site, trowel pointing north.

south of the bones. In addition to the two limb bones, the Wild Bull Site yielded a human molar tooth. This isolated find was made in the northernmost excavation unit (N187/W120), in the first six-inch level, and is of little archeological significance.

DESCRIPTION OF THE SPECIMENS

The Cedar Creek sites yielded a considerable quantity of occupational refuse, including both artifactual (intentionally modified specimens) and non-artifactual (incidental debris such as flint flakes, or animal bones) remains. Partly because of time limitations and partly because they displayed the greatest variation, the analysis has focused on the 2,714 artifacts. Only a portion of the miscellaneous residue, the faunal remains and the wattle-impressed daub, has been examined. Other non-artifactual debris, namely chipping refuse and mussel shells, has been retained but awaits study.

To initiate the analysis, the artifacts were grouped into broad categories based upon the materials from which they were manufactured —e.g., stone, clay, and bone. Next, these objects were sorted into inferred functional classes such as arrow points, dart points, knives, pottery, and the like. Most of these use-classes were then further classified into morphologically similar clusters which, whenever appropriate, were identified with a previously existing typology (such as Bell, 1960; Suhm and Jelks, 1962; and Johnson, 1962). Those artifacts which did not correspond with a known type were given descriptive designations such as subtriangular knives or engraved pottery. However, one tentative new type, the *Gossett* gouge, is defined.

In the following, the artifacts from the three sites are treated as a single collection, an approach justified by the many traits each site shares with the other two. The emphasis is placed on description, with a later section being devoted to a discussion of intrasite and intersite distributions.

ARTIFACTS OF STONE

Arrow Points

Including the unclassifiable fragments, a total of 192 arrow points was recovered. Seventeen of these are from Wild Bull, 44 from Lacy, and 131 from Gossett Bottoms. As a group, the arrow points are relatively small and thin, with pointed distal ends and, in most cases, well defined stems. The material from which they are made can broadly be termed chert which ranges from fine-grained to rather coarse-grained.

Based primarily on variations in outline form, the complete or reasonably complete arrow points are grouped into ten types (*Alba, Bonham, Catahoula*-like, *Cliffton, Cuney, Friley, Granbury, Perdiz, Scallorn,* and *Steiner*) and five descriptive groups.

Alba TYPE (Fig. 8, A-E; 6 specimens)

Distinguished by their concave-edged, triangular blades and slightly bulbous stems, these points have either prominent right-angle shoulders (Fig. 8, B, D, E), or faintly downward pointing barbs (Fig. 8, A). The lateral edges of the blades are often sinuous and, in one case, serrated (Fig. 8, D), in another recurved (Fig. 8, A). Each is bifacially chipped, but the workmanship on the whole is only fair. The four complete specimens range from 1.7 to 3.5 cm. in length, with the smallest example (Fig. 8, C) having possibly been reworked. All have maximum widths (across the shoulders) of between 1.6 and 2.1 cm.; while the stems are from .6 to .7 cm. in length and from .6 to .8 cm. in maximum width. The thickness varies from .2 to .4 cm.

Comments: These six specimens from Cedar Creek form a tight morphological group which compares very favorably with the *Alba* points from the George C. Davis Site (Newell and Krieger, 1949: 161–162, Fig. 56, A-H), but which shows less variation than the *Alba* points illustrated by Suhm and Jelks (1962: Pl. 132).

Bonham TYPE (Fig. 8, F, G; 2 specimens)

Two arrow points are somewhat hesitantly identified as the *Bonham* type. Each has a small triangular blade with weak barbs and straight or slightly convex lateral edges. The stems are short and essentially rectangular in outline with gently convex bases. Both are rather poorly made, being worked mainly on only one surface. Total length is 1.6 and 1.8 cm.; maximum width (across the shoulders) is 1.5 and 1.4 cm.; maximum thickness is .2 and .3 cm.; stem length is .4 cm. in each case; and maximum stem width is .4 and .5 cm.

Comments: It is the small size of these points that sets them apart from the *Bonham* found at the Sanders Site (Krieger, 1946: 185, Pl. 22, C) and from those illustrated by Suhm and Jelks (1962: 267, Pl. 134). In basic form, however, the Cedar Creek specimens seem related to the *Bonham* type.

Catahoula-LIKE POINTS (Fig. 8, H-J; 8 specimens)

Massive rectangular barbs, concave blade edges, and broad, slightly

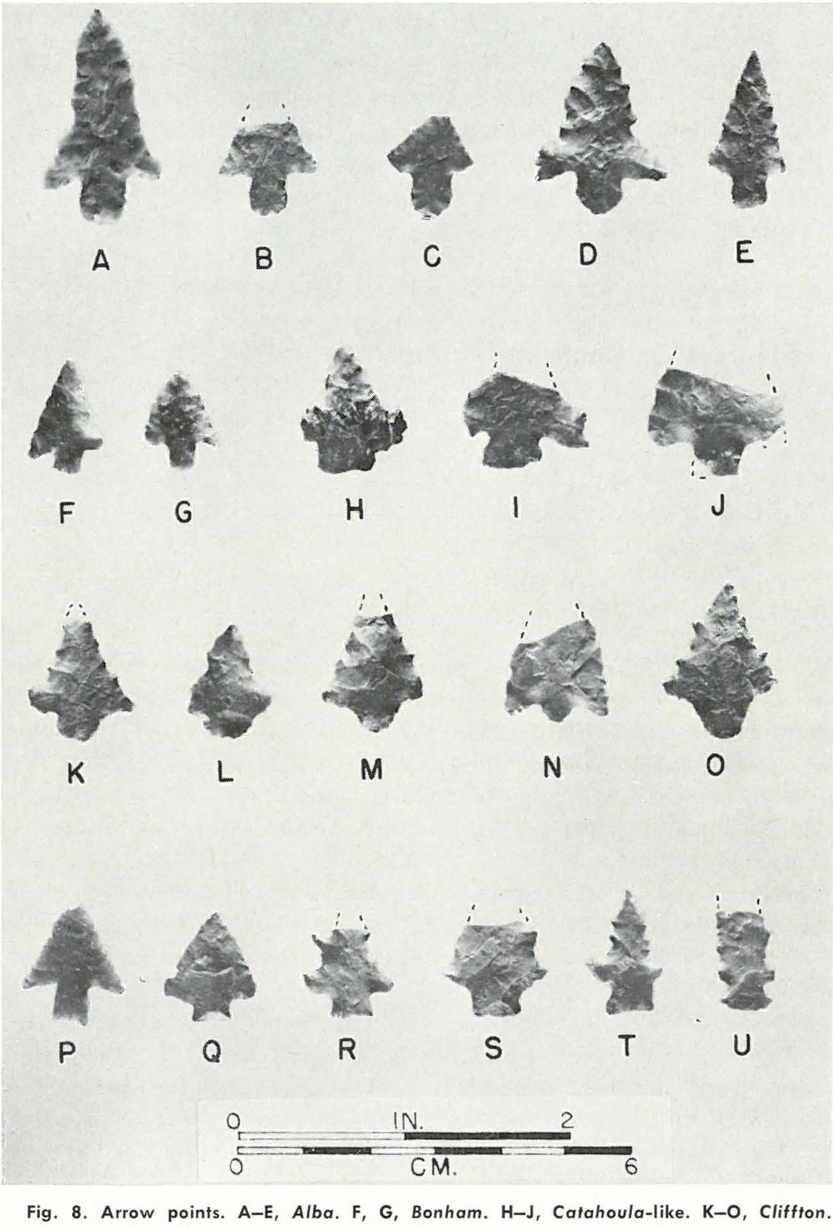


Fig. 8. Arrow points. A–E, *Alba*. F, G, *Bonham*. H–J, *Catahoula*-like. K–O, *Cliffton*. P, Q. *Cuney*. R–U, *Friley*. A–C, F–I, K, N, and S–U from Gossett Bottoms Site; D, E, J, and P–R from Lacy Site; O from Wild Bull Site.

expanding stems are the most salient features of this group. The stem is generally short and either gently convex or straight at the base. All but one are bifacially chipped and the workmanship is fairly good.

Only one specimen (Fig. 8, H) is complete, but the general impression is that all were rather large for arrow points. Maximum width occurs across the barbs and is between 2 and 2.3 cm., while the maximum thickness is between .3 and .5 cm. The stems are generally about .5 cm. long and from .7 to 1.1 cm. in maximum length. The single complete point is 2.1 cm. long.

Comments: The *Catahoula* type has been described by Bell (1960: 16, Pl. 8) who states that its most distinctive features are (1) relatively broad shoulders with massive, laterally-projecting barbs, (2) concave, often recurved, blade edges, and (3) short, wide expanding stems with convex bases. The eight specimens from Cedar Creek depart from the above in having less laterally-projecting barbs and only slightly expanding stems. They are perhaps a regional variation of the type, but until more specimens are described and illustrated it seems advisable to refer to them as *Catahoula*-like.

Cliffton TYPE (Fig. 8, K-O; 7 specimens)

The seven examples of this type have triangular blades with essentially straight lateral edges and, on five, fairly prominent serrations. Barbs are sometimes present but are never pronounced. The stems are contracting and have either pointed (Fig. 8, N) or convex (Fig. 8, K-M, O) bases, with more variation being observable in the treatment of the stem than the blade. Four of the *Cliffton* points are bifacially worked, while three are unifacially chipped. Total length is between 2 and 2.5 cm.; maximum width (across the shoulders) is between 1.4 and 2 cm.; stem length is from .3 to .7 cm.; stem width at the base is from .3 to .6 cm.; and maximum thickness is from .3 to .4 cm.

Comments: Although they fall within the range of variation defined for the *Cliffton* type (Suhm and Jelks, 1962: 269, Pl. 135), the Cedar Creek specimens are somewhat unusual in having (five instances) serrated blades. In addition, one of the points (Fig. 8, N) has downward pointing barbs and a small pointed stem—attributes suggestive of the *Bassett* type (*ibid.*: 265, Pl. 133).

Cuney TYPE (Fig. 8, P, Q; 2 specimens)

This type is characterized by a triangular blade and a rectangular or slightly expanding stem with a concave base. The shoulders are strong and may be barbed, while the blade edges vary from straight to mildly convex. One of the two examples (Fig. 8, P) is very well made;

the other (Fig. 8, Q) is crudely flaked with most of the chipping being confined to one face. Dimensions: total length 2 cm. (both points); maximum width (across the shoulders) 1.5 and 1.6 cm.; maximum thickness .2 and .3 cm.; stem length .3 and .6 cm.; and maximum width of stem (across base) .6 and .5 cm., respectively.

Comments: On the whole, these two points agree with the definition of the *Cuney* type (Suhm and Jelks, 1962: 271, Pl. 136).

Friley TYPE (Fig. 8, R-U; 7 specimens)

These are small arrow points having as their most diagnostic feature laterally-projecting barbs which are upturned toward the distal end. The edges of the blade vary from straight to concave and are often serrated. Almost always expanding, the stem is relatively short and broad, and has a base which ranges from straight or convex to concave. Workmanship is good with all examples being bifacially chipped. Length of the two complete points is 1.3 and 2 cm. Maximum width (across the shoulders) of all specimens is between 1.4 and 1.7 cm.; maximum thickness is from .2 to .4 cm.; length of stem is from .4 to .6 cm.; and maximum width of the stem is from .7 to 1.1 cm.

Comments: The *Friley* points from Cedar Creek compare favorably with those described and illustrated by Bell (1960: 46, Pl. 23), the only difference being that some of the former have serrated blades.

Granbury TYPE (Fig. 9, A-E; 17 specimens)

A fairly numerous group of rather crudely made arrow points with subtriangular outlines are identified as *Granbury*. The lateral edges of the blade and the base are either straight or convex, while the basal corners are consistently rounded. All specimens are bifacially chipped. Total length ranges from 2 to 3.1 cm.; maximum width (across the base) from 1.2 to 2.2 cm.; and maximum thickness from .2 to .6 cm.

Comments: Although these points are well within the range of the *Granbury* type, none can readily be linked with the three varieties recognized by Jelks (1962: 35–36, Fig. 14, M-W).

Perdiz TYPE (Fig. 9, F-N; 25 specimens)

Most common of the arrow point types, the *Perdiz* have contracting stems and triangular blades with straight or, less often, slightly concave to mildly convex lateral edges. The shoulders are prominent and usually barbed, while serrations occasionally appear on the blade edges. A few of the stems are sharply pointed, but most are rounded

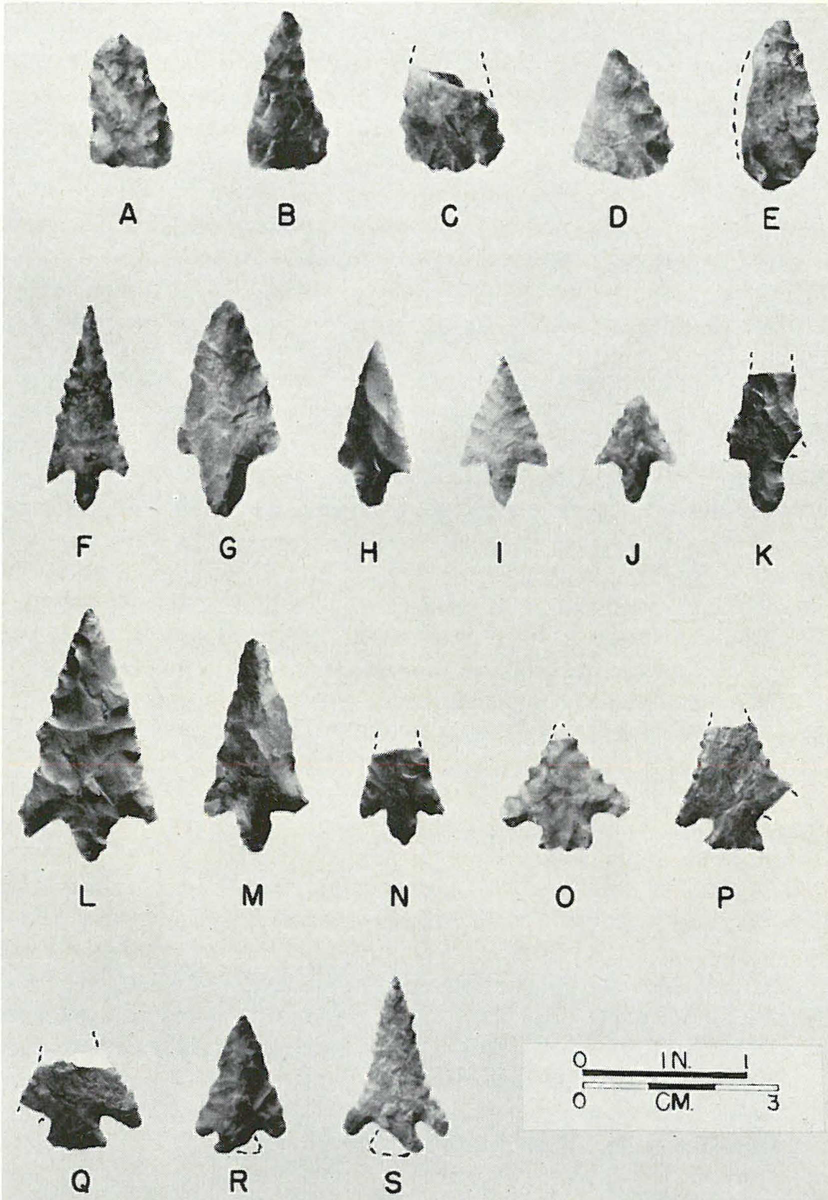


Fig. 9. Arrow Points. A–E, *Granbury*. F–N, *Perdiz*. O–S, *Scallorn*. A–E and L–S from Gossett Bottoms Site; F–K from Lacy Site.

and have slightly convex lateral edges. The workmanship is variable, with some specimens being crudely flaked and others being well made. On several, the chipping is limited mainly to one face. Total length is between 1.8 and 4 cm.; maximum width (across the barbs) is between 1.1 and 2.2 cm.; maximum thickness is between .2 and .6 cm.; stem length is between .6 and .9 cm.; and maximum stem width is between .3 and .7 cm.

Comments: In spite of some variation in outline form, the *Perdiz* points from Cedar Creek can be generally described as rather small with moderately short, contracting stems which have rounded bases. They are differentiated from the closely related *Cliffton* type on the basis of their better workmanship and more pronounced stems.

Scallorn TYPE (Fig. 9, O-S; 10 specimens)

Each of the 10 representatives of this type has a markedly expanding but fairly short stem and a triangular blade with either straight or concave edges. Serrations occur on three points, while all have strong barbs. The bases are straight or, less frequently, gently convex. Flaking is well done and occurs across the surface of both faces. Total length ranges from 1.1 to 3 cm., with the smallest specimen undoubtedly having been rechipped. Maximum width (across the barbs) is from 1.4 to 2.1 cm.; maximum thickness is from .2 to .4 cm.; stem length is uniformily .4 cm.; and maximum width of the stem is from .7 to 1 cm.

Comments: Relative to the *Scallorn* points from central Texas (where the type is quite common; see, for example, Jelks, 1962: 27–31, Fig. 13), the Cedar Creek specimens are smaller, have shorter stems and more squat blades. It is probable that additional studies will reveal them to be a regional variation of the type.

Steiner TYPE (Fig. 10, A-F; 12 specimens)

Originally named by J. Charles Kelley but described briefly by Newell and Krieger (1949: 162–164, Fig. 56, O-Q), the "Steiner Serrated" type is here tentatively revived with the suggestion that its name be shortened to *Steiner*. Both the specimens illustrated by Newell and Krieger and those from Cedar Creek Reservoir have as their most characteristic feature rather small triangular blades with deep serrations jutting out at right angles or, less often, at odd angles. The shoulders are prominent and occasionally extend laterally in a manner somewhat similar to the *Catahoula* type. In several cases (Fig. 10, B, C, D) one shoulder is more pronounced than the other. The stems are usually short but otherwise variable, ranging from expanding to slightly contracting; while the bases are straight to gently convex or concave. Workmanship is fairly good although three of the Cedar

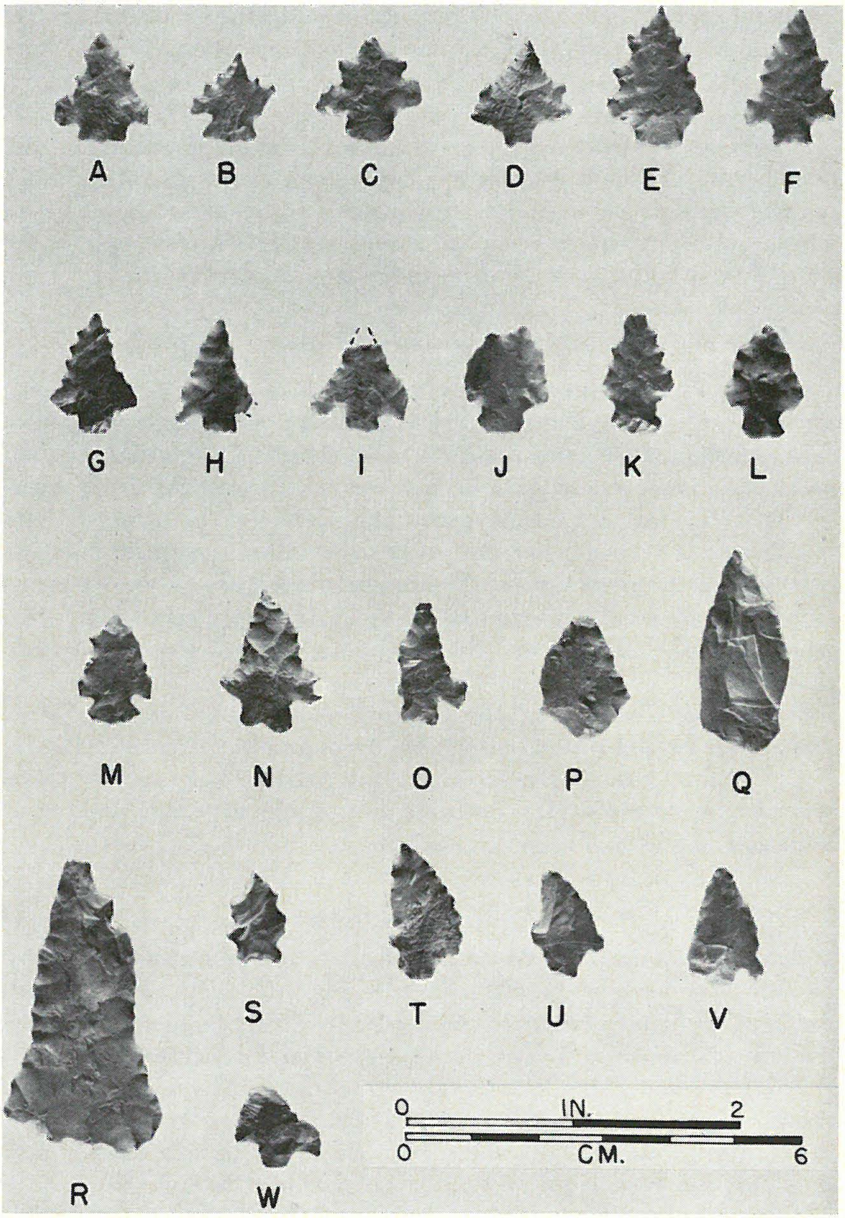


Fig. 10. Arrow Points. A–F, *Steiner*. G–I, Points with short, rectangular stems. J–M, Points with expanding stems and straight or convex bases. N, O, Points with expanding stems and concave bases. P–R, Points with subtriangular outlines. S–W, Eccentric-shaped points. A–D, G–L, N, O, and S–V, from Gossett Bottoms Site; D, F, and P–R from Lacy Site; M and W from Wild Bull Site.

Creek examples are unifacially chipped. Total length ranges from 1.4 to 2 cm.; maximum width (across the shoulders) from 1.4 to 1.6 cm.; maximum thickness from .2 to .4 cm.; stem length from .3 to .5 cm.; and maximum stem width from .5 to .7 cm.

Comments: Unlike most of the arrow point types, *Steiner* is based primarily on blade characteristics rather than on stem features. Serrated blades, of course, are fairly common but the deep, sometimes erratic, serrations on these points seem distinctive. The cultural affiliations and distribution remain uncertain (hence the provisional nature of the type), although probable *Steiner* points have been found at Forney Reservoir (Members of the Dallas Archeological Society, 1963: Fig. 7, M), at the Limerick Site (Duffield, 1961: Fig. 8, R), at the Strawn Creek Site (Duffield, 1963a, Fig. 11, A), and at Wylie Focus sites (Stephenson, 1952: Fig. 95, G, third from the right).

MISCELLANEOUS ARROW POINTS

Points with short, rectangular stems (Fig. 10, G-I; 6 specimens). This group of untyped specimens is represented by points having triangular blades and small, rectangular or very slightly expanding stems. Lateral edges of the blade are frequently serrated and usually concave. The shoulders are well developed and barbed, while the stem is generally parallel-sided and has a straight base. Workmanship is good and all examples are bifacially chipped. Total length is from 1.8 to an estimated 3 cm.; maximum width (across the barbs) is from 1.5 to 1.8 cm.; maximum thickness is from .2 to .4 cm.; stem length is from .3 to .4 cm.; and maximum stem width (across the base) is from .5 to .6 cm.

Comments: These six specimens appear to constitute a coherent morphological group which may eventually be recognized as a new type. Somewhat similar points have been reported from the Strawn Creek Site (Duffield, 1963a: Fig. 10, K, L).

Points with expanding stems and straight or convex bases (Fig. 10, J-M; 11 specimens). These specimens typically have small, triangular blades with prominent shoulders and short expanding stems. The edges of the blade range from straight to convex or concave, and are sometimes serrated. Considerable variation is apparent in the treatment of the stem, with the bases being straight or slightly convex to almost bulbous. On the whole, however, the stem is broader than it is long. The chipping on most specimens is merely fair and several represent only limited modification to flakes. Total length is between 1.7 and 2.6 cm.; maximum width (across the shoulders; largely estimated) is 1.1 to 1.4 cm.; maximum thickness is from .2 to .3 cm.; stem length is .4 to .5 cm.; and maximum width of the stem is .7 to .9 cm.

Comments: Possibly related to the *Scallorn* type, these points have not been so classified because (1) their stems are somewhat smaller and generally more convex or bulbous, and (2) they do not form a good continuum with the points from Cedar Creek identified as *Scallorn* (see above). At least some of these points also appear to be similar to the tentative new *Homan* type (Wood, 1963: 1–2; Fig. 1, a-r), but are perhaps of cruder workmanship and do not as frequently have concave blade edges.

Points with expanding stems and concave bases (Fig. 10, N, O; 3 specimens). Each of these points has a mildly expanding stem and a concave base. On two (Fig. 10, N, O) the blade is concave and one shoulder has a rectangular, laterally-projecting barb. The opposite shoulder is either weak (Fig. 10, N) or absent (Fig. 10, O). Both of these points are worked mainly on one face, but neither appears to have been rechipped. The third example differs considerably from the other two in that it has a small triangular blade with straight edges and prominent, downward pointing barbs. It, too, is unifacially worked. This last specimen is quite small, being 1.4 cm. long, an estimated 1.5 cm. wide across the barbs, and .3 cm. thick. Its stem is .4 cm. long and .7 cm. wide at the base. The other two points (both, incidentally, from the Gossett Bottoms Site) are 2 and 2.4 cm. long, 1.1 and 1.6 cm. wide at the shoulders, and .3 and .5 cm. thick, respectively. Their stems are .4 and .5 cm. long and .6 and .9 cm. wide at the base.

Comments: While this group is solely for descriptive convenience, the two points with massive barbs are distinctive and in some respects resemble the *Catahoula* type (Bell, 1960: 16, Pl. 8).

Points with subtriangular outlines (Fig. 10, P-R; 8 specimens). This heterogeneous group of stemless points includes specimens which have subtriangular to almost ovate outlines but which cannot be identified with either the *Young* or *Granbury* type. All are poorly made, with most being unifacially worked, sometimes only along the marginal edges. Total length is from 2.1 to 4.6 cm.; maximum width is from 1.5 to 2.5 cm.; and maximum thickness is from .1 to .6 cm.

Comments: It is probable that some of these specimens—especially the larger ones (such as illustrated in Fig. 10, R)—served as knives, while others (Fig. 10, P, Q) may have functioned as hastily-made arrow points.

Points with eccentric outlines (Fig. 10, S-W; 8 specimens). This category, like the immediately preceding one, is a catchall which includes a variety of small, very crudely-made stemmed points. The blades are usually asymmetrical and sometimes serrated, while the stems range from contracting to expanding. Each has been simply fashioned from a small flake and the outline form, at least in part, appears to have been influenced by the original shape of the flake. None is bifacially worked; indeed, the chipping is confined to marginal retouching. The total length varies from 1.3 to 2.2 cm.; the maximum width (across the shoulders) from .8 to 1.4 cm., the maximum thickness from .2 to .3 cm., the stem length from .3 to .5 cm., and the maximum stem width from .3 to .7 cm.

ARROW POINT FRAGMENTS (60 specimens)

Of the 192 arrow points from the Wild Bull, Lacy, and Gossett Bottoms sites, 60 are too fragmentary for further classification. The majority of these are blade pieces and none has an intact stem. In size, however, all clearly contrast with the dart and knife fragments.

Dart Points

Characterized by bifacial chipping, pointed distal ends, and generally distinct stems, the dart points are distinguished from the arrow points principally on the basis of their larger size and greater weight. A total of 373 dart points was found, 130 at the Wild Bull Site, 206 at the Gossett Bottoms Site, and 37 at the Lacy Site. Those complete enough for typological study have either been grouped into one of 10 types (*Bulverde*, *Edgewood*, *Ellis*, *Folsom*, *Gary*, *Kent*, *Marshall*, *Morrill*, *W.esley*, and *Yarbrough*), or left unclassified. In addition, two types, *Gary* and *Yarbrough*, have been broken down into subgroups or varieties, primarily for descriptive convenience.

Most of the dart points have been fashioned from chert or a fine-grained quartzitic stone. A few, however, are made of petrified wood.

Bulverde TYPE (Fig. 11, A, B; 2 specimens)

Both points identified as *Bulverde* are incomplete, but each appears to have had a large triangular or subtriangular blade with either moderate barbs or prominent shoulders. The stem is parallel-sided and has an essentially straight base which on one specimen (Fig. 11, B) consists of the nodular cortex. Rather crude flaking (perhaps a result of the hammerstone percussion technique) is exhibited by both examples. Total length cannot be determined; maximum width (across the shoulders) is 3.2 and an estimated 4 cm.; maximum thick-

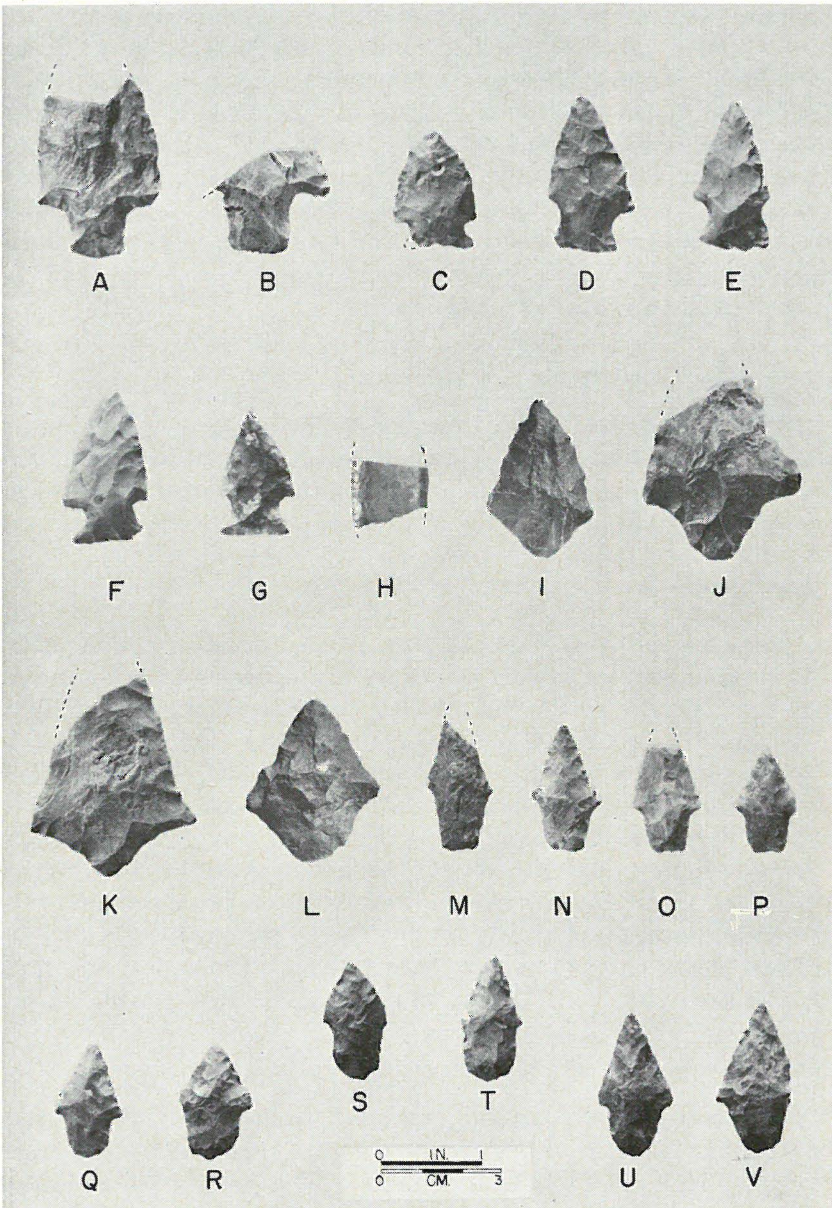


Fig. 11. Dart Points. A, B, *Bulverde*. C, *Edgewood*. D–G, *Ellis*. H. *Folsom*. I–L, *Gary alsa*. M–P, *Gary colfax*. Q–V, *Gary hobson*. A from Lacy Site; B–H, K, L, and Q–T from Wild Bull Site; I, J, M–P, U, V from Gossett Bottoms Site.

ness is .9 and .8 cm.; stem length is 1.2 and 1.4 cm.; and stem width at the base is 1.5 and 1.6 cm., respectively.

Comments: The most distinctive features of these points are their rectangular stems and prominent shoulders.

Edgewood TYPE (Fig. 11, C; 1 specimen)

The one example of this type is a side-notched point which has a small triangular blade with convex edges and strong, but not barbed, shoulders. Markedly expanding, the stem is short and almost as wide as the blade. The base is concave and may have been somewhat smoothed—fractures resulting from exposure to heat have damaged the stem, however, and make it difficult to be certain of this feature. Workmanship is generally good even though the flaking does not extend entirely across the surface of one side. Total length is 3 cm.; maximum width (across the shoulders) is 2.2 cm.; maximum thickness is .5 cm,; stem length is .6 cm.; and stem width is an estimated 2 cm.

Comments: In most respects, this point conforms to Johnson's (1962: 177, Fig. 7, F-H) description of the *dixon* variety of *Edgewood.*

Ellis TYPE (Fig. 11, D-G; 5 specimens)

Small triangular blades and sharply expanding stems with straight or very slightly convex bases are the most diagnostic attributes of these five points. The edges of the blade are straight or gently convex and, in one instance, beveled (to the left, distal end up). Shoulders are uniformly prominent although not barbed. For the most part, the chipping is well done with narrow, almost oblique flake scars occurring across the surfaces of the several specimens. Total length is from 2.2 (point probably rechipped) to 4.1 cm.; maximum width (across the shoulders) is from 2 to 2.3 cm.; maximum thickness is from .5 to .6 cm.; stem length is from .7 to 1 cm.; and stem width at the base is from 1.6 to 2 cm.

Comments: Compared to the *Ellis* points from the George C. Davis Site, where the type was first defined (Newell and Krieger, 1949: 166, Fig. 58, A-H), and to those illustrated in Suhm and Jelks (1962: Pl. 94), the Cedar Creek specimens tend to have somewhat more concave and sharply expanding stem edges. They are, however, clearly within the range of variation defined for the type.

Folsom TYPE (Fig. 11, H; 1 specimen)

Although consisting of only a small fragment, there can be no serious doubt that this piece represents the medial section of a *Folsom* point. A well defined flute is present on both surfaces, while the marginal edges are very skillfully retouched. The lateral edges contract faintly at one end, but it is impossible to distinguish the distal edge from the proximal edge. No lateral smoothing can be detected. This piece now measures 2 cm. wide, 2 cm. long, and .2 cm. thick (at the center).

Comments: Both this specimen and an unidentifiable basal fragment (conceivably from a *Scottsbluff* or *Eden* point) which has ground edges and a lenticular cross section were recovered from the Wild Bull Site. They are the only Paleo-Indian points found during the excavations and, unfortunately, neither was obtained from a context which could be identified as early. Hence, whether they were picked up and brought to the site by Archaic or Neo-American peoples, or were the only residue recognized from an early occupation at the site remains undetermined. Interestingly, a very similar fragment of a fluted point was found at the George C. Davis Site (Newell and Krieger, 1949: 168–170, Fig. 57, V). It, too, appears to have been found out of its original cultural context.

Gary TYPE (Figs. 11 and 12; 191 specimens)

Represented by over fifty percent of the identifiable dart points, the *Gary* type is by far the most common recovered from the Cedar Creek sites. As a group, the *Gary* points are linked by their contracting stems, with other features—such as size, blade form, and treatment of the base—showing a considerable range. Much the same degree of morphological variation was recorded at the Yarbrough and Miller sites where Johnson (1962: 161–166 and 244–247) recognized nine varieties of the *Gary* type: *alsa*, *colfax*, *emory*, *hobson*, *kaufman*, *kemp*, *kenedy*, *panna maria*, and *runge*. Most of these varieties apply rather well to the Cedar Creek material, although *emory* could not be satisfactorily separated from *colfax*. Johnson noted that *kaufman* and *hobson* were the "norms" for both the Miller and Yarbrough sites. At Cedar Creek the norm is *hobson*, with *alsa*, *colfax*, and *kemp* being secondary, and *kaufman*, *kenedy*, *panna maria*, and *runge* being minor varieties.

Alsa Variety (Fig. 11, I-L; 27 specimens). The most distinctive attributes of this variety are moderate size, crude workmanship, broad triangular blade, and relatively small stem. Lateral edges of the blade vary from straight or slightly convex to concave, while the shoulders are usually prominent and may even be outflaring (Fig. 11, J, K).

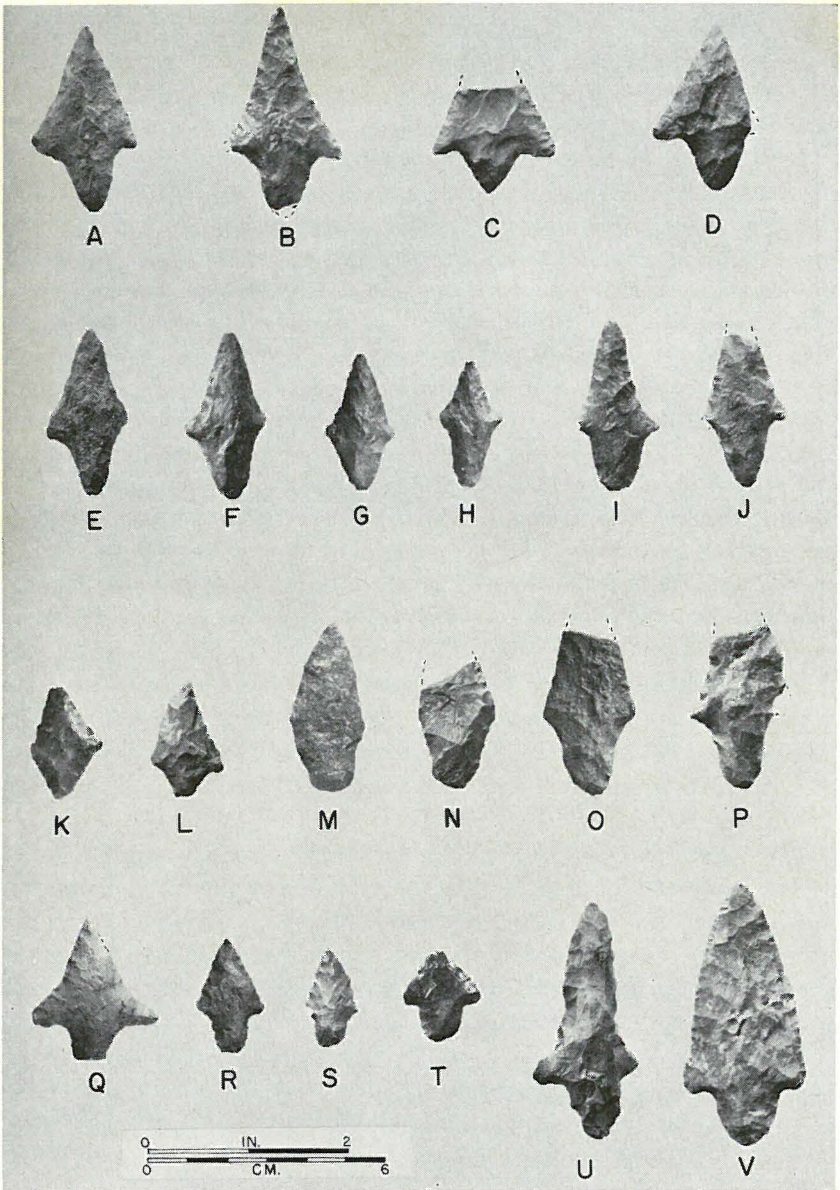


Fig. 12. Dart Points. A–D, *Gary kaufman*. E–J, *Gary kemp*. K, L, *Gary kenedy*. M, N, *Gary panna maria*. O, P, *Gary runge*. Q–V, Miscellaneous *Gary*. A–C and I–K from Wild Bull Site; D–H and L–T from Gossett Bottoms Site; U and V from Lacy Site.

The stem is typically short and contracting, terminating in either a pointed or convex base. Most examples of this variety are poorly chipped and have thick cross sections. Total length is 3.8 to 5.5 cm.;

maximum width (across the shoulders) is 2.2 to 4.4 cm.; maximum thickness is .6 to 1.5 cm.; stem length is .7 to 1.3 cm.; and stem width at the base is approximately .5 to 1.1 cm.

Comments: These are quite heavy points which may, at least on occasions, have served as knives. In outline form and workmanship they resemble the *Almagre* type (Suhm and Jelks, 1962: Pl. 81) and future studies should attempt to collect data to determine whether or not these similarities are fortuitous or the result of a historical connection. Indeed, the whole problem of the relationship between the contracting stem tradition (represented by the *Gary* and *Wells* types) in the eastern part of the state and that (represented by the *Almagre* and *Langtry* types) in the western part of Texas merits careful investigation.

Colfax Variety (Fig. 11, M-P; 25 specimens). All examples of this group are small and have as their most characteristic features slightly contracting stems and straight to faintly convex or concave bases. The blades are triangular with concave or straight edges and fairly pronounced shoulders. Several have shallow serrations which apparently resulted from marginal retouching (Fig. 11, N, O). The workmanship is good, although small (hammerstone percussion-produced?) flake scars predominate. Total length is 2.7 to 4.2 cm.; maximum width (across the shoulders) is 1.7 to 2.7 cm.; maximum thickness is .4 to .8 cm.; stem length is .7 to 1.2 cm.; and stem width at the base is .9 to 1.2 cm.

Comments: Johnson's (1962: 164–166) two varieties with flat bases, *emory* and *colfax*, are differentiated from one another principally on the basis of the degree of contraction of the stem. This distinction did not, however, seem practical in the Cedar Creek collection and all of the small, straight-based *Gary* points are grouped into the less-contracting stem *colfax* variety.

Hobson Variety (Fig. 11, Q-V; 44 specimens). The most definitive characteristics of this variety are small to medium size, a triangular blade, and, most importantly, a fairly broad stem with a rounded base. The stem is relatively long, being from about one-third to one-half the total length of the point. Lateral edges of the stem vary from convex to nearly straight, while the blade edges are straight or slightly concave to mildly convex. Workmanship is good and many points have been marginally retouched. Total length is 2.4 to 4.1 cm.; maximum width (across the shoulders) is 1.5 to 2.5 cm.; maximum thickness is .5 to .9 cm.; stem length is .9 to 1.3 cm.; and stem width at the base is approximately 1 to 1.2 cm.

Comments: It is the rounded base more than any other single feature that distinguishes the *hobson* variety.

Kaufman Variety (Fig. 12, A-D; 9 specimens). A triangular blade and an essentially pointed stem are the most diagnostic attributes of the *kaufman* variety. The shoulders are pronounced and tend to flare outward, with distinct barbs occasionally present. Stems are somewhat triangular in outline and terminate in either a pointed (Fig. 12, C) or very slightly rounded base (Fig. 12, A, B, D). The lateral edges of the stem are smoothed on two specimens. On the whole, the chipping is well done. Total length is 4 to 5.3 cm.; maximum width (across the shoulders) is 2.2 to an estimated 3.1 cm.; maximum thickness is .5 to .7 cm.; stem length is 1.2 to 1.4 cm.; and stem width at the base is approximately .2 to .5 cm.

Comments: A major variety at the Yarbrough and Miller sites (Johnson, 1962), *kaufman* is a minor form at Cedar Creek, having been found only at Wild Bull and Gossett Bottoms.

Kemp Variety (Fig. 12, E-J; 25 specimens). These points have rather long and narrow, contracting stems with pointed or very slightly rounded bases. Like the stem, the blade tends to be slender, while the lateral edges are usually concave. The shoulders are prominent, but lack true barbs. Workmanship is generally excellent and most blades have distinct lenticular cross sections which resulted from marginal retouching. Several blades appear to be beveled, a trait rarely reported for the *Gary* type. Total length is 2.3 to 5.4 cm.; maximum width (across the shoulders) is 1.6 to an estimated 2.2 cm.; maximum thickness is .5 to .8 cm.; stem lengths is 1 to 1.7 cm.; and stem width at the base is approximately .3 to .6 cm.

Comments: The *kemp* variety points from Cedar Creek differ slightly from those described by Johnson (1962: 164–165) in that they have more markedly concave blade edges. In outline form, the *kemp* variety is similar to the *runge variety*, the major difference being that the former is smaller than the latter.

Kenedy Variety (Fig. 12, K, L; 5 specimens). Each of the five examples of this variety has, as its chief distinguishing characteristic, a diamond-shaped or lozenge-shaped outline. The blade is triangular with straight or slightly concave edges and prominent shoulders, while the base of the stem is pointed. Moderately good flaking with some marginal retouching occurs on most of the specimens. Generally small in size, these points have a total length of between 2.5 and 3.2 cm.; a maximum width (across the shoulders) of between 1.6 to 2.4 cm.; a maximum thickness of between .5 and .7 cm.; a stem length of between .7 and 1.5 cm.; and a stem width of between roughly .4 and .6 cm.

Panna Maria Variety (Fig. 12, M, N; 5 specimens). Although only one of the examples of this variety is complete, each appears to have had a fairly long, triangular blade and poorly defined shoulders which merge almost imperceptibly with the stem. The stem with its convex edges and gently rounded base is less contracting than most of the other varieties of *Gary*. Workmanship is rather poor and the majority seem to have been percussion chipped by means of a hammerstone. Marginal retouching is in evidence on just one specimen. Maximum width (across the shoulders) is 1.7 to 2.2 cm.; maximum thickness is .6 and .9 cm.; stem length is 1 to 1.3 cm.; and stem width at the base is approximately .8 to 1 cm. The one complete point is 4.4 cm. long.

Comments: Unlike the *panna maria* variety points described by Johnson (1962: 165), none from Cedar Creek has a pointed base. In all other respects, however, they fall within the definition given by Johnson.

Runge Variety (Fig. 12, O, P; 13 specimens). Medium to large size and long, fairly narrow stem which ends in a pointed or slightly rounded base are the most distinctive characteristics of the 13 *runge* variety points. Most blades are broken, but all appear to have been triangular in outline with straight to slightly convex to concave edges. The shoulders are fairly prominent and sometimes (Fig. 12, P) flare outward. Workmanship is quite variable, ranging from good to poor. Total length is 4.1 to an estimated 7 cm.; maximum width (across the shoulders) is 2.1 to 3.7 cm.; maximum thickness is .7 to 1 cm.; stem length is 1.4 to 2.2 cm.; and stem width at the base is approximately .5 to 1 cm.

Comments: The *runge* variety points from Cedar Creek are slightly larger than those described by Johnson (1962: 164 and 246), but otherwise conform to his definition.

Gary, miscellaneous and fragmentary (Fig. 12, Q-V; 38 specimens). These are contracting stem points which fall within the general range of the *Gary* type, but which—either because of their fragmentary condition or their combination of attributes—cannot be assigned to any of the varieties yet defined for the type.

Kent TYPE (Fig. 13, A-C; 4 specimens)

This minor type at Cedar Creek Reservoir is represented by four rather small specimens which have essentially rectangular stems. The slender, triangular blade has straight or slightly convex edges which are sometimes faintly serrated (Fig. 13, A, B). The shoulders are distinct, but not barbed, and one side is sometimes—possibly because it was rechipped—stronger than the other. Lateral edges of the stem

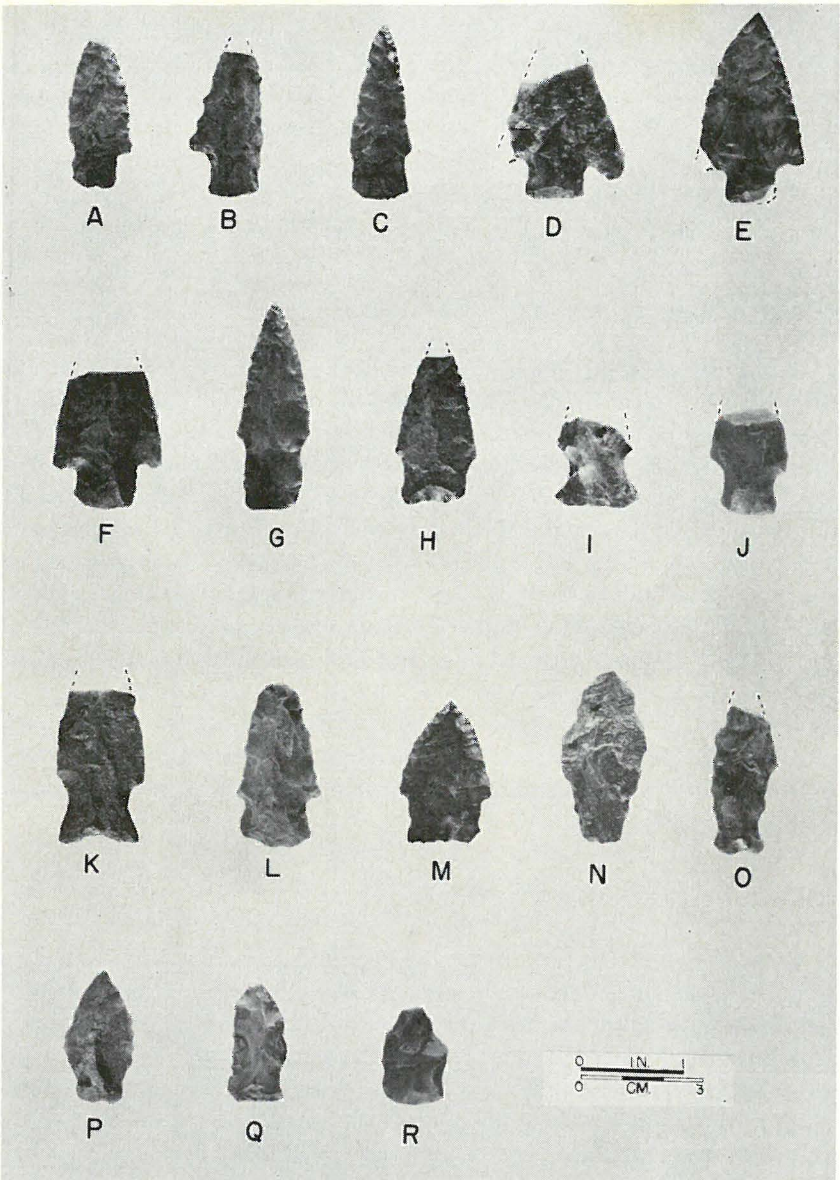


Fig. 13. Dart Points. A–C, *Kent.* D–F, *Marshall.* G, *Morrill.* H, *Wesley.* I, *Yarbrough dike.* J, *Yarbrough lindale.* K, *Yarbrough mabank.* L–R, Unclassified. A and F from Lacy Site; B, D, E, G–R from Wild Bull Site; C from Gossett Bottoms Site.

vary from straight to mildly convex, while the base ranges from slightly to markedly convex. Despite the rather coarse-grained material from which they are made, these points exhibit good workmanship. Total length is from 3.7 to 4.4 cm.; maximum width (across the shoulders) is from 1.6 to 2 cm.; maximum thickness is .5 to .7 cm.; stem length is from 1 to 1.2 cm.; and stem width at the base is from 1 to 1.3 cm.

Comments: In size and general outline form these points are similar to Johnson's (1962: 168, Fig. 5, D-G) *phalba* variety of *Kent.*

Marshall TYPE (Fig. 13, D-F; 4 specimens)

Long, massive barbs and short, generally rectangular stems are the most diagnostic attributes of this group of points. The blades are broad and triangular in outline with the lateral edges being straight or slightly convex. Edges of the stem are roughly parallel and the base is uniformly straight. In each case, the stem is broader than it is long. Three of these specimens are fashioned from a fine-grained chert and the chipping on all examples is unusually good. Maximum width (across the barbs) is from 3 to an estimated 3.5 cm.; maximum thickness is .7 to .9 cm.; stem length is from .9 to 1 cm.; and stem width at the base is from 1.3 to 1.6 cm. The one complete example is 5 cm. long.

Comments: The *Marshall* type occurs primarily in the central part of the state (Suhm and Jelks, 1962: 211), but does appear as a very minor form (3 specimens) at the Yarbrough Site (Johnson, 1962: 171, Fig. 6, A-C).

Morrill TYPE (Fig. 13, G; 2 specimens)

Both examples of this type have a long, rectangular stem and straight base. The edges of the stem are heavily smoothed on one point and lightly smoothed on the other. The one complete blade is long and slender and has a triangular outline with straight edge. Shoulders are present, but rather weakly developed on both specimens. The chipping is quite skillfully done, with marginal retouching being very much in evidence. Maximum width (across the shoulders) is 1.9 and 2 cm.; maximum thickness is .9 and .6 cm.; stem length is 2 and 1.8 cm.; and stem width at the base is 1.4 cm. in both instances. The complete point measures 5.7 cm. long.

Comments: While well within the range of variation indicated for *Morrill* (Suhm and Jelks, 1962: 223, Pl. 112), neither of these points agrees very favorably with either the *slocum* or *san pedro* variety described by Johnson (1962: 169–170, Fig. 6, N-S).

Wesley TYPE (Fig. 13, H; 1 specimen)

Recently defined by Johnson (1962: 178, Fig. K-M), this type has a long, triangular blade with straight edges and weak shoulders. The stem is broad and mildly expanding, and has slightly concave lateral edges which appear to have been faintly smoothed. The base of the stem is slightly concave. Well made, this point has neat marginal retouching which on the blade has produced shallow serrations. Total length is an estimated 4.3 cm.; maximum width (across the shoulders) is 2.1 cm.; maximum thickness is .7 cm.; stem length is 1.2 cm.; and stem width at the base is 1.7 cm.

Comments: The *Wesley* point from Cedar Creek, unlike those found by Johnson at the Yarbrough Site (*ibid.*), has a beveled blade (to the right, distal end up).

Yarbrough TYPE (Fig. 13, I-K; 3 specimens)

Although none of these points is complete, each seems to have had a long, slender triangular or lanceolate blade with straight or slightly convex lateral edges. The shoulders are clearly defined, but not barbed. Treatment of the stem, however, varies somewhat and primarily on this basis three varieties—*dike*, *lindale*, and *mabank*—have been recognized (Johnson, 1962: 173–174, Fig. 6, J-R). All three are represented in the collection from Cedar Creek.

Dike Variety (Fig. 13, I; 1 specimen). This quite fragmentary point is distinguished by its markedly concave stem edges and straight base. The workmanship is rather poor, resulting in an unusually thick cross section. Total length and maximum width cannot be determined, but the stem is 1.7 cm. long and 2.2 cm. wide at the base.

Lindale Variety (Fig. 13, J; 1 specimen). The most diagnostic feature of this variety is its slightly expanding stem with essentially straight lateral edges and flat base. The Cedar Creek example is rather well made, but lacks marginal retouching. Total length cannot be determined; maximum width (across the shoulders) is 2.1 cm.; maximum thickness is .8 cm.; stem length is 1.2 cm.; and stem width at the base is 1.5 cm.

Mabank Variety (Fig. 13, K; 1 specimen). This variety is very much like the *dike* variety of *Yarbrough*, except that it has a concave base. The workmanship is good and the lateral edges of the stem are slightly smoothed. Total length cannot be determined; maximum width (across the shoulders) is 2.3 cm.; maximum thickness is .7 cm.; stem length is 1.5 cm.; and stem width at the base is 2 cm.

UNCLASSIFIED DART POINTS (Fig. 13, L-R; 7 specimens)

Included in this category are seven reasonably complete points—all from the Wild Bull Site—which cannot be identified with any previously defined type. They exhibit a wide range of variation in workmanship and outline form. All are illustrated in Figure 13, L-R.

DART POINT FRAGMENTS (152 specimens)

Consisting primarily of blade pieces, these specimens are too incomplete for detailed typological study. They are rather arbitrarily separated from knife fragments on the basis of their smaller size and, to a lesser extent, better workmanship.

Knives

Each of the 211 specimens classed as a knife is bifacially worked along one or more edges or—more frequently—across both flat surfaces. Moreover, none has a clearly delineated stem and most have pointed distal ends. They are generally larger than the dart points and, on the whole, less well made than either the dart or arrow points. Because of their crude workmanship and frequent incompleteness, sorting the knives into discrete, yet coherent, morphological groups is troublesome. The most obvious and presumably most meaningful variation is in the outline form. However, on a few examples the locus of the cutting edge seems to be of importance, while on others the technique of manufacture or material from which they are made appears to be of significance. Consequently, in classifying the knives several criteria have been employed with varying emphasis. The resultant categories are of a purely descriptive nature and include ovate knives, subtriangular knives, lanceolate knives, bi-pointed knives, single-edged knives, cortex-base knives, and knives made from petrified wood. In addition, there are 132 fragments which are too incomplete for further study but which, on the basis of their size, appear to have come from knives.

OVATE KNIVES (Fig. 14, A-C; 18 specimens)

These small to medium size specimens with ovate outlines have rounded bases and evenly convex lateral edges. None is complete, but all appear to have been relatively short and broad. Each is bifacially flaked with several being rather skillfully made. Most were perhaps between 4 and 6 cm. in length; maximum width is from 2.2 to 3.5 cm.; and maximum thickness is from .4 to 1.3 cm.

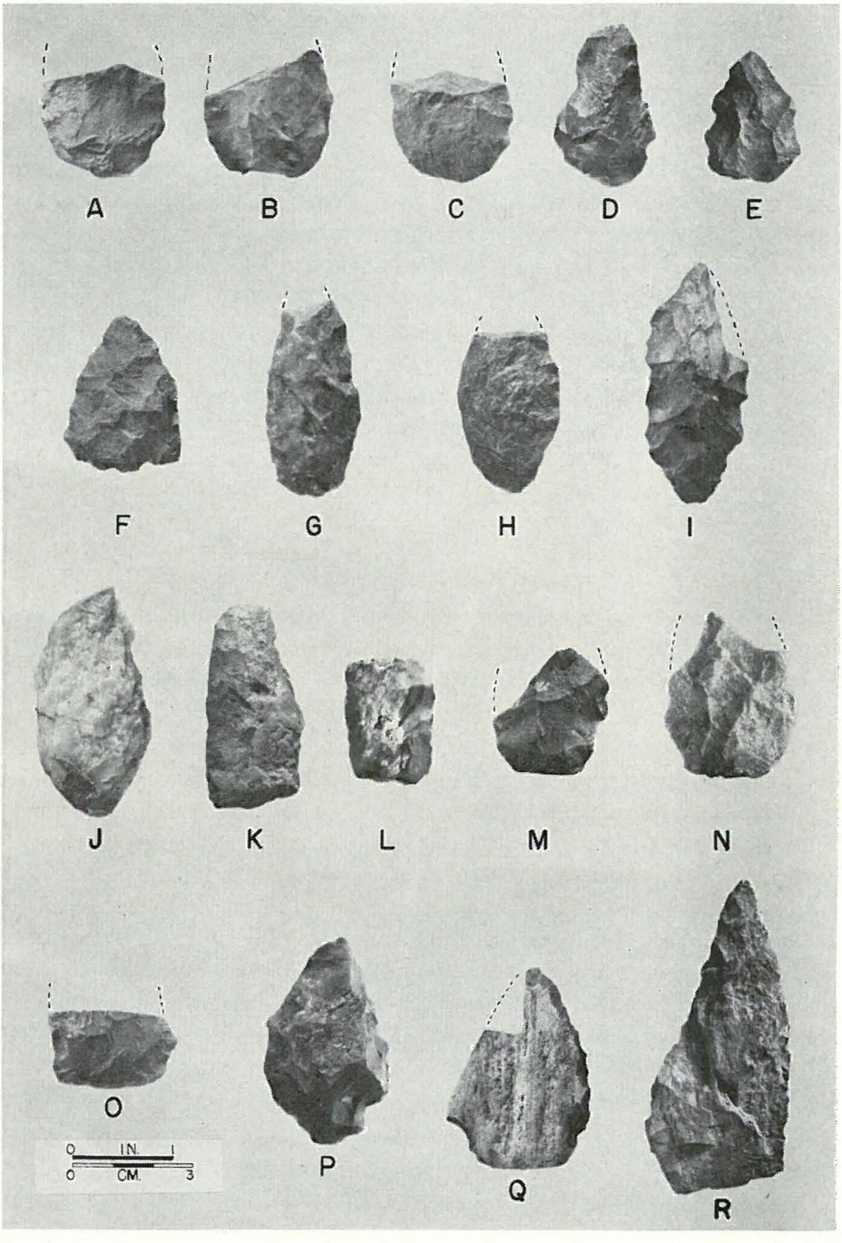


Fig. 14. Knives. A–C, Ovate. D–F, Subtriangular. G, H, Lanceolate. I, J, Bi-pointed. K, L, Single-edged. M–O, Cortex base. P–Q, Petrified wood. A–C, G, L, and N–R from Wild Bull Site; D, I, and K from Lacy Site; E, F, H, J, and M from Gossett Bottoms Site.

Comments: Very similar knives constitute Johnson's (1962: 184, Fig. 9, G-H) Group III.

SUBTRIANGULAR KNIVES (Fig. 14, D-F; 9 specimens)

This knife form is distinguished by its triangular to subtriangular outline and small to medium size. The lateral edges tend to be convex, while the base varies from straight to gently rounded. The workmanship is quite poor and rough percussion flake scars predominate. The proximal ends are thick on several examples and it is difficult to imagine exactly how these particular specimens might have been hafted. Total length is from 3 to 4.7 cm.; maximum width (at the base) is from 2.2 to 3.3 cm.; and maximum thickness is .5 to 1.4 cm.

Comments: The smaller subtriangular knives resemble the *Granbury* arrow point type (see above), except that they are thicker and more crudely made.

LANCEOLATE KNIVES (Fig. 14, G, H; 17 specimens)

Like the ovate knives, none of these specimens is complete. However, each appears to have had an essentially lanceolate outline with a slightly contracting proximal end. The base varies considerably, ranging from straight or gently concave to convex. The workmanship is good on some examples, poor on others. Maximum width is 2.1 to 3.4 cm.; maximum thickness is .5 to 1 cm.; and the length of the nearly complete lanceolate knife (Fig. 14, G) is an estimated 6 cm.

Comments: Similar knives have been found at the Yarbrough and Miller sites (Johnson, 1962: 184 and 253, Groups I and IV) and at the Strawn Creek Site (Duffield, 1963a: Fig. 12, D).

BI-POINTED KNIVES (Fig. 14, I, J; 6 specimens)

Sharply contracting proximal and distal ends are the distinguishing characteristics of this group of knives. Their lateral edges are convex, but not always evenly so, and the outline is sometimes slightly asymmetrical (Fig. 14, J). Although flaked by means of the percussion technique, most of the bi-pointed knives are fairly well made. Total length is 4.3 to 6.2 cm.; maximum width (approximately midway on the edges) is 2 to 3.1 cm.; and maximum thickness is .7 to 1.4 cm.

Comments: This form corresponds very favorably with Johnson's (1962: 184–186 and 253) Group V found at the Yarbrough and Miller sites.

SINGLE-EDGED KNIVES (Fig. 14, K, L; 15 specimens)

Bifacial chipping on these knives is confined to one lateral edge but is much more pronounced than that occurring on the utilized flakes (see below). The single-edged knives have been fashioned from flakes (Fig. 14, K) as well as small, rather flat pebbles (Fig. 14, L). The workmanship is crude and the outline is irregular. Total length is 4.2 to 6.8 cm.; maximum width is 2.2 to 4.3 cm.; and maximum thickness is 1 to 1.8 cm.

CORTEX-BASE KNIVES (Fig. 14, M-O; 9 specimens)

In outline form and size this group is very similar to the ovate knives, but is differentiated from them on the basis of the nodular cortex which appears at the base. Presumably these specimens were fashioned from either cortex flakes (Epstein, 1963: 28) or small, flat pebbles—it is difficult to be sure of which because of the bifacial flaking. The workmanship is generally good, although all are percussion chipped. Total length is 4.2 to an estimated 6 cm.; maximum width is 2.4 to 3.5 cm.; and maximum thickness is .6 to 1.1 cm.

KNIVES MADE FROM PETRIFIED WOOD (Fig. 14, P-Q; 5 specimens)

These five rather crude specimens have been fashioned from thin flakes or slabs of petrified wood, rather than the chert and quartzite stones used in the manufacture of the other knives. On most the chipping is limited to one or both marginal edges and the outlines can generally be described as subtriangular. Total length ranges from 4.4 to 8.2 cm.; maximum width from 3.2 to 3.6 cm.; and maximum thickness from .7 to 1.3 cm.

Comments: In many respects these knives (particularly that illustrated in Fig. 14, R) are similar to specimens found in the McGee Bend Reservoir area and termed *Bronson* knives by Edward B. Jelks (1965: 165–166, Fig. 81).

Bifaces

This category of artifacts forms a continuum with the knives in that they are bifacially worked, frequently have pointed distal ends, and lack clearly defined stems. The 85 specimens classified as bifaces, however, are generally larger and more crudely made than the knives. On the basis of variations in the outline and, to a lesser extent, the technique of manufacture the bifaces are sorted into three groups:

Bristol, pebble, and bi-pointed. In addition, there is a miscellaneous group composed of unclassifiable and fragmentary specimens.

Bristol BIFACES (Fig. 15, A-E′; 32 specimens)

Recently defined by Duffield (1963a: 43–44, Fig. 13, C-H), this highly distinctive group is most easily recognized by its subcircular outline and moderately small size. The edges vary from sinuous (Fig. 15, C) to, more commonly, even (Fig. 15, A, B, E), and about half are slightly to well smoothed (Fig. 14, D)—perhaps from use. Percussion flake scars predominate, although many are well made and have neat marginal retouching. Others are less skillfully manufactured and have thickened, though lenticular, cross sections. Patches of nodular cortex are occasionally present on one or both surfaces (Fig. 15, E-E′) and sometimes along the edges. Because of the bifacial chipping it is difficult to ascertain the details of manufacture, but there are suggestions that both flakes (apparently produced by the hammerstone percussion technique) and small, flat pebbles were utilized. The maximum diameter is 2.2 to 4.1 cm. and the maximum thickness is 1.1 to 1.8 cm.

Comments: First recognized at the Strawn Creek Site in Navarro Mills Reservoir (Duffield, 1963a: 43–44), *Bristol* bifaces have also been recovered from the Yarbrough, Miller (Johnson, 1962: Figs. 10, F-H and 30, O, P), Wolfshead (Duffield, 1963b: Fig. 14, D, E), Limerick (Duffield, 1961: Fig. 11, A, B), and Wood (Crook and Harris, 1952: Pl. 5, No. 6) sites, as well as from certain localities in the Forney Reservoir area (Dallas Archeological Society, 1963: Fig. 9, N). The cultural context in which the *Bristol* biface occurs is not yet well defined, although it appears to be late Archaic.

PEBBLE BIFACES (Fig. 15, F, G; 6 specimens)

Fashioned from small, elongated chert or quartzitic pebbles, each of these specimens has one (presumably the distal) end bifacially worked to form a pointed or slightly rounded blade. Much of the opposite end is unaltered and retains the nodular cortex. In outline and technique of manufacture they resemble choppers, but they seem too small to have effectively functioned as such. Moreover, none shows the battering one would expect on a chopper. The workmanship is crude and rough, with percussion-produced flake scars very much in evidence. Length is 4.3 to 7.1 cm.; the maximum width (generally midway along the lateral edges) is 3.3 to 5.5 cm.; and maximum thickness is 1.9 to 4 cm.

Comments: Similar specimens have been variously classified as

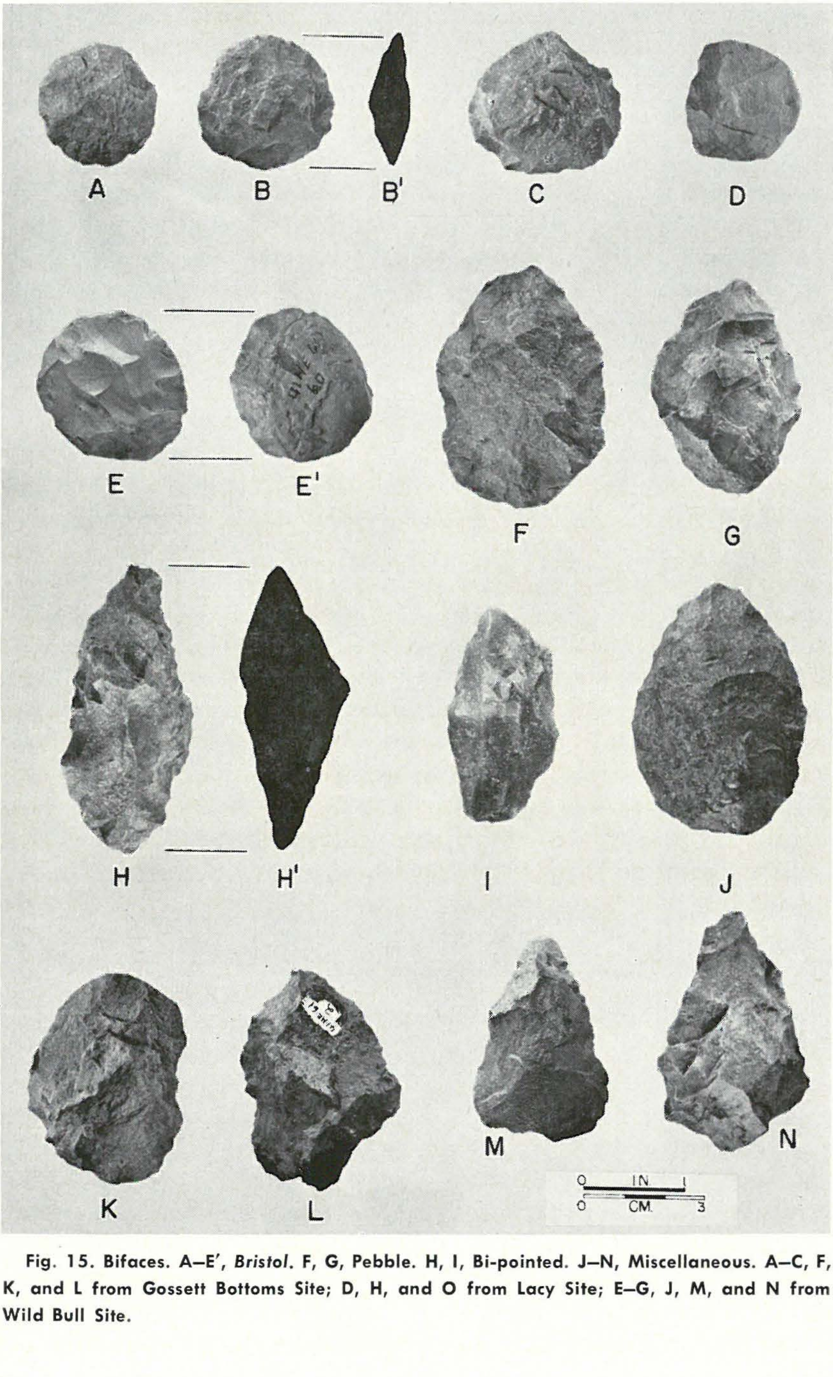


Fig. 15. Bifaces. A–E', *Bristol*. F, G, Pebble. H, I, Bi-pointed. J–N, Miscellaneous. A–C, F, K, and L from Gossett Bottoms Site; D, H, and O from Lacy Site; E–G, J, M, and N from Wild Bull Site.

picks (Jelks, 1961: Fig. 13, a-c), choppers (Duffield, 1963b: 114), blades (Tunnell, 1961: 133, Fig. 6, G-I), and *Perkin* pikes (Jelks, 1965: 175–176, Fig. 85).

BI-POINTED BIFACES (Fig. 15, H, I; 5 specimens)

These six, bifacially worked artifacts have convex lateral edges which terminate in more or less pointed distal and proximal ends. One end (the proximal?), however, tends to be slightly less pointed than the other and is sometimes better thinned. The workmanship is quite poor with most examples retaining traces of the nodular cortex. There are indications that all were made from small, elongated chert or quartzitic pebbles. The length ranges from 4.2 to 7.4 cm.; maximum width is from 2.3 to 3.2 cm.; and the maximum thickness is from 1.7 to 2.7 cm.

Comments: In basic outline these specimens resemble the bi-pointed knives (see above), but they are larger and more crudely made.

MISCELLANEOUS BIFACES (Fig. 15, J-N; 42 specimens)

Included in this group are 32 complete or reasonably complete bifaces which do not fit any of the above classifications, and 10 specimens which are too fragmentary for accurate identification. In outline, the former exhibit considerable variation, ranging from approximate ovate or subtriangular to asymmetrical. All have been roughly flaked from chert or quartzitic pebbles by means of the hammerstone percussion technique, and many still have portion of the cortex across either of the flat surfaces or at the edges. Length is from 3.6 to 7.2 cm.; maximum width is from 3 to 4.1 cm.; and maximum thickness is 1.1 to 2.8 cm.

Microliths (Fig. 16, A-E; 7 specimens)

This term is tentatively suggested for quite small, generally bifacially worked implements which show a variety of geometric forms. Some are rectanguloid (Fig. 16, A, C), while others are subtriangular to lanceolate (Fig. 16, B, D, E); none, however, is clearly pointed—hence their exclusion from the arrow point category. The flaking is generally good and appears to be mainly pressure-produced. Length is from 1.4 to 2.9 cm.; maximum width is from .9 to 2 cm.; and maximum thickness is .4 to .5 cm.

Comments: The most distinctive features of these microliths are small size and bifacial chipping. Outline form is quite variable, but, significantly, none terminates in a pointed distal end. Use as an arrow

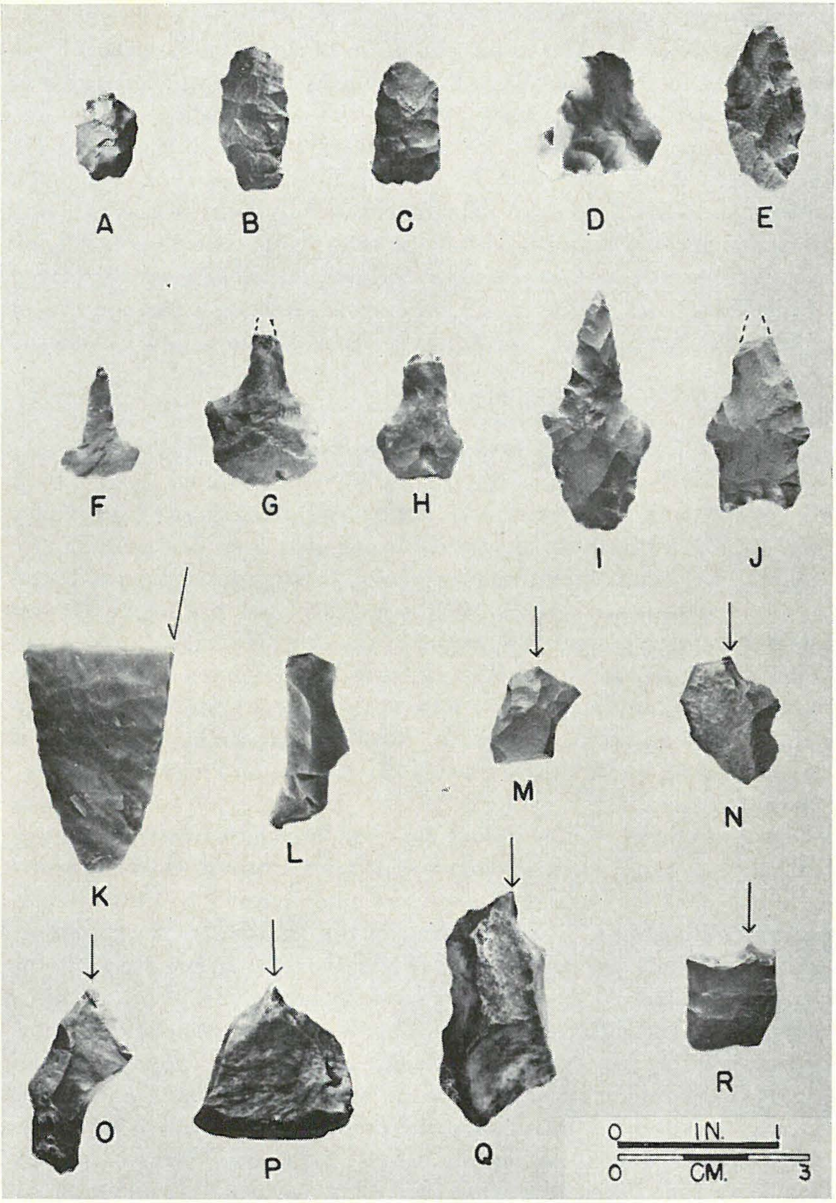


Fig. 16. Microliths, Drills, Burin, Burin Spall, and Gravers. A–E, Microliths. F–H, Flake drills. I, J, Large drills. K, Burin (arrow indicates burin blow). L, Burin spall. M–R, Gravers (arrows indicate graver points). A, B, F–H, M, N, and P from Gossett Bottoms Site; C and J from Lacy Site; D, E, I, K, L, Q, and R from Wild Bull Site.

point or even a small knife seem quite doubtful. More probably these implements, like the Mesolithic microliths of Europe and north Africa, were parts of composite tools—that is, set in slots or notches made in wooden or bone shafts to form piercing and cutting edges.

Similar, though generally larger, artifacts have been reported from the McGee Bend Reservoir (Jelks, 1965: 178–179, Fig. 86, G-J). Easily overlooked, it is possible that these implements are of much wider distribution than present evidence suggests. They are not, however, comparable to the microflint industry that has been described for the Jaketown (Ford, *et al.*, 1955: 137–150) and Poverty Point (Ford and Webb, 1956: 76–82) sites in Mississippi and Louisiana.

Drills (Fig. 16, F-J; 10 specimens)

Each of the drills recovered from the excavations has a relatively long, narrow shaft suitable for boring. When examined closely, they fall readily into two descriptive categories; drills made from flakes (Fig. 16, F-H) and drills apparently rechipped from dart points (Fig. 16, I, J). The seven examples comprising the first group are small and are chipped primarily across one face. The bases are expanded but are not carefully shaped. Treatment of the shaft is variable, with some having triangular to lenticular cross sections, while one is alternately beveled. Total length is from 1.9 to an estimated 3 cm.; length of the shaft is 1.2 to an estimated 1.5 cm.; width across the base is 1.2 to 1.8 cm.; maximum width of the shaft is .5 to 1 cm.; and maximum thickness is .3 to .5 cm.

The three drills of the second type are bifacially worked and are noticeably larger than those described above. On two the base is identical to the stem found on the *Gary* dart point type (Fig. 16, I), while the third (Fig. 16, J) is reminiscent of the *Pedernales* type. Lateral edges of the shaft are straight, and gradually taper to a sharp point on the two complete specimens. The cross section of the shaft is either triangular or lenticular. Each is well made and fine marginal retouching occurs along all edges. Total length is 3.7 to 4 cm.; length of the shaft is 1.6 to 1.9 cm.; width across the base is 1 to 1.3 cm.; maximum width of the shaft is 1 to 1.2 cm.; maximum thickness is 1.1 to 1.2 cm.

Comments: None of the lateral edges of the drills shows signs of wear (*e.g.*, smoothing) from use.

Burin (Fig. 16, K; 1 specimen)

A burin, or pointed engraving tool, was recovered from the Wild Bull Site. It appears on the lateral edge of a probable dart point blade and has been produced by the intersection of a burin facet with a transverse hinge fracture. Only one spall has been removed and the negative bulb of percussion is readily visible at the upper end (i.e., where the spall scar intersects the hinge fracture) of the burin facet. Microscopic examination of the burin point reveals some use wear. The burin facet measures 1.9 cm. long, and seems small enough to have been removed by means of pressure (Epstein, 1960: 93).

Comments: Burins are rare in the eastern part of Texas and the occurrence of this specimen is of considerable interest. Of additional significance is the fact that 1) the material, a blue-gray flint, is foreign to the area and probably came from central Texas, and 2) that the well-executed, parallel-flaking on the blade fragment is reminiscent of Paleo points. It should be recalled that a medial fragment of a *Folsom* point was found at the same site.

Burin Spall (Fig. 16, L; 1 specimen)

Besides the burin described above, the Wild Bull Site yielded an unusual flake which is tentatively identified as a burin spall. Its size and general shape are suggestive of a burin spall (Epstein, 1963: 31–33), but it has a squarish—rather than triangular or rectangular—cross section. Since there is no clear evidence of use, it may be that this piece is merely the residue from the production of a burin. The material from which it is manufactured is a brown flint which is of a better quality than that used for most other chipped stone artifacts found at Cedar Creek Reservoir. Total length is 3 cm., while the maximum width and maximum thickness are both approximately 1 cm.

Gravers (Fig. 16, M-R; 37 specimens)

All artifacts having a small, beak-like projection which may have served to incise or engrave objects of bone, clay, and the like are termed gravers. Apart from this projection, however, the gravers exhibit considerable variation. Twenty-three are made from small, flattish flakes with the projections having been formed by either lightly retouching two intersection edges (Fig. 16, M), or by pressure flaking two adjacent concavities in one edge (Fig. 16, N, O). Each specimen has only one projection, although several also have a second edge prepared for scraping (Fig. 16, N, O). The flakes are 2.8 to 4 cm. long, 1.2 to 2.5 cm. wide, and .3 to .9 cm. thick; the projections are from .2 to .6 cm. long.

The next most common variety of gravers is represented by 13 specimens made from small, stream-worn chert or petrified wood pebbles

(Fig. 15, P, Q). Their cross sections are typically thick and plano-convex, with most of the pebble apparently having been intentionally broken approximately in half. Much of the weathered cortex surface is retained, usually on the convex face. Each has a single graver point formed by either of the two techniques mentioned above. In addition, four have a beveled edge and presumably also functioned as scrapers. The entire specimen is 2.1 to 5.1 cm. long, 1 to 4 cm. wide, and .9 to 2.2 cm. thick; the graver points vary from .2 to .6 cm in length.

The only other graver (Fig. 16, R), from the Wild Bull Site, is quite unusual in that it has been chipped in the lateral edge of what appears to have been a dart point stem. The beak has been formed by two adjacent concavities unifacially chipped by means of the pressure technique. Even the material, a black, speckled flint, is distinctive and may have been obtained from the central part of the state. The over-all dimensions are: 1.5 cm. long, 1.7 cm. wide, and .4 cm. thick; the graver point is .3 cm. long.

Gouges

The 64 implements identified as gouges have prominent, often carefully prepared, bits which suggest use as specialized scraping tools. Most are made from small pebbles and seem distinctive enough to define as a tentative new type, *Gossett* gouges. The remaining four specimens compare favorably with either the *Clear Fork* gouge or the "Guadalupe" adz.

Gossett GOUGES (Fig. 17, A-H; 60 specimens)

Each of these artifacts has been made from a small, stream worn pebble (of chert, quartzitic stone, or petrified wood) and has a steep bit at one edge. The outline form was dictated principally by the natural shape of the pebble and ranges from almost circular (Fig. 17, F) to, more often, subtriangular or rectanguloid (Fig. 17, A-E, G, H). Flaking is confined to one surface and may or may not extend across the entire specimen. The opposite surface is never altered and retains the weathered cortex, perhaps to reduce the friction that might have been created during use (Fig. 17, A′, D′). This unaltered surface is usually polished, but it is impossible to determine whether from use or from stream abrasion. Cross sections are either plano-convex, or, less often, biconvex. The bits vary from straight or slightly concave to convex, are generally wider than the base, and frequently show secondary

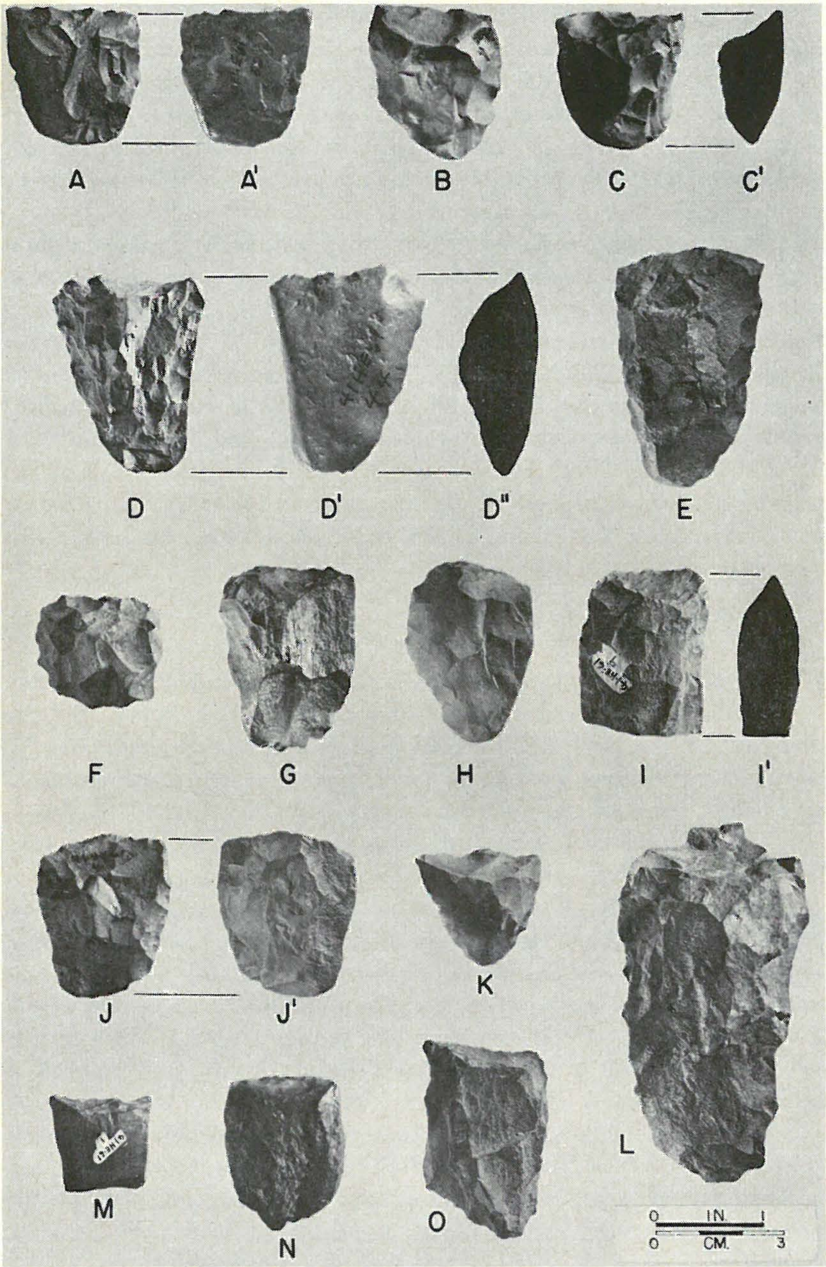


Fig. 17. Gouges and Scrapers. A–H, *Gossett* gouges. I–K, *Clear Fork* gouges. L, Possible "Guadalupe" adz. M–O, *Mineola* end scrapers. A–M, and O from Wild Bull Site; N from Gossett Bottoms Site.

retouching. Length is from 2.5 to 6.1 cm.; width across the bit is from 2.5 to 3.7 cm.; and maximum thickness is from .9 to 1.2 cm.

Comments: Some of the *Gossett* gouges—especially those with sub-triangular outlines—resemble Variety 2 of the *Clear Fork* gouges (Ray, 1941: 153–157). However, *Clear Fork* gouges are usually larger, are often bifacially worked, and do not appear to have been made from small pebbles.

Since many published descriptions of superficially similar artifacts do not clearly state whether or not the specimens in question have been fashioned from small pebbles and have retained the nodular cortex on the dorsal surface, is quite difficult to determine the distribution of the *Gossett* gouge. However, possible *Gossett* gouges have been found at the Harroun (Jelks and Tunnell, 1959; 49), and Pearson (Duffield and Jelks, 1961: 28, Fig. 6, f, g) sites in Texas and at the Boat Dock Site in Oklahoma (Bell, 1958: 43, Pl. 12, C, D). In addition, perhaps some of the gouges reported from various Trinity Aspect sites (Crook and Harris, 1952: 18–21 and 27–28, Fig. 2, Nos. 1–10) are also of this type.

Clear Fork GOUGES (Fig. 17, I-K; 3 specimens)

Three of the gouges from Cedar Creek (all from the Wild Bull Site) fall within the range of variation described by Ray (1941) for the *Clear Fork* type. Each is bifacially worked and has an essentially bi-convex cross section. Two (Fig. 17, J, K) are roughly triangular in outline and compare closely with Ray's (*ibid.*: 153–154, Pl. 2, Nos. 1, 2, 6, 11–15) Variety 1. The third example (Fig. 17, I) is incomplete, but appears to have had generally parallel lateral edges and a long, rectangular outline—features similar to those mentioned by Ray (*ibid.*: 157) for his Variety 3. On all examples the bit is steep and somewhat scooped-out. Although the percussion flaking technique was used, these gouges are fairly well made and usually show retouching at the bit. Length of the two complete examples is 2.7 and 3.8 cm.; width across the bit of all specimens is 2.8 to 3.1 cm.; and maximum thickness is 1.2 to 1.6 cm.

Comments: Unlike the *Clear Fork* gouges reported by Johnson (1962: 191–193) for the Yarbrough Site, those from Cedar Creek are made from chert (rather than ferruginous sandstone) and do not show wear from use.

"GUADALUPE"? ADZ OR GOUGE (Fig. 17, L; 1 specimen)

This unusual and crudely fashioned implement has a large, concave bit across one end. The lateral edges are sinuous but essentially straight, tapering gently toward the proximal end. Percussion flake scars are present on both surfaces, although one side retains a sizable portion of the nodular cortex. The cross section is quite thick and roughly lenticular, while the longitudinal section is triangular and shows distinct thinning at the proximal end. Length is 8.2 cm.; width across the bit is 4 cm.; width across the base is 2 cm.; and maximum thickness is 3.1 cm.

Comments: This specimen may be a crude example of the "Guadalupe" adz, a distinctive artifact which has not yet been studied in detail but which has been tentatively named by T. N. Campbell and briefly mentioned by Tunnell (Johnson, *et al.*, 1962: 108).

Scrapers

Chipped stone artifacts having one generally flat, unworked surface as well as one or more edges which could have been used for scraping are classified as scrapers. They are made from chert flakes or pebbles, less often from quartzitic stones and petrified wood. Exclusive of the unclassifiable and fragmentary specimens, the scrapers are divided into seven groups: *Mineola*, large end, thumbnail, core, initial cortex, secondary flake, and concave-edged.

Mineola END SCRAPERS (Fig. 17, M-O; 12 specimens)

Recently recognized by Johnson (1962: 189, Fig. 10, R-T), this type of scraper was manufactured from thin slabs of petrified wood. The outline is either rectangular or squarish, and both surfaces are flat. Marginal flaking is apparently of percussion type and is almost always limited to one face, occurring on one end (the bit) and, infrequently, along the sides. The bit is typically quite steep and is either straight or convex. Length ranges from 2.4 to 4.6 cm.; maximum width from 2.4 to 3.6 cm.; maximum thickness from .7 to 1.4 cm.

Comments: As noted by Johnson (*ibid.*) for the Yarbrough specimens, the form of these scrapers appears to be mainly a function of the fractioning characteristics of petrified wood. The *Mineola* end scrapers from Cedar Creek, however, tend to be slightly smaller than those from the Yarbrough Site.

LARGE END SCRAPERS (Fig. 18, A-C; 10 specimens)

These large, crudely made specimens have subcircular to rectanguloid or ovate outlines and at least one steep scraping edge. Six have

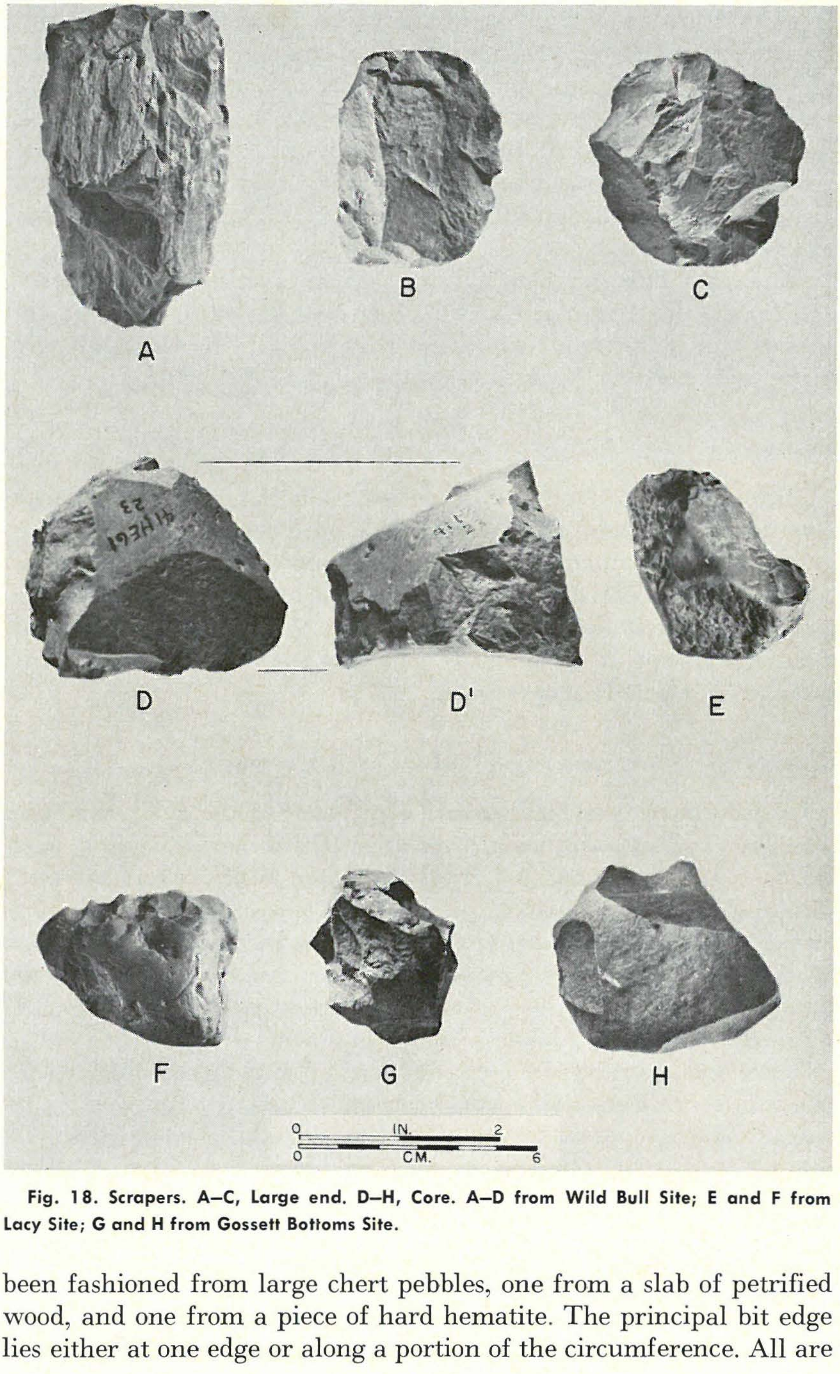


Fig. 18. Scrapers. A–C, Large end. D–H, Core. A–D from Wild Bull Site; E and F from Lacy Site; G and H from Gossett Bottoms Site.

been fashioned from large chert pebbles, one from a slab of petrified wood, and one from a piece of hard hematite. The principal bit edge lies either at one edge or along a portion of the circumference. All are rough percussion flaked and exhibit no marginal retouching. The more circular examples (Fig. 18, C) have a maximum diameter of 4.2 to 5.5 cm. and a maximum thickness of 2 to 2.8 cm.; the others (Fig. 18, A, B) are 4.9 to 8.2 cm. in length, 4 to 4.8 cm. in maximum width, and 1.7 to 2.5 cm. in maximum thickness.

Comments: These specimens are linked primarily by their large size and crude workmanship. Had the sample been larger it would probably have been desirable to divide them into more discrete categories.

THUMBNAIL SCRAPERS (Fig. 19, A-C; 3 specimens)

Diminutive size and delicate pressure retouching along one or more marginals are the most diagnostic features of this group. A sharp fracture appears at one edge of each and it is possible that none is complete. The present outlines are either ovate or rectanguloid, while the cross sections are consistently plano-convex. The length is uniformily 1.6 cm.; maximum width is 1.4 to 1.6 cm.; and maximum thickness is .3 to .5 cm.

CORE SCRAPERS (Fig. 18, D-H; 24 specimens)

This group consists of specimens manufactured from moderately large, stream worn chert pebbles. Much of the nodular cortex has been retained, and on many it naturally forms a planar surface (Fig. 18, D, D′). All have rude percussion flake scars which appear along the margins of one face. The cross section is plano-convex and a number of examples are almost as thick as they are wide or long. The outline form depends largely on the original shape of the pebble, there being very little evidence of intentional shaping. Scraping edges are quite steep and are usually limited to one edge or a portion of the circumference. Those 11 examples with subcircular outlines are 3.6 to 6.2 cm. in diameter and 1.5 to 5 cm. in maximum thickness. The remaining 12 specimens are rectanguloid to ovate and are 4.3 to 6.4 cm. long, 3.1 to 4.5 cm. wide, and 1.2 to 4 cm. thick.

Comments: Intended here as only a descriptive category, the core scrapers seem distinctive and may eventually be shown to be a valid cultural type.

INITIAL CORTEX FLAKE SCRAPERS (Fig. 19, D-G; 37 specimens)

Scrapers made from small to medium size initial cortex flakes form the most common group found at Cedar Creek Reservoir. These flakes can be easily recognized by their plano-convex cross sections and the weathered cortex on their convex surfaces (Epstein, 1963: 29). The planar face usually has a prominent positive bulb of percussion indicating that the flakes had been detached by means of the hammerstone percussion technique. None has a prepared striking platform. Moderately prominent flaking appears along one or more marginals of the convex surface. Length is 2.5 to 5.2 cm.; maximum width is 1.2 to 4.7 cm.; and maximum thickness is .7 to 1.6 cm.

SECONDARY FLAKE SCRAPERS (Fig. 19, H, I; 14 specimens)

Like those described above, these scrapers are made from small to medium size flakes. However, none has retained traces of the pebble surface and in most cases the bulb of percussion has been removed by chipping. In general, the flaking is good, and some specimens (for example, Fig. 19, H) may be intentionally shaped. The scraping edge is consistently steep and is usually along one or more lateral edges; only a few (Fig. 19, I) are beveled at one end. Length is 2.8 to 5.2 cm.; maximum width is 1.5 to 3 cm., and maximum thickness is .4 to 1.3 cm.

CONCAVE-EDGED SCRAPERS (Fig. 19, J-M; 11 specimens)

Included in this group are 11 unifacially flaked specimens and one bifacially worked piece. The latter (Fig. 19, J-J′) has been made from a flat chert pebble and may be a very crude imitation of the *Albany* spokeshave, subtype I (Webb, 1946: 10, Pl. 1, Nos. 1–3). Although bifacially chipped, this implement has a plano-convex cross section with one edge being concave and suitable for scraping. It has a definite stem and one shoulder, but is not notched like the *Albany* type (*ibid.*). The weathered surface of the pebble appears on parts of both flat faces and across the base of the stem. This specimen is 4.4 cm. long, 2.5 cm. wide at the shoulder, and 1 cm. in maximum thickness.

Eight of the other concave-edged scrapers are made from small, thin flakes (Fig. 19, K, L), while three are from large, rather thick flakes (Fig. 19, M). Both types have a single, shallow concavity produced by fine marginal retouching. No other scraping edge appears on these specimens. The smaller examples average about 2 cm. in length, 1 cm. in maximum width, and .3 cm. in maximum thickness; the larger ones, on the other hand, average about 3.5 cm. in length, 2 cm. in maximum width, and 1.4 cm. in maximum thickness. The concavity is fairly uniform in size, being from 1 to 2 cm. in maximum width and .2 to .4 cm. in maximum depth.

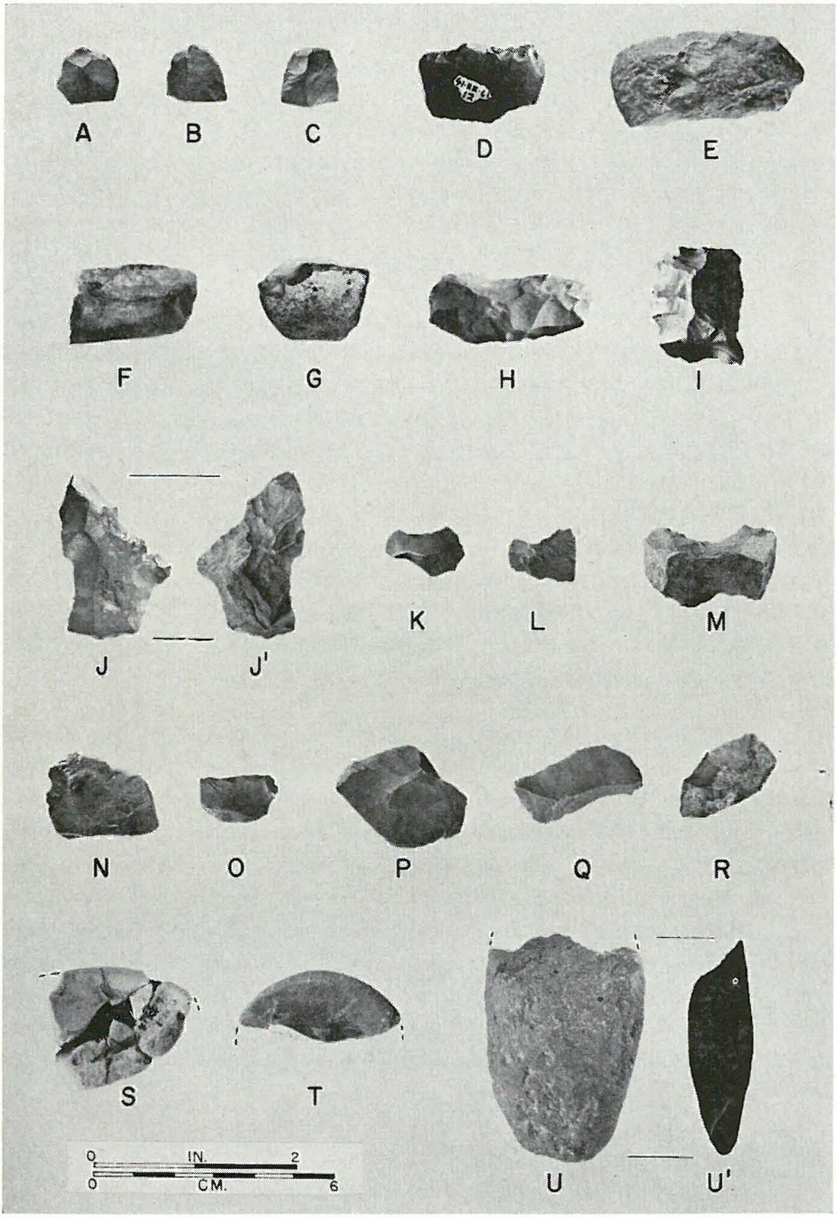


Fig. 19. Scrapers, Utilized Flakes, and Polished Stone Implements. A–C, Thumbnail scrapers. D–G, Initial cortex scrapers. H, I, Secondary flake scrapers. J, J', Possible *Albany* spokeshave. K–M, Concave-edged scrapers. N–R, Utilized flakes. S, T, Boatstone fragments. U, U', Celt fragment. A, B, D–J, P, and Q from Wild Bull Site; C, K–M, and R–T from Gossett Bottoms Site; N, O, and U from Lacy Site.

MISCELLANEOUS AND FRAGMENTARY SCRAPERS (24 specimens)

Of the 24 artifacts comprising this category, 14 are too fragmentary for further study and 10 do not have features which permit them to be included in any of the above-mentioned groups. All, however, have been unifacially worked and easily fall within the general definition of a scraper.

UTILIZED FLAKES (Fig. 19, N-R; 206 specimens)

A considerable number of the flakes recovered from the excavations show, upon careful examination, minute retouching along one or more edges. Since this may have resulted from use—perhaps from pressure applied in scraping—these specimens are termed utilized flakes. The working edges are straight, concave, or convex, while the amount of wear varies from slight to moderately pronounced. None of the flakes has been shaped so that a wide variety of outline forms and flake types are present. For example, there are billet flakes, hammerstone flakes, and initial cortex flakes. Most are small, averaging about 2.4 cm. in length, 1.7 cm. in maximum width, and .5 cm. in thickness. The largest is 4.4 cm. long, 3.6 cm. wide, and 1 cm. thick. One is made from petrified wood, the remainder are of chert.

Boatstones (Fig. 19, S, T; 2 specimens)

Two small, well smoothed—almost polished—stone pieces appear to be fragments of boatstones. Both have been hollowed out to form a concavity on one surface; the other surface is markedly convex. The over-all form cannot be reconstructed in detail, but one specimen (Fig. 19, S) was evidently somewhat canoe-shaped with a deep, V-shaped concavity. The other boatstone (Fig. 19, T) was apparently circular in outline and may have had a somewhat shallower concavity. The former has been manufactured from siltstone, and the latter from a hematitic stone with fine sand inclusions. No meaningful dimensions can be taken for either specimen.

Celt (Fig. 19, U, U′; 1 specimen)

The distal portion of a rather crudely pecked and partially ground celt of quartzite was recovered from the Lacy Site. The blade, or bit end, is intact and shows some battering, perhaps from use. In longitudinal section this celt appears to have been lenticular, and in cross section (Fig. 19, U′) roughly plano-convex. The lateral edges are convex and are not well smoothed. Present measurements are: 5.5 cm. long, 4 cm. wide (maximum), and 1.7 cm. thick.

Notched Pebbles (Fig. 20, A-E; 7 specimens)

The notched pebbles are readily divided into two groups, even though all are made from quartzite. Represented by six specimens, the most common form (Fig. 20, A-D) has been manufactured from small, somewhat roundish stones and notched at each end. Percussion flaking was used to produce the shallow, U-shaped notches and apparently to shape, at least in part, the pebble. Very little of the nodular cortex is still visible. The notches and, to a lesser extent, the edges are smoothed, perhaps both by wear and by intent. Length is from 4.3 to 5 cm.; maximum width 3.2 to 4 cm.; and maximum thickness 1.6 to 2.5 cm.

The only other specimen (Fig. 20, E) is considerably different in that it has been fashioned from a long, roughly rectangular pebble with a flattened cross section. Moreover, the notches appear in the lateral edges, with one being quite distinct, the other very slight. Both are percussion flaked and no other alterations to the pebble can be detected. It seems likely that the artifact-maker consciously selected a suitable-shaped stone—one which would require little modification. The length is 8.1 cm.; maximum width is 4 cm.; and maximum thickness is 2 cm.

Comments: Notched stones similar to those of the first group have also been termed sinker stones (Johnson, 1962: 197), *bolas* stones (*ibid.*), and "Waco" sinkers (Watt, 1938). The Cedar Creek specimens are especially similar to Watt's sinker, Type 5 (*ibid.*: 28).

Pitted Stones (Fig. 20, J, K; 5 specimens)

These generally large pieces of ferruginous sandstone have one or more shallow pits or depressions pecked into a flattish surface. One somewhat oval-shaped stone (Fig. 20, K), has a grinding facet on the same surface as the depression. This specimen and three with more irregular outlines appear to have been roughly shaped by percussion. By contrast, the fifth, and smallest, pitted stone is made from an elongated stream worn pebble (Fig. 20, J). It has one pit which has been pecked into the center of a lateral edge; in addition, one surface shows use as a grinding implement and one end had been battered, probably from secondary use as a hammerstone. One of the stones, an irregularly shaped specimen, has five depressions, all on one surface; each of the remaining examples has a single pit. Because of the variation in out-

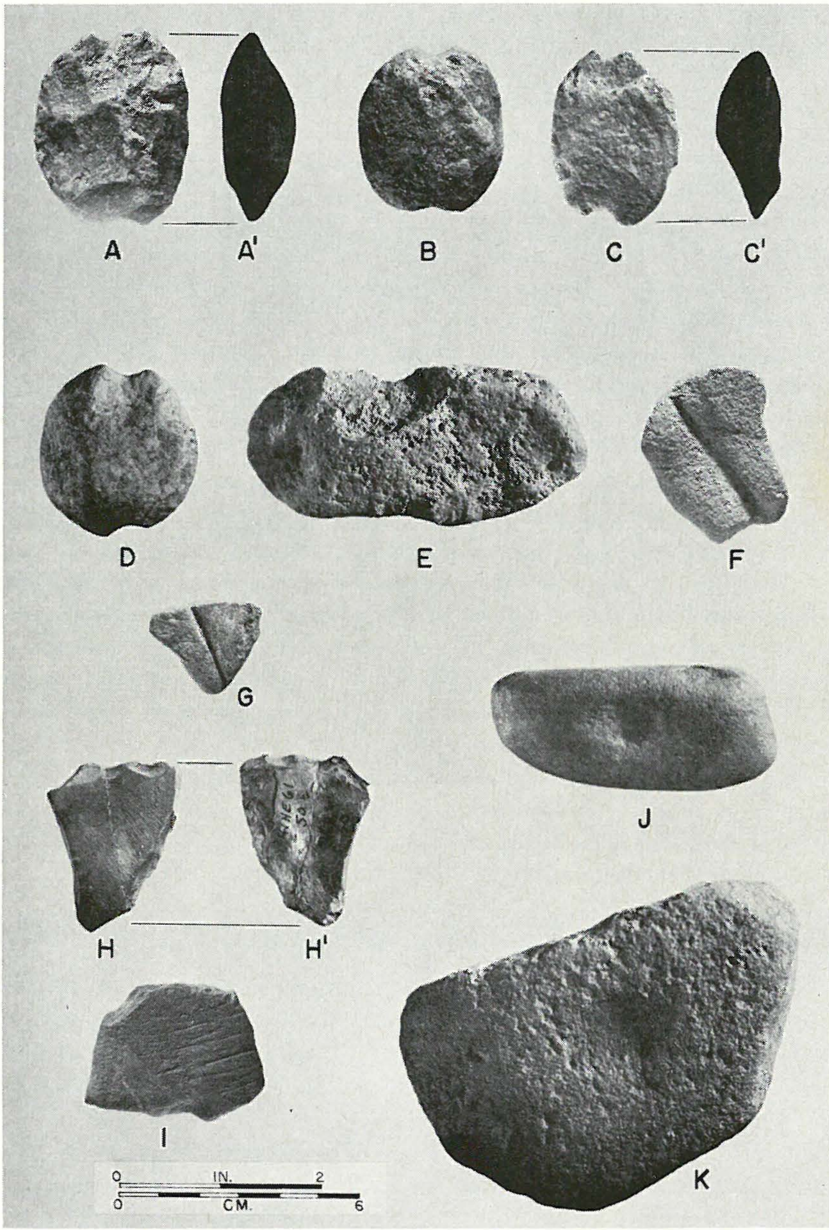


Fig. 20. Notched Pebbles, Abraders, Scored Hematite, and Pitted Stones. A–D, End-notched pebbles. E, Side-notched pebble. F, G, Abraders. H, I, Scored hematite. J, K, Pitted stones. A–F, and H from Wild Bull Site; G and I from Gossett Bottoms Site; J and K from Lacy Site.

line form, dimensions are difficult to take. The largest, however, is approximately 11.4 cm. in diameter and 6.2 cm. in maximum width. The smallest is 7 cm. long, 3.4 cm. wide, and 3 cm. thick. The depressions vary from 1.2 to 3 cm. in diameter and from .2 to .7 cm in maximum depth.

Abraders (Fig. 20, F, G; 2 specimens)

Each of these small, thin pieces of coarse-grained sandstone has a single V-shaped groove across one surface. Although one (Fig. 20, G) is possibly incomplete, both have irregular outlines and show no evidence of having been intentionally shaped. The grooves are narrow but tend to flare out slightly at one end. Abrasion, perhaps from sharpening implements such as bone awls, probably produced the grooves. They now measure 2.3 and 3.8 cm. long and approximately .1 and .3 cm. in maximum depth respectively.

Scored Hematite (Fig. 20, H, I; 2 specimens)

In addition to the abraders, there are two rather small, unshaped pieces of hematite which have numerous striations on one flat surface. On one (Fig. 20, I) the scoring marks are fairly pronounced and run parallel with the long axis, while on the other (Fig. 20, H) the striations are much fainter and more random in nature. This latter specimen also has two alternately beveled edges which indicate use as a scraper. At first blush it would seem that the marks may have been produced in the course of scraping; however, they are present on only one surface and not both as would have been the case if the implement had been used as such. Over-all dimensions are 4.5 and 4.4 cm. long, 3.6 and 3.4 cm. wide, and .7 and .8 cm. thick.

Comments: These pieces seem too hard to have served as sources of pigment, and consequently they are described separately from the ocher.

Hammerstones (Fig. 21, A, B; 12 specimens)

This category is comprised of roundish to somewhat oblong stream-worn cobbles which have one or more battered edges, presumably from use as a hammerstone. All are of hard stones, usually quartzite or chert, and none has been intentionally modified. There is little range in size, with the average specimen being approximately 6.5 cm. in diameter.

Handstones (Fig. 21, C, D; 10 specimens)

The handstones, or manos, consist of moderately small, stream worn cobbles which have one or more facets worn from use in conjunction with a grinding slab. With the possible exception of a fragmentary specimen, none appears to have been significantly altered. At the most, there are signs of limited pecking—or stream battering?—along the margins of three handstones. The outlines are somewhat irregular, although there is a slight tendency toward circular. On five examples there are worn surfaces on opposing faces, with the facets varying from flat to slightly convex. Each of the remainder has only one grinding surface and it is usually flat. Both sandstone and quartzite cobbles were used. Maximum diameter ranges from 6 to 8.8 cm., and maximum thickness from 2.2 to 5.2 cm.

Comments: All of the handstones appear to have been used with a circular grinding motion.

Ocher (Fig. 21, E, F; 14 specimens)

Numerous, often sizable pieces of ocher were recovered from Cedar Creek, particularly from the Wild Bull Site. The majority are of the soft, yellowish-brown limonite, although three small pieces of red hematite were found at Gossett Bottoms. Two of the latter have at least one smoothed surface and were probably used as sources of pigment. Most of the remaining pieces are large nodules, none of which shows evidence of having been modified (Fig. 21, E, F). Those from the Wild Bull Site, however, were recovered from a limited area (see Table II) and may have been a cache. The smoothed hematite specimens are essentially rectangular and are 1.6 and 2.7 cm. long, 1.5 and 1.7 cm. wide, and 1.2 and 2 cm. thick. Largest of the unworked limonite examples is 23 cm. long, 7 cm. wide and 6.5 cm. thick.

Artifacts of Clay

Represented by 1,146 specimens, artifacts of clay comprise the largest single class recovered from the Cedar Creek excavations. Included are 1,143 vessel fragments, a worked sherd, a tubular bead, and an ovoid lump of clay. In spite of the rather large number of sherds, many are small and no vessel could be even partially restored. Both of these factors make meaningful type identification difficult, and, in the descriptions which follow, the pottery has been grouped according to treatment of the exterior surface with the main categories being plain and decorated. The latter is further divided into finer groups

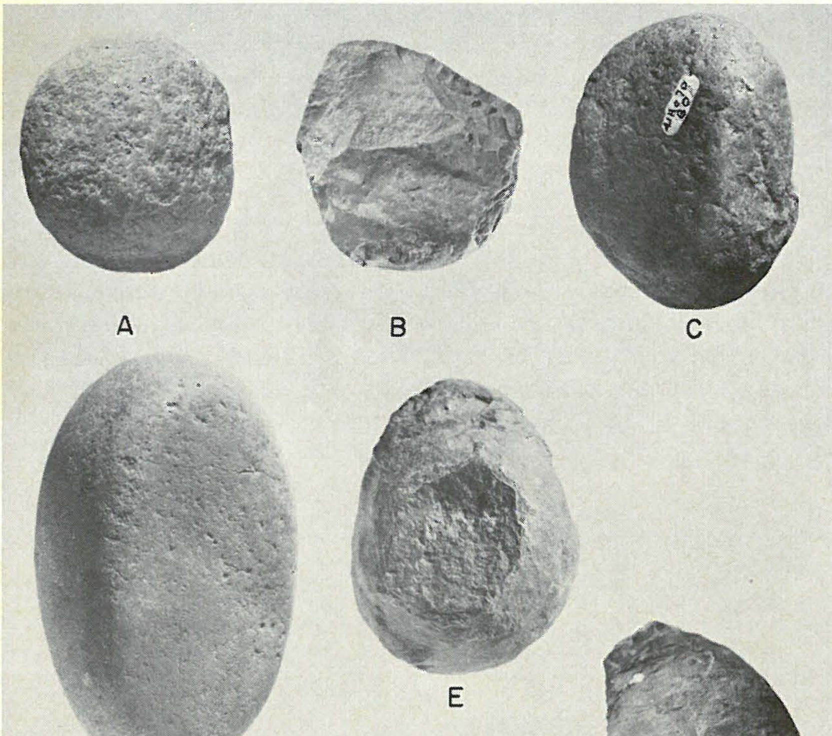


Fig. 21. Hammerstones, Handstones, and Ocher. A, B, Hammerstones. C, D, Handstones. E, F, Ocher nodules. A and C from Lacy Site; B and D–F from Wild Bull Site.

based upon the mode of decoration (e.g., engraved, punctated, brushed, etc.), while the former is discussed in terms of the major temper groups. The resultant classification is intended for convenience only, although comparisons are made with known pottery types whenever possible.

Plain Sherds (Fig. 22; 735 specimens)

Most of the potsherds from Cedar Creek are undecorated, the exterior surfaces merely having been smoothed, or very rarely, lightly polished. The majority of these, moreover, are from body sherds, suggesting that many may be from vessels decorated only on the rim. Twenty-seven are shell-tempered, 311 are bone-tempered, 366 are clay-tempered, and 31 are sand-tempered.

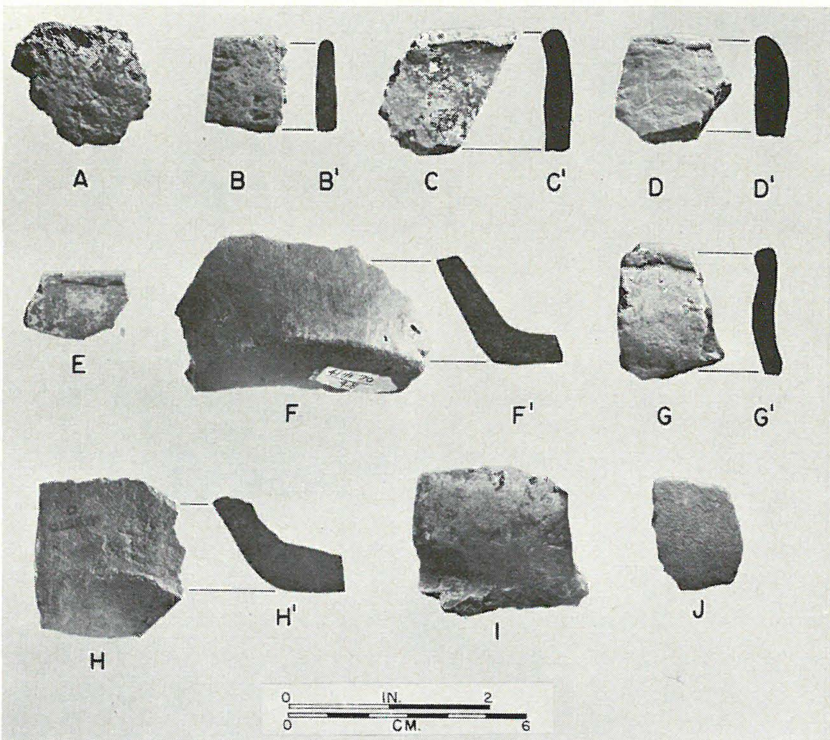


Fig. 22. Plain Pottery. A, Shell-tempered body sherd. B, B', Shell-tempered rim sherd. C–E, Bone-tempered rim sherds. F, F', Bone-tempered basal sherd. G, G', Clay-tempered rim sherd. H, H', Clay-tempered basal sherd. I, Clay-tempered strap handle. J, Sand-tempered body sherd. Exterior to the left on rim and base profiles. A, B, E–H, and J from Lacy Site; C, D, and I from Gossett Bottoms Site.

SHELL-TEMPERED

The easily recognized shell-tempered sherds include 26 body fragments and one small rim section (Fig. 22, A, B). Their surface color varies from reddish-tan and brown to grayish; while the cores tend to be slightly darker shades of the same color. Both the exterior and interior surfaces have been smoothed, but not polished. Leaching out of temper particles has occurred on a number of examples (Fig. 23, B) and has resulted in pitted, easily crumbled surfaces. The paste is laminated and frequently contorted, with crushed shell (apparently mussel) accounting for as much as one-fourth the total volume (Fig. 23, A). Individual tempering particles range from 2 mm. to microscopic. The surface hardness is from 2 to 3.5 on Moh's scale, and the wall thickness is from 4 to 9 mm. The one rim fragment (Fig. 22, B, B′) is essentially vertical and has a faintly beveled, convex lip.

BONE-TEMPERED

Contrasting most obviously with the above in tempering agent used (Fig. 23, C, D) are the plain sherds with pulverized particles of bone. Included are four basal fragments, 12 rim pieces, and 295 body sherds. Most, however, are too small to reveal particulars concerning vessel shape (Fig. 22, C-F). The base sherds (Fig. 22, F, F′) suggest fairly thick, disc-shaped bottoms which joined outcurved or nearly vertical walls. On one specimen the juncture of the base and the body is somewhat reinforced, while on another the thickest part occurs near the center of the base. The rim sherds suggest rather simple vessel forms, both jars and bowls, with the rim being straight or very slightly everted to inverted, and the lip flattened or gently convex. On some the lip is somewhat thinned or slightly thickened.

One, much-eroded body sherd has traces of a red slip or film on the exterior surface. Exterior surfaces in all other examples are merely smoothed, some rather well, others quite poorly. On some (particularly those from the Lacy Site) the exterior has a slightly chalky texture which is slightly reminiscent of the finish found on *Baytown Plain* (Phillips, *et al.*, 1951: 76–82). Interior surfaces are also smoothed, but generally more carelessly finished than the exterior ones, so that tool marks are commonly visible. Surface colors range from tan, sometimes a bit reddish, to gray and gray-brown. Firing was not always even as indicated by the occasional fire cloud and by some differentiation in core color. The core, more often, is the same color as the surface, or darker, sometimes almost black.

The paste is frequently rather granular (Fig. 23, C, D) and, in addition to the bone, may contain an occasional lump of clay (perhaps some ground sherds) as well as minute particles of sand. For the most part, the bone stands out prominently, with many individual pieces measuring 2 to 4 mm. On the less well smoothed sherds bits of bone are clearly visible on both the exterior and interior surfaces. Sherd edges are often jagged, mainly a reflection of the coarseness of the texture. Breaks, however, tend to follow horizontal planes suggesting the coiled manufacturing technique. Surface hardness is 2 to 3.5 on Moh's scale, while the wall thickness is 4 to 11 mm.

CLAY-TEMPERED

Among the 366 clay-tempered sherds are 11 basal fragments, 14 rim pieces, and one strap handle. In color and surface finish they resemble the bone-tempered pottery, except that small, irregularly-shaped lumps of clay are readily distinguished in the paste (Fig. 23, E) and frequently on the surface. Besides these inclusions, the paste contains an occasional ground sherd (or grog) and, in 220 instances, fine particles of sand. Specimens with both clay and sand tend to be firmer than those tempered with just clay. The latter are typically rather friable and have irregular edges. There is, however, sufficient intergradation between the two groups to justify treating them as a single category. Indeed, it seems quite probable that the sand is an accidental inclusion.

Very little information can be obtained on vessel shape, although there are indications that the forms represented are about the same as noted for the bone-tempered pottery (Fig. 22, G-H′). One rim sherd (Fig. 22, G, G′), however, should be singled out for it is slightly thickened on the exterior, just below the lip. The thickened area is accentuated by underscoring (apparently almost scalloped) which resembles, but is not the same, as an overhang line. There is also a nearly complete, undecorated strap handle (Fig. 22, I) similar to those found, for example, on types *Monkstown Impressed*, *Killough Pinched*, or *Harleton Applique*. Body sherds are 5 to 11 mm. thick, basal fragments 11 to 13 mm. thick. The hardness, on Moh's scale, is between 2 and 3.5.

SAND-TEMPERED

Sherds having a very sandy paste with little or no clay or bone inclusions make up a minor but distinct group. Most specimens are small (the largest piece is 4.5 by 2.2 cm.) and, moreover, 29 are from vessel walls (Fig. 22, J), two from bases. Both the exterior and interior sur-

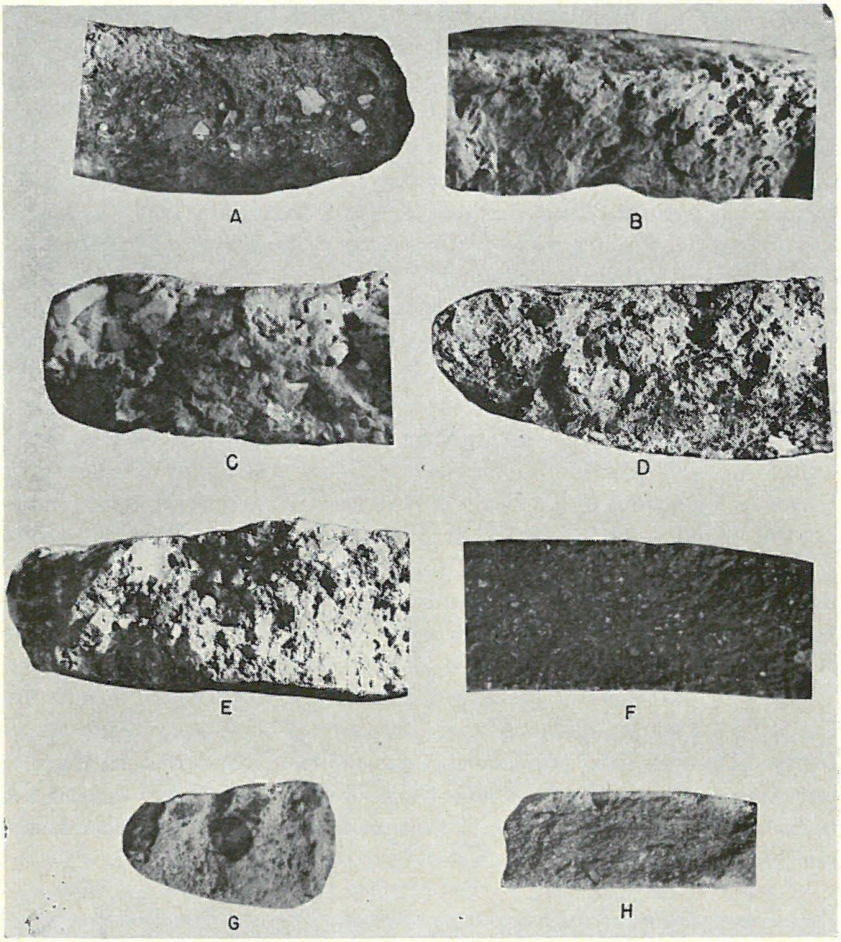


Fig. 23. Enlargements of Sherd Cross Sections. A, B, Shell-tempered; particles have leached out of *B*. C, D, Bone-tempered; bone particles burned black in *D*. E, Clay-tempered. F, H, Sand-tempered (quartz). G, Sand-tempered (hematite).

faces have been well smoothed, but often have a gritty feeling because of the sandy paste. Surface colors range from reddish (one instance), to tan and brownish-gray to almost black, with the interior being generally darker than the exterior. The core is black, or, less often, light gray to tan.

Fine-grained, largely quartz sand particles (Fig. 23, F, H), believed to have been intentionally added to the clay, are the major constituent of the paste in all but one specimen. This exception, a small, reddish body sherd (Fig. 23, G), has rounded hematite sand grains which vary in size from microscopic to as much as 3 mm. In addition to the sand, several sherds have an occasional finely ground sherd. On the whole, the paste of all sherds is reasonably firm and compact. The edges tend to be less jagged than on any of the other sherds, but they do not clearly follow horizontal fracture planes—admittedly, however, it is difficult to orient most sherds. The largest of the basal fragments indicates a flat bottom which was thickened in the middle and was joined to an outward sloping wall. Wall thickness is 3 to 9 mm.; hardness on Moh's scale is rather uniform at 2.5.

Viewing the plain sherds as a group, most fall technologically (*i.e.*, in paste and surface finish) within the Caddoan tradition. The only possible exception is the sand-tempered ware which may be broadly related to *Goose Creek Plain* of the Galveston Bay Focus (Suhm, *et al.*, 1954: 128–130 and 378–380), *Bear Creek Plain* of the McGee Bend area (Jelks, 1965), and the sand-tempered ware found at the George C. Davis Site (Newell and Krieger, 1949: 130–133). Specific type identification is impossible, largely because the Cedar Creek sample is too small and yields no significant data on vessel shape. Much the same situation applies to the remainder of the plain sherds. The clay-tempered ones, as well as most of those bone particles, are, in some respects, similar to *Sanders Plain* (Suhm and Jelks, 1962: 139, Pl. 70). There are, nonetheless, significant differences with *Sanders Plain*: the Cedar Creek sherds have a higher incidence of bone temper, the vessel form—although data are limited—appear to be simpler, and there is only one example of red-filming. Finally, it might be noted that on the basis of the paste and the surface finish, the shell-tempered sherds are close to type *Nocona Plain* (Suhm and Jelks, 1962: 115, Pl. 58).

Decorated Sherds (Figs. 24 and 25; 408 specimens)

The techniques employed in decorating the pottery from Cedar Creek include most methods common to Caddoan wares: incising, brushing, punctating, engraving, and appliqueing. Indeed, these are such widespread modes of surface alteration in the eastern part of the state that, on the basis of the present sample, specific type affiliations are difficult to assess.

ENGRAVED (Fig. 24, A-C′; 17 specimens)

Sherds having engraved designs are not well represented and occur at only the Lacy Site (Table 2). They can be sorted into three, possibly four, vessels, none of which can be restored. The first vessel is known from two base sherds and two rim pieces (Fig. 24, A, B). It ap-

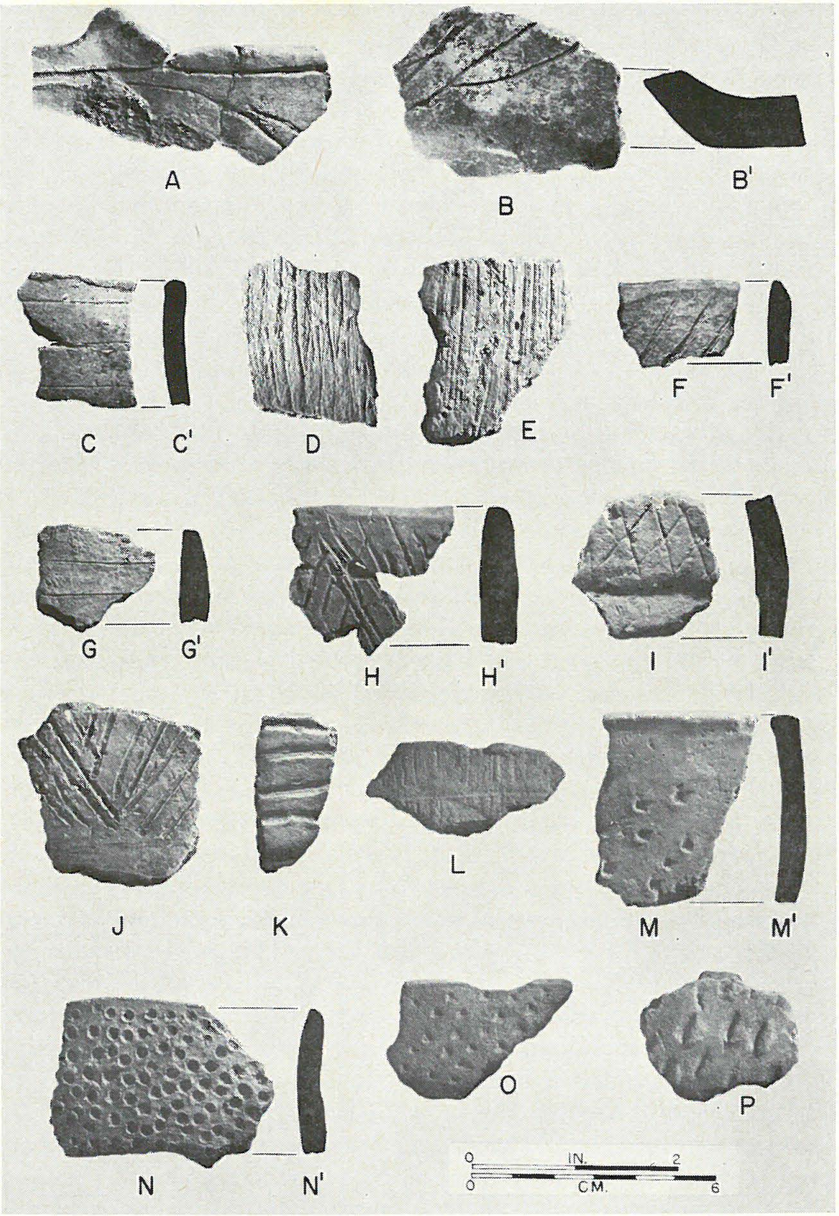


Fig. 24. Decorated Pottery. A–B′, Rim and base sherd from clay-tempered engraved vessel. C, C′, Rim sherd from bone-tempered engraved vessel. D, E, Brushed body sherds. F–J, Incised sherds. K, Trailed sherd. L, Brushed-incised rim sherd. M–P, Punctated sherds. Exterior to the left on rim and base profiles. A–C, E, H, J, M, N from Lacy Site; D, F, G, I, K, L, O, P from Gossett Bottoms Site.

pears to have been a small and quite shallow, flat-bottomed bowl which had simple outward sloping walls and at least two rim peaks. The rim is slightly everted, while the lip is tapered and varies from convex to almost flat. Most of the body has been covered with bold, crudely-executed engraved lines which seem to be grouped into rather widely-spaced curvilinear and diagonal elements. About 7 mm. below the lip there is an engraved line that evidently encircled the entire vessel. The diagonal elements, made up of at least three roughly parallel lines, extend from this line toward the base. The curvilinear design, on the other hand, appears initially to converge with the encircling line and only gradually to turn toward the base. Microscopic examination of the paste reveals that numerous and often irregularly-shaped lumps of clay (including perhaps an occasional ground sherd) are the major tempering agents. The texture is compact and the clay seems to have been well kneaded. Surface colors range from tan to light grayish-brown, with the interior being slightly darker than the exterior. The core is dark gray, tending to become somewhat lighter toward the exterior. Both surfaces have been fairly well smoothed, but neither is polished. Wall thickness is about 8 mm., while the base reaches a maximum of 12 mm. in thickness. The hardness on Moh's scale is 3.5.

The second engraved vessel is represented by ten, generally small body sherds and one rim fragment (Fig. 24, C). Most pieces have thin, roughly parallel horizontal lines which are spaced about 8 to 10 mm. apart and which probably encircled the entire vessel. In addition, two specimens have diagonal lines, but the design relationship between these and the horizontal ones is not clear. The horizontal lines begin approximately 8 mm. below the lip and continue for an undetermined distance toward the base. The rim sherd is slightly inverted and has a flat lip; the over-all vessel shape and size are not, however, apparent. Wall thickness is 4 to 6 mm. and the temper consists of pulverized bone. Surface colors are gray to gray-brown, while the core is darker, almost black. Hardness is 2.5.

Both of the remaining engraved sherds are small body fragments decorated with hatched lines which, in one instance, flank a circle. This latter sherd has traces of red pigment, presumably ocher, rubbed into the engraved lines. The exterior surfaces are a deep tan to dark, gray-brown, and are well smoothed. By contrast, the interiors are unsmoothed and suggest that these pieces are from bottle bodies. One is 6 mm. in thickness, the other is 4 mm. thick. The paste is compact and contains small lumps of clay, as well as an occasional small particle of sand.

None of the engraved pottery can be typed, although the first vessel described has certain attributes (*i.e.*, crudely-executed design and rim peaks) suggestive Titus Focus ceramics, such as types *Ripley Engraved* or *Wilder Engraved.* In general, all engraved sherds seem more closely affiliated with the Fulton, rather than the Gibson, Aspect.

BRUSHED (Fig. 24, D, E; 166 specimens)

Most common of the decorative techniques is brushing; that is, the occurrence of numerous striations apparently made by dragging or "brushing" clusters of stiff grass and/or small twigs across the still-plastic exterior surface. The interior surface is always smoothed and, on the less carefully finished pieces, sometimes shows tool marks. Since all but three of the brushed sherds are body sections, it is probable that many are from vessels having rim decorated by other means, such as by incising or punctating. The thickness and lack of much curvature on a number of sherds suggest that the most common form was a rather large jar with slightly outflaring rim and flat or mildly convex lip. While it is quite clear that brushing covered much of the exterior surface, no discernible orientation can be recognized, except on the three rim sherds where the striations are either horizontal (two cases) or diagonal.

Thirteen of the brushed sherds, all from the Gossett Bottoms Site, are tempered with numerous, finely pulverized pieces of bone. The remainder have clay temper, frequently combined with fine, quartz sand or grit. The latter, however, is probably an accidental inclusion, and the clay apparently naturally had a fairly sandy texture. Most sherds are well fired, and, although typically coarse, the paste does not crumble easily (hardness is 2.5 to 3). Exterior surface color is tan to gray-brown, while the interior is usually a darker shade of the same color, and the core is frequently darker than either the exterior or the interior. Wall thickness is 6 to 15 mm.

INCISED (Fig. 24, F-J; 70 specimens)

Included in the incised pottery are nine rim sherds and 60 body fragments, many of which appear to be from the upper portions of vessels. Although the rim pieces are generally too small to reveal many details concerning vessel shape, it is possible that both cylindrical jars and bowls (perhaps including carinated bowls) are represented. Lips are either flat or gently convex. Crushed particles of bone appear as the major tempering agent in 49 sherds, while clay is dominant in the paste of 21 sherds (all of the latter are from the Gossett Bottoms Site). The texture varies from coarse to fine, and is usually compact. Surface colors are reddish to dark tan and dark gray; the cores are consistently darker than either the exterior or the interior.

Designs are fairly simple and consist primarily of diagonal lines arranged into parallel sets which 1) run in the same direction (Fig. 24, F), 2) cross one another in a diagonal direction (Fig. 24, I), or 3) fill alternate panels (Fig. 24, H, J). Two rim sherds, however, have horizontal lines which begin just below the lip (Fig. 24, G). The one incised sherd (Fig. 24, I, I′) from the Wild Bull Site, a bone-tempered specimen, has crossed diagonal lines and, below this (if I have oriented the sherd properly), an overhanging line. Faintly incised marks, possibly light fingernail punctations, appear below this overhanging line just below the rim decoration, but little of the over-all design is preserved.

The incised sherds vary from 5 to 10 mm. in thickness and are between 2 and 3.5 in hardness. In mode of decoration and, less certainly, in vessel shape they show a general affinity with type *Canton Incised.* The paste is similar to that described for this type (Suhm and Jelks, 1962: 23), except that the incidence of bone temper is a bit high.

TRAILED (Fig. 24, K; 1 specimen)

A small body sherd has broadly incised, or trailed, lines made by a blunt-ended implement. It is dark gray to black (being darkest on the interior and core) in color and is tempered with tiny bits of clay. The texture is fine and quite compact, indicating that the clay had been well kneaded and well fired. Since the sherd cannot be properly oriented with any measure of certainty, it can only be noted that the trailed lines are roughly parallel and that they *may have been* placed horizontally on the vessel body. Wall thickness is 5 mm. and the hardness is 3 on Moh's scale.

BRUSHED-INCISED (Fig. 24, L; 5 specimens)

This small but distinctive group of sherds undoubtedly represents a single vessel decorated with vertical brushing and horizontally incised lines. On the one rim fragment (Fig. 24, L) the brushing extends almost to the lip and is interrupted at 1.5 cm. below the lip by an incised line. It is evident from this piece, and from the four body sherds, that the incising was done after the brushing. While the horizontal lines probably encircled the entire vessel, it is not clear whether they were confined to the upper portion of the pot, or occurred over much of the body.

Little can be determined of vessel shape, other than the rim is slightly everted and the lip is essentially flat. The paste is coarse, but reasonably firm, and is tempered with small lumps of clay, as well as minute particles of sand or grit. Both the exterior and interior surfaces are a dark, grayish-brown, and the core is a slightly darker shade of the same color. The interior has been smoothed, but not too well so that the clay temper is readily visible on the surface. Wall thickness is 10 to 12 mm. and hardness is 3.

PUNCTATED (Fig. 24, M-P; 111 specimens)

Indentations or punctations made by a fingernail or blunt implement occur on the exterior surface of 24 rim sherds and 87 body fragments. In some instances (Fig. 24, M) they appear to be confined to vessel rims, in others (Fig. 24, P) they may have covered much of the body area. The majority of the punctations have been produced by either a squarish or rounded tool which was pressed vertically into the plastic surface (Fig. 24, N, O), or pushed at an angle so as to raise or mound the surface opposing the direction of the tool (Fig. 24, M, P). Fingernail punctation, admittedly difficult to distinguish from indentations probably made with a split reed, appear to be present on at least 12 sherds (Fig. 24, P). No clear design pattern can be recognized on any of the sherds and most can be described as having random punctations. On six specimens the exterior surfaces appear to have been lightly smoothed over after the punctations were made. The interior surfaces are always smoothed, generally rather well.

The paste is typically coarse and granular, but does not crumble easily. Bone was used as the major tempering agent in 25 sherds, lumps of clay (perhaps some grog)—often combined with grit or sand—appear in 81 sherds, and bone, sand, and clay are present in the paste of five sherds. Surface colors range from reddish and tan to grayish-brown, with the interior usually being darker than the exterior. The cores are black and indicate an incomplete oxidizing atmosphere during firing.

Broken edges are often a bit jagged, although they tend to follow horizontal fracture plane. Wall thickness is 5 to 10 mm. and the hardness is 3. The lips are flat to slightly convex and may be somewhat thickened (Fig. 24, M). Rim sherds are generally small and provide few clues as to over-all vessel shape.

Punctating as a means of surface modification is widespread in Caddoan ceramics, occurring in both the Fulton and Gibson aspects. In the latter, however, they tend to be zoned rather than random punctations, suggesting that many of the Cedar Creek sherds can tentatively be assigned to the Fulton Aspect, even though a specific type cannot be identified.

PUNCTATED-INCISED (Fig. 25, A-D; 21 specimens)

Punctations combined with incised lines occur on the exterior of four rim fragments and 17 body sherds, with all of the latter probably coming from the upper portion of vessels. Most commonly the design consists of sets of parallel diagonal lines running in opposite directions and alternating with triangular spaces filled with stick punctations (Fig. 25, A-C). The lines may be closely (Fig. 25, B, C) or widely (Fig. 25, A) spaced, and the punctations made with squarish or, less frequently, rounded and sometimes pointed implements. Typically, the tools have been pressed in at an angle and caused the surface to be mounded on one side of the identation. On one sherd from the Gossett Bottoms Site (Fig. 25, D) a single punctation fills the center of each grid segment produced by crossed diagonal lines. On another, quite small sherd—also from the Gossett Bottoms Site—there are apparently diagonally crossed lines on the rim, below this an overhang edge, and, on the vessel body, fingernail punctations.

Characteristics of paste and color are similar to those described for the punctated sherds and need not be reviewed in detail. It should, however, be mentioned that four have minute, rounded quartz sand and small particles of clay as the temper; the remainder are tempered with bone, sand, and clay, some of which is definitely crushed sherds.

The larger rim fragments (Fig. 25, A′-C′) indicate jars with direct or slightly everted rims, while the lips on all sherds are either flat or gently convex. These few particulars of shape, along with the design layout, indicate that most of the punctated-incised sherds are closely affiliated with type *Canton Incised.*

PINCHED (Fig. 25, E, F; 15 specimens)

The Gossett Bottoms Site yielded a group of sherds each of which has one or more ridges produced by pinching the exterior surface with fingernails. All specimens are small, but the ridges appear to have been arranged primarily into straight-lined patterns. They occur on both rims (Fig. 25, F) and vessel bodies (Fig. 25, E).

In surface color these sherds range from light tan and grayish-brown to dark gray-black. The cores consistently have a deeper hue than either the exterior or the interior. Grit and clay are prominent in the paste of all but one sherd; this exception having finely pulverized particles of bone. The texture is fairly fine and typically well

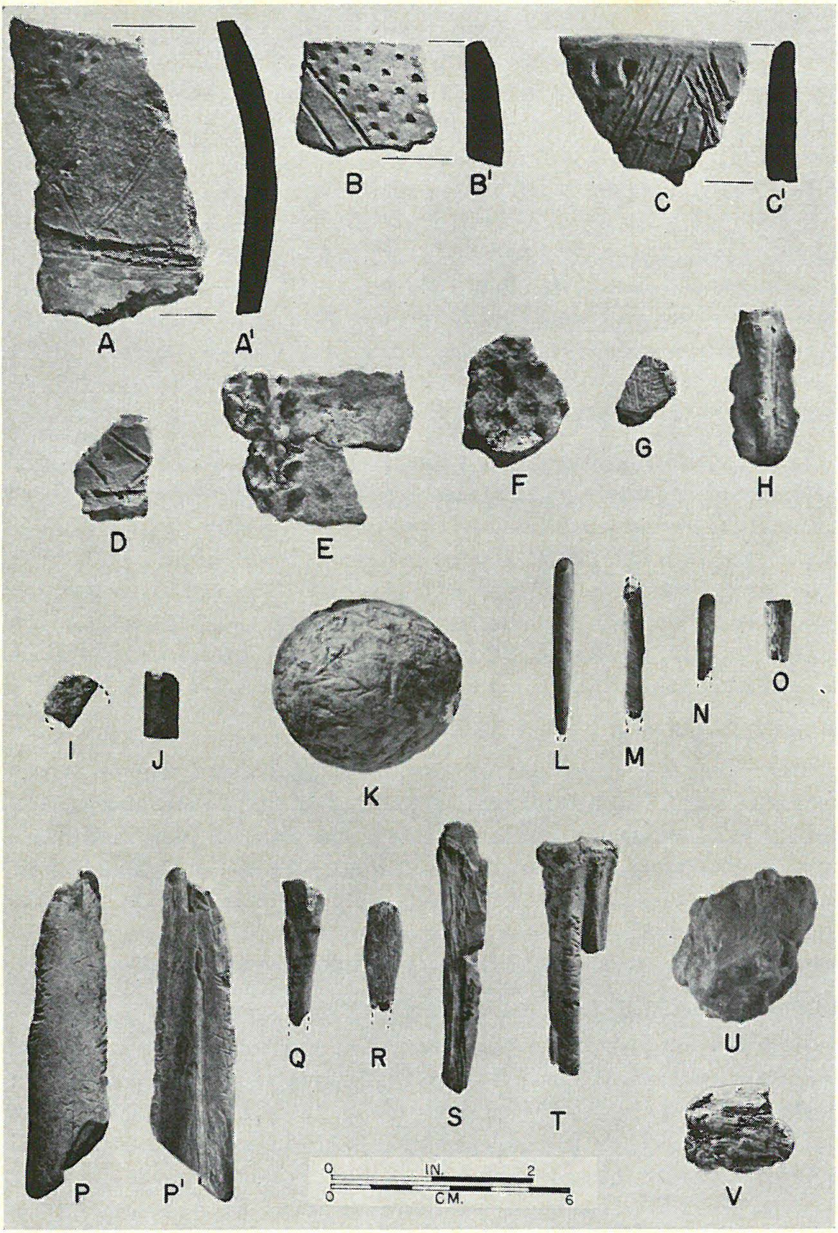


Fig. 25. Decorated Pottery, Miscellaneous Artifacts of Clay, Modified Bone, and Wattle-Impressed Daub. A–D, Punctated-incised sherds. E, F, Pinched sherds. G, Brushed-appliqued sherd. H, Applique ridge (?). I, Worked sherd. J, Ceramic bead. K, Lump of clay. L–N, Bone pins. O, Possible bone bead. P, P', Bone fleshing tool. Q, R, Bone awls. S, Possible awl. T, Bone residue. U, V, Wattle-impressed daub. Exterior in profiles to the left. A, B, D–H, J, and L–V from Gossett Bottoms Site; C, I, and K from Wild Bull Site.

fused. Where not covered with pinching, the exteriors are poorly to well smoothed, while all interior surfaces are moderately well finished. One of the two rim fragments has a slightly convex lip, the other is somewhat outturned and has a tapered, convex lip. Wall thickness is 8 to 10 mm., and the hardness is usually 3 on Moh's scale.

Pinching is not a widespread decorative technique, occurring primarily on *Killough Pinched* of the Frankston and Titus foci of the Fulton Aspect (Suhm and Jelks, 1962: 91). While identification with this type is not warranted at the present time, it is probable that the Gossett Bottoms sherds are closely related to *Killough Pinched.*

MISCELLANEOUS SHERDS (Fig. 25, G, H; 2 specimens)

Included in this category are specimens which cannot be classified into any of the above groups. One is a tiny clay-tempered body sherd (Fig. 25, G) with a brushed and appliqued decoration. The appliqued node? (or possibly ridge) seems to have been fingernail punctated. The second specimen (Fig. 25, H), also clay-tempered, is an unusual piece which appears to have been an applique ridge. Presumably it was not tightly welded to the vessel and has popped free. It is 4.3 cm. long, 1.8 cm. wide, and 1 cm. thick.

Worked Sherd (Fig. 25, I; 1 specimen)

Somewhat less than half of a small worked sherd was recovered from the Wild Bull Site. It was evidently disc-shaped and shows careful grinding along the one intact edge. The sherd is plain and has a fine, compact paste which contains small particles of crushed bone. The diameter is estimated to have been approximately 2 cm., and the maximum thickness is .3 cm. There are no indications of the specimen having been perforated and its use remains undetermined.

Ceramic Bead (Fig. 25, J; 1 specimen)

A rather small tubular bead having a very fine sandy paste was found at the Gossett Bottoms Site. One end is slightly damaged, but portions of the smoothed edge are still visible. The surface hardness is 3.5, while the color is dark gray on both surfaces and the core. Total length is 1.7 cm., outside diameter is .9 cm., and the inside diameter is .6 cm. Since the central perforation is uniform in size, it seems quite possible that the bead has been fashioned from a broken pipe stem.

Lump of Clay (Fig. 25, K; 1 specimen)

A rounded lump of untempered clay with a slightly flattened cross section was obtained from the Wild Bull Site. It is very soft, is light gray in color, and does not appear to have been fired. One surface is covered with numerous fingernail scratches, some of which are recent, but most are probably old. No other signs of wear can be detected and it may be that this piece is nothing more than an unused lump of clay collected by a potter. Its maximum diameter is 5 cm., and its maximum thickness is 3.1 cm.

Artifacts of Bone and Antler

Worked bone and antler are not common at the Cedar Creek sites, occurring almost exclusively at Gossett Bottoms. This discrepancy in distribution (Table 2), however, may be more a matter of preservation than cultural differences. At least, the surviving specimens are typically fragmentary and, as a result, difficult to classify. Included are three pins, a possible bead, a fleshing tool, six proximal ends of awls, four possible flaking implements, and 13 pieces which either bear only cut marks, or are too fragmentary to describe in detail.

Bone Pins (Fig. 25, L-N; 3 specimens)

While none of the bone pins is complete, each appears to have been short and to have had a pointed distal end. They are carefully worked, probably from mammal leg bones. All surfaces are either well smoothed or polished and have numerous small striations which run diagonally or horizontally across the long axis. On two, the cross section is almost rectangular, on the third it is circular. The proximal ends are well rounded, but otherwise unaltered. Maximum diameter is .4 to .5 cm., and the length of the one nearly complete bone pin is estimated to have been 5 cm.

Similar implements are often found at Wylie Focus sites and are illustrated by Stephenson (1952: Fig. 94, Nos. 16 and 17) and by Members of the Dallas Archeological Society (1963: Fig. 10, H-J).

Bone Bead? (Fig. 25, O; 1 specimen)

A short section of a light, tubular bone, probably from a bird or rodent, appears to have been cut at each end. The surfaces bear a number of small striations, and have been slightly smoothed. The lateral edges are somewhat tapered toward one end—undoubtedly a reflection of the natural shape of the bone—and the cross section is roughly plano-convex. Length is 1.7 cm.; maximum outside diameter is .7 cm., and maximum inside diameter is .5 cm.

Flesher (Fig. 25, P, P′; 1 specimen)

Manufactured from the long bone of a large mammal, perhaps a deer, this artifact is tentatively identified as a fleshing tool. It shows considerable smoothing or wear along the lateral edges and ends, but relatively little on the flat surfaces. There was evidently limited effort at shaping, the bone appears only to have been split and cut at the ends. One end has a rounded bit, while the other is somewhat pointed, having been produced by making a diagonal cut across the long axis. Rodent teeth marks are common along both marginal edges. The length is 8.6 cm., maximum width is 2.1 cm., and maximum thickness is 1 cm.

Bone Awls (Fig. 25, Q, R; 6 specimens)

Four proximal fragments and two medial sections are provisionally recognized as bone awls. One of the proximal pieces (Fig. 25, Q) has retained most of the articular joint, two have been extensively worked and are spatula-shaped (Fig. 25, R), and the fourth is fragmentary but may have also been spatula-shaped. Both of the medial pieces are quite small and have roughly triangular cross sections. The cross sections of the proximal fragments on the other hand, vary from circular to flattened. All were manufactured from the mammal limb bones, perhaps from one about the size of a dog or coyote. No meaningful dimensions can be taken.

Flaking Tools (4 specimens)

Each of these specimens is a small distal end of what may have been a flaking implement. One is the tip end of an antler tine, two are apparently fashioned from thick mammal bones, and the fourth is perhaps part of a deer ulna. Three are tapered, with two of these having somewhat beveled tips. The tip of the presumed ulna fragment is flat in cross section and rounded in outline. All are polished and two show probable use scars. Because of their incompleteness no measurements have been made.

Miscellaneous Modified Bone (Fig. 25, S, T; 13 specimens)

Included in this catchall category are 11 fragments of worked bone and two pieces evidently residue from the production of bone implements. The worked specimens are both polished and shaped but are too small to reveal much about the type of tool represented. Most, however, are possibly from awls, pins, or needles. Specifically, there are three keenly pointed distal fragments, a large portion of a possible unfinished awl (Fig. 25, S), and seven medial sections. The medial pieces have plano-convex, or flattened cross sections.

The bone residue consists of two articular fragments one of which has been completely severed 2.3 cm. below the joint. The other (Fig. 25, T), apparently the lower limb bone of a deer, has been split in two and a sliver removed from one edge.

Artifacts of Glass, Metal, and Leather

Although varying considerably in quantity (Table 2), all three sites yielded relatively recent refuse consisting primarily of metal and glass. From the Gossett Bottoms Site were obtained three thin fragments of iron (probably from cans), a small white (porcelain?) button, and two small iron stars, apparently ornaments once riveted onto an item of apparel. At the Wild Bull Site the following were collected: ten fragments of earthenware (all apparently ironstone), two pieces of leather, a 12-gauge shotgun cartridge (labelled "U.M.C. Co. Nitro Club"), two .22 shells (both marked with diamonds), 11 pieces of bottle glass, a tapered wood screw, a heavy fragment of iron (possibly from a stove), a strip of lead perhaps from a jar lid, six square nails, two round nails, an iron eye-like object, a small iron buckle, and an embossed, brass disc.

Historic materials from the Lacy Site are similar to those recovered from the Wild Bull Site and include: 45 pieces of bottle glass (one unquestionably represents the base of a brown snuff bottle), one iron tack, four staples, two bolts, four possible horseshoe nails, nine round nails, two key type can openers, nine sherds of plain earthenware (mainly ironstone), an iron buckle, base of a metal can, three fragments of an iron stove, a small iron cup (possibly from the base of a chair leg), a brass overalls button ("Lone Star"), a small wad of lead, a fragment of a glass button set, two pieces of narrow gauge iron wire, eight thin pieces of iron probably from cans, three 12-gauge shotgun cartridges (one "U.M.C. Co., New Club," one "Winchester Repeater", and one "Western Super-X"), one 16-gauge shotgun cartridge ("U.M.C. Co., New Club"), 15 .22-shells (one "P", three "U", one "US," one "Peters HV," six have diamonds, and three have no visible mark), a .32 shot cartridge, and a piece of pitch.

Without doubt this recent debris post-dates the Indian occupations, although most of the historic items were in use by the turn of the 19th century. The type and quantity from both the Wild Bull and Lacy sites suggest the presence of a house in the vicinity, while more transient use seems indicated for the Gossett Bottoms Site.

Non-Artifactual Refuse

A large number of specimens from the excavations are best described as miscellaneous, incidentally-accumulated refuse. Included are food remains (animal bones and mussel shells), chipping debris, and daub. Of these, only the daub and the animal bones have been examined and appear in Table 2.

Daub (Fig. 25, U, V; 1340 specimens)

Pieces of clay believed to have been used principally to plaster the outside of thatch houses were found at each of the Cedar Creek sites. All have been burned and many (an estimated 1/3 to 1/2) bear impressions of perishable construction materials ranging from what appears to have been grass (Fig. 25, V) to small poles (Fig. 25, U) perhaps as much as 3.5 cm. in diameter. None of the daub is tempered though many pieces have a somewhat sandy texture. The colors are from gray-black to almost orange, and the maximum dimension is from less than a centimeter to 6 cm.

While all three sites yielded daub, it was common (1273 specimens) just at Gossett Bottoms, where it occurred primarily in the eastern part of the excavations (see Table 2 for the vertical distribution). At both the Wild Bull and Lacy sites the daub was more scattered, although at the latter a slight concentration in the southern part of the excavations can be noted. In spite of a lack of collaborating evidence (such as post holes), the presence of the daub—especially that wattle-impressed—suggests the former existence of a structure.

Animal Bones (1064 specimens)

The vertebrate fauna represented at the Cedar Creek sites is listed in Table 2, the identifications having been made by Dr. Ernest L. Lundelius, Jr. of the Department of Geology, The University of Texas. Bones are fairly numerous at the Gossett Bottoms and Lacy sites, but are rare—probably because of poor conditions of preservation—at the Wild Bull Site. To judge from their frequency, deer and, at the Gossett Bottoms Site only, turtle were the most important sources of animal food. Other forms, namely, bison (identification tentative because of small sample), rabbit, raccoon, opossum, and fish, were also probably eaten, but must have accounted for only minor additions to the diet. Animals known from only a few bones—beaver, turkey, squirrel, coyote, skunk, and gar—could have been utilized, or could just as well have been introduced to the sites by some agency other than man (e.g., predators). Certainly, however, the gopher, snake, and armadillo (a recent addition to the fauna of the area) should be regarded as intrusive. As to the dog remains, most of those from Gossett Bottoms represent a burial (see earlier section on Features); those from Lacy have also been an intentional interment, but the field evidence is not clear on this point, as the bones were recovered from an animal burrow.

Provenience of the specimens, Cedar Creek Reservoir

WILD BULL (41 HE 61)

	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Artifacts of Stone										
Arrow Points										
Alba	....	....	....	....	....	....	....	....	....	0
Bonham	....	....	....	....	....	....	....	....	....	0
Catahoula-like	....	1	....	....	....	....	....	....	....	1
Cliffton	....	1	....	....	....	....	....	....	....	1
Cuney	....	....	....	....	....	....	....	....	....	0
Friley	....	....	....	....	....	....	....	....	....	0
Granbury	....	....	....	....	....	....	....	....	....	0
Perdiz	....	1	....	....	....	....	....	....	....	1
Scallorn	....	....	....	....	....	....	....	....	....	0
Steiner	1	....	....	....	....	....	....	....	....	1
Misc. rectangular stem	....	....	....	....	....	....	....	....	....	0
Misc. expanding stem, convex base	....	1	....	....	....	....	....	....	....	1
Misc. expanding stem, concave base	....	....	....	....	....	....	....	....	....	0
Misc. subtriangular	....	....	....	....	....	....	....	....	....	0
Misc. eccentric points	....	1	1	....	....	....	....	....	....	2
Arrow point fragments	2	6	2	....	....	....	....	....	....	10
Subtotals	3	11	3	0	0	0	0	0	0	17
Dart Points										
Bulverde	....	....	....	1	....	....	....	....	....	1
Edgewood	....	....	....	....	1	....	....	....	....	1
Ellis	....	....	....	3	1	1	....	....	....	5
Folsom	....	....	....	....	1	....	....	....	....	1

GOSSETT BOTTOMS (41 KF 7)

	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Artifacts of Stone										
Arrow Points										
Alba	....	2	1	1	....	....	....	....	....	4
Bonham	....	1	....	1	....	....	....	....	....	2
Catahoula-like	....	2	....	1	....	....	....	....	....	3
Cliffton	....	5	1	....	....	....	....	....	....	6
Cuney	....	....	....	....	....	....	....	....	....	0
Friley	....	3	2	....	....	....	....	....	....	5
Granbury	1	5	3	5	1	....	....	....	1	16
Perdiz	....	6	3	1	....	....	....	....	....	10
Scallorn	....	4	1	4	1	....	....	....	....	10
Steiner	....	5	2	1	....	1	....	....	....	9
Misc. rectangular stem	....	2	2	1	1	....	....	....	....	6
Misc. expanding stem, convex base	....	3	4	....	1	....	....	....	....	8
Misc. expanding stem, concave base	....	1	1	....	....	....	....	....	....	2
Misc. subtriangular	....	2	1	....	1	....	....	....	....	4
Misc. eccentric points	....	5	1	....	....	....	....	....	....	6
Arrow point fragments	....	24	11	4	1	....	....	....	....	40
Subtotals	1	70	33	19	6	1	0	0	1	131
Dart Points										
Bulverde	....	....	....	....	....	....	....	....	....	0
Edgewood	....	....	....	....	....	....	....	....	....	0
Ellis	....	....	....	....	....	....	....	....	....	0
Folsom	....	....	....	....	....	....	....	....	....	0

LACY (

	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5
Artifacts of Stone				
Arrow Points				
Alba	....	....	2	....
Bonham	....	....	....	....
Catahoula-like	....	3	....	1
Cliffton	....	....	....	....
Cuney	....	1	....	1
Friley	....	1	1	....
Granbury	....	....	1	....
Perdiz	....	8	4	2
Scallorn	....	....	....	....
Steiner	....	1	1	....
Misc. rectangular stem	....	....	....	....
Misc. expanding stem, convex base	....	1	1	....
Misc. expanding stem, concave base	....	....	1	....
Misc. subtriangular	....	3	1	....
Misc. eccentric points	....	....	....	....
Arrow point fragments	1	5	2	2
Subtotals	1	23	14	6
Dart Points				
Bulverde	....	....	....	....
Edgewood	....	....	....	....
Ellis	....	....	....	....
Folsom	....	....	....	....

TABLE 2—Continued

Provenience of the specimens, Cedar Creek Reservoir

	WILD BULL (41 HE 61)									
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Gary alsa	....	....	....	6	5	2	....	1	....	14
Gary colfax	....	1	1	3	1	....	....	....	....	6
Gary hobson	....	....	4	6	5	....	....	....	....	15
Gary kaufman	..	1	..	5	.	....	....	....	....	6
Gary kemp	....	1	1	4	1	1	....	....	....	8
Gary kenedy	....	....	....	1	....	....	....	....	....	1
Gary panna maria	..					....	....	....	..	0
Gary runge	....	3	1	1	3	....	....	....	....	8
Gary, misc. and fragmentary	....	....	1	4	3	2	....	....	....	10
Kent	....	....	....	2	....	....	....	....	....	2
Marshall	....	1	....	2	....	....	....	....	....	3
Morrill	1	....	1	....	....	....	....	....	....	2
Wesley	....	....	....	1	....	....	....	....	....	1
Yarbrough dike		1	..	..	....	..	..	..	..	1
Yarbrough lindale	....	....	....	....	....	1	....	....	....	1
Yarbrough mabank	....	....	....	1	....	....	....	....	....	1
Unclassified	....	....	1	1	3	1	1	....	....	7
Fragment	2	6	8	13	5	1	1	....	....	36
Subtotals	3	14	18	54	29	9	2	1	0	130
Knives										
Ovate	....	1	1	1	1	2	1	....	....	7
Subtriangular	....	....	....	....	1	1	....	....	....	2
Lanceolate	1	2	....	2	3	3	....	....	....	11
Bi-pointed	....	....	....	....	....	....	....	....	....	0
Single-edged	1	....	1	2	1	1	....	....	....	6
Cortex-base	....	....	2	....	2	....	....	....	....	4
Petrified wood	....	....	....	1	1	2	....	....	....	4
Fragments	4	8	10	10	9	8	1	1	....	51
Subtotals	6	11	14	16	18	17	2	1	0	85

	GOSSETT BOTTOMS (41 KF 7)									
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Gary alsa	....	2	1	2	2	3	....	....	....	10
Gary colfax	....	6	1	7	1	....	....	....	....	15
Gary hobson	....	3	6	9	3	5	....	....	....	26
Gary kaufman	....	....	1	....	1	1	....	....	....	3
Gary kemp	....	5	1	4	....	4	3	....	....	17
Gary kenedy	....	1	1	1	1	....	....	....	....	4
Gary panna maria	....	1	2	2	....	....	....	....	....	5
Gary runge	....	....	2	....	1	1	1	....	....	5
Gary, misc. and fragmentary	....	5	3	8	1	2	....	1	....	20
Kent	....	....	....	1	....	....	....	....	....	1
Marshall	....	....	....	....	....	....	....	....	....	0
Morrill	....	....	....	....	....	....	....	....	....	0
Wesley	....	....	....	....	....	....	....	....	....	0
Yarbrough dike	....	....	....	....	....	....	....	....	....	0
Yarbrough lindale	....	....	....	....	....	....	....	....	....	0
Yarbrough mabank	....	....	....	....	....	....	....	....	....	0
Unclassified	....	....	....	....	....	....	....	....	....	0
Fragment	...	35	21	18	14	11	1	....	....	100
Subtotals	0	58	39	52	24	27	5	1	0	206
Knives										
Ovate	1	3	....	2	2	....	....	....	....	8
Subtriangular	....	....	....	3	....	1	1	....	....	5
Lanceolate	....	2	....	1	1	2	....	....	....	6
Bi-pointed	....	1	1	....	2	1	....	....	....	5
Single-edged	....	2	....	....	....	....	....	....	....	2
Cortex-base	....	2	1	2	....	....	....	....	....	5
Petrified wood	....	1	....	....	....	....	....	....	....	1
Fragments	..	25	8	12	10	3	4	2	....	64
Subtotals	1	36	10	20	15	7	5	2	0	96

	LACY (4				
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0
Gary alsa	1	....	....	1	1
Gary colfax	....	....	....	3	1
Gary hobson	....	....	....	1	2
Gary kaufman	....	....	....	....	....
Gary kemp	....	....	....	....	....
Gary kenedy	....	....	....	....	....
Gary panna maria	....	....	....	....	....
Gary runge	....	....	....	....	....
Gary, misc. and fragmentary	....	1	2	3	2
Kent	....	....	1	....	....
Marshall	....	....	....	1	....
Morrill	....	....	....	....	....
Wesley	....	....	....	....	....
Yarbrough dike	....	....	....	....	....
Yarbrough lindale	....	....	....	....	....
Yarbrough mabank	....	....	....	....	....
Unclassified	....	....	....	....	....
Fragment	....	5	1	3	4
Subtotals	1	6	4	12	11
Knives					
Ovate	1	....	2	....	....
Subtriangular	....	....	....	1	....
Lanceolate	....	....	....	....	....
Bi-pointed	....	....	....	1	....
Single-edged	1	1	3	1	1
Cortex-base	....	....	....	....	....
Petrified wood	....	....	....	....	....
Fragments	1	2	4	4	5
Subtotals	3	3	9	7	6

Provenience of the specimens, Cedar Creek Reservoir

	WILD BULL (41 HE 61)										GOSSETT BOTTOMS (41 KF 7)										LACY (			
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5
Bifaces																								
Bristol	....	1	....	4	2	1	....	....	....	8	....	3	6	3	4	1	....	....	....	17	....	....	2	5
Pebble	....	....	....	2	1	1	....	....	....	4	....	....	1	....	....	....	....	....	....	1	....	....	....	1
Bi-pointed	....	....	....	1	1	....	....	....	....	2	....	....	....	....	....	2	....	....	....	2	....	....	....	1
Miscellaneous	....	1	3	5	6	3	....	....	....	18	....	5	5	4	3	....	1	....	....	18	....	....	2	1
Subtotals	0	2	3	12	10	5	0	0	0	32	0	8	12	7	7	3	1	0	0	38	0	0	4	8
Microliths	2	....	....	....	....	1	....	....	....	3	....	1	....	....	....	1	....	1	....	3	....	1	....	....
Drills																								
Flake	....	....	....	....	....	....	....	....	....	0	....	4	....	1	....	....	....	1	....	6	....	....	1	....
Reworked (?) dart points	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	0	1	....	....	....
Subtotals	0	0	0	0	0	1	0	0	0	1	0	4	0	1	0	0	0	1	0	6	1	0	1	0
Burins	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	0	....	....	....	....
Burin Spall?	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	0	....	....	....	....
Gravers	....	1	4	3	3	5	....	....	....	16	....	5	6	3	1	1	....	2	....	18	....	....	2	....
Gouges																								
Gossett	6	3	6	7	18	11	....	1	....	52	....	2	3	2	....	1	....	....	....	8	....	....	....	....
Clear Fork	1	....	....	1	1	....	....	....	....	3	....	....	....	....	....	....	....	....	....	0	....	....	....	....
Guadalupe?	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	0	....	....	....	....
Subtotals	7	3	6	9	19	11	0	1	0	56	0	2	3	2	0	1	0	0	0	8	0	0	0	0
Scrapers																								
Mineola	1	....	....	3	5	1	....	....	....	10	....	1	1	....	....	....	....	....	....	2	....	....	....	....
End, large	1	1	....	1	2	2	....	....	....	7	....	1	....	1	....	1	....	....	....	3	....	....	....	....
Thumbnail	....	....	1	1	....	....	....	....	....	2	....	1	....	....	....	....	....	....	....	1	....	....	....	....
Core	....	1	1	....	5	6	....	....	....	13	....	5	....	....	1	....	....	....	....	6	....	1	3	1
Initial cortex flake	2	1	....	6	9	8	....	1	....	27	....	3	2	....	....	....	....	1	....	6	....	2	....	1
Secondary flake	....	1	....	1	7	....	....	....	....	9	....	3	....	1	....	1	....	....	....	5	....	....	....	....
Concave-edge	....	....	....	....	....	....	....	....	....	0	....	4	2	1	4	....	....	....	....	11	....	....	....	....
Albany spokeshave(?)	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	0	....	....	....	....

TABLE 2—Continued

Provenience of the specimens, Cedar Creek Reservoir

	WILD BULL (41 HE 61)									
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Miscellaneous and fragmentary	1	2	1	3	3	1	....	....	....	11
Subtotals	6	6	3	15	31	18	0	1	0	80
Utilized flakes	1	6	7	10	12	6	1	....	....	43
Boatstones	....	....	....	....	....	....	....	....	....	0
Celt	....	....	....	....	....	....	....	....	....	0
Notched pebbles										
End	2	....	....	1	3	....	....	....	....	6
Side	....	....	1	....	....	....	....	....	....	1
Subtotals	2	0	1	1	3	0	0	0	0	7
Pitted stones	....	....	....	....	2	....	....	....	....	2
Abraders	....	....	....	1	....	....	....	....	....	1
Scored hematite	....	....	....	....	....	1	....	....	....	1
Hammerstones	1	1	1	....	1	4	1	....	1	10
Handstones	1	....	....	1	1	1	....	....	....	4
Ocher										
Smoothed	....	....	....	....	....	....	....	....	....	0
Unmodified	....	....	....	5	5	1	....	....	....	11
Subtotal	0	0	0	5	5	1	0	0	0	11
Artifacts of Clay										
Plain Sherds										
Shell-tempered	1	1	1	1	....	....	....	....	....	4
Bone-tempered	9	....	4	2	3	1	....	....	....	19
Clay-tempered	....	....	....	....	....	....	....	....	....	0
Sand-tempered	....	....	....	....	....	....	....	....	....	0
Subtotals	10	1	5	3	3	1	0	0	0	23
Decorated Sherds										
Engraved	....	....	....	....	....	....	....	....	....	0
Brushed	....	....	....	....	....	....	....	....	....	0

	GOSSETT BOTTOMS (41 KF 7)									
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total
Miscellaneous and fragmentary	....	6	....	3	3	....	....	....	....	12
Subtotals	0	24	5	6	8	2	0	1	0	46
Utilized flakes	....	47	48	19	17	8	4	6	....	149
Boatstones	....	1	1	....	....	....	....	....	....	2
Celt	....	....	....	....	....	....	....	....	....	0
Notched pebbles										
End	....	....	....	....	....	....	....	....	....	0
Side	....	....	....	....	....	....	....	....	....	0
Subtotals	0	0	0	0	0	0	0	0	0	0
Pitted stones	....	....	....	....	....	....	....	....	....	0
Abraders	....	....	....	....	1	....	....	....	....	1
Scored hematite	....	1	....	....	....	....	....	....	....	1
Hammerstones	....	....	....	....	....	1	....	....	....	1
Handstones	....	....	....	2	....	....	....	....	....	2
Ocher										
Smoothed	....	....	....	2	....	....	....	....	....	2
Unmodified	....	....	....	....	....	1	....	....	....	1
Subtotal	0	0	0	2	0	1	0	0	0	3
Artifacts of Clay										
Plain Sherds										
Shell-tempered	....	4	1	5	....	....	....	....	....	10
Bone-tempered	3	38	28	18	7	4	....	1	....	99
Clay-tempered	1	104	52	28	7	2	....	....	....	194
Sand-tempered	1	13	6	1	1	....	....	....	....	22
Subtotals	5	159	87	52	15	6	0	1	0	325
Decorated Sherds										
Engraved	....	....	....	....	....	....	....	....	....	0
Brushed	2	75	28	15	5	....	....	....	....	125

	LACY (4				
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0
Miscellaneous and fragmentary	....	....	....	1	....
Subtotals	0	3	3	3	1
Utilized flakes	1	3	3	4	1
Boatstones	....	....	....	....	....
Celt	....	....	1	....	....
Notched pebbles					
End	....	....	....	....	....
Side	....	....	....	....	....
Subtotals	0	0	0	0	0
Pitted stones	....	....	1	....	....
Abraders	....	....	....	....	....
Scored hematite	....	....	....	....	....
Hammerstones	1	....	....	....	....
Handstones	....	....	2	1	1
Ocher					
Smoothed	....	....	....	....	....
Unmodified	....	....	....	....	....
Subtotal	0	0	0	0	0
Artifacts of Clay					
Plain Sherds					
Shell-tempered	....	2	2	3	5
Bone-tempered	4	68	59	30	23
Clay-tempered	16	69	38	20	13
Sand-tempered	1	2	1	1	3
Subtotals	21	141	100	54	44
Decorated Sherds					
Engraved	....	5	3	6	2
Brushed	2	26	5	3	2

	WILD BULL (41 HE 61)										GOSSETT BOTTOMS (41 KF 7)										LACY (				
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1. to 2.
Incised	.	1	....	....	....	....	....	....	....	1	....	16	4	6	....	....	....	....	....	26	3	10	10	10	[illegible]
Trailed	....	....	....	....	....	....	....	....	....	0	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....
Brushed-incised	....	....	....	....	....	....	....	....	....	0	....	3	2	....	....	....	....	....	....	5	....	....	....	....	....
Punctated	....	....	....	....	....	....	....	....	....	0	1	20	20	12	1	3	1	....	....	58	2	12	14	16	[illegible]
Punctated-incised	....	....	....	....	....	....	....	....	....	0	....	4	1	1	3	....	....	....	....	9	...	2	6	2	[illegible]
Pinched	....	....	....	....	....	....	....	....	....	0	....	13	2	....	....	....	....	....	....	15	....	....	....	....	....
Miscellaneous	...	.	..	..	....	....	....	..	....	0	....	....	....	1	....	1	....	....	....	2	....	....	....	....	....
Subtotals	0	1	0	0	0	0	0	0	0	1	3	131	57	35	10	4	1	0	0	241	7	55	38	37	[illegible]
Worked sherd	....	....	....	....	....	....	....	....	....	0	..	....	....	....	....	....	....	....	....	0	....	1	....	....	....
Pipe stem	....	....	....	....	....	....	....	....	....	0	....	....	....	1	....	....	...	....	....	1	....	....	....	....	....
Clay lump	....	....	....	....	....	....	....	....	....	0	....	....	....	....	....	....	....	....	....	0	....	....	1	....	....
Artifacts of bone and antler																									
Pins	....	....	....	....	....	....	....	....	....	0	....	....	....	1	2	....	....	....	....	3	....	....	....	....	....
Bead (?)	....	....	...	..	...	..	...	..	....	0	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....
Fleshing tool	....	....	....	....	....	....	....	....	....	0	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....
Possible awl fragments	....	....	....	....	....	....	....	....	....	0	....	....	1	2	3	....	....	....	....	6	....	....	....	....	....
Possible flaking tool fragments	....	....	....	....	....	....	....	....	....	0	....	....	....	1	1	1	....	....	....	3	....	....	1	....	....
Miscellaneous	....	....	....	....	....	....	....	....	....	0	....	3	....	3	5	1	....	....	1	13	....	....	....	....	....
Subtotals	0	0	0	0	0	0	0	0	0	0	0	3	1	7	11	4	0	0	1	27	0	0	1	0	[illegible]
Artifacts of metal, glass and leather	4	34	2	....	1	....	....	....	....	41	....	6	....	....	....	....	....	....	....	6	....	87	15	7	....
Misc. occupational refuse																									
Daub	....	1	6	11	21	1	1	....	....	41	....	368	327	280	219	65	11	3	....	1273	....	4	15	5	[illegible]
Faunal remains																									
Bison bison(?) (bison)	....	....	....	....	....	....	....	....	....	0	....	2	....	1	2	....	....	....	....	5	....	....	....	....	....
Odoceileus sp. (deer)	....	1	....	....	....	....	....	....	....	1	1	82	68	102	92	59	16	5	....	425	...	62	79	61	[illegible]

TABLE 2—Continued

Provenience of the specimens, Cedar Creek Reservoir

	WILD BULL (41 HE 61)										GOSSETT BOTTOMS (41 KF 7)										LACY (41				
	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5	Uncertain	Total	Surface	0.0 to 0.5	0.5 to 1.0	1.0 to 1.5	1.5 to 2.0
Canis familiaris (dog)	....	....	....	....	....	....	....	....	....	0	....	....	1	1	1*	....	....	....	....	3	....	....	....	27	....
Canis latrans (coyote)	....	....	....	....	....	....	....	....	....	0	....	....	1	....	....	1	....	....	....	2	....	....	....	....	....
Procyon lotor (raccoon)	....	....	....	....	....	....	....	....	....	0	....	2	1	1	4	2	2	....	....	12	....	3	....	1	....
Spilogale puturious (spotted skunk)	....	....	....	....	....	....	....	....	....	0	....	....	....	1	....	....	....	....	...	1	....	....	....	....	....
Castor canadensis (beaver)	...	....	....	....	....	....	....	....	....	0	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....
Sciurus sp. (squirrel)	....	....	....	....	....	....	....	....	....	0	....	....	....	1	....	....	....	....	....	1	....	....	....	1	....
Geomys sp. (gopher)	....	....	....	....	....	....	....	....	....	0	....	2	2	1†	3	3	....	....	....	11	....	2	1†	....	....
Lepus californicus (jack rabbit)	....	1	....	....	....	....	....	....	....	1	....	1	....	1	....	....	....	....	....	2	....	....	....	....	....
Sylvilagus sp. (cottontail)	....	....	....	....	....	....	....	....	....	0	....	....	1	2	1	....	....	....	....	4	....	....	....	1	....
Didelphis virginiana (opossum)	....	2	....	....	....	....	....	....	....	2	....	9	5	4	2	....	....	....	....	20	....	....	1	....	....
Dasypus novemcinctus (armadillo)	....	....	....	....	....	....	....	....	....	0	....	11	6	4	3	....	....	....	....	24	....	....	....	....	....
Meleagris gallopavo (turkey)	....	....	....	....	....	....	....	....	....	0	....	....	...	....	1	....	....	....	....	1	....	....	....	....	....
Unidentified bird(?)	....	....	....	....	....	....	....	....	....	0	....	....	....	1	2	....	....	....	....	3	....	....	....	....	....
Terrapene (tortoise)	....	....	....	....	....	....	....	....	....	0	....	32	82	77	55	11	6	....	....	263	....	....	....	....	....
Snake	....	....	....	....	....	....	....	....	....	0	....	1	1	....	....	....	....	....	....	2	....	....	....	....	....
Fish	....	....	....	....	....	....	....	....	....	0	....	....	....	3	1	....	2	....	....	6	....	1	....	....	....
Gar	....	....	....	....	....	....	....	....	....	0	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....
Subtotals	0	4	0	0	0	0	0	0	0	4	1	142	168	201	168	76	26	5	0	787	0	68	81	91	17
																									GRAND

* *Canis familiaris*, Level 4/Dog burial—64 bones.
† Nearly complete skeleton of one individual.

DISTRIBUTION OF THE SPECIMENS

The vertical proveniences of all specimens described in the preceding section are presented in Table 2. In addition, the relative frequency by six-inch level (numbered from top to bottom) of selected artifact groups such as pottery, arrow points, and dart points, is plotted in Figures 26 and 27. Horizontal occurrences within each site were also carefully examined, but, with the exception of the daub at the Gossett Bottoms Site and, less clearly, Lacy Site, no meaningful differences could be detected.

Looking more closely at the vertical proveniences, all three of the sites appear to be considerably mixed. Clearest indications of this are perhaps to be seen in a comparison of the distribution of the arrow points and historic materials at the Lacy Site (Fig. 27), where one could argue with reason that the latter, dated at about 1860 at the earliest, is older than the former. That many of the specimens from the Wild Bull and Gossett Bottoms sites are equally as well mixed seems very likely in view of: (1) the similarity of the artifact-bearing deposit at all of the sites, (2) the diversity of types and classes recovered at each site, and (3) a comparison with the sequential data obtained from culturally-related sites such as Yarbrough and Miller (Johnson, 1962). Possible causes for this seemingly clear mixture of refuse are less apparent, although there can be no doubt that burrowing gophers and armadillos are contributing factors. Other plausible explanations are more evasive but perhaps lie in the techniques of excavations and/or the nature and origin of the culture-bearing sandy soil. Regarding the latter, it at least seems possible that part of all of the sandy deposit at each of the sites was formed or accumulated before any occupation took place and that the specimens have simply worked their way down into this zone.

Regardless of the causes, it is quite evident that the intrasite distributions are of limited utility and that the ordering of the collections must depend to a large measure upon less direct methods, particularly intersite comparisons. This approach reveals both qualitative and quantitative distributional differences, many of which probably represent gradual stylistic and/or functional changes which occurred throughout the general area. Still imperfectly defined and tentative in nature, these developments are summarized below by major artifact groups.

Arrow Points. Each of the sites yielded arrow points although they were numerous only at the Gossett Bottoms and Lacy sites. The vertical occurrences indicate that arrow points are generally later than dart points and, less certainly, pottery. A rather wide range of styles is represented in the collection and there do appear to be some differences in the distribution of certain types. At Lacy the most common types are *Catahoula*-like (4 specimens) and *Perdiz* (14 specimens), while at Gossett Bottoms types *Alba*, *Cliffton*, *Granbury*, *Friley*, *Perdiz*, *Scallorn*, and *Steiner* are each represented by four or more specimens. While no arrow point type can be said to be numerous at the Wild Bull Site, it is probably of importance that the only recognizable forms (one of each) are *Catahoula*-like, *Perdiz*, *Cliffton*, and *Steiner*. The stratigraphic evidence is not strong, but some gradual stylistic chances can be discerned. Markedly expanding stem (namely the *Scallorn* type) and subtriangular (*Granbury*) forms are apparently the earliest styles. These seem to be followed by a rather poorly defined group of less expanding and rectangular stem types (such as *Alba*, *Steiner*, and *Friley*) which, in turn, are replaced by better defined contracting stem forms (*Cliffton* and *Perdiz*), as well as the heavy-shouldered *Catahoula*-like points. A similar, but likewise weakly supported, sequence has been recognized in the McGee Bend area by Duffield (1963b: 140). To the west and south, in the central part of the state, there are excellent stratigraphic data to indicate that the expanding and subtriangular traditions precede the contracting stem one. The apparently more intermediate types at Cedar Creek and McGee Bend, however, are not well represented in central Texas.

Dart Points. Dart points occurred at all three of the sites, generally below the arrow points (Fig. 26). The contracting stem *Gary* is far and away the dominant type and is, for all practical purposes, the only form recovered at Gossett Bottoms and Lacy. The chronological position of *Gary* is not entirely clear, although evidence from other sites in the eastern part of Texas and adjacent sections of Oklahoma (Tunnell, 1961; Johnson, 1962; Duffield, 1963b) suggests that it is probably a late Archaic type which continued in use for a short period after the arrival of pottery. Since pottery and *Gary* points are present at each of the Cedar Creek sites, it may be that at least some of the ceramics are associated with this dart point form. However, it should also be noted that at the Wild Bull Site pottery was scarce, but *Gary* points were numerous; while at the Lacy Site pottery was common, but *Gary* points were relatively uncommon. Not by any means conclusive, these data nonetheless suggest that *Gary* points are associated primarily with preceramic occupation.

Except for the *Folsom* point, the non-*Gary* specimens (many of which cannot be typed) at the Wild Bull Site seem to represent a second, but light, Archaic occupation. While the stratigraphic position

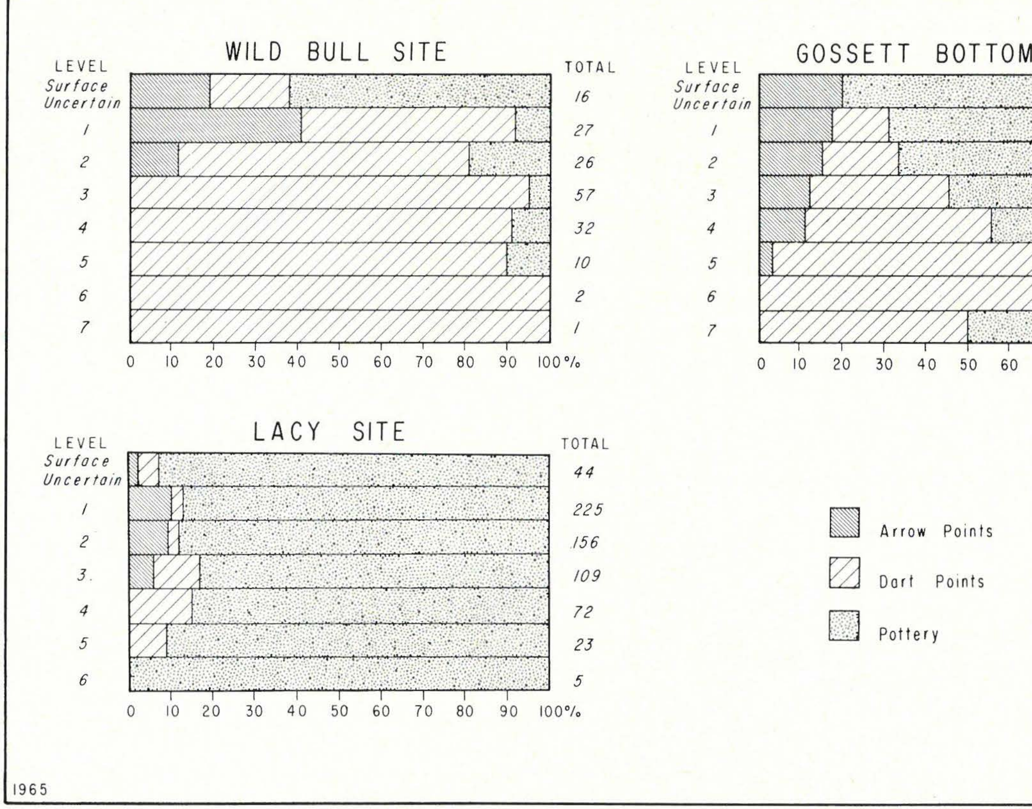


Fig. 26. Relative frequency, by six-inch levels, of arrow points, dart points, and pottery.

of these points provides no meaningful data, information summarized by Johnson (*ibid.*) argues in favor of their preceding the apparently late Archaic *Gary* type. As for the *Folsom* fragment, it could be all that remains (or can be recognized) of an even earlier—Paleo-Indian—occupation at the Wild Bull Site.

Other Stone Artifacts. Differences can be observed in the distribution of many of the other lithic specimens, although the interpretation of these contrasts is made tenuous by small samples and/or by poor stratigraphic data. It seems probable, however, that notched pebbles, *Gossett, Clear Fork*, and *Guadalupe*(?) gouges, *Mineola* end scrapers, *Albany* spokeshave, and petrified wood knives are associated primarily with the non-*Gary* points at the Wild Bull Site. Other possible Archaic tools which appear to be either more widespread or longer-lived include subtriangular knives, re-worked dart point drills, most of the bifaces (the *Bristol* type, however, may have continued in use during later periods), core scrapers, and large end scrapers. The only lithic types which seem to be linked mainly with the arrow points are the flake drills and the microliths. The remainder of the stone artifacts cannot even be tentatively assigned to chronologic periods; perhaps many of them were in use for a considerable span of time.

Pottery. The occurrence of pottery at the Cedar Creek sites presents a rather confused picture which is difficult to unravel. It is most common at the Lacy and Gossett Bottoms sites where arrow points were relatively abundant, and is rare at the Wild Bull Site where arrow points were relatively scarce. These distributions, coupled with the seeming absence of any demonstrably early type—such as *Williams Plain* found at the nearby Yarbrough and Miller sites (Johnson, 1962) or at the Scott Site in Oklahoma (Bell, 1953)—suggests that the pottery is linked mainly with the arrow point occupations and that it is rather late. On the other hand, the vertical distribution of the ceramics at the Lacy and Gossett Bottoms sites would seem to indicate that it was earlier than the arrow points (Fig. 26). Evidence to resolve this apparent conflict is simply lacking, as are data which might show a linkage between the decorative and technological subgroups and, say, the arrow point styles.

Artifacts of Bone. Modified bone objects were recovered from only the Gossett Bottoms Site, where they tended to be found moderately deep (i.e., below the arrow points) in the deposit. The absence of bone artifacts at Wild Bull may be a matter of preservation, particularly since only four pieces of unmodified bone were found at this site. However, at the Lacy Site there were considerable quantities of bone refuse (273 pieces), none of which had been worked. This hints that a cultural factor was, at least in part, affecting the distribution, although at this point its nature cannot be specifically defined.

SUMMARY AND CONCLUSIONS

Excavations carried out at Cedar Creek Reservoir in the spring of 1964 by the Texas Archeological Salvage Project resulted in the recovery of considerable quantities of occupational refuse from three, largely aboriginal, sites. An analysis of the native artifacts obtained indicates that all three were repeatedly, but intermittently, occupied over a considerable span of time. The disturbed nature of the deposits in which the specimens were buried, however, makes the ordering of the collections extremely difficult. In spite of these perplexing problems, certain changes in the culture of the various occupants can be distinguished, principally on the basis of contrasts in the intersite distribution of some of the artifacts. These changes can be conveniently, if somewhat oversimply, grouped into five broad chronologic periods (numbered from earliest to latest):

Period 1, believed to be the earliest represented, is tenuously factored out of the collection from the Wild Bull Site solely on the basis typological pecularities of a *Folsom* point medial section, a basal fragment of a second, stylistically early-appearing point (possibly of the *Eden* type), and even more uncertainly, a burin and burin spall. Each of these occurs in a very mixed cultural context and could conceivably have been introduced to the site by later inhabitants. I feel, nonetheless, that their occurrence at only the Wild Bull Site and the fact that they are made from foreign materials make it more reasonable to assume that these artifacts represent a very brief occupation during Paleo-Indian times.

The second period of occupation is more definitive, but is significantly present only at the Wild Bull Site. Its temporal placement is troublesome and must be largely inferred from findings made at other nearby sites (Crook and Harris, 1952; Duffield, 1963b; Johnson, 1962). The diagnostic artifacts fall stylistically within the Archaic tradition and include notched pebbles, a high percentage of scraping and cutting tools (many of which tend to be large and crudely-made), and a rather miscellaneous series of rectangular and expanding stem dart points (many of which cannot be typed). Of the scraping tools, the *Gossett* and *Clear Fork* gouges, and perhaps the *Albany* spokeshave, the *Mineola* end scraper, and the initial cortex flake scraper are the most characteristic. Other lithic specimens, such as knives, heavy bifaces, core scrapers, grinding implements, pitted stones, and gravers appear to be typical of the period, but are less definitive and probably carried over into at least Period 3.

Period 3, believed to mark the late Archaic and to be most easily recognized by the contracting stem *Gary* dart point type, occurs at each of the sites, but can be said to be well represented only at Gossett Bottoms and Wild Bull. Other traits which might be associated with this period are difficult to enumerate, although the *Bristol* biface, many of the knife forms, grinding implements, scrapers, pitted stones, and perhaps even a few polished stone implements (boatstones and celts) are likely candidates. While the vertical proveniences (Table 2 and Fig. 27) suggest that pottery may have first appeared in at least the latter part of Period 3, there are also indications of a preceramic *Gary* component. Evidence in favor of this component consists of the finding of large numbers of *Gary* points (68 specimens) and few sherds (24) at the Wild Bull Site and, conversely, by the presence of few *Gary* points (18) and large numbers of sherds (533) at the Lacy Site. Less direct support for the largely preceramic nature of Period 3 comes from the apparent absence of any demonstrably early pottery, such as *Williams Plain*, which in other areas has been associated with *Gary* points (Bell, 1953; Johnson, 1962).

Period 4 is heralded chiefly by the appearance of arrow points, with types *Scallorn* and *Granbury* being the most distinctive. Other forms possibly also associated, but perhaps arriving later or lasting longer, include *Alba*, *Friley*, *Steiner*, and *Bonham*. Both plain and decorated pottery were surely being made, but the linkage of specific technological or decorative types is impossible. For all practical purposes, Period 4 is present only at the Gossett Bottoms Site.

The last occupational period recognized occurs at each of the sites, although in significant quantities just at Lacy and Gossett Bottoms. *Cliffton*, *Perdiz*, and *Catahoula*-like are the major arrow point forms of Period 5, having replaced the largely expanding stem and subtriangular forms of Period 4. There are hints that fewer lithic implements were in use, with the heavier bifaces, gouges, and scrapers having been almost completely abandoned. Small flake drills, however, do appear to be associated. Pottery continued to be made and, while no specific complex can be defined, it may be that shell-tempering and engraved decorations appear for the first time.

The relative sequence of artifact changes briefly outlined above are interpreted as having occurred over a rather considerable period of time and as having extended over a fairly wide geographical region. On the Archaic level, the Cedar Creek materials of Periods 2 and 3 compare quite favorably with a group of sites (Yarbrough, Miller,

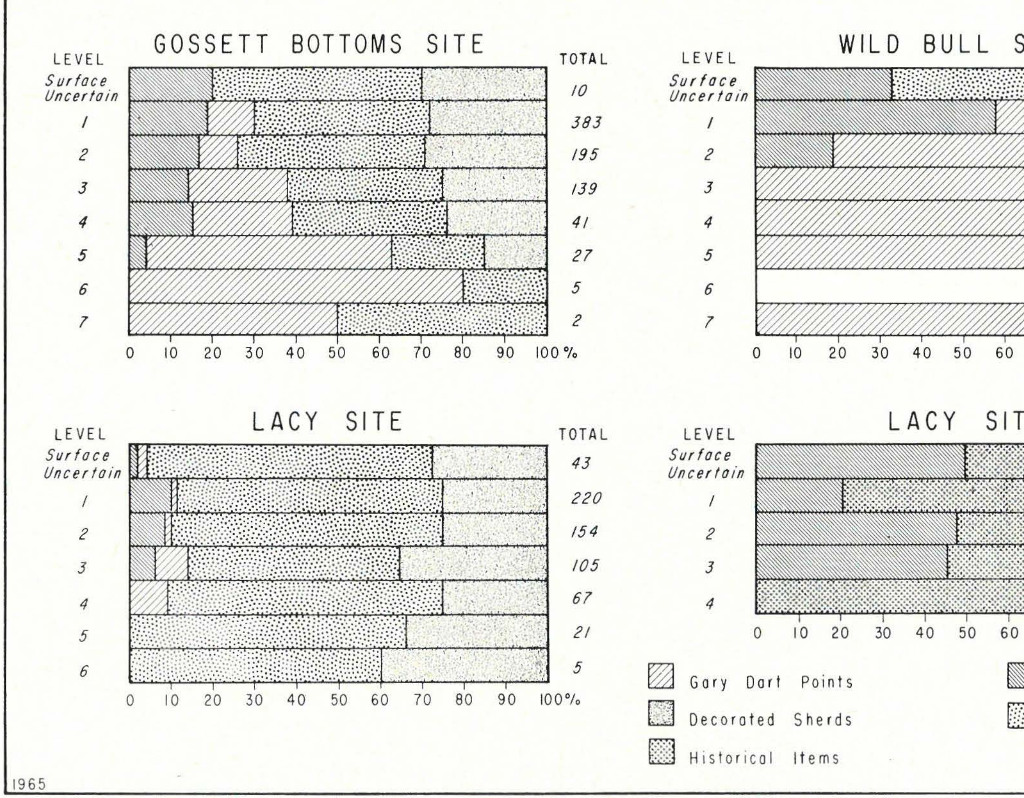


Fig. 27. Relative frequency, by six-inch levels, of arrow points, Gary dart points, decorated rds, plain sherds, and historic artifacts.

Martin, Limerick, and Boat Dock) found in northeastern Texas and adjacent parts of Oklahoma and recently recognized as comprising a distinctive areal cluster within the La Harpe Aspect (Johnson, 1962: 268–280). The early part of the La Harpe Aspect, distinguished mainly by expanding stem dart points, appears to equate, at least in part, with the light Period 2 occupation at the Wild Bull Site. If so, the data from Cedar Creek suggests that notched pebbles, heavy bifaces, large end and core scrapers, and *Mineola* end scrapers are traits which might also belong to the early phase of the La Harpe Aspect. The late La Harpe Aspect, marked mainly by the presence of *Gary* points, seems to be particularly well represented at Cedar Creek, corresponding to occupational Period 3. On the other hand, the terminal La Harpe Aspect, characterized primarily by the arrival of plain, often crudely-made pottery, appears to be completely absent at the three Cedar Creek sites. Also missing are such items as full-grooved axes and flexed burials, but these last-named absences may reflect sampling errors more than cultural differences.

While there is no doubt that the Archaic ties lie mainly with the central cluster of La Harpe Aspect sites, there are a few indications of limited relationships with other areas. Among these are suggestions of slight contact with peoples in the southeastern part of the state, an area that Johnson (1962: 269–278) sees as constituting yet another distinct areal division within the La Harpe Aspect. Specific Archaic traits at Cedar Creek which seem to point in this direction include the petrified wood knives and, less clearly, the pebble bifaces and possibly the *Albany* spokeshave. The few sand-tempered sherds found at Clear Creek could also possibly relate to the south, where sand-tempered pottery is quite common and was evidently first introduced in late Archaic times (Tunnell, 1961). However, the Cedar Creek specimens cannot, on the basis of the present sample, be proven to be typologically the same, nor can they be said to be clearly associated with the Archaic occupations.

Somewhat closer, though perhaps more generalized, ties can be found to the northwest, in the upper Trinity River drainage, with the Carrollton and Elam foci of the Trinity Aspect (Crook and Harris, 1952; 1954). Most interesting of the traits shared with these foci are gouges (apparently most of the *Clear Fork* type) and notched pebbles. The remainder of the like artifacts are fairly numerous, but are also common to virtually all of the central group of La Harpe Aspect sites. Johnson (1962: 270) has already noted these similarities and has left open the question of including the Trinity Aspect, especially the Elam

Focus, in the La Harpe tradition. The data from Cedar Creek contribute relatively little to clarification of this problem.

Evidence of any prolonged connections with Archaic manifestations in the central part of the state, chiefly the Edwards Plateau Aspect, are lacking, although a few of the dart point types (*Bulverde* and *Marshall*), the *Clear Fork* gouges, and the notched pebbles do frequently occur in that region. On the whole, however, the materials from Cedar Creek appear to represent a basically distinct culture whose history is far more intimately bound with that of Archaic remains (largely the La Harpe Aspect) found in the eastern part of the state.

The Neo-American Stage at Cedar Creek Reservoir is defined as including all materials of Periods 4 and 5, with arrow points and pottery being the most characteristic artifacts. As for the pottery, none of the sherds can be identified with a specific type with any meaningful measure of certainty. Most, however, appear to be within the Caddoan ceramic tradition, showing general typological similarities with types found in the Gibson Aspect (perhaps mainly Sanders Focus) and, to a lesser extent, the Fulton Aspect. This suggests the hypothesis that the local ceramics may have been derived mainly from contact with Gibson Aspect peoples and that the pottery styles of the later Fulton Aspect did not as profoundly affect the Cedar Creek area. Significantly, a somewhat comparable situation may have prevailed at the Strawn Creek Site, roughly 40 miles to the southwest, where the pottery appears to reflect strong influence from the Alto Focus of the Gibson Aspect (Duffield, 1963a).

The major arrow point types recognized at Cedar Creek are common, or at least well recorded, in central and north-central sections of the state. *Perdiz* and *Cliffton* are the principal diagnostics of the protohistoric Toyah Focus, while *Scallorn* and *Granbury* are important traits of the earlier Austin Focus (Jelks, 1962: 84–90). All four of these types, in addition to *Alba* and *Catahoula*, are also frequently found at sites identified as Wylie Focus—a complex which occurs mainly in the upper Trinity area and which, as presently defined (Stephenson, 1952), may represent a considerable span of time. These data suggest, but by no means prove, that the developments in arrow point styles recognized at Cedar Creek are closely linked to those which took place in north-central and/or central Texas. Other traits that might have bearing on possible relationships with the Wylie Focus are the dog burial and bone artifacts found in uncertain context (*i.e.*, unassignable as to period) at the Gossett Bottoms Site. Canine interments (mainly wolf?) and numerous bone artifacts—pins, awls, canine tooth pendants, deer ulna flaking tools, bone beads, and the like—have been listed as typical Wylie Focus features (Stephenson, 1952). On the other hand, many core traits of this complex are not present and it is possible that the similarities which do exist may have come to both the Cedar Creek area and the Wylie Focus from a common, but as yet unrecognized, source.

Obviously this and many other problems raised by the Cedar Creek sites cannot be answered by the present findings. Significant gaps still exist in the available data and the need for carefully-controlled field work is evident. Also there is clearly a need for more broadly-based typologies, ones which will eventually permit accurate and meaningful reconstruction of the cultural prehistory.

ACKNOWLEDGMENTS

I am indebted to a number of persons for their assistance in the preparation of this report. Among the salvage project personnel, Miss Marsha Jackson helped to prepare the figures and tables, Mrs. Barbara Wood typed the manuscript, and Messrs. Harry J. Shafer, James Corbin, and Elton Prewitt checked the field records. Dr. Ernest L. Lundelius, Jr. of the Department of Geology, The University of Texas, identified the faunal remains, while Mr. Cader A. Shelby of the Bureau of Economic Geology, The University of Texas, examined and identified temper particles in a selected sample of sherds. Finally, Dr. Edward B. Jelks, Director of the Texas Archeological Salvage Project, took time from his busy schedule to discuss problems of analysis and interpretation.

REFERENCES CITED

Bell, Robert E.

1953. The Scott Site, Le Flore County, Oklahoma. American Antiquity, Vol. XVIII, No. 4, pp. 314–331.

1958. Archeological Investigations at the Boat Dock Site, Ma-1, in the Lake Texoma Area, Marshall County, Oklahoma. Bulletin of the Oklahoma Anthropological Society, Vol. VI, pp. 37–47.

1960. Guide to the Identification of Certain American Indian Projectile Points. Oklahoma Anthropological Society Special Bulletin No. 2.

Blair, W. Frank

1950. The Biotic Provinces of Texas. The Texas Journal of Science, Vol. II, No. 1, pp. 93–117.

Crook, Wilson W., Jr., and R. K. Harris

1952. Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. Bulletin of the Texas Archeological Society, Vol. 23, pp. 7–38.

1954. Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. The Record, Vol. 12, No. 1, pp. 2–16.

Davis, W. A.
1961. Archeological Survey and Appraisal of Cedar Creek Reservoir, Henderson and Kaufman Counties, Texas. Mimeographed report submitted to the National Park Service by the Texas Archeological Salvage Project, The University of Texas.

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

Duffield, Lathel F.
1961. The Limerick Site at Iron Bridge Reservoir, Rains County, Texas. Bulletin of the Texas Archeological Society, Vol. 30 (for 1959), pp. 51–116.
1963a. The Strawn Creek Site: A Mixed Archaic and Neo-American Site at Navarro Mills Reservoir, Navarro County, Texas. Mimeographed report submitted to the National Park Service by the Texas Archeological Salvage Project, The University of Texas.
1963b. The Wolfshead Site: An Archaic–Neo-American Site in San Augustine County, Texas. Bulletin of the Texas Archeological Society, Vol. 34, pp. 83–141.

Duffield, Lathel F., and Edward B. Jelks
1961. The Pearson Site: A Historic Indian Site at Iron Bridge Reservoir, Rains County, Texas. Archaeology Series, No. 4, Department of Anthropology, The University of Texas.

Epstein, Jeremiah F.
1960. Burins from Texas. American Antiquity, Vol. 26, No. 1, pp. 93–97.
1963. Centipede and Damp Caves: Excavations in Val Verde County, Texas, 1958. Bulletin of the Texas Archeological Society, Vol. 33, pp. 1–129.

Fenneman, Nevin M.
1938. Physiography of Eastern United States, McGraw-Hill Book Co., Inc.

Ford, James A., Philip Phillips, and William G. Haag
1955. The Jaketown Site in West-Central Mississippi. Anthropological Papers of the American Museum of Natural History, Vol. 45, Pt. 1.

Ford, James A., and Clarence H. Webb
1956. Poverty Point, A Late Archaic Site in Louisiana. Anthropological Papers of the American Museum of Natural History, Vol. 46, Pt. 1.

Jackson, A. T.
1938. Picture-Writing of Texas Indians. The University of Texas Publications, No. 3809.

Jelks, Edward B.
1961. Excavations at Texarkana Reservoir, Sulphur River, Texas. Bureau of American Ethnology Bulletin 179 and River Basin Surveys Papers, No. 21.
1962. The Kyle Site: A Stratified Central Texas Aspect Site in Hill County, Texas. Archaeology Series No. 5, Department of Anthropology, The University of Texas.
1965. The Archeology of McGee Bend Reservoir, Texas. Ph.D. dissertation, The University of Texas.

Jelks, Edward B., and Curtis D. Tunnell
1959. The Harroun Site: A Fulton Aspect Component of the Caddoan Area, Upshur County, Archaeology Series, No. 2, Department of Anthropology, The University of Texas.

Johnson, LeRoy, Jr.
1962. The Yarbrough and Miller Sites of Northeastern Texas, with a Preliminary Definition of the La Harpe Aspect. Bulletin of the Texas Archeological Society, Vol. 32 (for 1961), pp. 141–284.

Johnson, LeRoy, Jr., Dee Ann Suhm, and Curtis D. Tunnell
1962. Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge, and Oblate Sites. Texas Memorial Museum Bulletin, No. 5.

Krieger, Alex D.
1946. Culture Complexes and Chronology in Northern Texas. The University of Texas Publications, No. 4640.

Members of the Dallas Archeological Society
1963. An Appraisal of the Archeological Resources of Forney Reservoir, Collin, Dallas, Kaufman, and Rockwall Counties, Texas. Multilith report submitted to the National Park Service by The University of Texas.

Newell, Perry H., and Alex D. Krieger
1949. The George C. Davis Site, Cherokee County, Texas. Memoirs of the Society for American Archaeology, Vol. XIV, No. 4, Pt. 2.

Phillips, Phillip, James A. Ford, and James B. Griffin
1951. Archeological Survey in the Lower Mississippi Valley, 1940–1947. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. XXV.

Ray, Cyrus N.
1941. Various Types of Clear Fork Gouges. Bulletin of the Texas Archeological Society, Vol. 13, pp. 152–162.

Sellards, E. H., W. S. Adkins, and F. B. Plummer
1954. The Geology of Texas, Vol. I: Stratigraphy. The University of Texas Bulletin, No. 3232. 3rd printing.

Sellards, E. H.
1941. Stone Images from Henderson County, Texas. American Antiquity, Vol. 7, No. 1, pp. 29–38.
1952. Early Man in America: A Study in Prehistory. The University of Texas Press.

Stephenson, Robert L.
1952. The Hogge Bridge Site and the Wylie Focus. American Antiquity, Vol. XVII, No. 4, pp. 299–312.

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.

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

Watt, Frank H.
1938. The Waco Sinker. Central Texas Archeologist, No. 4, pp. 21–70.

Webb, Clarence H.
1946. Two Unusual Types of Chipped Stone Artifacts from Northwest Louisiana. Bulletin of the Texas Archeological Society, Vol. 17, pp. 9–17.

Wood, Raymond W.
1963. Two New Projectile Points: Homan and Agee. The Arkansas Archeologist, Vol. IV, No. 2, pp. 1–6.

Texas Almanac, 1964–1965
1965. Published by the Dallas Morning News.

Tunnell, Curtis D.
1961. Evidence of a Late Archaic Horizon at Three Sites in the McGee Bend Reservoir, San Angustine County, Texas. Bulletin of the Texas Archeological Society, Vol. 30 (for 1959), pp. 123–158.

The University of Texas
Austin, Texas

The Bipolar Flaking Technique In Texas and New Mexico

KENNETH H. HONEA

ABSTRACT

The bipolar flaking technique consists basically of holding a pebble core vertically on an anvil and striking the top of the core with a hammerstone. Primary flaking of this type is widespread in those parts of the world where the main source of flaking material is pebbles. The author has found the bipolar technique to occur in east-central Texas and north-central New Mexico.

The nature of core material available in a given area is a prime factor determining not only the practice of certain stone flaking techniques but also the technological development of prehistoric cultures. Research has shown that certain materials—depending on their fracturing qualities, size, and form—can be worked by certain techniques but not by others, and that these materials can be used to produce certain tool forms but not others (Clark, 1954: 160–161; Honea, ms.a; ms.b; 1965).

Take as an example the McGee Bend Reservoir of east-central Texas where the most abundant raw material is coarse-grained silicified wood. Fracturing qualities are characteristically laminate or tabular. Chunks of this material are easily fashioned into a variety of hand tools by freehand hammerstone percussion. Due to its inherent fracture, however, it cannot be successfully worked by either the pressure or cylinder-hammer (billet) techniques. A prerequisite of materials to be worked by either of these techniques is conchoidal to even fracturing qualities. Consequently, there is a notable absence of implements fashioned by these techniques in areas where native coarse-grained silicified wood or similarly textured stones are the only sources of core material.

It is of course possible, and in some cases demonstrable, that a *change* in the type of available material took place (either through human or natural agencies) permitting the development of flaking techniques and tool forms not previously possible. Trade and quarrying are two such possibilities; another is the exposure by either erosion or tectonic action of new, more suitable materials.

On the other hand, the practice of certain flaking techniques may be characteristically associated with given stages in the development of a lithic complex. Later stages may show evolutionary changes tending towards refinement. Nonetheless, "crudity" of flaking does not always indicate a *lesser* stage of development, nor refined flaking an advanced stage. Here again, the above-mentioned nature of available material may play an important role. Thus, a series of closely related lithic cultures occurring in different areas may show some diversity of materials and flaking techniques in their respective areas of occurrence, but yet belong to a related complex.

The relation of all these factors to the formal morphology of flaked stone tools is obvious. Projectile point Type × may be characteristically made of certain materials and by certain techniques in one area, but the same type point may also be made from different materials and by different techniques in another area.

In other instances, the choice of flaking materials may have been determined through *cultural conservatism*, even when a variety of suitable materials were available. So far as known, obsidian was rarely, if ever, used in the making of projectile points during the Paleo-Indian Horizon of north-central New Mexico. This material was certainly available in quantity. By contrast, obsidian, pitchstone, and fine-grained basalt, all black rocks, were extensively employed during the succeeding Archaic Horizon of the same district, even though choice chalcedonies and cherts were also at hand (examples in Museum of New Mexico collections).

Finally, the choice of materials was influenced by the intended *function* of tools. Thus, implements utilized in battering functions are generally of tough, durable materials, such as the basalt used for hammerstones found in north-central New Mexico Puebloan sites.

The occurrence of the *bipolar technique* in certain areas of the world is a striking example of the influence of the size and form of locally-available core material on flaking techniques. Lantier, the French archeologist, working on the basis of Old World findings, has shown that the bipolar technique consistently occurs in those areas where the main or choice source of core material is littoral or fluviatile pebbles *too small to work by freehand hammerstone, cylinder-hammer, or block-on-block percussion* (Lantier, 1958: 33–34).

The bipolar technique consists of holding an oblong pebble core, the size of an egg or smaller, vertically on a flattish, stationary anvil and striking the core on the proximal or top end with a hammerstone (Breuil et Lantier, 1959: 75–77; Clark, 1954: 155; Furon, 1958: 149; Honea, ms.a). The anvil utilized is commonly of stone, but a large bone, block of hardwood, the ground, the padded thigh or even palm of the stone-worker's hand may also be employed.

The flakes struck off in the above manner are called bipolar flakes. They are usually about three-quarters the length of the pebble core and are commonly longer than they are wide. Sometimes flakes are detached simultaneously from both ends of the core. More frequently than not, those coming off the distal or lower end of the core are both smaller and shorter than those coming off the top (Fig. 1).

Occasionally, a bipolar flake, approximately equal in length to the pebble core, will exhibit a major bulb of percussion on the proximal end and a minor bulb of percussion on the distal end of the inside or

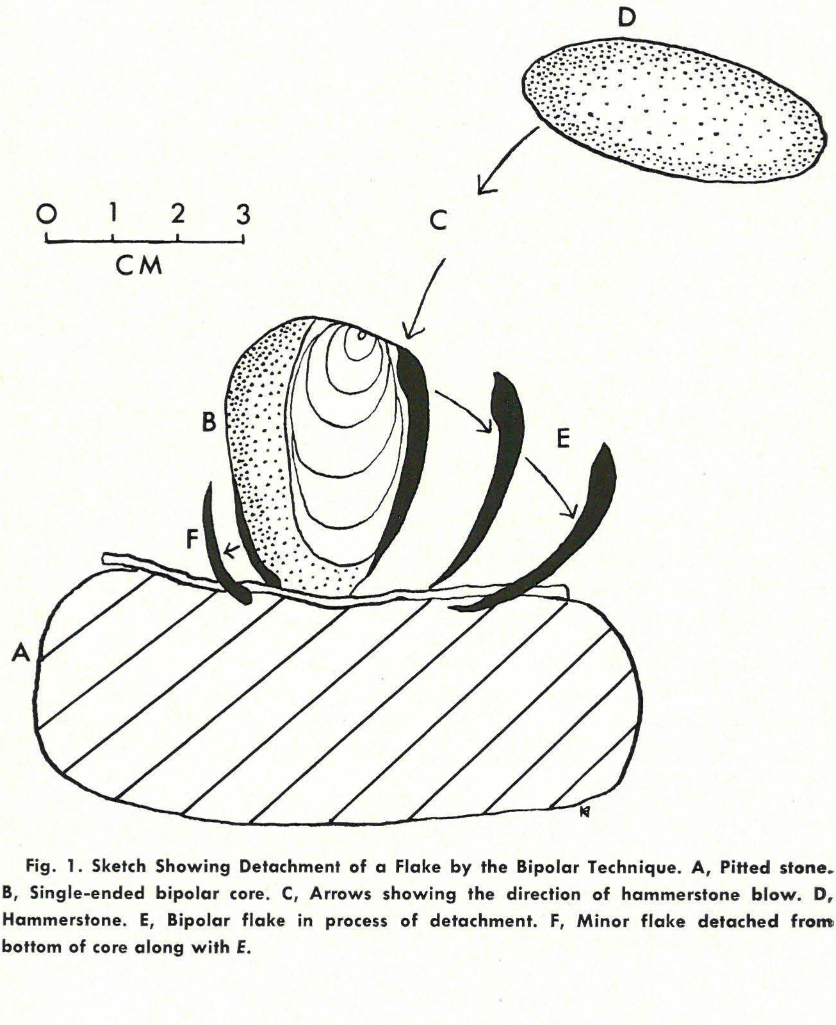


Fig. 1. Sketch Showing Detachment of a Flake by the Bipolar Technique. A, Pitted stone. B, Single-ended bipolar core. C, Arrows showing the direction of hammerstone blow. D, Hammerstone. E, Bipolar flake in process of detachment. F, Minor flake detached from bottom of core along with *E*.

flat face. These are produced in the following manner on stone anvils. As the term "bipolar" implies, mechanical force, inducing fracture of a flake from a core, is applied at *both ends* of a core: at the proximal end by the hammerstone and at the distal end, resting on the stone anvil, by secondary mechanical force rebounding from the anvil upwards into the core. Opposed major and minor bulbs are formed when the axes of percussion or *poles* of this combined primary and secondary mechanical force coincide. Bipolar cores are occasionally worked on their lateral edges, in which case flakes tend to be short and stubby (Fig. 2, C, D). Several types of bipolar pebble cores can be distinguished. The criteria used in their classification are much the same as those applied to cores worked by other techniques (see recent description by Suhm in Johnson, *et al.*, 1962: 73). On the *single-ended* type, flakes have only been struck from one end of the core (Fig. 2, A). On the *double-ended* type, flakes have been struck alternately from both

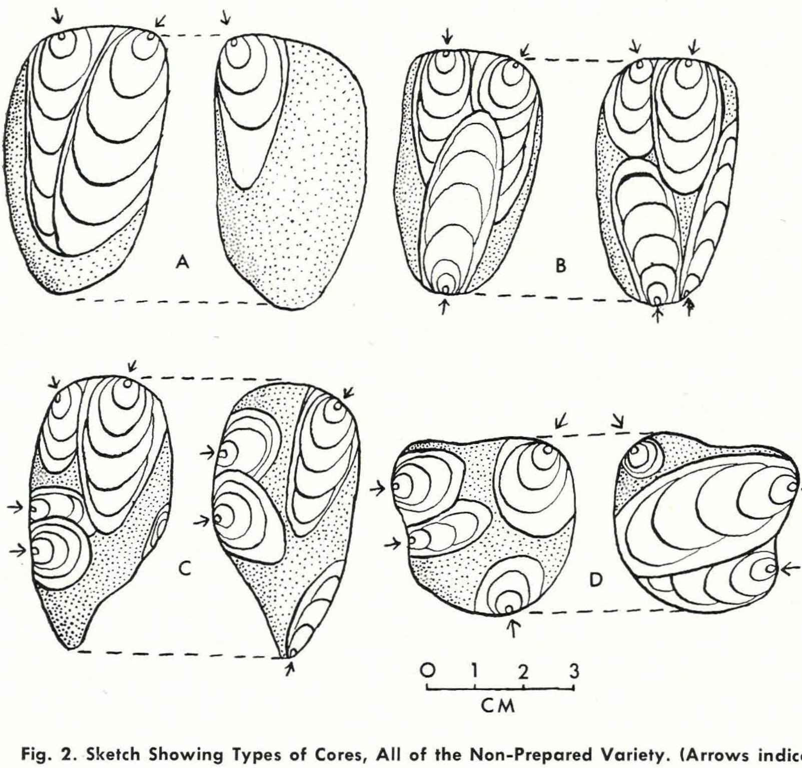


Fig. 2. Sketch Showing Types of Cores, All of the Non-Prepared Variety. (Arrows indicate points of impact of hammerstone, and the dotted areas the stone cortex.) A, Single-ended. B, Double-ended. C, D, Multi-platformed.

ends of the core (Fig. 2, B). On the *multi-platformed* type, however, flakes have been struck from both ends and lateral edges of the core (Fig. 2, C, D).

Platforms of bipolar pebble cores are commonly *plain*. That is, a naturally convex, concave or plane, cortex-covered surface of one end of a pebble core was used as a platform. Remnants of this kind of platform, as well as the others described below, are present on the proximal or bulbar ends of the detached bipolar flakes. Occasionally, *unfaceted platforms* are made on pebble cores. In this case, a *single* flake is struck off one end of the core at an approximate right to slightly oblique angle to the length of the core and direction of intended primary flaking. The resultant flake scar, somewhat concave, is used as a platform. *Faceted platforms* are less frequently made on pebble cores. They are made by striking off a *series* of roughly parallel flakelets from the top of the core at approximate right angles to the intended direction of flaking. Both unfaceted and faceted cores are sometimes *prepared* in the Levallois fashion, i.e., the cortex is trimmed off the core surfaces by multi-directional unifacial or bifacial percussion flaking before preparation of the platform and prior to commencement of primary flaking.

In summary, it might be asked how we can specifically determine presence of the bipolar flaking technique at an archeological site. One body of suggestive evidence is the presence in quantity of bipolar pebble cores. A second, and better, indicator is the presence of stone-anvil struck bipolar flakes exhibiting a major, positive bulb of percussion on the upper end and a minor, positive bulb of percussion on the lower end. On bipolar cores, these features on any given bipolar flake scar are apparent as major negative and minor negative bulbs respectively. They are only produced when direct primary mechanical force (from the hammerstone) and indirect secondary rebounding mechanical force (from the stone anvil) are exerted simultaneously on both ends of a core. The third indicator is association of bipolar pebble cores and bipolar flakes with stone anvils, as outlined below.

In the course of research carried out between 1960 and 1964, the author has found evidence suggesting the bipolar flaking technique in both east-central Texas and north-central New Mexico. The studied artifactual material from Texas sites stemmed from the McGee Bend Reservoir area (41 SA 69, Sowell Site; 41 SA 117, Wolfshead Site; 41 SA 118; 41 SA 120; and 41 NA 11, Etoile Site). The New Mexico material was from the Cochiti Reservoir sites LA 272; LA 6455, Nelson Site; LA 6462, North Bank Site; and LA 70, Pueblo Encierro, all to the west-northwest of Santa Fe. Study of lithic assemblages from these two regions was complemented by experimental flaking carried out in both the field and in the laboratory, using unworked pebble cores, hammerstones, and stone anvils excavated or collected from the above sites. In the way of specific materials, the Texas pebble cores were of jasper and fine-grained silicified wood, while those from New Mexico were of obsidian, chalcedony, and similar materials.

Experiments consisted of flaking, in the bipolar fashion, of 20 vertically-held pebble cores from each site, employing either stone or wooden anvils, and the palm of the hand. Ten additional cores from each site were separately worked by free-hand hammerstone percussion, during which the horizontally held cores were end-struck.

Results of these experiments showed that pebble cores were more *effectively* worked in conjunction with stationary anvils of stone, using the bipolar technique as above described. Free-hand hammerstone percussion of *horizontally* hand-held cores was difficult to control. There was a consistent tendency for detached flakes to be quite short and thick, probably as a result of the *absence* of secondary rebounding mechanical force.

While it was feasible to strike off flakes from the ends of cores held *vertically* in the *supported* palm of the hand, it was determined the method was neither as efficient nor as satisfactory as in the use of stone or wooden anvils, especially the former. Disadvantages in the repeated use of the palm were apparent in a bruised, aching palm. Insertion of a leather cushion did relieve some of the discomfort, however. Otherwise, palm-worked cores compared favorably with those worked on stone and wooden anvils. The superiority of the latter, particularly those of stone, was marked with respect to facility and rapidity of flaking, by which large numbers of longish bipolar flakes could be detached.

Stone anvils employed in the working of Texas jasper pebble cores were of sandstone; basalt, sandstone, and rhyolite stone anvils were used with New Mexico materials. Use-marks produced on all, including those of wood, were in the form of localized areas of battering or pitting. Texas sandstone anvils used in the experiments had a small, circular depression on one face, in which the core was held while flaking. The apparent advantage of the depressions was prevention of cores from slipping when struck on their upper end with the hammerstone.

"Pitted stones" were noted during our research to consistently occur at sites in the McGee Bend Reservoir, together with bipolar cores and flakes. These stones, which, as we shall observe, may have been used as anvils, are flattish, frequently fist-sized or somewhat larger cobbles exhibiting one or more small, shallow, circular depressions on one or more faces or sides. In some instances, pitted stones have been intentionally pecked and ground to rectangular, oval or discoidal shapes. They are commonly of sandstone, less frequently of hematite.

Some authors, such as Fundaburk and Foreman (1957: Pl. 72), have considered pitted stones to have been used as "nutting stones" (*i.e.*, nuts presumably were placed in a depression and cracked with another stone). Another possible use would be utilization as miniature paint grinders. Although it is probable that pitted stones may have been in part thus used, it does not seem this was in fact their only function.

The characteristic depressions on pitted stones have been produced either incidental to use, or by intentional pecking and perhaps grinding. It seems feasible, at least in theory, that their function could have been to accommodate the convex bases of pebble cores during flaking by the bipolar technique, perhaps to prevent the core from slipping to the side at the moment of percussion. Pitted stones observed to have more than one depression, often of different sizes (usually on the opposite face, but occasionally, on larger stones, several on both faces or sides), are thought to conceivably have been used in the working of cores of variable size. This, however, is only a conjecture.

The association of pitted stones with the bipolar flaking technique in the McGee Bend district seems to be supported by the occurrence at all of the sites studied of 1) stone-anvil struck bipolar pebble cores, as well as bipolar flakes, and 2) various tools which may have been made of these small cores and flakes.

It is of interest, and at the same time quite in keeping with evidence from sites in parts of the Old World, that the main sources of *quality* core material in the McGee Bend area were pebbles of jasper and, to a lesser extent, fine-grained silicified wood. Both of these take a conchoidal fracture. The quantitatively dominant material, however, was coarse-grained silicified wood. It occurs abundantly in small to large angular chunks. In contrast to pebble materials, this was worked uniformly by free hand hammerstone percussion. The tabular or laminate fracturing qualities of this material seems, incidentally, to have precluded flaking by the cylinder-hammer (billet), pressure, and bipolar techniques.

An analysis of McGee Bend bipolar cores and flakes showed the presence of single-ended, double-ended, and multi-platformed bipolar pebble cores. The latter was least frequent. Studies of platforms indicate that bipolar cores were commonly flaked without special preparation of the platform surface. Characteristically, this surface was comprised of the cortex of the original pebble core. Unfaceted platforms were quite rare, while faceting was absent. The faces of some cores may have been prepared in the Levallois fashion prior to the striking off of bipolar flakes.

Studies of lithic assemblages from sites in the Cochiti Reservoir district of north-central New Mexico suggest practice of the bipolar technique during all Pueblo culture stages represented in the district. The technique is associated there with the working of obsidian pebbles, which are found in abundance in deposits of volcanic ash in the nearby Jemez Mountains. These pebbles also occur in local stream gravels, primarily those of the Rio Grande. Pebbles of chalcedony, agate, chert, and jasper were less often employed.

Bipolar core and flake types are in the main stone-anvil struck and do not differ with respect to morphology appreciably from those of east-central Texas. Cochiti district specimens usually have plain platforms, and cores are either single-ended, double-ended, or multi-platformed, in that order of frequency.

Pitted stones of the type found in the McGee Bend Reservoir area of Texas are absent at the Cochiti sites. The perhaps closest parallels are the occasional, secondarily pitted manos which have a circular depression worked into either one or both faces. The original function of these pieces is established by the presence on one or both faces of *previously-produced* use-striations running at right angles to the mano long-axis. Such striations are typically the result of grinding grain on a metate. Depressions are sometimes also found on the surface of grinding stones, grinding slabs, and lapstones. In the Cochiti district, the latter are usually of fine-grained basalt. They were used primarily as a base or support stone on which leather or vegetal materials were rested while being cut with stone knives or sharp-edged flakes. Long, shallow, multi-directional striations are suggestive of this function. More frequently, localized areas of *battering*, rather than actual depressions, are observed on the surface of lapstones. These use-marks, in our opinion, are strongly suggestive of use in an anvil function. Since stone-anvil struck bipolar cores and flakes were excavated from the same Cochiti sites where these implements were found, it seems possible bipolar flaking could have been carried out on them. The rare depressions observed on manos, grinding stones, grinding slabs, could, it appears, have been similarly used. Nonetheless, we do not discount the possibility that at least some depressions were employed in paint grinding. This was not the general practice, however, since large numbers of pigment-stained paint grinding *palettes* were excavated from the sites in question.

As a final point, it should be noted that both pebble cores and pitted stones of various kinds occur in many parts of the Southwest. Whether or not they were associated with practice of the bipolar flaking technique remains to be clarified. We also do not yet know the temporal range of this technique, nor all the culture complexes with which it occurs. Clearly, there is much research to be done before these questions can be answered.

REFERENCES CITED

Breuil, H., et R. Lantier
1959. Les Hommes de la Pierre Ancienne. Payot.

Clark, J. D.
1954. Prehistoric Cultures of the Horn of Africa. Cambridge University Press.

Fundaburk, E. L., and M. D. F. Foreman (editors)
1957. Sun Circles and Human Hands. Published by Emma Lila Fundaburk.

Furon, R.
1958. Manuel de Prehistoire Generale. Payot.

Honea, K.
ms. a. The McElroy Site. Unpublished manuscript on file at the Texas Archeological Salvage Project Office, The University of Texas.
ms. b. The Flaked Stone Industries of Pueblo Las Madres and Pueblo Largo, Galisteo Basin, North-central New Mexico. Unpublished manuscript on file at the Division of Research, Museum of New Mexico.
1965. A Morphology of Scrapers and their Methods of Production. Southwestern Lore, Vol. 31, No. 2. The Colorado Archaeological Society.

Johnson, LeRoy, Jr., Dee Ann Suhm, and Curtis D. Tunnell
1962. Salvage Archeology of Canyon Reservoir: The Wunderlich, Footbridge, and Oblate Sites. Texas Memorial Museum, Bulletin No. 5.

Lantier, R.
1958. La Vie Prehistorique. *Que Sais-je?*, No. 535. Le Point des Connaissances Actuelles. Presses Universitaires de France.

Museum of New Mexico
Santa Fe, New Mexico

A Guide to the Drafting of Archeological Maps

VAUGHN M. BRYANT, JR. AND ROBERT K. HOLZ

ABSTRACT

Scholarly writing in archeology is often accompanied by maps and other forms of graphic illustrations. In the past the quality of these illustrations has been rather poor. Maps are an important form of visual communication, but a map can detract from the scholarly nature of the accompanying written text if it is not drafted and presented in a professional cartographic manner. Too often the archeologist seems to be unaware of the whole, vast field of cartographic technique. The use of even the rudimentary principles from this field would improve archeological mapping significantly. This article outlines some of the basic errors and problems associated with archeological maps and presents ideas, suggestions, and techniques for solving these problems.

INTRODUCTION

The science of archeology concerns itself with the study of past cultures and the task of the archeologist is to record this information in a factual and scholarly manner. Archeologists use maps to help them present data, yet in many instances the quality of their maps is rather poor. The caliber of archeological maps can be improved through an understanding of some of the basic principles of cartography. This article will investigate some of these principles and will show how each of them can be applied in the designing of archeological maps for reproduction and publication.

MAP REDUCTION

Every piece of paper has two marginal limits, a *page size* and an *effective page size*. In this paper the page size refers to the entire sheet of paper, or the whole page; while the effective page size is the page size minus its border area, or that part of the paper which will be used for printing. The page size of this journal is six inches by nine inches, yet the maximum effective page size is only four and one-quarter inches by six and one-half inches (Fig. 1). Any map or illustration published in this bulletin can be of any size so long as it does not exceed the dimensions of the effective page size. Ideally, a map designed for use in this journal should be drawn with linear dimensions twice those of the effective page size, or eight and one-half inches by thirteen inches. Subjecting this enlarged illustration to one full reduction will reduce its *area* to one-fourth the original size. Linear distance, however, will be reduced by one-half their original length (Fig. 2).

The question may be asked, "Why draft a map larger than the size needed for publication?". Cartographers usually draft maps with linear dimensions twice as large as their intended reproduced sizes for a variety of reasons. For example, it is easier to work with larger letter sizes, line widths, and symbols on the bigger workmap. It is nearly impossible to draft a map with precision and accuracy if the map is the same size as the one to be used in publication. Reduction also minimizes minor letter and line variations and tends to sharpen line distinction.

The cartographer's use of the reduction technique introduces certain problems in map design. One of these is the change in map scale caused by reducing the original workmap. The problem of scale change is basic to map drafting and will be discussed in detail in the following section.

SCALE

Principle of Scale

The scale on a map determines its degree of generalization and its level of accuracy. Therefore, when selecting a scale for map use, a cartographer must determine the map's eventual publication size, its intended purpose, and its degree of detail. Each of these three factors have a direct relationship to one another. For example, a reservoir survey map will generally show the location of archeological sites with small symbols because the map scale is too small to show these sites in detail. On the other hand, a site map is drawn at a much larger scale and can therefore show a greater degree of scale.

Expression of Scale

All maps depict the earth's surface at a greatly reduced size compared to the actual features they represent. This proportional relationship, or ratio, is defined as the map's scale.

There are three generally accepted methods of representing map scale. These are: 1) by a statement, 2) in terms of a representative fraction, abbreviated "RF", and 3) as a graphic representation or bar scale. Statements such as "one inch represents approximately one

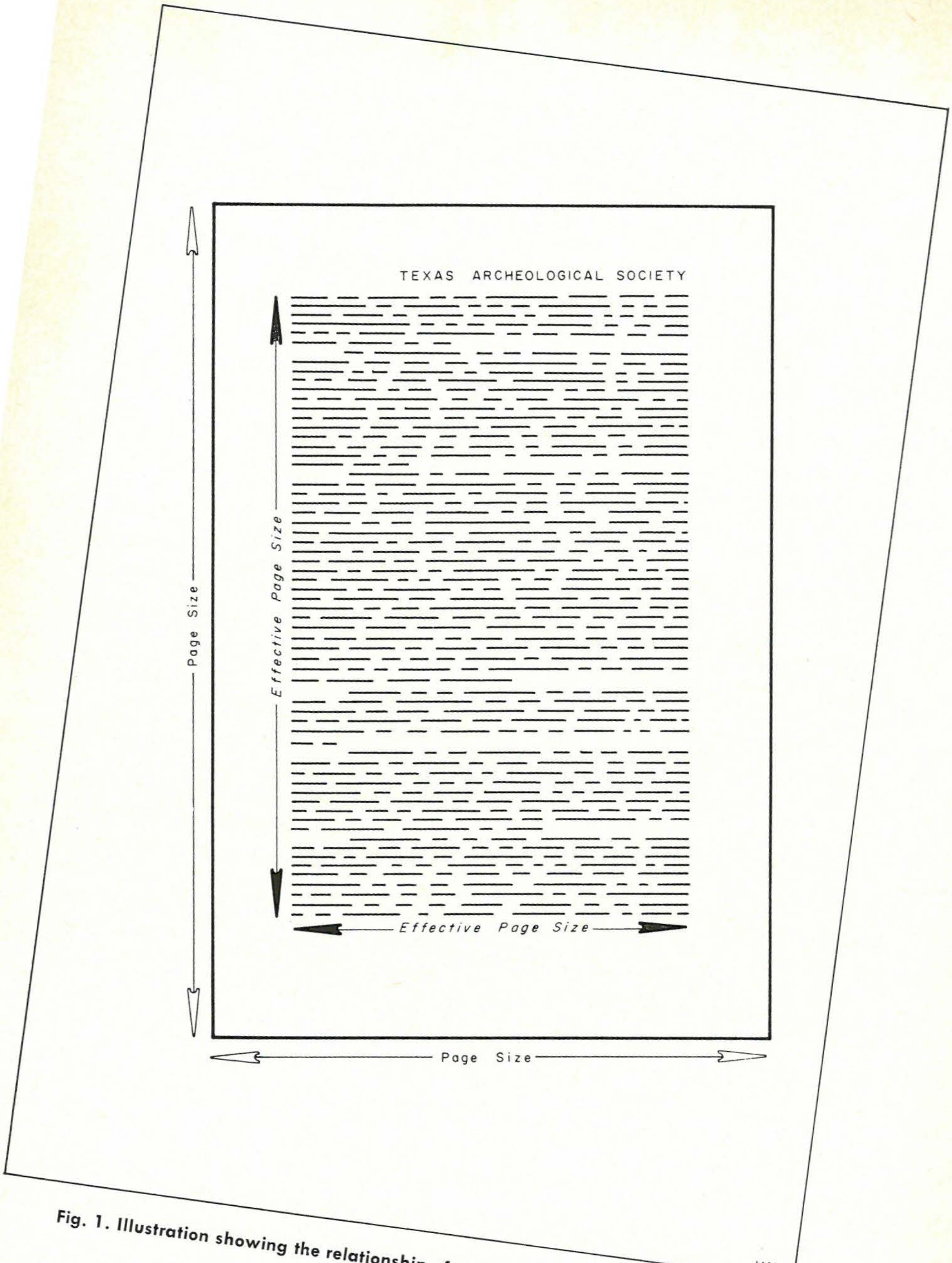


Fig. 1. Illustration showing the relationship of page size to effective page size.

mile", and "one inch equals ten feet" are examples of a statement scale. Often this type of scale will appear on road maps and on U.S. Geologic Survey maps in conjunction with either a graphic or repre-

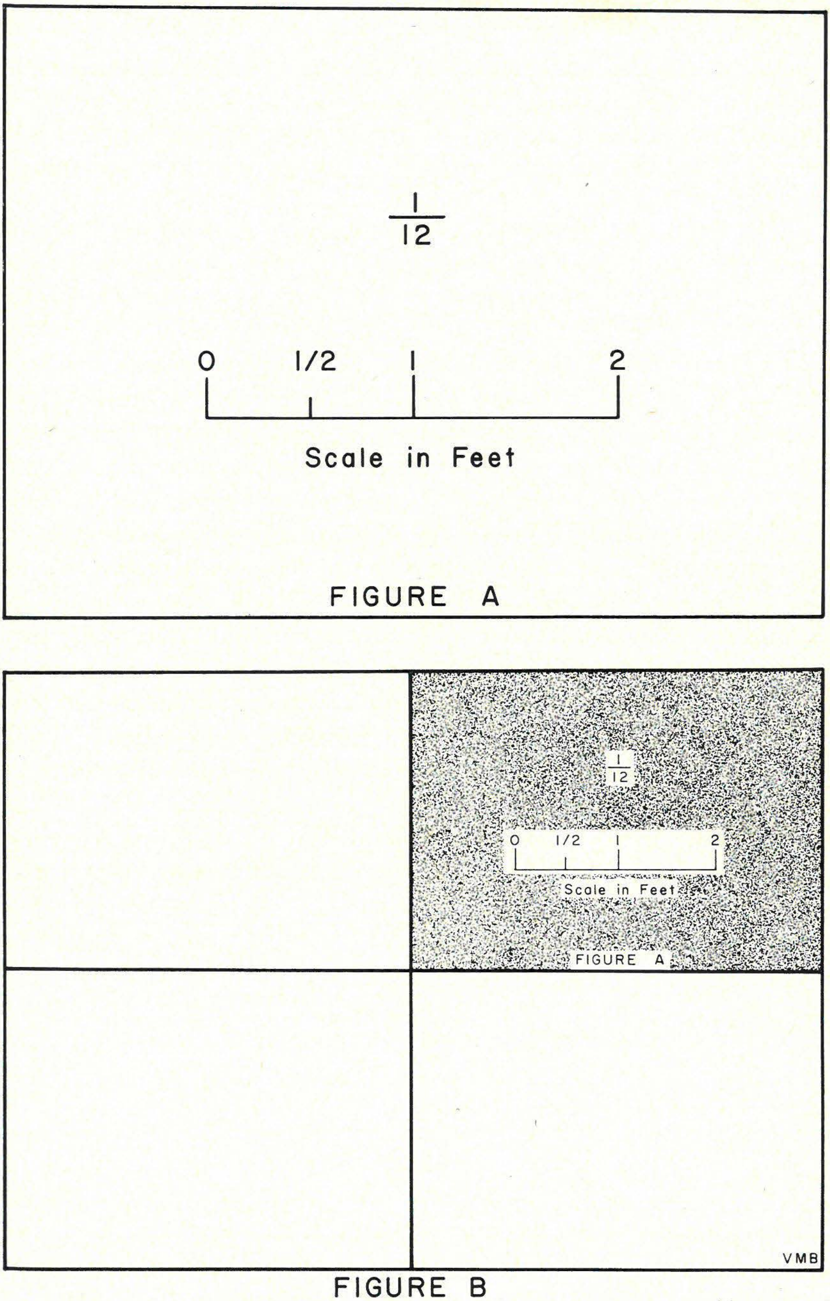


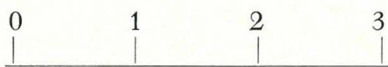
Fig. 2. Illustrations subjected to one full reduction have linear distances reduced by one-half and areas reduced to one-fourth. Note the effect of reduction on both the graphic and representative fraction scale.

sentative fraction scale. However, this type of scale is awkward to use and therefore impractical for most map use. Furthermore, in reducing a map for publication, a written statement remains constant while linear distances, or scale, changes in proportion to the amount of reduction.

The representative fraction scale makes use of a ratio between a unit of measurement on a map and the corresponding unit on the earth's surface. It can be expressed in either of two ways: $\frac{1}{62{,}500}$ or 1:62,500. The latter form is generally preferred since it is easier to set up in type or print. Representative fractions are a valuable method of indicating scale because any standard unit of measurement (inches, centimeters, feet, meters) can be applied to a map as long as the same unit of measurement is used on each side of the fraction or ratio. Therefore, regardless of the standard units of measurement, any literate person can understand and use the representative fraction. For example, on a map with a scale of 1:250,000 one inch would be equal to 250,000 inches or 3.95 miles; while one centimeter would represent 250,000 on the earth's surface or 2.5 kilometers. Both measurements are correct even though each makes use of a different standard unit of measurement. In one way both the representative fraction and the statement scale are similar. Both remain constant when a map is reduced or enlarged.

Graphic, or bar scales are represented by a line which is generally subdivided into units of some standard form of measurement, such as:

Scale in Feet



Scale in Miles

This type of scale is the most versatile of the three and is generally used on maps which will be reduced for publication. When a map is either reduced or enlarged, the line representing the graphic scale changes in length in exact proportions to all other lines, or linear distances, on the map. Therefore it accurately represents the scale of the map at its reduced size.

There are other methods of showing map scale but these unusual types are rarely used and are beyond the scope of this article.

LETTERING THE MAP

A map is a graphic representation of a conceptual image of the earth's surface through the use of conventionalized symbols. One of the most useful and necessary types of map symbolization is lettering, for it aids the reader in visualizing the location of places and it allows differentiation of map phenomena. A road map, for example, would be meaningless unless the names of the cities and the numbers of highways were lettered.

The placement of lettering on a map requires careful planning and forethought in order to be effective. If a map is complex in detail, then a greater degree of consideration must be given to the size, type, and placement of lettering. However, even on a relatively simple map at least five major factors concerning lettering must be considered. These are: 1) the *method* of lettering—freehand, mechanical, commercially prepared "stick-on" lettering, 2) the *form* of lettering—capital, lower-case, 3) the *style* of lettering, 4) the *size* of lettering, and 5) the *position* of the lettering.

Method of Lettering

A map can be lettered freehand, by the use of commercially prepared "stick-on" lettering, or mechanically. Freehand lettering is the most versatile of the three methods and is the most rapid and artistic for map use. Through the use of freehand lettering the cartographer may orientate and scale letters precisely as desired. Freehand lettering also adds an individual or personal touch to a map. However, learning to draw precise freehand letters requires many hours of training and knowledge of the principles of letter formation and design. Most of us do not have the time to develop sophisticated and uniform techniques of hand lettering, and, therefore, we usually turn to other methods of lettering maps.

Preprinted, or "stick-on" lettering is a relatively new technique which has become widely used in recent years. Many companies such as Para-tone, Artype, Chart-Pak, and others offer an almost limitless variety of letter styles and patterns. This type of lettering is applied to the map surface by first cutting out the appropriate letters from the preprinted, adhesive-backed acetate sheets and then burnishing them down on the map surface. Stick-on lettering is useful for map work but has several disadvantages over the other methods. First, letters that are printed in an upright position cannot be effectively tilted in a slanting position. Secondly, preprinted letters often use type-face styles which are not designed for reduction. Thus, it is often necessary to use extra large preprinted letters on the workmap. Furthermore, the careful positioning of these individual letters in an even line of print is a long and painstaking task.

For most thematic, or statistical maps (which includes almost all archeological maps) mechanical lettering is the preferred method because it is simple, cheap, reasonably fast, and assures letter uniformity. There are many types of mechanical lettering devices available and it is beyond the scope of this article to consider the merits of each type. Therefore, in this article discussion will be confined to a single, but perhaps the most commonly available method of mechanical lettering—the Leroy method.*

The basic elements of a Leroy Lettering Set are a scriber, a set of templates with indented lettering guides, and various sizes of Leroy pen points. Lettering of illustrations is achieved by tracing the indented letters of the template with the stylus of the scriber while the arm, containing the pen, traces the outline of the letter in ink on the surface of the illustration. Consecutive letters in a word are made by moving the template along a straight edge. Ruled spaces are provided on the bottom edge of templates to aid in letter spacing. However, most cartographers attain sufficient skill through practice to space these letters by sight.

Leroy templates come in a wide range of sizes (Fig. 3) and a variety of letter styles. On each of these templates, letter size can be determined by converting the last set of numbers in the upper right-hand corner to a measurement in inches. For example, on the Simple Sans Serif, or Gothic style Leroy template, letter size is given in thousandths of an inch. Thus, a template showing the number 200 will make letters 200/1000 or one-fifth of an inch tall. Each set of numbers on a Leroy template is followed by either a capital "C" or by a "CL". The letter "C" indicates that the template has numbers and capital letters. On the other hand, the letters "CL" indicate that the template can be used to make both capital and lower-case letters as well as numbers. On other Leroy templates, which incorporate different styles of lettering, the letter sizes are either written in thousandths of an inch or in type-point sizes.

When selecting Leroy templates for lettering a map, the cartographer must remain constantly aware of the results reduction will

* Leroy is manufactured by the Keuffel and Esser Company and is the patented name given to one of its mechanical lettering systems.

have upon the lettering. Reduction tests have shown that capital letters are illegible when they are smaller than one-twentieth of an inch tall and that lower-case letters must be at least one-thirtieth of an inch tall in order to be readable (Raisz, 1948). Thus, the number 100/1000 or one-tenth of an inch Leroy template is the smallest size template that can be effectively used on a map that is drafted one full size larger than its publication size. If smaller letter sizes are used, the letters will "close-out" and appear as a small black spot on the reduced copy; or they will be too small to easily read with the unaided eye.

Lettering Form—Capitals and Lower-Case

Letters have two basic forms, capitals and lower-case. In printing, or map lettering, words are written in capitals, in lower-case, or combinations of these forms. Map titles, and the names of important places are usually written entirely in capitals because to the reader capitals psychologically command more attention. Lower-case lettering is generally reserved for less important names and places. On the other hand, lower-case lettering is easier to read because these letter characters contain more visual recognition characteristics (Robinson, 1953). A well designed map will make limited use of words made entirely of capital letters and will reserve their use for only selected, important features.

Lettering Styles

The cartographer can choose from an almost infinite variety of letter styles for map use, from simple Gothic, to the more complex Old English. Each of these styles requires the use of special Leroy templates, yet many different variations of style can be developed with the most commonly used, or Gothic Leroy templates. By changing the sizes of the inking pen in the Leroy scriber (Fig. 3), it is possible to draw thin or very thick lined letters. Slant letters can also be made by changing the angle of the stylus arm on the adjustable Leroy scriber.

Choice of lettering styles is one of the most important decisions a cartographer must make. Short, stubby letters, for example, are more difficult to read and are less pleasing visually than tall thin letters. Furthermore, thin letters are more legible after reduction than thick letters. When using a Leroy lettering set, thin lettering can best be achieved by using one pen size smaller than what is normally recommended on the template.

Good cartographic technique calls for the use of upright letters to represent man-made features such as cities, roads, or archeological

LEROY TEMPLATE SIZE	PEN SIZE 000	00	0	1	2	3	4	5
500	A	R	C	H	E	O	L	O
425	A	R	C	H	E	O	L	O
350	A	R	C	H	E	O	L	O
290	A	R	C	H	E	O	L	O
240	A	R	C	H	E	O	L	O
200	A	R	C	H	E	O	L	O
175	A	R	C	H	E	O	L	
140	A	R	C	H	E	O		
120	A	R	C	H	E			
100	A	R	C	H				
80	A	R	C					

VMB

Fig. 3. Variations in Leroy template and pen point sizes. (Illustration adapted from Keuffel and Esser Co., Catalog No. 6).

excavations while the lettering of natural features such as landscape and water bodies should be done in slant lettering. There are no well defined rules of when or where slant lettering must be used. Either upright or slant lettering can be used in the names of almost any feature on a map. The decision of when to use these types should remain the cartographer's. However, slant letters seem to suggest the flowing quality of water and therefore are more often used to represent hydrographic features. If a cartographer used slanting letters to represent various map features, then he should take great pains to insure that their use is consistent. For example, if he choses to use slanting letters for water features, he should use them for *all* water features on the map.

Lettering Size

The size of the lettering is one of the most widely and easily criticized parts of a map. This criticism is often the result of lack of careful planning and misunderstanding of the effects of letter reduction. When a cartographer is selecting the size of letters to be used on a map, he remains constantly aware of the effects of reduction. An improper choice of letter size can often render the lettering illegible after reduction (Fig. 4). Furthermore, letters which are less than one-tenth of an inch in height will often become blurred or will "close-out" after the map has been subjected to one full reduction.

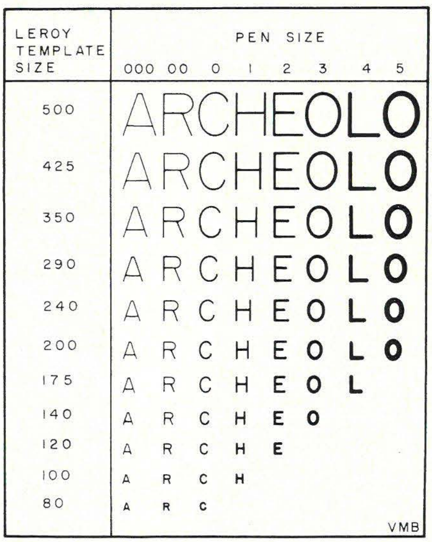


Fig. 4. Leroy letting reduced in size by one full reduction. Note how the small, wide letters tend to "close-out" under reduction.

There are two other limiting factors affecting the size of letters used on a map. These are the degree of importance of each item named, and the size of the space available for lettering. Traditionally, the most important features on a map, such as the title should be represented by the largest letter sizes while the less important information should be shown in smaller letters. As a corollary, the date and the authorship of a map should be written in the smallest legible letters because they are of marginal importance on a map. In between these two extremes lie a series of letter sizes which should be graded in relation to the significance of the data they represent. This takes a considerable degree of planning and should be done before pen and ink are ever applied to the map surface.

Often the scale of the map limits the size of the space available for lettering and becomes the governing factor in determining selection of letter size. In some cases, this problem can be solved by using smaller lettering while in other cases it can be resolved only by adjusting the position of the entire word.

Positioning of Letters

The lettering on a map should refer the reader unmistakenly to the item it represents. If a feature has a long linear dimension, or "flow," the lettering should give the appearance of length of fluidity. For example, names of rivers should be placed along the stream in some convenient location (a straight portion if possible) and should follow the course of the river. The letters in the name should be spread slightly, but not so much that they become meaningless. Furthermore, abbreviations should be avoided at all times. Occasionally, it might be necessary to repeat river names if the stream course is very long or after a major tributary joins the main channel (Fig. 5).

Names of features which do not have any "flowing" characteristics should be written parallel to the bottom margin of the map. Whenever this is impossible, it is permissible to tilt the word at an angle. However, when tilting a place name it is advisable to tilt it as little as possible and only under extreme circumstances should a word be tilted at more than a forty-five degree angle above or below the horizontal margins of a map. Furthermore, the angle of all tilted names should be approximately the same and should all be aligned in the same direction so that one simple turn of the map will allow all of them to be read.

The names of large map features such as counties, states, or countries always should be widely and evenly spaced so that the letters of the name encompass as much of the total area of that feature as possible. Care must be taken in these cases to insure that the place names do not become a random scattering of incoherent letters.

The names of archeological sites or other location points on a map preferably should be placed to the right side and above the symbol. This allows for the best possible identification between the letters and symbol because this is the direction in which we normally read. Other choices for letter placement are to the lower right, the upper left, and lower left of the symbol. Experiments in cartographic lettering have proven that letters placed in these positions have the best chance of being associated with the features they represent. Centering the lettering above or below the symbol it represents should be avoided at all costs.

An effort should be made to place the names of all features completely within the area they represent. For example, the name of an island, peninsula, or county should be placed entirely within the lines enclosing them. The names of bays, coves, and inlets should be placed over the water features they represent. If the land, or water, features are too small for the entire name, then the lettering should begin on the feature it represents and extend into the adjacent water or land. Coastal cities and other coastal land features should be labeled entirely on the land. If this is impossible, then the names should be placed entirely on the adjacent body of water. A place name should only break a boundary when there is no other solution for its placement.

TITLE

The title "tells the story" or explains the purpose of the map, and, therefore, it should be the most prominent lettering on the map. The obvious location for a title is at the top of the page because habit has taught us to read from top to bottom. The principle of "supraposition" dictates the title's pre-eminent position whenever possible. If the location of various map features precludes using the top of the *effective page size* for the title, then it should be given another prominent position. Correct title placement, however, is not enough. In order to make a title distinguishable, it should also be separated from surrounding data, correctly centered, and written in large or bold letters. The size and style of lettering will vary from map to map but regardless of a map's size, the title always should be written in a letter size larger than any others used. Furthermore, map titles should be self-contained, short, carefully worded, and should be a concise summary of the map's contents.

LEGEND

A map legend serves two basic functions: 1) it explains all map symbols which are not self-explanatory, and 2) it balances the map's layout or design. A map legend normally will include the date the map was drafted, and the initials or name of the cartographer. The date indicates that the map includes only information known prior to that time, while the authorship reveals who compiled the data and drafted the map.

Legends can be placed almost anywhere on a map and are sometimes enclosed in an outline. In the past, legends were generally the most decorative part of a map and were set-off by ornately designed outlines. This is no longer a valid practice because cartographers are concerned more with the explanation of symbolization on a map than with its decorative attractiveness. Thus, the present trend in cartography is to either enclose the legend with a thin, simple line or omit the outline altogether. The latter is the more accepted practice.

Cartographic technique calls for placing the legend in an inconspicuous but artistically well balanced position on the map. Under normal conditions this will position it near or at the bottom margin of the map. When the outlines of map phenomena make this impossible, the legend should be placed in some other area where it will not obscure vital map data. However, under no conditions should a legend be placed above the map's title or omitted from the map.

SYMBOLS

One of the main differences between maps and photographs is that maps use symbols to represent real objects while photographs are reduced copies of the entire real world. Maps are constructed using the selective judgment of the cartographer in the choice of symbol representation. Some symbols represent linear features such as highways and railroads, others show point location such as cities or archeological sites while still others, such as patterns and screens, can be used to show spatial distribution. When combined on a map, these symbols form a graphic code through which a visual image of a geographical area can be represented.

A well selected symbol is one which gives the map reader a visual impression of the phenomenon it represents. This can best be achieved by using symbols which are either reminiscent of the feature they represent or by using symbols which have gained wide acceptance and recognition through repeated usage. For example, an airplane located near a city on a map graphically suggests an airfield. Furthermore, water features are often symbolized by a series of thin wavy lines because the waves suggest rippled water surfaces.

Point symbols are used to show the location of small areas on a map. Symbols used to show the location of cities, archeological sites, burials, post molds, and other such data are all examples of point location symbols. As a general rule, these symbols should be just large enough to be read easily and if possible should suggest the feature they represent. Small symbols also are more artistically pleasing to the eye than large ones.

Area symbols are used to show the area covered by map features. For example, the outline of a test pit on an archeological site map is one form of area symbol because it shows the extent of the test excavation and differentiates it from the surrounding map features. One of the most effective ways to show this differentiation is through the use of contrast. Variations in the size, shape, interval, direction, and color give change to the pattern, value, and intensity of the area symbolized and are acceptable cartographic methods of showing contrast.

Some cartographers draft their own variations of contrast. However, this method has two main drawbacks. First, it is time consuming and requires a great deal of accuracy, artistic ability, and patience on the part of the cartographer. Secondly, whenever an error is committed in drafting, it has to be painstakingly erased. The use of pressure-sensitive, adhesive, preprinted acetate sheets to show contrast eliminates these problems. Such companies as Para-tone, Artype, Chart-Pak, and others offer a wide variety of patterns, most of which are suitable for showing variations of contrast. These preprinted, acetate sheets are inexpensive to use (if one considers the amount of time they save the cartographer), simple to apply, durable, and can be removed easily from a map surface if it becomes necessary.

The Exaggerated Symbol

Highways on the earth's surface are usually less than one-half a mile in width, yet they appear to be much larger when their symbol width is measured on the scale of most road maps. This is an example of symbol exaggeration. If a normal width highway were drawn to scale on a road map, it would appear as a barely visible line a few thousandths of an inch in width. Most map symbols need to be exaggerated in order to be legible.

The degree of symbol exaggeration will vary from map to map depending upon the map's scale, its purpose, and the area represented by the symbol. Furthermore, symbols should be graded in proportion to their actual size on the earth's surface and their relative importance on the map. For example, on a road map a narrow county road is generally represented by a thinner, lighter colored line while a multi-lane superhighway will appear as a broad band almost one-thirty-second of an inch in width and will be printed in a prominent color.

Standardization of Archeological Map Symbols

We are able to read and understand writing because the alphabet has become standardized over the centuries. Combinations of these basic letter symbols indicate words of the spoken language which have special meaning to us. Map symbols, like words of a language, are used to convey a message. However, unless some type of order and standardization occurs, the meaning of symbols can be confused or remain obscure to those who attempt to interpret them. Once a standardization of symbol types has been developed for a specific group of maps such as topographic, climatic, geologic, or archeological maps, then all the maps in that series should use only those standardized symbol forms. Think of the chaos that would develop if each of the regional U. S. Geologic Survey offices used a different set of symbols on their maps.

The field of archeology needs to develop a "graphic dictionary" of symbol usage. At the present time, archeological maps are going through a stage of graphic diarrhea. On some maps, archeological sites are currently being symbolized by small triangles, on others, sites are represented by dots, squares, *x*'s or a variety of other symbol forms. Archeologists need to agree on standardization of symbol forms so that anyone trained in this discipline will immediately recognize known symbol forms on archeological maps.

CONCLUSION

Let this article serve as a plea for the more careful drafting of archeological maps and the need for standardization of mapping techniques. There is a vast body of cartographic knowledge that seems to be unknown to the archeologist—knowledge which cartographers have painstakingly developed over centuries of work and which is applicable to the drafting of all maps. The use of these techniques in archeological mapping would improve the quality, the artistic appearance, and the scholarly expression of graphic illustrations.

Maps, like writing, are a form of visual communication. The scholarly nature of an archeological paper would certainly be suspect if it were poorly written. Therefore, is there any reason not to suspect an article which is well written but poorly or inadequately illustrated?

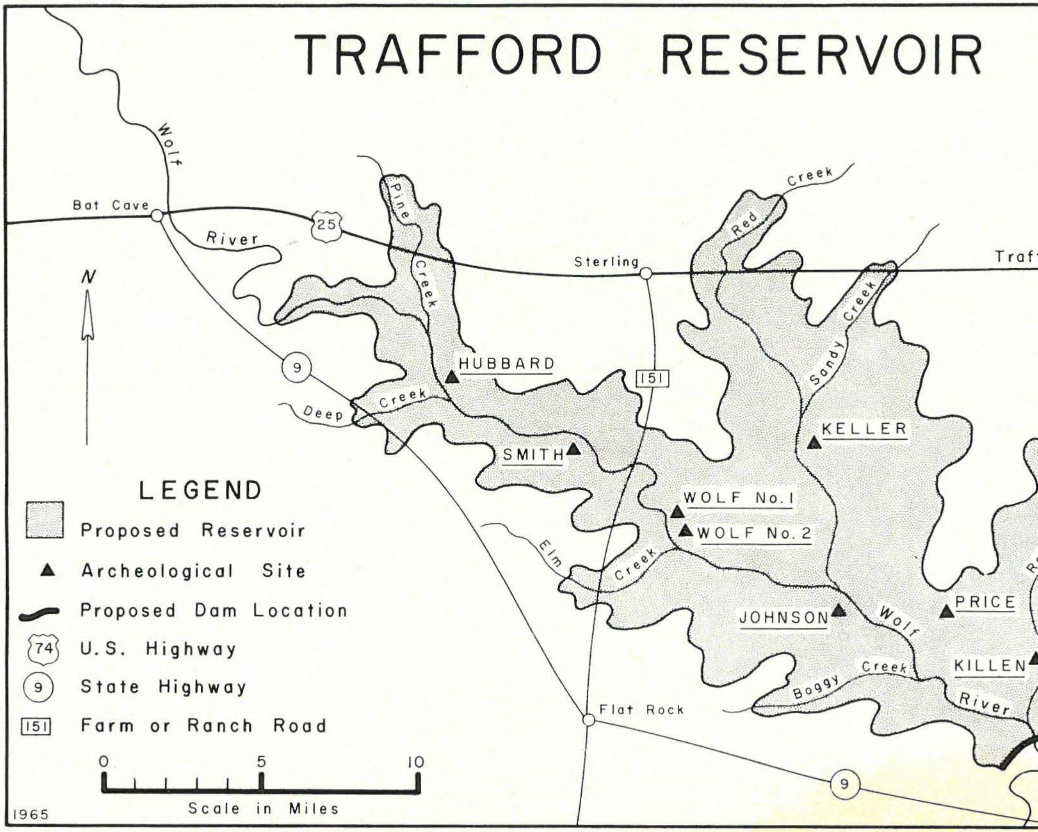


Fig. 5. Map of hypothetical reservoir emphasizing accepted cartographic principles.

BIBLIOGRAPHY AND RECOMMENDED READINGS

Debeham, Frank
1951. Map Making. Blackie & Sons Ltd.

Dury, G. H.
1960. Map Interpretation. Sir Isacc Pitman & Sons Ltd.

Greenhood, David
1964. Mapping. University of Chicago Press.

Monkhouse, F. J., and H. R. Wilkinson
1952. Map and Diagrams. Methuen & Co. Ltd.

Raisz, Erwin
1948. General Cartography. McGraw-Hill Book Co., Inc.
1962. Principles of Cartography. McGraw-Hill Book Co., Inc.

Robinson, A. H.
1952. The Look of Maps. University of Wisconsin Press.
1953. Elements of Cartography. John Wiley & Sons, Inc.

Department of Anthropology
The University of Texas

Department of Geography
The University of Texas

A Preliminary Archeological and Documentary Study of the Womack Site, Lamar County, Texas

R. K. HARRIS, INUS MARIE HARRIS, JAY C. BLAINE, AND JERRYLEE BLAINE

ABSTRACT

Intermittently over the past 35 or so years, amateur and professional archeologists have been collecting artifacts and other scientifically valuable data from the Womack Site, an important historic Indian village on the Red River, Lamar County, Texas. This paper, the first to report in any detail on the site, is concerned exclusively with an analysis of those artifacts and documents which are most useful in placing the Womack Site in a meaningful historic context. The findings indicate that it can be identified as a component of the Norteño Focus, very probably being the Quidehais (Kichai) village contacted by Du Rivage in 1719. If correct, this interpretation is contrary to the widely held view that Wichita-speaking Indians did not come south to the Red River until the middle 1740's.

INTRODUCTION

The Womack Site lies in the northern part of Lamar County, Texas, on a high bluff overlooking the Red River. It consists of midden debris, burials, and probable house remains buried in a sandy layer which appears to average about 18 inches thick. Below this zone is a red clay stratum which is devoid of occupational refuse but does occasionally preserve the outline of certain structural features. Covering an area of about 30 acres, most of the site has been under cultivation for a number of years, and some parts are considerably eroded. The uncultivated portions of the site support a fairly luxurious growth of cedar, bois d'arc, persimmon, ash, willow, hackberry, dogwood, pecan, several species of oak, hickory, sycamore, and grass, and the wild Cherokee rose. A grove of tall, slim, straight cedars, which could well have furnished poles for house construction, grows near the northern edge of the site. More than ample water for the domestic needs of the villagers could have been obtained from the Red River, or from the numerous springs that outcrop at the base of the bluff.

Despite the archeological importance of the Womack Site, it has never been intensively excavated. In the late summer of 1931, personnel from the Department of Anthropology, The University of Texas, made limited tests which uncovered eight burials and sampled some of the midden refuse (Krieger, 1946: 164; notes on file at the Texas Archeological Research Laboratory, The University of Texas). The remainder of the investigations at the site have been carried out primarily by interested amateurs who have made surface collections, dug a number of small test pits, and salvaged burials disturbed by plowing or fence building.

In the report whcih follows, the authors have not attempted a comprehensive analysis of all the specimens and features from the site. Rather, this study is based almost exclusively on the notes and artifacts recovered by amateurs, and only two artifacts, a bow fragment from a trigger guard and a flintlock cock, from The University of Texas collection are described. Even the descriptions of the specimens included are variable, with the greatest attention being given to those—mainly certain European-made goods—which are most useful in placing the Womack Site in a meaningful historic context. It is hoped that, in the near future, extensive controlled excavations will be made at the site, and that a detailed report will be published.

ARCHEOLOGICAL BACKGROUND

For a number of years, persons interested in historic archeological remains in the southern Plains, especially in north-central Texas, have been at least vaguely aware of the existence of several culturally related sites. Formalization of these data came in 1961, when Lathel F. Duffield and Edward B. Jelks published a report on the Pearson Site in Rains County, Texas. In this paper they provisionally defined a complex of native traits which they termed Norteño Focus and tentatively attributed to protohistoric and historic southern Wichita Indian groups (mainly the Taovayas, Tawakoni, and Yscani, but also the Waco and Kichai). In addition to Pearson, components of the Norteño Focus are recognized at the Spanish Fort Site on the Red River in Montague County, Texas and Jefferson County, Oklahoma; the Sanders and Womack sites on the Red River in Lamar County, Texas; the Stansbury Site on the Brazos River in Lamar County, Texas; the Stone Site on the Brazos River in McLennan County, Texas; the Vinson Site between the Brazos and Trinity rivers in Limestone County, Texas; and the Gilbert Site on the Sabine drainage in Rains County, Texas (Duffield and Jelks, 1961: 70–71; Harris and Harris, 1962: 2–9; Jelks, ms.).

Of the known Norteño Focus sites, Stansbury, Pearson, Gilbert, Womack, Sanders, and Vinson have been at least partially excavated; however, only Pearson has been described in detail (Krieger's 1946 report on the Sanders Site deals most exclusively with the prehistoric Sanders Focus). Understandably many problems of interpretation yet surround the Norteño Focus. Despite the surge of research in historic archeology, even the dating of these sites is difficult and rests mainly on still poorly known European trade goods. Matching the Norteño Focus sites with historically documented Wichita villages is, of course, most important. To date, only three—perhaps four—can, with a meaningful measure of confidence, be linked to the southern Wichita: Spanish Fort with a large 18th century Taovayas village, Stansbury with a late 18th century Tawakoni village, Pearson—more tentatively—with an 18th century Tawakoni-Yscani village (Duffield and Jelks, 1961: 69 and 76–79), and, as this paper attempts to demonstrate, Womack with an early 18th century Kichai village. Some of the other problems which remain are: 1) refining the definition of the Norteño Focus, 2) distinguishing, if possible, variations in this complex through time and space, and 3) relating the Norteño Focus to the Wichita remains (the Big Bend Aspect) recognized in central and southern Kansas by Wedel (1959: 571–589).

OCCUPATIONAL FEATURES

Finds designated as occupational features are of two types: 1) circular concentrations of bone, shell, artifacts, burned daub, and stone, and 2) burials. None of the former has been fully investigated, but it is believed that they represent the remains of houses.

Eight burials have been unearthed by The University of Texas (but are not included in this study), and four have been found by amateurs. In each case, the latter burials were partially disturbed prior to excavation, and the skeletal remains were in a poor state of preservation, apparently a result of the high acid content of the sandy soil (animal bones recovered from the site were also in poor condition).

BURIAL 1

Excavated by R. K. Harris and his father, the late S. W. Harris, this burial was found in August, 1938, just after the site had been plowed. The plow damaged one edge of a vessel found in the grave, and destroyed the face of the skull. As the interment had been made in a darkly stained midden deposit, it was impossible to trace the outlines of a burial pit, although the bottom of the grave appeared to be roughly eight to 10 inches below the surface. The skeleton was extended on its back, with the head to the north. In too fragile a condition to be recovered, the bones seemed to represent an adult male, approximately 25 to 35 years of age at the time of death.

Two vessels were the only grave offerings. One of these, a bowl (Fig. 4, A) which has the shape and design of *Womack Engraved* (Duffield and Jelks, 1961: 36–39) but is incised, was recovered from the right side of the skeleton, just below the pelvis. The other, a shell-tempered bowl of type *Natchitoches Engraved* (Fig. 4, B), was found on the left side of the burial, roughly midway between the shoulder and the elbow.

BURIAL 2

This burial was found in the spring of 1940, essentially under the same circumstances as Burial 1. Excavated by R. K. Harris, it too had been placed in what appeared to be an extensive midden accumulation. The exact grave outline could not be distinguished because of the uniformily dark nature of the soil, but the base of the burial pit appeared to lie about 10 inches beneath the surface. Too deteriorated to determine sex, the skeleton appeared to be that of an adult. It was extended on its back, with the head to the northeast.

The only grave goods found with the burial were three vessels. Two of these, a *Simms Engraved* bowl (Fig. 4, C) and a bowl (Fig. 4, D) which has the attributes of both *Simms Engraved* and *Womack Engraved*, were found near the right shoulder of the skeleton. The third vessel (Fig. 4, E), found near the opposite shoulder, is of type *Emory Punctated.*

BURIAL 3

Burial 3 was discovered by Rex Housewright during the 1940's, but it was so severely disturbed by plowing that very little information could be salvaged by its excavation. However, remains of seven vessels, all of which could be restored, were associated with the skeleton. Included are a water bottle (Fig. 5, A) of type *Hudson Engraved,* a somewhat aberrant example (Fig. 5, B) of *Simms Engraved,* two *Emory Punctated* vessels (Fig. 5, C), and three *Womack Engraved* bowls (Fig. 5, D, E).

BURIAL 4

In the summer of 1963, a fence was built near the south end of the site and, in digging one of the post holes, the back of a skull was disturbed. The remainder of the burial was excavated by R. K. Harris and

Jay C. Blaine, who found it to consist of an elderly female placed extended on her back, with the head to the northeast. The grave, like those of the other three burials, had been dug into a midden accumulation, with the pit extending for approximately 15 inches below the surface, into the upper part of the underlying red clay. A later fire pit had been dug through the right side of the burial, between the hips and knees. The skeletal material was in very bad shape and could not be removed. No grave goods were associated with Burial 4.

THE ARTIFACTS

Numerous specimens of both European and native origin have been recovered from the site. While the present analysis of these materials is only preliminary and incomplete, it is reasonably clear that two components are represented. In terms of the interests of this paper, as well as the number of specimens which—on typological grounds—can be assigned to it, the most important of these components is the historic Norteño Focus (Duffield and Jelks, 1961). The second occupational component, apparently assignable to the Archaic Carrollton Focus, is known from about 60 artifacts recovered from a limited portion of the site. Since these specimens have no bearing on the historic period, they are excluded from the discussions which follow.

Native-Made Artifacts

Included in this category are items of stone, clay, shell, and metal which, on the basis of their morphological and/or technological characteristics, are believed to have been fashioned into useful forms by the historic Indian occupants of the site. While the distinction between native and European manufacture is not always easily made, it is a convenient and, for the most part, meaningful dichotomy.

The majority of the specimens of stone herein linked with the Norteño Focus agree favorably with those described for this complex by Duffield and Jelks (1961: 71–73). These, and all other, types or descriptive groups that have already been well defined in print will not be treated in detail, and the reader should assume that the specimens from the Womack Site are within the range given in previous reports.

Materials from which the chipped stone artifacts are made include Alibates flint from the Texas panhandle, Kay County Flint, a beautiful banded stone found near Springtown, Oklahoma, Novaculite from Arkansas, and various local flints and jaspers which occur in the Red River gravels. Most of the pecked, ground, and polished stone objects are made from locally-occurring sandstone, basalt, quartzite, and limestone. The exceptions, a pipe fragment of catlinite and three turquoise beads, indicate trade with the former probably coming from the central Plains and the latter from New Mexico.

SPEAR POINT

The one large projectile, perhaps spear, point (Fig. 1, A) from the site has a triangular outline, deep side notches, and a straight base. It is much like the *Harrell* arrow point type in outline form but is far too large, 12.0 cm. in length and 4.0 cm. in maximum width, to be so classified. The material from which this specimen is made is the banded flint found near Springtown, Oklahoma.

ARROW POINTS

The 928 arrow points collected from the site vary from 1.0 to 4.2 cm. long. At least six types are included, with the well made, triangular *Fresno* (Suhm, *et al.*, 1954: 498–499) being unquestionably the dominant form. Of the 863 examples of this type, 478 have straight bases (Fig. 1, B, C) and 385 have concave bases (Fig. 1, D, E). Among the remainder of the typed points there are 20 examples of *Harrell* (Fig. 1, F, G; Suhm *et al.*, 1954: 500–501), eight examples of *Morris* (Fig. 1, H; Bell, 1958: 60–61), two examples of *Bassett* (Fig. 1, I; Suhm *et al.*, 1954: 494–495), two examples of *Bonham* (Fig. 1, J; *ibid.*: 496–497), 12 examples of *Scallorn coryell* (Fig. 1, K; Jelks, 1962: 28), and six examples of *Scallorn sattler* (Fig. 1, L; *ibid.*: 30). The other 15 arrow points from the site are of styles which cannot be identified with an established type.

The *Fresno* and *Harrell* types have been linked with the Norteño Focus by Duffield and Jelks (1961: 71). Whether or not the other forms represented at the Womack Site should also be included is not clear. It is possible, however, that the *Bassettt* points indicate trade from the east, while the *Scallorn* and *Morris* points may be carry-overs from an earlier period, or may have been collected from earlier sites. The *Bonham* type, a major form at the nearby Sanders Site (Krieger, 1946: 185), is perhaps also intrusive at the Womack Site.

KNIVES

Eighty-nine chipped stone knives have been recovered from the site. They include 28 small triangular specimens (Fig. 1, M), 35 small leaf-shaped specimens (Fig. 1, N), 15 large leaf-shaped specimens (Fig. 1,

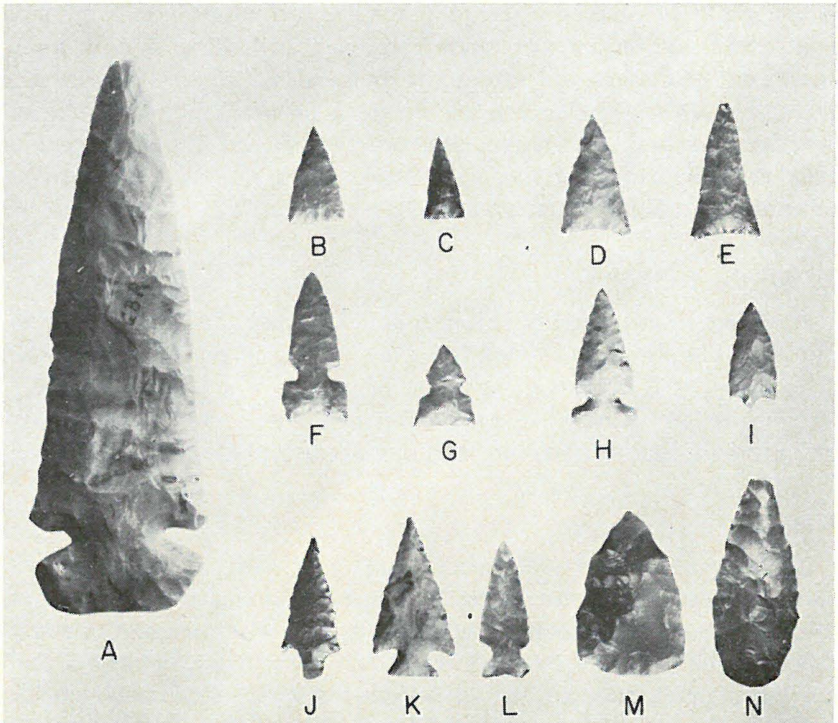


Fig. 1. Points, Knives, and Axe. A, Possible spear point. B–E, *Fresno* points. F, G, *Harrell* points. H, *Morris* point. I, *Bassett* point. J, *Bonham* point. K, *Scallorn coryell* point. L, *Scallorn sattler* point. M, Small, triangular knife. N, Small, leaf-shaped knife. O, Large, leaf-shaped knife. P, Diamond-shaped, alternately beveled knife. Q, *Jowell* knife. R, Double-bitted axe.

O), six diamond-shaped, alternately beveled specimens (Fig. 1, P), and five slender, bipointed specimens (Fig. 1, Q). Of these, the bipointed knives are of the greatest interest as they are of a type which appears to be characteristic of the Allen Focus, a historic Caddoan complex found to the south, on the Angelina and Neches rivers. They have not been well described but are sometimes referred to as *Jowell* knives (Suhm, *et al.*, 1954: 220).

DOUBLE-BITTED AXE

A rather small, roughly chipped, double-bitted axe (Fig. 1, R) was found at the site. It may not, however, belong to the Norteño Focus occupation, as it came from that part of the site which yielded mainly Archaic artifacts. In addition to having a bit at each end, this specimen has a broad, shallow notch on each lateral edge, probably for hafting.

SCRAPERS

Numerous scrapers (872 specimens) principally of the snub-nose variety, occur at the site. They have been fashioned from a range of siliceous materials, which, in addition to locally-occurring flints and cherts, includes stones from central Texas, Oklahoma, Arkansas, and the Texas panhandle. In over-all length the scrapers fall between 1.2 and 9.5 cm., and the majority conform quite well to the descriptive groups recognized by Duffield and Jelks (1961: 24–30) for the Pearson Site collection. These include 35 tapering base snub-nose scrapers (Fig. 2, A), 205 rounded base snub-nose scrapers (Fig. 2, B), 65 subtriangular snub-nose scrapers (Fig. 2, C), 186 straight base snub-nose scrapers (Fig. 2, D), 105 rectangular snub-nose scrapers (Fig. 2, E), 25 miscellaneous—largely fragmentary—snub-nose scrapers, 18 spokeshaves (Fig. 2, F, G), 47 flakes scrapers (Fig. 2, H, I), and 20 semilunar wedge-shaped scrapers (Fig. 2, J). Forms present at the Womack Site, but not at the Pearson Site, are 142 side scrapers (Fig. 2, K, L), three scrapers rechipped from small *Gary* dart points (Fig. 2, M), and 21 snub-nose scrapers with graver beaks (Fig. 3, A-C). The last-mentioned group appears to represent an early Norteño Focus trait, perhaps one which predates the occupation at the Pearson Site. It has also been found at the Gilbert Site in Rains County (Jelks, ms.), an unmixed Norteño site excavated in the summer of 1962 by members of the Texas Archeological Society. The small graver on these specimens occurs sometimes on the corner of the steeply beveled distal end (Fig. 3, A), as well as along other portions of this beveled edge (Fig. 3, B, C).

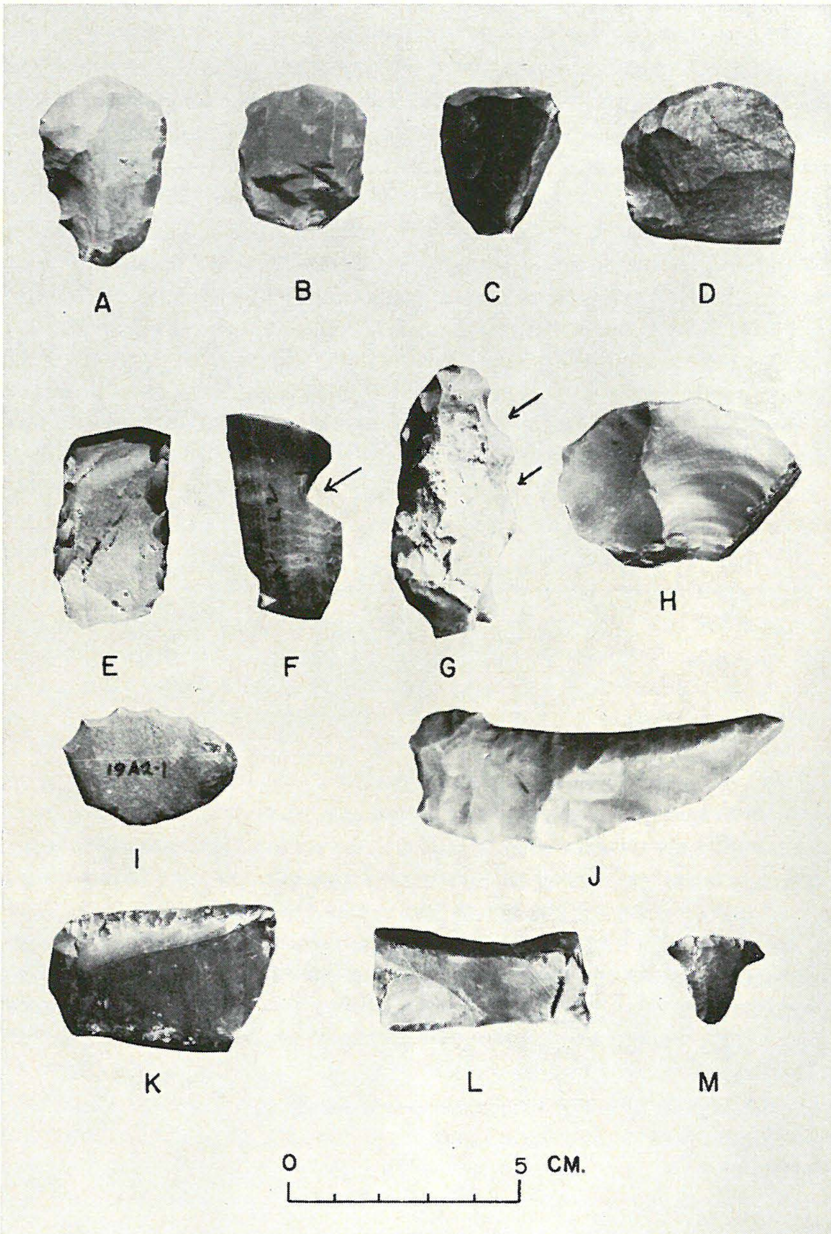


Fig. 2. Scrapers. A, Tapering base snub-nose. B, Rounded base snub-nose. C, Subtriangular snub-nose. D, Straight base snub-nose. E, Rectangular snub-nose. F, G, Spokeshaves. H, I, Flake. J, Semilunar wedge-shaped. K, L, Side. M, Rechipped *Gary* point. Arrows indicate spokeshave concavities.

DRILLS

Each of the 68 drills possesses a long, narrow, pointed projection on the shaft which has been carefully shaped by pressure flaking. They can be readily divided into two groups: 43 with expanding, but unworked bases (Fig. 3, D), and 25 with expanding, carefully flaked bases (Fig. 3, D). The high frequency of drills at the Womack Site is interesting in that Duffield and Jelks (1961: 71–73) do not mention this among their Norteño Focus traits. The Womack Site appears to be earlier than the Norteño Focus components known on the Sabine (Pearson and Gilbert sites), Brazos (Stone, Stansbury, and Vinson Sites), and Upper Red River (Spanish Fort). In these apparently later sites stone drills are rare, or even absent, although metal awls do occur in some numbers. Significantly, only one metal awl (see below) was found at the Womack Site.

GRAVERS

In addition to the graver beaks found on the snub-nose scrapers, 14 flakes have small graver projections (Fig. 3, F). The data from the Womack Site indicates that gravers on otherwise unaltered flakes should also be added to the Norteño Focus trait list.

GUNFLINTS

Twenty-three of the 31 definite gunflints from the site appear to be of native manufacture (Fig. 18). Most of native specimens have been fashioned from locally-obtained flint, although one is made of Novaculite from Arkansas. In outline form these specimens vary from square to rectangular (Fig. 17, A-G), while in size they are from 0.75 by 0.81 in. to 0.97 by 1.22 in. They are biconvex in cross section and, although thinned on all edges, show no battering. Interestingly, many native gunflints (approximately 60%) appear to be unused and were probably held in reserve for use when European flints could not be obtained.

POSSIBLE GUNFLINTS

Five faceted blade fragments from the site have what appear to be intentionally produced rectangular or almost square (Fig. 17, H-J) outlines. In cross section they are plano-convex, much like the snubnose scrapers. On their convex surfaces two, occasionally three facets, are present. While a single break across a blade is not unusual, a second one which produces a square or rectangular outline, is noteworthy.

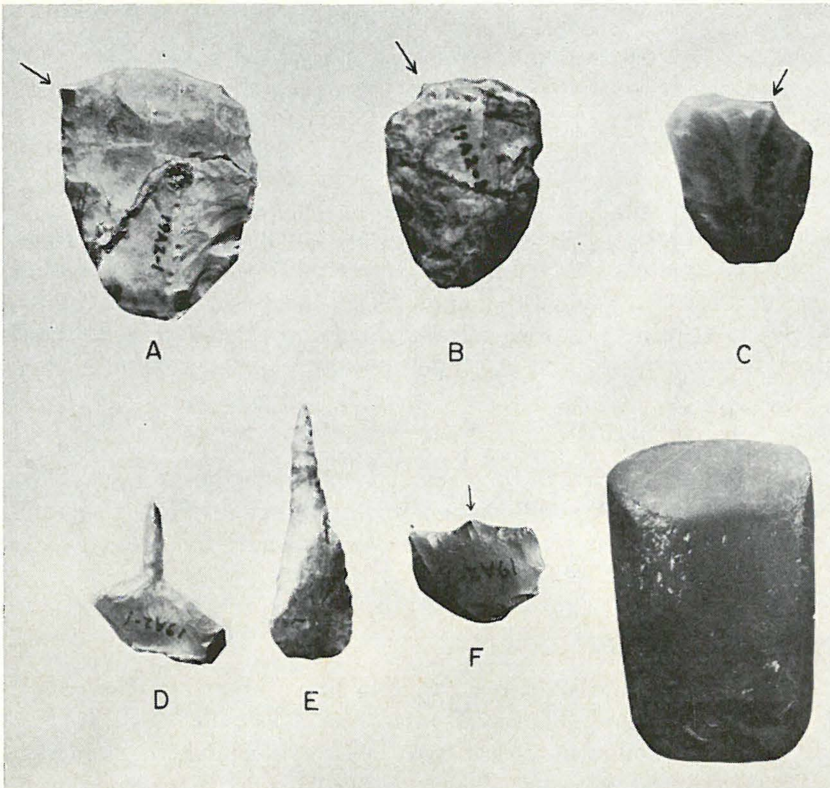


Fig. 3. Scrapers, Drills, Gravers, Celts, Abrader, Pipes, and Beads. A–C, Snub-nose scrapers with graver beaks. D, E, Drills. F, Graver. G, H, Celts. I, Arrow shaft abrader. J, Limestone pipe. K, Catlinite pipe. L, Crinoid bead. M, Turquoise bead. Arrows indicate graver beaks.

There are, however, no indications that these pieces have been used as gunflints and perhaps they, too, were kept in reserve. They vary in size from 0.63 by 0.66 in. to 1.03 to 1.07 in.

CELTS

Very similar to specimens from the Pearson Site (Duffield and Jelks, 1961: 32–34) each of the nine polished stone celts from the Womack Site has a rectanguloid outline and a chisel-like bit at one end (Fig. 3, G, H). In cross section they are rectangular with somewhat rounded edges. Both sandstone and basalt was used in their manufacture.

MANOS

The six manos from the site are of a compact sandstone. Most are fragmentary, but all seem to have been of the type used in a back-and-forth motion. Similar specimens have been reported for the Henrietta Focus (Suhm, *et al.*, 1954: 83–84).

ARROW SHAFT ABRADERS

Fourteen rectangular-shaped pieces of fine-grained sandstone have one or more longitudinal grooves across one of their flat surfaces (Fig. 3, I). In cross section they vary from square to rectangular. Although arrow shaft abraders occur in many prehistoric sites, they should probably be added to the Norteño Focus trait list.

HAMMERSTONES

The 28 hammerstones from the site consist of river rolled cobbles which have battering marks suggestive of use in hammering and pecking. Most are of quartzite, and all are between 4.0 and 9.0 cm. in diameter.

PIPES

Three fragmentary stone pipes have been recovered from the Womack Site. All appear to have been of the elbow type, with two being made from limestone (Fig. 3, J) and one of catlinite (Fig. 3, K).

BEADS

The seven stone beads include four fashioned from fossil crinoids (Fig. 3, L) and three (Fig. 3, M) made from turquoise. Both types were probably worn on necklaces. The turquoise beads indicate contact (either direct or indirect) with Puebloan peoples to the west, probably in New Mexico.

QUARTZ CRYSTAL

A small, unworked quartz crystal was recovered from the site and perhaps represents a trade item from Arkansas, or a piece picked up during an excursion to Arkansas for Novaculite. A small flake or two has been detached from the crystal, but this is probably accidental.

Artifacts of Clay

Among the native-made ceramic objects from the site there are complete vessels, unrestorable vessel fragments, pipes, and a figurine fragment.

POTTERY VESSELS

Thirteen complete or restorable vessels have been recovered, 12 from Burials 1 through 3, and one from a midden deposit. One of those (Fig. 4, A) from Burial 1 is a large, grit-tempered bowl which has an incurved rim and rounded shoulders, and an *incised*, but *Womack* style, design. Of the four major designs, A, B, C (Duffield and Jelks, 1961: Fig. 10), and D (Harris and Harris, 1962: 9), found on *Womack Engraved* (Fig. 6, A-D) this vessel (Fig. 4, A) has Design B—a motif dominated by rather broad, meandering, negative scrolls and, through the center of the scroll, a ticked line. The other vessel (Fig. 4, B) from Burial 1 is a rather small, shell-tempered bowl of type *Natchitoches Engraved* (Suhm, *et al.*, 1954: 334–335).

One (Fig. 4, C) of the three vessels from Burial 2 is a typical shell-tempered *Simms Engraved* bowl (*ibid.*: 354–355). The second bowl (Fig. 4, D), however, has attributes of both *Simms Engraved* and *Womack Engraved*. It is shallow like *Simms*, but the curve of the shoulder is more like *Womack;* the design includes engraved horizontal lines and triangles which are reminiscent of, but not identical to, those found on *Womack*. The third vessel associated with Burial 2 is a shell-tempered jar (Fig. 4, E) which, at the juncture of the rim and body, has a row of punctations and, just below the rim, two equally spaced nodes. It falls within the range of a new type, *Emory Punctated*, which has been recognized mainly on the basis of the findings at the Gilbert Site (Jelks, ms.).

The largest number of vessels, seven, were found with Burial 3, the one so badly damaged by plowing. One of the vessels (Fig. 5, A) is a

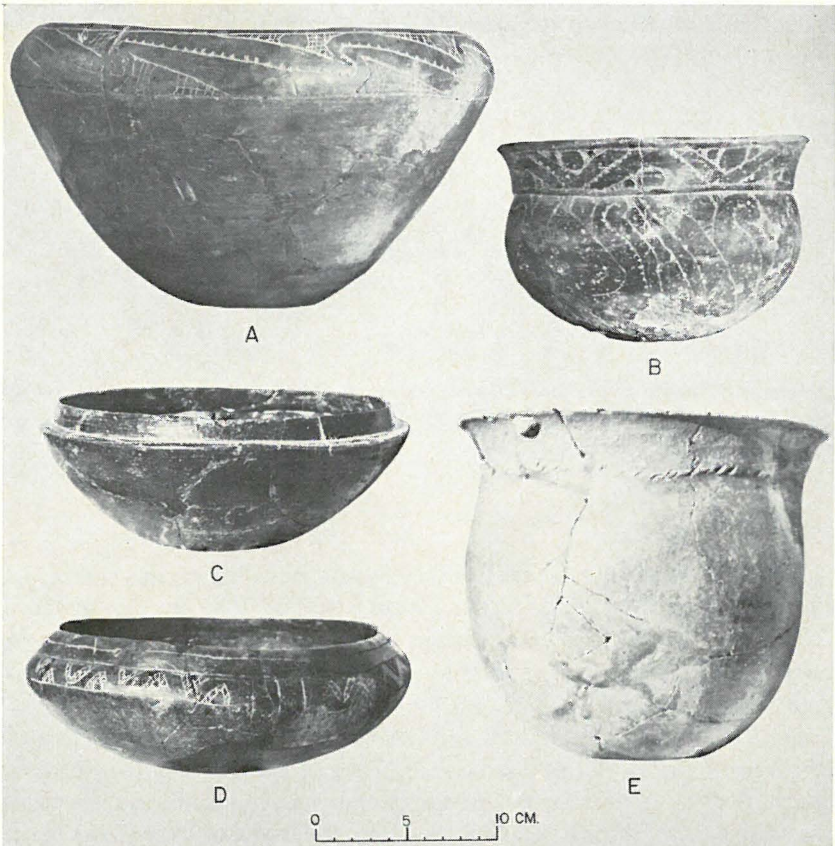


Fig. 4. Vessels. A, Incised bowl from Burial 1. B, *Natchitoches Engraved* bowl from Burial 1. C, *Simms Engraved* bowl from Burial 2. D, Bowl from Burial 2. E, *Emory Punctated* jar from Burial 2.

small, shell-tempered water bottle of type *Hudson Engraved* (Suhm, *et al.*, 1954: 304–305). It has the characteristic *Hudson* spool-shaped spout and curvilinear, cross-hatched band design. Another shell-tempered specimen (Fig. 5, B) from Burial 3 is not typical of any one type, but rather it has the shape of the *Simms Engraved* bowl, and a design (Type A) like that found on *Womack Engraved.* The remaining four vessels from this burial include two shell-tempered *Emory Punctated* jars (Fig. 5, C) and three grit-tempered *Womack Engraved* bowls (Fig. 5, D, E).

Two vessels have been found in the midden area, not associated with any burial. One of them is of European origin and is discussed in more detail in a later section. The other (Fig. 5, F), found by Henry Hanna, is a shell-tempered hemispherical vessel of type *Nocona Plain* (Suhm, *et al.*, 1954: 389).

POTTERY SHERDS

The 2,570 sherds from the surface of the site have been analyzed with the following results:

Womack Engraved		
grit-tempered, Design A	54	
shell-tempered, Design A	7	
TOTAL DESIGN A		61
grit-tempered, Design B	559	
shell-tempered, Design B	48	
TOTAL DESIGN B		607
grit-tempered, Design C	64	
shell-tempered, Design C	8	
TOTAL DESIGN C		72
grit-tempered, Design D	4	
TOTAL DESIGN D		4
TOTAL *WOMACK*		744 sherds
Emory Punctated		
grit-tempered	78	
shell-tempered	485	
TOTAL *EMORY*		563 sherds
Natchitoches Engraved, shell-tempered		8
Simms Engraved, shell-tempered		5
Hudson Engraved, shell-tempered		5
Avery Engraved, shell-tempered		7
Nocona Plain, shell-tempered		10
Untyped engraved, incised, and punctated		118
Plain, strap handles, shell-tempered (probably from *Emory* vessels)		2
Plain, shell-tempered	Probably from undecorated portions of *Womack* and *Emory* vessels	487
Plain, grit-tempered		621
GRAND TOTAL		2,570

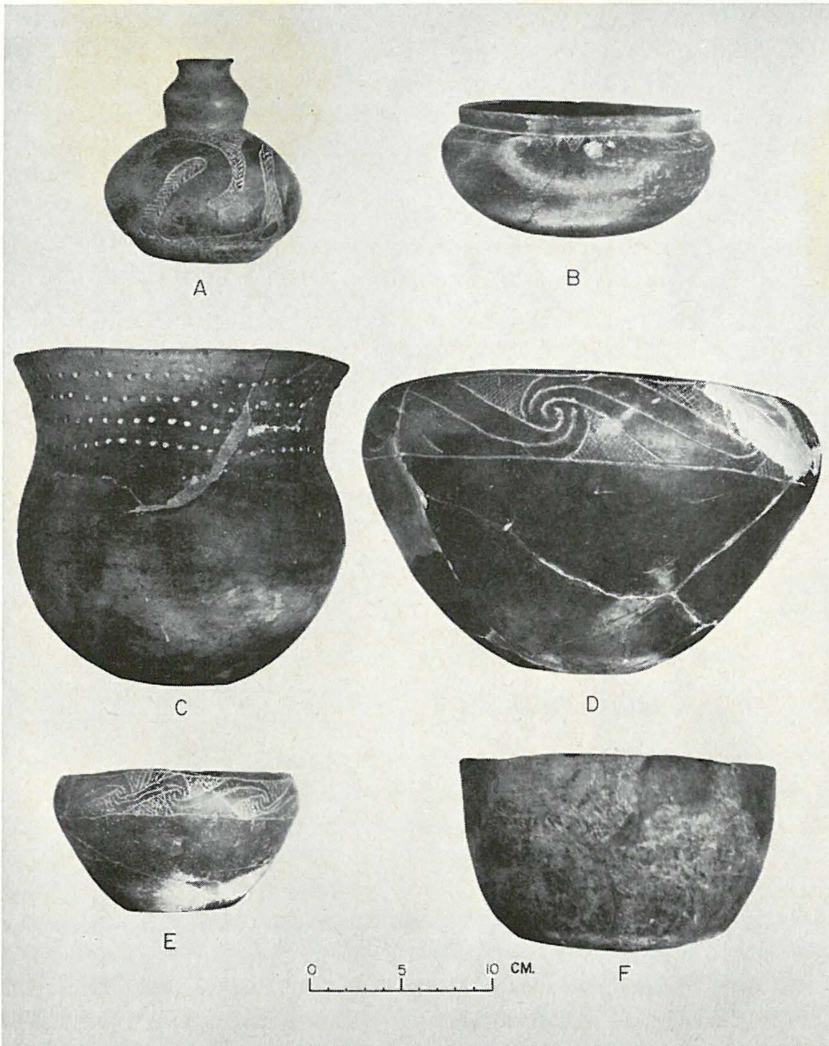


Fig. 5. Vessels. A, *Hudson Engraved* bottle from Burial 3. B, Bowl from Burial 3. C, *Emory Punctated* jar from Burial 3. D, E, *Womack Engraved* bowls from Burial 3. F, *Nocona Plain* bowl from midden.

From the above tabulation it is apparent that *Womack Engraved* and *Emory Punctated* are the resident pottery types at the Womack Site. The writers have noticed that *Womack* vessels show very little evidence of having been used in cooking and appear, instead, to have served as storage containers. By contrast, a large number of the *Emory* vessels and sherds have smudged carbon on their outside surface, presumably a result of their having been used in cooking.

It is also evident from the above frequencies that Design B was the most popular, occurring on 607 of the 744 sherds of *Womack Engraved*. To judge from the writers' collections, the same design is the most common in the Norteño Focus component at the Sanders Site. Significantly, Sanders and Womack appear to be the earliest of the known Norteño sites on Red River. While much less frequent, Design C seems to occur along with Design A at both of these sites. Design A, a very minor motif at Womack, becomes more important at Norteño sites located on the Sabine, Brazos, and upper Red rivers, apparently at the cost of Designs B and C. Design D, so far as presently known, occurs only at the Gilbert and Womack sites, where in both cases it is a very minor form (one and four examples, respectively).

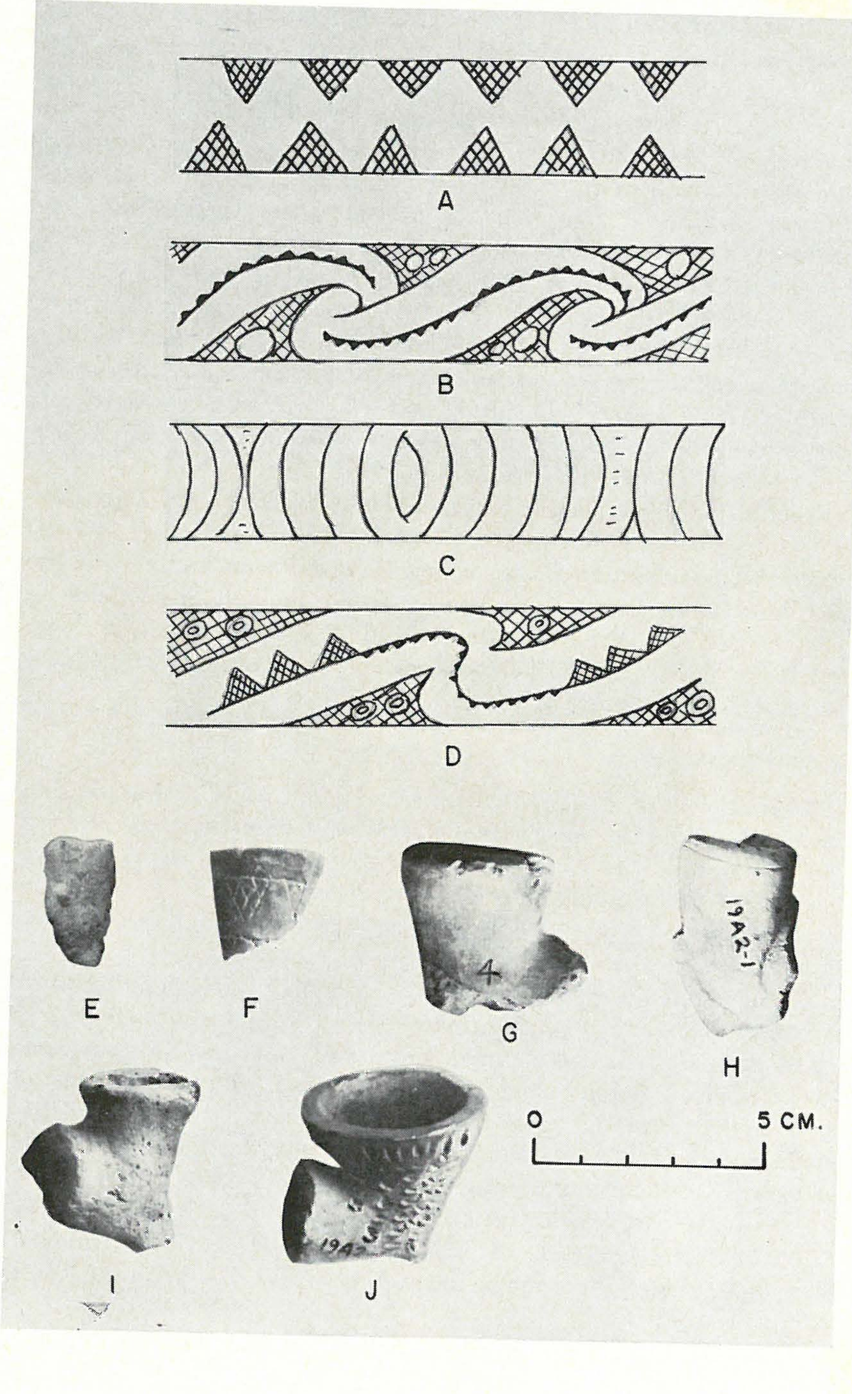
Probable trade pottery is represented by *Natchitoches Engraved*, *Simms Engraved*, *Hudson Engraved*, *Avery Engraved*, and *Nocona Plain*. All but *Nocona Plain*, which is linked principally with the Henrietta Focus to the west, are generally thought of as Caddoan types. Conversely, *Emory* occurs, probably as trade ware, as far down Red River as the Angola Farm (Ford, 1936), a historic Tunica site near the mouth of that river.

FIGURINE FRAGMENT

A small piece of a baked figurine (Fig. 6, E), possibly representing the leg of an animal, was recovered. It is too fragmentary for detailed description, although it might be noted that portions of figurines have been recovered from other Norteño Focus sites.

PIPES

Twenty-seven, largely fragmentary, ceramic pipes are included in the collection. They are of the elbow type, with the lip of the bowl and the stem being flat, and a projection, usually an angular spur, commonly appears at the outside juncture, or heel, of the stem and the bowl. Fourteen of the pipes have small, engraved, crosshatched triangles and ticked circles (Fig. 6, F, H), one has single engraved lines (Fig. 6, G), nine are undecorated (Fig. 6, I), and three are much like those usually associated with the Allen Focus (Suhm, *et al.*, 1954: 220). The one complete example (Fig. 6, J) of the last-mentioned group has punctations covering the body of the bowl and two small feet at the base of the bowl.


A
B
C
D
E
F
G
H
I
J
0
5 CM.

Artifacts of Shell

CONCH SHELL BEADS

Three rather large beads which were probably worn on necklaces have been fashioned from conch shell columellae. Two are tube-shaped and one is barrel-shaped.

CONCH SHELL GORGET

The two gorgets made from conch shell whorls are undecorated discs. The larger of the two (Fig. 7, A) has a hole drilled in the center and two holes near the presumed upper edge. One large central perforation occurs on the other gorget (Fig. 7, B).

Artifacts of Metal

Included in this category are brass beads and tinklers which appear to be of native manufacture, although the raw material was obviously obtained from Europeans. Numerous other metal objects were recovered from the site but these retain most or all of the European design. A very different situation prevails at later Norteño sites where both scrap metal and worn out tools were frequently reworked.

BEADS

Fifteen beads have been made by rolling pieces of sheet kettle brass into either short (Fig. 7, D) or long (Fig. 7, C) tubes. Twelve are made of 25 gauge (0.018 inches) brass and three from 19 gauge (0.036 inches) brass. The 25 gauge metal was apparently obtained from small kettles, while the 19 gauge brass probably represents large kettles (for a fuller description of brass kettles see descriptions in a later section).

TINKLERS

The 77 cone-shaped tinklers from the site have also been made from scrap pieces of kettle brass. Two different shaped blanks were used to form most of them. One is trapezoidal in outline and, when rolled, it produces a tinkler like those shown in Figure 7, E, F; the other is rec-

---

Fig. 6. Designs on *Womack Engraved* Pottery, Possible Figurine Fragment, and Pipes. A, Design A. B, Design B. C, Design C. D, Design D. E, Possible Figurine Fragment. F–J, Ceramic pipes.

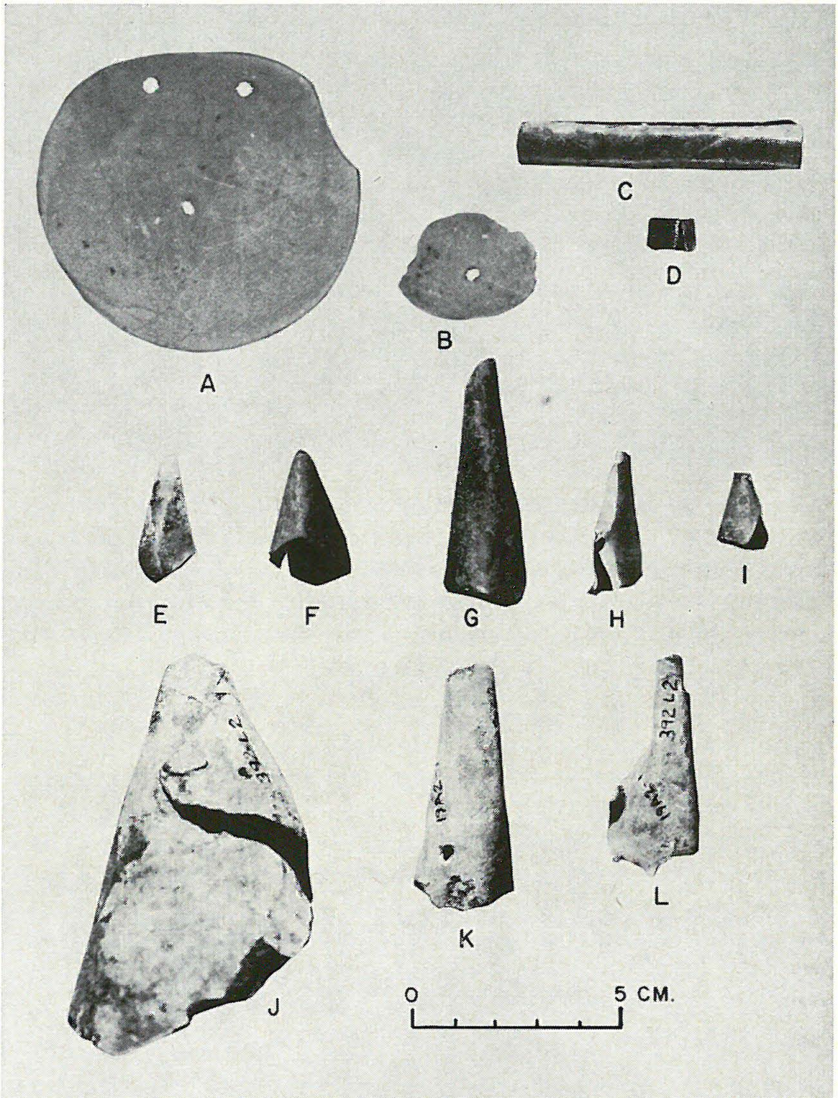


Fig. 7. Gorgets, Beads, and Tinklers. A, B, Shell gorgets. C, D, Brass beads. E–L, Brass tinklers.

tangular or square in outline and, when rolled, it produces a tinkler like those shown in Figure 7, G-I.

The site yielded an extra large tinkler (Fig. 7, J) which upon cleaning, was found to contain two somewhat smaller tinklers (Fig. 7, K, L) within the hollow cone. Brass salts had preserved buckskin thongs inside all three, and it appears that these specimens constituted a bell, possibly an item of horse paraphenalia. All three of these tinklers are of 19 gauge brass. The other 74 specimens include 42 of 25 gauge brass, 21 of 22 gauge brass, and 11 of 19 gauge brass.

In examining collections from other historic sites, the authors have noticed that the tinklers from Womack and Angola Farm are loosely rolled, while those from later historic sites are tightly rolled. Also there are no iron tinklers known from the Womack Site, but they are common at the later Norteño Focus site of Spanish Fort.

European-Made Artifacts

Objects of European origin and design make up an important segment of the collection from the Womack Site. Most apparently represent items the Europeans exchanged for native goods and favors, or simply gave to the Indians to win their friendship. Included are glass trade beads, gun parts, various specimens of iron, brass, lead, pewter, and clay.

Glass Beads

The 2,123 beads from the site examined by the authors are believed to be of considerable importance in determining the dates of the historic Indian occupation. Hence, in the sections which follow, they are classified in detail, and several pertinent documentary materials are reviewed. In analyzing the beads the authors have employed the same terminology of structure and size as Duffield and Jelks (1961: 40–50). Included are *simple* beads which have a monolithic structure, *compound* beads which have two different structural components, and *complex* beads which have three or more component parts. The sizes range from *large* (greater than 6 mm. in diameter) and *medium* (4 mm. to 6 mm. in diameter), to *small* (less than 4 mm. in diameter). Documentary evidence (Du Pratz—quoted in Swanton, 1911: 56) suggests that the larger beads were used mainly on necklaces, while the small and medium-sized ones were used principally on skins, garters, and the like.

The various shapes recognized are also essentially the same as those employed in the Pearson Site descriptions, except for some of the larger (necklace) beads where the term *olive-shaped* is used. It is taken from an early 18th century document (Thwaites, 1959: 143) and was apparently widely used by the French to describe certain of the trade beads. A standard color chart (Bustanoby, 1947: 28–29) has been used to indicate the hues of beads. It should be noted that the surfaces of the beads are frequently altered by age and weathering and it is sometimes difficult to determine the original color. However, the color can be restored by immersing the beads in a weak solution of muriatic acid for about two hours and then washing them in water. It is surprising how many beads that would otherwise have been classified as dirty white turn out to be red, green, yellow, etc. when cleaned. An example of each of the 56 different kinds of beads recognized in the collection is shown in Figure 8. The number which appears opposite each refers to the type designation given below.

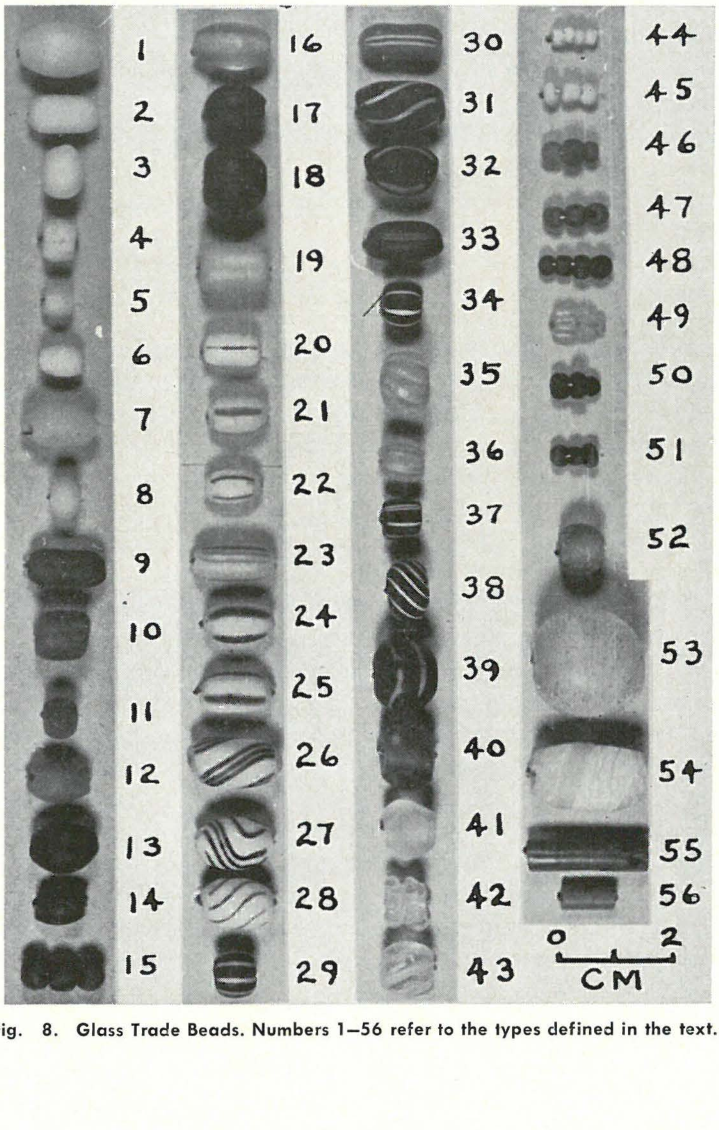


Fig. 8. Glass Trade Beads. Numbers 1—56 refer to the types defined in the text.

BEAD TYPES

No. 1: Large, white, opaque, olive-shaped necklace bead of simple construction. The glass is porcelain-like in texture. 141 specimens.

No. 2: Large, white, opaque, elongated, olive-shaped necklace bead of simple construction. The glass is porcelain-like in texture. 125 specimens.

No. 3: Large, white, opaque, round necklace bead of simple construction. The glass is porcelain-like in texture. 105 specimens.

No. 4: Large, white, opaque, barrel-shaped necklace bead of compound construction. The inner layer of glass has a porcelain-like texture, while the outer layer has a slightly frosted appearance. 70 specimens.

No. 5: Medium, white, opaque, barrel-shaped garter bead, of compound construction. The two layers of glass in this bead are the same as those described above for type No. 4. 105 specimens.

No. 6: Medium, white, opaque, olive-shaped garter bead of simple construction. The glass is porcelain-like in texture. 75 specimens.

No. 7: Large, grayish-white, semitranslucent, olive-shaped necklace bead of simple construction. The glass has a frosted-like appearance. 31 specimens.

No. 8: Large, light grayish-white, semitranslucent, donut-shaped necklace bead of simple construction. The glass has a frosted-like appearance similar to No. 7. 17 specimens.

No. 9: Large, Peacock Blue, opaque, elongated olive-shaped necklace bead of simple construction. The glass has fine lines running lengthwise with the bead, giving it a texture reminiscent of stripped sugarcane. 15 specimens.

No. 10: Large, Peacock Blue, opaque, barrel-shaped, necklace bead of simple construction. The glass is the same as No. 9. 45 specimens.

No. 11: Medium, Peacock Blue, opaque, barrel-shaped garter bead of simple construction. The glass is the same as No. 9. 27 specimens.

No. 12: Large, Turquoise Blue, opaque, olive-shaped necklace bead of simple construction. The glass is porcelain-like in texture. 3 specimens.

No. 13: Large, dark Bluebird Blue, translucent, olive-shaped necklace bead of simple construction. The glass is often cane-like in appearance. 9 specimens.

No. 14: Medium, dark Bluebird Blue, translucent, olive-shaped, garter bead of simple construction. 5 specimens.

No. 15: Medium, Gobelin Blue, opaque, barrel-shaped, garter bead of simple construction. The glass is porcelain-like in texture. 62 specimens.

No. 16: Large, clear glass, olive-shaped necklace bead of simple construction. The glass is clear but, due to age, sometimes appears frosted. 3 specimens.

No. 17: Large, black, opaque, olive-shaped necklace bead of simple construction. The glass is somewhat cane-like in appearance. 2 specimens.

No. 18: Large, black, opaque, round necklace bead of simple construction. The glass is porcelain-like in appearance. 3 specimens.

No. 19: Large, Dandelion Yellow, opaque, barrel-shaped necklace bead of simple construction. The glass is porcelain-like in texture. 1 specimen.

No. 20: Large, white, opaque, elongated olive-shaped necklace bead of complex construction. The bead surface is covered with four dark blue stripes which are evenly spaced and extend along the long axis. The white glass of the bead is porcelain-like in texture. 4 specimens.

No. 21: Large, white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with three blue stripes which are evenly spaced and are parallel to the long axis. The white glass of the bead is porcelain-like in texture. 7 specimens.

No. 22: Large, white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with two red and two blue alternating stripes. The white glass of the bead is porcelain-like in texture. 1 specimen.

No. 23: Large, bluish-white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with three longitudinal sets of three blue stripes spaced evenly around the bead. The bluish-white glass of the bead is porcelain-like in texture. 21 specimens.

No. 24: Large, white, opaque, olive-shaped necklace bead of complex construction. Extending longitudinally across the surface of the bead are three sets of stripes, each of which is composed of two red stripes and, between these, a blue stripe. The white glass of the bead is porcelain-like in texture. 4 specimens.

No. 25: Large, white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with three sets, each of which is composed of two brown stripes and, between these, a blue stripe. The white glass of the bead is porcelain-like in texture. 1 specimen.

No. 26: Large, white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with three sets of three blue stripes which are twisted in an *S*-shape fashion around the bead. The white glass of the bead is porcelain-like in texture. 8 specimens.

No. 27: Large, white, opaque, olive-shaped necklace bead of complex construction. The surface of the bead is covered with six, more or less evenly spaced, blue stripes which are twisted in an *S*-shape fashion around the bead. The white glass of the bead is porcelain-like in texture. 2 specimens.

No. 28: Large, white, opaque, olive-shaped necklace bead of complex construction. The bead surface is covered with six, rather evenly distributed, red stripes which are twisted in an *S*-shape fashion around the bead. The white glass of the bead is porcelain-like in texture. 2 specimens.

No. 29: Large, Emerald Green, translucent, barrel-shaped necklace bead of complex construction. The bead surface is covered with eight white stripes, rather evenly spaced and parallel to the long axis. 3 specimens.

No. 30: Large, Brittany Blue, opaque, elongated olive-shaped necklace bead of complex construction. The surface of the bead is covered with three evenly spaced sets of stripes, each of which is composed of two white stripes and, between these, a red stripe. 3 specimens.

No. 31: Large, dark Bluebird Blue, translucent, olive-shaped necklace bead of complex construction. The surface of the bead is covered with five white stripes, twisted around the bead in an *S*-like fashion. 1 specimen.

No. 32: Large, dark Bluebird Blue, translucent, olive-shaped necklace bead of complex construction. Parallel to the long axis of the bead are more or less evenly spaced crescent-like white stripes. 1 specimen.

No. 33: Large, dark Bluebird Blue, translucent, olive-shaped necklace bead of complex construction. The surface of the bead is covered with three sets of stripes, each of which is composed of two white stripes, and, between these, a red stripe. 2 specimens.

No. 34: Large, dark Bluebird Blue, translucent, barrel-shaped necklace bead of complex construction. The surface of the bead is covered with eight, evenly spaced white stripes. 1 specimen.

No. 35: Large, clear glass, donut-shaped necklace bead of complex construction. Eight twisted white stripes appear embedded in the body of the glass. In making this bead, a layer of clear glass was used for the core, then the white stripes pressed into the surface of glass, and another layer of clear glass was added to finish the bead. The white stripes are twisted in an *S*-shaped fashion. 1 specimen.

No. 36: Large, black, opaque, barrel-shaped necklace bead of complex construction. The surface of the bead is covered with twelve white stripes running lengthwise with the bead. The surface of this bead type, and that of No. 35, sometimes appears frosted, probably due to age. 5 specimens.

No. 37: Large, black, opaque, barrel-shaped necklace bead of complex construction. The surface is covered with eight white longitudinal stripes, spaced more or less evenly. The black glass of the bead is porcelain-like in texture. 1 specimen.

No. 38: Large, black, opaque, donut-shaped necklace bead of complex construction. The surface of the bead is covered with eight white stripes twisted around the bead in an *S*-shape pattern. The black glass of the bead is porcelain-like in texture. 1 specimen.

No. 39: Large, black, opaque, round necklace bead of complex construction. The surface of the bead is covered with six ivory-colored, crescent-shaped stripes which run perpendicular to the core. The black glass of the bead is porcelain-like in texture. 3 specimens.

No. 40: Large, Bluebird Blue, translucent, eight-faceted necklace bead of simple construction. The surface of the glass sometimes appears to be frosted, probably due to age. 2 specimens.

No. 41: Large, clear glass, eight-faceted necklace bead of simple construction. The surface of this bead sometimes appears frosted, probably due to age. Both this bead and bead No. 40 are wire-wound and the facets were pressed. 2 specimens.

No. 42: Large, clear glass, barrel-shaped necklace bead of simple construction. This bead is wire-wound with a surface which is pressed into a pattern which resembles that of hobnail glass. This type is often called the "mulberry bead." 1 specimen.

No. 43: Large, clear glass, barrel-shaped necklace bead of simple construction. The bead is wire-wound and the surface pressed into six spiral-shaped elements which give a corrugated effect. 1 specimen.

No. 44: Small, white, opaque, donut-shaped garter bead (sometimes called "seed bead") of simple construction. The glass has a porcelain-like texture. This is the smallest type of bead found at the Womack Site, and is similar in size to those commonly found at later historic sites. 75 specimens.

No. 45: Small, white, opaque, donut-shaped garter bead of compound construction. The two layers of glass in this bead, are the same as those in bead Type 4. 685 specimens.

No. 46: Small, Peacock Blue, opaque, donut-shaped garter bead of simple construction. The glass of this bead has the sugar cane-like texture of bead Types 9, 10, and 11. 201 specimens.

No. 47: Small, Gobelin Blue, opaque, donut-shaped garter bead of simple construction. The glass has a porcelain-like texture. 175 specimens.

No. 48: Small, dark Bluebird Blue, translucent, donut-shaped garter bead of simple construction. The glass in this bead is the same as Nos. 13 and 14. 37 specimens.

No. 49: Small, clear glass, donut-shaped garter bead of simple construction. The glass of this bead is the same as that of Nos. 16, 35, 36, 41, 42 and 43. 5 specimens.

No. 50: Small, black, opaque, donut-shaped garter bead of simple construction. The glass of this bead is porcelain-like in texture. 5 specimens.

No. 51: Small, red, opaque (outer layer), donut-shaped garter bead of compound construction. The outer layers of opaque glass is brick red, and the inner layer is a translucent light green. This bead is generally referred to as "Cornaline d'Aleppo" (Duffield and Jelks, 1961: 48). 8 specimens.

No. 52: Large, amber, translucent, barrel-shaped necklace bead of simple construction. The bead is wire-wound. 2 specimens.

No. 53: Extra large (19 mm. in diameter), milk-glass, translucent, round necklace bead of simple construction. The bead is wire-wound. 3 specimens.

No. 54: Large, milk-glass, translucent, olive-shaped necklace bead of simple construction. The bead is wire-wound. 2 specimens.

No. 55: Large, red, opaque (outer layer), tube-shaped necklace bead of compound construction. The outer layer of opaque glass is birck red and the inner layer is a translucent light green. This bead is generally referred to as "Cornaline d'Aleppo," but in this case, the bead stock was broken into tube-shaped beads, instead of the small, donut-shaped beads described under No. 51. 2 specimens.

No. 56: Small, but long (bugle type, 9 mm. long and 4 mm. in diameter), Brittany Blue, opaque, tube-shaped, probably a necklace bead, of simple construction. The glass of this bead is porcelain-like in texture. 1 specimen.

Beads Nos. 55 and 56 usually occur on sites dated in the middle 18th century (Jelks, ms.). Inasmuch as only three specimens of the tube beads have come from the Womack Site, they could have been introduced into the site towards the latter part of the occupation.

DOCUMENTS AND COMPARATIVE DATA PERTINENT TO BEAD STUDY

The beads from the Womack Site, when viewed as a whole, contrast significantly in shape, size, and variety of stripes with bead types found at the later Norteño Focus sites (Spanish Fort, Pearson, Gilbert, Vinson, Stansbury, and Stone). To be sure, some of the beads recovered from Womack also occur at these later components, but they are much less frequent then at Womack. These comparative data suggest that, shortly after the 1730's, an important change was taking place in the bead industry. Indeed, according to Rogers and Beard (1937: 40) the island of Murano, located in the lagoon of Venice and long famous for the production of glass, in the 1730's began to decline. The fall of Murano, of course, was intimately linked to the fall of the commercial Republic of Venice. Thus by about 1735 what had once been a flourishing enterprise supporting 300 glass houses was quickly reduced to less than 20 glass houses. Because of the secrecy that surrounded the manufacture of beads, it is difficult to unravel the historical details. However, it is quite possible that other glass houses in Europe took over the market served by the Murano bead makers. With this shift in locus of manufacture, there must have been some changes in the types of beads traded to the Indians.

Three documents cited below give some insights into the sizes, colors, and uses of some of the glass beads traded to the Indians by the French in the lower Mississippi Valley between 1700 and 1740. In one of these, an invoice dated March 5, 1702, and addressed to Father Jean de Lamberville (Thwaites, 1959: 29), a Catholic priest ordered certain trade goods for the missions up river, about Fort St. Louis of Louisiana (present day St. Louis, Missouri). Among the items requested are:

Ten livres [probably a pound of 12 ounces] of large glass Beads . . . black, white and striped.
Ten livres of small glass Beads . . . white, green and transparent.

The second document is a letter written from Fort St. Louis of Louisiana, dated February 23, 1708, and signed by Father Jacques Gravier. In this letter he ordered, among other items, ". . . 10 livres of white Beads, olive-shaped and large-sized, 4 livres of small beads . . . blue, green, and white . . ." (Thwaites, 1959: 142).

In the third document, Le Page du Pratz's *The History of Louisiana*, published in 1758, is to be found one of the few early descriptions of trade beads among the Indians:

> When they have beads (*rassade*) they make necklaces composed of one or more rows. They make them long enough for the head to pass through. The *rassade* is a bead of the size of the end of a finger of a small infant. Its length is greater than its diameter. Its substance is similar to porcelain. There is a smaller one, ordinarily round and white. They value it more than the other. There is a blue one and one of another style which is banded (*bardelée*) with blue and white. The medium sized and the smallest are strung to ornament skins, garters, etc. (quoted in Swanton, 1911: 56).

The word *rassade* in Old French means "little bits of colored glass," and it was commonly used with reference to the beads traded to Africans (glass beads were traded to Africans long before they were traded to North American Indians). *Bardelée*, on the other hand, comes from the Old French word, *barde*, which during the Middle Ages, referred to a covering of horse armor, sometimes placed in strips or stripes over the horse. *Bardelée* means "the act of covering with strips or stripes."

It is possible that Father Gravier's large, olive-shaped beads are represented by Types 1, 2, 6, 7, 12–14, 16, 17, 20–28, and 30–33 at Womack; while Le Page du Pratz's *rassade* bead with a porcelain-like surface seems to describe Nos. 1–6, 15, 18–28, 37–39, 44, 45, 47, and 56. The *bardelée* bead is mentioned as being banded with blue and white, although Du Pratz does not state whether it was white with blue stripes, or blue with white stripes, At Womack, Types 20, 21, 23, 26, and 27 are white with blue stripes, and Types 31, 32, and 34 are blue with white stripes.

Of the 56 bead types described for Womack, 47 have been found in burials at the Angola Farm, a historic Tunica village in Louisiana, near the mouth of the Red River (Ford, 1936). Thirty-one of the types occur at the Fish Hatchery Site (personal observation; Gregory, 1962), a former Natichitoches Indian village near Natchitoches, Louisiana, and 29 have been found at Fort St. Louis de Kadohadacho (the Roseborough Lake Site near present day Texarkana and the probable location of the Nassonite Post established in 1719 by La Harpe; Harris, *et al.*, ms.). As will be brought out in later sections, Womack and these three sites all appear to date from the same time period and, more importantly, appear to have been visited by the La Harpe party during the course of its journey up Red River.

Gun Parts

BACKGROUND

To many gun authorities and collectors, the Indian trade gun, easily identified as a distinctive type after 1800, is characterized by a combination of features: the brass serpent or dragon side plate, the deep "ox bow" trigger guard, the ribbed rampipe, and flat butt plate. In reality, such guns and their definitive characteristics represent the *culmination* of certain developments in the *English* trade gun that took place in the 1700's. During various periods in time, the common name was the Hudson's Bay Company fuke or fusil, the Mackinaw gun, and, the most famous of all, the Northwest gun (Hanson, 1955). Supplied by the English, the Northwest flintlock became so well known to the Indians by the 19th century that often they would not accept a weapon in trade that did not fit this type. While some imitations were made in Belgium and in the United States after 1800, the Northwest gun was manufactured mainly in England from its inception in the late 1600's until after 1860. It is probably the single best known item of English trade. Although the Northwest gun is well identified as a type after 1800, it is quite another matter in the period prior to that time. Some of the elements that eventually became characteristic of this type appear to be present earlier, but it is clear that the stylistic evolution was not complete.

Then French were also producing trade guns. According to Russell (1957: 22–24), something like 200,000 French trade guns were manufactured in 100 years (*ca.* 1650–1750). These, however, have virtually disappeared and to our knowledge not one has been identified in a museum or a private collection. This is of considerable importance to the present study, as the Womack Site lies in an area which during the 18th century was served primarily by French trade. At this, and many other historic Texas Indian sites, there are many gun parts which do not appear to be of English origin, even in view of the indefinite characteristics of the 18th century trade gun. Since the Spanish policy of trade did not encourage traffic in weapons during this period, it is improbable that the guns at the site were obtained from this source.

If some of the parts labeled herein as coming from French flintlocks are not of domestic French origin, it is very likely that they were at least produced by manufacturers on the European Continent who supplied common arms for the French market and who were certainly influenced by French master gunsmith designs. Thus, in this report, when we say French trade gun, we simply mean a specimen probably

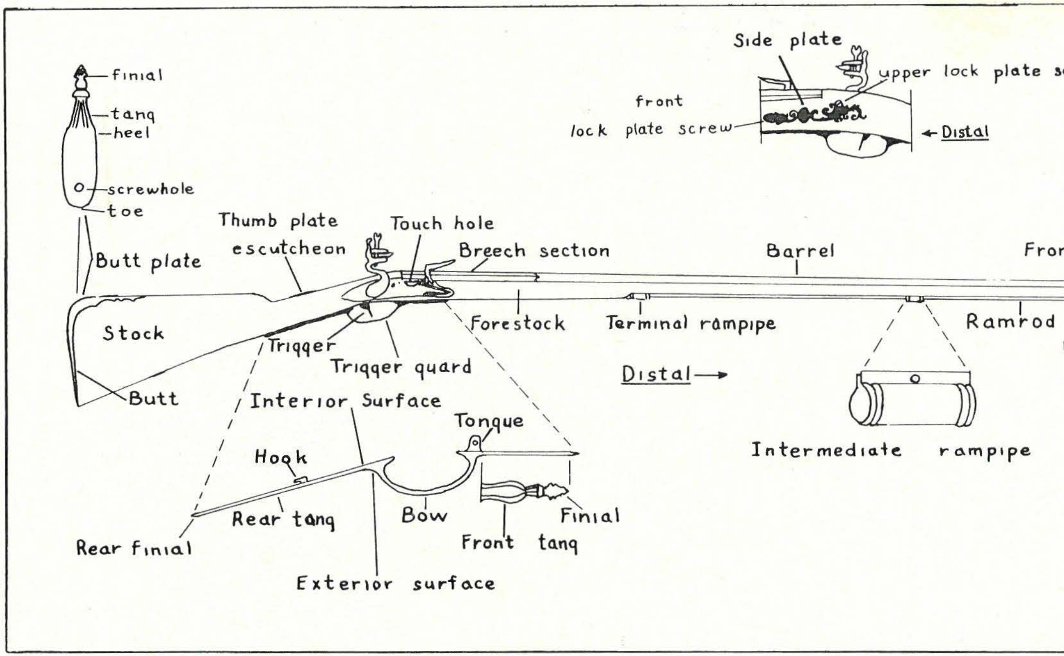


Fig. 9. Illustrations showing component parts of fusil class weapon.

designed for use in the French trade but not necessarily of French manufacture.

When a recognizable, repetitive pattern occurs among the apparent trade gun parts from Norteño Focus sites, it seems invariably to involve hardware suitable to the *fusil* (light weight) type flintlock. Other, non-fusil type parts, are infrequent and fail to exhibit a clear or consistent pattern. Since all the guns from the site have been disassembled and component parts (see Figs. 9 and 10 for a definition of these parts) are often broken, there is no way of being sure that any two parts were associated with the same gun. This is an unfortunate but common occurrence. As we have already mentioned, there is no known example of the 18th century French trade gun. Almost nothing is known of the components of such a weapon beyond Hamilton's (1960a: 208) tentative linking of certain breech dimensions and bores with the late 17th and early 18th century French trade gun. Other probable French gun components have been recognized in the collection from the Gilbert Site (Jelks, ms.), but this material is not yet published. However, library and field research carried out over the past two years by the authors have strengthened the tentative assignments made in the Gilbert Site report. These assignments are made after a careful study of the literature available concerning the characteristics of properly identified flintlock guns of the periods assumed represented in the sites under study. Particular attention was focused on those fusil specimens held to be typical products of a particular country and period.

Among the major manufacturers, the English guns are among the best detailed in the literature, and the French ones among the least detailed. We know from history that trade items from these two countries are the ones that archeologists are most likely to encounter in 18th century Indian sites in Texas and adjacent areas. The Spanish colonial policy was not to trade weapons to Indians, and when they finally did grudgingly issue guns—usually, on a token basis—they appear, at least during the late 1700's, often to have been supplied through French sources.

The writers have no argument with the experienced gun authorities who state that guns of these early times cannot be definitely identified by any of their component parts. Indeed, it is difficult in most cases to identify positively the age and source of a complete specimen. We do, nonetheless, firmly believe that useful information can ultimately be obtained by the recognition of repeatedly occurring patterns and by adequate description of gun parts recovered from archeological sites.

In the section which follows reference will be made to certain

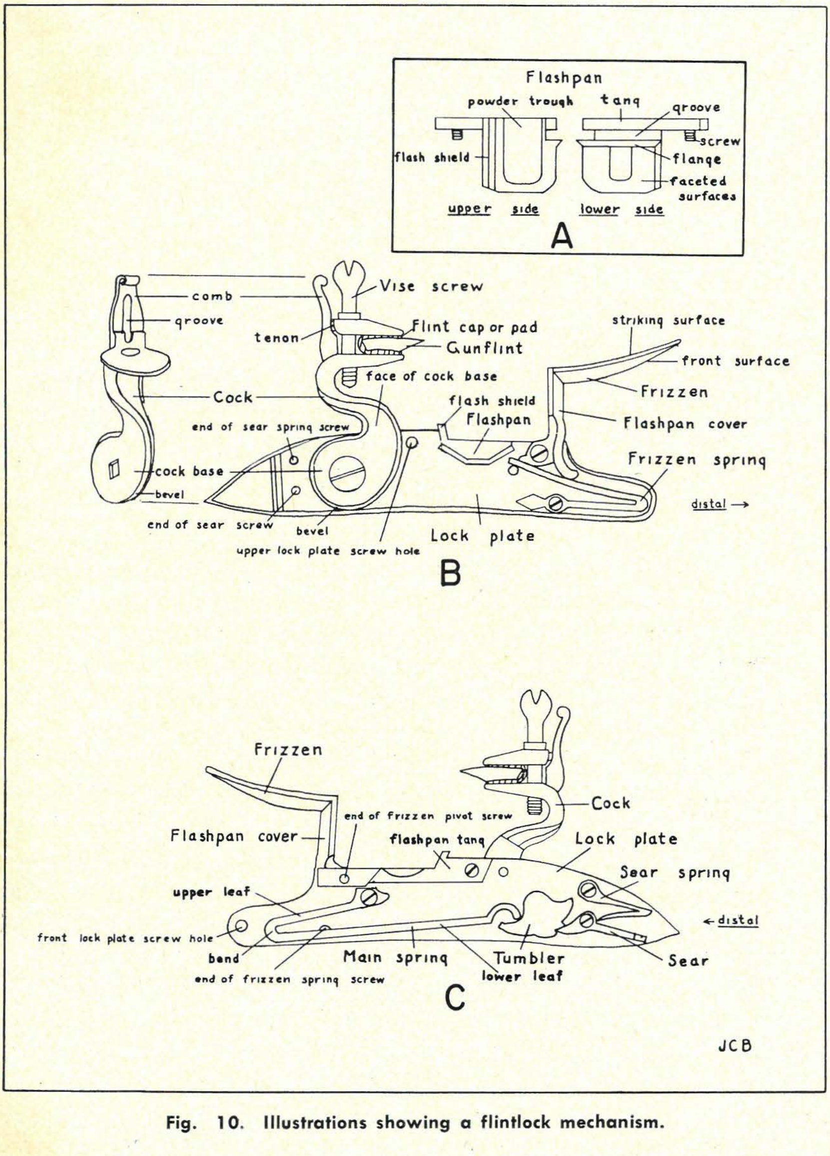


Fig. 10. Illustrations showing a flintlock mechanism.

decorations and design features which, to the authors, appear to have been based on French pattern books (Hayward, 1963). These books were used throughout Europe by fashionable gun decorators and gunsmiths. There are indications that even the common grade of gun may reflect some of these patterns, *albeit* in simplified form and technique. As aids to dating, they can at least indicate a possible starting date for a particular design. Fortunately, for our study, the 18th century English gunsmiths, unlike those on the Continent, were generally not so prone to adopt all the French designs. In dealing with common grade guns, this tendency among the English seems to offer a useful point of comparison. However, it will take a good deal more study to determine the full value of this approach.

FLINTLOCK COCK

The one flintlock cock (Fig. 11, A, A′) collected from the site thus far is in The University of Texas collections. It is complete with top vise jaw and vise screw. The vise screw has a slotted head and the wide comb has been vertically grooved (mortised) for receipt of a tenon on back of the top vise jaw. With an over-all sharp curvature, the cock is of the gooseneck form and is not reinforced. The cock base is flat in cross section, and has beveled edges and a square hole for the tumbler shaft. No major cleaning has been attempted and the measurements (see Fig. 11, B for locus of measurements) are: A, 1.45 in.; B, 2.87 in.

Remarks: Hamilton (1960b: 166) has illustrated cocks with combs and central grooves, stating that they were most popular *ca.* 1750, and that they could be from England, France, or the Low Countries. A cock combining these features with a flat, beveled base is illustrated in a French encyclopedia for the years 1751–65 (Held and Jenkins, 1957: 115). The same combination of attributes can also be seen in two French guns of the 1720's, a fowling piece and a pistol, which are illustrated by Hayward (1963: Pls. 8c, 9b). Hayward notes (*ibid.*: 49, 200) that, as a French characteristic, the flat cock (usually combined with flat, rather than plano-convex, lock plate) continues from its introduction in the late 17th century until the mid-18th century, when the plano-convex cock and lock plate were again produced during the same period as the flat cock and lock plate. In England, the plano-convex cock base persisted through this period and was not superseded as a standard in fine guns until the 1770's (*ibid.*: 200).

In short, we seem to have a period, 1700–1750, in the production of first quality guns when the presence of a flat cock and lock would seem to eliminate an English source. S. James Gooding (1960: 85) makes a case for the persistence of the round or plano-convex form in the English trade gun from the end of the 17th century through the next 200 years. This is also substantiated in the English fusil and sporting class guns by Joel Shiner's findings at Fort Frederica on Simons Island, Georgia (Shiner, ms.). At this site there were four flat musket cocks identified with the early 1700 period. All thirteen of the round base cocks from Fort Frederica are of the smaller fusil and pistol class. According to Manucy's (1959: 49, 51) description, the blacksmith shop in which they were found should date between 1736 and 1743—certainly not later than 1760. While there is always the possibility that a French weapon or two might be represented in this group of parts from Fort Frederica, there can be little question, in view of the nature and history of the site, that most are of English origin.

If the data from the above sources have been correctly interpreted, then, regardless of the quality or class of the weapon, the *English* flintlock cock made between the late 17th century and *ca.* 1750 appears best characterized by the rounded face on the base of the cock. This period can be extended to about 1770 for fine arms, and, to the end of the flintlock era (*ca.* 1875) for the trade gun class.

As a possible indication of how useful this cock feature may be, at the Gilbert Site, dated *ca.* 1750, the bases of all 13 cocks recovered had flat cross sections. Present evidence indicates that the bulk of the European trade at this site was with the French.

Conclusions: The flintlock cock from Womack is probably from a French trade gun which dates between 1700 and approximately 1750. It is of a size suitable for use on a fusil class weapon.

FRIZZEN

The term *frizzen*, as used in this report, refers to the combination of *steel* and *flashpan cover* in one part.

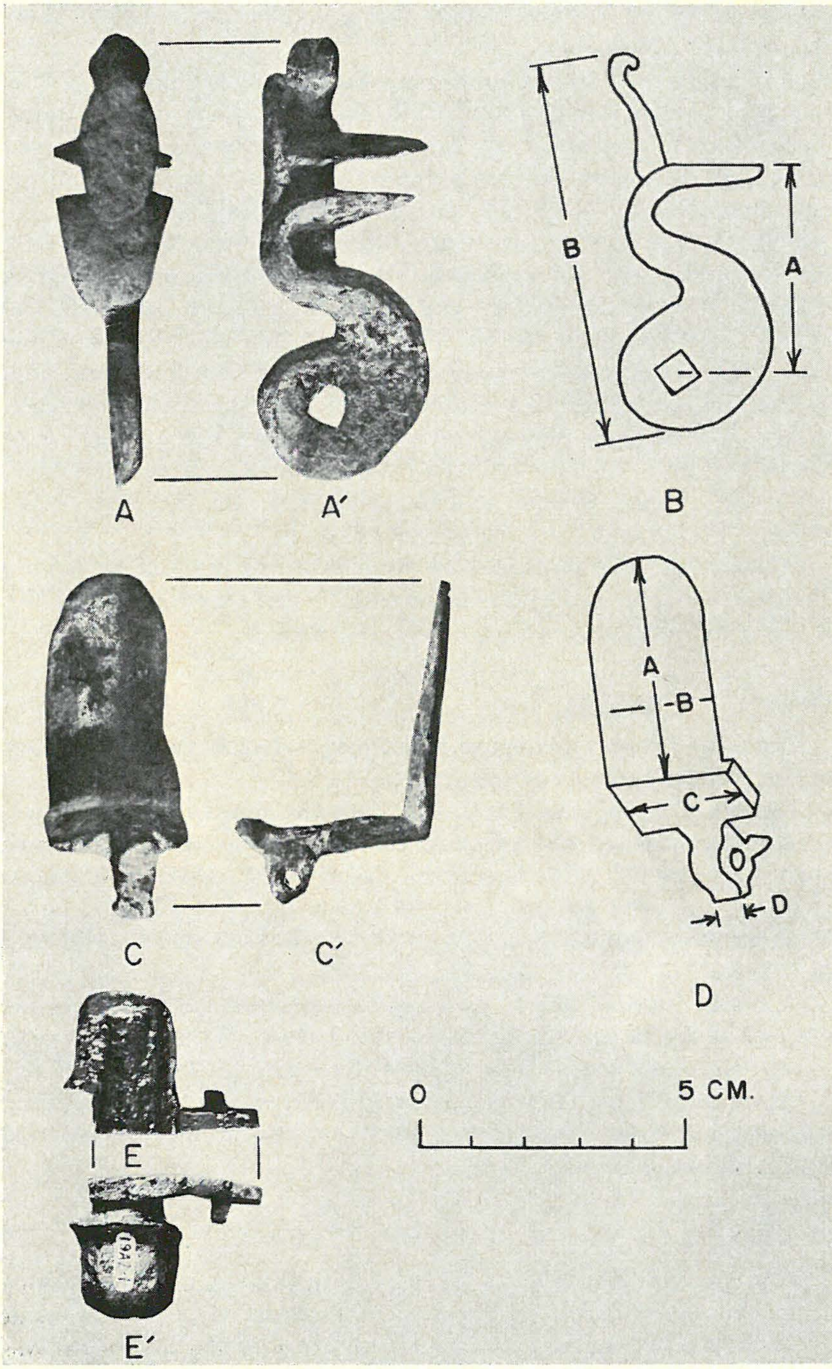
The one frizzen (Fig. 11, C, C′) from the site is of iron or steel. It has a rounded top and a slightly curved striking surface. The front surface is beveled, with two major facets being present. No major cleaning has been done and the measurements (see Fig. 11, D for locus of measurements) are: A, 1.78 in.; B, 0.98 in.; C, 1.03 in.; D, 0.31 in.

Remarks: This frizzen is too large to have been used in the same gunlock as the flashpan from the site (see below). It is also larger than the average-sized specimen from the Gilbert Site (Jelks, ms.).

Conclusions: Of a rather generalized type, such a specimen could date anytime from about 1690 to the close of the flintlock trade period in North America, *ca.* 1875.

FLASHPAN

This iron flashpan (Fig. 11, E–E′) was made separate (removable) from the lock plate. The flashpan is shallow with the underside formed in three facets. Contact with the face of the lock plate was



A
A′
B
B
A
B
C
C′
A
-B-
C
D
D
E
E′
0
5 CM.

made by a flange which projects from this bottom side. The rear of the pan was fastened to the inside of the lock plate by a screw (still in place) which was passed through a tang, or tail, and into the inside of the lock plate. A front section of the pan has an oblique surface to key into the lock plate. The powder trough is essentially parallel-sided, and there is a low flash shield at the rear of the pan. There is no waterproof feature, nor a bridle (supporting strap) for the frizzen. After major cleaning, this specimen measures, 0.97 in. wide (measurement taken same place as frizzen dimension "C") and 1.22 in. long (front of oblique "key" surface to end of tail).

Remarks: Flashpans that are shallow and faceted on the underside—very similar to this one—may occur shortly after 1705. They were extensively used by the French between about 1720 and 1750 (Hayward, 1963: 297, 347; Pls. 8c, 93, 95b). The military used them from 1717 until 1766, when they returned to rounded (rather than faceted) forms (Boudriot, 1963: *Modéle* 1717, *Modéle* 1766). The military version had added the supporting strap (a metal projection from the outer edge of the flashpan to the head of the frizzen pivot screw) for the frizzen screw to flashpan in 1728 (*ibid.: Modéle* 1728). However, a book of gun decoration designs, first published shortly after 1705 and republished in 1730 (Hayward, 1963), has the strap still missing on the pan of the civilian style lock. This absence continues in French civilian guns until 1750 (*ibid.:* Pls. 11a, 12; Held and Jenkins, 1957: 115).

Conclusions: This flashpan is smaller and lighter than seems suitable for a military weapon. It is probably from a French trade gun which was made between 1720 and 1750.

MAINSPRING

The one mainspring from the site is of steel or iron and consists only of the upper leaf section, having been broken in the bend. It is beveled on the outside edge (side away from the lock plate). There is a screw hole in the tang and on the inside of the spring there is a small boss which fits into a hole in the lock plate. No major cleaning has been attempted and this specimen has maximum width of 0.52 in.; and a maximum thickness of 0.19 in.

Fig. 11. Cock, Frizzen, and Flashpan. A, A′, Cock. B, Drawing of cock showing where measurements were taken. C, C′, Frizzen. D, Drawing of frizzen showing where measurements were taken. E, E′, Flashpan.

TRIGGER

Included in the collection is an iron trigger (Fig. 12, A) of long, graceful form. The lower end terminates in a full circle or loop. This specimen is quite similar to two of the triggers from Fort Michilimackinac (Maxwell and Binford, 1961: Pl. IV). No major cleaning has been attempted and this trigger is 1.84 in. long.

TRIGGER GUARDS

Briefly described below are 17 trigger guards, 15 of which have been collected by the authors, one of which is from The University of Texas Womack Site collection, and one of which is from the Fort St. Louis Site in Texarkana. The last-mentioned specimen (Fig. 12, L′) is included because it fits onto the broken end of one of the trigger guard tangs (Fig. 12, L) from the Womack Site.

Trigger Guard No. 1. This undecorated, cast brass trigger guard (Fig. 12, B, B′) has been broken across the front tang (forestock plate) and across a countersunk screw hole in the rear (proximal) tang. The front tang has a tongue on the upper surface with a pin hole in the tongue. This tongue was inserted into a slot in the bottom of the gun stock and held into place by a pin passed through the stock. Both tangs are plano-convex in cross section, while the bow is biconvex in cross section.

Maximum width of bow, 0.89 in.; thickness of bow at point of maximum width, 0.13 in.

Trigger Guard No. 2. Consisting of only the bow section, this brass, cast trigger guard (Fig. 12, C) had been broken across both ends. The lateral edges of the outside surface are bordered by two parallel grooves, while the center part is engraved with a simple design which is reminiscent of the Chevrolet trade mark. At each end of this design there are two small circles. The bow is biconvex in the cross section.

Maximum width of bow, 0.82 in.; thickness of bow at point of maximum width, 0.17 in.

Trigger Guard No. 3. The bow piece (Fig. 12, D) is almost identical to No. 2, differing from that trigger guard only in that it is broken near the midsection and lacks the small circles at the ends of the engraved design.

Maximum width of bow, 0.81 in.; thickness of bow at point of maximum width, 0.17 in.

Trigger Guard No. 4. Broken across the front tang at the base of the finial and across the bow, this piece was also cast in brass. Its front tang is trapezoidal in cross section, with wide lateral bevels being present on the exterior face. A tongue with a pin hole projects from interior surface of this tang. The margins of exterior surface of the bow are engraved with a single line design which is lost beyond the break in the bow.

Maximum width of front tang, 0.67 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 5. This specimen (Fig. 12, E, E′) is similar to No. 4, except that no decoration is present. A small, identical flaw appears in the metal of both suggesting the possibility that Nos. 4 and 5 were cast in the same mold.

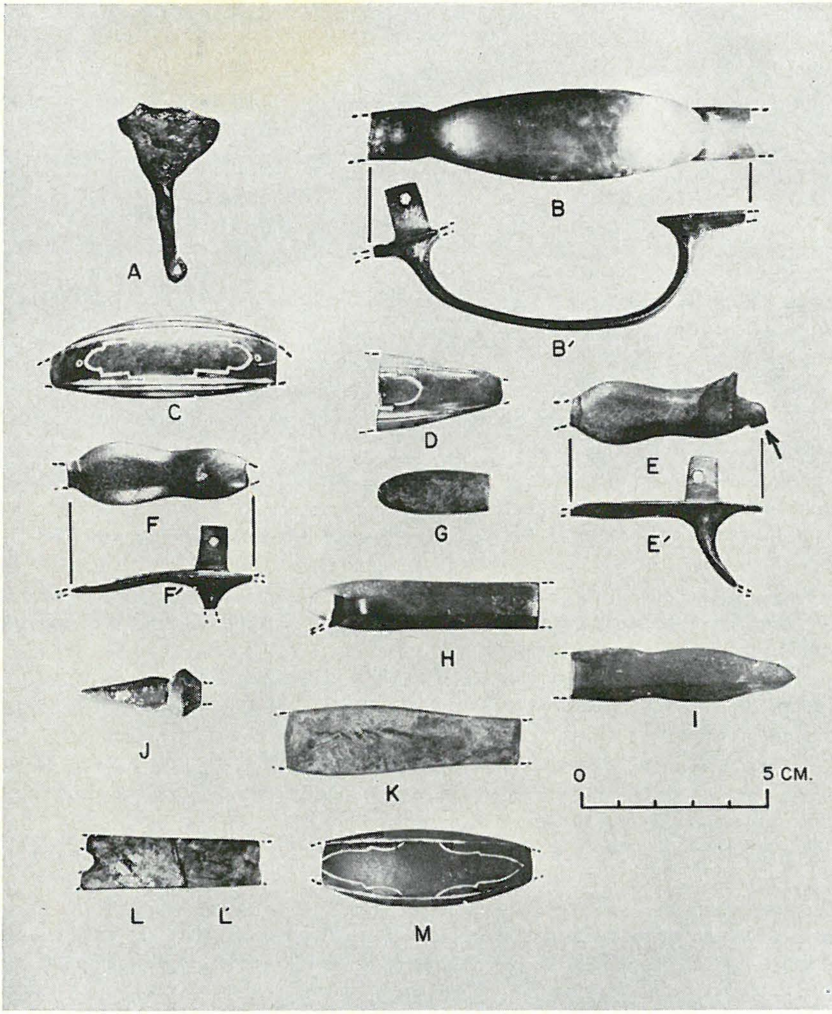


Fig. 12. Trigger and Trigger Guards. A, Trigger. B, B′, Trigger guard No. 1, C, Trigger guard No. 2. C, Trigger guard No. 3. E, E′, Trigger guard No. 5. F, F′, Trigger guard No. 6. G, Trigger guard No. 7. H, Trigger guard No. 8. I, Trigger guard No. 11. J, Trigger guard No. 12. K, Trigger guard No. 13. L, L′, Trigger guards Nos. 15 and 16. M, Trigger guard No. 17. Arrow points to mold flaw on *E*. The proximal or rear ends of the trigger guards are to the right, except for *C*, *D*, and *L*, *L′* which are too fragmentary to orient.

Maximum width of front tang, 0.66 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 6. This trigger guard (Fig. 12, F, F′) is much like No. 4, except that it has been broken at the foot of the bow section and no details of the bow can be determined.

Maximum width of front tang, 0.64 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 7. Cast in brass, this specimen (Fig. 12, G) consists of a front tang section. It is trapezoidal in cross section and has wide, lateral bevels on one face. The finial is missing and the broken tang has been bifacially sharpened on the distal end and along the two sides. The proximal end is broken. No measurements were taken.

Trigger Guard No. 8. Broken across the rear tang and rear section of the bow, this cast brass tang fragment (Fig. 12, H) has a trapezoidal cross section and wide lateral bevels.

Maximum width of section present, 0.61 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 9. Cast in brass, this specimen consists of a rear tang section broken across both ends. It is trapezoidal in cross section and has wide bevels.

Maximum width across shoulders, 0.58 in.; maximum thickness at same point, 0.09 in.

Trigger Guard No. 10. This cast brass trigger guard is the same as No. 9, except that it has the tongue with a pin hole.

Maximum width across shoulders, 0.58 in.; maximum thickness at same point, 0.09 in.

Trigger Guard No. 11. This incomplete, cast brass specimen (Fig. 12, I) consists of a rear finial section broken across the rear tang. It is trapezoidal in cross section and has wide lateral bevels on one face.

Maximum width across shoulders, 0.58 in.; maximum thickness at same point, 0.09 in.; maximum width across finial, 0.59 in.; maximum thickness at same point, 0.09 in.

Trigger Guard No. 12. Cast in brass, this specimen (Fig. 12, J) is a front finial section which has been broken across the neck of the front tang. It is trapezoidal in cross section and has wide bevels.

Maximum width across finial, 0.51 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 13. This tang section (Fig. 12, K) has been cast in brass. It is broken across both ends and has a plano-convex cross section.

Maximum width of tang, 0.76 in.; maximum thickness at same point, 0.11 in.

Trigger Guard No. 14. Consisting of a cast brass tang section with a plano-convex cross section, this piece has battered lateral edges. One break crossed the edge of a screw hole that is countersunk into the exterior surface. No measurements were taken.

Trigger Guard No. 15. Also a cast brass tang section, this fragmentary specimen (Fig. 16, L) has a plano-convex cross section. The exterior surface of one end has the remnants of a countersunk screw hole. No measurements were taken.

Trigger Guard No. 16. Although not from the Womack Site, this specimen (Fig. 16, L′) fits one broken end of No. 15. It is from the Fort St. Louis Site at Texarkana, 100 miles down river from Womack. Undoubtedly, they are part of the same trigger guard. No measurements were taken.

Trigger Guard No. 17. From The University of Texas collection, this cast brass bow section (Fig. 16, M) is broken across both ends. Parallel to each lateral edge is a groove and, in the center, there is a simple engraved design much the same as that on No. 2. It is, however, a slightly more stylized version of that motif. This bow has a maximum width of 0.81 in.

Remarks: Trigger Guard No. 1 resembles some of the French military specimens made between 1717 and 1746 (Boudriot, 1963: *Modéle* 1717–1746), and Nos. 13, 14, 15, and 16 may be tang fragments from similar guards. Specimens No. 2, 3, and 17 are engraved with designs like those found at the Angola Farm Site which dates between 1709 and 1729. This Chevrolet trademark-like element can be traced to French pattern books of 1705 and 1730. It also occurs as a more complex, but still recognizable element, on Type I trigger guards from the Gilbert Site (estimated to date at about 1750). However, the Womack trigger bows (Nos. 2, 3, and 17), and those from the Angola Farm, are somewhat thicker and wider than specimens from the Gilbert Site.

A comparison of the front and rear tangs found at Womack, Gilbert, and Angola does not reveal any major differences. Trigger Guard No. 12, the only front finial section from the Womack Site, is longer, but is of a simpler form, like those from the Gilbert Site. Finials from the Anglo Farm end in an acanthus leaf. Only two of this type were found at Gilbert, and, on these, the acanthus leaf has been depicted in a slightly different manner.

The use of the pinned tongue for fastening the front of the guard onto the stock of English fowling pieces dates from the early 18th century (George, 1947: 104). A tongue on the front tang and hook on the rear tang are shown on a French trigger guard illustrated for the period 1751–1765 (Held and Jenkins, 1957: 115).

Conclusions: Trigger guard bow sections 2, 3, and 17 probably represent French trade guns of about 1720. The same could be true of Nos. 4–12, although we believe that they were still in style in *ca.* 1750.

SIDE PLATES

The 15 side plates from the site are described individually below. The thickness measurements in each case were taken at the ends of the long axis. The use of the term *upper* for the upper lock or side screw hole which occurs in the upper edge of the side plate, at the point of maximum width, is to avoid the use of the term *middle*, and its possible implication of a three screw plate.

Side Plate No. 1. This cast brass, apparently complete side plate consists of two fragments that seem to fit together (they are shown together in Fig. 13, A). The break occurs across the rear section of the plate, along a transverse decorative groove. The broken end of the larger piece has been bifacially resharpened, making perfect matching of the two fragments impossible. The margins of the exterior, engraved

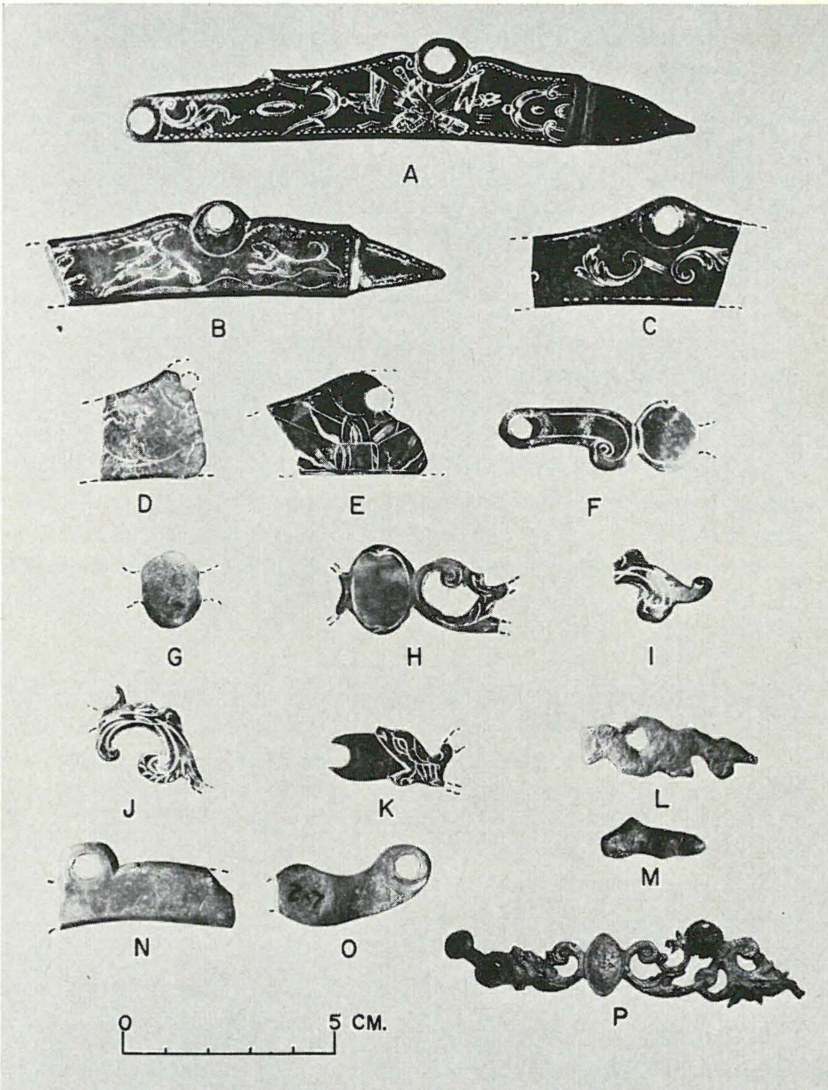


Fig. 13. Side Plates. A, No. 1. B, No. 2. C, No. 3. D, No. 4. E, No. 5. E, No. 6. G, No. 7. H, No. 8. I, No. 9. J, No. 10. K, No. 11. L, No. 12. M, No. 13. N, No. 14. O, No. 15. P, Side plate from pistol in Texas Memorial Museum collections. The proximal or rear ends of plates are to the right.

surface of both sections are beveled, while the lateral edges of the plates are undercut toward the interior surface—evidently to facilitate inlaying.

The larger of the two pieces is extensively engraved, with the central design consisting of a trophy of arms and a boar's head. An arch-like design appears on each side of this central element. The one on the front side vaguely resembles the Chevrolet trade mark (similar motifs were found on three of the trigger guard bows), while the one on the rear side combines this design with small scroll elements. An elliptical-shaped element with a circle at each end and a leaf scroll, vaguely of acanthus form, finish out the pattern. The upper and lower edges are bordered by a double row of small, essentially triangular-shaped, marks. The piece has oxidized to a black color.

The other section, evidently from the same plate, is a triangular-shaped rear (or proximal) piece. It also has a double row of triangular-like marks. Assuming that the two do belong to the same specimen, it is a two-screw side plate, with the distance between the front and upper screw holes being $2\frac{13}{16}$ inches. The larger section is 0.05 to 0.08 in. in thickness; the small section is 0.06 to 0.08 in. in thickness.

Side Plate No. 2. This incomplete side plate (Fig. 13, B) is of cast brass, flat in cross section, beveled on the sides of the exterior surface, and undercut at the lateral edges. It is transversely broken across the distal, or front, section. Included in the engraved design is a double row of triangular-like marks which, on the main body of the plate, are parallel to the top edge and extend down the border of a transverse groove which sets off the triangular-shaped proximal section. The proximal part of the plate also has a double row of triangles, but these parallel both the upper and lower edges. The central engraved design is a chase scene consisting of a stag and two collared dogs, one with a curled tail. On the lower margin of the rear piece there is a small hole which was probably for the trigger pin. The upper side plate screw hole is present, and, although the part which would be expected to contain the front screw hole is missing, there is no doubt that this was a two screw hole side plate. The thickness is 0.04 to 0.05 in.

Side Plate No. 3. This cast brass side plate fragment (Fig. 13, C) is flat in cross section, is slightly beveled along the sides of the exterior surface, has undercut lateral edges, and is transversely broken at both ends. The engraved design in the central portion consists of two opposing acanthus, or leaf-scroll, elements joined by several parallel lines. The break along the front end cuts through a small circle. Parallel to each lateral edge is a single engraved line and a row of triangles. The upper screw hole is present and the thickness is from 0.04 to 0.05 in.

Side Plate No. 4. Consisting of a small part of the central section, this cast brass side plate (Fig. 13, D) is flat, slightly beveled along the margins of the exterior surface, and undercut along the lateral edges. It is broken across both ends, with rear break passing through the upper screw hole. Rather badly battered, it appears to be engraved with an acanthus scroll design. The thickness is 0.05 to 0.06 in.

Side Plate No. 5. Made of cast brass this central section fragment (Fig. 13, E) is flat, beveled along the margins of the exterior surface, and undercut at the lateral edges. It is broken across both ends, with the break at the rear edge passing through the upper screw hole. The poorly executed engraved design consists of a drum flanked by banners, and, along the borders of the plate, an engraved line. The plate has oxidized to a black color and is 0.05 to 0.06 in. in thickness.

Side Plate No. 6. Of cast brass, this piece (Fig. 13, F) is apparently from the front section of a side plate. Its exterior surface is slightly convex and beveled on the sides; the lateral edges, however, are not undercut. An engraved line parallels each border, with one of these (the lower line) terminating in a scroll. The intact distal end contains a side screw hole, while the other end is broken across the edge of a cartouche-like element. The thickness is from 0.06 to 0.08 in.

Side Plate No. 7. This undecorated cartouche fragment (Fig. 13, G) is of cast brass, flat in cross section, beveled along the margins of the exterior surface, and undercut at the lateral edges. It is 0.08 in. in thickness.

Slide Plate No. 8. Broken at each end, this cast brass side plate fragment (Fig. 13, H) has undercut lateral edges, and is essentially flat in cross section, although the oval-shaped escutcheon has a slightly convex exterior surface. This plate is a simple version of the pierced or fretted type, and the outlined leaf-scroll elements are emphasized by engraved lines. It is 0.06 to 0.07 in. in thickness.

Side Plate No. 9. This specimen (Fig. 13, I) is the proximal section of a side plate decorated in the same manner as No. 8. It is of cast brass, is flat in cross section, and has been broken across the upper end. Only one edge appears to be undercut. The thickness is from 0.07 to 0.08 in.

Slide Plate No. 10. This specimen (Fig. 13, J) is almost identical to No. 9. It is a proximal section of a cast brass side plate which was flat in cross section but not undercut. Although broken across both ends, only a small portion of the proximal part of the decorative scroll is missing. Because of the extent of oxidation, it is difficult to be sure, but one edge of the upper screw hole may be present along portions of the distal break. The thickness is from 0.05 to 0.06 in.

Side Plate No. 11. This piece (Fig. 13, K) is of cast brass, is flat in cross section, and lacks undercut lateral edges. Evidently representing the front part of a pierced type side plate, it is outlined and engraved to depict the head of a serpent (or dragon). The distal screw hole is present in front of the serpent's mouth. The plate has been broken across an excised area in the serpent's neck. The thickness is from 0.07 to 0.08 in.

Side Plates Nos. 12 and 13. Both of these quite fragmentary and badly oxidized pieces (Fig. 13, L, M) are of iron. As a result, their identification is tentative and no significant measurements can be made. However, they were probably fretted.

Side Plate No. 14. This specimen (Fig. 13, N) is of cast brass and has a flat exterior surface which is beveled along the edges. The lateral edges, however, are not undercut. Broken across both ends, the distal break appears just beyond the upper screw hole, while the proximal break occurs just above a small, right-angled corner on the bottom of the plate. There are two round punch marks on the interior surface. They are 0.07 in. in diameter and 0.11 in. apart. The thickness is from 0.11 to 0.3 in.

Side Plate No. 15. Probably of sheet brass, this undecorated proximal fragment (Fig. 13, O) is transversely broken on the distal side. At the edge of the other end is what appears to be the proximal hole of a two-holed side plate. The thickness is uniform at 0.025 in.

Remarks: The flat, unfretted side plate of simple outline form, and decorated chiefly by means of engraving, began to be used on fashionable weapons by the French about 1715–1720 (Hayward, 1963: 297, Pl. 92). The English, by contrast, did not adopt this style until about 1750; they abandoned it between 1798 and 1800 (George, 1947: 111, 112).

Note the curvature of the bottom edges of side plates Nos. 1 and 2. According to Peterson (1956: 36, Pl. 38) *lock plates* with such a curve would generally date prior to 1770. Whether or not a lock plate used with this type of side plate would normally have a matching curve along its lower edge has not been determined. It does, at least, seem possible. A pistol illustrated by Hayward (1963: Pls. 9b, 10b) with a side plate comparable to No. 1 from Womack does have a matching curve along the lower edge of the lock plate. The apparent absence of this style side plate at the Angola Site makes it seem *unlikely* that they were common on guns traded prior to 1730. This general style of side plate is present at the Gilbert Site which is dated at *ca.* 1750 (Jelks, ms.).

The design on the side plate of a French pistol dated at about 1720 (Hayward, 1963: Pl. 10b) is so similar to that found on specimen No. 1 from the Womack Site, that both could have been copied from the same basic pattern. Designs based on military trophies and the chase were used by European gunmakers and are rather difficult to pin down as to source and age. On the other hand, the Chevrolet trademark-like element (*i.e.*, a design made of essentially parallel, but offset lines), represented in a stylized form on side plate No. 1, and trigger guards Nos. 2 and 3, and the opposing leaf scroll elements, found on side plate No. 3, are motifs that repeatedly occur at other Texas sites where French trade is indicated (Jelks, ms.).

Side plate No. 14 (Fig. 13, N), while quite fragmentary, gives the impression of having had a markedly curved lower edge. This possibly suggests an early 18th century date, while the thickness and lack of decoration suggest a military weapon. The outline form of side plate No. 15 (Fig. 13, O) resembles the 1767 model fusil made for French infantry lieutenants (Boudriot, 1963: *Modéle* 1767), although it does appear to be smaller and perhaps too thin for use on a military weapon.

Side plate No. 6 (Fig. 13, F) may be transitional between the fretted (pierced) and the non-fretted styles. It has the symmetrical cartouche and elaborated outline of the fretted style, but it is not pierced. Side plate No. 7 appears to be similar to No. 6. Side plates Nos. 8, 9, 10, and 11 (Fig. 13, H-K) are fragments of fretted or pierced side plates and are of a type that was in use at the Angola Farm which is dated at 1709 to 1729 (Ford, 1936; Swanton, 1911). According to Hayward (1963: 45), the pierced side plate on expensive (fine class) French guns was going out of fashion by about 1710.

Side plate fragments 8, 9, and 10 (or 8, 9, and 11) could be from the same specimen. If true, then only the head of the serpent would be rendered in reptilian form; the remainder, the "body," would consist of a pierced leaf scroll design. A possibly similar side plate from a pistol in the Texas Memorial Museum Collections (catalogue No. 1721–270) is illustrated in Figure 13, P. This weapon is badly rusted and no identification marks can be seen, but the style is French, and the authors believe that it probably dates from the period 1700–1725.

A generally similar pierced type side plate was found on a gun associated with Burial 7 at Angola Farm. The butt plate tang on this Angola specimen was shortened and the finial was of the acanthus leaf style—*both* of these appear by 1710 as general features of the leading French fashion (Hayward, 1963: 45). The trigger guard bow from this gun is engraved with a design (much like the Chevrolet trademark) similar to those found on some of the specimens from the Womack Site. Portions of this decorative element can also be found in the French Pattern books of De Lacollombe which date from 1705–1730 (*ibid.*: 297). The pierced side plate had evidently disappeared by the time the Gilbert Site was occupied, probably about 1750 (Jelks, ms.).

It would seem from the foregoing data that gunsmiths producing weapons used in the French *trade* followed the leading French fashions when these designs were suitable for reproduction in a relatively inexpensive manner. Since *fashion* change is represented, it seems possible that these weapons were being made for the ordinary French market and not solely for the Indian trade.

Conclusions: The pierced type side plate, Nos. 8 through 11, probably represents the French trade gun of *ca.* 1720. The solid type side plate of simple outline, Nos. 1 through 5, represents the French trade gun of *ca.* 1750, and quite possibly earlier.

GUN BARRELS

Including a specimen containing the breech section, nine iron barrels were recovered from the site. Five of the barrel pieces were originally round but are broken across both ends and flattened. The other four have retained more diagnostic features and are more fully described below.

Gun Barrels Nos. 6 and 7. Barrel section No. 6 (Fig. 14, A) is 12 inches long, bent, and broken on both ends. One end, however, is still round and approximately og .55 caliber after major cleaning. A flat, longitudinal facet, averaging 0.19 inches in width, extends the full length of this piece. In the absence of a sight or pin (barrel mounting) lug, there is no sure way of properly orienting this piece.

Barrel section No. 7 (Fig. 14, B) is 5.25 inches long, round in cross section, and broken at both ends. After major cleaning the caliber measures approximately .58. There is a flat, *slightly raised* sighting rib, averaging 0.16 inches wide and extending the entire length of the upper side. On the underside a short flat for a mounting lug has been filed in the barrel. One end of this flat is undercut and interrupted by a break. A pin lug was probably set into the bottom of the barrel at this point. It is possible, but we believe unlikely, that a sight was dove-tailed into the barrel at this

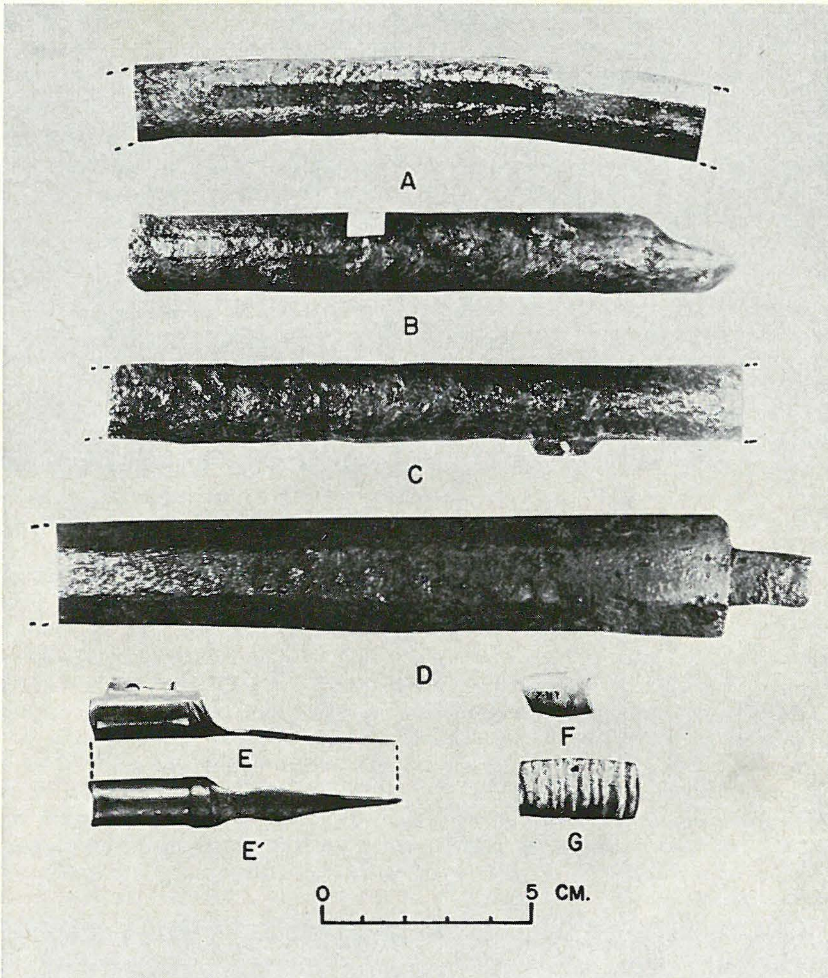


Fig. 14. Gun Barrels and Rampipes. A, Section of gun barrel No. 6. B, Gun barrel No. 7. C, Section of gun barrel No. 8. D, Gun barrel No. 9, with breech section. E, E′, Rampipe No. 1. F, Rampipe No. 2. G, Rampipe No. 3.

point. If we have correctly assumed the pin lug location, then the rib would be on the top of the barrel.

Remarks: Among the features of the first standard French musket, model of 1707, Peterson (1956: 172) lists a flat face, which extends to within five inches of the muzzle, on top of a round barrel. The caliber of this model, .69, is considerably larger than any of those from the Womack Site. The use of a slightly raised rib by the French dates from about 1685 to 1720 (Hayward, 1963: 44, 49, and 78). This characteristic does not generally appear on English guns (*ibid.*: 78).

Gun Barrel No. 8. This fragmentary barrel (Fig. 14, C) is 6.13 inches long, round in cross section, and has a pin lug brazed into the underside. A round pin passed through the forestock and this lug, keeping the barrel in place. No major cleaning has been done, but the caliber appears to be .55.

Gun Barrel No. 9. This octagonal barrel fragment (Fig. 14, D) includes the largely intact breech section. Exclusive of the breech plug it is 6.38 inches long and is .58 caliber after major cleaning. Across the flats this piece is a maximum of 1.125 inches in diameter. The breech plug is intact, although the tail of the tang is broken off. The back of the breech plug is notched for the upper lock plate screw. A touch hole is present on the side of the breech.

Remarks: The breech section of this piece measures 1.13 inches in diameter across the flats. According to Hamilton (1960a: 208; 1960b: 126) a breech diameter in excess of one inch should eliminate the 19th century Northwest gun and may be assumed to indicate an 18th century trade gun, an 18th or 19th century military musket, or Colonial smoothbore. Since the bore size of the Womack specimen does not match those common to the French, English, or Colonial *muskets* of the period, it appears probable that this is from an 18th century trade gun. We cannot determine the origin, but the caliber is larger than those believed by Hamilton (*ibid.*) to be typical of the late 17th and early 18th centuries. We believe bores of caliber .58 and .60 represent the French trade gun of a slightly later period, *ca.* 1750.

At the Gilbert Site (Jelks, ms.), where the guns represent principally items of French trade, all, but two, of the measurable bores were approximately caliber .58–.60. The exceptions were smaller, approximately .55. At least one earlier association of a breech measuring over one inch in diameter with balls of .58 caliber can be noted: At the Angola Farm such a barrel and 11 balls of approximately caliber .58 were found with Burial No. 4 (personal observation). It is a highly conjectural process to determine the probable bores in which any particular size ball was used, except, that it is usually safe to assume that the ball was intended for a bore larger than itself. Depending on the thickness of the patch (a piece of greased cloth or leather used as wrapping for a rifle ball), a ball may often be intended for use in a bore considerably larger. Hamilton (1960b: 132) believes a useful estimate of caliber for smoothbores can be obtained by adding 0.02 in. to the actual ball size —we tend to agree.

Conclusions: This breech section probably represents an 18th century trade gun and could date from *ca.* 1720 to *ca.* 1750.

RAMROD GUIDES

The site yielded three ramrod guides or rampipes—essentially tubular-shaped pieces of brass afixed to the forestock and used to hold the ramrod in place.

Ramrod Guide No. 1. This complete specimen (Fig. 14, E, E′) of cast brass is a lower or terminal guide, so-called because it was afixed to the proximal portion of the forestock. The proximal end consists of a long pointed tail or tang which has recurved lateral edges and which was probably inlaid into the lower surface of the forestock. The distal section of the guide is tubular-shaped, although the edges are not joined. The upper edges of this portion are flanged and pierced for a pin which secured the guide to the forestock. Five longitudinal facets have been filed on the exterior surface of the tubular part, and a ring encircles each end of the tube. These two presumed decorative rings appear to have been formed in the casting process and retouched by filing. The lower external surface at the proximal end is damaged, possibly from wear produced in balancing the gun across a saddle. This guide has an external diameter of 0.34 in. and a length of 2.75 in.

Ramrod Guide No. 2. This quite fragmentary piece (Fig. 14, F) is from the tubular portion of a cast sheet terminal ramrod guide. It is too incomplete for further description and meaningful measurement.

Ramrod Guide No. 3. Representing an intermediate or upper guide, this tubular-shaped piece (Fig. 14, G) of sheet brass is complete. Annular ribs are present on the *exterior* surface, with only the center rib having a matching groove on the interior surface. The upper edges are brought together, flanged, and pierced. This specimen is 0.42 in. in diameter and 1.03 in. in length.

Remarks: The recurved tail of specimen No. 1 closely resembles a ramrod guide obtained from Burial No. 7 at the Angola Farm Site (personal observation). Of the examples of ramrod guides from the Gilbert Site, it is similar to only one, a large specimen of iron. Ramrod guide No. 3, on the other hand, does not resemble in detail the typical intermediate guide from either Angola or Gilbert. It is more like those from the 19th century English trade gun, although it lacks the distinctive *CC* marking found on guides from that weapon. Ribbed rampipes of this general form were fairly common in the early 18th century, appearing on both English and French arms.

Conclusions: Ramrod guides Nos. 1 and 2 are probably from French trade guns, with the former most probably dating about 1720 and the latter between 1720 and 1750. The third specimen is of a more generalized type which was present throughout the 18th century and lasted on into the 19th century, where it occurs on the Northwest gun.

THUMB PLATE ESCUTCHEONS

Four thumb plate escutcheons were recovered from the site. A thumb plate escutcheon is set into the upper surface of the stock between the proximal end of the breech plug tang and distal end of the comb of the stock, if used on a shoulder weapon. This position is the same if used on a pistol, except of course, there would be no comb.

Thumb Plate Escutcheon No. 1. Complete, this cast brass specimen (Fig. 15, A, A′) has a concave inner surface and convex external surface. The exterior side is cast or filled in low relief, beveled on the edges, and bears an engraved design. An acanthus leaf element appears at the top of the design, and a series of curvilinear lines and triangles from the remainder of the motif. A solid cylindrical peg is molded into the inner surface.

Thumb Plate Escutcheon No. 2. Quite similar to the above, this cast brass escut-

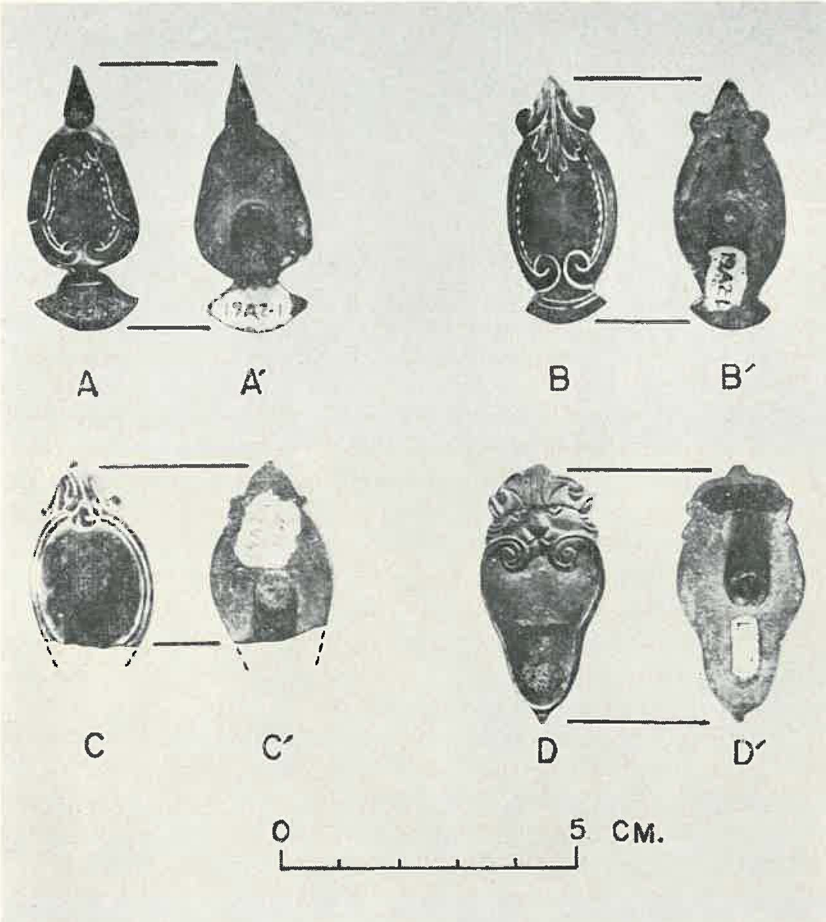


Fig. 15. Thumb Plate Escutcheons. A, A', No. 1. B, B', No. 2. C, C', No. 3. D, D', No. 4.

cheon (Fig. 15, B, B') is also concave-convex in cross section. On the external surface there is an engraved design which is basically similar to that on specimen No. 1. A solid cylindrical peg is molded into the inner surface.

Thumb Plate Escutcheon No. 3. Broken across the lower edge, this cast brass escutcheon (Fig. 15, C, C') has a concave internal surface and convex exterior surface. A solid cylindrical peg is molded onto the internal surface, while the exterior surfaces is molded in low relief and retouched with engraving. The design at the top vaguely resembles an inverted plume, although we believe that it is an adaption of the acanthus pattern. Double ridges border each side.

Thumb Plate Escutcheon No. 4. This cast brass specimen (Fig. 15, D,D') is concave on the interior surface and convex on the exterior surface. There is a hollow cylindrical peg molded onto the inner surface while the exterior surface is molded in low relief and retouched by means of engraving. This resulting design is dominated by a lion-like mask. The edges and lower portion of the escutcheon are adorned with a curving ridge which ends in scrolls just below this mask.

Remarks: The occurrence of the four thumb plate escutcheons at the Womack Site is unusual, as they have not been observed by the writers in any of the collections from other historic sites in *Texas*. Moreover, they do not conform to any of the illustrations of English escutcheons which J. N. George (1947: Fig. XVII) indicates as being standard for the period between 1720 and 1750.

Escutcheon No. 3 is topped with a stylized floral element which strongly resembles a distal end lock plate design taken from patterns by De Lacollombe and published in Paris about 1705 and again in 1730 (Hayward, 1963: 297, Pl. 93). This is rendered in a crude form suggestive of "mass" production—perhaps supplied by a large brass founding center such as that at Liege (Hayward, 1963: 165). (Indeed, it is quite possible that most of the brass mounts on the French trade guns are from these foundries.) The decorative escutcheon No. 4 is quite similar to a trigger fore tang pattern in the same pattern book.

Conclusions: The design motifs on the escutcheons, especially No. 4, were possibly based on French patterns available as early as 1705. It must be noted, however, that these pattern books were widely used on the European continent.

BUTT PLATES

During the period apparently represented by the Womack flintlock parts, a butt plate was a sheet of metal fastened across the end and portion of the top or comb of the butt stock. It was secured by various combinations of screws and pins, and, in some English guns, with small spikes. Thirteen butt plates are recognized in the collection from the Womack Site.

Butt Plate No. 1. Incomplete, this cast brass butt plate (Fig. 16, A) is broken across the finial (decorative projection at the upper end) and lower part of the heel (the curved area of the plate). A tongue, for attaching the plate to the wooden stock, is molded onto the interior surface of the finial and has been broken across the pin hole. The finial area is flat on the interior surface and convex on the exterior surface. The tang and heel areas are also convex on the outside surface but concave on the interior. The lateral edges of the heel are beveled. Decoration on the exterior consists of four longitudinal grooves which tend to converge toward the finial. The toe area (missing here) of such a plate was usually secured by one screw.

Butt Plate No. 2. Broken across the neck (constricted portion) of the finial and across the heel, this specimen (Fig. 16, B) is also of cast brass. The tang area (the upper, tapered projection between the heel and the finial) is plano-convex in cross section, while the heel is concavo-convex in cross section. The decoration on the

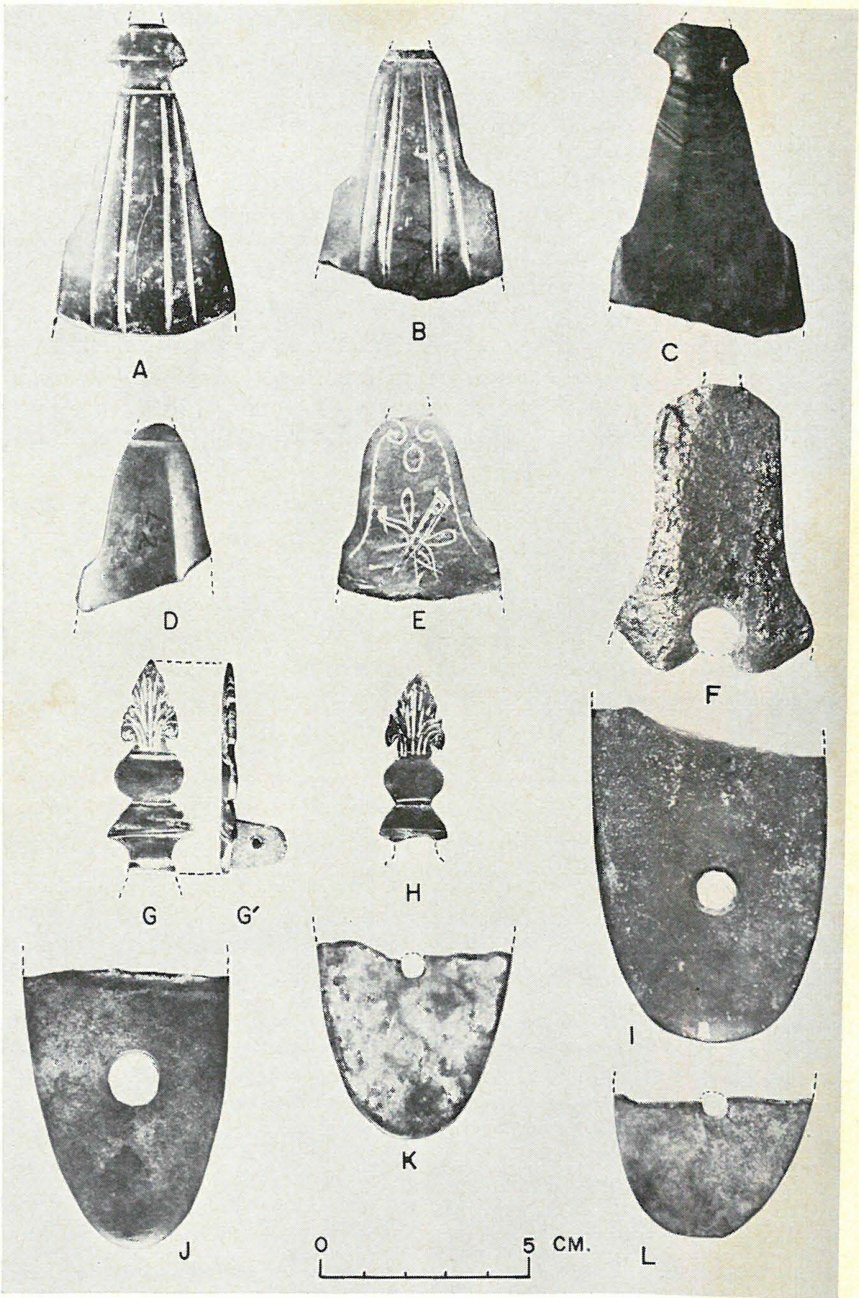


Fig. 16. Butt Plates. A, No. 1. B, No. 2. C, No. 3. D, No. 4. E, No. 5. F, No. 6. G, No. 7. H, No. 8. I, No. 9. J, No. 10. K, No. 11. L, No. 12.

convex exterior surface is basically similar to the above, differing from that specimen only in having two additional lines inside of, and parallel to, the two inner grooves. The grooves terminate just above the break across the heel.

Butt Plate No. 3. This specimen (Fig. 16, C) is of cast brass, is broken across the heel, across the upper edge of the finial, and though restored, across the juncture of the finial and the tang. A tongue is present on the interior surface of the finial, but it has been broken across the pin hole. The exterior surface of the tang is convex and formed into three longitudinal facets. Five parallel grooves cross the tang just below the finial, angling down from each side and extending straight across the center facet. The exterior surface of the heel is beveled at the sides, while the interior surface is concave.

Butt Plate No. 4. This cast brass plate (Fig. 16, D) has been broken just below the finial and across the beginning of the heel area. It is concavo-convex in cross section. There is a groove across the tang (just below the missing finial) and three longitudinal facets below this.

Butt Plate No. 5. Consisting only of a tang section, this piece (Fig. 16, E) has been pounded flat. However, marks typical of a contouring tool are present on the interior surface, and there is no doubt that this tang was once concavo-convex in cross section. A single engraved line, superimposed by small triangular-shaped marks, appears along each side and terminates in a scroll at the top of the design. A small oval is engraved just below the scroll and, below this, is the main design: an unstrung bow, quiver, and two clubs.

Butt Plate No. 6. Of iron, this tang section (Fig. 16, F) is broken just below the finial and across the top of the heel. The lateral edges of the heel that are intact are beveled and there is a countersunk screw hole in the center edge of the lower break. The cross section is concavo-convex, and three longitudinal facets are formed on the tang.

Butt Plate No. 7. Consisting of a finial section which ends in an acanthus leaf pattern, this specimen of cast brass (Fig. 16, G, G′) is broken at the point of juncture with the tang. There is a tongue with a pin hole on the under surface. In cross section it is slightly concavo-convex.

Butt Plate No. 8. This finial section (Fig. 16, H) is of cast brass and has been broken across the lower part of the finial. It is topped with an acanthus leaf pattern and is slightly concavo-convex in cross section.

Butt Plate No. 9. Of cast brass, this piece (Fig. 16, I) represents the lower section of a butt plate. The outer edges are beveled, while the exterior surface is convex and the interior one is concave. A screw hole is countersunk into the exterior surface, and on the interior surface a ring-shaped area about this hole has been deliberately cast thicker than the remainder of the plate. A mark, apparently a crown over an *R*, is stamped on the exterior, just above the bottom edge.

Butt Plate No. 10. This lower part of a butt plate (Fig. 16, J) is essentially the same as No. 9, although it lacks the interior reinforcement around the screw hole, as well as the mark at the lower edge.

Butt Plate No. 11. Also from the lower section of a butt plate, this piece (Fig. 16, K) is broken across a screw hole countersunk into the exterior surface. The plate has been pounded flat and the exterior lateral marginal edges are beveled.

Butt Plate No. 12. Apart from battering on the lower edge of the toe and a concavo-convex cross section, this piece (Fig. 16, L) is much like No. 11.

Butt Plate No. 13. This iron tang section—it is broken just below the finial and across the heel area—has been hammered almost flat but was probably once concavo-convex in cross section. The edge across what was the heel area has been bifacially sharpened, probably for use as a scraper.

Remarks: For purposes of analysis, butt plate sections 1 and 2 can be combined with finial pieces 7 and 8. Their decorative patterns match and, combined, they are in close agreement with the complete brass butt plates from the Angola Farm. A similar tang decoration—*i.e.*, longitudinal grooves—occurs on a butt plate from the Fish Hatchery Site near Natchitoches, Louisiana (Gregory, 1962: 60–61). The short tang (as opposed to the long tang variety found on late 17th century guns) with the finial ending in an acanthus leaf was in general vogue in France by 1710 (Hayward, 1963: 45). Its occurrence at Angola indicates that it had been used as a design motif on French trade guns before 1730.

Butt plates 3 and 4, of brass, and No. 6, of iron, each have three longitudinal facets—a feature which does not appear on corresponding gun parts from the Gilbert Site. While No. 3 differs from Nos. 1, 2, 7, and 8 in decorative detail, we believe that it is essentially of the same type.

The engraved bow, quiver, and arrow design on specimen No. 5 is generally similar to decorations found on five butt plates and two side plates at the Gilbert Site. As noted in the report on that site (Jelks, ms.), the English were using similar motifs on fine weapons in the period between 1702 and 1720. The bow and quiver can be traced back at least as early as 1685 in French gun design (Hayward, 1963: 91). A French pattern book first issued in about 1705 and republished in 1730, shows a design combining an unstrung bow, an arrow, and a club (*ibid.:* Pl. 93). Its use on fine French weapons of about 1720 is illustrated by a fowling piece made by Germain (*ibid.:* Pl. 8c). Hamilton (1960b: Pl. 52) shows a basically similar design for an historic Osage site dated between 1730 and 1775. Like patterns can also be seen on specimens from Fort Michilimacknac which dates from the latter half of the 18th century (Maxwell and Binford, 1961: 101–102). Two such designs also occur on an early 19th century trade gun made by P. Bond (Russell, 1957: 113–114). As a decorative motif, then, the bow, arrow, quiver, and club were in use for more than 100 years. In regard to French use, these design elements were originally employed on sporting weapons of fine grade. Their presence on five of the Gilbert Site butt plates, as well as two of the side plates, suggest that they were also at least one of the major designs used on the French trade gun of 1750.

Butt plate No. 9, with a possible maker's mark, matches the butt plate from the Fish Hatchery Site, as well as those from Angola Farm (personal observation). All are approximately 0.25 in. wider than the specimens from the Gilbert Site. By contrast, butt plates Nos. 10, 11, and 12 are narrower and more nearly resemble the Gilbert pieces. Butt plate No. 13 is similar to No. 6, although it lacks the screw hole and any facets that might have been present would have been obliterated by hammering.

Conclusions: Specimens Nos. 1, 2, 3, 7, 8, and 9 probably represent French trade guns which date about 1720. Butt plates, Nos. 3, 4, and 6, with their faceted tangs, suggest a variant form which appears to predate specimens from the Gilbert Site. On the other hand, Nos. 5, 10, 11, and 12 do not differ in any important detail from those found at Gilbert and could, therefore, represent French trade guns of *ca.* 1750; they could also be earlier. In view of the length of its tang, butt plate No. 13 is possibly of a form earlier than those from Gilbert.

GUNFLINTS

In addition to the 23 native-made gunflints, there are eight gunflints believed to be of European manufacture. These can be sorted into two categories, spall gunflints and conventional gunflints. Both types were mounted in a cock vise and, when the cock was released by the trigger, were struck against the striking surface of the frizzen, thus producing a spark to ignite the priming powder in the flashpan.

Spall Gunflint. Three spall type gunflints (Hamilton's gunspalls) can be recognized in collection largely on the basis of their wedge-shaped or plano-convex longitudinal sections (Fig. 18). One of these (Fig. 17, M) is made of pinkish-tan chert and is extensively reworked. The other two (Fig. 17, K, L), of light gray chert, have retained their original form. They are 1.03 and 1.22 in. wide, and 0.88 and 1.0 in. long.

Remarks: According to Hamilton (1960c: 76–77; 1964: 52–53), gunspalls were produced by detaching wedged-shaped spalls from a small, rounded cobble of chert (Subtype A) or flint of unknown source (Subtype B), as well as from core remnants of flint from known quarries (Subtype C). Our examination of a large number of spall gunflints from Texas sites suggest that at least some of them (including specimens from Womack, Gilbert, Spanish Fort, and Fort St. Louis at Texarkana) were produced by techniques which involved rudimentary preparation of a core. Many of these specimens have little or no secondary flaking along the lateral edges, nor a bulb of percussion visible on the plano surface. However, this plano surface usually has at least one transverse flake scar, apparently produced in dressing the original core. Also in the heel area of these gunspalls a prepared facet or striking platform often is still apparent. In these ways, the cited Texas specimens appear to bridge the technological (and possibly chronological) gap between the Subtype A spall gun-

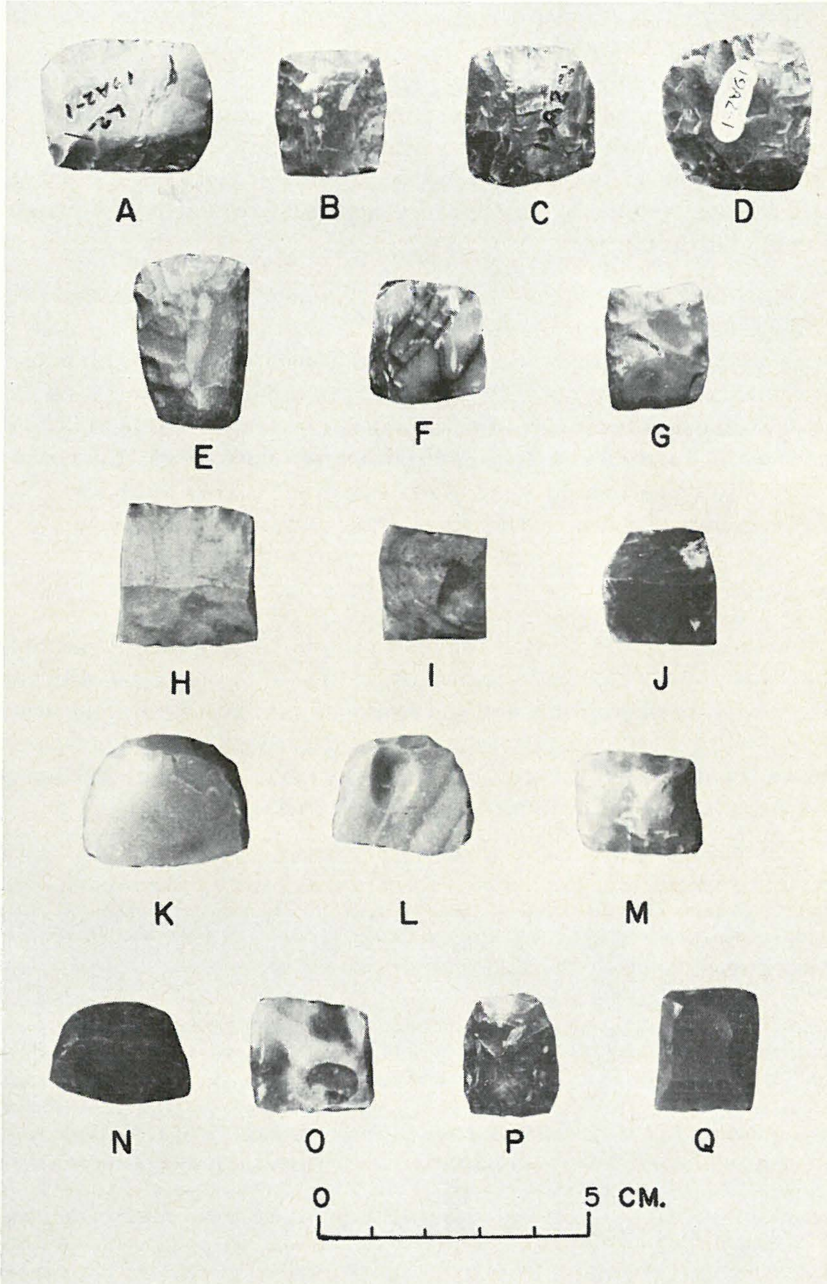


Fig. 17. Gunflints. A–G, Native-made gunflints. H–J, Possible native-made gunflints. K–M, Spall gunflints. N–P, Conventional French gunflints. Q, Conventional English gunflint.

flints produced from and unprepared pebble core according to the method described by Hamilton, and the conventional gunflint produced from blades removed from a carefully prepared core.

Conclusions: The three, probably French, gunspalls from Womack could date anytime from the early 17th century to about 1750.

Conventional Gunflints. Five gunflints are included, four of which appear to be of French origin and one (Fig. 17, Q) of English origin. Three (Fig. 17, N-P) of the probable French ones are of the characteristic blond color, while the fourth is grayish-white. Two of these have D-shaped outlines, with rounded backs (Fig. 17, N, P) and one (Fig. 17, O) is square with two edges. The latter has the distinctively French "gnawed" retouching (secondary flaking) on the sides (Fig. 18). One blond flint (Fig. 17, P) is reworked in the Indian fashion.

The fifth gunflint (Fig. 17, Q) is rectangular in outline and dark gray in color. Its recognition as English rests mainly on technique of manufacture which is identified by single blow undercut fracture (Woodard, 1960: 30–31; Hamilton, 1964: 53).

The French gunflints are from 0.94 to 1.02 in. wide, and from 0.75 to 0.88 in. long. The probable English one is 0.69 in. wide and 0.94 in long.*

Remarks: As Hamilton (1960c: 75) makes clear, the occurrence of French gunspalls and gunflints at the sites is not, by itself, a reliable indication of direct trade with the French.

According to Witthoft (cited in Hamilton, 1960c: 74–79; 1964: 52), the conventional gunflint began to displace the spall gunflint about 1750, and, by 1775, almost all were of the conventional type. However, the conventional gunflint was apparently first introduced into the Western Hemisphere about 1680 (Hamilton, 1964: 55). We note (personal observation) in the collection of offerings from a burial at the Angola Farm Site that there were eight spalls and one honey colored gunflint. This burial probably dates about 1720, and it is to our knowledge, the earliest date example of a honey colored French gunflint from the sites discussed in this report.

Conclusions: The French gunflints could easily have been present at the Womack Sie by 1720, and possibly earlier. We have no estimate concerning the English specimen, but we seriously doubt a pre-1700 origin.

SPHERICAL BULLETS

Six spherical bullets, molded lead balls (Fig. 19, A, B), were recovered from the Womack Site. All are oxidized, and all, but one, deformed. This exception shows mold marks and flat sprue cut. Following the system devised by Hamilton (1960b: 128–129), calibers and gauges† can be worked out for five of the spherical bullets.

* No attempt has been made to indicate what size guns these gunflints (and the gunspalls) were intended to be used with; it remains a difficult problem (Woodard, 1960: 36).

† The gauge is the interior diameter (bore) of a barrel expressed by the number of spherical lead bullets fitting it required to make a pound.

Grains	Approximate Caliber	Gauge
149.6	.49–.50	56–36
215.4	.53–.55	32–28
218.0	.53–.55	32–28
232.2	.55	28
267.7	.55–.58	28–24

LEAD SHOT

The site yielded two oxidized and deformed specimens of lead small shot. These shots were weighed and assigned sizes (see below) which correspond with the weight classes listed in an early table (George, 1947: 211). Early size designations often do not match modern ones. Since the early sorting was based on the use of graded screens, shot of different weights may receive the same label.

Grains	Size
5.1	#1 shot
13.0	Duck shot

QUESTIONABLE GUNPART

Included in this category is a slender, bent piece of iron which may represent a gun pin. Its fragmentary condition, however, makes positive identification impossible.

Possible Sword Guard

Of cast brass, this broken specimen (Fig. 19, C) appears to be from a hemispherical- or spherical-shaped object, possibly a sword guard. The external surface is convex and the interior one is concave. A light, probably engraved, design appears on the exterior surface. Although incomplete, it seems to have consisted of a centrally placed circle formed by two concentric lines and, radiating out from this element, a series of panels separated from one another by sets of parallel lines.

Remarks: This specimen could be from the cup of Caribbean cup-hilted type sword. If so, it probably dates back to the 17th century (Peterson, 1956: 74).

Trade Axes and Wedges

Three complete and three fragmentary axe heads and a wedge have been found at the site. All are of iron and some have been cleaned of rust in an effort to locate maker's marks or names. Unfortunately none was found, although several did show use scars.

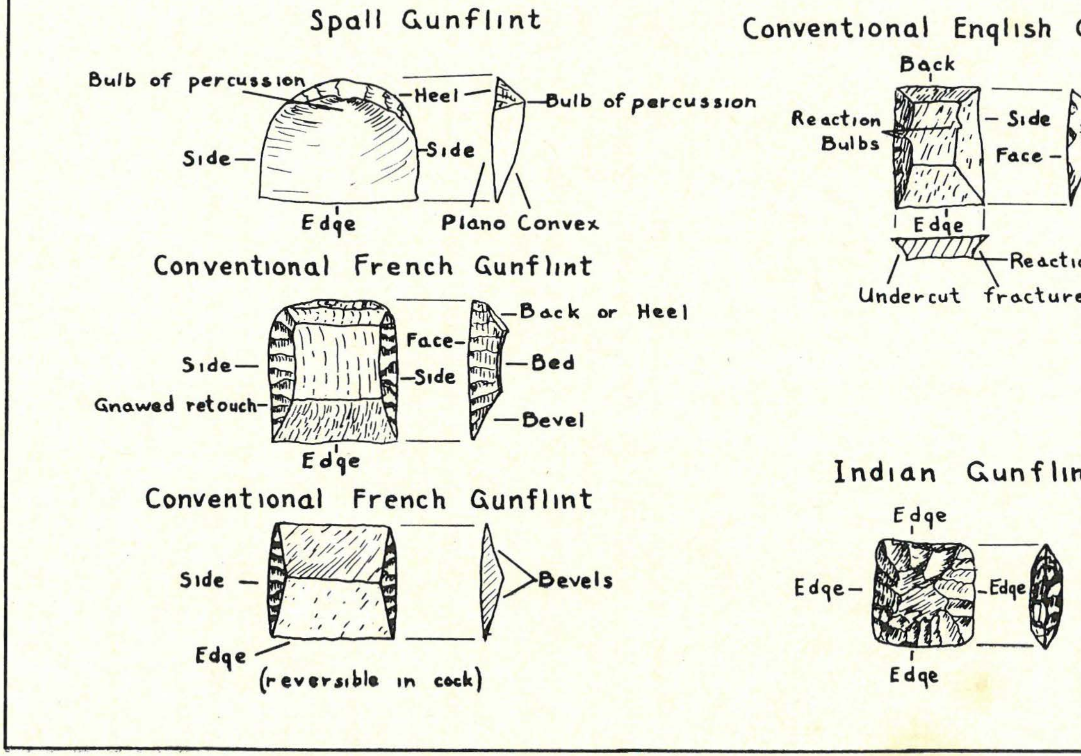


Fig. 18. Idealized sketches of the major types of gunflints found in Norteño Focus sites.

One of the complete axes (Fig. 19, D), which has not been cleaned because of extreme rusting, does not have a hafting eye for a handle. It is single-bitted and has a swept back blade. Similar specimens have been found in Pennsylvania at historic sites which yielded French trade items dated between 1650 and 1718 (Cadzow, 1936: 218, Pl. 90).

A second complete single-bitted axe head (Fig. 19, E) is of the camp or belt (*i.e.*, light) type. It has a broad, swept back blade and a rounded hafting eye. It was cleaned of rust, but no marks were found. One of the fragmentary specimens (Fig. 19, F), lacking only the cutting edge, is of the same type. After breakage the remaining portion of this specimen was straightened out, inadvertently revealing the method of manufacture: the iron was forged, shaped, and then bent to form an eye for the handle, and, finally, the two ends were forged together to form the cutting edge (All belt axe heads examined by the authors have been fashioned in this manner, while the blades of regular axes and wedges are of simpler construction.). When cleaned this fragmentary camp axe was found to contain small cut marks on one face, possibly a result of use as an anvil. Similar scars have been observed on axes and wedges from the Gilbert and Spanish Fort sites.

The specimen shown in Figure 19, G is a single-bitted camp axe that was probably forged by a blacksmith at one of the trading post sites. Apparently made from a flat, rectangular-shaped piece of iron, the blade was first shaped then the lateral edges above the blade were bent to receive a handle. Since this hole, unlike those of the other axes, parallels the long axis, it would require a handle bent at an angle of about 70 to 75 degrees, or, a limb with a branch extending out at about the same angle. A small perforation in one side was evidently made to receive a pin and, thus, to secure the handle.

The two remaining axes are single-bitted blade fragments which, in each case, appear to be of the camp type. At least, they have the same blade form and were constructed by forging together the ends of a long piece of iron.

The blade of the one rim wedge (Fig. 19, H) from the Womack Site differs from those of the axe heads in that both lateral edges are flared. The top of this wedge has signs of extensive battering, perhaps from being hammered or from use as an hammer. When cleaned this piece showed the same type of cut marks as noted for one of the fragmentary camp axes. Similar wedges from the Gilbert and Spanish Fort sites have also been observed to have like scars. In many instances, it seems as if one wedge was used as an anvil and another as a cutting implement, possibly for working brass for tinklers and other artifacts.

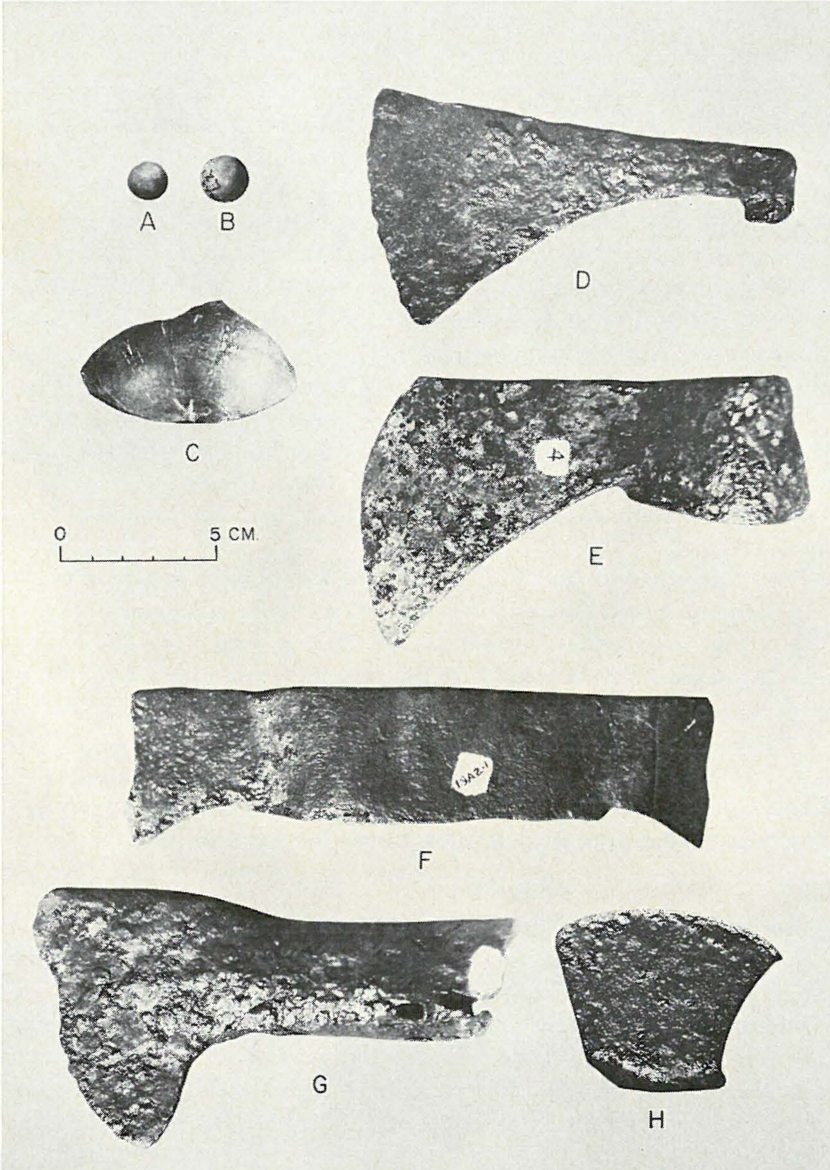


Fig. 19. Spherical Bullets, Possible Sword Guard, Axe Heads, and Wedge. A, B, Spherical bullets. C, Possible sword guard. D–G, Axe head. H, Wedge.

Knives

BACKGROUND

After several years of studying collections mainly from Norteño Focus sites it has been possible to recognize six different types of iron knives (Fig. 20) which, in turn, can be subdivided into clasp (folding) and case knives. Only two of the six forms are known for the Womack Site, but all six are present at the Spanish Fort Site and several of the types are found at Fort St. Louis at Texarkana and at the Gilbert Site.

The three types shown in Figure 20, A-C are French clasp knives. Types 1 and 2 differ only in outline form, as both have a small basal flange or boss which extends over the upper edge of the blade and which served as a stop to make the knife rigid when open. Type 3 has a different form of stop, a small perforated tang at the back of the blade, which is similar to that found on present day knives. All three types are identified as French on the basis of names found on them after cleaning.* In some cases, crowns or emblems have been noted following the names.

The other three types (Fig. 20, D-F) are case knives. All three are ridged and designed either for a handle to be held in place by pins or a tang tightly inserted into a solid handle. The tang on Type 2 is square in cross section. Types 1 and 3 of the case knife may have two, sometimes three, pins for the handle, while Types 2 and 3 have raised bosses for the handle to fit against. Type 3 has a "fish-scaler" on top of the knife blade. Type 1 can be identified as French or English on the basis of the names found after cleaning. Examples of the other two forms have been cleaned, but no names have been located thus far.

KNIVES FROM THE WOMACK SITE

One complete, one reworked, and five fragmentary knife blades have been recovered from the site. To judge from their shape or from the names found on them, six are definitely of French manufacture.

The complete specimen (Fig. 21, A) is a French clasp knife of Type 1. When it was cleaned, two sets of letters, one above the other, could be distinguished. The top row consists of . . NNET . . and is too incomplete to reveal the full name. On the bottom row the letters

* A word of caution should be given on the cleaning of knives and other specimens of iron for the purposes of securing names and designs. *One should not attempt to clean such an artifact by the electrochemical method unless he has had experience*, as this method will often destroy weak letters and designs. *Use only a slow acid acid method and do not leave the specimen in the acid longer than 20 or 30 seconds.* The proper cleaning of the iron is a very slow process and may take two or three days per specimen.

. . LAVD . . can be made out. Since *CLAVDE*, a good French name, has been found on several knives from Gilbert and Spanish Fort, there can be no doubt that it is the name imperfectly preserved on this knife from Womack. (Incidentally, in reading these names the *V* can represent either a *V* or a *U*.)

Three specimens (Fig. 21, B-D) lacking the ends of the blades are fragments of French clasp knives. Although their incompleteness makes precise identification impossible, they are either of Type 1 or 2. The letter *E* was raised one one (Fig. 21, D).

A fourth fragmentary blade (Fig. 21, E) is from a rather large Type 3 clasp knife. The blade on this piece was resharpened after breakage. No letter could be located on this specimen, but similar specimens from the Gilbert and Spanish Fort sites have yielded French names.

Another fragmentary specimen (Fig. 21, F) cannot be identified as to type, as it is from the center part of the blade. When cleaned, however, it produced two rows of letters and an emblem. Both names are French and are complete as follows: On the top row, *MATHIEVR*, and on the bottom row, *CALLE LAVNE*. A heart-shaped emblem appears after these names. It is turned at a 90 degree angle to the names and the bottom of the "heart" is missing. Similarly shaped emblems have been found on knives from the Gilbert Site.

The only other knife blade (Fig. 21, G) from the site is a medial fragment. It is too incomplete for further classification, and no letters were detected in cleaning.

Remarks: The names on iron knives probably represent the names of the Guilds that manufactured them. When a number of examples have been found and identified with the iron guilds in Europe, they will undoubtedly be excellent means of dating historic sites. The writers now have matching names on knives from Gilbert and Fort St. Louis at Texarkana, and on knives from Fort St. Louis and Spanish Fort. These data suggest that Fort St. Louis (the possible site of the Nassonite Post) was a trading center for the upper Red and Sabine rivers (Harris and Harris, 1961: 4; Harris, Miroir, McVey, and Blaine, ms.).

Awl

A fairly long, but incomplete, iron punch or awl (Fig. 21, H) is pointed at one end. When cleaned, it was found to contain the letters *RENA* . ., being broken just beyond the *A*. It might be noted that a French knife from the Gilbert Site bears the name *RENARD*. Perhaps it is the same name that is only partially discernible on this punch.

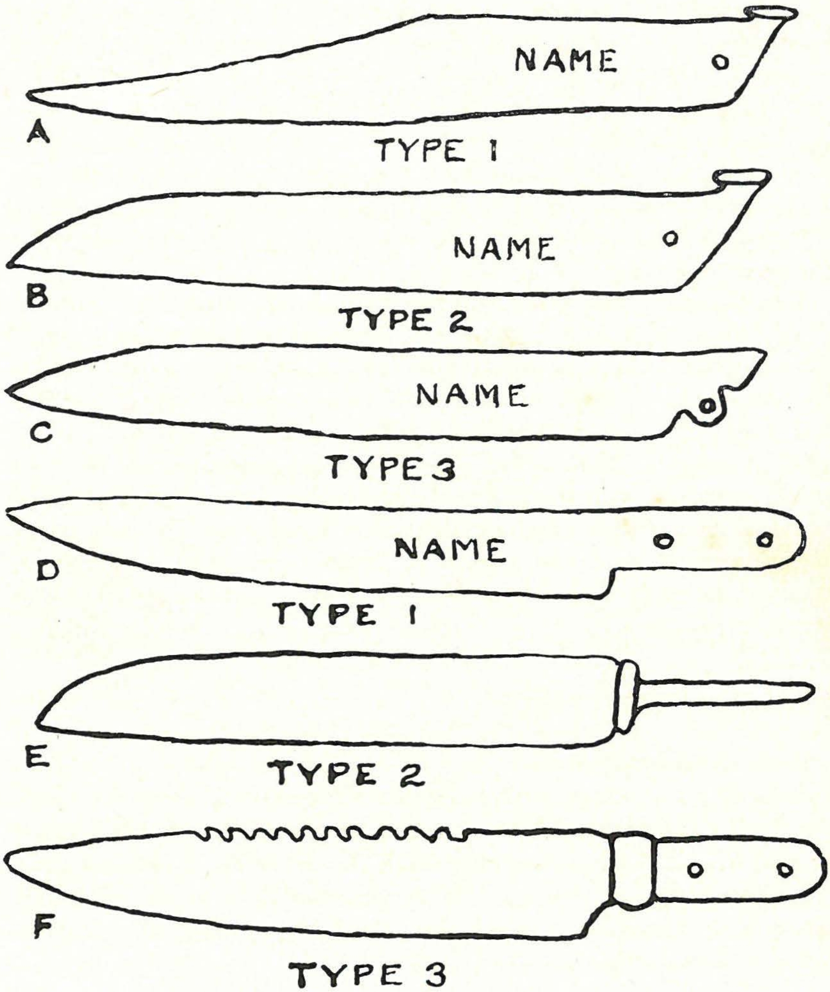


Fig. 20. Sketch Showing Knife Blade Types. A–C, Clasp knives. D–F, Case knives.

Bridle Bit Fragments

Two specimens (Fig. 21, I, J) appear to be fragments of the distinctive Spanish ring bits (Tunnell, ms.). This type is, in a sense, an elaboration of the curb bit, as it has a prominent port (curve in the horizontal bar placed into the horse's mouth). However, unlike the curb bit it has: 1) a large ring which attaches to the proximal end of the port and encircles the lower jaw of the horse, 2) two chains which extend from this ring to the lower portion of the bit legs (or shanks),

3) two small, flat bars which are placed across the port, and 4), on these bars, three to four small rings which cause the horse to salivate.

One of the pieces from Womack (Fig. 21, J) can definitely be identified as coming from the central part of such a bit. It has the port and cannons (horizontal extensions on either side of the port) intact, as well as the flange through which the large ring was attached. The other, more fragmentary specimen (Fig. 21, I) may possibly represent a portion of one of these large rings. It is perhaps from the same bit, or from yet another bit.

Tunnell (ms.) has noted that the Spanish ring bit occurs at almost all historic sites in Texas. This is in agreement with observations made by explorer La Harpe who, on September 3, 1719, met a high chief of the Touacaras (Tawakoni) near the Arkansas River. He stated that this chief rode a horse that was saddled and bridled according to the Spanish mode (Smith, 1959: 525). Then, on September 8, 1719, La Harpe gathered with the chiefs of the Touacara nation and they told him of the route to the Spanish dwellings in the west. The presence of the Spanish bridle bit fragments at Womack provides material evidence of the trade between the Spanish in New Mexico and Witchita-speaking peoples.

Miscellaneous Horse Trappings

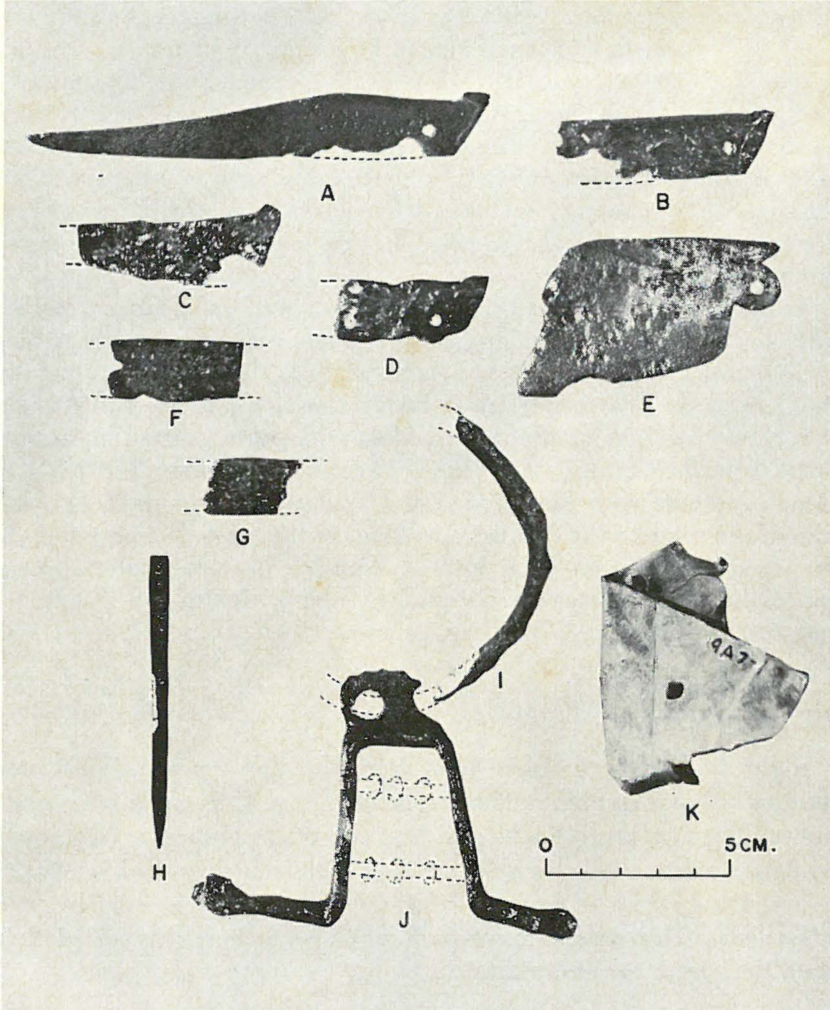
Eight fragments of sheet brass from the site appear to be from harness or horse trappings of some sort. Four are of 25 gauge brass and four of 22 gauge brass. Each consists of two pieces of sheet brass joined by native-made, brass rivets (Fig. 21, K) with leather or rawhide strips between the sheets of brass. The leather has been preserved by the brass salts. The writers have seen similar specimens in all of the collections from Norteño Focus sites.

Strike-A-Light

A roughly C-shaped fragment of iron is believed to be from a strike-a-light. It is shown in Figure 22, A.

Probable Fragment of Armor

An elongated, slightly curved piece of iron (Fig. 22, B) has a hole drilled in each end. It cannot be positively identified but may be a piece of armor.



Fif. 21. Knife Blades, Awl, and Horse Trappings. A, Type 1 clasp knife blade. B–D, Fragments of clasp knife blades. E, Type 3 clasp knife blade. F, G, Medial blade fragments. H, Iron awl. I, J, Bridle bit fragments. K, Possible piece of harness trapping.

Miscellaneous Iron Scrap

Nine pieces of iron scrap have been recovered from the site. In view of its low frequency of occurrence, it is unlikely that the Indians were working much iron. This is in marked contrast with later Norteño sites, such as Gilbert, Spanish Fort, and Stone, where large amounts of iron scrap occur. It is pertinent to note that after having collected from the

Womack Site for about 35 years, the authors have never found an iron or brass arrow point. However, metal projectile points are numerous in their collections from later Norteño Focus components.

Brass Kettle Fragments

No complete kettle has been found at Womack, although numerous fragments of sheet brass appear to be from worn out kettles (Fig. 22, C, D). In studying these pieces, it was noticed that they are of three different thicknesses which, by using an American Standard Wire Gauge, can be converted as follows:

Measurement	Gauge
.018 in.	25
.025 in.	22
.036 in.	19

Apart from the probable kettle fragments reworked into tinklers and described earlier (scrap kettle brass was often used by the Indians to manufacture a variety of artifacts), included in the collection are:

Type	Gauge	Number of Specimens
Rim fragments	25	2
Rim fragments	22	3
Rim fragments	19	4
Side or bottom fragments	25	67
Side or bottom fragments	22	40
Side or bottom fragments	19	22
Kettle lug	22	1
Kettle lug	19	1
		140 total

Inasmuch as kettle brass from historic sites appears to be of several sizes, it seems quite plausible that the differences in thickness, or gauge, reflect differences in size. If correct, then small, medium, and large kettles appear to be represented at Womack.

There is very little direct indication of shape of the kettles, although one of the rims (Fig. 22, C) is rolled (similar rims occur at Gilbert and Spanish Fort). At the contemporaneous Angola Farm Site, however, there were complete kettles. These have flat bottoms and essentially straight sides (Ford, 1936: 136–137).

The writers have noticed that a kettle rim in their collection from the Spanish site of Los Adais in Louisiana is of red brass, while kettle brass from all known Norteño sites is yellow. It may be that this difference in color will, if reinforced by more extensive research, prove to be useful for distinguishing between French and Spanish kettles.

Hawk Bells

There are two fragments of hawk bells in the collection (Fig. 22, E). Both are of the soldered type and are made from 25 gauge brass.

Brass and Lead Discs

Two discs (Fig. 22, F, G), one of lead and one of brass, were found together at the site. They are of an identical size and each contains four matching holes. Their function is unknown, although very similar specimens have been illustrated (Cadzow, 1936: Pl. 39) for a site in Pennsylvania which had French contact between 1675 and 1718.

Pendant

A small, disc-shaped pendant of pewter (Fig. 22, H) has a perforation near one, the presumed upper, edge. Pendants of this type, but of brass, have also been found at the above-mentioned historic site in Pennsylvania (Cadzow, 1936: Pl. 88). They have not, however, been reported from other Norteño Focus components.

Medal

A disc-shaped medal cast in pewter (Fig. 22, I) has an attachment hole in a flange at the top and a small perforation along each side. Presumably, a ribbon to suspend the medal from the neck was passed through the flange, while small ribbons or streamers may have dangled from the lateral perforations. The exterior surface is covered with a design which has as a central element the head of an Indian with long hair and streamers. About this is a typical French godroon border and, along the edge of the medal, a French laurel leaf wreath—both of which are usually found on 18th century French blanket or baling seals. It is possible that this medal was presented to a chief at the Womack Site, perhaps to induce him to send two guides to help La Harpe find the best route to the Arkansas River.

Buttons

Six of the ten buttons from the site can be identified with types recently defined by Olsen (1963: 551–554). These include: one example (Fig. 22, J) of his Type A which is dated at 1700–1765, two

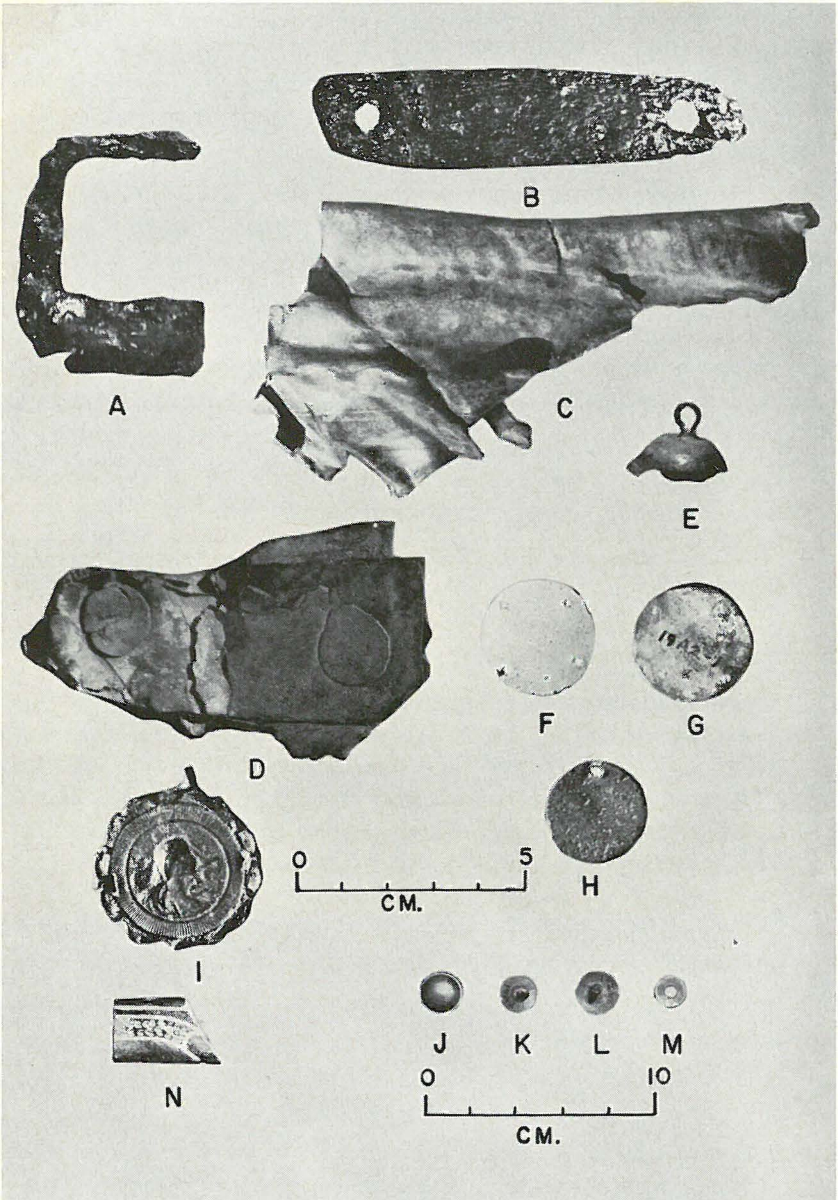


Fig. 22. Artifacts of Iron, Brass, and Pewter. A, Fragment of a strike-a-light. B, Possible fragment of armor. C, Fragment of kettle rim. D, Fagment of kettle lug. E, Hawk bell fragment. F, G, Brass and lead discs. H, Pewter pendant. I, Pewter metal. J–M, Buttons. N, Unidentified fragment of brass. *J–M reduced twice as much as A–I and N.*

examples (Fig. 22, K, L) of his Type D which is dated at 1760–1785, and three examples (Fig. 22, M) of his Type G which is dated at 1785–1800. Three of these buttons are English and have the words *Gilt* or *Trebble* (letters mainly in Old English script) on their back sides. The four unclassified specimens include:

1) A compound brass button which resembles half of a hawk bell. The front is concave and decorated with a design composed of four lines and a floral pattern. The attachment loop is the same as that found on many hawk bells.

2) A compound brass button which has four holes and a cut out pattern on the front. This pattern consists of multi-pointed star-like element with a *fleur-de-lis* on those points oriented toward the cardinal directions.

3) A compound brass button which is decorated on the exterior surface but too badly damaged to discern the pattern.

4) A badly damaged brass button which is too fragmentary for further description.

Miscellaneous Brass Fragment

A small unidentifiable fragment of cast brass (Fig. 22, N) has been sawed across one end and broken diagonally across the other end. Its exterior surface is engraved and stamped, possibly to represent the scales on an animal figure which may have been the central design element. A small beveled area along portions of the broken end may represent a screw hole countersunk from the exterior (decorated) surface.

Glass Fragments

Two small fragments of crown glass from the site are probably from mirrors traded to the Indians.

Vessel

Found eroding out of the midden depost, this wheel-made vessel (Fig. 23, A) represents the only European ceramic container found to date at the site. Although the neck is broken, and the edge of the break subsequently smoothed, it appears to have been a water bottle. The body is globular and the base is convex. Somewhat porcelain-like in texture, the paste is very white and compact. The interior is glazed while the exterior has four painted lines which encircle the body. In

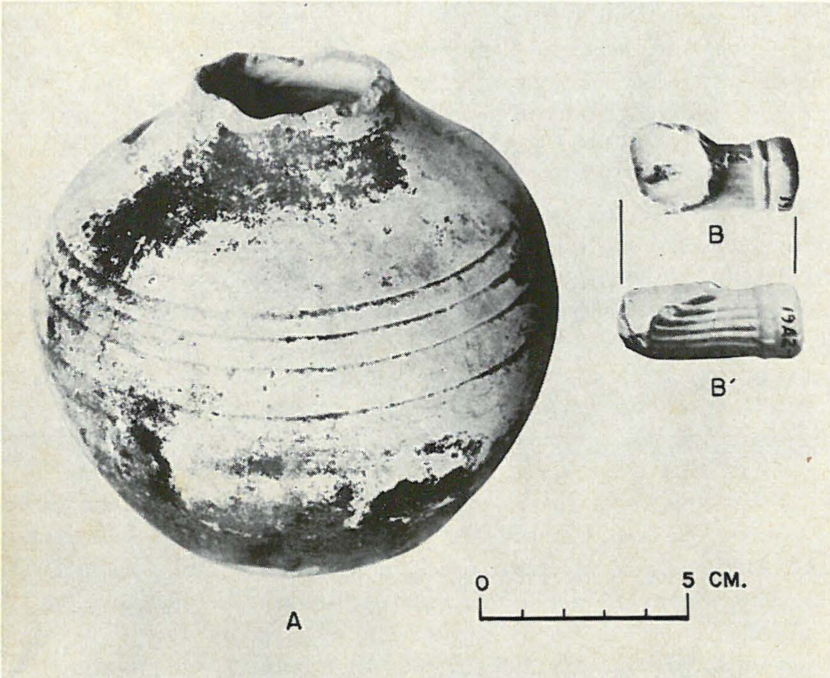


Fig. 23. European Ceramics. A, Wheel-made vessel. B, B′, Pipe.

addition, reddish-black lines and splotches of red and black paint appear on the outside surface.

Pipes

Five fragments of European-made, ceramic pipes have been recovered from the site. All appear to be of the elbow type and the most complete example is shown in Figure 23, B, B′.

THE JOURNEY OF BÉRNARD DE LA HARPE

The historic Norteño Focus component at the Womack Site can tentatively be identified with the early 18th century Quidehais (Kichai) village visited in 1719 by Du Rivage, a member of the La Harpe expedition. Of the four criteria Duffield and Jelks (1961: 96) recommend be met before a field location can accurately be related to a documented historic site, at least three—1) location agree with documentary sources, 2) physical evidence of occupation be present, and 3) cultural remains be of appropriate age and character—can be satisfied. The second and third are abundantly present and are the subject of the preceeding section. Of concern in this section is the first criterion, and it is the documentary evidence, the journal left by the French explorer and trader Bénard de la Harpe, that will be briefly reviewed. This journal records La Harpe's 1718–1719 sojourn up the Red River, made for the purpose of establishing a trading post, known as the Post of the Nassonites because of its location near a Nassoni (or Nasoni) village in Kadohadacho territory.

The English translation of La Harpe's journal used in this paper was made by Dr. Ralph A. Smith and published in the *Southwestern Historical Quarterly*, Vol. LXII, Nos. 1–4. It was first printed in French in Pierre Margry's *Découvertes et establissements des Francais dans l'Ouest et dans le Sud de l'Amerique septentroinale (1614–1754)*. Whenever deemed desirable, the writers have checked Margry's French version of La Harpe's journey against Smith's translation.

As was typical of the period, La Harpe stated distance in terms of leagues. He sometimes used leagues by river, and at other times, by land. According to an *Encyclopaedia Britannica* published in 1888 (Vol. 24: 485) the value of a league as used in 1719 is equivalent to 1.59 miles.

To improve the French position in their rivalry with the Spanish over control of the Indians, Bénard de la Harpe was charged by MM. de Bienville and Hubert with the exploration of the Kadohadacho territory and the establishment of a post in that region. With these goals in mind, the La Harpe expedition left New Orleans on December 18, 1718, and reached the mouth of the Red River on January 10, 1719. At this point La Harpe left his boats and took a pirogue to visit the Tunica Indians, arriving at the village of the Tunicas on January 12, 1719 (Smith, 1958: 78–80). This Tunica village has been identified as the Angola Farm Site excavated by James A. Ford in 1934. It was occupied by the Indians from about 1709 until 1729 (Swanton, 1911: 311–313).

After this brief excursion La Harpe returned to his boats, and, on January 15, 1719, entered the mouth of the Red River. On February 21, he reached the French post at Natchitoches, noting that from the mouth of Red River to Natchitoches they had traveled 83 leagues to the northwest (Smith, 1958: 80–85). Using the conversion value of 1.59 miles to a league, La Harpe journeyed 131.97 river miles from the mouth of Red River to Natchitoches. This distance today measures 126.5 river miles and the minor discrepancy between the two figures (only 5.47) is of no significance, especially in view of the changes in the Red River channel that have occurred in the intervening 245 years.

Significantly, the Natchitoches village near this post has been identified as the Fish Hatchery Site (Gregory, 1962).

On March 6, 1719, La Harpe left Natchitoches, taking with him a detachment of six soldiers and senior sergeant assigned to him by M. Blondel, the commandant at Natchitoches. He entered the mouth of the Bear River (now known as the Sulphur River), journeyed onto the Nassonite village, giving these Indians 2,000 livres of merchandise in a big festival. On April 21 and 22, he established nearby Nassonite Post. La Harpe has left a good description of this area about the post (Smith, 1958: 245). If one will check this, visit the Rosenborough Lake Site near Texarkana, then consult the astronomical observations made on July 26, 1806, at the Nassonite Post by the Freeman-Custis expedition (Swanton, 1952: 80), he will note that the Roseborough Lake Site (also known as the Rochelle Place) closely matches La Harpe's description, and is only 12 seconds off the reading given by the Freeman-Custis party. It seems, therefore, that the Roseborough Lake Site near present Texarkana, is the Nassonite Post of 1719, and Fort St. Louis de Kadohadacho (San Luis de Cadodacho) are one and the same (Harris, Miroir, McVey, and Blaine, ms.).

While La Harpe was erecting the Nassonite Post, he did not lose sight of his desire to open trade with New Mexico. The Indians told him about the wild tribes to the west, and the Toucaras (Tawakoni) to the north, on the banks of a great river. La Harpe resolved to send M. du Rivage, along with 1500 livres of merchandise, up Red River to contact the nomadic tribes and to make an alliance with them (Smith, 1959: 372).

On July 29, 1719, Du Rivage returned from his sojourn with two savages of the Quidehais (Kichai) nation. He reported to La Harpe that at 70 leagues by land (*de chemin*) to the westward and from the west a quarter northwest, he encountered members of several nomadic tribes—including the Quidehais, Naouydiches (Nabedachi?), Joyvan (Yojuane), Huanchané (Waco), Huané (Waco), Tancaoye (Tonkawa)—by whom he had been well received (*ibid.*: 375–376).

Du Rivage states that he traveled 70 leagues by land which, using the 1.59 mile conversion, is 111.3 miles. Today, if one will start at the Roseborough Lake Site, come out of the Red River bottoms (it is doubtful that Du Rivage went through the dense thickets of the river bottomland), and follow present Hwy. 82 to Paris, Texas, then turn northwest to the Womack Site, one would have gone about 108 miles—only 3.3 miles less than the distance covered by Du Rivage. The age and nature of the Womack Site, coupled with its distance and direction from the Roseborough Site, argue for its identification as the village where Du Rivage obtained the two Kichais who guided La Harpe north to the Toucaras on the great river (Arkansas River) in September 1719.

It has been stated that the Indians told La Harpe of the nomadic tribes to the west of the Nassonite Post. It is possible that La Harpe had some advance knowledge where to locate these people, as two Frenchmen, MM. de Bienville and St. Denis, had preceded him up the Red River in 1700 (French, 1875: 73). Significantly, it was Bienville who gave La Harpe the order to journey up the Red River.

SUMMARY

The journal left by Bénard de la Harpe has made possible the tentative identification of the Womack Site with a Kichai village and, thus, places Wichita-speaking Indians on the Red River as early as 1719. Expeditions by Bienville and St. Denis to the upper Red River suggest that at least some Wichita may have been there as early as 1700. Additionally, it has been stated that the Kichai were south of Red River by 1701 (Swanton, 1952: 321).

With a reasonably firm cut off date of 1729, the Angola Farm Site is of considerable importance in the interpretation of historic sites extant on the upper Red River between 1700 and 1729. To judge from the trade bead types and some of the gun parts, there appears to be a definite connection between Angola Farm, Fish Hatchery Site, the Nassonite Post, and Womack Site. It is possible that some of the items common to these sites represent goods distributed by the La Harpe party.

The complete absence of metal projectile points and the relatively high incidence of chipped stone drills and gravers suggest that the Womack Site was occupied earlier than Norteño Focus components on the Sabine, Brazos, and upper Red rivers. Most of the trade goods found at the site place it between 1700 and 1730. There are, however, several European objects which appear to date between 1675 and 1718; at least they have been found in this temporal context in Pennsylvania.

ACKNOWLEDGMENTS

Although most of the specimens studied are in the authors' collections, a number of cooperative individuals and institutions have made available their artifacts. These include: Mr. and Mrs. R. B. Hicks, Mr. and Mrs. J. R. Parsons, Loyd Harper, Rex Housewright, Lester Wilson, Henry Hanna, J. B. Sollberger, E. J. Ruhland, Clifford Ray Allen, Mark Huff, and the Texas Memorial Museum and the Texas Archeological Research Laboratory, The University of Texas. Thanks are also due Louisiana State University and William G. Haag, and Northwestern Louisiana State College of Natchitoches and H. F. Gregory for permitting the writers to examine collections from sites in Louisiana. T. M. Hamilton of Missouri and Joel Shiner of Southern Methodist University have also helped by graciously allowing the writers to use unpublished research material.

REFERENCES CITED

Bell, R. E.
1958. Guide to the identification of certain American Indian Projectile Points. Oklahoma Anthropological Society, Special Bulletin No. 1.

Boudriot, J.
1963. Armes A Feu Francaises-Modéles Reglementaires. L. Petitot.

Bustanoby, J. H.
1947. Principles of Color and Color Mixing. McGraw-Hill Book Co.

Cadzow, Donald A.
1936. Archaeological Studies of the Susquehannock Indians, Vol. III. Pennsylvania Historical Commission.

Duffield, Lathel F., and Edward B. Jelks
1961. The Pearson Site: A Historic Indian Site in Iron Bridge Reservoir, Rains County, Texas. The University of Texas, Department of Anthropology, Archaeology Series No. 4.

Encyclopaedia Britannica
1888. Vol. 24.

Ford, James A.
1936. Analysis of Indian Village Site. Collections from Louisiana and Mississippi. Department of Conservation, Louisiana Geological Survey.

French, B. F.
1875. Historical Collections of Louisiana and Florida.

George, J. N.
1947. English Guns and Rifles. The Stackpole Co.

Gooding, James S.
1960. A Preliminary Study of the Trade Guns Sold by the Hudson's Bay Company. *In* Indian Trade Guns (compiled and arranged by T. M. Hamilton). Missouri Archaeologist, Vol. 22, pp. 81–95.

Gregory, H. L.
1962. Louisiana Studies, Vol. 1, No. 2. Northwestern State College.

Hamilton, T. M.
1960a. Concluding Comments and Observations. *In* Indian Trade Guns (compiled and arranged by T. M. Hamilton). Missouri Archaeologist, Vol. 22, pp. 207–209.

1960b. Some Gun Parts from 18th Century Osage Sites. *Ibid.*, pp. 120–171.
1960c. Additional Comments on Gunflints. *Ibid.*, pp. 73–79.
1964. Recent Developments in the Use of Gunflints for Dating and Identification. *In* Diving Into The Past (edited by June Drenning Holmquist and Ardis Hillman Wheeler), pp. 52–57. Published by the Minnesota Historical Society and the Council of Underwater Archaeology.

Hanson, Charles E., Jr.
1955. The Northwest Gun. Nebraska State Historical Society, Publications in Anthropology No. 2.

Harris, R. K., and Inus Marie Harris
1961. Spanish Fort, A Historic Trade Site. The Record, Vol. 16, No. 1. Published by the Dallas Archaeological Society.
1962. Another Marker on the Trail of the Norteño: A Preliminary Report on the Gilbert Site. *Ibid.*, Vol. 17, No. 1.

Harris, R. K., M. P. Miroir, J. L. McVey, and Jay C. Blaine
ms. Fort St. Louis de Kadohadacho. Unpublished manuscript.

Hayward, J. F.
1963. The Art of the Gunmaker, Vol. II. St. Martins Press.

Held, Robert, and Nancy Jenkins
1957. The Age of Firearms—A Pictorial History. Harper and Brothers.

Jelks, Edward B.
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.

Jelks, Edward B. (editor)
ms. The Gilbert Site. Unpublished manuscript.

Krieger, Alex D.
1946. Culture Complexes and Chronology in Northern Texas, with Extension of Puebloan Datings to the Mississippi Valley. The University of Texas, Bulletin 4640.

Manucy, Albert
1959. The Fort at Frederica. Publication of the National Park Service, The U. S. Department of Interior.

Maxwell, Moreau S., and Lewis H. Binford
1961. Excavations at Fort Michilimakinac. Publications of the Museum, Michigan State University, Vol. 1, No. 1.

Olsen, Stanley J.
1963. Dating Early Plain Buttons by Their Form. American Antiquity, Vol. 28, No. 4, pp. 551–554.

Peterson, Harold L.
1956. Arms and Armor in Colonial America. Bramhall House.

Rodgers, Frances, and Alice Beard
1937. 5000 Years of Glass. Frederick A. Stokes Co.

Russell, Carl P.
1957. Guns on the Early Frontiers. University of California Press.

Shiner, Joel L.
ms. The Excavation of Fort Frederica. Unpublished manuscript.

Smith, Ralph A.
1958–59. Account of the Journey of Bénard de la Harpe: Discovery Made by Him of Several Nations Situated in the West. Southwestern Historical Quarterly, Vol. LXII, Nos. 1–4. Texas State Historical Association.

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.

Swanton, John R.
1911. Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. Smithsonian Institution, Bureau of American Ethnology, Bulletin No. 43.
1952. Indian Tribes of North America. *Ibid.*, Bulletin No. 145.

Thwaites, Reuben Gold
1959. The Jesuit Relations and Allied Documents, Vol. LXVI. Pageant Book Co.

Tunnell, Curtis D.
ms. A Description of Spanish Ring Bit Fragments from Some Historic Archeological Sites in Texas. Unpublished manuscript.

Wedel, Waldo R.
1959. An Introduction to Kansas Archeology. Smithsonian Institution, Bureau of American Ethnology, Bulletin No. 174.

Woodard, Arthur
1960. Some Notes on Gun Flints. *In* Indian Trade Guns (compiled and arranged by T. M. Hamilton). Missouri Archaeologist, Vol. 22, pp. 29–39.

9024 San Fernando Way
Dallas, Texas
827 Havenwood
Dallas, Texas

Book Reviews

The Cosgrove Report, by Mr. and Mrs. C. B. Cosgrove, 1925. El Paso Archeological Society, Special Report No. 3, 1965. 23 pp., 15 figs. $1.25.

This report is presented just as it was prepared 40 years ago. It describes briefly the excavation of a multi-roomed pueblo structure near Three Rivers, New Mexico, and a survey of sites in the El Paso area of western Texas. Mention is made of some pictograph and petroglyph sites in the El Paso area. The work was carried out in April of 1925 by members of the El Paso Archeological Society, and the unpublished manuscript has been referred to in archeological literature for many years. This year the local Society decided to publish the old manuscript without correction or revision.

This little report describes the daily field trips made by members of the El Paso Society. It gives few details about site locations or the nature of the cultural remains. There is, however, a brief room-by-room description of the excavated pueblo structure, listing contents and giving some information about room size and associated cultural features—burials, hearths, doorways, etc. Photographs of some of the excavated rooms show some details and indicate a sophisticated excavation technique for that early time period. There are brief ceramic descriptions which utilize type names probably long outdated.

This report is valuable primarily as a documentation of the activities of one of the earliest amateur archeological groups in Texas. Its content is not particularly valuable because of inadequate descriptions and outdated terminology. It will be of interest primarily to people working in the Southwest and immediately adjacent areas.

Curtis Tunnell
Texas Memorial Museum

Tlacuilolli: Die mexikanischen Bilderhandschriften Stil und Inhalt mit einem Katalog der Cordex-Borgia-Gruppe, by Karl A. Nowotny. 287 pages, 10 figs. 67 double-page plates and tables (some being fold-outs). Monumenta Americana, III, Ibero-Amerikanische Bibliothek, Berlin, 1951. DM 100.

This is the third volume in the excellent *Monumenta Americana* series of Berlin's Ibero-Amerikanische Bibliothek, the previous titles being Kutscher's *Nordperuanische Keramik* (1954) and Burland's *Selden Roll* (1955). The series' large format (23 x 31 cm.) is particularly suited to codex reproductions and studies such as the *Selden Roll* and the present study by Nowotny.

In the precolumbian New World, ancient Mesoamerica was unique in developing native systems of writing. Evidence of early writing first appears in the form of stone inscriptions dated close to the beginning of the Christian epoch. From the evidence now available, admittedly most incomplete and fragmentary, it is a good hypothesis that the origins of Mesoamerican writing lie in calendrical notation, particularly in the context of devination and prognostication, perhaps including the forecasting of weather. Such matters represent a great *leitmotiv* of Mesoamerican writing.

Mesoamerican writing achieved its greatest development among the Maya who perhaps developed the only "true" hieroglyphic script of the ancient New World. Maya writing was employed for calendrical notation and astronomic or, better, astrologic emmendation, but also in formal historical texts glorifying exploits of the dynasts. We have no evidence of Maya writing in more profane contexts, such as temple accounts or commercial transactions, although our view could well be biased by the limitations of archeological survival—in this instance, primarily monumental texts.

Elsewhere in Mesoamerica, native scripts never developed as fully and have left us a far smaller corpus to testify to their former role and importance. Again, however, ritual and mantic contexts figure importantly although we do have significant examples of historical texts as well as the inventory of tribute. These sources are preserved mainly in the form of late preconquest or early postconquest native manuscripts.

The present study is devoted to the early mantic-ritual manuscripts of Mexico. It therefore excludes the three Maya ritual documents although cross references to them are sometimes provided. In addition to covering the purely religious manuscripts, mantic-ritual passages from historical manuscripts, such as some of the Mixtec codices, are included in the present work.

The study opens with a brief introduction in which matters of art style, provenience, and relationship of the manuscripts are considered. Nowotny emphasizes the importance of the manuscripts for the study of art style, drawing upon the analogy of medieval book illuminations in European art history.

There follows 67 plates which provide an illustrated inventory, together with a schematic dissection, of representative passages from the manuscripts studied. About half of the passages are selected from the Codex Borgia. Each passage receives an analytical commentary; this section might well serve as a manual and guide to mantic-ritual interpretation. The passages reproduced are selected to illustrate each of the themes of mantic-ritual subject matter catalogued in the concluding portion of the volume. Although the plates do not follow the catalogue organization, they are keyed to it by heading references.

The remainder of the study consists of an analytical outline or index of themes of mantic-ritual subject matter in the studied manuscripts. Each theme receives a brief commentary and its incidence in the manuscript corpus is listed. This outline catalogue lists all themes so far recognized while the commentary indicates the extent of present understanding of the topic. Needless to say, such a catalogue is an invaluable research tool which will greatly facilitate future codex studies.

Tlacuilolli is of great usefulness both to the student beginning in the study of native Mesoamerican documents as well as to the advanced researcher. Nowotny is to be warmly congratulated for such an effective and well executed contribution.

University of California, Berkeley
John A. Graham