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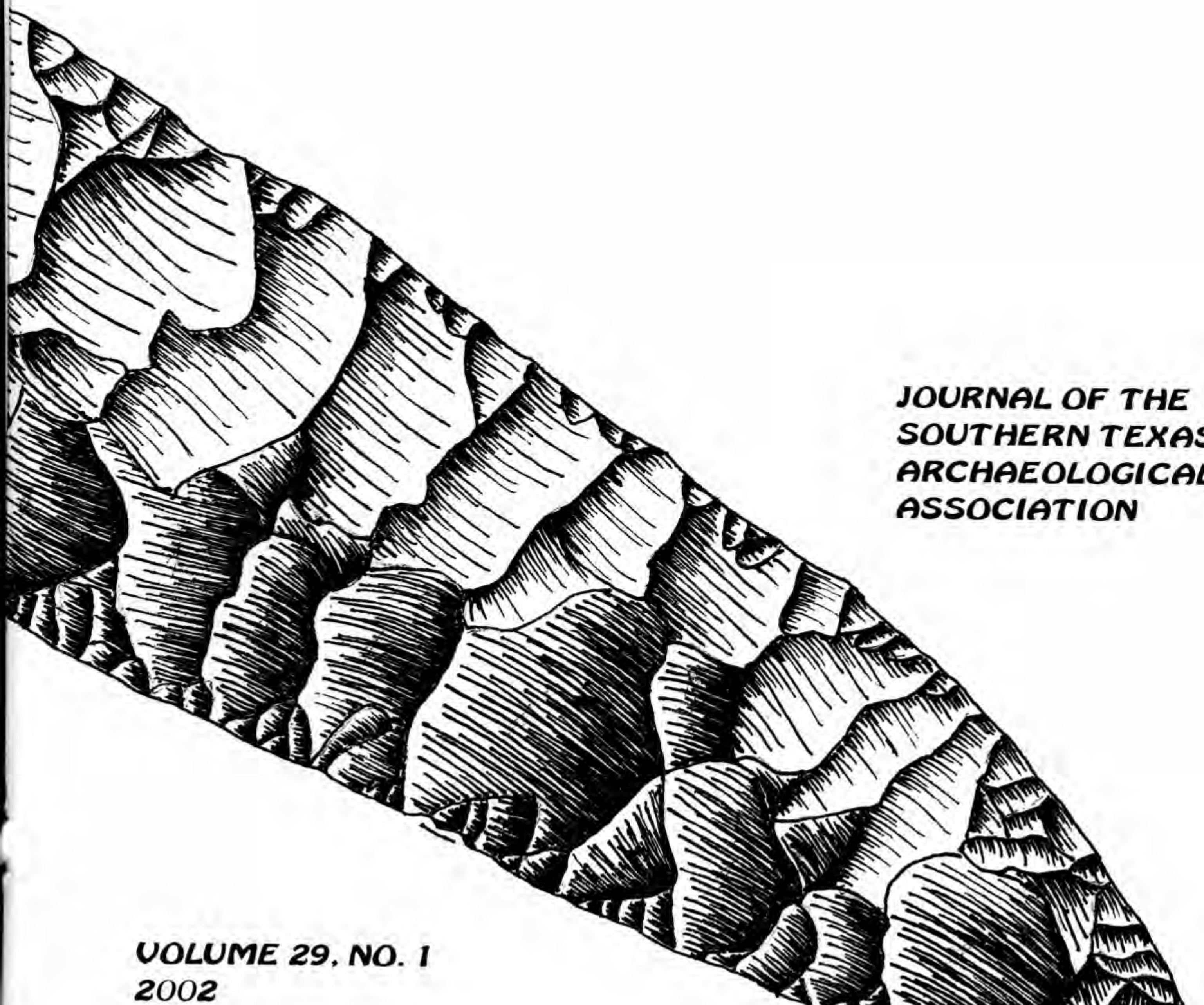

JOURNAL OF THE SOUTHERN TEXAS ARCHAEOLOGICAL ASSOCIATION

VOLUME 29, NO. 1
2002

LA TIERRA

QUARTERLY JOURNAL OF THE SOUTHERN TEXAS ARCHAEOLOGICAL ASSOCIATION

Volume 29, No. 1
2002

Thomas R. Hester
Editor

About the cover (front and back)...Large biface (full size) from 41MS67. See Lintz and Saner paper, page 12.

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Articles in *La Tierra* are now summarized in *Abstracts in Anthropology* published by Baywood Publishing Co. and are listed in *Anthropological Literature*, published by the Tozzer Library, Harvard University, an index covering anthropological literature worldwide since 1979.
La Tierra is printed on acid-free paper.
Library of Congress Catalog No. 76-649774.
ISSN No. 0163-0695
Contributions to this non-profit organization are tax deductible.

Printed by LEBCO GRAPHICS, INC., Boerne, Texas

NOTES ON SOUTH TEXAS ARCHAEOLOGY: 2002-1

An Unfinished Bannerstone from a Site in Coryell County, Texas

Thomas R. Hester

In October 1999, an artifact collector loaned to the Texas Archeological Research Laboratory (TARL), The University of Texas at Austin, an unfinished bannerstone dug earlier that year at a site in Coryell County, central Texas. The site is a multicomponent occupation locale on the Lampasas River near Kempner, Texas. Based on the detailed description of artifacts found in non-scientific excavations at the site, the deposits date mainly from Late to Early Archaic times.

The artifact described here was found at a depth of 3.5 feet, and was associated with Bulverde points. A few inches below, an Andice point was recovered. The association of the unfinished bannerstone with Bulverde points would make it at least 4000 years old, based on the chronology of Collins (1995:376), while contexts reviewed by Turner and Hester (2002: 82) suggest that Bulverde may occur as early as 4500-5000 years ago.

The Artifact

The specimen is classified as an unfinished winged bannerstone. Bannerstones occur most commonly in the Archaic of the eastern United States and are fairly rare occurrences in east and southeastern Texas (Turner and Hester 2002: 291-292). Additional comparative comments are offered at the end of this paper. In terms of function, bannerstones are thought to be spear-thrower (atlatl) weights.

This artifact (Figure 1, a-c) is made of a hard, fine-grained light reddish sandstone (identified by Dr. Michael Collins of TARL, November, 1999). When comparing the material to the Munsell color charts, it had no close match; however, the Geological Society of America Rock Chart provides a match described as "moderate reddish orange" (10R/ 66; Hue 10R). Using a digital scale, its overall weight was 138.4 grams. Viewing it as shown in Figure 1, it is 9.8 cm wide, 4.95 cm high, and has a maximum thickness of 2.7 cm. The raised area in the center of the bannerstone varies in width from 1.8 to 2.4 cm, and represents the maximum thickness of the piece (2.7 cm.); it's minimum thickness is 2.2 cm. The "wings" on either side vary in thickness from 1.4-1.9 cm. Although the artifact had been washed after discovery, there were still some encrusted areas of calcium carbonate.

Bannerstones, when complete, have a hole drilled through the central (raised) area. This allowed it either to be slipped onto an atlatl, or to be tied to it in some manner. Finished bannerstones in the eastern United States are highly variable in size and in the diameter of the central perforation. In the case of this particular specimen, there is a slight depression, resulting from a drilling attempt, at the base of the raised area (Figure 1,c). It is 85 mm in width. At the other end of the raised area, initial efforts to begin drilling were made. There is no clear indication as to what sort of tool was used in the aborted drilling efforts, though it seems that it was intended to be a biconical perforation.

There was considerable smoothing of the surface of the bannerstone, although no efforts had been made to accomplish any time of polish or other final "finishing touches." This also supports the interpretation of the specimen as unfinished.

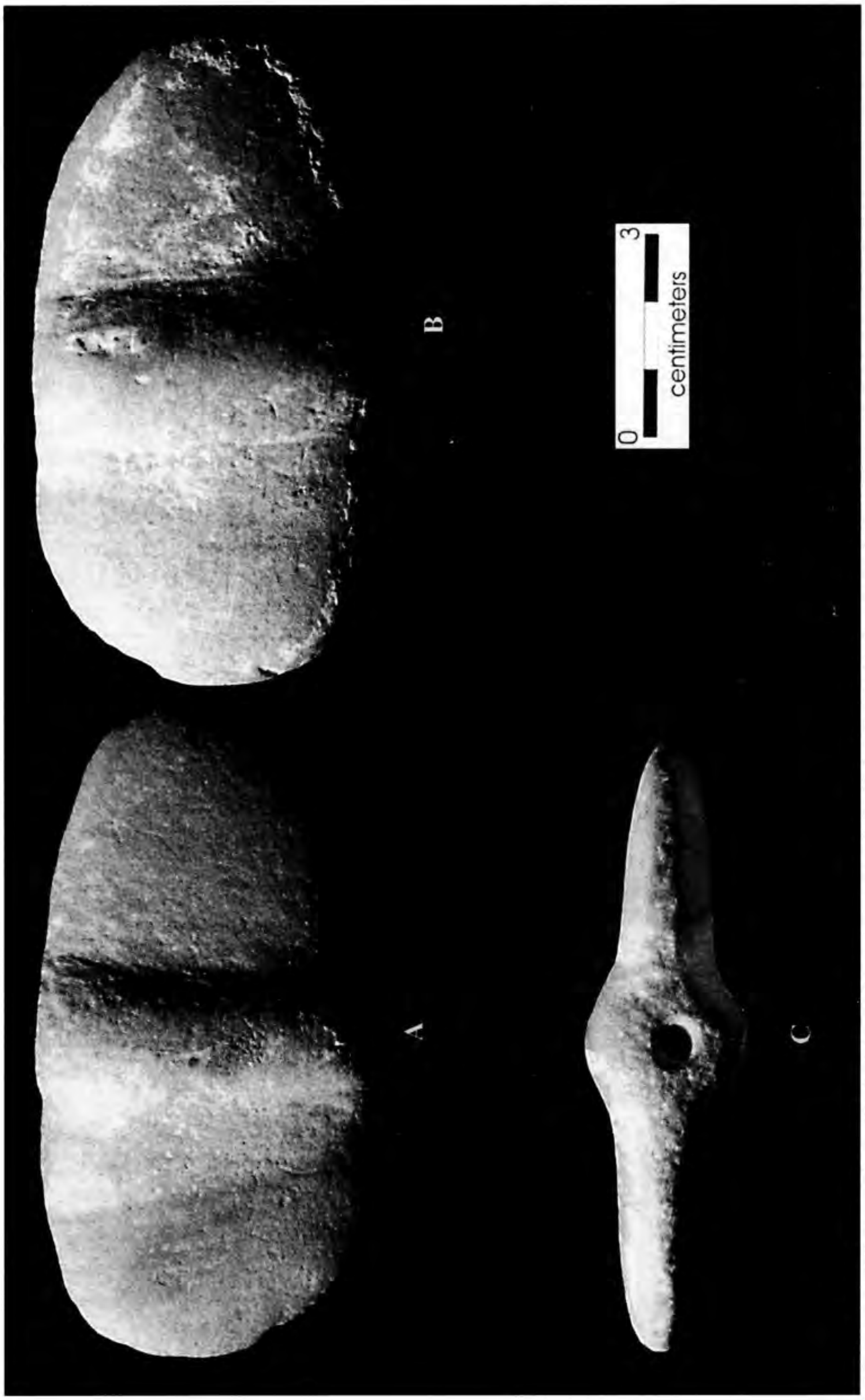

Figure 1. Views of an Unfinished Bannerstone Found in Coryell County, Texas. A, B, both sides are shown; C, end view showing initial efforts at drilling a hole in the bannerstone.

Observations and Comments

Bannerstones found in Texas rarely have any contextual placement. They are present in artifact collections, perhaps found on the surface or dug long ago and the types of associated points were not recorded or remembered. Though this artifact was excavated without the careful methods used by professional and avocational archaeologists, the discoverer was quite observant and could relay important information on its age, based on numerous Bulverde points from the "zone" in which it was found.

Half of a winged bannerstone, made from slate, was reportedly found at a site on Padre Island in Cameron County, southern Texas (Mitchell et al. 1980). It was a surface find, exposed by sand dunes. However, of great significance has been the discovery of bannerstones at the Buckeye Knoll site (41VT98) in Victoria County. The excavator, Robert Ricklis has reported (transcript of February 26, 2002 meeting, to be found at the website of the Galveston District, U.S. Army Corps of Engineers) the discovery of a variety of mortuary inclusions in a 7,000-year old cemetery. The burials are attributed to Zone 3, dating to the Early Archaic. Winged bannerstones are among the objects that have been documented, and they are obviously at least 2,000-3,000 years earlier than the specimen from Coryell County documented in this paper.

While still only found on rare occasions, bannerstones clearly extend into central Texas and the coastal plain. If the general date of the Coryell County specimen is correct, along with the radiocarbon dates from 41VT98, winged bannerstones are part of an Early to Middle Archaic "link" to the Eastern Archaic. These unusual artifacts have the potential to tell us a good deal about the exchange of ideas, trade, or perhaps the spread of cultural horizons. Hopefully, the data from 41VT98 noted here will provide additional insights upon its full publication.

ACKNOWLEDGMENTS

I want to express my thanks to Bill Arnold and Jack C. Bates for providing information on the unfinished bannerstone. Milton Bell (TARL) took the photographs used in Figure 1. Thanks also go to Michael B. Collins and Dee Ann Story for their comments on the artifact.

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THE TOYAH 1 BURIAL, FALCON RESERVOIR

James B. Boyd and Diane E. Wilson

ABSTRACT

Skeletal remains were discovered by an artifact collector at Falcon Reservoir in 1984 at a site that has yielded several burials over the last 15 years. Only the cranium and mandible were recovered, and there are parallel cut marks located on various parts of the cranium. The results of a replicative experiment, utilizing a mammal bone, unmodified chert flakes, and thin triangular bifaces, and a comparison of the cut marks suggests that the those on the recovered cranium were made with a thin chert flake.

INTRODUCTION

In the early 1980s as the water level of Falcon Reservoir, located on the lower Rio Grande, fell to record low (at that time) levels, numerous prehistoric archaeological sites located on both the U.S. and Mexican shorelines were exposed. During 1983 and 1984, significant upper portions of the Zapata Terrace (see Evans 1961:39) were suddenly exposed by the dropping water levels at the lake. Many of the sites located on these upper portions of the Zapata Terrace had Late Prehistoric period occupations (Boyd n.d.a). Prehistoric burials are often found in sites such as these (Boyd n.d.a).

In 1983, large amounts of skeletal remains were collected by the owner of a local fishing lodge in Zapata, Texas, in a site (41ZP7) just southwest of that city. These remains were later sent for study to the Texas Archeological Research Laboratory (TARL), The University of Texas at Austin (Wilson and Hester 1996:8). The following year another burial, accompanied by a large assortment of associated grave goods, was salvaged at the same site by the senior author (Wilson and Hester 1996:8). Various individuals were also finding other burials, more fragmentary in nature, mainly in several other sites in the northern portions of the lake (Boyd n.d.a). In the years following, many

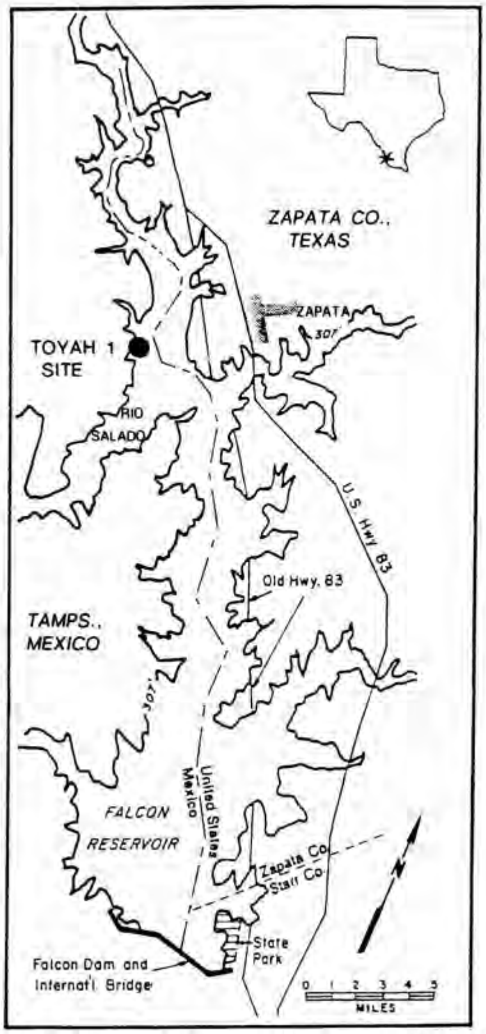

Figure 1. Map of Falcon Reservoir, showing the approximate location of the Toyah 1 site where the burial was found. Inset shows location of the area in the state.

burials were discovered, almost all of them in the northern portion of Falcon Reservoir (cf. Boyd 1996a:13-17, 1996b:42-45, 1997:8-14. 1998 11-15, 1999:4-7, 2000:45-51, n.d.b; Boyd et al. 1997:387-425; Wilson and Hester 1996). The probable reason that nearly all of them were found in the northern portion of the lake is that the Zapata Terrace was exposed along the shoreline there, while it was largely covered by the waters of Falcon Reservoir in the southern part of the lake. The lake is much wider in its southern half, where Falcon Dam is located, and it narrows considerably as one travels northward from the dam.

THE TOYAH 1 SITE AND BURIAL

The Toyah 1 site is located on a peninsular landform on the Mexican side of Falcon Reservoir, just northwest of Zapata, Texas (Figure 1). It is on the northwest edge of a tributary arroyo known locally as the Arroyo Custes. The site has been exposed to substantial wave action, and to the prevailing southeasterly wind that nearly incessantly blows in the region during the spring and summer months. The Toyah 1 site originally was named by artifact collectors from the Rio Grande Valley in the early 1980s who found large numbers of Toyah arrow points there. The site has also yielded various classes of artifacts, including dart points, spanning the time periods from the Paleoindian through the Late Prehistoric, and has been mentioned in previous reports, with other burials having been found there as well (Boyd 1996a:13-17, n.d.a; Boyd et al. 1997: 418).

In 1984 the senior author was contacted by an artifact collector, then from McAllen, Texas, regarding a burial he had found at the Toyah 1 site. The collector had recovered a skull, eroding from the archaeological deposits, but had found no additional skeletal remains. A few days later, the senior author accompanied the collector to the site in an effort to locate other associated remains. The deposits where the skull had been recovered were probed and screened, but no additional skeletal remains were encountered (Boyd n.d.a). It appeared that only the skull (and mandible) had been buried at the site. Also, no associated artifacts were found.

THE RECOVERED CRANIUM/MANDIBLE

The artifact collector kept the recovered cranium and mandible for several years, but the specimens were eventually given to the senior author so that they could be taken to TARL for examination. In 1995 the recovered remains were taken to TARL where they were analyzed by the junior author.

The nearly complete cranial and mandibular remains of this individual represent a middle-aged adult male, aged 35-49 years of age at the time of death on the basis of cranial and palatine suture fusion. The few remaining teeth were heavily worn, and there was evidence of pre-mortem tooth loss and alveolar resorption of the RI 1, RI 2, LI 1, LI 2, LM 1, LI 1, RI 1, RP 1, RP 2, RM 1, RM 2, and RM 3. The cranium and mandible exhibit several very masculine non-metric traits, including an overall rugged appearance, prominent supraorbital torus, large mastoid processes, squared and lowered orbits with rounded superior margins, laterally arching zygomatics, and a small gonial angle that flares.

A small dental abscess was present at the time of death on the superior buccal surface associated with the first left maxillary molar (LM 1). The cause of this abscess is likely exposure of the pulp cavity to infectious agents due to heavy dental attrition. A well-healed bilateral dislocation of the mandible was noted in erosion present on the mandibular fossae.

Mild porosity is present around the bregma. Although the causative agent is unknown, slight porosity present in the orbital grooves is suggestive of healed anemia.

Fine cut marks are present on the frontal, parietals, and occipital, indicating probable defleshing prior to disposal. The cut marks are often difficult to discern due to post-mortem erosion. In general, the cut marks are short and parallel and are perhaps most evident running perpendicular to the temporalis on the left parietal. The cut marks appear to have been produced by flakes rather than bifaces because they are narrow rather than broad and V-shaped. The cut marks are evident only on the cranium (Figures 2 and 3), but not on the mandible.

Figure 2. Frontal portion of the cranium showing numerous parallel cutmarks. The cutmarks are evident running from top to bottom in the photo. All photographs were taken by the senior author.

Figure 3. Parallel V-shaped cutmarks on right frontal portion of the cranium. Area shown is approximately 1.08 cm in width.

POSSIBLE REASONS FOR THE LACK OF ASSOCIATED SKELETAL REMAINS

The lack of skeletal remains other than the cranium and mandible from this burial may be due to several factors. It is possible that the skull was the only portion of the skeletal remains that was originally buried; that is, the rest of the skeleton was not buried with the skull for some reason. The occurrence of only a skull with a burial(s) in the Falcon Reservoir area has not been previously reported, although one burial without a skull was reported (Boyd 1998:11-15). As it appears the skull had been defleshed prior to disposal, this makes it unique compared with numerous other skulls in various other burials in this area and some special circumstance may be responsible for the skull being buried in a solitary context.

It is also *possible* that the skull was removed from the original (complete) skeleton at some unknown time in the past, even in modern times, and later reburied in a location away or offset from the rest of the skeletal remains. However, there is no evidence to support this.

It is highly unlikely that the collector that originally discovered the skull and mandible overlooked other skeletal remains. The surrounding deposits were examined in detail, and were later screened; no other remains were encountered. Also, it is very doubtful that other associated remains had decayed to the point of being overlooked, as the skull and mandible were in quite good condition.

Finally, it is possible that the skull and mandible may have been associated with one of the other burials documented from this site in later years, although there is no definitive proof of this. All things being equal, it is highly unlikely that this question will be resolved in the near future.

A REPLICATIVE EXPERIMENT

The senior author performed an experiment in an attempt to replicate the cut marks found on the cranium from the Toyah 1 burial. A small mammal femur (recent origin) was selected as a base specimen, as were two secondary (chert) flakes and two small, thin triangular bifaces.

The two secondary flakes varied in thickness and sharpness along their lateral edges. One was very thin and sharp, while the other was thicker and less sharp. The edges of the specimens were completely unmodified. These two secondary flakes were used to make more than 40 cuts along one side of the bone. Various degrees of pressure were used during the experiment, resulting in a substantial range in the depth of the cuts (Figure 4). The resulting cuts were very straight, and the groove of each cut is distinctively V-shaped when viewed from the side under low magnification (Figure 5). Light pressure exerted on the bone with the chert flakes produced very light scratch marks that were short and straight. During the experiment, it was noted that very minute fragments of chert were broken off the lateral edges of the flakes as the cuts were being made on the bone specimen.After a few minutes, the edges of the flakes, once smooth, had become modified substantially (Figure 6), especially on the thinner flake. It was also noted that the thinner of the two flakes was capable of making cuts that were much deeper than the thicker specimen.

When the two small, thin triangular bifaces (Figure 7) were used to produce cuts on the opposite side of the same piece of bone, different results were achieved (Figure 8). Despite the fact that various degrees of pressure were exerted when the edges of the bifaces were moved in a slicing motion across the face of the bone, the cuts produced were shallow and not straight. The width of the resultant cuts was approximately the same as the cuts produced by the secondary chert flakes, but they were considerably shallower. Also, when viewed edge-on under magnification, they did not have the distinctive V-shaped appearance. Only a minute degree of edge modification of the thin bifaces occurred during this short exercise.

The cause of the variability of cut patterning produced by the two classes of lithic specimens is a direct result of the thickness and sharpness of their lateral edges. The very sharp and thin edges of the secondary flakes produced cut marks that are straight and V-shaped in cross-section, whereas the cuts produced by the thin bifaces are much shallower, lack the distinctive V-shape, and are not straight.

Based upon evidence obtained during the experiment, it appears that the cut marks on the cranium were produced, as originally suggested by the junior author, by the use of thin chert flakes that were scraped in a repetitive fashion over the surface of the skull, possibly in an effort to remove any flesh or tissue still adhering to it. Since the apparent depth of the cut marks is minimal, even taking into account post-mortem erosion of the bone, it would appear that when this scraping motion was being performed, not very much force was being exerted on the chert flakes.

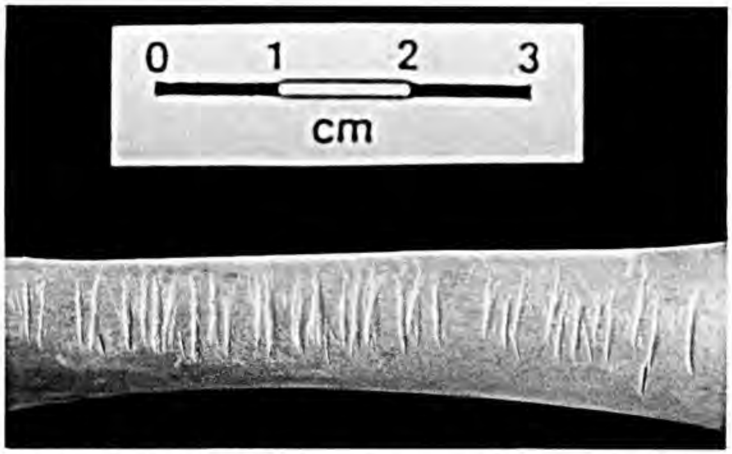

Figure 4. Parallel V-shaped cut marks on animal bone produced during the replicative experiment. The cut marks were produced by the chert flake shown in Figure 6.

Figure 5. Side view of mammal bone shown in Figure 4, detailing V-shaped cut marks produced by chert flakes. Segment shown is approximately 2.52 cm in width.

Figure 6. One of the secondary chert flakes used to produce cut marks shown in Figures 4 and 5. The edges of the flake have been extensively modified during the cutting or slicing motion on the mammal bone.

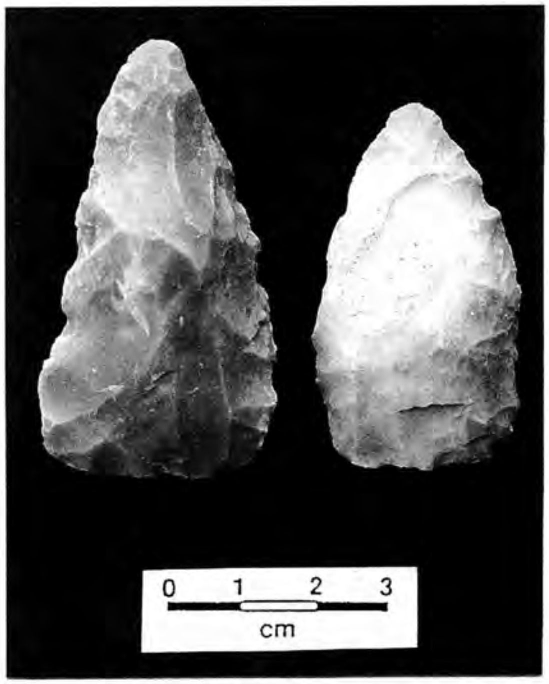

Figure 7. Two small, thin triangular bifaces used to produce the cut marks shown in Figure 8. No observable edge modification occurred during the experiment.

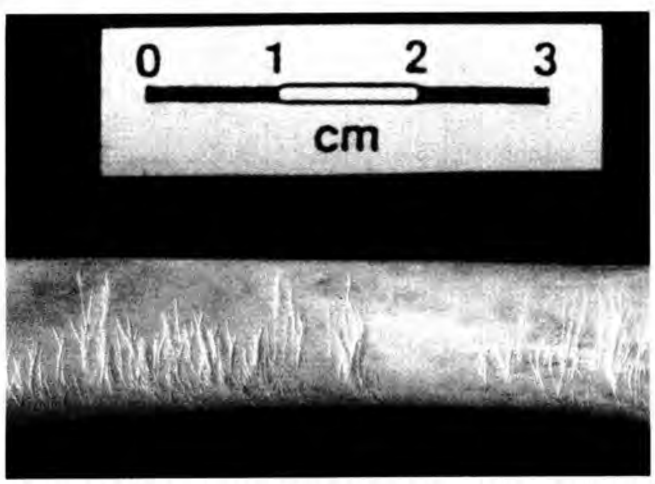

Figure 8. Shallow and irregular cut marks produced by thin, triangular bifaces shown in Figure 7.

CONCLUSION

The recovery of the skeletal remains at the Toyah 1 site in 1984 was unusual because it was the first one known in the region that consisted only of a cranium and mandible. Numerous cut marks on the cranium are apparent, and the Toyah 1 burial is the first in the Falcon Reservoir district with such marks.

These marks were likely made during a defleshing episode prior to disposal/burial of the skull, possibly through the use of chert flakes. In order to test this assertion, the senior author conducted limited testing of cut patterning on fresh mammal bone. Sharp-edged, thin secondary chert flakes, as well as thicker, triangular bifaces were utilized, and the results indicated that very thin, sharp-edged chert flakes, when used in a cutting or slicing motion with only light pressure, produced cut marks that were very similar in appearance to those on the cranium from the Toyah 1 site. Information gathered and analyzed from this burial increases the database on burials in the region, and demonstrates the diversity in the character of mortuary practices in the vicinity of Falcon Reservoir, where until recently, very little was known in this poorly studied region.

ACKNOWLEDGMENT

Thanks are extended to Dr. Timothy K. Perttula of Austin, for his review and helpful suggestions regarding this paper.

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THE HOERSTER CACHE FROM 41MS67, MASON COUNTY, TEXAS

Christopher Lintz and Bryant Saner, Jr.

ABSTRACT

Mechanical leveling of land on the outskirts of Mason, Texas, uncovered a cache of 18 very large, thin bifaces. Most are triangular to ovate in form, but one is an enormous bi-pointed specimen. Technological analysis indicates that these items are unfinished implements representing the fourth stage in Callahan's biface reduction sequence. The bifaces were made from eroded bedrock nodules of Edwards Group cherts, and were carried more than 9 km into the chert-poor region near Mason. The age, cultural affiliation and ultimate intended function of the cached items are unknown, but several options of these issues are explored in this paper.

Information presentation about this cache expressly departs from the traditional site report. Instead, data are explored using a discourse style of presentation structured to answer a series of questions about these objects. The format is designed to derive explicit inferences from the initial questions, to present data about this and other caches, and to reach interpretative conclusions about these interesting objects. We hope that by presenting information in this format, the readers gain insights into how we have reached our conclusions.

Introduction

During March of 2000, Mr. Charles Hoerster was leveling the slope of a hillside north of the city of Mason with a bulldozer to expand the storage lot facilities for his company's well pump and pipe yard (Figure 1). As the bulldozer cut into the slope, he noticed a quantity of large pieces of chert in the push-pile and stopped work to investigate. Altogether Mr. Hoerster and his son, Roy, recovered 18 large, thin bifaces from an estimated depth of about 1 meter below surface. Although none of the pieces was found in situ, Mr. Hoester believes that the pieces were from an area less than 1 meter in size. He left a low mound about 7 meters long and 3 meters wide in the yard near the area where the chert bifaces were found. The discovery of so many large bifaces together in a small area suggests that prehistoric groups who intended to retrieve them at a later time buried them at this spot. Several people, including Glen Goode, heard about the bifaces, and came to inspect the pieces. Out of concerns about possible theft, the Hoersters kept the pieces in a safety deposit box in the city bank.

During the fall, Charles and his wife, Mona, brought the bifaces to the Texas Memorial Museum, during the semiannual material identification day. He posed a series of questions about the chert items. What are these things? How were they made? Were they made at one single time? Where are they from? Why were they buried in the yard? How old are they? What were they used for? How common are these kinds of objects? And, what are they worth? Due to the number of other people in line with materials for identification at the museum, insufficient time was available to thoroughly examine and document the bifaces. Although the Hoersters had concerns about leaving them at the museum, they were willing to have archaeologists come to Mason to document the implements and inspect the discovery locality.

On February 3, 2001, the authors met the

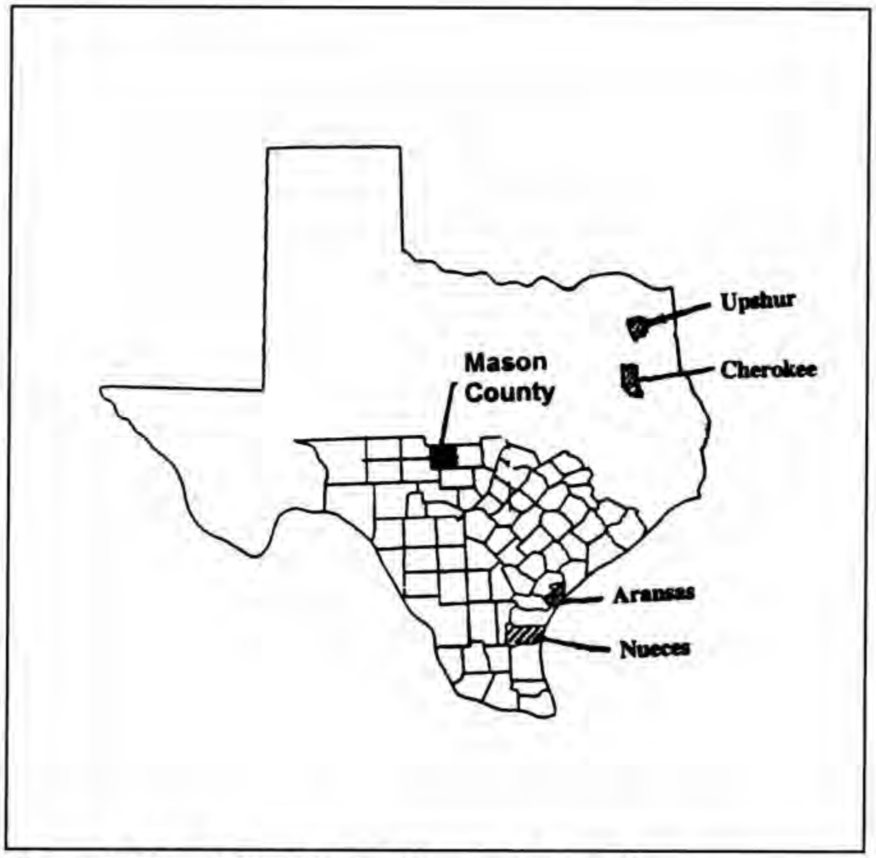

Figure 1. Map of South Texas Showing Mason County.

Hoersters in Mason and spent a delightful day recording the specimens and inspecting the find locality. Each specimen was assigned a unique number and placed in a zip-loc bag to prevent confusion about the specimens. None of the bifaces had been washed, and samples of soil from three implements were collected and kept in film canisters to provide comparisons to the soils of the site. The dimensions and weight of each specimen was obtained, and the colors of the chert, patina and cortex were recorded using a Munsell Color Chart (Munsell 1988). The pieces were photographed individually and as a collection using color slide and print film, and a full-size photocopy of each face was made to document the flake scars patterns, cortex locations, and any post-manufacture damage evident to the pieces. Later the photocopies were used to gather information about the symmetry, cortex/patina locations, widths of the specimens at quartile positions along the length, and distance from the base to the widest point on the biface, and the perimeter dimensions for potential cutting edge length. On May 9th, an opportunity arose to collect fluorescence information from 17 of the bifaces using both long and short wave ultraviolet lights. This information provides insights into the possible sources of the bifaces and about possible resharpening episodes.

A few hours were also spent during the February trip inspecting the discovery location.

All of the loose dirt from the bull-dozing operation had been removed during the intervening months . Half a dozen minuscule flakes and two fragmentary pieces of small, thick bifaces were observed that were clearly not part of the large biface collection. An inspection of the cut bank around the perimeter of the storage yard found no midden deposits, nor any in situ flakes, fire cracked rock or bone eroding from the hill slope. A State of Texas site form was completed, and the locality was assigned number 41MS67 by the Texas Archeological Research Laboratory, University of Texas. This means that the locality is the 67th archaeological site recorded from Mason County (MS) in Texas. (The 41 prefix is the numerical ranking of Texas in an alphabetized list of the 48 contiguous United States; Alaska and Hawaii became states after the system was developed).

This paper documents the biface collection and answers the questions posed by Mr. Hoerster, except for the value of the collection. Professional ethics and unfamiliarity of the trader's market prevents us from answering his last question. Mr. Hoerster was encouraged to donate the materials to a state university or museum for future study and to preserve the collection.

1. What are these things?

Inferences about the use of the biface pieces are derived from the size, form, and extent of knapping of the 18 specimens. Seventeen pieces are thin subtriangular or ovate in form and one has an exceptionally long, thin, bipointed form (Figures 2-5). Due to the differences in size and shape, the longest bi-pointed piece is discussed separately from the other 17 specimens.

<u>The Subtriangular and Ovate Specimens</u>

The seventeen subtriangular and ovate-shaped pieces are large and thin (Table 1). The size and weight means, standard deviations, and ranges for the pieces are as follows: The average length is 19.35 ± 2.9 cm (7.62 ± 1.14 inches), while the range is 14.80 to 26.4 cm (5.83 to 10.39 inches). The average width is 9.44 ± 1.7 cm (3.72 ± 0.67 inch) and the range is 7.4 to 13.3 cm (2.91 to 5.24 inches). The average thickness is 1.44 ± 0.2 cm (0.57 ± .08 inch), and the range is 1.2 to 1.8 cm (0.47 to 0.71 inch). The length-to-width ratios range from 1.51 (Specimen 16) to 2.76 (Specimen 15) and indicate that these specimens are mostly one and a half to more than two and three quarters times as long as they are wide. The average weight is 306.66 ± 92.90 grams (10.73 ± 3.25 oz), while the range is 188.9 to 543.8 g (6.61 to 19.0 oz). The total weight of the 17 sub-triangular/ovate specimens in the collection is 5,213.3 g, or slightly less than 11.5 pounds. The distance around the perimeter edge constitutes the potential cutting edge length of the specimen. These 17 bifaces have a combined potential cutting edge length of 817.5 cm (321.8 inches), and on average, each piece has 48.09 ± 6.52 cm (18.93 ± 2.57 inches) potential cutting edge with a range of 37.25 to 62.50 cm (14.67 to 24.60 inches). Although none of the pieces represents a broken segment, seven specimens (2, 3, 8, 11, 13, 15, and 16) have recently removed pieces from their edges that undoubtedly occurred during the bull-dozing activities.

Seven of the 17 subtriangular and ovate bifaces are bilaterally symmetrical (Nos. 1, 5, 10, 11, 12, 14 and 15); but the other ten are asymmetrical with mismatched lateral edges, differential rounding of the corners, and in one case, a base that diagonally slopes relative to the long axis of the implement (Table 2). All have wide bases, broad blade faces and terminate in moderately well defined distal ends.

Most of the biface forms seem to ideally range from subtriangular (widest portion near, but not at the base, cf. 10, 11, 14) to ovate (widest near the middle). Many of the ovate bifaces seem to have straight, nearly parallel

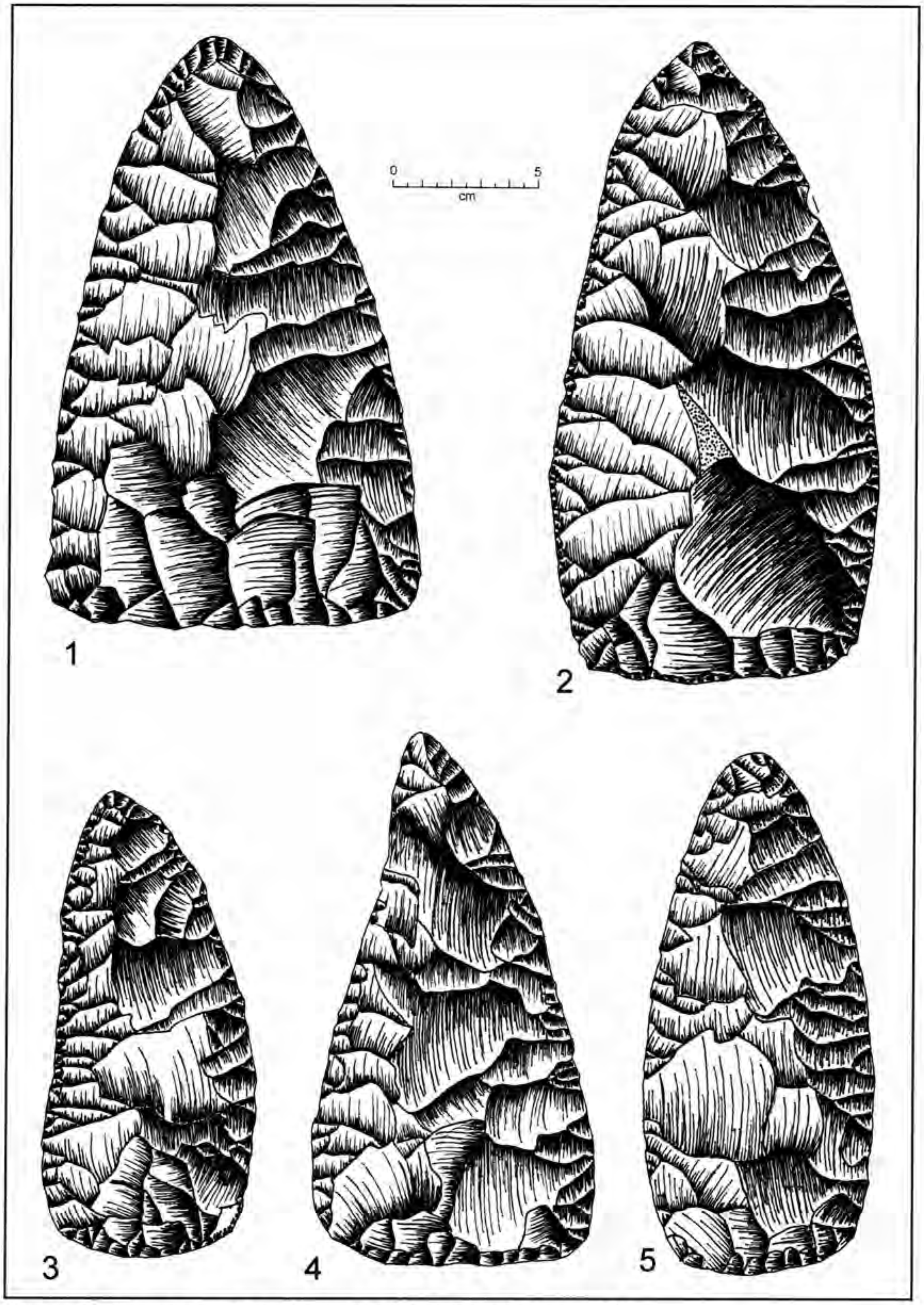

Figure 2. Drawings of the Hoerster Site Cache Bifaces 1-5.

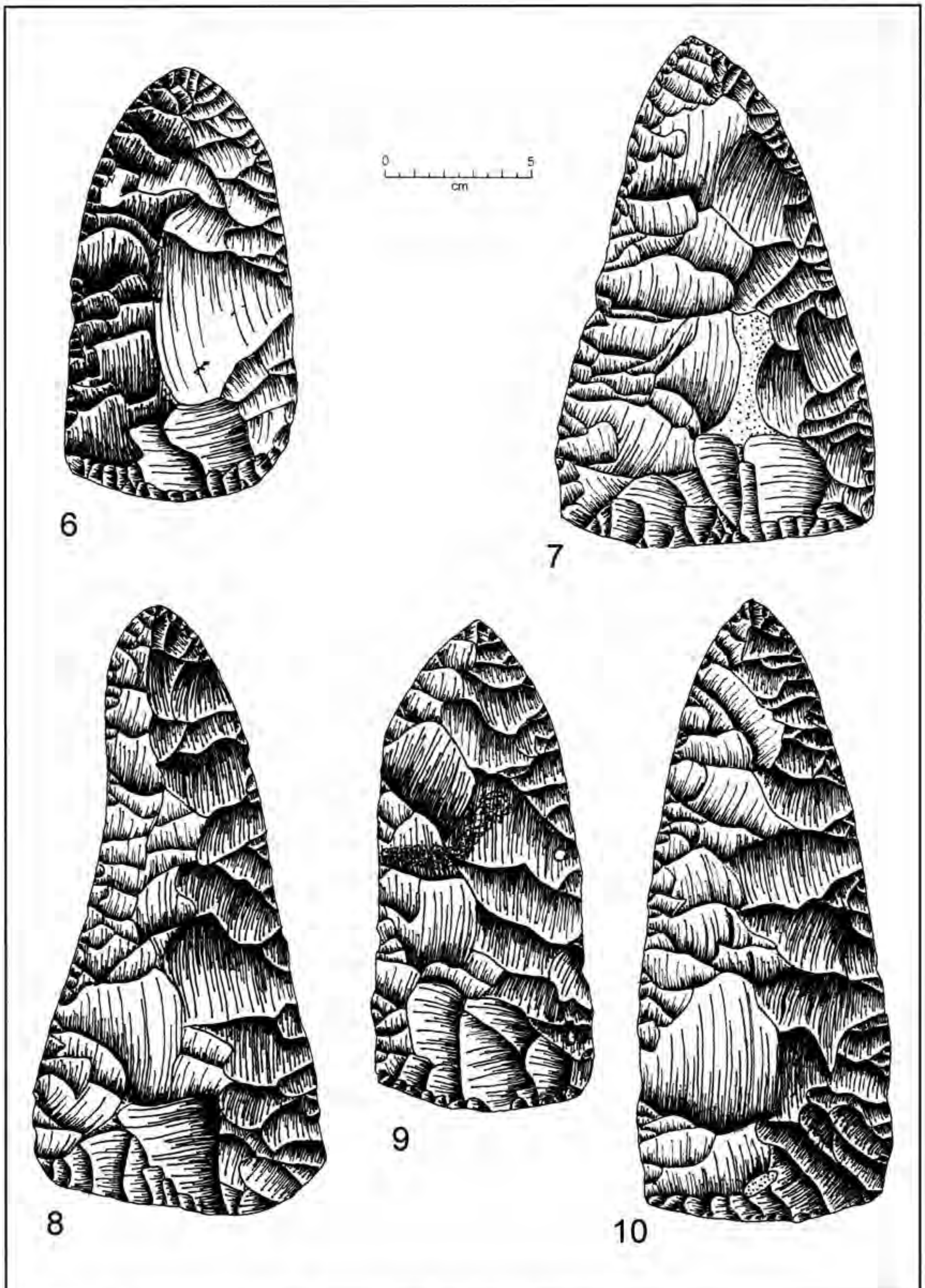

Figure 3. Drawings of the Hoerster Site Cache Bifaces 6-10.

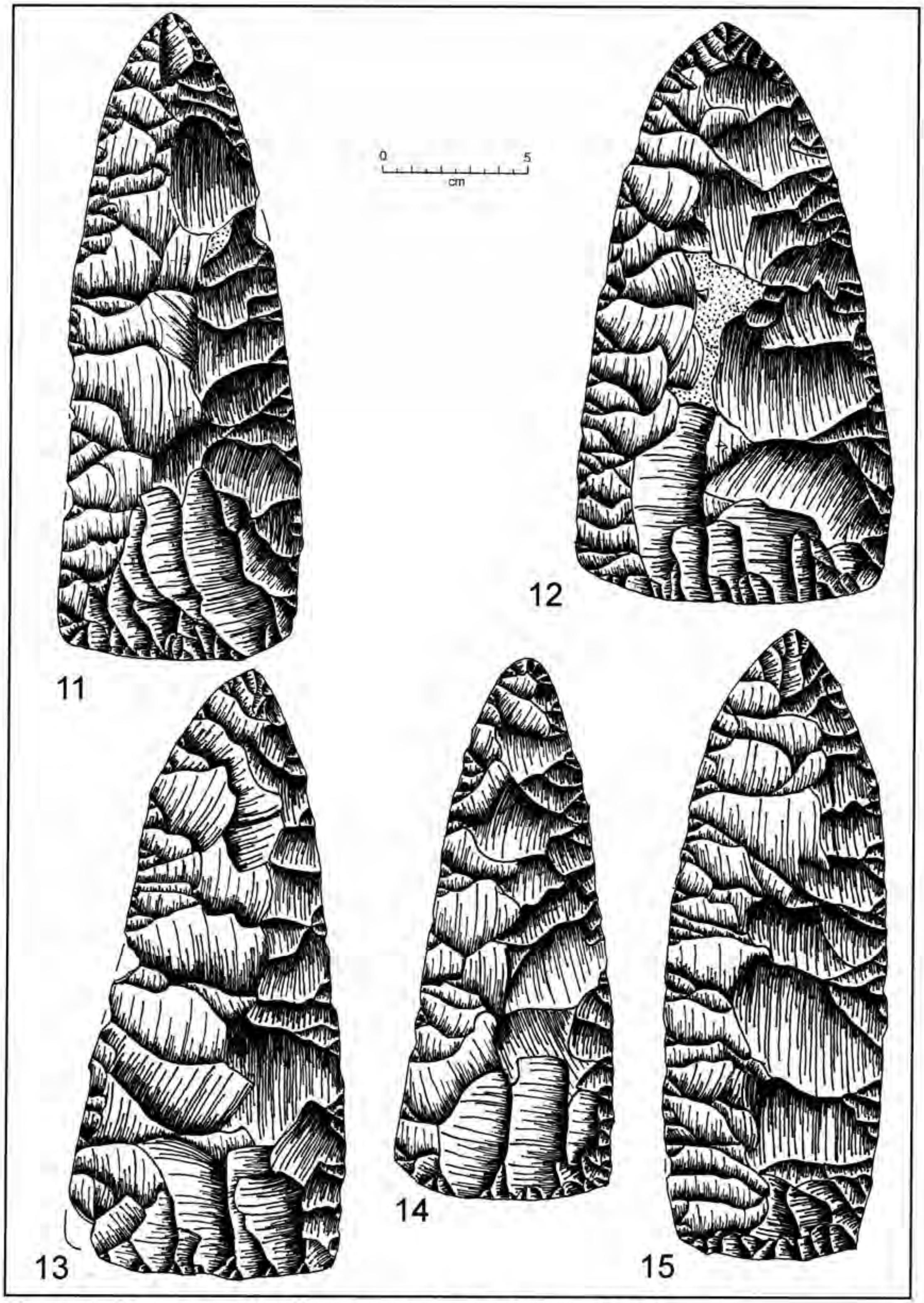

Figure 4. Drawings of the Hoerster Site Cache Bifaces 11-15.

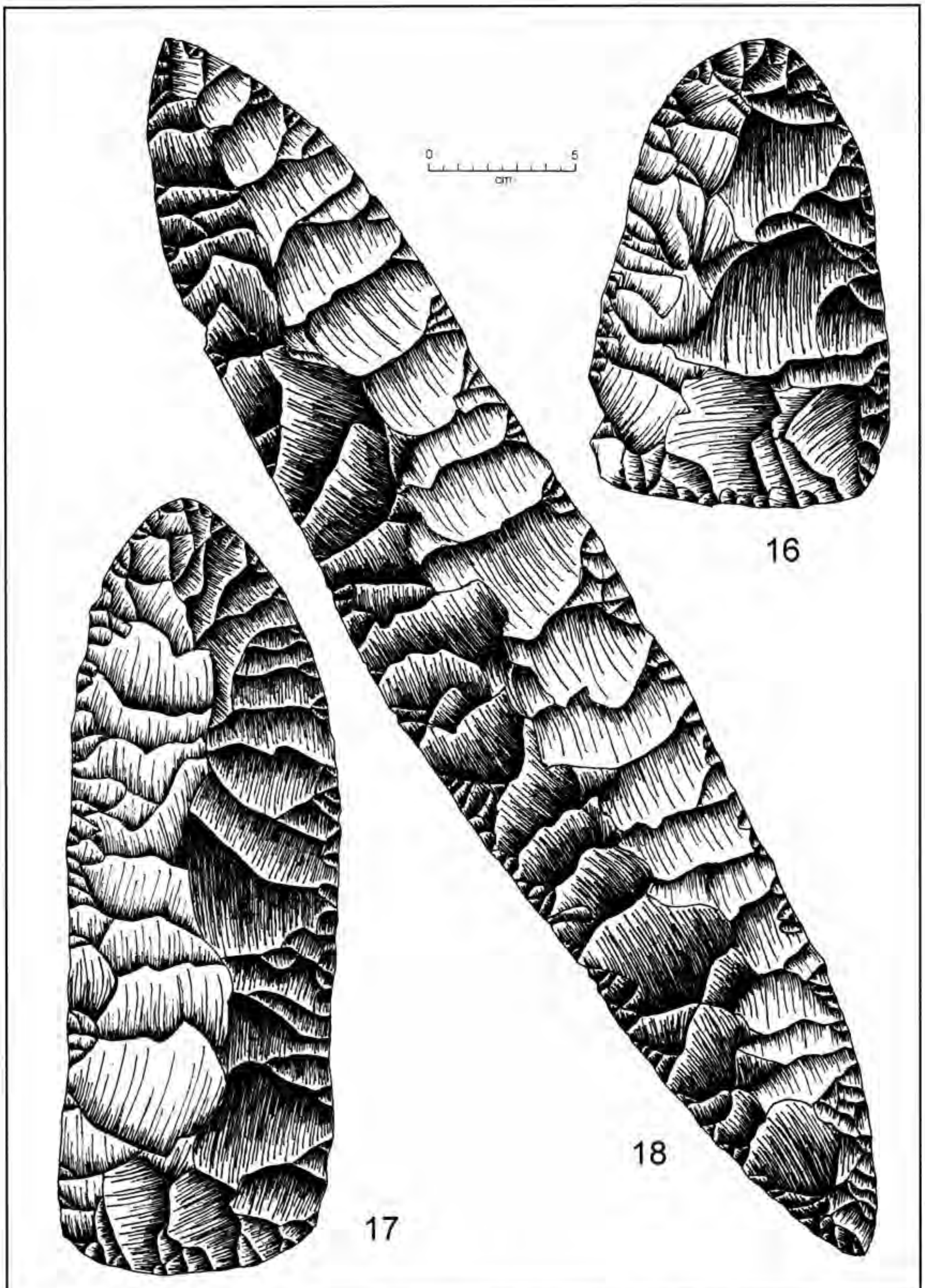

Figure 5. Drawings of the Hoerster Site Cache Bifaces 16-18.

proximal edges extending to or beyond the middle of the piece's length, then turning convex distally and ending in a moderately pointed tip (cf. 6, 9, 12, 13, 16, 17). This is evident from the percent reduction of the widths recorded at 25 percent or quartile intervals along the implement's length as measured from the base (Table 1). At a point one-quarter of the length of the implement (the proximal quartile position), the average width of the specimens is 94.4 + 2.0 percent of the widest dimension of the implement. And at the mid-point or medial part of the implement's length, the average width was 83.8 + 8.7 percent of the piece's maximum width. Even at a point three-fourths of the distance from the base (distal quartile position), the average width is still 66.7 + 11.9 percent, or almost two-thirds of the maximum width of the implement. Clearly the edges of these pieces do not constrict in a uniform manner.

Thirteen specimens have their widest dimensions within the first proximal quartile (ranging from 5.8 to 23.7 percent of the total length measured from the proximal end). The widest dimension of four other pieces (Nos. 2, 3, 5, and 15) occurs in the second quartile that ranges from 25.6 to 44.8 percent of the total length, as measured from the proximal end. One specimen (No. 17) has uneven parallel proximal edges and scores its widest dimensions at both 18.6 and 64.0 percent as measured from the proximal end.

In the order of frequency, most basal edges are semi-convex (n=7), straight (n=4), convex (n=3), slightly convex/straight (n=2), or straight but sloping relative to the long axis of the piece (n=1). Seven specimens have asymmetrical basal corners (Table 2). When each corner is scored separately, the basal corners most often tend to be rounded (n=15), or slightly rounded (n=10); whereas less common forms are sub-pointed (n=2), and pointed (n=6). One specimen (No. 13) has lost one basal corner from damage during the mechanical grading of the site and cannot be scored.

The biface edge configurations show a range of forms. Due to the asymmetrical shapes of seven pieces, each edge was characterized separately. Presented in the order from most to least common, the edge forms include straight proximal with convex distal (n=16), convex lateral (n=7), slightly convex lateral (n=4), relatively straight but undulating (n=3), straight to slightly convex (n=2), and recurved lateral (n=2). These implements have slightly sinuous (wavy or undulating) edges when viewed from the side. And all specimens have slightly to moderately ground or dulled edges, which undoubtedly is a technological remnant of the manufacturing process.

The edges of most specimens are completely chipped in a bifacial manner. But three specimens (Nos. 3, 7 and 8) have small to moderate places along their edges that retain cortex, which is part of the natural limestone rind on the chert nodule. On Specimen 3, the cortical edge is along the basal corner and measures about 1.6 cm in length. The cortex on Specimen 7 measures only some 0.4 cm in length and occurs at the pointed tip. Cortex is present at two edge locations on Specimen 8. One area located adjacent to the tip measured about 2.2 cm in length; while the other area is near the mid-blade edge on the opposite edge and measures about 5 cm in length. One interesting aspect of the cortex at the later edge position is that the shape of that edge is scored as being recurved, with the concave portion caused by the unknapped shape of the original nodule.

The distal tips are not consistent in sharpness. One specimen (No. 4) has a relatively sharp distal tip; seven specimens (Nos. 1, 2, 7, 9, 10, 13, 15) have moderately sharp tips; three specimens (Nos. 3, 11, 12) have semi pointed tips; and six specimens have rounded distal tips (Nos. 5, 6, 8, 14, 16, 17).

We could see no macroscopic evidence of wear or polish on the flake scar ridges on either face. Such wear might have been derived from

Table 1. Metric Variables of the Hoerster Cache.

Specimen	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Length to Max. Width from Base	Length to Max Width Percent	Prox 1/4 Width (cm)	Medial Width (cm)	Distal 1/4 Width (cm)	Prox 1/4 Width Percent	Medial Width Percent	Distal 1/4 Width Percent	Perimeter Edge Length (cm)	Length to Width Ratio	Width to Thickness Ratio
Trianguloid and Ovoid Biface															
1	20.2	13.3	1.3	427.9	1.8	8.91	12.2	10.5	7.3	91.73	78.95	54.89	54.00	1.51880	10.23
2	21.8	11.5	1.3	430.0	7.1	32.57	10.9	10.1	7.3	94.78	87.83	63.48	55.00	1.89565	8.85
3	16.0	7.4	1.5	188.9	4.1	25.63	7.1	6.4	5.0	95.95	86.49	67.57	39.00	2.16216	4.93
4	18.2	9.9	1.5	271.0	3.6	19.78	9.4	7.2	4.4	94.95	72.73	44.44	46.00	1.83838	6.60
5	17.2	8.1	1.2	225.8	7.7	44.77	7.8	7.7	5.8	96.30	95.06	71.60	42.50	2.12346	6.75
6	14.8	8.1	1.5	218.5	3.5	23.65	7.8	7.3	6.1	96.30	90.12	75.31	37.25	1.82716	5.40
7	17.3	11.1	1.4	315.0	3.0	17.34	10.5	8.3	5.9	94.59	74.77	53.15	46.00	1.55856	7.93
8	20.5	10.1	1.8	332.0	2.6	12.68	9.0	6.6	5.0	89.11	65.35	49.50	51.75	2.02970	5.61
9	16.8	7.6	1.6	231.3	1.8	10.71	7.3	6.9	5.9	96.05	90.79	77.63	41.00	2.21053	4.75
10	21.3	8.8	1.4	282.8	3.2	15.02	8.4	7.4	5.4	95.45	84.09	61.36	51.00	2.42045	6.29
11	22.0	8.5	1.5	332.0	3.7	16.82	8.0	7.4	5.6	94.12	87.06	65.88	52.00	2.58824	5.67
12	20.0	11.1	1.3	367.8	4.2	21.00	10.5	9.0	5.9	94.59	81.08	53.15	51.00	1.80180	8.54
13	20.8	9.5	1.4	283.1	1.2	5.77	9.0	7.3	5.7	94.74	76.84	60.00	51.25	2.18947	6.79
14	18.5	7.6	1.4	-216.0	1.2	6.49	7.0	5.8	4.6	92.11	76.32	60.53	44.00	2.43421	5.43
15	21.5	7.8	1.2	264.1	8.6	40.00	7.3	7.4	6.4	93.59	94.87	82.05	50.00	2.75641	6.50
16	15.7	10.4	1.6	283.3	2.8	17.83	10.1	8.9	7.4	97.12	85.58	71.15	43.25	1.50962	6.50
17	26.4	9.6	1.7	543.8	4.9	18.56	8.9	9.2	8.4	92.71	95.83	87.50	62.50	2.75000	5.65
					16.9	64.02									
Sum	329.0	160.4	24.6	5213.3	81.9	401.5	151.2	133.4	102.1	1604.2	1423.8	1099.2	817.50		
Mean	19.4	9.4	1.4	306.7	4.6	22.3	8.9	7.8	6.0	94.4	83.8	64.7	48.09		
SD	2.94	1.70	0.20	92.90	3.74	14.86	1.50	1.30	1.10	2.02	8.66	11.87	6.52		
Bipointed Biface															
18	47.8	9.4	1.5	757.6	22.7	47.49	8.9	8.9	7.1	94.68	94.68	75.53	98.75	5.08511	6.27
					29.0	60.67									

Table 2. Form Attributes of the Hoerster Cache.

Specimen No.	Damaged by Machinery	No. Damaged Edges	No Cortex/Patina	Cortex One Face	Cortex Both Faces	Patina One Face	Patina Both Faces	Unflaked Cortex Edge	Heat Treated	Bilateral Symmetry	Base Form	Corner 1 Form	Corner 2 Form	Side 1 Form	Side 2 Form	Tip Form
Triangular/Ovoid Form																
1		0					x			x	SCx	R	R	Cx	Cx	Pt
2	x	1		x			x				ST/SCx	R	Pt	Cx	SCx/UN	Pt
3	x	1		x			x	x			Cx	R	R	Cx	ST/UN	SR
4		0					x				ST	SR	R	Cx	RC	APt
5		0					x			x	SCx	R	R	Cx	Cx	R
6		0	x								Cx	SR	R	Cx/ST	Cx/ST	R
7		0		x			x	x			SCx	Pt	Pt	ST/UN	ST/UN	Pt
8	x	1		x			x	x			ST/SL	R	R	CC/RC	Cx/ST	R
9		0					x		x		SCx	R	Pt	Cx/ST	Cx/ST	Pt
10		0		x		x				x	SCx	SR/Pt	SR/Pt	SCx	SCx	Pt
11	x	3		x			x			x	ST	SR	SR	Cx/ST	Cx/ST	SR
12		0			x		x			x	ST/SCx	SR	SR	Cx/ST	Cx/ST	SR
13	x	4		x			x				ST	SR	M	SCx	Cx/ST	Pt
14		0				x				x	SCx	Pt	SR	SCx/ST	SCx/ST	R
15	x	1				x				x	ST	Pt	SR	Cx/ST	Cx/ST	Pt
16	x	2		x		x					SCx	R	SR	Cx/ST/UN	Cx/ST	R
17		0		x			x				Cx	R	R	Cx/ST/UN	Cx/ST/UN	R
Sum	7	13	1	9	1	4	12	3	1	7						
Percent	41.2		5.9	52.9	5.9	23.5	70.6	17.6	5.9	41.2						
			1	10		16										
Bi-Pointed Form																
18	x	2					x			x	Pt	NA	NA	SCx/UN	SCx/UN	Pt

Attribute Key:

APt	Acutely Pointed	NA	Not Apply		
Pt	Pointed	CC	Concave	SCX	Semi-Convex
R	Rounded	RE	Recurved	CX	Convex
SR	Semi Rounded	UN	Undulating	SL	Sloping
		ST	Straight	M	Missing

hafting or contract between bifaces during transport. It is possible that better lighting conditions or higher magnification power might have revealed faint scratches or polish on the flake scar ridges that might reflect either haft wear or wear and abrasion during transport.

The Bi-Pointed Specimen

The single bi-pointed specimen (No. 18) is an impressive piece, measuring 47.8 cm (18.8 inches) long, 9.4 cm (3.7 inches) wide, 1.5 cm (0.6 inch) thick (Table 1). The length-to width ratio of 5.09 indicates that this biface is more than five times longer than it is wide. The bi-pointed specimen alone weighs 757.6 g. (1.7 pounds), which brings the weight for all 18 bifaces to 5,970.9 g, or a little over 13 pounds. The length of the potential cutting edge for this specimen is 98.75 cm, or a little less than 39 inches. A small area of one edge has been nicked and damaged.

The widest part of the bi-pointed biface specimen (9.4 cm) occurs at two places located about 47.5 and 60.7 percent of the implement's length when measured from one end. The specimen is bilaterally symmetrical with one of the pointed ends being ever so slightly wider than the other. Both ends have moderately well defined points formed by slightly convex tapering sides near the ends that expand gradually along the length of the specimen to approximately the middle of the piece. Most of the lateral edges are relatively straight with slight undulations. As with the other pieces, this big specimen has slightly sinuous edges when viewed from the side, and all edges are slightly-to-moderately ground. No cortex occurs along any of the edges.

In summarizing what are these things, present evidence suggests that they are not finished tools. This conclusion is based on the large sizes of the bifaces, the high percentage (66 %) of specimens with bilateral asymmetry, remnants of the original cobble cortex on the edges of three of the subtriangular/ovate specimens, the slightly sinuous edge configurations and slight-to-moderate ground and dulled edges on all specimens. Instead, most, if not all of these items are probably lithic biface blanks or preforms that were shaped and thinned to reduce weight for transport and maximize the potential use of the objects. It would take very little additional knapping effort to remove the ground and dulled edges and have a sharp, serviceable implement that could be fashioned into a multitude of cutting, slicing or sawing tool forms.

The bi-pointed specimen is very thin, well shaped and is, frankly, impressive by its size. But it also has slightly sinuous edges and slightly-to-moderately ground and dulled edges around the entire perimeter. Consequently, it is also probably not a finished implement.

2. How were they made?

We choose to reformulate this question to ask 1) what kinds of materials were gathered to make these bifaces, and 2) how were they worked down to their present biface form. Inferences about the manufacturing methods are based on the cross sections of the overall bifaces, the locations of cortex and patina on the faces, the length-width and width-thickness ratios of the pieces, the treatment of the biface edges, the size of flake scars on each face, and impressions based on the depths of the negative flake scar bulb from the flake scars.

Bifaces are generally made by striking a nodule of chert with either a hard object (usually a rock hammerstone) or a softer object (wooden or antler billet) and driving off spalls or flakes. The technique of fashioning stone tools by striking chert is called percussion knapping. Bifaces can be made from either whole chert nodules, portions of chert nodules, or large flakes struck from massive chert cores. The splitting of a chert cobble or removing flakes from a large core typically leaves the resulting biface with a plano-convex cross section. The dorsal surface from the outside of the nodule or prior flake removal in the case of a core is typically domed, and the ventral surface is flat to concavo-convex where the nodule was spilt or the flake removed from the core nodule. Subsequent reduction stages involved in working the split cobble or flake are apt to encounter problems in removing long flakes from the ventral surface, such that the final bifaces often show the distinctive longitudinal curve of the flake, and/or remnants of the original ventral flake surface.

A second line of evidence for the method of biface manufacture is based on the presence and locations of cortex and patina on the surfaces of the bifaces. A brief discussion of cortex and patina is presented as background for addressing the problem. Chert is a precipitate that forms as nodules or beds in sedimentary rocks and is harder than the surrounding deposits. It can occur as massive and extensive beds, as lenticular nodules parallel to the bedding plane of the limestone, or as amorphous nodules that cross-cut the bedding planes (Kibbler 2000:210). Over time, the nodules may erode free of the bedrock and in some areas of central Texas loose chert cobbles cover the ground surface for easy gathering and use (Fredrick and Ringstaff 1994). The rough surface of chert nodules forming the transition from limestone is called cortex. The chemically altered and discolored chert that occurs beneath the cortex or on exposed knapped surfaces is called patina (Ludke 1992). Many chipped stone artifacts also develop patina from ultraviolet exposure from lying in the sun on the surface of sites. Generally, if patina develops after an artifact is made, the discoloration tends to be cloudy or irregular across the face of the implement, and often one face will be more discolored than the other. However, if the patina is a remnant of the chemical alteration of the chert matrix below the cortex, then the discoloration is apt to be a markedly different color (either lighter or darker) and have fairly abrupt boundaries that may or may not coincide with flake scars.

A third line of manufacture evidence is based on the stage of biface manufacture (Callahan 1979; Muto 1971; Newcomer 1971; Waldorf 1984). Callahan (1979:36-125) defines nine distinct stages of a continuum in the strategy of converting chert pieces into fluted paleo-Indian projectile points; the first five stages are applicable to the production of general bifaces. The five stages reflect changes in reduction goals and sometimes changes in the use of specific fabrication tools (hammerstones and billets) needed to accomplish the goal. But as the chert piece passes through the successive sequential stages of cobble reduction, and as more flakes are removed from the implement, it develops a thinner profile or cross section (progressively increasing width-to-thickness ratios). At the same time the edge angles decrease, and the edge sinuosity is reduced towards a more regular and straighter line when viewed from the side. Indeed, the width-to-thickness ratios are commonly used to characterize a manufacturing stage. The following are Callahan's (1979) stages that are traditionally, although not universally used in making bifaces:

> <u>Stage 1</u> involves the procurement of raw materials (nodules, split cobbles or large flake blanks) suitable for biface reduction. Materials in this stage may show the removal of a few flakes that reflect the testing of the piece for chert texture, quality and or the presence of flaws. There is generally no attempt at thinning or shaping the pieces, and the form reflects largely that of the original nodule or flake blank selected for reduction.

> <u>Stage 2</u> involves initial edging around the perimeter of the piece to create a bifacial edge. This stage is accomplished

by percussion flaking often using a hammerstone. A flake scar on one face becomes the striking platform for removing a flake on the opposite face. The bifaces are irregular in form and largely reflect the shape of the original nodule or flake blank. These items have very sinuous edges and thick cross sections. Width-to-thickness ratios are often less than 3.0, and edge angles generally range between 55° and 75°.

Stage 3 involves primary thinning of the piece using hammerstones. The edges of the flakes are manipulated to set up platforms to drive off flakes that extend beyond the centerline of the biface. This is often accomplished by setting up a striking platform behind ridges between flakes on the opposite face and using that ridge to channel the fracture energy towards the midline of the piece. Flake scars are large, and if hard hammerstones are used, then the scars will have pronounced concavities or negative bulb indications near the points of impact. Shaping and symmetry considerations are generally not evident, and the edges are moderately sinuous. The width-to-thickness ratios are often between 3.0 and 4.0, and the edge angles tend to be 40° to 60°.

Stage 4 involves secondary trimming, initial attempts at shaping, and further thinning that often uses a soft hammer billet. To reduce these thinner pieces, the knapper must pay particular attention at setting up platforms, prior to executing the blows. Typically minor flakes are removed at steep angles to create a striking platform that is closer to the face where long thinning flakes are to be removed, and the edges are ground with a stone or other abrasive materials to enhance stabilization prior to delivering the blow that often extends beyond the midline of the biface. Thinning flakes removed by billet or soft hammers tend to be flatter and with less salient bulbs of percussion than flakes removed with hard hammers; accordingly, the negative flake scars on the bifaces shaped by percussion tend to be relatively broad and flat. The biface pieces often take on a simple geometric form by this stage. With the continual flake removal, the edge profile becomes slightly sinuous to regular. The width-to-thickness ratios typically range between 4.0 and 5.0, or more, and the edge angles range between 25° and 45°. These items are often regarded as thinned preforms dressed for either long distance transport, or suitable for working into a specific tool form.

Stage 5 involves the transformation of preforms into specific tools using pressure flaking (rather than percussion) by the creation of notches, serrations, or further shaping into specific kinds of formal tools. In general, the pressure flaking technique produces smaller, narrower and more delicate flake scars.

From the foregoing synopsis of the reduction stages, the critical observations used to identify the methods of manufacture of the Hoerster cache pieces involve several attributes. These include the overall cross sections of the pieces, presence and locations of cortex and patina, the width-to-thickness ratios, the treatment of the biface edges, and both the size and relative flatness of the negative thinning flake scars.

All but Specimen No. 6 of the subtriangular or ovate pieces and the bi-pointed bifaces have slightly biconvex cross sections, with slightly sinuous non-twisted alignment of the edges and flake scar removals extending nearly across both faces. Even Specimen 6, with the noticeable twist to the blade, has thinning flake scars originating from both lateral edges. Even though some pieces have cortex or patina, none shows remnants of a large dorsal flake surface. This suggests that most of the Hoerster bifaces are made from separate chert nodules and not from large flake blanks struck from cores, or split cobbles.

Supporting evidence about the form of the original nodules comes from the occurrence and locations of cortex and patina. Weathered limestone cortex is present on ten specimens, and all but one specimen (No.6) has patina on one or both faces (Table 2). The occurrence of cortex on both faces of Specimen 12, and the occurrence of cortex along the edges of three implements (Nos. 3, 7 and 8) clearly indicates that they were fashioned from separate whole chert nodules that were only about 2 cm thick. Twelve of the 17 specimens with patina have it on both faces. In all cases, the patinas are marked by an intense color change limited to restricted areas, and thus probably reflect chemical alterations near cortical surfaces rather than forming after the bifaces had been shaped. Taken together, the lines of evidence from the cross section and cortex/patina suggest that most bifaces in the Hoerster collection were made from separate chert nodules. The single exception may be Specimen 6, which is the only specimen lacking patina/cortex and has a marked twist to the blade. It is possible that this one piece was made from a large flake blank.

The manufacturing stage represented by these bifaces is gleamed from the width-to-thickness ratios, the edge preparation, and the nature of the thinning flakes scars on the bifaces. Overall, the bifaces are very thin with width-to-thickness ratios ranging from 4.75 to 10.23 (Table 1), suggesting that they represent Stage 4 biface preforms. Supporting evidence for this stage assignment comes from the large, tabular flake scars on the bifaces. The presence of tabular thinning flake scars often measures 3.2 to 6.1 cm long by more than 2.1 to 4.4 cm wide. The lack of salient bulbs suggests that they are thinning flake scars derived from soft billet percussion. The slightly sinuous biface edges and the occurrence of slight-to-moderate edge grinding around the perimeters of the implements further supports Stage 4 production.

Some special knapping concerns may have faced the maker of the large bi-pointed biface, No 18. At face value, the length of the specimen at almost 49 cm is mostly a function of the size of the nodule selected for reduction. Virtually all flake scars originate from the lateral edges and must extend less than 5 cm to pass the midline width of the specimen. Thus, the longer biface would follow the same knapping procedures and would be limited only by the length of the original cobble selected. However, in practice, knapping long bifaces presents special concerns for supporting the entire piece for each and every percussion blow in order to absorb and attenuate rebounding shock waves reverberating throughout the piece. If the long biface is not supported for its entire length against the knapper's leg or other firm, cushioning material, then, depending on the geometry of the piece, the shock waves may culminate in an unanticipated fracture causing the end of the piece to fall off. Such end shock problems are less of a concern for smaller pieces.

In summarizing how the bifaces were made, it seems likely that most bifaces were made from thin, possibly ovate chert nodules that had eroded free from the limestone bedrock. This conclusion is based on the cross section geometry and cortex/patina locations on most specimens. One possible exception is Specimen 6, which has a twisted form and lacks cortex/patina; it may have been fashioned from a large flake blank struck from a core or nodule. The bifaces generally represent Callahan's Stage 4 of production, and have been thinned and shaped by soft billet percussion into roughly finished pieces that show some asymmetry in form.

3. Were they made as a single manufacturing episode?

Inferences about the number of manufacturing episodes are based on two factors. One is the diversity of chert resource materials as indicated by natural and fluorescence colors of chert, and the other concerns observation regarding the treatment and chert preparation of the nodules prior to knapping.

Chert colors are derived from impurities, the kind and size of mineral trace elements and water inclusions embedded in the silica dioxide acquired either during the formation process or from subsequent exchange of water in the stone (Ludke 1992:66). A single geological formation may express stratigraphic or lateral facies changes in the colors of chert within a region. For example, studies of chert diversity conducted on Edwards Group limestones at Fort Hood have discerned 26 relatively distinct chert "kinds" based on color, texture, translucency and these have been organized into four principal geographical provinces within the 883 km^2 (339.6 mi^2) training range (Abbott and Trierweiler 1995; Tomka 1996). The differences among these kinds of cherts were sufficient to allow archaeologists to have some degree of confidence in tracing group movements around the larger region based on the kinds of chert types found at various sites and recognizing the distances/directions of chert flakes from their source areas. Unfortunately, no studies have been conducted on other Edwards Group cherts near Mason County to determine whether comparable degrees of variability occur elsewhere across this expansive formation. Edwards Group cherts are primarily derived from the Fort Terrett and Segovia Formations of limestone that covers an extensive region from Del Rio, east to San Antonio, northwestward through Fredericksburg to Big Springs, and southwestward to Fort Stockton and Sanderson; it also occurs in a linear band coinciding with the Balcones escarpment stretching from San Antonio eastward to New Braunfels, then northward near Austin to an area just north of Waco (Frederick et al. 1994). Not all areas of the Fort Terrett and Segovia formations yield chert, however. The occurrence of very different natural and fluorescence colors of chert among the bifaces in the Hoerster cache suggests that the raw materials were not all collected from a single source at the same time (Table 3).

In addition, most prehistoric people in North America learned that the knapping quality of chert could be improved by heating the nodules under controlled conditions (Ludke 1992:99-107). The improved knapping capabilities occur when chert cores, nodules, preforms, or flake blanks are gradually heated by being buried under hearths, protected by sand layers within earth ovens or placed directly on white ashes of a dying fire. The process of heat treatment may take from a few hours to more than a day to accomplish. When chert is slowly heated to temperatures between 250 and 450° C and then slowly cooled, changes occur in the mineralogical, visual and mechanical properties. Mineralogical free water and some kinds of impurities are oxidized. Often heat-treated chert is easily recognized by a reddish hue and glossy texture. The latter characteristic is attributed to changes in the micro structural features that allow knapping fractures to cross through quartz grains, rather than pass around them. Thus, the recognition of heat-treated specimens among a group of non-heated specimens indicates a different degree of treatment prior to extensive knapping. And the time and labor involved in heat treatment suggests that not all pieces were collected and knapped during a single event.

An examination of the natural chert color data from the Hoerster cache bifaces shows that six specimens have uniform or homogeneous colors (Nos. 4, 8, 11, 12, 14, and 16; Table 3).

Table 3. Chert Color Variability of the Hoerster Cache

Subtriangular and Ovoid Bifaces				Interior Color				Patina/Cortex Color		Value	Chroma
Specimen Number	Speckled	Crystals, Inclusions Seams	Banded Mottled	Munsell Color	Name	P*	C*	Munsell Color	Name	(light+/ dark-)	(intensity)
1	x			10YR5.5/2	lt. grayish brown/ grayish brown	x		10YR 7/1.5	lt. gray	+ 1.5	- 0.5
2	x		x # 2 band	10YR5/1 & 10YR5/2	gray grayish brown	x	x	10YR 7/1	lt. gray	+ 2	0
3	x			10YR 5.5/2	lt. grayish brown/ grayish brown	x	x	10YR 6.5/6	brownish yellow/ yellow	+ 1	+ 4
4				10YR 5.5/2	lt. grayish brown/ grayish brown	x		10YR 6.5/2	lt. grayish brown/ lt. gray	+ 1	0
5	x		x #5 band	10YR 5/1 & 10YR 3.5/4.5	gray dark yellowish brown	x		10YR 8.5/2	white	+ 3.5	+ 1
6		x		10YR 6.5/1	lt. gray			na		na	na
7	x		x # 7 band	10YR 5.5/1 & 10YR 4.5/3	gray brown	x	x	10YR 7/2	lt. gray	+ 1.5	+ 1
8				10YR 4.5/1	gray/ dark gray	x	x	10YR 7.5/2	white/ lt. gray	+ 3	+ 1
9		x	x # 9 band	5YR 6.5/2 & 2.5YR 6/2	pinkish gray pale red	x		10YR 5.5/4	lt. yellowish brown/ yellowish brown	- 1	+ 2
10	x		x # 10 band	10YR 5/2 & 7.5YR 4/4	grayish brown brown/ dark brown	x	x	10YR 7.5/1	white/ lt. gray	+ 2.5	- 1
11				10YR 4.5/2	grayish brown/ dark grayish brown	x	x	10YR 7.5/1	white/ lt. gray	+ 3	- 1
12				10YR 7/1	lt. gray	x 	 x	10YR 5/6 10YR 7/3	yellowish brown very pale brown	- 2	+ 5
13			x # 13 band	10YR 5/2 & No data	grayish brown	x 	 x	10YR 7/2.5 10YR 7/3	lt. gray/ very pale brown very pale brown	+ 2	+ 0.5
14				10YR 4/1	dark gray	x		10YR 7.5/1	white/ lt. gray	+ 3.5	0
15	x			10YR 5.5/1	gray	x		10YR 7/1	lt. gray	+ 1.5	0
16				10YR 7/1	lt. gray	x	x	7.5YR 7/5	reddish yellow	0	+ 4
17				10YR 7/1	lt. gray	x 	 x	7.5YR 5.5/6 7.5YR 7/6	reddish yellow/ strong brown reddish yellow	- 1.5	+ 5
Bi-Pointed Biface											
18	x	x	x # 18 band	10YR 6.5/1 & No data	lt. gray	x		10YR 7.5/1	white/ lt. gray	+ 1	0

* P=patina, C=cortex

Three have mottled or blotchy color patterns (Nos. 2, 13, 18), and four have subtly broad banded color patterns (Nos. 5, 7, 9, 10). Eight specimens have mostly a uniform or mottled/banded color patterns with tiny fine speckles (Nos. 1, 2, 3, 5, 7, 10, 15 and 18). One specimen (No. 6) has a homogenous color and small crystal inclusions, and the bi-pointed piece (No. 18) had a seam of clear material oriented diagonally across one face.

Most of the natural colors are yellowish brown hues (10YR), with higher values (lighter shades of gray) and lower chromas (color intensities; Table 3). Typically these colors keyed out as light gray (n=5), gray (n=4), light yellowish brown to grayish brown (n=3), or grayish brown (n=3). The broad banded or mottled pieces tended to be in the range listed above, but also grade into cloudy areas of brown, brown/dark brown, very dark brown, or dark yellowish brown. The range of variation in most colors and patterns may potentially be within the minor variability found in a single lithic source province.

Patina and cortex are present on all but one specimen, Number 6. And of the 17 pieces with patina, the intensely discolored area is nearly always limited to specific areas with abrupt limits. This kind of patina is believed to reflect the chemical weathering that occurs adjacent to the cortex. In all but one instance (No. 12), the patina and cortex colors are lighter than the natural chert colors. The patina and cortex colors tend to be mostly white/light gray (10YR 7-7.5/1-1.5, n=10), or very pale brown (10YR 7/3, n=2). Single examples are also white (10YR 8.5/2), yellow/brownish yellow (7.5YR 6.5/6), and pink/reddish yellow (7.5YR 7/5). The overall difference in the patina and cortex from the natural flint color involves a change of 0 to 3.5 Munsell value point lightening, and for the most part either no change or a 1 Munsell chroma point higher or lower in intensity.

Two specimens stand out as exceptions for their distinctive colors and patination. Specimen 12 was made of an exceptionally light colored piece of chert, even though it keyed out to a light gray color (10YR 7/1). This was also the only piece whose patina and cortex were darker than the parent chert. The patina was a yellowish brown (10YR 5/6) and cortex was a very pale brown (10YR 7/3). These differences are in marked contrast with all other bifaces, and might suggest that it is a nodule from a different chert source from the other bifaces.

Specimen 9 was banded with a glossy sheen in colors ranging from pale red (2.5YR 6/2), pinkish gray (5YR 6.5/2), to yellowish brown (10YR 5/4); one band of matrix inclusion was a dull yellowish brown (10YR 5.5/4). The reddish color and glossy sheen strongly suggest that this piece has been heat-treated.

Fluorescence data was collected on 17 of the 18 specimens (Specimen 1 was locked in a glass case and emitted unreliable color signatures through the glass). Examination of this information indicates that the chert colors tend to emit yellowish brown (10YR) or yellowish (2.5Y) hues, with very high values (shades of light gray, approaching white), and moderate chromas (color intensities, Table 4). The value ranges of most specimens are so light that the distinctions between the hues for most specimens are meaningless and interchangeable. The chert fluorescence indicates that most bifaces emit yellow (6 under long and short wave each), pale yellow (1 under long wave, 4 under short wave), or very pale brown (9 under long waves, 6 under short waves). One specimen, No. 6, emits a noticeably different color characterized as olive yellow (long wave) or light yellow brown (short wave). In addition, the heat-treated specimen No. 9, that has a typical pale yellow fluorescence, also emits a brown/dark brown (10YR 4/3) color from an area marked by a texture inclusion difference. And Specimen 10 that emits the typical yellow hue also contains a band that is a noticeably reddish brown (5YR 7/4). Although limited studies are published on the fluorescence properties and

Table 4. Fluorescence Information on the Hoerster Site Cache.

	Chert		Patina		Break		Reworked
	Long Wave	Short Wave	Long Wave	Short Wave	Long Wave	Short Wave	
Spec-imen No.	Munsell Color Name	Munsell Color Name	Munsell Color Name	Munsell Color Name	Munsell Color Name	Munsell Color Name	
1	Not examined	Not examined	Not examined	Not examined	Not examined	Not examined	Not examined
2	2.5Y 7/6 yellow	2.5Y 7/4 pale yellow	2.5Y 8/4 pale yellow	2.5Y 8/4 pale yellow	2.5Y 7/6 yellow	2.5Y 7/4 pale yellow	Not evident
3	2.5Y 8/6 yellow	2.5Y 7.5/4 pale yellow	2.5Y 3/2 very dark	2.5Y 3/2 very dark	2.5Y 8/6 yellow	2.5Y 7.5/4 pale yellow	Not evident
4	2.5Y 8/6 yellow	2.5Y 8/6 yellow	2.5Y 8/6 yellow	2.5Y 8/8 yellow	unbroken		Not evident
5	2.5Y 7.5/6 yellow	2.5Y 7.5/6 yellow	2.5Y 7.5/6 yellow	2.5Y 7.5/6 yellow	unbroken		Not evident
6	2.5Y 6/8 olive yellow	2.5Y 6/4 light yellow brown	None	None	unbroken		Not evident
7	10YR 8/4 very pale brown	2.5Y 7.5/4 pale yellow	10YR 8/2 white	2.5Y 7.5/2 light gray/ white	unbroken		Not evident
8	2.5Y 7/6 yellow	2.5Y 7/6 yellow	2.5Y 2/0 black	2.5Y 2/0 black	2.5Y 8/6 yellow	2.5Y 8/6 yellow	Not evident
9	2.5Y 8/4 pale yellow	2.5Y 7/4 pale yellow	2.5Y 8/4 pale yellow	2.5Y 7/4 pale yellow	unbroken		Not evident
9*	10YR 4/3 brown/ dark brown	10YR 4/3 brown/ dark brown					
10	10YR 7.5/6 yellow	10YR 7.5/6 yellow	10YR 7.5/6 yellow	10YR 7.5/6 yellow	unbroken		Not evident
10**	5YR 7/4 reddish brown	5YR 7/4 reddish brown					
11	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 8/4 very pale brown	10YR 8/4 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	Not evident
12	10YR 8/4 very pale brown	10YR 7/4 very pale brown	10YR 5/3 brown	10YR 5/3 brown	unbroken		Not evident
13	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	Not evident
14	10YR 7.5/4 very pale brown	10YR 7/6 yellow	10YR 7.5/4 very pale brown	10YR 7/6 yellow	unbroken		Not evident
15	10YR 7/4 very pale brown	10YR 7/4 very pale brown	10YR 8/3.5 very pale brown	10YR 8/3.5 very pale brown	10YR 7/4 very pale brown	10YR 7/4 very pale brown	Not evident
16	10YR 8.3 very pale brown	10YR 8/4 very pale brown	10YR 4/3 brown/ dark brown	10YR 4/3 brown/ dark brown	10YR 8/3 very pale brown	10YR 8/3 very pale brown	Not evident
17	10YR 7/3 very pale brown	10YR 7/3 very pale brown	10YR 3/2 very dark	10YR 3/2 very dark	unbroken		Not evident
18	10YR 7.5/4 very pale brown	10YR 7.5/6 yellow	10YR 8.5/2 white	10YR 8/4 very pale brown	10YR 7.5/4 very pale brown	10YR 7.5/6 yellow	Not evident

9* Inclusions 10** Band

variability of Edwards Group cherts (Hofman, Todd and Collins 1991; Hillsman 1992), we think that the fluorescence indicates that nearly all of the biface nodules are from a single region. Even Specimen 12, which was distinctly whiter under natural light, emits fluorescence colors comparable to most other specimens. The single possible exception is Specimen 9, which also is the only piece lacking cortex/patina and has a twisted blade that suggests that it was made from a flake blank.

The fluorescence observations made on the 16 bifaces with patina show that most patinas emit colors similar to the chert. These include hues of yellow (3 long, 4 short wave), pale yellow (2 each long and short waves), very pale brown (4 each long and short waves) and white or white/light gray (2 long wave, 1 short wave). However, five specimens (Nos. 3, 8, 12, 16, and 17) have patina areas that fluoresce substantially darker than the chert, in hues of brown, dark brown, very dark gray brown and black. These colors are similar to the fluorescence signatures of the cortex.

The fluorescence of chert exposed in fresh nicks and breaks on eight specimens damaged by the bulldozer were found to emit colors very close to that of the older chert surfaces. Only biface No. 8 emitted a slightly lighter color than the fluorescence colors of the raw chert. Although sometimes reworked artifacts made of Edwards Group cherts emit distinctly different colors due to the removal of solar induced patina, we suspect that the lack of fluorescence color difference in the Hoerster cache specimens is due to the lack of patina development on these pieces, which presumably have been buried shortly after they were manufactured.

In summarizing the evidence about whether they were made during a single manufacturing episode, it is unlikely that the bifaces were all collected and made at one time. Even though Specimen 12 appeared under natural light to be different from most other bifaces, the fluorescence data indicate that it is from the same general source area.

The red color and glossy sheen of Specimen 9 indicate that at least one biface was subjected to the time-consuming process of heat-treatment to improve its knappability. Furthermore the fluorescence data from Specimen 6 is distinctly different and it might have been made from a large flake blank, rather than a chert nodule. These observations all suggest that individual pieces were probably made at different times and were amassed to form the present collection.

4. Where are they from?

Inferences about the source of the bifaces are based on identifying the sources of cherts in the region, and a comparison of chert colors to known kinds of chert in the region. Consulting geological maps to determine the distribution of chert-bearing deposits of known geological ages identifies regional chert sources. But the identification of source areas for the bifaces is based on comparisons of the artifact's chert color, and inclusion attributes with available information about the bedrock cherts in the region. In addition, knowing that the bifaces were knapped from large nodular chert forms also helps eliminate some kinds of bedrock chert resources.

Regional geological maps indicate that the Hoerster biface cache was reportedly recovered from an area of Precambrian rocks of the central Texas mineral region, that do not produce chert of any form (Barnes 1981). The region of the site is classified as an igneous and metamorphic area (the Packsaddle formation schist) that contains schist, gneiss, marble hornblende and quartz-feldspar and mica.

The area around Mason, Texas has many geological faults, and numerous small exposures of Upper Cambrian through Pennsylvanian age sedimentary deposits are exposed in small to moderate size areas (Barnes 1981). No fewer than 11 Upper Cambrian-through-Pennsylvanian era sedimentary formations that may contain chert materials occur within distances ranging from 2 and 20 km from the cache discovery site. Eight of these limestone formations have limited area exposures ranging from 0.5 to 5 km in diameter; except for three Lower Ordovician formation exposures that range from 4 to 30 km away and cover moderate size areas measuring about 25 km in diameter. Most of these kinds of bedrock are indurated sedimentary limestone and dolomite rocks may contain bedded black cherts, or cherty pebbles among cemented breccias, but the actual locations and nature of chert deposits within any of these areas is unknown. The extensive bedrock faulting in the region renders many of these cherts jointed and flawed, and poorly suited for making even small chipped stone artifacts. We believe that none of the cached bifaces are made from these sources due to the size of the pieces and especially the range of chert colors.

In contrast, based on color, translucency, inclusions, and fluorescence results, most, if not all of the Hoerster bifaces are made from the gray and tan cherts that commonly erode from the Segovia and Fort Terrett formations of the Edwards Group limestones (Banks 1990; Frederick and Ringstaff 1994). As previously discussed, these formations cover an extensive area and in some places, large, loose lenticular-shaped nodules cover the ground surface comparable to those postulated as the source of the cached items based on patina on both faces. The nearest Fort Terrett formation is located on the drainage divide between the San Saba and Llano Rivers, only 9 km north and northwest of the cache discovery areas (Barnes 1981). Very extensive deposits of both Segovia and Fort Terrett limestones covering hundreds of square kilometers are located 25 to 40 km to the south, west, and northwest of the reported discovery site, or from beyond the central Texas mineral region, located more than 100 km to the east. As yet the distribution of chert from this expansive area is still poorly known.

In summarizing the evidence to determine where these specimens were made, it is probable that most, if not all were made from Edwards Group cherts. Even the white specimen, No. 12, might be made of a different regional exposure of Edwards Group chert. Considering the bedrock sources of the limestone formations, it seems likely that people carried the bifaces as a package for distances ranging between 9 and 100 km or more, depending upon the direction of movement. Archaeological surveys have documented the widespread use of Edwards Group cherts for making prehistoric tools in the source areas. Most likely, the production of the large bifaces were made by hunting and gathering non-specialist knappers who opportunistically made bifaces as free-time activities embedded in periodic or seasonal movements around the region. It is clear, however, that the recovery of the cache in a chert-poor region demonstrates an intention of the prehistoric people to bring in critical chert resources to sustain their ways of life. Although such impressions apply to the subtriangular and ovate pieces, the large bi-pointed specimen seems to be of a size not well suited for routine processing activities of plant or animal resources.

5. Why were they buried in the yard?

Inferences about this question are derived from an examination of the specific reported find locality, with special consideration of the stratigraphic context of the discovery site, and the evidence of archaeological materials present. A key consideration for understanding why these materials were buried at this particular spot is the knowledge that no chert resources are available in the immediate vicinity. As discussed above, the closest sources for finding Edwards group formations that may yield lenticular chert nodules are the Fort Terrett and Segovia formations that might be located only 9 km to the northwest.

The discovery site is located on the mid-slope position of a long sweeping hill, located south of West Comanche Creek. Local residents mention that a spring or seep used to flow from an area a few hundred meters north of the discovery site. Since this location is on private land, this reported area was not visited to determine if evidence of a habitation site is present.

Soils in the discovery site's vicinity belong to the Hye-Pontotoc series that are typical of sloping upland areas (Soil Survey Staff 1978). Soils of this series are characterized by moderately deep to deep loams. About thirty-five percent of the sediments are classified as Hye soils, thirty percent are Pontotoc soils and the rest are Nebgen, Oben, and Vashti soils forming an irregular pattern. All of these soils formed in loamy sediments over sandstone.

Hye soils are found on convex slopes. The near surface sediments are brown or reddish brown fine sandy loam to a depth of 66 cm (26 inches). Below this is a layer of reddish brown or reddish brown sandy clay loam that extends from 66 to 91 cm (26 to 36 inches), and rests on unweathered sandstone bedrock about 101 cm (40 inches) thick. In contrast, the Pontotoc soils are dark reddish brown fine sandy loams found on concave slopes to a depth of 84 cm (33 inches). From 84 to 170 cm (33 to 67 inches) is dark red sandy clay loam. Weakly cemented sandstone is about 152 (60 inches) thick below this.

The mechanically cut bank around the perimeter of the storage yard measures up to 1.5 meters tall and showed three stratigraphic zones overlying the bedrock. The basal layer consisted of reddish yellow coarse sandstone with blackish manganese inclusions and some concretions. Geological maps indicate that the parent rocks at the discovery locale should represent the Packsaddle schist formation that is Precambrian in age (Barnes 1981). But clearly, the basal rocks at the discovery site are composed of medium coarse sandstone. Capping this was the lowest sediments, Zone 1, consisting of about 30 cm of in-place, decomposed bedrock or medium coarse sandy regolith. At the upper surface contact of the regolith was a line of small sandstone cobbles, that probably reflects slope wash (colluvial) gravels concentrated on an ancient surface by deflation and erosion. It is believed that the bedrock and regolith are too old to contain cultural materials

Capping the regolith is Zone 2, a 35.5-cm thick layer of moist brown loam that probably represents the native soils from a mixture of in-place development, wind-blown (eolian) deposits, and slope-washed (colluvial) sediments. No fire cracked rocks, bones, charcoal, nor chert flakes were observed in the walls of the cut bank. But this zone is undoubtedly Holocene in age and the occurrence of sparse flakes and two chunky biface fragments in the construction yard are undoubtedly displaced from this layer.

Zone 3 represents imported coarse sand fill that was deposited on existing roads and pipeline routes leading to adjacent rural residences. These deposits are probably derived from sand quarries near modern rivers and have been placed on the hill slope during the past 50 years. No cultural materials are associated with this zone.

The foregoing stratigraphic profile description shows that the bifaces were not associated with a major occupation or village site, although the presence of a few small chert flakes suggests that prehistoric peoples may have had a temporary camp or bivouac on the hill slope at various times in the past. In light of the concentration of large bifaces, it is probable that they were buried as a group in a cache. Perhaps they were even stored or hidden in a shallow pit feature. The sediments adhering to bifaces 4, 16, and 17 were composed of a yellowish brown (10YR 5/4) fine sandy silt, finer than the texture of the basal regolith that might indicate the sediments in a pit feature. Assuming that the bifaces were stacked face-to-face, and in consideration of the dimensions of the bifaces, then such a pit feature would have to be slightly bigger then 48 by 25 cm in area. If the bifaces were individually wrapped in hides and placed in a pouch or bag, then the pit may have been a little larger. But there is no clear evidence that the people responsible for hiding the bifaces were the same groups that left the few small flakes at the same location.

Other than being located a few hundred meters upslope from a reported ancient spring, there are no distinctive markers remaining on the landscape (no prominent rock outcrops, gullies on the hill slope, or marker cairn stones) that might assist a person in relocating the buried biface pieces. Of course, they might have been placed under a marking stone near an ancient trail or tree, whose evidence has vanished over time or from historic agricultural activities. It is not uncommon for some caches to be marked by a covering slab, or exceptionally large chert cores or cobbles. Such marking stones have been reported for the Spreen Site Cache (Lintz and Dockall n.d.), the Whitsett Cache (Miller 1993:145); possibly the Hart Cache #10 (Hart 1983), and Bissell Cache #5 (Miller 1993: Appendix I).

In summary to the question of why the materials were placed at this specific location, there is no unambiguous answer. It seems unlikely that the few small flakes and crude biface fragments also present around the discovery site are indicative of a substantial occupation, even through an historic seep is reported to have been a few hundred meters away that might have made this area attractive for camping. There is no way of evaluating any temporal relationship between the people who left the sparse quantity of small flake materials and those who cached the bifaces. And it is sheer speculation to argue for or against contemporaneity of cache to these other materials. There has simply been too much historical development in the area to draw any firm conclusions about any landmarks that might have aided in the retrieval of the cache.

6. How old are the bifaces?

Inferences about determining the age and antiquity of bifaces are usually derived from the context of these biface materials and their associations with datable materials, or styles of artifacts that have been dated. Less direct methods involve locating comparable forms of bifaces in dated contexts at other sites that might identify the age of these pieces.

As is often the case with prehistoric caches, no datable materials, or temporally revealing diagnostic materials were found among the Hoerster cached materials. Similarly, the bulldozing activities have removed evidence of the stratigraphic context of their original find. But even if remnants of a pit had survived, the shallow depth of the deposits and lack of other temporal-morphologically diagnostic dart or arrow forms at the discovery location hinders the direct age determination of this specific collection of bifaces. Although the age of these materials are uncertain, comparative specimens from other sites offer some insights as to the age of the cache.

Miller's (1993) study of biface caches in central Texas claims that caching behaviors span from paleo-Indian to the early Historic times, or roughly covering the last 11,000 years. However, he feels that most biface caches in Texas are seemingly affiliated with the Middle to Late Archaic and Late Prehistoric periods (Miller 1993: 42, 133). Although Miller does not provide specific ages for his ascribed periods, other researchers indicate that the time frame for periods assigned the same names may extend from 4000 B.C., or about 6,000 years ago to about 1,500 years ago (Johnson and Goode 1994; Collins 1995). Indeed for the list of 40 biface caches presented by Miller (1993: Appendix I), seven of the ten caches that are ascribed to sites with a specific cultural affiliation are identified as Archaic period campsites. In addition, two caches reportedly contained corner-tanged knives (Hart Cache #8 from Gaines County), or Pedernales type dart points (Willey Williams Cache from Travis County) and provide direct associations of Archaic materials with the biface caches. And it is indeed tempting to suggest that many of the large transport blanks from the Hoerster cache are generally shaped and well suited for making comparably large Archaic corner-tanged knives.

Furthermore, the recovery of such exotic items as large corner-tanged knives, marine whelk shell pendants, ground slate gorgets, boatstones, copper pins, and stone beads from Middle and Late Archaic burial sites in east and southeast Texas has been used to suggest that many Archaic societies from Florida to the Great Lakes were linked in the trade or exchange of prestige items (Hall 1981; Patterson 2000). Johnson (1982) postulates that these items were needed to meet religious obligations. However, to our knowledge, few reported Archaic-age sites have yielded bifaces approaching the size of the bi-pointed specimen from the Hoerster cache. A series of six bi-pointed knives of chert ranging between 17.7 and 27 cm in length and two tubular pipes were found as grave offerings in an Archaic age cemetery, 41KL4, on Padre Island (Campbell 1964; Johnson 1986: 30).

The nearly half meter long bi-pointed biface in the Hoerster cache may provide an alternate clue to the antiquity of the cache. Occasionally large, narrow and bi-pointed bifaces occur in burial contexts from Late Prehistoric period graves in the Caddoan area in northeast Texas, Oklahoma, Louisiana and Arkansas, as well as elsewhere across the southeastern United States. For example, within the lavish ceremonial and burial paraphernalia at Craig Mound near Spiro, in east-central Oklahoma, a series of 153 fragmentary and 20 complete large, thin bifaces were recovered (Brown 1976:121-134, 153-166). The Spiro Mound bifaces typically measure less than 38 cm long by less than 6 cm wide and only 1.1 cm thick and are smaller than the bi-pointed biface from the Hoerster cache. None of the Spiro Mound specimens are identified as being made of Edwards Group chert resources.

Late Prehistoric period Caddoan burial sites in northeastern Texas have also yielded large bifaces as funerary offerings, even though few have been documented in the literature. Two long, thin bifaces reportedly measuring 45 to 60+ cm long and made of black chert were looted from graves at the Sword Site, 41UR208, in northeastern Texas, located about 400 km (250 miles) from the Hoerster cache find locale (Dan Potter, personal communications 2001; Tim Perttula, personal communications 2001). Since the shape, precise metric dimensions, and material of the Sword Site bifaces are unknown, we are uncertain how they compare to the bi-pointed biface from the Hoerster cache.

Other Late Prehistoric Caddoan sites also periodically contain large, thin triangular bifaces in burial or ritual contexts that are similar in size to the majority of other bifaces in the Hoerster site cache. These other implements can occur in a number of forms and are variously called Gagahan bifaces, Mineral Springs Points, Kay points, and Ovoid bifaces (Brown 1976:121-134; Shafer 1973; Turner and Hester 1999:255). The Gagahan biface is a large, triangular, thin implement with a sharp point, distinctive recurved lateral edges, sharp corners and a straight base. The Mineral Springs points are long, broad, triangular bifaces with sharp points, straight to moderately recurved lateral edges and a wide, moderately-to-deeply concave base with pronounced corners. One of the most distinguishing attributes of the Mineral Springs point is a set of notches at the lateral edges and bases adjacent to each corner that were presumably used for suspension. The Kay points are large bifaces with sharp points, convex lateral edges, a slightly-to-moderately convex base and relatively broad corner notches that defined a moderately long stem. The Ovate biface forms have sharp-to-oval points, convex lateral edges, and ovate or straight bases. Some ovate examples with straight bases have small, shallow corner notches placed immediately adjacent to the base. Several large, triangular bifaces were recovered from the George C. Davis Mound site in Cherokee County Texas (Shafer 1973:223-233). The largest was a triangular piece assigned to a "Group 2" form that had slightly convex edges; it measured 48 cm long, by 8 cm wide and 1.5 cm thick. As many as 35 other triangular bifaces with recurved edges were classified as Gahagan bifaces; the largest measured 28 cm long, by 6.5 cm wide and 0.9 cm thick and are comparable to the triangular/ovate bifaces from the Hoerster cache. The size of the subtriangular and ovate bifaces from the Hoerster cache is within the range and general form for these other kinds of Late Prehistoric bifaces.

Although there are general size and form similarities of both the bi-pointed and subtriangular/ovate forms in the Hoerster cache with that of the Late Prehistoric implements in the Caddoan area, Mason County is a considerable distance southwest of the traditional Caddoan area. Furthermore, the recovery of these specimens from a relatively isolated cache is quite different from the grave and ceremonial contexts that yielded the large bifaces in the Caddoan area. Nevertheless, Caddoan potsherds (Poynor Engraved, Boothe Brushed, etc.) do occur in low frequencies on Late Prehistoric sites around central Texas (Ricklis and Collins 1994: 263; Suhm 1955; Quigg and Peck 1995). Their occurrences suggest that the Caddo occasionally hunted (probably bison) in the region, or maintained contacts with the indigenous Late Prehistoric age Toyah phase groups in the area. And it is possible that items contained in the Hoerster cache were shaped and thinned for transport to the chert-poor regions of northeastern Texas to meet the Caddoan need for large prestige bifaces used as symbols of social differentiation.

Large bifaces, ranging from 12 to 27 cm in length are also occasionally recovered from gulf coast area sites near Rockport and Corpus Christi (Johnson 1986). These specimens come in a variety of forms that may have some geographical differentiation. The large knives found in the area of Aransas County tend to be large, triangular, unnotched, thin bifaces with straight or recurved (Gahagan-like) lateral edges, and long corner-notched, stemmed forms; but in Nueces County, the knives tend to be unnotched lanceolate or bi-pointed forms. Although some of the archaeological specimens are attributed to the Archaic period, large knives were in ceremonial use along the gulf coast region when the earliest Spanish explorers visited the region (Johnson 1986).

In summary to the question of how old are they, there is again no unambiguous answer. There is no direct evidence from the discovery site that sheds light on the age of the cache. Although most large biface caches that have been found in areas surrounding Mason County are usually attributed to the Middle to Late Archaic period, none has been found with comparable large bi-pointed bifaces. If this is an Archaic period cache, then it may date between 1,500 and 6,000 years ago. But on rare occasions large bi-pointed bifaces as large as or exceeding the largest biface in the Hoerster cache and sub-triangular and ovate bifaces of comparable size are also recovered from burial contexts from Caddoan sites in northeast Texas, eastern Oklahoma, northwestern Louisiana, and southwestern Arkansas. At the same time large triangular bifaces are in use by hunting and gathering groups along the Texas gulf coast between the Archaic and historic periods. If these materials represent unfinished products made from the Edwards Group cherts from formations west of Mason County with the purpose for transport or trade into the Caddoan or Texas gulf coast areas, then it is possible that the Hoerster cache could be only 300 to 800 years old.

7. How were they used/What was their intended use?

Inferences about how the Hoerster cache bifaces were intended to be used are well within the realm of speculation, and are not derived from empirical attributes of the pieces themselves. Some insights into this issue are gained from the condition of the materials and their form, but most insights are based on general anthropological models and contexts of large bifaces from other sites.

Turner and Hester (1999:24-27) refer to large, early stage bifaces that are thick with moderately sinuous edges as "quarry blanks," and the thinner, later stage bifaces with more regular edges as "trade blanks." The latter name implies that the bifaces were not only thinned to reduced weight for long distance transport but were also intended to be exchanged with other groups. The weight reduction might just signify the movement of raw materials over some distance into regions devoid of chert resources. But it is entirely possible that the bifaces were meant for internal consumption by the group who made the implements in preparation for their movement into and seasonal residence within chert-poor regions. For this reason, we prefer to call these items transport blanks, rather than trade blanks, since it is not always possible to determine if the bifaces passed from one group to another.

The fact that the cached bifaces were moderately well shaped and thinned, yet contained ground edges and, in a few cases, cortical areas along the worked edges suggest that they were not finished items. Although we feel that the ground edges are a technological remnant from edge stabilization during their manufacture, the dulled edges would also minimize impact damage that might have occurred to delicate, sharp edges during long distance transport. The lack of visible haft or "bag wear" in the form of striations or polish on the flake scar ridges on each face may simply reflect the poor lighting conditions of the available examination facilities, and should not be used to argue for minimal transport distances from the place of manufacture.

If the local group intended the cached items to be used for personal consumption, we speculate that most of the cached bifaces served as a stored chert resource that was hauled to the chert-poor area of the central Texas mineral region and kept in anticipation for future use. Since the Hoerster cache does not occur at a major campsite, relatively mobile groups exploiting general resources in the region may have marked the location of the stashed bifaces in some manner for later retrieval. The cache might have served as an expedient means of resupplying or replacing worn-out gear without trekking back to distant outcrop sources. Periodically as the local group drew upon the cache to furnish bifaces needed to replace broken or worn-out implements, the number of remaining specimens in the stock reserve declined.

In this context it is interesting to note that Miller's (1993: Appendix I) survey of large thin biface caches made from Edwards group cherts contained up to 120 bifaces, of which 105 were middle to late stage bifaces (cf. Texas Ranger Museum Cache from Martin County). However, of those caches with middle-to-late stage large bifaces, most contained less than 25 pieces. This variability, coupled with the rare recovery of isolated large bifaces (Chandler 1997; Hester and Barber 1990; Assad and Potter 1979) suggests that some chert reserves are drawn upon and one or more pieces were removed for use.

Alternatively, large bifaces, such as the bipointed specimen in the Hoerster Site cache are exceptionally large and may have been too bulky for utilitarian activities. Instead, it may have been imbued with symbolic meaning. Brown (1976) regards such bifaces as "socio-technique weapons" that are non-utilitarian versions of functional edge implements. Socio-technique artifacts contain dysfunctional features in the use of either softer or more brittle materials than required for utilitarian purposes and the incorporation of superfluous attributes that compromise any presumed functional effectiveness, and the exaggeration or diminution of artifact size beyond the limits of functional utility (Brown 1976:148). Such implements serve as prestige symbols to differentiate elite individuals from commoners. Two classes of socio-technique artifacts recognized by Brown at the Spiro site include 1) ceremonial clubs (in the shapes of crown head maces, axes and swords or long, thin edged bifaces), and 2) knives and projectile points in exaggerated sizes. The sword form of clubs can occur as either bi-pointed specimens or with rounded ends. One interesting aspect of the Spiro chipped stone sword forms is that these pieces are made of cherts from Kansas, Nebraska, Illinois and Tennessee, but none of the specimens found in east-central Oklahoma are positively identified as being made from the Edwards Plateau cherts. Other Caddoan burial sites in northeastern Texas do have long sword-like bifaces made of Edwards Group cherts. The apparent need for such long symbolic bifaces occurs at distances of about 400 km (250 miles) northeast of the Hoerster cache discovery location.

Along the Texas gulf coast region near Corpus Christi, large knives were documented as in use when Cabeza de Vaca passed through the area in 1533 (Campbell and Campbell 1981:26-27; Johnson 1986). In this region that was occupied by numerous egalitarian hunters and gatherers, the chipped stone knives estimated to be up to 40 cm long were not regarded as symbols of elite social differentiation. Instead, legends among a group called the Avavares claim that a shaman named Mala Cosa ("Bad Thing") used large knives in ritual healing events that involve slight-of hand removal of diseased tissues from abdominal incisions or severed elbow joints that were then miraculously restored (ibid:27). It is clear then, that exceptionally large bifaces were imbued with magical powers that were used by shamans.

From the foregoing, it is possible that the cached items found by the Hoersters were made of chert nodules found in the vast Edwards Group areas southwest of Mason, and the cache of transport bifaces was in the process of being moved towards the Caddoan or Texas coastal areas.

In summary to the question of how they were used, or what was their intended function, we offer no conclusive answers but three possibilities arise. Either the local hunters and gatherers used the cache as a bank of raw chert resources trimmed to be fashioned into replacement implements, or the cache was intended for long distance transport out of the region to supply distant groups with stratified groups with socio-technical prestige symbols or hunters and gatherers with magical ceremonial paraphernalia. There is nothing inherent about the Hoerster cache to sway our opinion one way or the other regarding their use. The archaeological record is too imprecisely known yet to determine which alternatives are more likely. Eventually as the nature and condition of the chert resources in areas southwest of the central Texas mineral region become better understood, or as more caches from dated contexts come to light, then this issue can be examined in a meaningful way.

8. How common are caches and large bifaces?

Inference about the frequency of caching behavior is based on the theoretical literature of involving the relative degree of mobility of groups as they pass through an environment with patchy resource distributions, coupled with research on the regional literature for caches in the region. In the same manner, inferences about the frequency of large ovate bifaces are also based on the regional literature reporting the sizes and kinds of materials found in caches.

The concept of caching merely refers to the accumulation and storage of goods in hiding places for anticipated future recovery and reuse (Tunnell 1978; Miller 1993). Caches can take many forms. They may include the following:

1) Storage of food reserves or crop seed, (nuts, grains, and in some cold regions/seasons, meats; etc. (cf. Lintz and Zabawa 1984; Frison and Todd 1986);

2) Storage of raw unmodified material resources, (chert cobbles, special bow wood, bone tool blanks, etc.; cf. Calhoun 1965; Hart 1983:95; Hale and Freeman 1978:90-98; Brooks 1987:102-104);

3) Storage of reduced and shaped chert nodules (early, middle and late stage bifaces, preforms and flake blanks, etc.; cf. Miller 1993; Tunnell 1989; Mallouf 1981);

4) Storage of finished tools as specialized kits (clusters of points, end scrapers, Guadalupe tools, and mano/metate sets, etc., cf. Hester 1972; Tunnell 1978; Brown 1985; Treece et al. 1993:64; Johnson 1991);

5) Storage of finished tools as generalized tool chests, (diversified implements, etc.; cf Lintz 1981; Lintz and Dockall n.d.; Jackson and Woolsey n.d.:18-19);

6) Storage of containers (baskets, pots, and gourds, etc; cf. Dale 1973; Spielmann 1983: 264); and

7) Storage of sacred objects and treasures (turquoise, marine shells, miniature arrows, etc.; cf. Kelly 1977). Many of these kinds of caches have been found in and adjacent to Texas.

The long-term storage of specialized tool kits (i.e. manos with metates) and diversified tool chests on repeatedly occupied sites constitute part of the site's "furniture" that is fundamentally different from such logistical reserves as whole or partially reduced raw materials stashed at strategic locations across a landscape. We exclude funerary objects and dedicatory offerings from the concept of caching, since these goods are removed from social use and are not intended for retrieval or further employment.

In contrast to the storage of finished implements in tool chests and kits, the caching of whole and partially reduced knapping resource materials is a strategy prehistoric people used to reduce their risks by lessening the inequalities of raw material availability, diminishing time stress required to recover those materials, and leveling out the irregular distribution of specific resources (Nelson 1994:63). Caching of resources provides insurance against the risk of depleted reserves. Much like a bank account, people can return to a cache location and draw on hidden raw and reduced chert material reserves to resupply worn-out and depleted tools. Furthermore a few large bifaces with a generalized shape offers more efficiency to mobile pedestrian groups than the manufacture of a multitude of smaller, specialized tool forms (Morrow 1996).

The presence of caches signals that the ancient ones possessed a tactical depth of knowledge about the inequalities of resource distribution of the region and that they planned in anticipation of a return to the storage place (Binford 1979; 1989). Among nomadic hunters and gatherers, caching decisions are based on evaluating several economically based factors. These include: 1) the relative degree of group mobility and rate of site abandonment in chert poor regions, 2) the anticipated duration and season of periodic use of the region, 3) the distance or direction to/from the occupied site to the next site or resource area, 4) the nature of anticipated activities to be performed at the next site or series of sites (thus, some caches may involve storage of off-season gear), 5) the consideration of resource bulk or material size and weight, 6) the manufacture labor investment and material replacement costs, and, 7) the remnant use-life of the existing implements and gear. Archaeologically recovered caches represent static snap-shots of a dynamic prehistoric process of assembling, using and dispersing a mass of goods that are regarded as useful by the individual possessing the cache.

If intra-group exchange is anticipated, then the preparation and movement of goods beyond the primary resource procurement areas may reflect investment decisions involving the labor costs of transporting materials over long distances. The form and nature of trade materials and packaging considerations may also influence the kind of materials in the cache. In some parts of the world where face-to-face contact with alien groups is risky, stressful or inconvenient, some people practice a form of "silent exchange" by leaving trade goods at designated locations for retrieval by trading partners at later times.

The foregoing discussion should indicate that behaviors underlying the caching of goods involve a complex series of factors. Not all caches are alike, and there is a wide range of reasons for storing materials. Furthermore, the cache as a collection of materials may have a defined series of stages in a use-life that possibly reflects periods of initial procurement/ assembly, selective partial use, restocking and ultimately dispersal or abandonment of least useful materials. Unlike manufacturing debitage and lost or discarded implements commonly found on prehistoric sites, materials found in caches are interesting to archaeologists since they provide insights into the prehistoric selection behaviors of goods that were regarded by their assemblers as useful and important.

In an attempt to determine how common caching behavior is in the central Texas region, Miller (1993) surveyed the files at the Texas Archeological Research Laboratory and identified about 40 bifacial caches made of Edwards chert. Since then, several other caches have been reported (Flaigg and Reed 1996; Hester 1995; Chandler 1997; Chandler and Kumpe 1997). We feel that the number of reported and compiled caches is but a small fraction of the number of caches found.

When the distribution of the biface caches made of Edwards Group cherts are plotted relative to the surface distribution of Edwards Group formations, it is evident that caches are rarely found in areas where bedrock materials are available, even though some occur within only a few kilometers from such exposures (Figure 6). The currently known distribution of caches is most likely biased by the energies of individuals who seek out and document such materials. Thus, the scarcity of biface caches reported from west Texas and south Texas is apt to reflect the paucity of archaeological research and perhaps population densities, rather than an accurate accounting of caches.

In general, biface caches of Edwards Group cherts frequently occur up to distances of 200 to 250 km (125-160 mi) from the bedrock sources. We feel that the concentration of 11 caches reported by Hart (1983) for Martin, Howard, Gaines, Dawson, and Terry Counties, northwest of the chert-bearing formation, is probably a fairly representative density of caches that might be expected to occur in any direction from the source region. Since Miller's (1993) list of caches represent all stages of biface reduction and represent from 4 to 120+ bifaces per cache, it seems likely that these caches either served a multitude of purposes or reflects different stages in the retrieval and use of chert resources.

From the foregoing discussion, we suggest

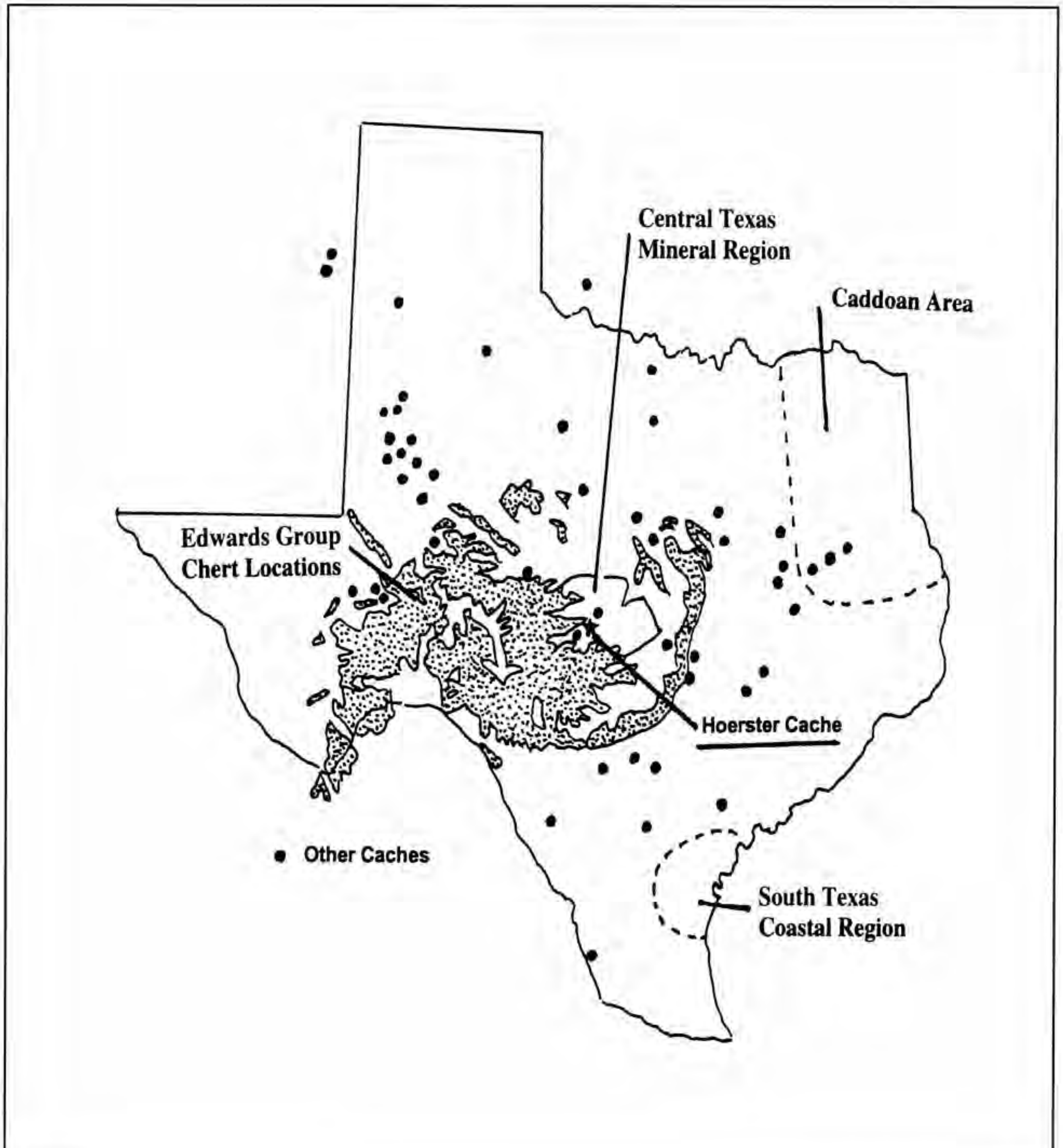

Figure 6. Map of Caches Relative to the Distribution of Edwards Formation Cherts.

that a few prehistoric chert caches are probably discovered each year in Texas. Considering that most were probably produced over the last 6,000 years, in terms of the pageantry of prehistory, few caches were abandoned as unused. Although caches are not exceedingly common, the finding of cached bifaces during the course of modern earth-moving activities is neither a unique event nor an overly rare occurrence. That being said, it remains to be determined how rare are the contents of the Hoerster site cache materials.

Several caches contain one or more bifaces as large or a few centimeters larger than the biggest triangular/ovate pieces in the Hoerster cache (Miller 1993:28-29, Appendix I). The Texas Rangers Museum Cache from Martin County, the L. K. Stam and Mayfield-Kothman Caches from Mason County, the Goldapp Cache in Fayette County, and the Fairview Cache in Travis County have bifaces larger than 26 cm maximum length. Miller mentions that most of these caches with large, thin bifaces tend to occur in isolation and away from habitation sites. The fact that the Hoerster, L. K. Stam, and Mayfield-Kothman caches all occur in Mason County seems to be more than a mere coincidence, and is apt to reflect a persistent adaptive strategy for using the chert-poor areas of the central Texas mineral region.

A survey of the existing archaeological literature indicates that the bifaces as large as the Hoerster bi-pointed piece is very rare, but not absolutely unique. And as discussed above, such bifaces are regarded as prestige or socio-technological symbols used by elite folks in the Caddoan area and Late Prehistoric cultures east of the Mississippi River, or as magical paraphernalia by shamanistic healers among hunters and gatherers of south Texas.

In summary to the question of how common are caches and the kinds of materials contained within the Hoerster cache, we conclude that caches were used for a multitude of purposes. Biface caches of Edwards Group cherts are not overly abundant, but probably a few new biface caches are discovered each year in Texas. In terms of size, the sub-triangular and ovate pieces are moderately large, but several previously recorded biface caches have reported one or more thin bifaces that are larger in size. Such transport bifaces occur in low frequencies across central Texas. In contrast, the size and form of the large bi-pointed biface is very rare. It is probably not the largest biface documented in Texas, but probably among the largest three or four bifaces ever reported to the professional archaeological community from sites within Texas.

Summary and Conclusions

This paper documents a cache of 17 large subtriangular and ovoid bifaces and one very large bi-pointed thin biface that was found in Mason County. Technological analysis suggests that these were not finished implements, but represent Stage 4 thin bifaces that were made of Edwards Group cherts during multiple knapping episodes from sources at least 9 km from the discovery site. These conclusions are based on the presence of cortex along the perimeter edge of several pieces, the extensive grinding on all edges, the diversity of chert varieties in the cache, and the presence of one heat-treated piece. There is nothing about the cache that provides a clear indication of its age; it might date as early as 6,000 years ago, but the exceptionally large size of the bi-pointed biface might indicate that the cache relates to the Late Prehistoric period of 300 to 800 years ago. The thin biface cache was stashed at an isolated (non-village) setting in a chert-poor region and may have either served as: 1) a reserve of large transport bifaces for consumption by local hunter-gatherer groups using the central Texas mineral region, 2) prestige items intended for trade to groups residing more than 400 kilometers to the northeast, or 3) ceremonial knives used by healers among hunters and gatherers in east and south Texas, residing about 400 km to the southeast. The largest bi-pointed piece is impressive and is probably among the largest three or four thin biface pieces currently reported from Texas. Its discovery so far from areas where socially differentiated groups reside makes its recovery very intriguing indeed. Yet its occurrence with 17 other items suggests that it is not a shaman's tool kit.

ACKNOWLEDGEMENTS

Foremost, we would like to thank Charles and Mona Hoerster for notifying us about this cache, and for several intrusions by us and others to document and record the bifaces and the site where these materials were found. Were it not for their conscious efforts, this important collection may have disappeared forever. We would also like to thank their son, Roy, for allowing us access to examine Biface 1 as part of this cache.

We would also like to acknowledge the help of a number of other people who took an interest in the cache and pointed us in various directions while the study unfolded. These individuals include David Calame, Glenn Goode, Kevin Miller, Tim Perttula, Dan Potter, J. Michael Quigg, and Steve Tomka. We would also like to thank David Parkhill and other folks at the Texas Archeological Research Laboratory for their help in assigning a site number to the discovery site. Richard Drass helped supply information on bone tool caches.

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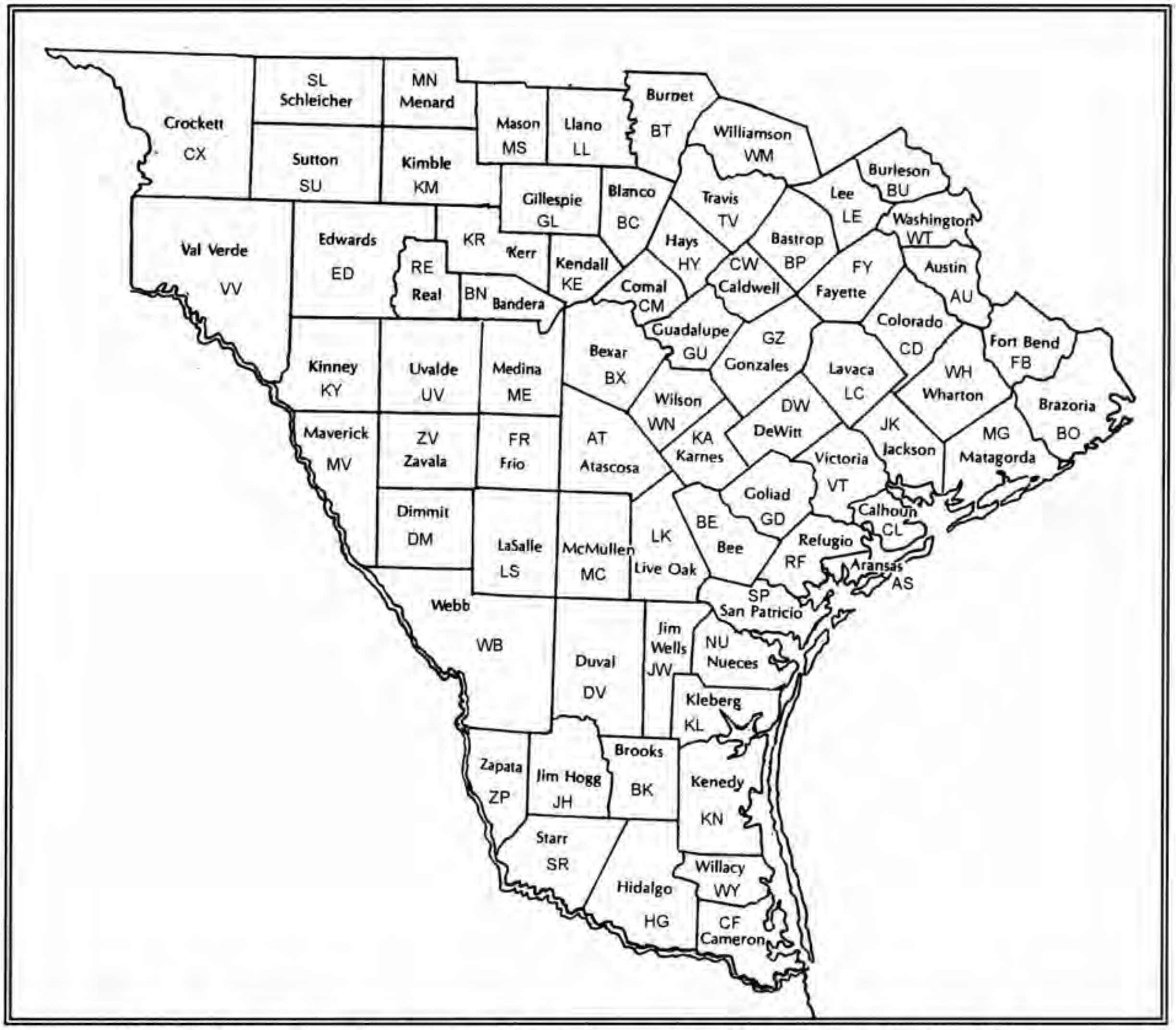

South Texas counties with symbols for archaeological site designations.

CONVERSION CHART

Multiply	By	To Get	Multiply	By	To Get
millimeters (mm)	0.0394	inches	inches	25.4	millimeters
centimeters (cm)	0.394	inches	inches	2.54	centimeters
centimeters	0.0328	feet	feet	30.48	centimeters
meters (m)	3.281	feet	feet	0.3048	meters
meters	1.094	yards	yards	0.9144	meters
kilometers (km)	0.621	mile	mile	1.609	kilometers
hectares (ha)	2.471	acres	acres	0.4047	hectares

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The Southern Texas Archaeological Association brings together persons interested in the prehistory of south-central and southern Texas. The organization has several major objectives: To further communication among avocational and professional archaeologists working in the region; To develop a coordinated program of site survey and site documentation; To preserve the archaeological record of the region through a concerted effort to reach all persons interested in the prehistory of the region; To initiate problem-oriented research activities which will help us to better understand the prehistoric inhabitants of this area; To conduct emergency surveys or salvage archaeology where it is necessary because of imminent site destruction; To publish a quarterly journal, newsletters, and special publications to meet the needs of the membership; and to assist those desiring to learn proper archaeological field and laboratory techniques for southern Texas.

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