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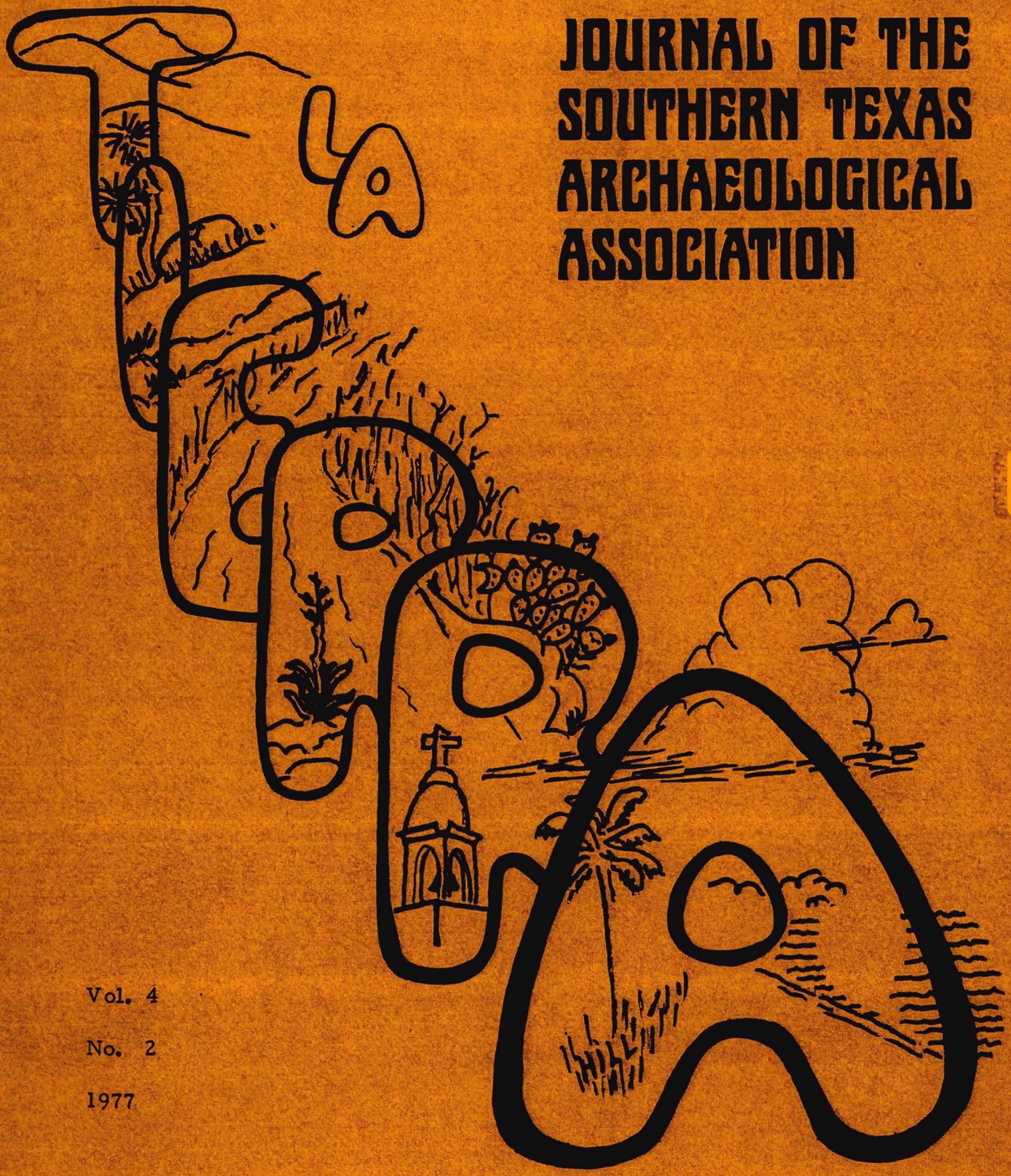

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REPLICATING EXPERIMENTS WITH THE GRAVER AND BONE NEEDLE

Major Howard D. Land

Gravers and bone needles are often found on Early Man camping sites of the Llano, Clovis, Folsom, and Plano complexes. Use of the bone needle is self explanatory, implying cultural association with the manufacture of clothing and shelter. Use of the graver does not so easily lend itself to specific explanation, thus causing much speculation and theory as to its intended use. It has been suggested that the graver was used to incise both bone and wood, was a tool used for tattooing animal or human skin, or was used for making the tiny hole that became the eye of a bone needle (Roberts 1941: 79). In order to better understand the use of the graver and the use of a bone needle in sewing hides for shelter and clothing, the author undertook several replicating experiments with the objective of manufacturing and using both the graver and bone needle. Hopefully, this paper will provide additional information on the manufacture of the bone needle as well as provide a possible alternative use for the graver. Additional study in wear-pattern analysis and more replicating experiments are needed so that we may better understand the manufacturing processes and cultural usage of these primitive tools.

In an effort to manufacture a bone needle, the author acquired a fresh deer metapodial and several waste flakes from previous flint-knapping activities. Small needle-like spurs were pressure-flaked on several thin flakes having ridges (Plate 1-A). The graver was then used to inscribe two parallel lines in the form of a needle on the flat area of the long bone. It quickly became apparent that the graver spurs were too fragile for this type of cutting work, and that it was much easier to select sharp flakes from the waste pile for use "as is", rather than trying to contend with the resharpening and reworking of graver spurs. MacDonald has noted that gravers found at the Debert Site were too delicate to have been used for extensive work on bone or antler (MacDonald 1968: 100). It took approximately one hour to cut through the bone and remove the needle preform as shown in Plate 1-B. Another thirty minutes of hand grinding and shaping with a limestone and pumice-stone rock were required to shape the needle in the proper size and form. The most difficult part of the process was the making of the eye. This effort was helped considerably by the use of the graver spur. The first attempt failed due to breakage of the eye as the result of too much pressure and torque being applied. The broken remains were refashioned into a shorter version and great care was

taken in the successful completion of the needle (Plate 1-C). A very small spur had to be used in a slow and deliberate fashion, as well as in a drilling and cutting motion. This process took approximately fifteen minutes.

The next step was to use the needle for sewing heavy hide. Two thick sheets of cow-hide were selected to be sewn together using deer sinew, much as one would expect heavy bison hides to be sewn together for placement over sticks and poles in the making of a temporary shelter. An unanticipated problem immediately arose. How to cause the needle to penetrate the thick hides? Soaking the hide in water to make it softer was not practical and did not help in penetration by the needle. It became apparent that the small spurs extending from the graver would possibly help perforate the two hides providing holes through which the needle and sinew could pass. Application of this technique worked tremendously well. One need only ensure that the holes are reasonably aligned between both sheets. Surprisingly, the graver spurs lasted for a considerable length of time before having to be reworked or discarded. The gravers shown in Plate 2-A are post usage. Plate 2-A,a, b, and c were used to incise and cut bone while Plate 2-A,d and e were used to perforate holes through the leather sheets. Total penetration of the 5mm thick hides was aided by placing the hide on wood or stone (anvil base) and applying pressure on the graver to perforate in a rotating motion, much like using a drill. In this sense, the graver became a perforator. The making of heavy stitches through previously prepared holes became a simple task--the bone needle and sinew easily penetrating the prepared holes (Plate 2-B).

An alternative method of softening bone and antler in preparation for cutting or scraping, is the use of boiling water or steam. The author experimented with this by heating several stones and dropping them into a container of water--causing the water to become very hot, and in some cases, to boil. An antler tine and a deer metapodial were placed in the hot water for one hour. After drying and cooling, it was found that both bone and antler were more easily worked by cutting and scraping using both waste flakes and gravers. The same results are also possible by a method of bone and antler preparation using a technique similar to the steaming of fish and clams. The bone/antler is wrapped in a water-soaked material such as hair and mud, bark, or animal skin, placed at the bottom of a small pit dug into the earth, and covered with hot ashes and dirt. This arrangement essentially steam cooks and softens the bone or antler making it much easier to work with lithic tools.

Early Man most surely utilized available waste flakes as a readily available and convenient cutting tool. Functional suitability as knives,

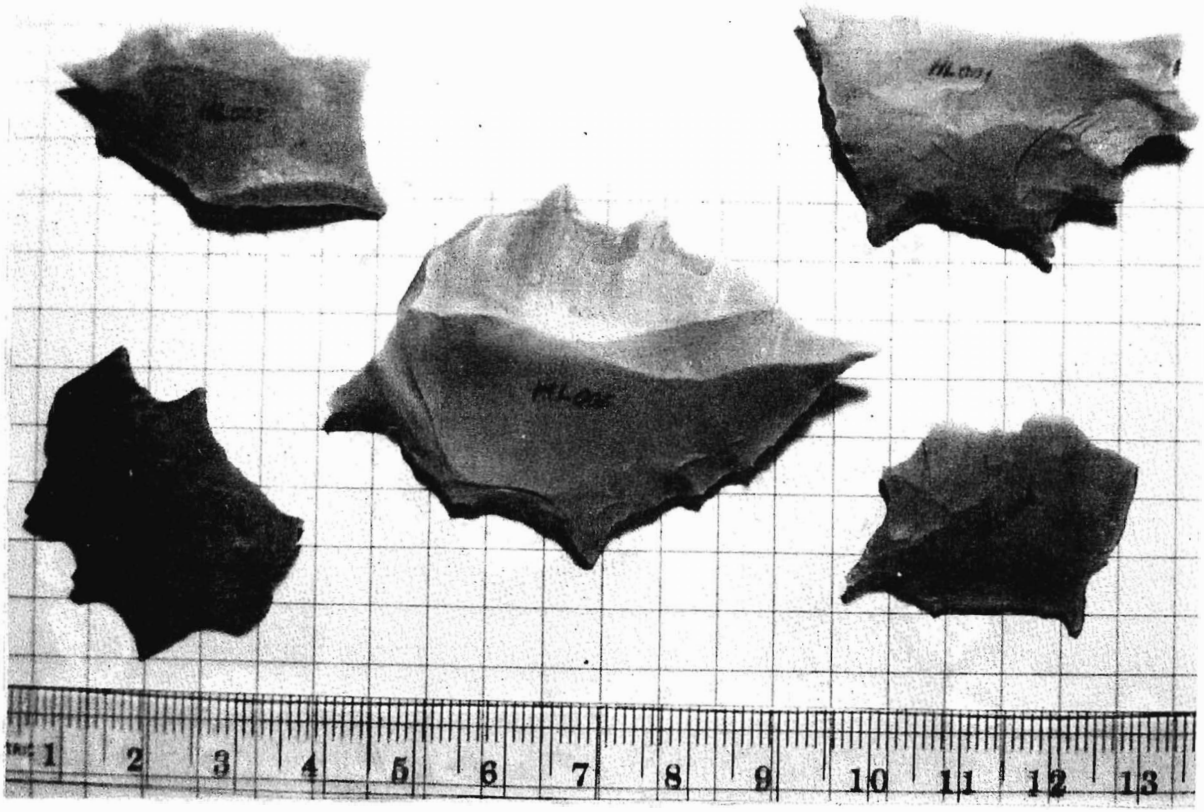

Plate 1-A

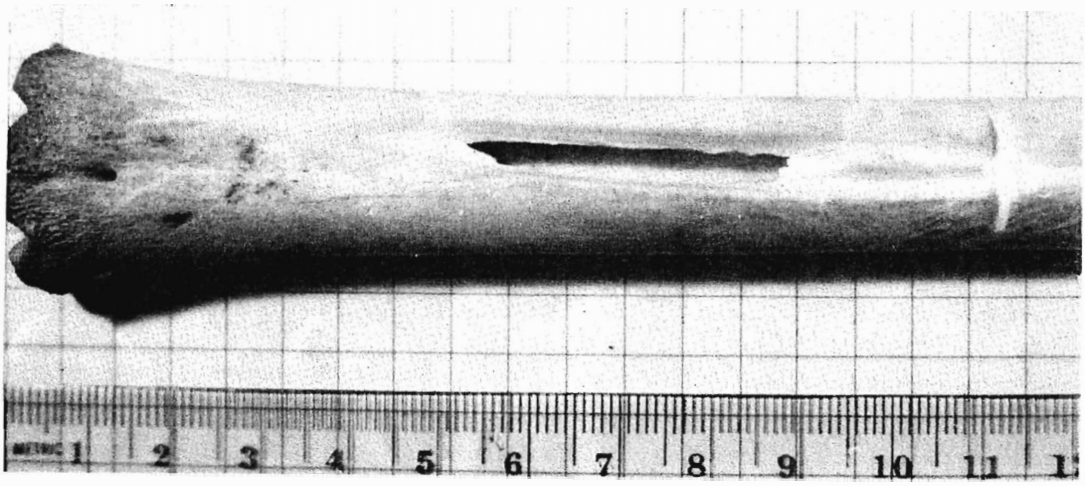

Plate 1-B

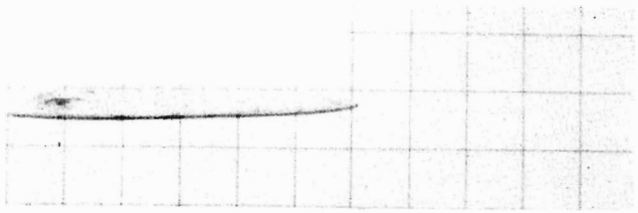

Plate 1-C

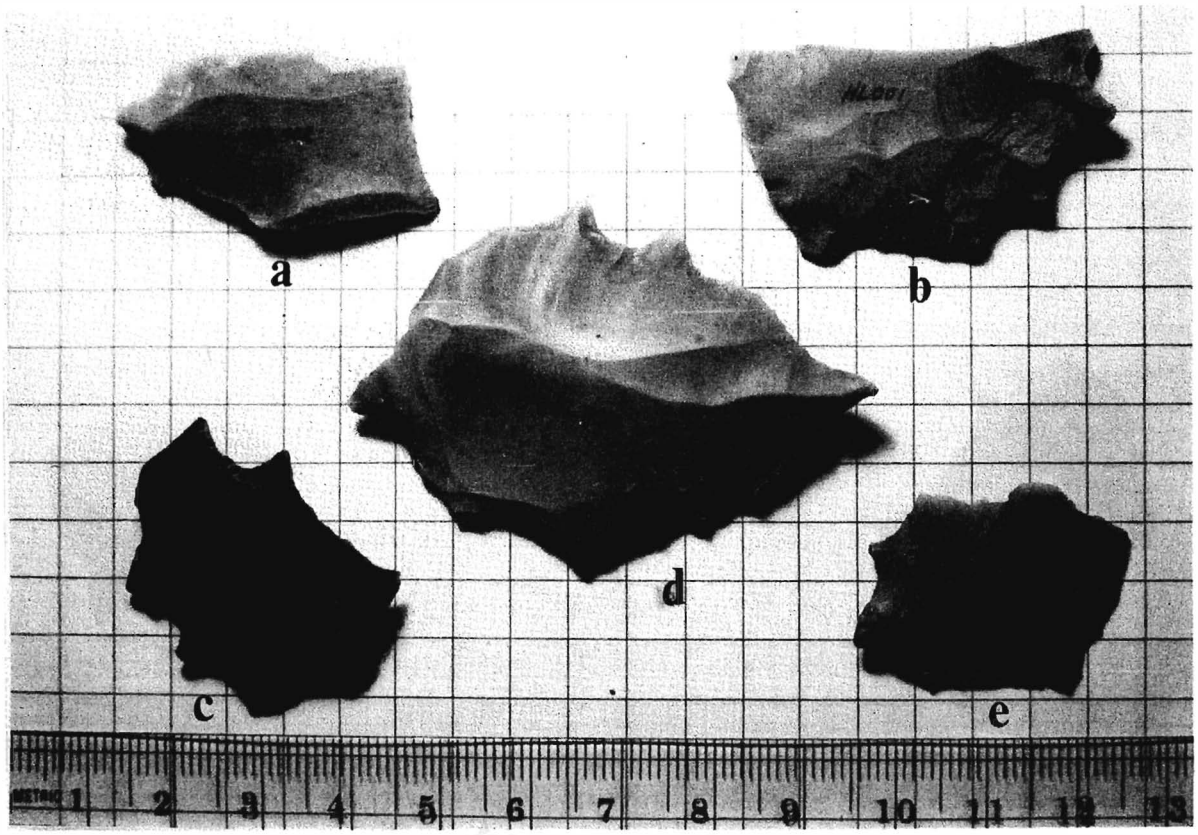

Plate 2-A

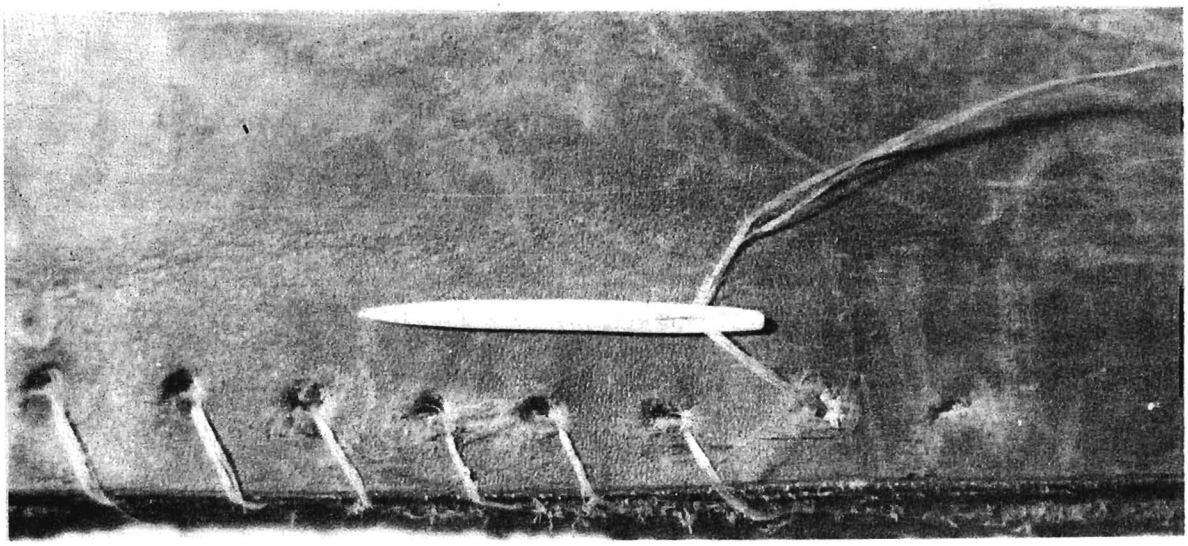

Plate 2-B

scrapers, saws, chisels, perforators, and incising tools is potentially excellent. Experiments conducted by Callahan and others during the Pamunkey Project strongly suggest that utilized flakes usually make up the largest tool category at a campsite, and were used as a matter of expediency (Callahan 1976: 101). Specialization and specific needs required that man "invent" a suitable tool that would satisfy the requirement. This ranged from a slight modification of available flakes to special tool shapes as perceived by the worker. This is perhaps the case of the graver in that it is one of the most diagnostically recognizable tools as made from a modified flake. Its utilization, however, is not fully known. The author is suggesting that the graver was used as a perforator for hide preparation in the support of the task of sewing clothes and shelter covers. Perhaps additional wear-pattern analysis and replicating experiments will shed additional light on this problem.

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AN ARCHEOLOGICAL COMPLEX IN KENDALL COUNTY, TEXAS

L. W. Patterson and J. H. Adams

Through the courtesy of the owner, Weaver Adams, an archeological survey has been made on a ranch near upper Cibolo Creek in Kendall County, Texas. A total of nine sites was found, with possible age ranges from the Pleistocene through the middle Archaic. The general setting is in the central Texas hill country, with a Cretaceous limestone base covered by thin deposits of more recent soils. Because of the geological position, there are large quantities of flint available locally for lithic tool manufacture, but not at the exact location of each archeological site. The area would have been ideal for Indians practicing a hunting and gathering lifeway. Reliable water supplies are available from spring-fed creeks. There are both plant and animal food resources readily apparent, such as deer, and probably bison in previous times. The prickly pear would have been a good seasonal food, for example.

No diagnostic materials were found that would indicate any late prehistoric occupations. The entire inventory from these sites consists of lithic artifacts judged to indicate Archaic and earlier occupations. Data are not sufficient to speculate on the nature of seasonal occupation patterns.

There are two sites, 41 KE 69 and 41 KE 73, which have possible indications of Pleistocene period campsite use, as well as being probable lithic raw material sources over longer periods of time. These two sites are on adjacent hilltops and have very similar lithic technologies. Each site covers several acres. Since large flint nodules occur naturally on these sites, quarrying activities have been on a large scale, and the same flint types on lower sites indicate use of these lithic sources over the general area. Aside from evidence of quarry activities, each of these two sites has a full lithic technology for making and using tool types usually found on Pleistocene sites. While no complete projectile points were found, there is an extensive inventory of well-used heavy bifaces and large flake tools. Two leaf-shaped bases from projectile points or preforms were found on site 41 KE 73. Flake tools are of a generally massive nature, with many over 50 mm square and a large number over 70 mm square. These large flake tools include convex and concave scrapers, notched tools, denticulates, and large gravers (beaks). Many show heavy use wear patterns on edges.

Complete industries for manufacturing and using large prismatic blades and prismatic flakes are present on sites 41 KE 69 and 73. Most prismatic blades appear to be derived from prepared platform cores, with single facet platforms. Blade core examples are roughly semi-conical, with little striking platform edge preparation. Core trimming flakes are present. Most prismatic blades are over 20 mm in width, and are typical of examples produced by experiments using direct hard percussion (Sollberger and Patterson 1976). Hammerstones were observed on these sites. Many of these large prismatic blades show heavy use as cutting and scraping tools on the lateral and distal edges.

A few retouched flakes were found that could be classified as "Mousteroid points". These are simply retouched pointed flakes, as generally illustrated from the Eurasian Middle Paleolithic (Bordes 1972), with examples continuing into the Siberian Upper Paleolithic (Rudenko 1961: Fig. 14). Irwin and Wormington (1970: 26) illustrate some of these artifacts from Pleistocene sites in the Great Plains as "double side scrapers" (their Types 11, 12). The overall lithic technology of these two sites is similar to site 41 ME 3 (Patterson 1975 and ms) and other sites in Medina County, Texas, which Patterson feels are related to a Pleistocene period lithic tradition. Many bifacial "hand axes" were found, with most over 100 mm in length. These are too well finished to simply have been bifacial cores used to produce flakes.

Aside from the production of large prismatic blades, prepared platform cores on sites 41 KE 69 and 73 were used to produce rather massive prismatic blakes. One large well made prismatic flake had measurements of 140 mm long, 80 mm wide and 38 mm thick, with lateral edges showing use wear. Irregular shaped flakes were produced on these sites from both discoidal and amorphous shaped cores. An analysis of small size lithic flakes from site 41 KE 73 shows that most small flint flakes were probably formed by direct hard percussion, when compared with replicate experiments (Patterson and Sollberger ms). The attributes of flint flakes shown in Table 2 are characteristic of the rather amorphous thick flakes produced by direct hard percussion.

A natural question to ask is how sites 41 KE 69 and 73 differ from the many quarry-workshop sites found in south-central Texas. There is surprisingly little documentation of this type of site. A series of reports have been written for this type of site in Comal County by archaeologists at the Center for Archaeological Research at The University of Texas at San Antonio (Hester, Bass and Kelly 1975; Kelly and Hester 1975a, b), in which the authors judge that most sites have Archaic period affiliations. We feel that two types of quarry-workshop sites are present in south-central Texas. One type is a campsite, with a full lithic tool kit, located on or near a lithic source

Table 1
Flake Sizes on Lower Sites

	41 KE 70		41 KE 72		41 KE 75		41 KE 76	
	No.	%	No.	%	No.	%	No.	%
Under 10 mm square	2	6.1	3	5.7	0	0.0	0	0.0
10 to 20 mm square	8	24.2	27	50.8	13	16.5	12	52.2
20 to 30 mm square	8	24.2	18	34.0	46	58.2	7	30.5
30 to 40 mm square	11	33.4	3	5.7	14	17.7	3	13.0
40 to 50 mm square	3	9.1	1	1.9	2	2.5	1	4.3
Over 50 mm square	1	3.0	1	1.9	4	5.1	0	0.0
Total	33	100.0	53	100.0	79	100.0	23	100.0

Table 2
Lithic Flake Attributes
Site 41 KE 73 Debitage

Flake Size	No.	Thickness, mm Avg.	Thickness, mm Range	Conc. Force Bulb	Avg. Wt., Grams	Resid. Strike Plat.	Force Lines Vent.	Bilat. Symm.	Erail. Flakes	Cross Sect. Symm.	%
18-20 mm sq.	6	4.7	3.7-8.8	33%	1.73	33%	67%	16%	50%	16%	6.9
16-18 mm sq.	11	6.1	3.9-8.3	9	1.39	45	36	18	9	0	12.6
14-16 mm sq.	27	5.8	3.7-9.6	0	1.06	19	30	7	7	0	31.0
12-14 mm sq.	17	4.7	1.9-6.8	0	0.74	35	59	0	0	0	19.5
10-12 mm sq.	14	4.4	2.4-7.4	0	0.46	7	50	0	0	0	16.2
8-10 mm sq.	10	3.2	2.3-5.0	10	0.27	20	70	10	10	0	11.5
6- 8 mm sq.	2	4.2	3.0-5.3	0	0.15	0	50	0	0	0	2.3
Total	87										100.0

area. The other type is a true specialized quarry-workshop, with or without some subordinate tool use for activities such as woodworking. Sites 41 KE 69 and 73 can be classified as the first type and the sites in Comal County can be classified as the second type. Patterson (ms) has discussed in detail the first type for a possible Paleo-Indian quarry-campsite in Medina County. Compared to Archaic period quarry-workshop sites, the campsite-quarry sites of possible Paleo Indian age seem generally to have a more complete tool kit and flake tool size distribution may be larger. The campsite-quarry sites have complete industries for manufacturing and using large prismatic blades, and have some tool types not generally present at Archaic quarry-workshops, such as burins, beaks and "Mousterian-like" points. The quarry-campsites have high percentages of utilized flakes, indicating much tool-using activity at the site itself. The quarry-campsites also have lower percentages of primary cortex flakes, indicating a more complete lithic reduction process. Data on the two Kendall County sites 41 KE 69 and 73 described here is not as well defined as on Medina County site 41 ME 3 (Patterson ms), but the same tool types occur on all of these sites. In placing sites 41 KE 69 and 73 as possibly in the Paleo-Indian lithic tradition, this could mean any time in the Pleistocene period up to the transitional pre-Archaic.

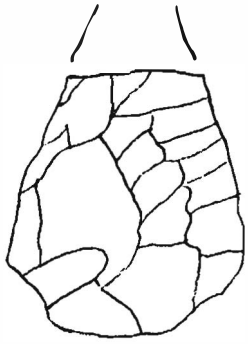
Other than the variety of projectile point types, and some range of variability between individual archeological sites, there is an essential continuity of lithic technology for the Pleistocene and early transitional Archaic. The Pleistocene lithic tool kits normally contain large prismatic blades, large flake tools, beaks, denticulates, notched tools, and sometimes burins. Some prismatic blades are retouched as end scrapers. There are many other similarities in Pleistocene site lithic collections. Examples of published sites in this lithic tradition are: Clovis (Hester and others 1972), Folsom (Wilmsen 1974), general Paleo-Indian (Adair 1976, Dragoo 1973, Lewis and Kneberg 1956, Wilmsen 1970, Irwin and Wormington 1970), and terminal Pleistocene (Lewis and Kneberg 1958, Jennings 1957, MacNeish and others 1967). Jennings (1974: 133) specifically notes the presence of Clovis-like large prismatic blades in the transitional late Paleo-Indian Dalton complex.

Leaving the hilltops, seven other sites were found located on lower terraces overlooking creeks. The lithic technologies of these lower sites all seem to be of the Archaic time period. Blade tools are generally much smaller than the hilltop examples, as shown in Table 1. Prismatic blades are less common and are smaller than on the hilltop sites. Pressure flaking becomes evident for the first time on the lower sites, with a diamond-shaped small flake 30 mm long from site 41 KE 75, made from a prismatic blade segment and having

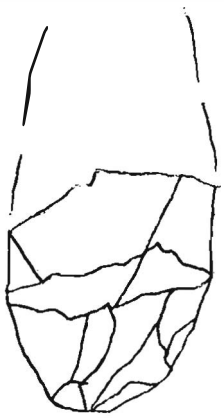
FIGURE 1

DART POINTS AND OTHER LITHICS

(ACTUAL SIZE)



(A) 41KE 75



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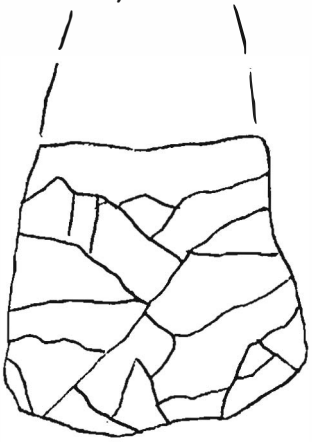
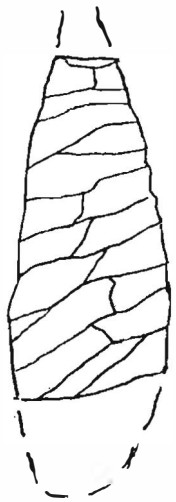
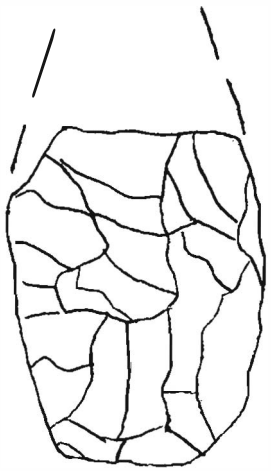


(C) 41KE 75



(D) 41KE 72



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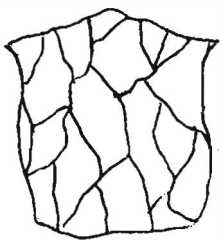

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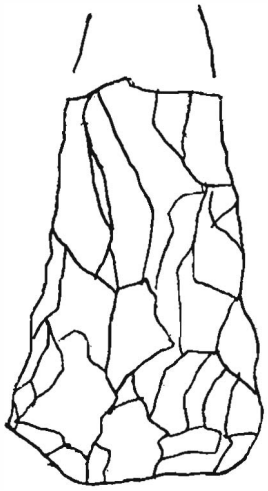
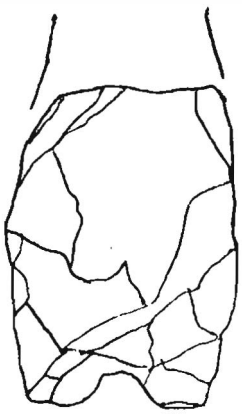
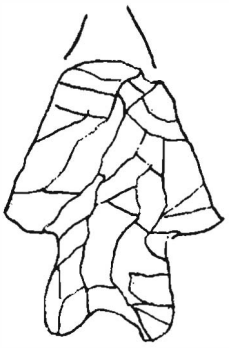


(G) 41KE 72

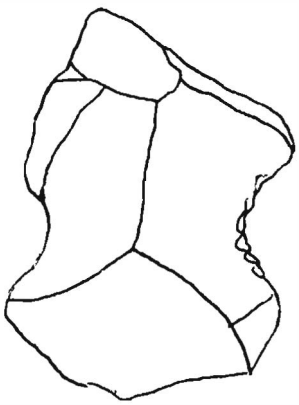


(H) 41KE 72

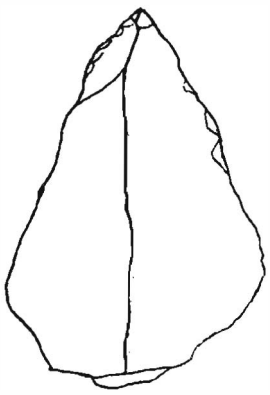


(I) 41KE 76

(J) 41KE 75



(K) 41KE 69



(L) 41KE 73

A- dart point, B- Leaf-shaped point, C- triangular point, D- Angostura (?) point, E- preform (?), F- square stem, G- Tortugas point, H- Gower point, I- corner-notched point, J- pointed flake, K- notched tool, L- Mousteroid point

a pressure flaked bifacial point on one end (Figure 1, j). Pressure flaking is not really common on these lower sites, however. Projectile point types also indicate Archaic period associations for the lower sites.

Site 41 KE 70 is located on a low first terrace above a creek, and is about 100 feet in diameter. Aside from the flint flakes shown in Table 1, there was a biface fragment, a thick flint chip, one small amorphous flint core, a two hole limestone slab gorget, and a stemless dart point or preform of roughly triangular shape. On a second higher terrace above 41 KE 70, site 41 KE 71 was found, a few hundred feet downstream. Lithic materials observed on the site included elongated blade-like flakes, irregular shaped flint flakes, a small discoidal core, and thick flint chips. The sizes of the flint flakes were similar to those on site 41 KE 70. Site 41 KE 71 is roughly 50 by 100 feet in size.

On another creek, on a high first terrace, scattered flint flakes were found over several hundred feet, on site 41 KE 72. Aside from the flakes shown in Table 1, there was a small discoidal core, and a graver point on a large flint flake. Dart point specimens found include 1 preform, 1 unclassified fragment, 1 large square stem (Bulverde?), 1 Gower point and 1 large triangular Tortugas point. A possible Angostura point was also found here with good oblique parallel ripple flaking. Dart points described in this article are illustrated in Figure 1. The dart points at this site are similar to those found on surveys of sites located a few miles to the east in Kendall County (Bass and Hester 1975; Kelly and Hester 1976). The Angostura and Gower points possibly represent the late Paleo-Indian and pre-Archaic periods (Prewitt 1974: Fig. 7, Sollberger and Hester 1972: Fig. 6). The large Tortugas point may be from the transitional early Archaic (Bass and Hester 1975: 34). The large square stem of a possible Bulverde type point could be from the later portion of the early Archaic (Prewitt 1974: Fig. 7). Overall, site 41 KE 72 dart points seem to cover the very early to middle Archaic time interval of roughly 7,000 to 4,000 B.C.

Site 41 KE 75 is located on a high first terrace above a creek, and is somewhat over 100 feet in diameter. Three prismatic blade segments, all under 20 mm wide, were found, and other flakes shown in Table 1. Other artifacts included 10 small amorphous flint cores, 11 thick flint chips, 1 medium size bifacially edged chopper and 3 large dart point fragments. The dart point fragments include one stemmed point with weak shoulders, a leaf-shaped point, and a triangular possible Tortugas preform. The small flint flakes and cores found on this site illustrate the contrast with the two hilltop sites 41 KE 69 and 73. Here, on site 41 KE 75 only small flakes were being manufactured and used.

On the opposite creek bank from site 41 KE 75, three other sites were found. Site 41 KE 76 yielded 1 small amorphous flint core, 2 partially chipped small flint nodules, a small prismatic blade segment (19 mm wide) and the flakes shown in Table 1. This site is over 100 feet in diameter. A corner-notched dart point was found that may indicate occupation in the transitional early Archaic (Sollberger and Hester 1972: Fig. 6). Site 41 KE 77 consisted of 4 small flint flakes over a 50 foot diameter area. Site 41 KE 78 yielded an unclassified dart point reworked as a tool and 4 large flint chips.

While not large, the lithic collections of the lower sites in this complex all have materials that would be expected for early to middle Archaic sites in this area, including the dart point types and lithic flake sizes. The lithic flake collections are similar to other Archaic sites in nearby Bandera County, such as 41 BN 8 (Patterson 1974) and 41 BN 11. For example, the lithic flake size distribution for site 41 BN 11 shown below is similar to that shown in Table 1 for the lower sites in the Kendall County complex:

Flake Size		
Under 10 mm square	0	0.0
10 - 20 mm square	151	64.6
20 - 30 mm square	71	30.3
30 - 40 mm square	11	4.7
40 - 50 mm square	1	0.4
Over 50 mm square	0	0.0
Total	234	100.0

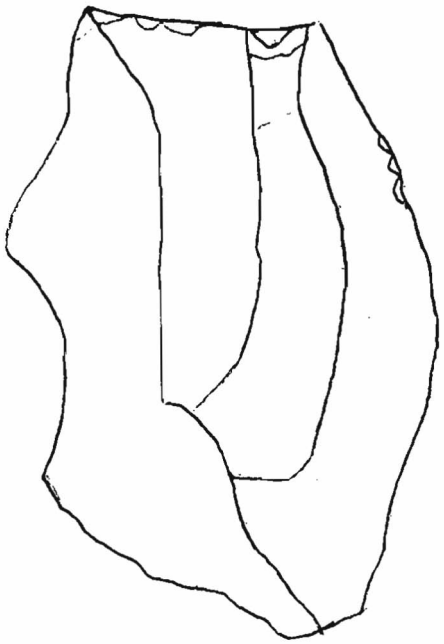
The above lithic flake collection from 41 BN 11 is accompanied by Abasolo, Angostura (?), Frio, and unclassified dart points, with no later small arrow points present.

On many archeological sites it could be argued that very large stone tools were not used simply because of the inconvenience of carrying heavy materials long distances from quarry locations. This is not a major consideration in the case of the lower sites in this Kendall County complex, as the lower sites are generally only a few hundred yards from the hilltop flint sources. Here, use of heavy tools only on the hilltop sites appears to represent cultural differences, and not primarily distance considerations. A central point of this artacle is that there could be a change in site locations in the archeological complex being discussed from early high "lookout sites" to later Archaic period sites with a lower riverine adaptation. This same tendency has been noted by Dragoo (1973: 46) for Tennessee and by Irving and Cinq-Mars (1974: 65) for the Yukon. This change in site locations may show

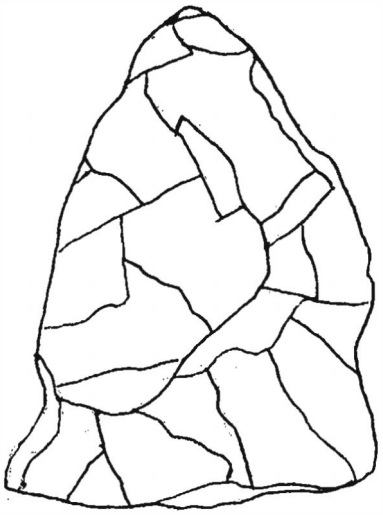
FIGURE 2

LITHIC ARTIFACTS

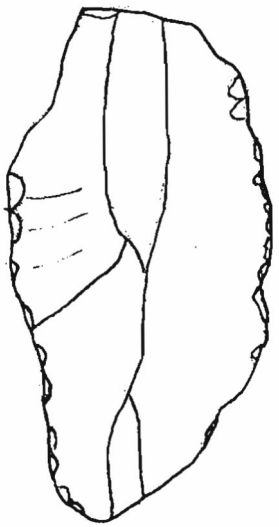
(ACTUAL SIZE)



(A) 41KE 73



(B) 41KE 72



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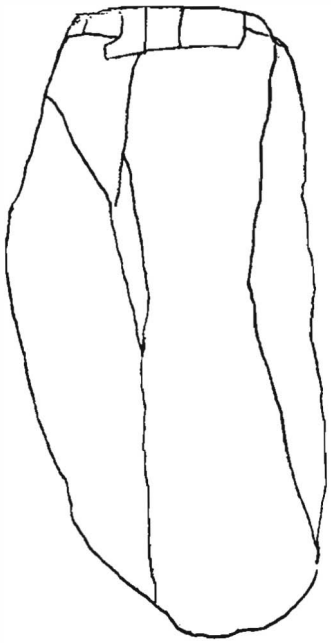

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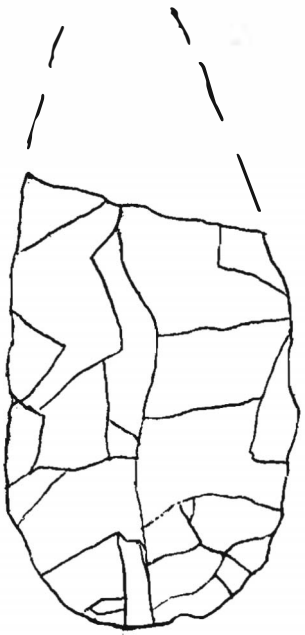

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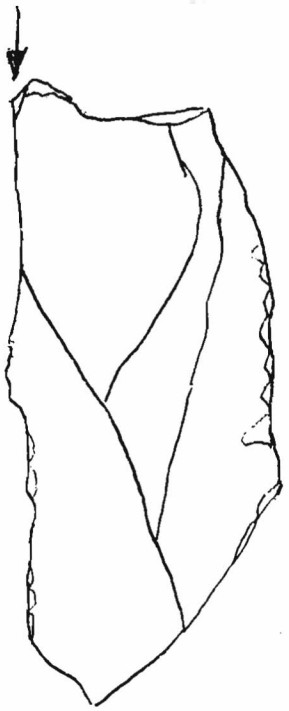

(F) 41KE 73

A- blade core trim flake, B- biface, C- retouched blade,
D- large prismatic blade, E- point preform (?), F- burin on blade

a change in hunting patterns from early pursuit of large herd animals to later hunting of deer and smaller animals. Surveys by Patterson in Bandera, Medina, and Real Counties suggest that this shift in site locations in Kendall County is not an isolated phenomenon, but rather may be a generalized pattern for the hill country of south-central Texas. In the past, investigators have failed to note that many quarry sites have complete tool assemblages that could indicate additional use of the sites as early campsites.

In summary, this article has presented a survey of an archeological complex in Kendall County, Texas with several sites having components of possibly late Paleo-Indian to middle Archaic age. Two hilltop sites located in lithic source areas may have supplied the lower Archaic sites with raw materials. These two hilltop sites may also show use as Paleo-Indian campsites, judging by the typology and heavy use of the lithic tools present. It is hoped that this artacle will stimulate further detailed studies of the individual nature of sites located at or near lithic sources, because of the potential variations in uses of these sites.

Acknowledgements

Appreciation is expressed to Thomas R. Hester and Anne Fox of The University of Texas at San Antonio for supplying information and reports on related sites in central Texas. The responsibility for final conclusions remains with the author.

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A COLUMELLA BEAD FROM THE SAN ANTONIO AREA OF SOUTH CENTRAL TEXAS

John W. Greer

It is often the unusual object which catches one's eye and tends to receive undue attention. At times, however, it is the unusual form which seems to have more wide-reaching interpretative potential than its more commonplace counterparts. It is the intention here to pass on one such note which may be useful in future distributional studies.

An elongated cylindrical bead 7.3 cm long is made from a ground and polished conch columella, finely cut perpendicularly at the ends, both of which are well smoothed. The dimensions are as follows:

Length	73	
Diameter - middle	15	
Diameter - ends	10 x 6	11 x 7
Diameter - top holes	3	2
Diameter - end holes	3.5	2

The distinctive feature is the form of the suspension holes. Each end is conically drilled inward about 7 mm. A similar hole from the upper lateral surface at each end then intersects to form a right-angle, curved suspension hole.

It seems likely that in use several similarly drilled beads were horizontally suspended, one above the other, in a breastplate fashion. The string would go through the upper lateral surface and then out through the end before going to the next bead down (Fig. 1).

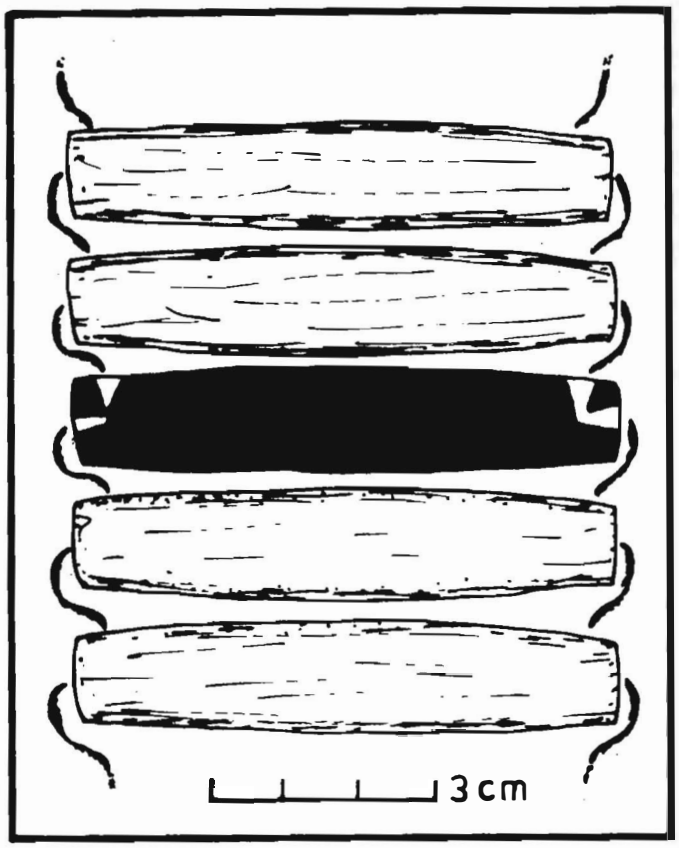
The columella bead was found in a plowed field beside an unknown creek on the northwest edge of San Antonio. Cultural associations are totally unknown, as is the exact location. At the time I recorded the specimen (1962) it was in the collection of Tom Munnerlyn, previously of Del Rio and then stationed in San Antonio.

I thought little of the object, noting only that the form seemed unusual, until a few weeks later when I was looking through a private collection of polished stone ornaments from the central coastal Huastec area of eastern Mexico. Included were several finely polished greenstone (Jadite?) beads of exactly the same form and size as the columella specimen. Other similar specimens must exist in the literature or in private or public collections, but they appear to be extremely rare.

Grant D. Hall (Allen's Creek: A Study in the Cultural Prehistory of the lower Brazos Valley, Texas. Research Report No. 61, Texas

Archeological Survey, University of Texas-Austin, 1977, in press) found several columella beads of a similar form and drilled in about the same manner. His specimens are somewhat smaller (ca. 2 - 5 cm long), and the longitudinal holes are deeper and the vertical holes therefore closer together. Technologically the forms are very similar, although dimensionally they are quite different. Hall's specimens are from an apparently Late Archaic component of a cemetery on the coastal plains in Austin County (associated Fairland points; corrected C-14 dates 311 A. D. and 635 B. C.). These are the only similar specimens found during a very limited comparative search. The huge A. E. Anderson collection (on file at the Texas Archeological Research Laboratory in Austin) from the lower Texas coast, extending considerably into Tamaulipas, apparently contains no similar specimens, although it does house thousands of conch shell beads in a multitude of forms.

It is unknown whether a concerted search through the archeological literature or coastal collections would be rewarding, or whether a distributional study or a detailed comparison of assemblages containing this bead form would contribute any useful information, but the possibility seems likely. Certainly, without question, an organizing and detailed reporting of the exhaustive Anderson collection should be a prerequisite for such a study, as it should for any comparative research dealing with archeological materials on the lower Gulf Coast or the inland areas of South Texas. Only when that collection is adequately reported, and hopefully studied, can we hope to place such isolated finds as the San Antonio bead in any sort of archeological perspective, or attenpt to provide an informative evaluation.



Fib. 1 Cross section of columella bead and suggested method of stringing in breastplate fashion.