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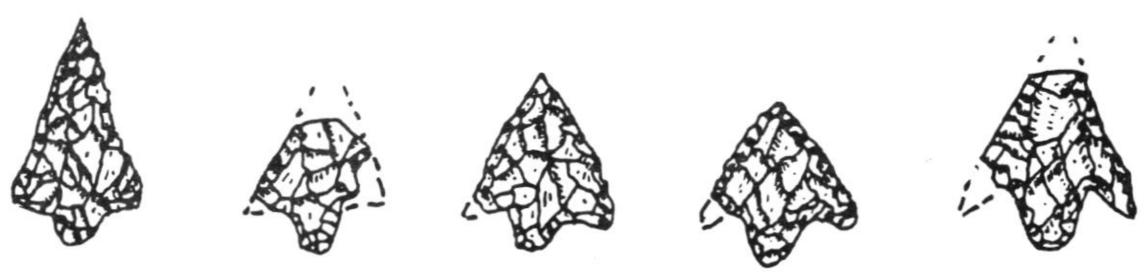
JOURNAL
HOUSTON ARCHEOLOGICAL SOCIETY

Number 106 August 1993



Perdiz Points from Site 41CH161

Houston Archeological Society Journal
Number 106, August 1993

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ISSN-8756-8071

Excavations at 41CH161, Chambers County

Sheldon Kindall and Leland Patterson

Location

This site is located on the edge of Cotton Lake, one of several old lakes in the Trinity River delta. Trinity River empties into Trinity Bay, a part of Galveston Bay. Cotton Lake has been made deeper by recent subsidence but it is still a shallow lake. The western and northern edges of Cotton Lake are a part of the rim of Galveston Bay: there are about two miles of marsh land between Cotton Lake and Galveston Bay. The water in Cotton Lake is brackish but there are nearby bayous sufficiently close to the site to be a source of fresh water fish. One bayou which was near the site, Alligator Bayou, is now inundated by a modern Houston Lighting and Power (Houston Industries) cooling pond.

Background

This site was reported to the Houston Archeological Society by a person who had found a handle among the ceramics on the site. The handle looked like a primitive but ordinary coffee cup handle. There was a strong suspicion that this was a site with occupation lasting into the Historic period.

Objectives of test excavations

The objective of the excavation was to try to determine whether the occupation period of this site did extend into the Historic time period. Also, the excavation results will contribute to the regional database for coastal margin sites.

Procedure

Ceramics were collected from the surface along the lake shore and inland for a distance of 10 meters. Site 41CH161 is a large Rangia shell midden. A part of the midden is just offshore, now under water. A large amount of pottery had eroded out of the offshore portion of the midden and washed up on the beach.

A total of five 1-m-square test pits were started. Three of these pits were terminated early because they missed the main site and encountered a not very early Anglo disturbance, which tended to confuse the objective of this work. Only two pits were excavated through the site to sterile soil, pits A and E. Both pits were about 40 meters back from the shoreline and up a steep bank, about 4 meters above the water level (see Figure 1).

Excavation proceeded in levels of 5 centimeters. All soil was water screened through 1/4-inch mesh screen. A 10-cm-square column of soil was removed from the wall of pit A and another from the wall of pit E. Both were carefully extracted and bagged in levels of 5 cm, and taken to the lab for fine screening and microscopic examination.

The area of the site is estimated at 1050 square meters, not counting the portion of the midden in the water. The amount of the site disturbed by this work was very small.

All artifacts were removed to the HAS lab facilities at Rice University for further processing. The soil for fine screening was turned over to Bill McClure, who is also doing the faunal analysis.

Participants

Many of the regular Houston Archeological Society field workers participated in the examination of this site. Included were Karen Acker, Phyllis Bradley, Richey Ebersole, Bob Etheridge, Dick Gregg, Joe Hudgins, Mike Johnston, Sheldon Kindall, Mike Marshall, Don McReynolds, Bev Mendenhall, Bernard Naman, Tommy Nuckols, Lee Patterson, Bill Schurmann, Bob Shelby, Gina Short, Ray Trebbi, Dudgeon Walker, Muriel Walker, Jim Wells, and Gina Williamson.

Access acknowledgments

This site is owned by Mr. Robert L. Barrow of Baytown. Mr. Barrow was aware that the site was on his land. He granted the Houston Archeological Society permission to investigate the site and he has expressed a desire to put some of the artifacts on display at the Wallisville Heritage Park Museum which is near the site. The Houston Archeological Society will work with Mr. Barrow to honor his request.

The only way to get to the site is to drive through land owned by Houston Industries Incorporated. The HAS obtained permission to cross the Houston Industries land through Mr. John P. Ott. Mr. Ott retired before this field work was finished and our interface to Houston Industries became Mr. Jim Hejl.

Lithic artifacts

Projectile points

Both dart points and arrow points were found on this site, as shown in Table 1 and Figure 2. Dart points associated with the Late Archaic (1500 B.C. - A.D. 100) and the Early Ceramic (A.D. 100 - 600) time periods are found at coastal margin sites in Southeast Texas. Use of darts with the spearthrower (atlatl) as a weapon system was replaced by the bow and arrow on the coastal margin in the Late Prehistoric (A.D. 600 - 1500) according to Aten (1983:306). Use of darts continued into the Late Prehistoric in the adjacent inland subregion of Southeast Texas, however, after the bow and arrow had become the dominant weapon system.

Since no preceramic (Late Archaic) occupation was found by excavations at this site, the dart points may represent only the Early Ceramic time period. There is, however, a possibility that excavations were not extensive enough to detect an area of the site that was occupied before the start of pottery. All dart points were found by surface collecting at the eroded lake edge. Dart point specimens from site 41CH161 include a Williams-like point, a crude unfinished Gary point, a Kent point stem, and a dart point tip. Gary and Kent point types occur throughout a very long time period in Southeast Texas (Patterson 1991a), including the Early Ceramic period, as at this site. The Williams-like specimen is more representative of the Middle-to-Late Archaic. A Williams-like point was found in the Early Ceramic period at site 41FB42 (Patterson et al. 1993: Table 2), although this specimen may have been displaced from Late Archaic strata. Lithic materials used here for dart points included chert and petrified wood.

Six Perdiz arrow points including a stem fragment were found at this site. The Perdiz point was used throughout the Late Prehistoric period, and its use continued into the Historic Indian period after A.D. 1500 (Patterson 1991b). One Perdiz specimen (Figure 2B) had mainly unifacial flaking. Lithic material used here for arrow points included chert, petrified wood, and fine-grained quartzite. The range of weights for whole arrow point specimens is 1.3 to 1.9 grams. Arrow points in Southeast Texas seldom weigh much over 2 grams (Patterson 1985).

General lithics

Few unifacial stone tools were found at this site. Small scrapers were found in pit D (20-25 cm) and in pit E (30-35 cm), shown in Figure 2I,J. The scraper from pit D was made from a split pebble, and the scraper from pit E was made from a chert flake. Two unifacial flake gravers were found on the surface of this site (Figure 2K,L). Stone tools are usually not found in large quantities at coastal shell midden sites in Southeast Texas, in this lithic-poor area. A total of 67 lithic flakes were recovered in the 1/4-inch mesh screens, as summarized in Table 2. As is typical of coastal margin sites (Aten 1983:257), most flakes from this site are of small sizes, with 78% under 15 mm square. A large proportion of the small lithic flakes from this site are probably a result of pressure flaking in the production of arrow points. For example, at Late Prehistoric site 41HR745 where arrow points were produced, over 80% of the flakes found were of sizes under 15 mm square (Patterson n.d.).

Many more flakes were recovered from the fine screen material. For example, from only one level of pit E, 35-40 cm, there were 21 flakes under 10 mm square recovered from the fine screen material. Flakes recovered from the fine screen material from pit A are summarized in Table 3. A total of 446 flakes were recovered in the fine screen material for various excavation levels of pit A, all of sizes under 14 mm square. This illustrates that a high proportion of small size flakes from arrow point manufacture are generally not recovered in regular 1/4-inch mesh screens.

Three specimens of petrified wood were recovered from fine screen samples. One specimen was a fractured piece with dimensions 30 by 21 by 6 mm. Two specimens were smooth, elongated petrified wood pebbles which could have been used as pottery smoothing tools. Lengths were 39 mm and 49 mm, and diameters were 12 mm and 15 mm, respectively. A piece of pumice was found in pit E (25 - 30 cm); it was probably collected from the Gulf coastline.

The small amount of lithic artifacts at 41CH161 is typical of coastal margin shell midden sites. Lithic materials suitable for stone tool manufacture do not occur naturally on the coastal margin, and Indians in this subregion of Southeast Texas imported only limited quantities of lithic material. Cherts are found mainly in the Colorado and Brazos River valleys, and petrified wood is found along the Trinity River and some other areas of the northeastern portion of this region. Limited quantities of petrified wood are found in the Brazos River valley. Coastal Margin Indians often used bone instead of stone for tools such as awls and projectile points, and oyster shell for scraping and cutting tools (Aten 1983: Figures 13.2, 13.3).

Bone tool

A bipointed bone tool of nearly circular cross section was found in pit A (40-45 cm), made of a deer metapodial bone. This tool (Figure 2M) could have been used as either an awl or a dart point. It has a weight of 4.4 grams, a length of 85.9 mm, and a maximum diameter of 7.7 mm. The weight of this bone tool is within the weight range of stone dart points found in this region. The excavation depth of this specimen is below that of all arrow points found here, and it is possibly from the Early Ceramic period. It is often not possible to determine the actual function of a tool found in an archeological site.

Ceramic artifacts

Figure 3 shows the weight distribution by level of the pottery for pits A and E. There is a large amount of pottery at this site.

Ceramics analysis

The Houston Archeological Society is engaged in an extensive analysis of the pottery from 41CH161. This work is being directed by Melissa May, HAS Lab Director. May reports (n.d.) that sand-, grog-, bone-, and shell-tempered pottery types are present at this site although most of the pottery is of the untempered sandy paste type. She also reports the presence of "Tchefuncte-like" and "Coles Creek - like" pottery, and the rare "red-filmed" and "cord-marked" types.

Pottery decoration

Prehistoric pottery of coastal Southeast Texas was sometimes decorated by a linear geometric border design, incised around the upper 5 to 8 cm of the vessel rim. A catalog of over 350 specimens was compiled by Black (1989). These were largely from surface collections in Harris, Chambers, Fort Bend, and Brazoria Counties. As of this time, it has not been possible to associate a decoration pattern with any particular time period, but the possibility of a chronological distinction exists and the pottery decoration patterns from 41CH161 will be incorporated into the growing and now extensive data base of Southeast Texas pottery decoration patterns.

Other artifacts

Two trade beads were found in the fine screen soil. One, a blue glass bead 1.57 mm long and 2.05 mm in diameter, came from a depth of 10-15 cm in pit E. The other, an opaque white glass bead of about the same size, came from the 30-35 cm level of pit A. These beads are the subject of a separate investigation (May 1993).

A small spall of glass, 5 mm in diameter by 1 mm thick, was found in pit A at a depth of 30 cm. This spall could easily be a chip from a glass bottle.

Shell

In addition to the large shell midden in the water, the onshore site had concentrated Rangia clam shell to a depth of 70 cm. The shell was judged to be unusually robust, the beak or umbo (hinge) part of many shells were relatively massive. A large amount of the shell was saved for further investigations.

Radiocarbon date

The starting date of this site is of more interest than usual. A sample of Rangia shell from the bottom shell layer of pit E, taken at 45 cm depth, was sent to Teledyne Isotopes in New Jersey for a radiocarbon date. Some cultural remains were found deeper in pit E (Figure 3), so the starting date for this site is earlier than the radiocarbon date. The result was 1660 $\pm$ 80 years B.P. (I-17532), or about A.D. 290. A second sample from a depth of 30 cm in Pit E and in the vicinity of an arrow point was tested; the result was 700 $\pm$ 80 years B.P. or about A.D. 1250. The funds for both of these tests were donated by Lee Patterson.

Faunal analysis

The faunal material from this site has been turned over to Bill McClure for analysis. McClure reports that the column recovered from the wall of pit A contains over 100,000 bones and bone fragments, some of which belong to a rodent species now extinct. Preliminary results indicate that most of the bones are of fish – both fresh water and salt water fish. This work will be issued as a separate report.

The vertical distribution of bone found in the 1/4-inch mesh screens is included in Figure 3.

Concluding remarks

Most of the material removed from this site for analysis came from only two 1-m-square pits, yet the amount of material almost choked down the lab's ability to handle material. This site is extraordinarily dense with cultural material. This preliminary report is being released at this time only because it is two years later than what was promised to the site owner, Mr. Barrow. The detailed analyses of both the faunal material and the pottery will be published at a later time.

The Houston Archeological Society feels that this is a very significant site. It is a contact site; its period of occupation extends into the Historic period and the later occupants probably interacted with the nearby Mission Nuestra Señora de la Luz del Orcoquisac (see Fullen 1978). Much more can be learned from this site.

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Table 1. 41CH161 Projectile Points

pit	level,cm	type	material	Fig. 1
A	25-30	Perdiz	black quartzite	A
A	25-30	Perdiz	petrified wood	B
E	25-30	Perdiz	chert	C
E	25-30	Perdiz stem	petrified wood	-
	surface	Perdiz	chert	D
	surface	Perdiz	chert	E
	surface	William-like	chert	F
	surface	Kent stem	chert	H
	surface	dart point tip	petrified wood	-
	surface	crude Gary	petrified wood	G

Table 2. 41CH161 Lithic Flakes from Regular Screens (1/4-inch mesh)

		flake size, mm square				
pit	level,cm	under 15	15-20	20-25	30-35	35-40
A	25-30	20	1			
A	30-35	5				
A	35-40	4	1			
A	60-65	1				
E	15-20		2			
E	25-30	14	2	1		
E	30-35	5	1		1	
	surface	3	2	3		1
	totals	52	9	4	1	1

Table 3. 41CH161 Lithic Flakes from Fine Screen, Pit A

	flake size, mm square					
level,cm	under 6	6-8	8-10	10-12	12-14	total
10-15	21	1				22
25-30	48	18	2			68
30-35	141	27	3	4	1	176
35-40	90	5	1			96
45-50	20	4				24
50-55	31	3				34
55-60	9	2				11
60-65	10	4	1			15
total	370	64	7	4	1	446
percent	83.0	14.3	1.6	0.9	0.2	100.0

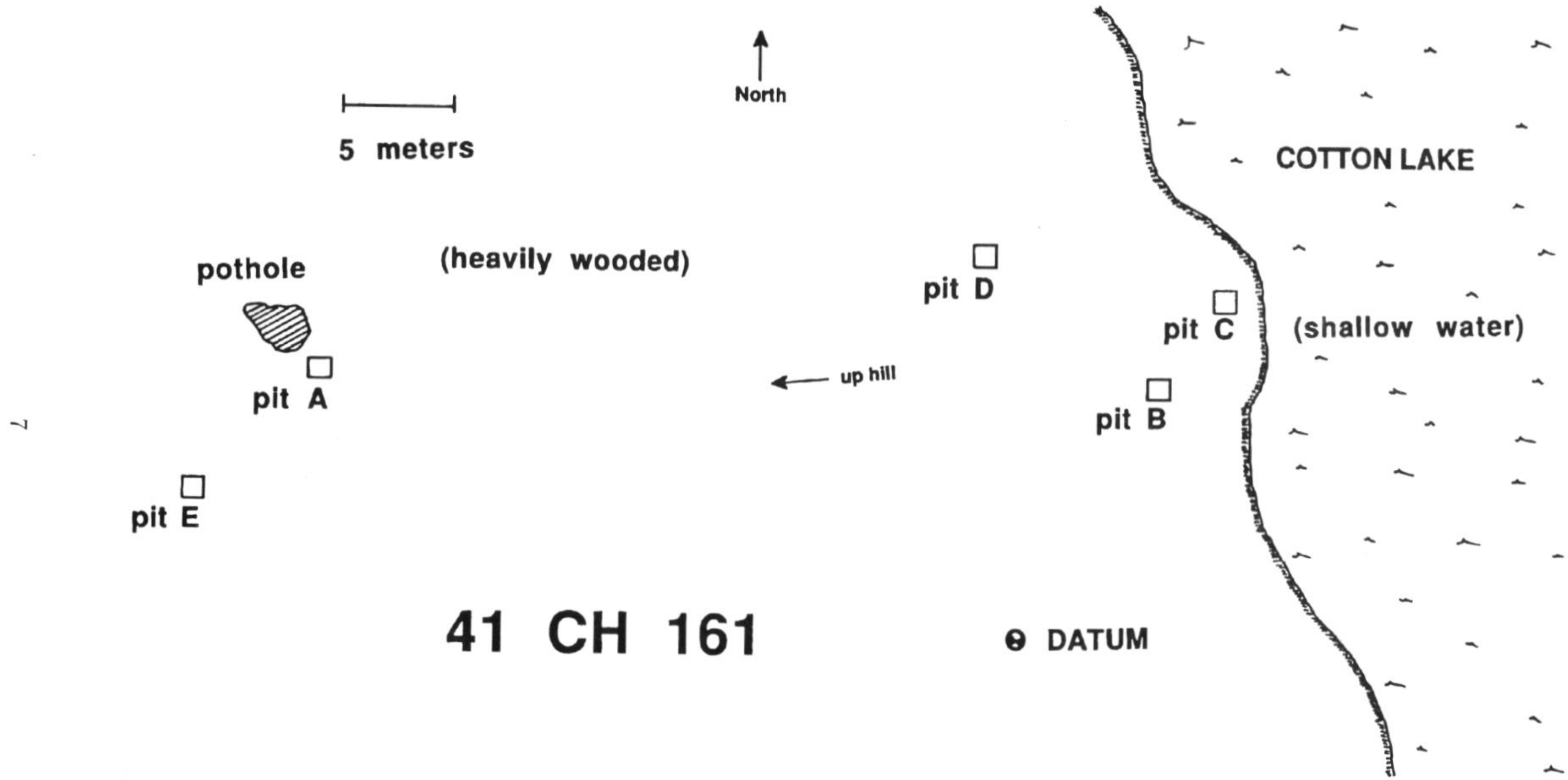
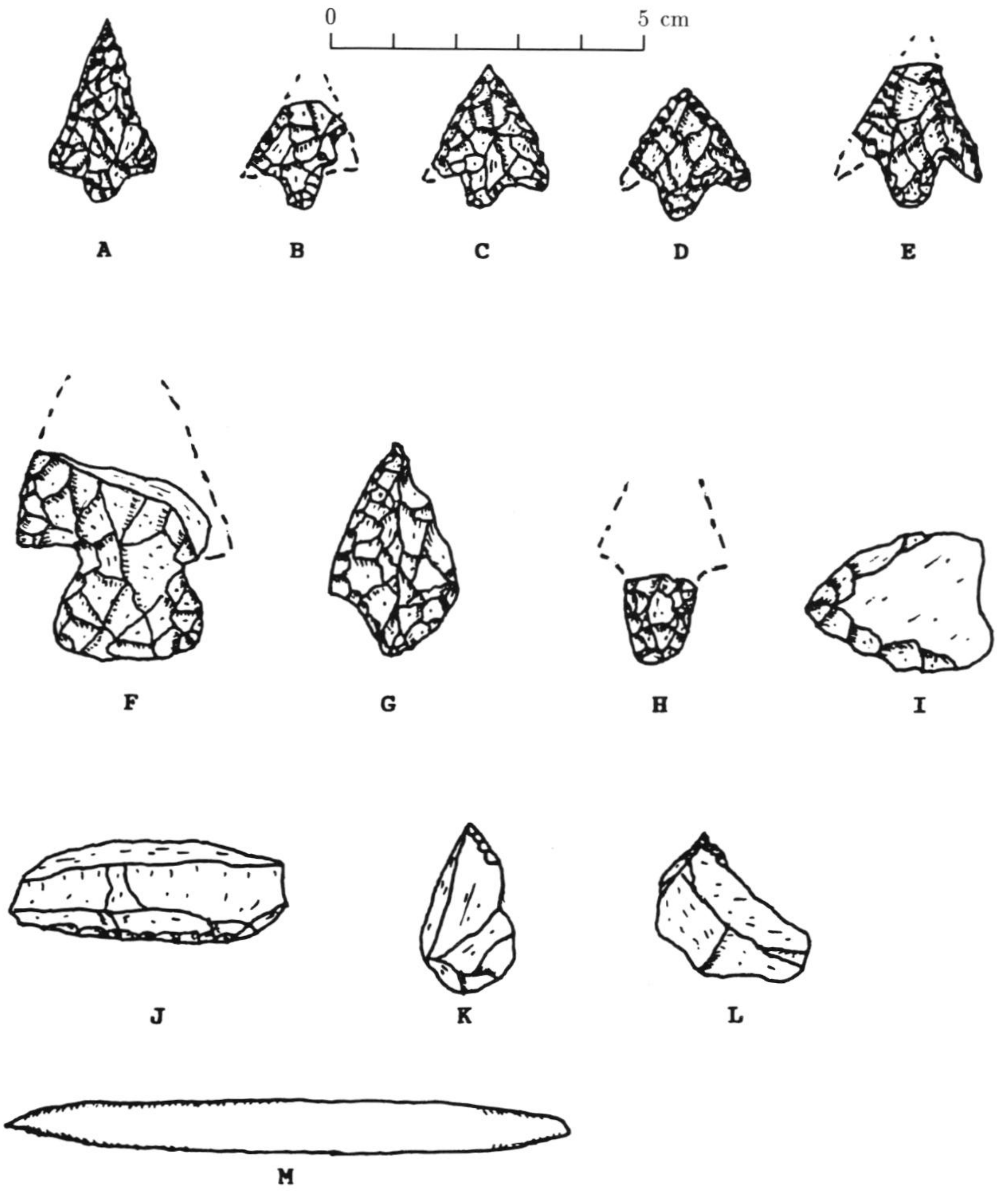


Figure 1. Map of 41CH161



A to E – Perdiz points; F – Williams-like point; G – unfinished Gary point; H – Kent point stem; I,J – scrapers; K,L – gravers; M – bone tool

Figure 2. Lithic and bone artifacts, 41CH161

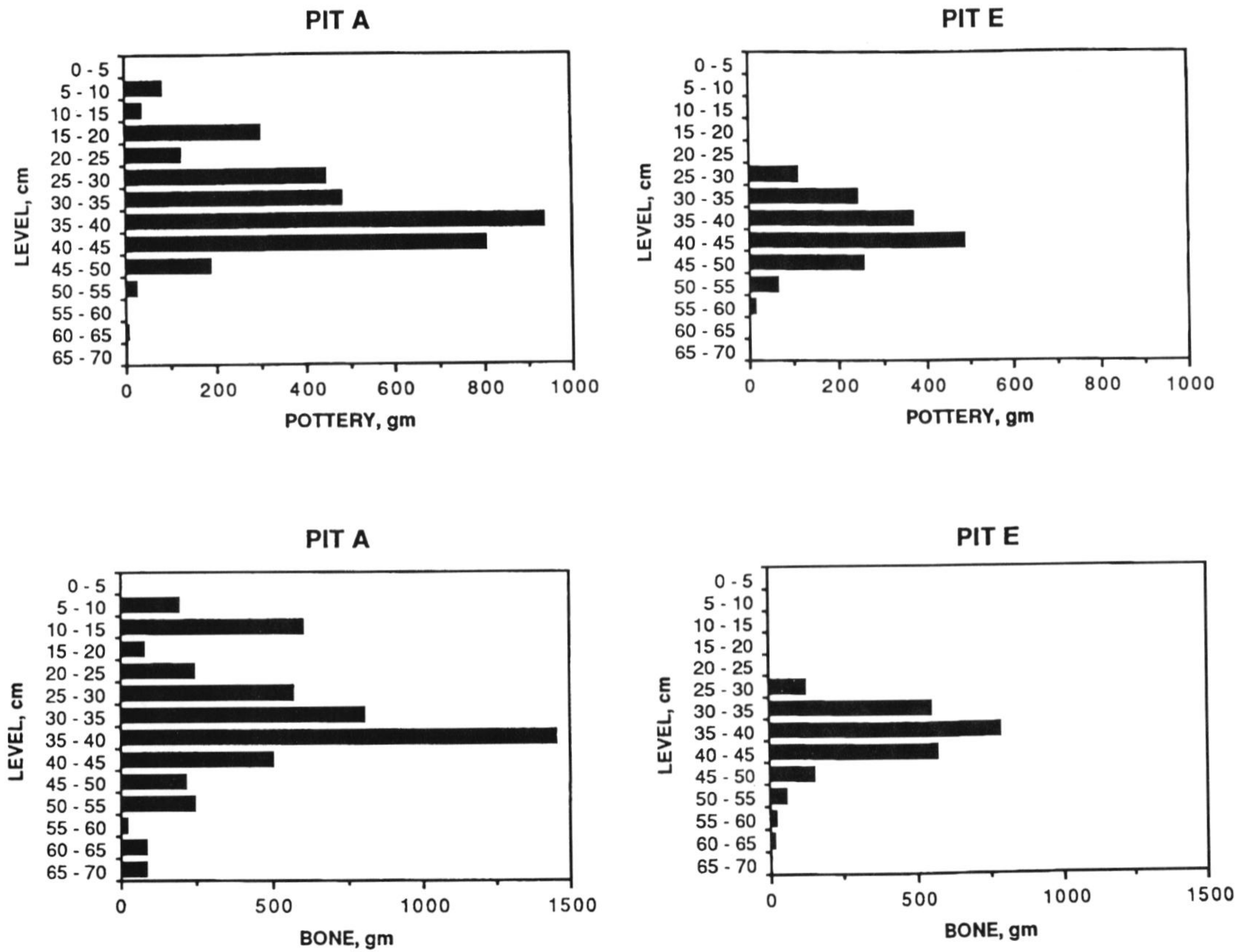


Figure 3. Pottery and bone vertical distribution

Trade Beads from Site 41CH161 and a Review of Bead Manufacture and Classification

Melissa May

Two glass trade beads of European manufacture were excavated at site 41CH161 in Chambers County, Texas. Prior to providing a description of these beads, it is important to review the history of bead manufacture and trade. This discussion will provide a framework for evaluating the significance that beads can represent in determining the age of a site. A general description of this site is provided by Kindall and Patterson (1994).

Bead research

Francis (1989) in reviewing the archeological analysis of beads states: "The raw data of bead research comes from many sources: archival (history and ethnohistory), comparative (archaeology and ethnology), and observational (a detailed cataloguing of an assemblage). Researchers must be familiar with the site involved and its cultural milieu. Following cataloguing using standard descriptions, the data derived are used to answer many questions. These are specific for each bead, but can be grouped into four categories: (1) what is the origin of the bead? (2) how did it arrive at the site? (3) how was it used at the site? and (4) how did it leave the systemic (living) context of the site to enter the archaeological?". I will use these basic questions as an outline for the following discussion.

(1) What is the Origin of the Bead?

The origin of bead manufacturing has been traced to the ancient Egyptians, Phoenicians, and Syrians, then disseminated by the Romans via their Empire to the Gauls and Venetians (Dubin 1987). The Venetians became the masters of glass making and for centuries held a virtual monopoly on the practice via their family-members-only perpetuated guilds. The penalty for divulging any of the trade secrets could be death and they controlled the industry.

Eventually, apprentices recognized the special job skills they had acquired and struck out on their own (if they survived the wrath of the guild members) to set up shop in other parts of Europe. The 16th through 20th centuries saw the Spanish, English, Asian, Indian, Portuguese, Dutch, French (16th century), and Bohemians (19th - 20th) (Ross 1989) gaining repute as bead manufacturers. This rise of European bead manufacturing centers included countries known to have explored the coastal regions of Texas during some of the time that 41CH161 was occupied.

Trade of glass "canes" has also been documented. Although it is possible to ascertain the chemical composition of the glass canes used (which could indicate their country of origin), the trade of these with other countries complicates the identification of individual bead origins. Wherever the cane or bead was manufactured is further obscured by to whom the actual bead was sold for export.

(2) How Did It Arrive at the Site?

It is not as straight forward as "the Spanish came to Texas; we know they brought beads to trade, so these beads must be from Spain"! From whom did the Spanish get their beads and when? The British "Hudson Bay Company" traded beads of Chinese, Venetian, and Dutch origin, and the French obtained some of their beads from Holland during the 18th century (Brain 1979). Karklins (1983) suggested that Holland supplied the French and British with beads during the 1700s, and he felt that Spain, Portugal, and Denmark were also customers of the Dutch. It is known that the indigenous people of Texas had contact with the French, Spanish, and British (Aten 1983). The question becomes, Who provided these Europeans the beads to trade and which of them came in actual contact with the people of this site, or to which Indian group were these beads traded or given to be subsequently traded or given to the people of 41CH161? The only thing we can say with confidence is that these two beads were manufactured in Europe and were transported to Texas between the 15th and 19th centuries.

(3) How Was It Used at the Site?

The context in which these isolated beads were found precludes any precise determination of their usage at this site. For more in-depth study of the magico-religious significance of beads to the American Indians, refer to Hamell (1982).

(4) How Did It Leave the Living Context of the Site to Enter the Archeological?

"The last human act in which most beads are involved is their transfer out of the systemic context. Beads leave the systemic context in one of four ways: (1) purposeful deposition, as in burials, foundation deposits, or caches; (2) purposeful discard when broken, heavily worn, or out of favor; (3) loss; and (4) abandonment" (Francis 1989). As these beads were not found in association with any ritual or burial objects, and were not broken or severely worn, it would appear they were either lost, abandoned, or purposefully discarded.

Bead manufacture

To understand the stylistic differences between beads, one must first determine how they were made. Discussion of the chemical constituents used to create a certain glass color is beyond the scope of this paper, as is discussion of the methods utilized to determine which chemical blends may have originated in which country. I have only endeavored to provide insight as to readily observable attributes and the standards used to describe and document same by those specializing in bead research. In general, various chemical elements were mixed to form a specific color of glass. A cane of that color glass was produced and beads were either made directly from this cane on-site, or the canes were traded to the actual bead manufacturing center.

A synopsis of Kidd and Kidd (1970) follows, roughly detailing how beads were made. Simple beads were drawn, wound, or mold-pressed only and monochrome (of one color). Complex beads were created using a combination of techniques, and can be monochrome or polychrome.

Simple drawn beads began as a "gather" of heated, viscous glass which was lifted from a crucible on the end of a hollow metal rod (like a straw) by the master bead maker. He then blew a bubble into the gather via this "straw," dipped the gather again to add more glass to the bubble, then handed the rod to an assistant. Another assistant affixed a second rod to the opposite end of the "inflated" gather and the two individuals walked in opposite directions, "drawing" the gather to the desired diameter. This glass length (now also called a cane) was set down perpendicular to parallel slats on the floor, where it solidified. It was then cut into many pieces of the desired bead size. Finishing followed, with various methods being used for the respective bead types.

Drawn beads may retain their rough edges and tubular shape, which is helpful in their identification. However, if they were hot-tumbled (see section on Finish Technique), their shape can be radically different (i.e., circular [ring] shaped versus tubular). In the process of manufacturing glass, air becomes trapped in the molten mass. When a bead is "drawn," the air bubbles will have an elongated shape, extending length-wise parallel to the perforation. Also, it appears that the perforation is fairly distinct for a wound bead. In a given draw, the diameter of the perforation fluctuates as the glass is cooling while being drawn, whereas the perforation of a wound bead seems tighter, more distinct, and uniform.

Complex drawn beads are created by (1) twisting the glass cane as it is being drawn, (2) using pincers, paddles, or molds to impress or reshape the gather before it is drawn, (3) placing the air-filled gather into a basket containing glass canes of various colors in such a manner that they adhere to the gather, then reheating this combination and drawing it out, or (4) dipping the initial gather into molten glass of a different color singly or multiple times (to build up a layered effect) prior to drawing it out.

Simple wound beads were manufactured by winding molten glass around a rotating machine- or hand-held wire, rod, or straw (known as a mandrel) coated with a clay slip, ash, or lime (Ross 1989) to the desired diameter . They were then removed from the mandrel, cooled, cleaned, sorted, and packaged. "Complex and decorated wound beads were altered by molding or shaping, by applying stripes, by faceting, etc." (Ross 1990). Wound beads (1) may evidence a "swirl" or tail of glass (Ross 1989) around the perforation where the molten "drizzle" was swirled off of one bead as the maker began the next, (2) may be blackened or appear dirty on the bead interior where the clay slip, lime slurry, or ash coating the mandrel adhered to the bead, or (3) may contain air bubbles which wrap around the bead in a helical manner parallel to the perforation.

Mold-pressed beads were manufactured by pinching or pressing molten glass in a two-part mold. "Round canes, approximately 3 to 3.5 cm in diameter and 100 to 150 cm long ... were heated and melted in a pressing oven. As soon as the glass on the front end of the cane in the oven has melted, the glass presser removes the latter from the oven, takes it to the mould and presses off as many beads as the softness of the heated portion will allow" (Ross 1989). "Perforations were partially formed by either a tapered pin that appears to have been an integral part of one cavity or by pushing a pin into the mold and through the glass. Upon removal from the mold, the preform had a partially formed perforation and a mold seam around its circumference with fine glass fins protruding from it. Facets were subsequently ground on the bead, thus removing the fins and the incomplete perforation was punched through, forming a roughly spherical faceted bead with a bi-conical perforation" (Ross 1990). So evidence of mold-pressed beads would be a mold mark around the circumference and possibly unequal perforations.

Finishing Techniques

Many methods have been used to finish glass beads. Beads (1) may have facets ground; (2) may have edges smoothed off by grinding; (3) may be placed in sacks filled with a bran or ashes and tumbled to smooth the edges; (4) , if molded, may be skewered on a thin heated iron stem screwed to a disk and coated with a sludge of lime or clay, heated, and remelted somewhat as the disk rotates slowly and constantly in proximity to the heat source or oven, then recooled, knocked off into a pot of wood ashes, cleaned, and threaded (Ross 1989); or (5) may be stirred in a container of lime (Ross 1989) or ash (Francis 1989) until their holes are filled, then placed in a barrel, pan, or "iron drum containing powdered charcoal and sea sand" (Ross 1989) which is tumbled or agitated over the heat source until the beads are smooth or rounded. The beads are then cooled in flat pans, sifted, cleaned, and strung or packaged.

Bead description and classification

Descriptions of the beads from site 41CH161 are given in Table 1; a discussion of the descriptive terms follows.

Bead Length, Diameter, and Size

Bead length is measured parallel to the perforation. Diameter measurements are made perpendicular to the perforation. Ross (1990) records least diameter (LD) when measuring a bead. Karlis Karklins (personal communication 1994) clarified that least diameter is "the dimension that allows a bead to pass through a set of sieves until it comes to rest in a size group with beads of like least diameter." This assumes the bead length is smaller than the least diameter. A bead was never perfectly circular in cross section, but would have areas that were flatter than others. When Karklins measures a bead, he balances it on his finger and the bead invariably pivots into the cor-

Table 1. Description of Beads from Site 41CH161

	Bead 1	Bead 2
Provenience:	Pit A, Level 6 (25-30 cm)	Pit E, Level 3 (10-15 cm)
Size:	Small/seed	Small/seed
LD:	2.80 mm	2.05 mm
PD:	1.0 mm	0.9 mm
Length:	1.60 mm	1.57 mm
Color:	White (no color equivalent provided by Johnson); Kidds' = White	Bluebird Blue 4/E 784; Kidds' = Robin's Egg Blue
Clarity:	Opaque	Translucent to Transparent
Shape:	Circular (ring)	Tube
Kidds' type:	IIa12	Ia5
Manufacture:	Drawn. Has small pockmarks from either air bubbles when drawn or as a result of corrasion since deposition. Has been radically rounded off by hot tumbling.	Drawn. Edges are slightly rounded (method undetermined), but not to the extent that bead shape differs significantly from that of the original tubular cane.

rect position to measure this least diameter as the jaws of the calipers clamp down on its surface. In cross section, a bead should be slightly oblate where LD is taken. Perforation diameter (PD) is also given in Table 1. Bead size is based on an arbitrary scale utilizing least diameter proposed by Kidd and Kidd (1970):

very small:	under 2 mm
small:	2-4 mm (also referred to as "seed" or embroidery beads by Rumrill [1991])
medium:	4-6 mm
large:	6-10 mm
very large:	over 10 mm

Bead Color and Clarity (Diaphaneity)

According to Ross (1990), "Beads with fortuitous layers (generally of the same color hue, but with a different chroma, color value, and/or diaphaneity) appear to have been produced naturally when a gather of one color cooled. ... This phenomenon results as glass cools from its surface to its interior, causing different chemical elements to migrate slower or faster. As coalescing elements 'freeze,' concentric layers which are brighter or duller, lighter or darker, or more opaque, translucent, or transparent than adjacent layers are created." Extreme caution must be exercised in determining whether a difference in hue is due to cooling or actually represents a polychrome bead.

Many authors cite bead colors taken from Kidd and Kidd (1970), who base their color system on the Color Harmony Manual, or from the Munsell Book of Color, 1966 (Ross 1990) or 1976 (Karklins and Barka 1989) editions. Another system was constructed utilizing Benjamin Moore and Co. paint chips, following the J. H. Bustanoby color chart of 1947 entitled "Principles of Color and Color Mixing," referenced by Harris and Harris (1967). Johnson (1993) published "A Color Chart" based on the rare Bustanoby chart and also constructed a comparable one using Benjamin Moore chips. The colors referenced herein utilize Johnson (1993) first and Kidd and Kidd (1970) second.

Glass bead clarity is recorded using the terms opaque, translucent, and transparent. "Opaque beads are impenetrable to light except on the thinnest edges. Specimens that are translucent transmit light but diffuse it so that an object (such as a pin in the perforation) viewed through them is indistinct. A pin in the perforation of a transparent bead is clearly visible" (Karklins and Schrire 1991).

Bead Shape, Classification, and Method of Manufacture

Kidd and Kidd (1970) compiled a system to aid in standardizing the terms used to describe bead shape (round, circular-ring, oval, tube, flat, disk), size, method of manufacture, color, etc., with an alphanumeric key from which to "compare and classify" beads. The method of manufacture is surmised, based on the author's examination of beads under a 15X binocular microscope.

Age of beads

The presence of European trade beads at 41CH161 indicates that occupation of this site by Indians occurred at least in part during the period from A.D. 1492 to A.D. 1830. Aten (1983) has suggested that the Akokisa were well established in the region surrounding site 41CH161 during the 1700s, and their presence is documented as early as 1650. These people were also known as the Orcoquisacs, for whom the Spanish Mission "Nuestra Señora de la Luz del Orcoquisac" was built around 1756; Tunnel and Ambler (1967) record 4351 beads from the vicinity of the site of "Presidio San Agustín de Ahumada," which was associated with the Mission. Aten further states there is no record of Akokisa existence in this area after 1830.

The shrink and swell of the soil (as well as the animal burrow close to Pit E and pot hunter's hole adjacent to Pit A) could have impacted the original depositional levels of the beads. The age of the trade beads can be considered with respect to their association with a bone-tempered ceramic sherd, lithics, and shell material described in Kindall and Patterson (1994).

Bead 1 was recovered from Pit A, level 6. It resembles a bead which originated in Amsterdam and which dates to the 1682-1785 period of the Mohawk bead sequence established by Rumrill (1991). Perdiz points found at this same level might range in age from Late Prehistoric to Historic. No radiometric dates have been obtained from Pit A and no other age-diagnostic artifacts have been identified.

Bead 2 was recovered from Pit E, level 3. A bone-tempered sherd was found in Pit E, level 5; in this area, bone tempering is considered by Aten (1983) to have appeared no earlier than A.D. 1100. Rangia shell from level 6 in this pit has yielded a radiocarbon date of A.D. 1250, which is consistent with Perdiz points whose age range is Late Prehistoric to Historic (Kindall and Patterson 1993).

Rangia shell at level 9 was radiocarbon dated to approximately A.D. 290. Occasional occupation of this site, therefore, extended from at least as early as 290 A.D. into the historic period, possibly as recently as the 19th century.

Conclusions

More research is necessary to better determine the origin and age of beads. Existing collections should be compared to enhance what is known about the types, sizes, and colors of beads the ancient coastal people of Texas had. While this paper has not confirmed the origin of these beads nor by whom they were traded, it is hoped the discourse has afforded the reader a better grasp of the complex issues and questions two little beads can raise.

Acknowledgements

My personal thanks to K. Karklins, R. L. Gregg, and M. Silcox for their assistance.

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Difficulties in the Explanation of Technological Change

Leland W. Patterson

Introduction

Archeological studies are mainly historical and descriptive (Hole 1973:303). Some investigators have attempted to go to a more detailed and abstract level of study, however, to explain why cultural changes have occurred. This is the so-called Processual School of archeology (Renfrew and Bahn 1991:411). Processual studies have seldom been successful in determining exact reasons for technological change. Lack of success has been mainly because the archeological record is only a partial account of prehistoric lifeways, and because there are generally several possible reasons for technological change (Renfrew and Bahn 1991:421). Counter to the Processual School of archeology, a theoretical approach has more recently developed called Post-processual Archeology (Hodder 1986:156). Hodder feels that processual archeological studies have been done on a level that is too abstract, and states that: "Indeed, it is false to separate theory and data, since the later can only be perceived in relation to the former. It is also doubtful whether theory can exist independent of data examples." Thomas (1989:574) suggests that "The establishment of general theory in archaeology requires that archaeologists transcend the specifics of chronology and lifeway to examine relevant processes that condition human behavior in general," and that progress in this area remains to be seen.

This article gives some examples from the archeology of Southeast Texas on the difficulties in explaining why technological change has taken place. In all examples, there are several possible reasons for technological change. Further, explanations involving abstract issues, such as cultural preference, cannot be studied with available data.

Changes in stone tool types

Heavy unifacial and bifacial stone tools, such as scrapers and combination scraper-gravers, were used during the Paleo-Indian period in Southeast Texas (Patterson et al. 1987). These heavy tool types have large dimensions of length, width, and thickness, with typical thicknesses above 10 mm. After about 7000 years ago, starting in the Early Archaic time period, few heavy stone tools are found, and the unretouched utilized flake becomes the dominant tool type, often casually selected from bifacial thinning debitage from dart point manufacture. Changes in stone tool type in this region can be well described, but the explanation of why these changes occurred is not apparent. Some possible reasons for these changes are as follows:

1. Paleo-Indians may have been performing tasks for which heavy stone tools were especially well suited.

2. Paleo-Indian heavy stone tools may represent a cultural tradition that changed over time.

3. Paleo-Indian heavy stone tools were made on large flake blanks that were brought to campsites specifically for this purpose. Later Indians may have taken advantage of readily available bifacial thinning debitage for utilized flake tools, as an easier method of obtaining stone tools.

4. Highly mobile Paleo-Indians may have tended to curate formal heavy stone tools for use in seasonal rounds, because of the limited availability of lithic materials at some locations. Judged by the degree of reuse of campsites in Southeast Texas, however, Late Paleo-Indians do not appear to have had a more mobile lifestyle than later Archaic period Indians.

5. Climatic change can be considered as affecting prehistoric lifeways. However, Butzer (1982:301) notes that in respect to environmental changes "there is no archaeological case for causally related technological or behavioral readjustments."

Stylistic changes in projectile points

In the greater Southeast Woodlands, including Southeast Texas, there was a sequence of projectile point styles in the Late Paleo-Indian and Early Archaic time periods from side-notched to corner-notched to stemmed varieties (Fagan 1991:310; Patterson et al. 1987). The following are several possible reasons for these stylistic changes:

1. Styles of projectile point types may tend to change over time as the result of changing cultural preferences. Jennings (1989:26) has observed, however, that "There is an unproved assumption that changes in details of the attributes of artifacts are an index to significant changes in other aspects of the culture where the objects had their original value." It should be noted that the stylistic changes in projectile point types discussed here cannot be related to local cultural preferences, since geographic distribution of these stylistic changes is from East Texas to South Carolina, throughout the Southeast Woodlands.

2. Projectile point type changes could be the result of changes in hafting methods.

3. There is an advantage to use of stemmed points in terms of ease of manufacture. I have found experimentally that stemmed dart points are easier to make than notched dart points, especially where tough grades of lithic raw materials are involved.

The introduction of pottery

In the southeastern United States, pottery started on the Atlantic coast in Georgia, and then the use of pottery slowly diffused westward. Pottery started in Georgia about 4500 years ago (Sassaman 1993:Figure 4), but did not start in the Galveston Bay area of Southeast Texas until about A.D. 100 (Aten 1983:297). It took nearly two millennia for pottery to become widely accepted throughout the southeastern United States (Sassaman 1993:3). For example, pottery was known to the Poverty Point culture of Louisiana but not widely used (Sassaman 1993:223). Apparently, hunter-gatherers were conservative in nature and not inclined to experiment with successful lifestyles. Pottery is heavy and bulky, not easily transported by mobile hunter-gatherers. The explanation of adoption of pottery by various hunter-gatherer groups is hampered by the lack of data on how pottery was used. Pottery could have been used for cooking, food storage, or water storage. Since pottery started in a coastal area at shell midden sites, and diffused primarily along the Gulf Coast to the west, there might be some particular advantage for use of pottery in processing shellfish. In inland Southeast Texas, there are no data to indicate that the introduction of pottery had a major impact on general lifestyle. In any event, the explanation for the adoption of pottery in Southeast Texas may be refined by future studies that determine how pottery was actually used.

Summary

Examples have been given to show the difficulties in determining specific reasons for technological change. Cultural behavior is complex, even for the simple lifestyles of hunter-gatherers, and archeological data are generally not adequate to demonstrate specific reasons for technological change. It is likely that utilitarian technological changes were not made by conservative hunter-gatherers unless there were advantages for this specific lifestyle (Hayden 1993:213). This situation should not be lamented, since this is the nature of archeological data. Even though it is seldom possible to explain why technological changes were made by hunter-gatherers, it is still possible to construct good general descriptions of prehistoric lifeways from available archeological data. Also, there is no reason why archeologists should not consider possible factors for technological change, even when firm conclusions cannot be made.

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Prehistoric Use of Acorns in Southeast Texas

Leland W. Patterson

Introduction

Because floral remains are seldom preserved at archeological sites in Southeast Texas, the complete diets of prehistoric hunter-gatherers cannot be determined. Wild plant foods were undoubtedly important, however. Some idea of plant foods used by prehistoric hunter-gatherers can be obtained from ethnographic data. Acorns are among the plant foods that are mentioned in records of historic Indians in Texas, and many other areas of the United States (Turner 1988:177).

In Texas, acorns were eaten by historic Tonkawa (Newcomb 1969:139), Coahuiltecans (Newcomb 1969:139), Karankawa (Newcomb 1969:139; Ricklis 1992:221), and Caddo (Swanton 1946:293) Indians. Acorns were also utilized extensively in the greater Southeast Woodlands (Swanton 1946:293). Because of the widespread occurrence of several varieties of oak in Southeast Texas, it seems likely that prehistoric Indians in this region would have eaten acorns. Early European settlers in North America also ate acorns (Wigginton 1975:352). A recent television program noted that a few Tunica Indians in Louisiana still gather acorns.

Tannin in acorns

Some varieties of oak have acorns that contain tannin, which must be extracted before human consumption. Acorns of the White Oak group (which have leaves with rounded lobes) contain less tannin than those of the Black Oak group (with pointed lobes), and require little or no treatment (Goodchild 1984:22). Acorns of the White Oak group that would not require treatment could be obtained from White Oak (*Quercus alba*), Post Oak (*Quercus stellata*), and Swamp White Oak (*Quercus bicolor*). Live Oak (*Quercus virginiana*) acorns also do not require treatment (Swanton 1946:279).

Extraction of tannin from acorns can be done by boiling whole acorns or using slow, cold-water leaching of ground acorn meal (Wigginton 1975:353). Some California Indians extracted tannin from acorns by putting acorn meal in a sandy porous pit and then adding water from time to time (Turner 1988:179). This process was shown on a recent television program, with an Indian woman remarking that water leaching was used until the acorn meal was "sweet." Other California Indians simply left whole acorns in swampy ground for six to twelve months (Goodchild 1984:22).

It is not known whether Indians in Southeast Texas would have selectively utilized types of acorns that contain little tannin or would have processed acorn types that contained tannin to remove that chemical substance.

Jones (1981:Appendix) has observed experimentally that ground Red Oak (*Quercus rubra*) acorn meal soaked in water had a pH of 5, which would indicate that tannin was in the form of tannic acid. Jones (1981) and Turner (1988) have proposed that calcined limestone was used by Central Texas Indians to neutralize tannic acid in acorns. Contrary to the experimental results by Jones (1981), I have found that water from boiled Red Oak acorns and cold water from acorn leaching had a neutral pH of 7. This shows that at least some acorns contain tannin in neutral chemical form, not as tannic acid. I have no explanation of why my experimental results were different from those of Jones. Perhaps different soil conditions were a factor. In any event, there is no need to use a neutralizing agent for extraction of tannin from acorns. Tannin can be removed by boiling or cold water extraction, whether the tannin is in neutral chemical form or is present as tannic acid. I have produced 'sweet' acorns from Red Oak simply by boiling for two hours, as recommended by Wigginton (1975:353).

In regard to calcining limestone (calcium carbonate) to produce lime (calcium oxide) as discussed by Jones (1981) and Turner (1988), it should be noted that it would be difficult to produce a large quantity of lime from typical limestone found in burnt rock middens in Central Texas. Fist-size chunks of limestone do not have much surface area for heat transfer, and wood fires are not very hot, probably 800-900°F. In commercial practice (Shreve 1945), lime is produced from finely pulverized limestone in a kiln operating at 1000°C (1832°F).

Acorn cooking procedures

Regardless of whether tannin extraction is required for acorn preparation, the first processing step is to remove the shell. This can easily be done by cracking the shell between two rocks or two pieces of wood. Nut cracking is tedious, but not difficult. Gathering and cracking enough acorns to have been a significant dietary item would have been a fairly labor-intensive operation.

"Acorns were eaten roasted, boiled, or crushed into flour to make bread, and oil was extracted from acorns of Live Oak (*Q. virginiana*), a southeastern species" (Goodchild 1984:23). Swanton (1946:279) also notes that oil was produced from Live Oak acorns by Indians of the Southeast. If varieties of acorn were used that did not require tannin extraction, acorns could have been cooked by roasting, or boiling, or prepared as a flour for baking or use as a soup base. However, if tannin extraction was required, use of roasted acorns would have been eliminated. In this case, acorn consumption would have been limited to eating whole boiled acorns, use of acorn meal from boiled acorns, or use of acorn meal from cold water extraction of tannin. There would be no reason to roast acorns prior to tannin extraction.

Platt (1953:11) notes that "Acorns of the White Oak group are fairly good to eat when roasted." Acorns should be only lightly roasted before consumption. I have found that roasting acorns at 300°F for 30 minutes is sufficient. Longer roasting time produces a very hard product that is difficult to chew. I roasted acorns in the shell, and found that over 70% of the shells cracked during roasting, so that most specimens did not need further shell cracking after roasting.

Food value of acorns

Various varieties of acorns from oak trees at my home have small nuts that weigh 0.24 to 0.73 grams per nut in shelled form, or large nuts (Red Oak) that have an average weight of 1.5 grams per nut in shelled form. For this discussion, an average weight of 1.0 grams per shelled acorn is used.

There is not much data readily available on the nutritional value of acorns, but an approximation can be obtained by using protein and calorie values for other types of nuts. Based on data by Chaney and Ahlborn (1943) for various types of nuts, it is assumed here that acorns have 700 calories per 100 grams, and 20 grams of protein per 100 grams. Also, based on data by Chaney and Ahlborn (1943:Table 78), it is assumed here that minimum individual daily requirements are 2500 calories and 60 grams of protein. With these numbers, 100 grams of acorns would give 28% of daily calorie requirement, and 33% of daily minimum protein requirement. Thus, acorns could have been a significant dietary item on a seasonal basis.

Summary

Based on the widespread occurrence of various types of oak in Southeast Texas, acorns would have been a significant available food source on a seasonal basis for Indians of this region. Data for historic Indians in Texas and the adjacent greater Southeast Woodlands indicate that it is likely that prehistoric Indians also utilized acorns in Southeast Texas, as well as in other parts of Texas. Due to lack of preservation of floral remains, the quantitative importance of various plant foods in the diet of prehistoric hunter-gatherers of Southeast Texas will probably never be determined.

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The Fish Bones of Site 41WH73

W. L. McClure

Introduction

The Houston Archeological Society excavated 10 test pits at Site 41WH73 in 1992. The site is located on a terrace of the San Bernard River in Wharton County, Texas. The soil is dark sandy loam and required water screening through 1/4-inch mesh screens. Cultural materials indicate that the site was occupied during the Early Ceramic and the Late Prehistoric time periods. Preservation of bone was poor with only a few fragments of unidentified turtle and other vertebrates being recovered (Patterson and Hudgins 1992).

Samples of the soil from Pit G were set aside for later screening through finer mesh screens. These samples were dried and then washed through fine screens. The results of that effort are the subject of this report.

Results

As was the case in the field screening, very few bones were recovered. A few fragments of bone were from fishes, from small mammals, and from unidentifiable vertebrates. All had been charred by exposure to fire. The only items that could be related to particular animals were four fish bones.

At the 30-35 cm level there was a thoracic vertebra (diameter 2.0 mm) that compares favorably with the vertebra of a 15-cm-long catfish (*Ictalurus* sp.). At the 45-50 cm level there was a caudal vertebra (diameter 2.35 mm) that compares favorably with a vertebra of a 18-cm-long catfish. At the 50-55 cm level there were a tooth and a dorsal spine. The tooth has a diameter of 2.15 mm and is from a freshwater drum (*Aplodinotus grunniens*). The size of the fish can not be estimated since teeth of the drum are of variable size. The dorsal spine compares favorably with the spine of a 9-cm-long catfish.

Discussion and conclusions

All of the fish bones came from the levels representing the Early Ceramic time period. This demonstrates that the occupants were utilizing relatively small fish and small mammals in the diet. This effort also demonstrates the value of using fine screens for a sample of each excavation even when bone preservation is poor.

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Identifying Historic Indian Sites in Southeast Texas

Leland W. Patterson

Introduction

Historic Indian period sites (A.D. 1500-1800) are probably underidentified in Southeast Texas, because few artifact types changed from the Late Prehistoric period (A.D. 600-1500) into the Historic Indian period. For example, at site 41WH19 (Patterson et al. 1987) there is a protohistoric radiocarbon date of A.D. 1585 for the top stratum, but no changes in artifact types from earlier strata with Late Prehistoric remains. This paper summarizes current data types that can be used for identification of Historic Indian period sites in this region.

European artifact types and historic records

The presence of European type artifacts can be a positive identification of a Historic Indian period site, if there is no evidence of European or African settler occupation of the site. The most common types of European artifacts found on Historic Indian sites include metal and glass items. At site 41WH8 (Hudgins 1984), European items included a metal dart point, a Spanish coin, and unifacial tools made of glass. European glass trade beads have been found at some sites, such as 41CH110 (Gilmore 1974) and 41CH161 (May 1993). Other European type artifacts sometimes found at Historic Indian sites are gunflints and modern potsherds. Sites of acculturated Alabama-Coushatta Indians of the early nineteenth century have many European type artifacts (Perttula 1992:23).

Historic records are not generally useful in identifying Historic Indian sites in this region because the majority of such sites are not identified in historic records. Many Historic Indian sites in Southeast Texas that are mentioned in historic records have not been located. Exceptions are some of the sites noted by Fullen (1978) for the El Orcoquisac Archeological District, which includes some Historic Indian period sites that are mentioned in historic records, as follows: Site 41CH57 includes Joseph Blancpain's trading post, Village de Atakapas (1754), the first location of the Spanish Presidio San Agustín de Ahumada (1756-1766), and the first location of Mission Nuestra Señora de la Luz (1756-1759). Site 41CH54 is the second location of Mission de la Luz (1759-1771), and site 41CH22 is the Orcoquiza Indian Rancheria associated with the mission. Site 41CH53 is the second location of Presidio Ahumada.

Historic population levels

In the 1992 updates of the computerized data bases for the inland (Patterson 1989a) and coastal margin (Patterson 1989b) subregions of Southeast Texas, there are fewer sites in the Historic Indian period than in the Late Prehistoric period. A comparison of population levels can be made by using the relative population factor (RPF), which is the number of sites divided by the number of years in a time period times 100. The following tabulation shows both number of sites and relative population factors for the Late Prehistoric and Historic Indian periods:

	Late Prehistoric		Historic Indian	
	no. of sites	RPF	no. of sites	RPF
inland	164	18.2	13	4.3
coastal margin	128	14.2	28	9.3

The decrease in population levels shown here from the Late Prehistoric to the Historic Indian period is probably overstated, however, because of problems discussed here for the identification of Historic Indian period sites. The relative population factor is not an precise measurement, but rather provides an indication of population level trends.

Since many Historic Indian sites probably do not have any European type artifacts, it appears that only a limited number of Historic Indian period sites can be identified by distinctive projectile point and pottery types, as follows:

Historic arrow points

There are several arrow point types that occur in both the Late Prehistoric and Historic Indian periods. These include Bulbar Stemmed (Turner and Hester 1993:203; Hudgins 1984: Figure 9), Cuney (Turner and Hester 1993:210; Hudgins 1984: Figure 8), Fresno (Turner and Hester 1993:213; Hudgins 1984: Figure 6), Perdiz (Patterson et al. 1987:Table 2), and Scallorn (Patterson et al. 1987:Table 2). Only the Guerrero arrow point type is identified solely with the Historic Indian period in Southeast Texas (Turner and Hester 1993:216; Hudgins 1984: Figures 7,10). Glass and metal arrow points have been found in other regions of Texas, but so far not in Southeast Texas.

The Guerrero arrow point is described by Turner and Hester (1993:216) as a triangular to lanceolate point made during the Spanish Colonial era (1700s). This point type has been found at site 41WH8 (Hudgins 1984: Figures 7,10) and site 41WH16 (Hudgins 1985) in the western part of Southeast Texas. At site 41HR182, in the central part of this region, an arrow point previously classified as leaf-shaped (Patterson 1985: Figure 10D) is now being reclassified as a Guerrero point. This specimen is shown in Figure 1A, and is similar to some specimens of the Guerrero point type at site 41WH8 (Hudgins 1984: Figure 10). Metric measurements of this specimen are: length 30.9 mm, width 10.9 mm, thickness 5.0 mm, and weight 1.8 grams. This adds a Historic Indian period component to site 41HR182. An arrow point (Figure 1B) previously classified as leaf-shaped at site 41HR624 (Patterson et al. 1990: Figure 3I) is also being reclassified as a Guerrero point for the inland Texas computerized data base.

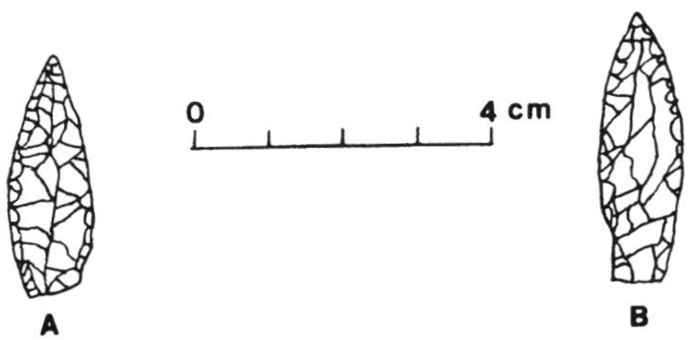

Figure 1. Guerrero arrow points
A – site 41HR182, B – site 41HR624

Historic pottery types

There is no pottery type in Southeast Texas that is found only in the Historic Indian period. Aten (1983: Figure 14.1) shows that Goose Creek, San Jacinto, bone-tempered, and Baytown Plain pottery types all occur in the Historic Indian period. However, all of these pottery types also occur in the preceding Late Prehistoric period, before A.D. 1500 (Aten 1983: Figure 14.1; Patterson 1980; Patterson and Hudgins 1989). The only ceramic attribute that appears to be exclusively associated with the Historic Indian period in this region is the loop handle. Loop handles for pottery have been found at sites with Historic Indian components, 41WH8 (Hudgins 1984: Figure 16), 41CH161 (HAS field notes), and 41BO138 (R. L. Gregg, personal communication 1994).

Summary

Historic Indian period sites in Southeast Texas are probably underidentified. Therefore, settlement patterns and population dynamics for this time period in Southeast Texas cannot be well defined at present. European type artifacts and materials can be used to identify Historic Indian period sites, but only if there is no evidence of other site use by non-Indian settlers. Several arrow point types occur in both the Late Prehistoric and Historic Indian periods in this region, but the Guerrero arrow point is the only type that occurs only in the Historic Indian period. The only ceramic attribute exclusively associated with the Historic Indian period in this region is the loop handle for pottery. The development of additional methods to identify Historic Indian period sites remains a subject for further research.

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