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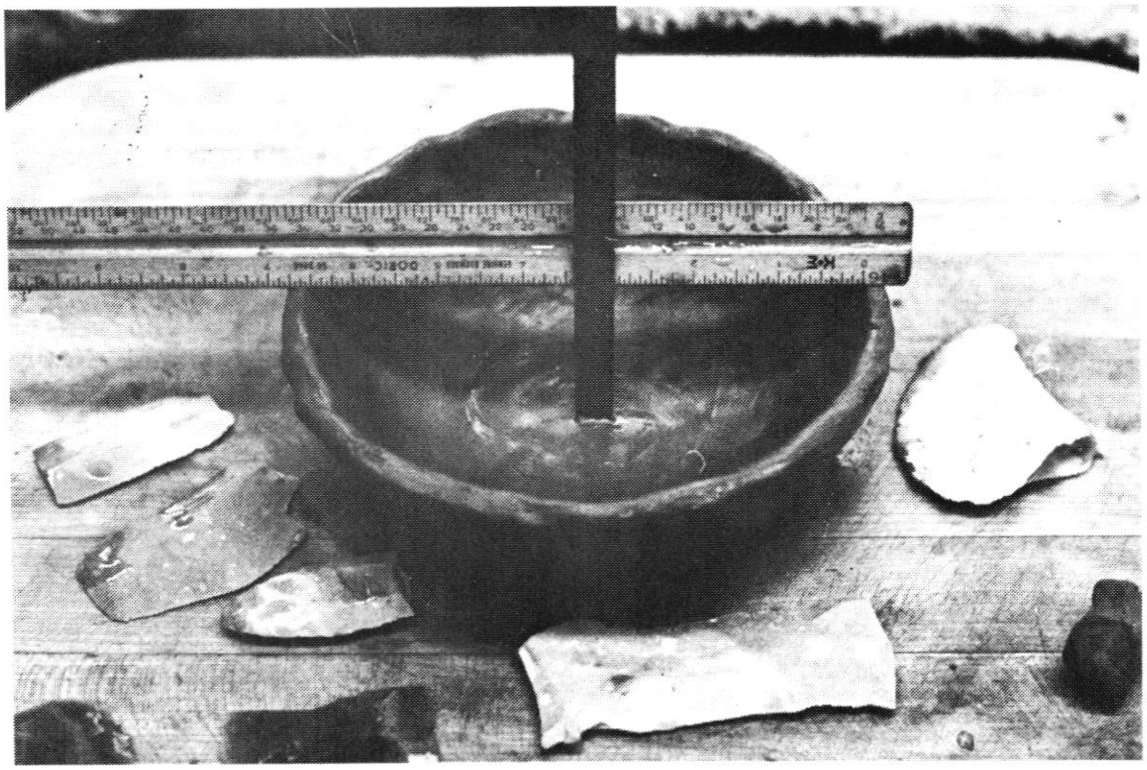

Replication of Goose Creek Pottery

Contents

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Experiments in Replication of Goose Creek Pottery

W. Marshall Black

Introduction

This work was undertaken with two objectives: (1) attempt to produce replicas for museum/educational purposes, and (2) gain hands-on insights into how pottery may have been produced using very primitive methods. Examples of complete Goose Creek pots are virtually unknown, although partial reconstructions have revealed the shapes and sizes that were traditional. The technical problems overcome by the primitive potter are not generally appreciated (Blandino 1984; Rhodes 1968).

A degree of success was achieved in both objectives; however, the firing techniques required for a high percentage of successful pots remain unknown to me. Indeed, I conclude that a very high failure rate may have been acceptable. The work centered on round- and cone-bottom vessels having maximum diameters of 8 to 10 inches and heights of 9 to 14 inches. About 30 were made. Figure 1 shows typical examples.

Materials

Two native clays were tried: Beaumont, which is available throughout most of the Goose Creek ware range, and Brazos River, which is carried by the river in suspension. A commercial potter's clay, trade name "Longhorn Red,C 06-04," was used for control. This clay "matures" or vitrifies between 1830°F (C 06) and 1940°F (C 04). The Beaumont was dug in the immediate vicinity of a shell midden in Baytown. Samples were segregated by color hue: black (surface), red, yellow, and white. The black clay lacks ductility and has excessive organic content. The red and yellow are fair potting clays but contain calcareous granules which are virtually impossible to remove. These will decompose and cause cracks and cone-like blowouts if the firing temperature gets above about 1500°F. These acid-soluble particles have been observed in sherds. The white clay occurs in rare lenses, usually exposed only at low tide. It is very dense and free from inclusions, but lacks thermal shock resistance. The Brazos clay is found in layers in inlets at low water. It is clean and usable immediately for potting. All the clays are laborious to dig and heavy to transport. For this reason, I believe that clay digging was a group activity.

Two sand (temper) sources were tried: from the narrow beaches around the Baytown bays, and from point bars in Buffalo Bayou. Both sands are very fine; monolayer measurements with a micrometer indicated maximum grain size of around 0.007 inch. The beach sand also may contain the small calcareous granules. The bayou sand has organic matter which can easily be removed by floating. The sands were largely used in the as-gathered condition (unsifted) in amounts of 20 to 40 percent by volume. It is difficult to detect the intentional addition of such fine and poorly-sorted sands. I did not experiment with grog (San Jacinto ware) although its use is known to produce a stronger and more thermal-shock-resistant paste (Blandino 1984).

Wet wedging , i.e., mixing in the sand, was elected as being more likely than dry mixing wherein the clay must first be powdered. Also I worked in small, 15-pound amounts suitable to only one or two pots. The as-dug, moist clay is spread on a hide (or tray). The desired amount of sand is sprinkled on, and sufficient water is added to produce a thick slurry. The mixture is then squeezed between the fingers. This is tiring and was also probably a group activity – likely with assistance of tiny stamping feet. The larger calcareous inclusions can be felt and picked out. When thoroughly mixed, the slurry is separated into globules and left in the sun to dry for several hours. After the excess moisture has evaporated, the globules are pounded into a loaf for storage or immediate use.

Forming

It is virtually impossible to coil a large, rounded bottom pot without use of a bottom form. This can be a disk of dried clay 4 to 5 inches in diameter and about 1.5 inches high into which a hollow having the desired base curvature has been formed. Modern Pueblos call this a "puki." It need not be fired and can be reused many times. The puki serves two vital functions: it supports the base of the pot which would otherwise sag into a crumpled, flat bottom; it permits the growing pot to be turned as opposed to the potter having to crawl constantly around the pot.

Many base sherds of Goose Creek ware have a central node or nipple. The purpose or function is conjectural: the nodes could be desired functional features of the finished pot or they could be requisite to the forming. In lieu of a formal puki, the base support could be created as a depression in a mound of sand. A bit of hide could have been pressed in and the pot begun with a large, pivotal node of clay (Blandino 1984).

The first step in replication is to make a full-sized drawing from the fragmentary reconstruction. This shows diameters at increments of height. To do this, a diameter must be established at some point and the corresponding radius laid off from a centerline. The profile is then obtained by shadow projection. This preliminary sketch must then be enlarged about 8 to 10 percent to allow for shrinkage of the clay when it dries.

Coiling begins atop a pancake of elastic paste which has been pressed into the bottom form and trimmed around the top about 0.5 inch above the puki. Coils are about 1.25 inches in diameter. The coil is laid around the circumference and gently pressed to the base member. Next the left-hand fingers are placed against the coil on the inside for support while the right thumb drags a portion of the coil downward on the outside (see Figure 2). The process is then repeated around the inside with reversed hands, again dragging a portion of the coil downward. The pot is rotated during these steps.

Next the fingers of both hands are placed outside the pot on the far side, thumbs inside, and the weld is pinched. At the same time the hands must move toward each other or the flattening coil will form into an outward flare. With this technique, the pot wall will grow about 1.5 inches per coil, limited mainly by the length of the thumb. Examination of reconstructions confirm this typical height gain per coil. A pot 8 inches tall will require four to five coils. A 14-inch pot will require eight to ten coils. Figure 3 shows a partially formed large pot for which smaller-diameter coils were used.

After three or four coils have been added, a convex flint chip is used to wet-scrape the inside. This wet scraping does not remove clay; rather it tends to smooth out the pinch marks. This produces the vertical or diagonal striations that are characteristic of the inside of Goose Creek pots. The outside is likewise scraped using a straight-edged flake. When the final height has been attained, the pot is allowed to rest for several hours so that the paste can become stiff. At the right time, the exterior can then be smoothed or "filmed" by rubbing with moist hands, using care not to let the pot become too wet. The finished pot *must* stand vertically in its puki for a day or so – until the paste approaches the leathery state. An additional two to four days is required for complete drying, which is essential. (The pot may be sanded with a sherd, but this removes the characteristically "slick" filmed finish.)

This technique came closest, among many tried, to duplicating the typical finish observed on Goose Creek sherds. An average size pot can be so formed in three to four hours. The rate at which the paste stiffens governs the minimum time required more than does the skill of the potter. One cannot go too fast or too slow, and, once the coiling is started, it is practically mandatory to work continuously to completion. I believe that pot-forming was a valued service performed by specialists within the larger band or villages, though many would have possessed the basic skills.

Incising can be done immediately after the filming step, but is difficult to do well then because the pot must be standing vertically in its puki, an awkward position. The cuts will also be too deep. Goose Creek incising is often simply a roughly slashed design. The neater designs are much more easily achieved after the pot has become leathery and can be held in one's lap. Incising becomes atypically "crumbly" if attempted when the pot has dried. While we shall never know why some Goose Creek ware was incised and some left plain, there is this "opportunity-lost" technicality. The rim of a pot dries first and rather rapidly.

Firing

This is the most critical step in which all the labors of digging materials, wedging, and forming are placed at great risk of being wasted. In my experiments, I did not allow use of any devices or architectural attributes of even the most primitive kiln (Rhodes 1968). Instead I tried various methods of controlling open fires to achieve the conflicting objectives of slow and uniform temperature buildup and as high a terminal temperature as possible. The notion that large, thin-walled, wide-mouthed vessels can simply be placed in the flames or glowing coals of a mature fire is just not valid. The piece will either explode or shatter. I believe that purposely built fires were used.

Three things can be done that have nothing to do with the fire: (1) Use a forgiving clay-temper mix. The more "open" the paste, the more the thermal shock resistance (Blandino 1984). This is the role of sand or grog. (2) Use a structural shape that is less prone to thermal stress cracking. This is the role of rounded bases, and, in my experience, slightly incurving or contracted rims. (3) Avoid sudden changes in wall thickness or curvature and strive for uniformity around the vessel.

Smaller pieces can be fired with reasonably high chance of success in a "log-cabin" rick of medium-sized wood. A base layer or two of about 2 feet square is laid out, and set afire. When this layer has burned down to coals it is covered with a thick layer of sherds. The vessel, which has been warmed beside the initial fire, is then placed rim down on the sherds. Quickly, a log-cabin-like structure of firewood is built so as to enclose the vessel, but fuel is kept at least six inches away. This rick will slowly ignite, but will soon surround the vessel with hot, oxidizing flame. Figure 4 shows a small rick fire. The fire is allowed to burn out and the vessel left to cool. If the vessel survives, it will be very clean and tan colored because of the oxidizing atmosphere. The maximum temperature attained is judged to be not more than 1200°F. This is far below the maturation (vitrification) temperature of 1800°F to 1900°F, but the ware will be water-stable. While this method worked well with numbers of small pots, it was not successful in firing the larger sizes without some cracking.

A second method, more suitable for large pots, is to place the vessel(s) rim down on several layers of sherds atop a hot bed of coals. It is then covered with a large mound of pine needles, leaves, and twigs (typical forest floor debris). This is ignited all around the periphery. The fire will flare up rapidly but burn from the outside inward. Fresh fuel is added after each flare-up. This tends to smother the fire and allow a slower temperature rise inside. The operation is continued for two to four hours. In the latter stages the flame is allowed to contact the vessel. The terminal temperature probably does not exceed 900°F. This is just sufficient to stabilize the clay into a weak earthenware. Because of a lack of oxygen the vessel will be black or fire-mottled on the outside and black inside if the vessel was first stuffed with fuel.

A third method utilizes a pit in an effort to conserve heat and attain higher temperature. The pit has a diameter about three to four times the vessel diameter and is half again as deep as the vessel is tall. A hot fire is allowed to burn to coals in the pit. A layer of sherds is placed on the coals and the pot placed rim down on these. Quickly a surrounding wall of medium-sized firewood is placed around the wall of the pit, and finally across the top. This fuel will usually ignite slowly and uniformly, resulting in a final hot, oxidizing fire. Figure 5 shows a pit firing near its peak. Effort should be made to keep burning brands from falling against the vessel. Additional wood is added if fireless sides develop. After this primary fire has burned down, and assuming the characteristic "ping" of a thermal crack has not been heard, the pit is quickly packed with pine needles, twigs, etc., and the pit covered with earth. The fire continues to smolder. The pit is opened a day or so later; the vessel will still be too hot to handle. This method will yield a fire-mottled exterior, but less so than with the second method. The interior will be black if the vessel was first stuffed with the lighter fuel. The secondary fire was tried with the notion that a prolonged "soak" at relatively low temperature might equate to a shorter period at higher temperature. This does not appear to be true, but does provide a desirably prolonged cooling-down period.

Probability of success increases greatly for any method if the vessel to be fired is covered with a protective vessel. I tried an ordinary large flower pot. This is a step toward a primitive kiln (Rhodes 1968). The covering pot was nearly always shattered, though it would stand intact, while the inner pot usually was nicely fired. Were an abundance of large sherds available, it is possible that these could be stacked around the new pot.

Nature of failures

Vertical rim cracks, extending down to the uppermost coil joints and thence along these joints, were most common. These are extremely likely if the vessel is fired rim up. Spalling was also common. This is usually attributed to air pockets in the clay; however, in my experiments it usually occurred where a local hot spot developed. In many instances the vessel simply shattered into three to eight large segments, attributed to an overly rapid temperature rise.

Rim cracks were repaired by drilling holes on either side and then lacing. As long as the pot remained dry this measure did strengthen the piece adequately for dry usage. But if the pot were dampened, the crack would invariably propagate until the pot would fall apart. This is a characteristic of underfired earthenware. Rim cracking was never directly attributable to incising or inner rim notching – plain ware was equally prone.

Vessels made from all of the clay-sand mixtures tried were successfully fired without cracking by electric kiln to C 05 (1915°F); however, at this maturation temperature the calcareous inclusions decomposed.

Conclusion

My attempts to replicate Goose Creek ware, though only thirty pots were involved, have left me with a profound respect for the skills and secrets of the primitive potter. I believe that I simulated the basic procedures; however, the nuances of technique that would have assured a higher level of success eluded me. Undoubtedly there were such, passed down through the generations by hands-on instruction. Otherwise I would be forced to conclude that many of the sherds and large fragments we find never saw service.

Potting is a protracted, labor-intensive activity. Many steps – digging of the clay, preparing the paste, fuel gathering, even the provision of a drying hut – would seem to have naturally been communal. The forming step is a one-person task, but it is eminently suited to socializing. Thus traditional vessel shapes and manufacturing techniques would be taught and persevere. While there is no technical reason for there being potting centers, I believe the activity was carried on in a selected area within a village. Unfortunately the potting activity per se leaves no durable debitage. The only tools required are the fingers (with very short nails), and two properly shaped flint flakes. The sole archeological evidence might be concentrations of larger sherds, perhaps in association with charcoal. Clay balls are not an inherent byproduct.

Disposition

Seven of the more successful vessels produced in this work were donated to the Baytown Historical Museum, a project of the Bay Area Heritage Society.

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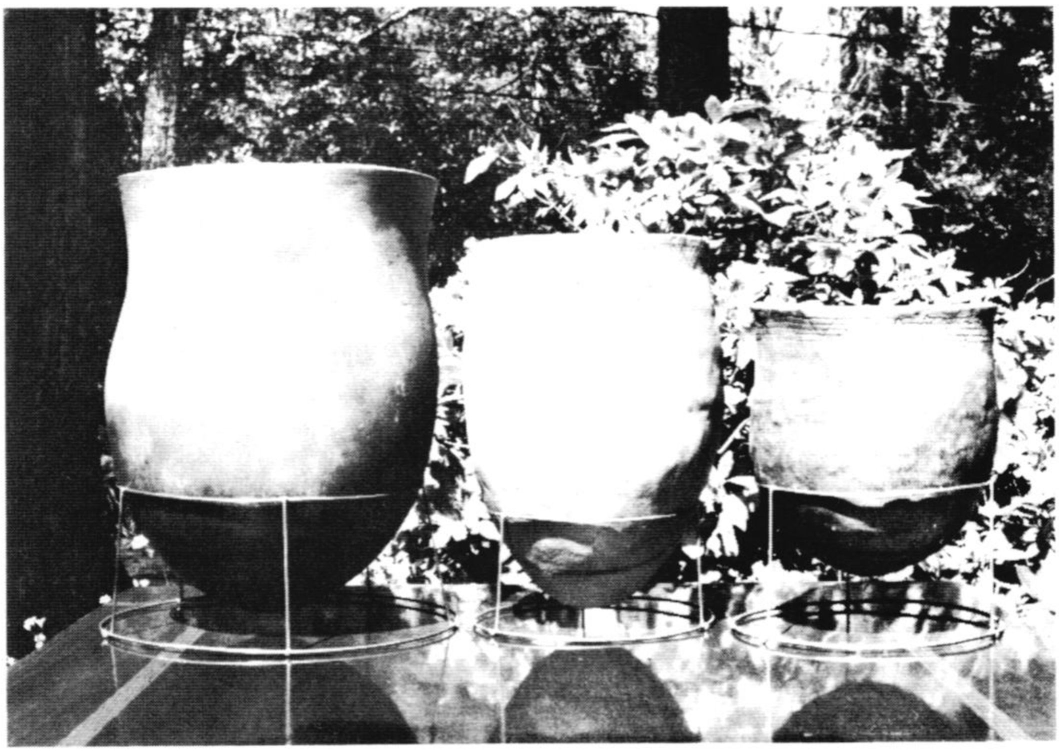

Figure 1. Some typical pots produced in this study

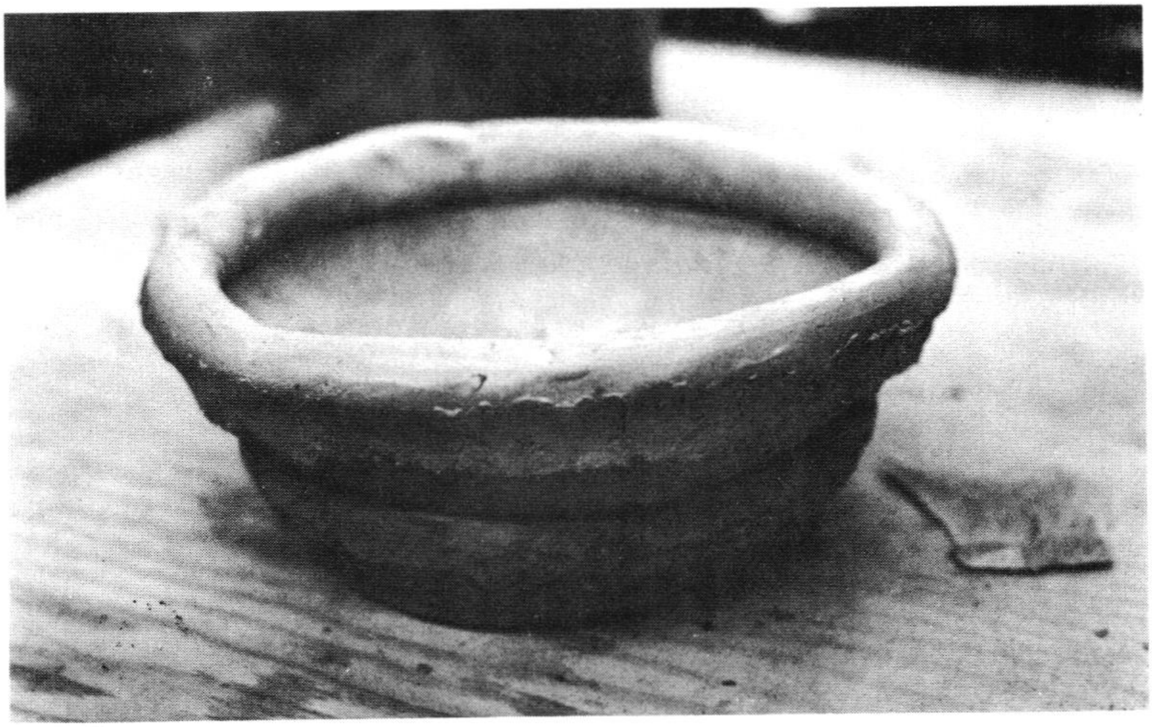

Figure 2. Addition of the first coil after dragging a portion of the clay downward

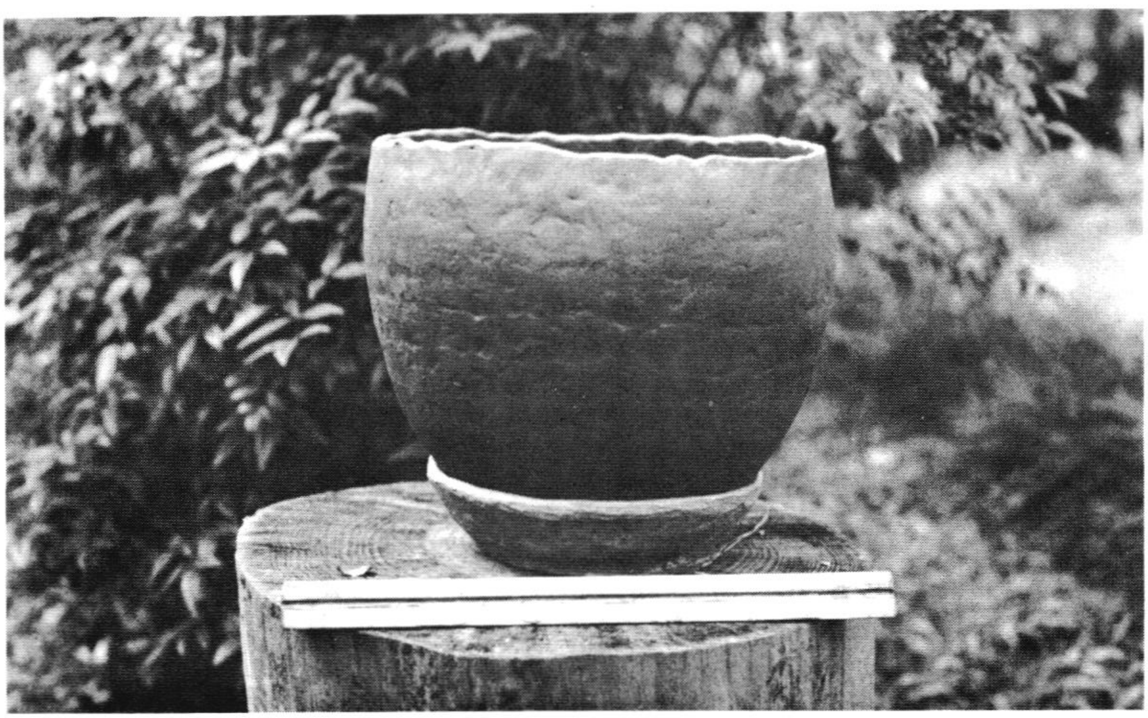

Figure 3. Partially formed large pot in a "puki." Pot is now ready for first wet scraping.

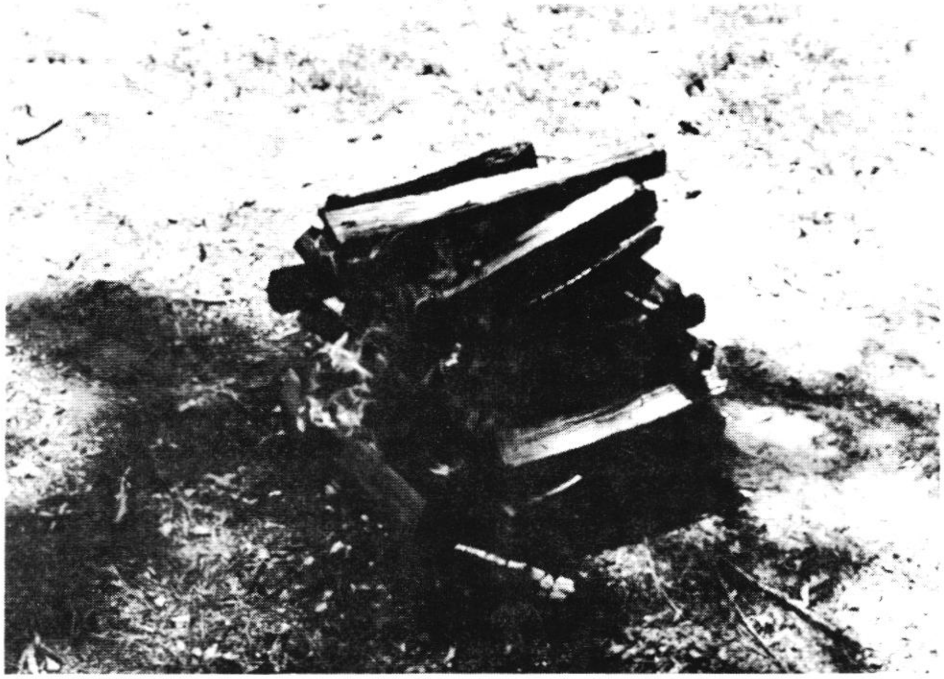

Figure 4. Small rick fire

Figure 5. Firing in a pit

Intragroup Conflict in Prehistoric Texas

Leland W. Patterson

Introduction

It has been shown that at some prehistoric mortuary sites in Texas a significant number of deaths were caused by violent means (Hall 1981; Prewitt 1974). Projectile points were found in the skeletal remains. Hall (1981:307) has discussed intergroup warfare as a possible cause of these violent deaths, while Prewitt (1974:50) considers alternate possibilities of inter- and intragroup conflict. This article examines the possibility that the principle cause of violent death in prehistoric hunter-gatherer groups in Texas may have been due to intragroup and personal conflict.

Presently available data does not permit a positive determination of the reasons for violent deaths observed at some prehistoric mortuary sites in Texas. However, it is possible to discuss possibilities based on analogies from ethnographic accounts of historical hunter-gatherer groups.

This article does not consider violent deaths in higher level formative social organizations in Texas, such as the Caddo, where retainers and wives may have been sacrificed at the burial of a leader, as was done by the Natchez in the southeastern U.S. (Hudson 1976:328). Discussion is confined to considerations of hunter-gatherer groups that operated at the band level of social organization.

General considerations

Determination of causes for conflict by use of archeological evidence is at best a difficult undertaking. Indications of violent death at mortuary sites of hunter-gather groups can seldom be directly related to causes of conflict. For example, projectile points found in skeletal remains are normally typical of the region in question. Therefore, this type of evidence cannot usually be used to distinguish between aggression by outside groups and intragroup conflict.

While intergroup warfare has been documented for some historic hunter-gatherer groups, such as the Aleut (Lantis 1984:177), there is little published material available on this subject for prehistoric groups at the hunter-gatherer band level. In addition, changes in group territories due to aggression are difficult to determine because territorial changes over time can occur for reasons other than aggression, such as climatic change and general movements of nomadic groups to improve subsistence activities. Also, technological traits can diffuse without changes in social boundaries. As Prewitt (1974:50) has observed, archeologically defined cultural units based on artifact typology are not necessarily related to real expressions of social groupings.

The concept of warfare in the modern sense does not apply well to hunter-gatherer societies, as neither strict territoriality nor highly organized conflict are often involved. "Most so-called 'warfare' among such societies is no more than revenge for alleged witchcraft or continued interfamily feuds" (Steward 1968:334). Chagnon (1988:987) points out that the concept of politically distinct groups may not be a good concept for primitive conflict, as groups may be transient due to migration, emigration and fissioning.

Studies have shown that homicides due to intergroup and personal conflict are surprisingly common in historic hunter-gatherer groups in widespread geographic locations (Bower 1988). Some causes for homicide are personal arguments, kinship feuds, killing of sorcerers and punishment of crime. These causes of violence have been well-documented for the Eskimos (Damas 1984:354,425, 455,615). Much of the intragroup violence seems to have revolved around control of sexual relations (Bower 1988:91, Chagnon 1988:986).

A proposed example of warfare in Southeast Texas

Hall (1981) has discussed Late Archaic trade patterns in Central and Southeast Texas. He has proposed that at the end of the Late Archaic period there was a retraction in the trade spheres for various goods because of aggression by people from the west. Hall uses as evidence the apparent decline of trade and the evidence of violent death at burials of the Allens Creek site complex in Austin County (Hall 1981:307-309). Hall's hypothesis would be difficult to prove in a conclusive manner. Trade in this region was not a well-organized system (Story 1985:48), so that an apparent decrease in trade could have been caused for a variety of reasons. The projectile point types (Kent, Fairland) found in skeletal remains where violent death is indicated are common to this Western Transitional Zone of the upper Texas coast (Patterson 1983:Table 1). While the violent deaths found at the Allens Creek site might have been the result of intergroup conflict, it would be difficult to extrapolate from events at this specific location to more generalized aggression by peoples from the west in relation to a larger geographic area involved in trade patterns.

Summary

This article has discussed causes of violent death in hunter-gatherer groups. While intergroup aggression can be a cause of death in this type of social organization, ethnographic accounts indicate that violent death is more likely to be caused by personal and intragroup conflict. In the cases of violent deaths noted at mortuary sites of hunter-gatherer groups in Central and Southeast Texas, there does not seem to be enough data available to identify the ultimate causes of conflict. Since archeological assemblages for hunter-gatherer groups normally define only a series of technological traits, it is difficult to use archeological data to address the higher level of abstraction for causes of social action, in this case homicide.

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A Bannerstone from Austin County, Texas

Alan R. Duke and Bruce R. Duke

Abstract

This report describes a complete "hourglass" bannerstone from a site on Mill Creek, Austin County, Texas. The bannerstone appears to be the first artifact of this classification reported in Austin County.

Introduction

Bannerstones are found infrequently in Texas and a preliminary examination of the Texas Archeological Research Laboratory records reveals just three site reports that mention bannerstones. These sites are 41VT1, 41RA2 and the A. C. Floarnoy farm site (Wood County). All bannerstones found at these sites are fragmentary. Re-examination of a fragmentary artifact from 41AU1, previously classified as a bannerstone, has resulted in the conclusion that it is not a bannerstone (A. R. Duke 1981-2; Story 1987).

Another fragment of a winged, slate bannerstone was reported from Cameron County, Texas (Padre Island) (Mitchell et al. 1980).

A complete winged bannerstone from Texas is located in the National Museum of the Smithsonian Institution (Miles 1963).

Bannerstones do not appear in Turner and Hester's *Field Guide to Stone Artifacts of Texas Indians* (1985) mainly because of the paucity of these artifacts in Texas (Hester 1987).

The site

The bannerstone was found at site 41AU4 on Mill Creek in Austin County, Texas. The artifact, along with paleo, archaic, late prehistoric and historic artifacts, was washed from the stream bank as a result of the flooding that occurs regularly during heavy rains in the area. The presence of artifacts from all periods indicates long occupation from paleo through historic times. Paleo material includes a Plainview point and a Meserve point. It should be noted also that bison bones and the molar of a juvenile mammoth have been found at the site.

Unfortunately, the high flood waters have eliminated all visible stratigraphy of the site (B. R. Duke 1985). Erosion, slumping and scouring of the stream banks have been devastating and have worsened over the last thirty years since the site was reported by Wayne Neyland and Dick Worthington. It is possible but doubtful that any portion of the original site remains. Precise dating of the artifacts, therefore, is not possible.

The artifact

The bannerstone from 41AU4 was fabricated from a banded, grayish-white metamorphic stone resembling unpolished marble. The bands contain minute green crystals. Similar material is found in the stream bed, so the artifact could have been fabricated using local material. The stream bed also contains high grade flint, jasper, petrified wood, sandstone, and a great variety of lithics suitable for flaking and grinding. A gravel pit is located about a mile upstream from the site.

The bannerstone is of the "hourglass" variety (see Figure 1). It is 4.9 cm long on one side and 4.3 cm on the other. It is 6.0 cm wide at one end and 6.2 cm on the other end. The hole drilled through it is very smooth and uniform and is 1.1 cm in diameter over its entire length. It appears to have been drilled from one direction. The concavity on each side is 2.0 mm at its greatest depth. Thickness at the center (at hole) is 1.8 cm, tapering to 3.0 mm and 3.5 mm at the outer edges. (See Figure 2).

Weight of the bannerstone is 65 gm.

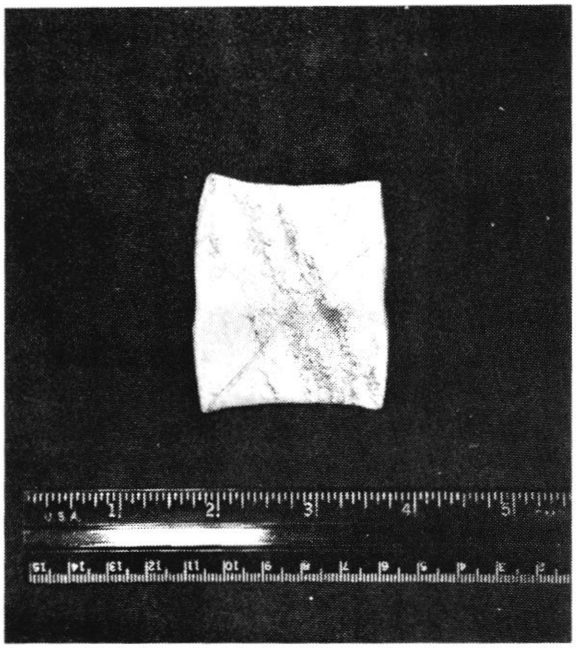

Figure 1. Bannerstone from 41AU4

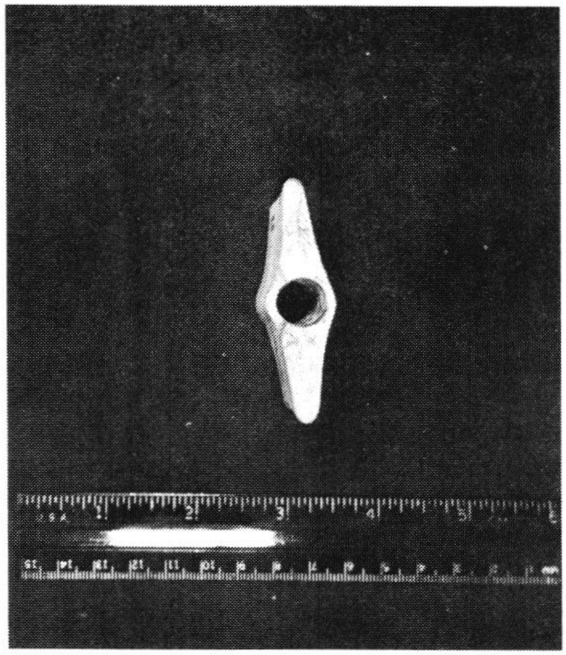

Figure 2. Bannerstone from 41AU4

Discussion

The function of bannerstones is debatable. Obviously the large bannerstones found in other parts of the country would not have been used on the atlatl since their great weight and beautiful workmanship probably would place them in the so-called ceremonial category. The smaller bannerstones definitely could have been used on the atlatl. The Austin County bannerstone definitely could have functioned on the "throwing stick" and probably was used in this fashion for tuning or balancing to produce maximum velocity and accuracy of the spear.

The authors are interested in learning of other sites in Texas where bannerstones have appeared. The provenience of these artifacts, uncommon in Texas, should be documented and the bannerstones studied to establish characteristics, use patterns, materials of construction and sources of these materials.

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Recollections of a Defunct Archaeological Society

William E. Moore

Brazos Valley Research Associates

Recently, I was looking at artifacts I collected when I was in college. While examining the small collection of points from 41SJ159, I was reminded of the archaeological society I helped form which was responsible for these artifacts being in my possession. The manner in which they were obtained and my association with this society are the subjects of this article.

In the 1960s I was a student at Sam Houston State Teachers College in Huntsville, Texas. Through Robert VanBurkleo, a professor who teaches Sociology and Anthropology, I met Tom Zimmerman – also a student. Tom was very interested in locating Indian sites and in our free time we visited most of the counties in the area recording sites and making collections. Neither of us had any formal training in archaeology but we had read enough to know that site locations should be put on a map and all artifacts collected should be catalogued accordingly. During all the years I collected in this area I always kept artifacts separated according to the sites where they were found.

Tom had met a Mr. Max Hill from New Waverly who had an extensive artifact collection. Hill used to visit sites when most of the area was in cultivation during World War II. He told us some site locations and we went to every one. Whenever we visited sites in the New Waverly area we would stop in his store and show him what we found. It was very pleasant to have a cold drink and look at the numerous frames of arrowheads. He always found time to talk with us and sometimes he would show us the location of another site. The more sites we found the more interested we became in this hobby.

As our interest grew, we decided to form a local society in order to learn more about archaeology. Since we were students at the university we decided to affiliate ourselves with that institution. I remember only a few of the details surrounding the formation of this society and can recall only a few members. There was no charter drawn up and members were not asked to sign a pledge promising they would abide by the ethics of professional archaeologists. Meetings were held in a classroom and speakers, when we could get them, were usually local professors. I believe I was elected President the first year but I don't recall any of the other officers. The society was called the Archaeology Club. Tom and I intended that we as a club would work together to learn about the archaeology of Walker County and adjacent areas. We believed the first thing to do was to travel around the county locating and recording sites. Once we had more experience in archaeology we could take on the task of excavation.

The members, however, had other ideas. They wanted to dig and find artifacts! Tom and I tried to discourage them but they were intent on digging in an Indian site. We were afraid we would lose our members and, ultimately, the club if we did not give in. So the archaeology club participated in its first and only archaeological excavation. The site — 41SJ159 on the banks of the East Fork of the San Jacinto River in San Jacinto County.

This site, situated on a sandy hill in close proximity to water, is typical of so many sites in this area. It had been partly destroyed through construction of an oil field road.

Other disturbances at the time included a house on the site with a garden, well, driveway, and fencing. The first time Tom and I visited the site, a dart point of petrified wood (Figure 1i) was found in a cutbank exposed by the road.

We had learned of 41SJ159 through Max Hill who had collected there in the past. The owner was very cordial and did not mind if we dug on his land. Tom and I had excavated a small area to see what kind of artifacts were present and discover the depth of the site. We referred to this as a test pit although we took no photographs and kept no notes.

When the club members started talking about where to dig Tom and I decided 41SJ159 would be a good choice. It was rather far from campus and since we had not found many artifacts in our test pit, we concluded that the members might become discouraged and give up the idea of digging for a while.

It was miserably cold on that Saturday morning we were to dig in the site. I got a late start and when I arrived I was in for quite a surprise. The site area was covered with club members all digging frantically in various locations over the site with every kind of implement possible. There was a fire going and some members had brought their .22 rifles and shot them on occasion – at what I don't recall. When the day was over, 41SJ159 was full of holes and piles of dirt that had not been backfilled. The fire was smouldering and there was trash about the area.

It was our idea that the group concentrate on one area and try to dig in a somewhat scientific manner. Tom and I had brought bags to put artifacts in and tape measures to identify levels and the depth of each artifact found. It was immediately evident that the members had no intention of doing anything but moving as much dirt possible in order to find the maximum number of artifacts.

The result of this uncontrolled digging was an angry landowner. It was years before he got over what had happened and he has not been as open to archaeologists since that time. The club continued after I graduated. I do not know how long it was active but, to my knowledge, they never dug in another site. The last time I attended one of their meetings they were talking about a trip to Mexico City to visit ruins.

In my possession are 16 artifacts from this site, all collected by myself (Figure 1). I was unable to obtain any artifacts found by the other club members and I never saw all of the specimens found during the dig.

The collection depicted in this article was obtained primarily through excavation. Only two specimens (Figure 1e,i) were found on the surface. The lithic artifacts from this site were made from local materials such as petrified wood, quartzite, and chert. Pottery and arrow points were found by some of the club members but I was unable to retain any of these specimens.

Basically, the artifacts from this site are typical of a late prehistoric occupation. The artifacts in my collection consist of 14 dart points (Figure 1a-n), 1 arrow point (Figure 1o), and 1 probable dart point preform (Figure 1p). This collection will be curated at the Texas Archeological Research Laboratory in Austin, Texas. Since these specimens were excavated in an uncontrolled manner, it is virtually impossible to make any definite statements regarding the age of this site. All of the dart points fall within the range of Gary and Kent types as defined by Suhm and Jelks (1962) and Turner and Hester (1985). The association of pottery and arrow points with Gary and Kent dart points suggests 41SJ159 was occupied sometime between the Early Ceramic and Late Prehistoric time periods. Patterson (1985:255) has proposed tentative dates of 3500 B.P. - 1400 B.P. for the Late Archaic/Early Ceramic period and 1400 B.P. - 500 B.P. for the Late Prehistoric period. Since the Gary/Kent point series is believed by some (Hall 1981; Patterson 1980, 1983) to have begun in the Middle Archaic period and continued through the Late Prehistoric period, the age of this site could be older than suggested above (especially since data do not exist concerning the stratigraphic position of artifacts recovered from 41SJ159).

It is unfortunate that this site was dug in the manner described above. The lack of records documenting this work makes it virtually impossible to discuss this site in anything but general terms. The unprofessional manner in which 41SJ159 was investigated by a group representing themselves as an archaeology club should serve as a reminder of the need for strong organization and leadership in all archaeological societies. The amount of data recovered from this site, although somewhat useful, is vastly overshadowed by the loss of information due to the careless manner in which the work was undertaken.

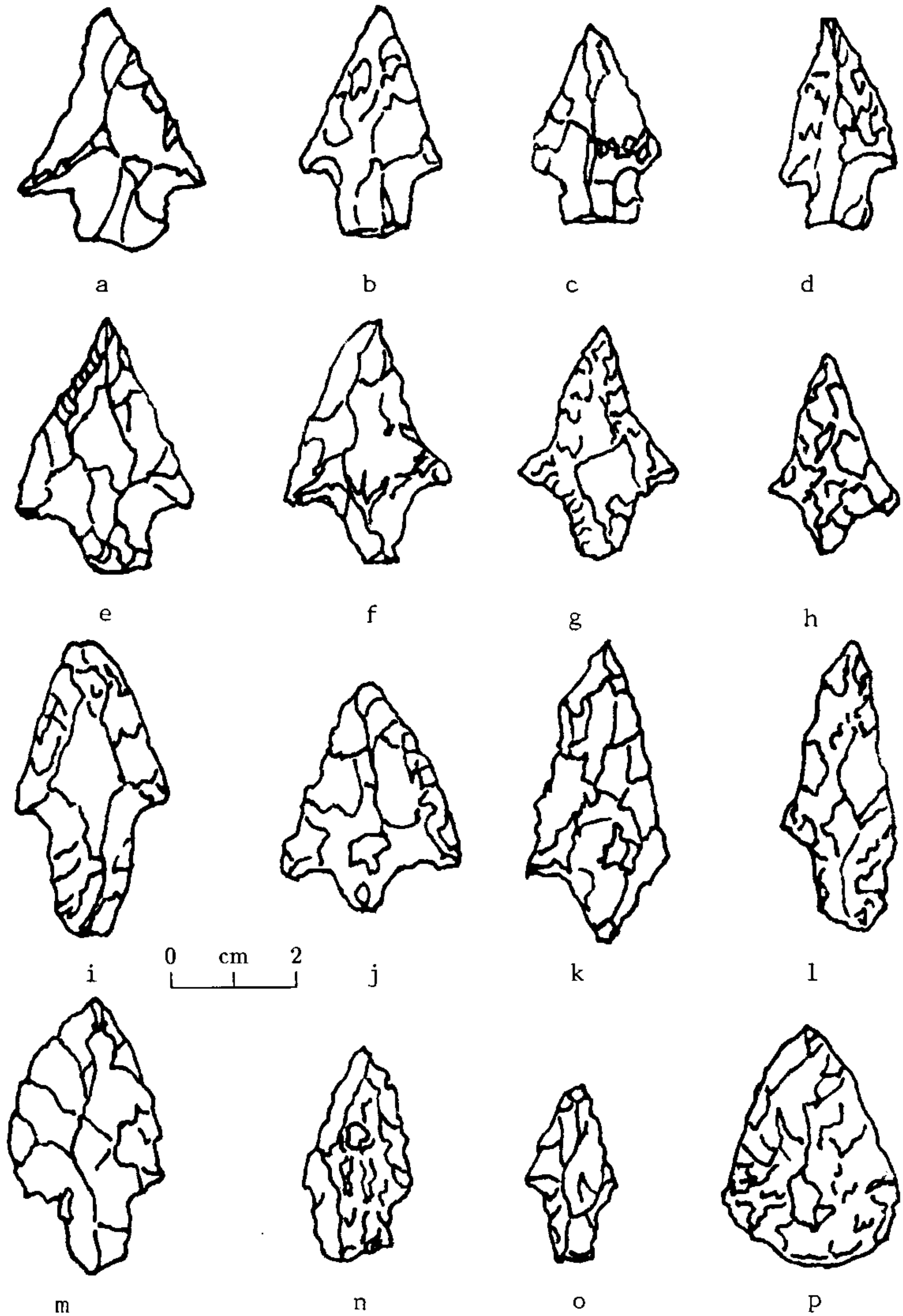

Figure 1. Artifacts collected from Site 41SJ159. Gary/Kent series, a-n; arrow point, o; preform, p

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Technological Interactions in Central and Southeast Texas

L. W. Patterson

Introduction

The geographical distribution of a prehistoric cultural trait is often presented as a defined area with fixed boundaries. These boundaries generally represent the judgement of the author of the study on the geographic limits of the distribution of a specific trait. In many cases, hypothetical boundaries for a trait simply represent the limits of currently available data. There is, however, another common obstacle to the studies of the geographical distributions of cultural traits, which is referred to here as Archeocentrism. This is a term coined by Ekholm (1964:492) which refers to the tendency of archeologists to regard their work area as probably the center of things. In many cases, the geographic area of distribution of a trait is fixed more by what studies have been published and where investigations have been conducted, rather than by a true geographic distribution of an artifact type.

In the real world, few artifact types of prehistoric hunter-gatherers have geographic distributions with precise boundaries. Due to the movements of people and cultural interactions, there are often transitional zones where major artifact types of adjacent regions are mixed. Even beyond cultural transitional zones, a few artifacts that represent one region will be found in an adjacent region. The frequency of occurrence of an artifact type or other cultural trait can often be described by a linear or an exponential dropoff model. One example of this type would be for the geographic distribution of a specific lithic raw material, described as its frequency of occurrence compared to the distance from the source, in the case where Indians were the cause of the distribution.

This article presents some comments on the geographic distributions of some prehistoric projectile point types in Southeast and Central Texas, where the concepts of transitional zones and distribution dropoff models seem to be appropriate. Also, one example is given of fairly complete replacement of one arrow point type in a region by another type from an adjacent region. In addition, an example is given where diffusion of a dart point style from one region to an adjacent region was accompanied by technological modification.

It should also be noted that areas of concentration of various artifact types within a region will not necessarily be the same. Movements of people, time differences, and different inter-regional interactions can result in different geographic distributions for individual artifact types. Of course, some artifact types can share the same geographic distribution.

Another important point is that geographic distributions of artifact types are descriptions of technological traits, that do not necessarily correspond to distributions of other cultural traits, such as language and cultural affiliation.

The Western Transitional Zone of SE Texas

In Southeast Texas, many projectile point types have fairly uniform geographic distributions. In the Archaic and Early Ceramic time periods some examples of dart points with fairly uniform geographic distributions are Gary, Kent, Darl, Yarbrough, Ensor and Bulverde-like points. In the Late Prehistoric period, the Perdiz arrow point has a rather uniform geographic distribution in this region.

It has previously been noted (Patterson 1983) that there appears to be a Western Transitional Zone for Southeast Texas, where projectile point types are a mixture of types from Southeast and Central Texas. The Pedernales dart point, which is a major point type in Central Texas in the

Middle Archaic period (Prewitt 1981:Figure 4), is commonly found in the Western Transitional Zone of Southeast Texas, between the Brazos and Colorado Rivers (Patterson and Hudgins 1980, 1987a). East of this zone, however, a dropoff model can be used for the distribution of this point type. In Harris County, in the central part of Southeast Texas, Pedernales points occur with much less frequency than in the Western Transitional Zone. Pedernales points occur in small quantities at Harris County sites such as 41HR206 (Patterson 1980c) and 41HR182 (Patterson 1985). East of Harris County, Pedernales points are rare. Only one Pedernales point was found in the very large Kyle collection (Kindall and Patterson 1986:Table 3), which represents an area mainly between the Trinity and Sabine Rivers.

As a side comment, the Pedernales point may occur about as early in the Western Transitional Zone of Southeast Texas as in the main area of this point type in Central Texas. There is one radiocarbon date for the Pedernales point level at an excavation in Austin County (Hall 1981:49) of 4560 ±140 B.P. that is earlier than the earliest date of 3855 ±165 B.P. given by Prewitt (1983:Table 1) for Central Texas. Also, Pedernales points are found in the Western Transitional Zone of Southeast Texas with ground stem edges (Patterson and Hudgins 1986, 1987b), which is an attribute of the earliest Pedernales points at the McCann Site (Preston 1969:176) in Lampasas County, Central Texas.

The Western Transitional Zone of Southeast Texas, between the Brazos and Colorado Rivers, seems to extend somewhat farther north than the coastal plain counties of Southeast Texas (Patterson 1983:Figure 1), in respect to projectile point styles. A report on prehistoric sites in Burleson County (Roemer and Carlson 1987:117) indicates that both Central and Southeast Texas projectile point types occur in this county.

Modifications in technology can occur as an artifact type diffuses from one region to an adjacent region. One possible example is the Bulverde dart point, which occurs in the Middle Archaic period in Central Texas (Prewitt 1981). Classic Bulverde points are identified as having wedge-shaped stems (Suhm and Jelks 1962:169). This point style also occurs in Southeast Texas (Patterson 1980a), but many Bulverde-like points also occur in Southeast Texas that have the same general morphology as classic Bulverde points but that do not have wedge-shaped stems (Patterson and Hudgins 1987a). This may represent a minor modification of the Bulverde point style after diffusion from Central to Southeast Texas. In this example, instead of a simple dropoff in frequency east of the Western Transitional Zone, the point style continues to occur at a fairly high frequency but more often in a modified form than in the original classic form.

Other examples of Central Texas dart point forms that decrease in frequency east of the Western Transitional Zone include Travis, Marcos, Lange and Fairland.

The Scallorn arrow point is another example where a dropoff model can be applied east of the Western Transitional Zone of Southeast Texas. The Scallorn point is fairly common in the Western Transitional Zone (Hudgins and Kindall 1984), somewhat less common to the east in Harris County (Patterson 1985), and relatively uncommon in the large Kyle collection (Kindall and Patterson 1986:Table 3) east of Harris County. The chronological sequence for arrow point types is not the same in Central and Southeast Texas, as is discussed below.

Technological interactions from the East

The above examples concern technological influences that are mainly from Central Texas to Southeast Texas, where the frequency of occurrence of a projectile point type decreases to the east. Examples can also be given of projectile point types in Southeast Texas where the frequency of occurrence decreases to the west.

The Carrollton dart point of the Early-to-Middle Archaic period (Patterson 1983:Table 1) can be found in the Kyle collection (Kindall and Patterson 1986:Table 3) at the east side of Southeast Texas and at sites farther west in Harris County (Patterson 1980:Table 3), but there are only a few reported specimens of Carrollton points in the Western Transitional Zone (Patterson and Hudgins 1985a, 1987c)

The Catahoula arrow point is another example of decrease in frequency from east to west in Southeast Texas. This is a major point type in the Kyle collection east of Harris County (Kindall and Patterson 1986:Table 3) and occurs fairly frequently in collections from sites in Harris County (Patterson 1976), but the Catahoula point is rare in the Western Transitional Zone (Hudgins and Kindall 1984).

The San Patrice point style of the Late Paleo-Indian period is still another example of decrease in frequency of occurrence from east to west in Southeast Texas (Patterson 1980b).

A point style replacement example

In addition to technological interaction between adjacent regions, an artifact type from one region can sometimes replace a functionally similar artifact type from an adjacent region. This appears to have happened when the Perdiz arrow point replaced the Scallorn arrow point in Central Texas during the Toyah Phase (Prewitt 1981:83). While the Scallorn arrow point occurs before the Perdiz point in Central Texas (Prewitt 1981:Figure 4), the Perdiz point is the earliest standardized bifacial arrow point in Southeast Texas (Patterson 1986b:11), although there appears to have been some earlier use of unifacial arrow point types. These two point types each start about A.D. 600 in their respective regions, as shown by Prewitt (1981:83) for the Scallorn point in Central Texas, and by Aten (1983:Figure 15.2) for the Perdiz point in Southeast Texas. Excavations at inland sites in Southeast Texas consistently show an earlier start for the the Perdiz point in this region (Wheat 1953:Table 5; Patterson 1980a:Table 6; Patterson and Hudgins 1985b:Table 1). The Scallorn point later becomes a common but minor arrow point type in Southeast Texas as was discussed above. In contrast, however, the Perdiz point seems to largely replace the Scallorn point in later time in Central Texas. Thus, it appears that the Scallorn point that started in Central Texas had a minor influence on the technology of Southeast Texas, while the Perdiz point that started in Southeast Texas replaced the Scallorn point later in Central Texas.

Discussion and conclusions

In consideration of technological influences between adjacent regions, the term "diffusion" is probably too general for use where detailed data is available. In the above examples for projectile point styles, it may be seen that technological interactions between adjacent regions can take a number of forms, as follows:

1. Transitional zones with mixtures of artifact types from adjacent regions.
2. Dropoff models, with a decrease in frequency of occurrence in an artifact type as a function of distance from one region into an adjacent region.
3. Diffusion of an artifact type from one region into an adjacent region, but with technological modification occurring.
4. Replacement of an artifact type in one region by a functionally similar artifact type from an adjacent region.

When sufficient data is available, these various types of interactions between adjacent regions can be fairly well described in terms of geographic distributions. The causes for different types of interactions, such as trading, migration and aggression, are more difficult to determine and will generally remain for future research to address. In the formulation of regional archeological syntheses, inter-regional interactions are often ignored. This may limit the interpretive value of the model.

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