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The Shell Assemblage from Morhiss (41VT1), an Archaic Site on the West Gulf Coastal Plain

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Abstract. *The Archaic shell artifact assemblage from the Morhiss site (41VT1), located on the Texas portion of the West Gulf Coastal Plain, is one of the most significant in the region. The assemblage is noteworthy not only for its size (over 3,000 shell artifacts), but also for evidence of on-site production of shell tools and ornaments, including tool kits, shell caches, and manufacturing debris. Inferences concerning tool hafting patterns and function are provided by an analysis of microscopic use wear and fracture patterns. The results indicate that shell tools were used in a variety of cutting, chopping, and scraping tasks. A large percentage of the assemblage consists of marine rather than freshwater shell, despite the site's distance from the coast and its close proximity to a large freshwater river. These results are placed into regional context by comparing the Morhiss assemblage to those from other large inland and coastal Archaic mortuary sites in Texas.*

The Archaic period on the Texas coast is somewhat poorly known, with only sporadic research on various sites and ill-defined cultural sequences that are often based on changes in projectile point style (Story 1985:28). Only one cultural complex, the Aransas, has been defined for the Archaic period on the West Gulf Coastal Plain of Texas.[1] Among the definitive traits of this complex are distinctive shell ornaments and tools. The Morhiss site (41VT1), located on the inland portion of the West Gulf Coastal Plain, has produced one of the largest shell artifact assemblages in the region. Campbell (1976:84) noted that "shell tools and ornaments from the Morhiss site link it with the coastal Archaic culture known as Aransas." However, as significant as this assemblage is for linking Morhiss to sites of the coastal complex, it has never been adequately documented. Here we provide a long-overdue description of the Morhiss assemblage, emphasizing technological and functional aspects of the shell artifacts, as well as data on manufacturing and mortuary contexts at the site. We provide also a comparison of Morhiss shell artifacts with other Archaic Gulf coastal assemblages in terms of source origins, raw material uses, and mortuary contexts. Our discussion begins with some background information on the Morhiss site and its investigation.

Site Description

The Morhiss site is a large Archaic site located on the West Gulf Coastal Plain (as defined by Fenneman 1938:100) in Victoria County, Texas (Figure 1). The site is located on a remnant river terrace on the east bank of the Guadalupe River, approximately 3.8 km south of the modern city of Victoria and 0.4 km from the current flow of the Guadalupe River (Campbell 1976:81; Duffen 1940:16–17), immediately adjacent to one of its old channels. Morhiss is approximately 32.2 km from the innermost portion of the San Antonio Bay, and approximately 64.3 km from the coastal strand.

Morhiss was excavated from October 1938 to January 1940 by workers for the Works Project Administration (WPA), under the direction of William A. Duffen (Duffen 1940:17). Approximately 5,000 5 × 5-ft units were excavated to various depths in an area measuring 145 m long by 91 m wide (Campbell 1976: 81–82). Morhiss is of critical importance in understanding the prehistory of the inland region of the West Gulf Coastal Plain because, as Campbell (1976: 81) described, the site is "undoubtedly one of the key sites in the Victoria area." Shafer and Bond (1985:278) concurred in their survey of the Texas Gulf Coastal area by describing Morhiss as "the *single most important site in this part of the coastal inlands*" (emphasis added). Although archaeologists have long acknowledged the importance of this site to coastal archaeology, little research has been done on the assemblage and no formal site report has been written.

Because of a lack of research, Morhiss remains undated by chronometric means. Cross-dating with projectile points indicates that most of its components date to the Archaic, and a Late Paleoindian component has also been suggested by the presence of Angostura and Plainview points (Campbell 1976:84–85). Lithics identified at the site include Archaic forms such as Darl, Morhiss, Lerma, and Tortugas, among others (see Turner and Hester 1993 for more information on these types). Clear Fork tools and Guadalupe gouges were also recovered. The excavators also recovered a very slight Late Prehistoric occupation represented by Scallorn and Perdiz arrowpoints and occasional ceramics. Over 200 flexed, extended, and bundle burials were eventually excavated from the site and are now being analyzed. In addition to burials, over 30 hearths were identified at the site.

Initial excavations at Morhiss also produced a large assemblage of shell tools and ornaments, as well as unmodified shell. Although the lack of chronometric assays hinders our dating of the shell assemblage, its

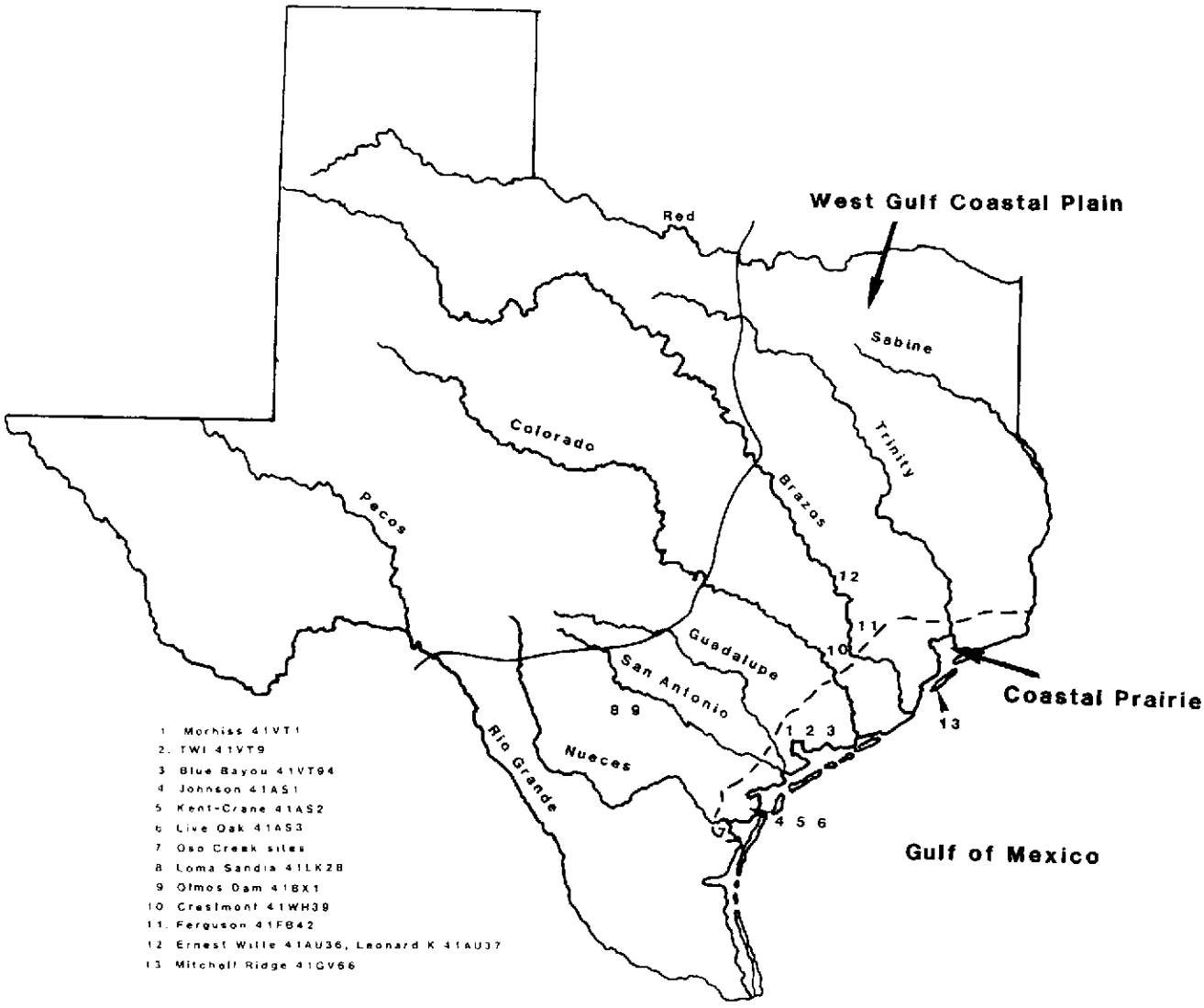

Figure 1. Map of Texas illustrating site locations referred to in text. The boundary for the West Gulf Coastal Plain follows Fenneman (1938). The coastal prairie zone follows Arbingast et al. (1976:13).

similarity to others from coastal sites in Texas that have been dated (described below), strongly suggests that the Morhiss shell assemblage is exclusively Late Archaic in age.

The Morhiss Shell Assemblage and Methods of Analysis

In undertaking this analysis, we decided to include all of the shell that had been recovered during the WPA excavations, including freshwater and marine varieties, modified and unmodified, whole and fragmented. In all, 3,323 shells and shell fragments were analyzed. In spite of the site's proximity to the Guadalupe River, marine shell far outnumbered freshwater, riverine varieties (Table 1). A total of 3,294 marine shells were recovered from Morhiss, compared to a mere 29 freshwater specimens. The inclusion of over 3,000 *Marginella apicina* (Common Atlantic Marginella) beads dominates the marine category. If these *Marginella* beads are excluded from the marine count, then 266 marine specimens were recovered compared to the 29 freshwater specimens. Therefore, even being conservative in estimation, less than 10 percent of the Morhiss shell assemblage consists of freshwater shell.

Identification of marine shells were made using the terminology and taxonomy of Turgeon et al. (1988: 90). However, it should be noted that their nomenclature for the Lightning Whelk (referred to by them as *Busycon sinistrum*; [Turgeon et al. 1988:90]) is not followed, but is referred to in this paper as *Busycon perversum pulleyi*, the Texas Lightning Whelk. This is the nomenclature used by archaeologists who have analyzed shell assemblages from the West Gulf Coastal Plain of Texas (Birmingham and Huebner 1991; Dreiss 1994, 1995; Lukowski 1988; Steele 1988). Our identification of the shell as *Busycon perversum* was based on the description provided in Andrews (1977: 147) and on comparative specimens from the Zooar-

Table 1. Shell Species Recovered from Morhiss (41VT1).

Species	Pendant	Bead	Tool	Modified, Other	Unmodified
Marine Shells					
Class Gastropoda					
Busycon sp.	X	X	X		
B. perversum			X	X	
Busycotypus spiratus					X
Neritina virginea		X			
Oliva sayana		X			X
Pleuroploca gigantea			X		
Neverita duplicata		X			X
Marginella apicina		X			
Fasciolaria lilium					X
Class Bivalvia					
Macrocallista nimbosa			X	X	X
Crassostrea virginica				X	X
Geukensia demissa					X
Mercenaria campechiensis					X
Noetia ponderosa	X				X
Rangia cuneata					X
Trachycardium muricatum				X	
Freshwater Shells					
Class Bivalvia					
Ambleminae				X	
Amblema plicata plicata	X			X	
Lampsilis sp.					X
Lampsilis teres	X			X	X
Megalonais nervosa					X
Quadrula sp.					X
Quadrula apiculata				X	
Indeterminate	X				
Indeterminate	X			X	X

chaeology Research Collection at Texas A&M University, which are identified as *Busycon perversum*. Dreiss (1994:429) stated that, generally, *Busycon perversum* is the only sinistrally whorled whelk species on the Texas portion of the Gulf Coast. The taxonomic classification of *Busycon perversum* is a matter of debate among malacologists, some of whom (see Turgeon et al. 1988) view *Busycon perversum* merely as a variety of *Busycon sinsitrum*.

Freshwater shell species identifications were made following Strecker's (1932) book on Texas freshwater mussels, as well as by the key provided by Parmalee (1967). Most importantly, access to the Texas A&M University Comparative Zooarchaeological Research collection allowed verification of many freshwater and marine shell identifications.

Shell Ornaments

Three-thousand-one-hundred-and-twenty-five artifacts from the Morhiss site are classified as shell ornaments, either beads or pendants.

Beads. Over 3,000 beads were recovered from Morhiss, all of which were made from marine shell (Table 1). The overwhelming majority (97 percent) are *Marginella* beads (Figure 2a; Table 2). These beads were found in 19 clusters, of which 13 were associated with burials. *Marginella* clusters ranged in size from 3 to 764 beads. These beads were manufactured by grinding a facet on the side of the outer whorl opposite the aperture. The aperture is present in each case and the spire is intact. The perforations ground into the shells are oval in shape and measure approximately 3 mm in length and 2 mm in width.

Another bead type identified at Morhiss was manufactured in the same way as the *Marginella* beads, but was made from *Neritina virginea*, the Virgin Nerite. Only 19 of these beads were recovered, but even in small numbers their presence is significant. *Neritina* beads have been reported from only one other Archaic site in Texas, the Ferguson (41FB42) site, in Fort Bend County (Figure 1), also located on the West Gulf Coastal Plain (Gregg 1993; Patterson et al. 1993). But shell beads from Ferguson were manufactured differently; the columella was sectioned and the apex of the shell was left intact, but the aperture was absent. At both Morhiss and Ferguson, the *Neritina* beads lack polishing around the ground areas indicative of abrasion against a cord, and thus appear to have been applied to clothing (Dockall and Dockall 1994).

Only 36 *Busycon* sp. (whelk) columella beads were recovered from Morhiss. These were found with three burials and were all of a tubular style. In addition to these *Busycon* sp. beads, 18 *Oliva sayana* beads (Lettered Olive) were identified in four clusters, only two of which were associated with burials. These beads were manufactured in two different fashions: all but one were processed so that the apex was ground down. A string then could have been passed through the shell in much the same manner as with the columella beads. One bead, however, was manufactured in the style of the *Marginella* and *Neritina* beads such that the whorl opposite the aperture was abraded. This indicates that most *Oliva* beads at the site were strung, while some may have been applied to clothing. The last type of bead found at Morhiss was manufactured from *Nevertina duplicata*, Shark's Eye. This isolated example was made by abrading the area opposite the aperture, as in *Marginella* and *Neritina*.

Pendants. Unlike beads, pendants present at the site were manufactured from both marine and freshwater shells, with the majority made from the marine whelk *Busycon* (Table 3; Figure 2b–d). Most of the freshwater pendants seem to be in an unfinished form with drilled suspension holes and unfinished edges and/or surfaces.

The *Busycon* pendants take several different forms, all made from the outer body whorl of the whelk.

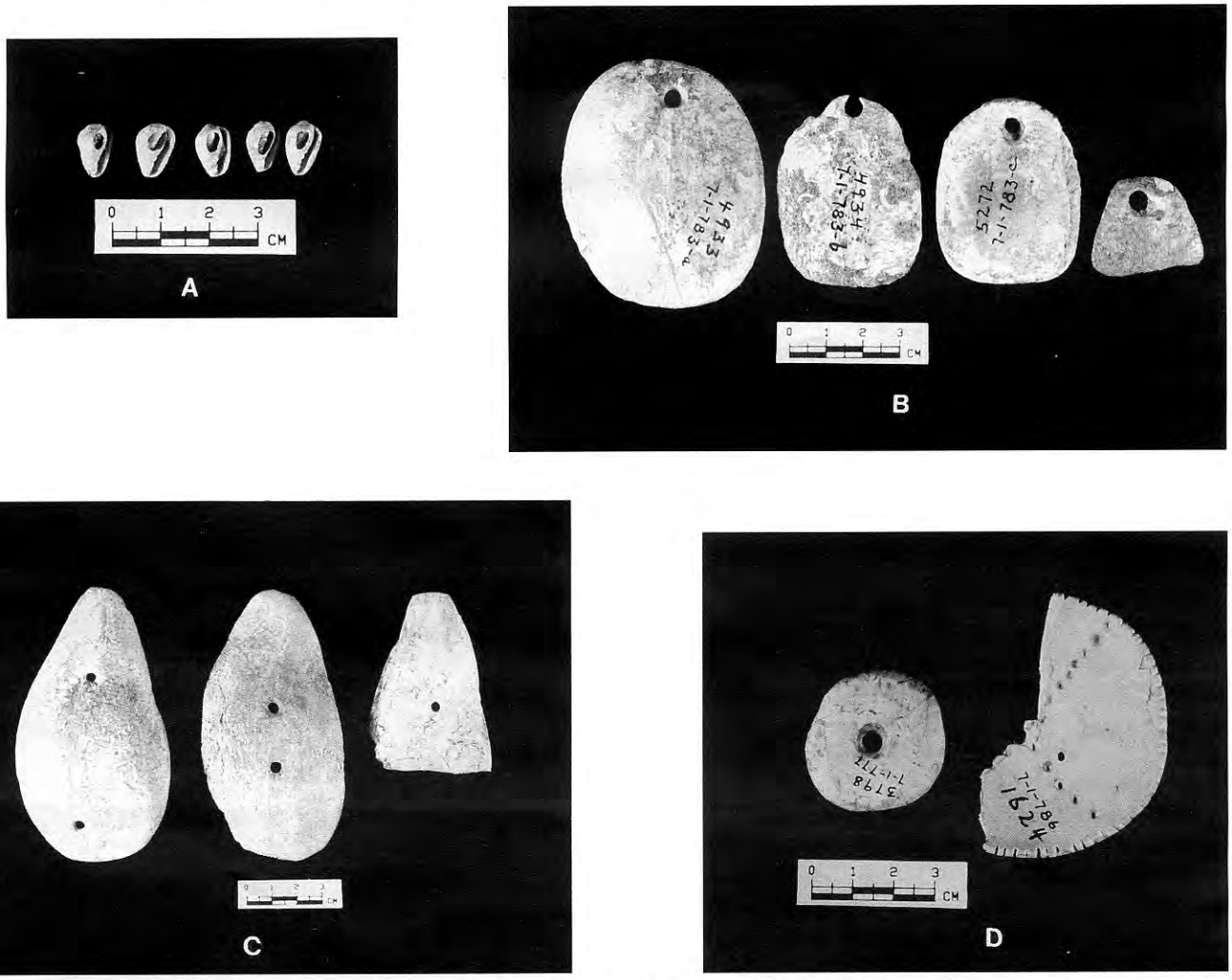

Figure 2. Shell ornaments recovered from Morhiss: (a) *Marginella apicina* beads; (b) *Busycon* sp. pendants with single perforations; (c) *Busycon* sp. pendants with two drilled perforations (the pendant to the right is broken); (d) two unique pendant types.

The most prominent type, illustrated in Figure 2b, has a single biconically drilled suspension hole near the top of the ornament and measures approximately 55 mm long by 35 mm wide. This type of pendant has been identified at several sites on the coastal plain, including Ernest Witte (Hall 1981) and Crestmont (Vernon 1989). Another common pendant type (Figure 2c) maintained the natural curve of the outer whorl, but the surface was finely finished and two drilled perforations were placed in a parallel fashion along the midline of the ornament.

Two *Busycon* pendants are unlike any others recovered from Morhiss. One is a disk-shaped pendant

Table 2. Shell Bead Frequency at Morhiss.

Species	Number	Percentage
Marine Shells		
Class Gastropoda		
Busycon sp.	36	1.2
Neritina virginea	19	0.6
Oliva sayana	18	0.6
Neverita duplicata	1	0.03
Marginella apicinia	3,045	97.6

Table 3. Shell Pendant Frequency at Morhiss.

Species	Number	Percentage
Marine Shell		
Class Gastropoda		
Busycon sp.	12	60.0
Class Bivalvia		
Macrocallista nimbosa	1	5.0
Noetia ponderosa	1	5.0
Freshwater Shell		
Class Bivalvia		
Ambleminae	1	5.0
Amblema plicata plicata	1	5.0
Lampsilis teres	1	5.0
Indeterminate	3	15.0

Table 4. Shell Tool Frequency at Morhiss (41VT1).

Tool Type	Species	Number	Percent
Hammers			
Type I	*B. perversum*	1	2.3
Type II	*B. perversum*	2	4.5
Beveled			
Type I	*Busycon* sp.	17	38.6
Type II	*Busycon* sp.	2	4.5
Beveled Columella	*Busycon* sp.	10	22.8
	P. gigantea	4	9.1
Beveled Whorl	*Busycon* sp.	2	4.5
Spoon/Scoop	*B. perversum*	1	2.3
Scraper	*L. teres*	1	2.3
Uniface	*M. nimbosa*	4	9.1

with smoothly ground sides and a centrally placed biconical perforation (Figure 2d, left). Measuring 37 mm by 34 mm, this item has three sets of incised, horizontal lines on one face. An almost identical pendant was recovered from Loma Sandia, an Archaic site in Bexar County (Dreiss 1995).

The most unusual, and finely finished, pendant located at Morhiss is illustrated in Figure 2d (right). Although broken, it is obvious that the outer edge was scored with small lines and that punctations had been placed in a crossed design. A single perforation (the edge of which can be seen in the photograph) was placed in the middle of the disc. This complex of scored lines and punctated designs has been noted at other Archaic sites along the West Gulf Coastal Plain (Aten et al. 1976; Dreiss 1995; Lukowski 1988), and could indicate a common belief or social system.

Three shells that were possibly pendants are not included in Table 3. One was identified as *Megalonaias nervosa* (Washboard Mussel) and another was classified as *Trachycardium muricatum* (Yellow Cockle). The third was so heavily weathered that it could not be identified to species or genus. All of these specimens exhibit perforations, but their classification as culturally produced holes cannot be verified.

Shell Tools

The shell tool assemblage from Morhiss is much smaller than the shell ornament assemblage. There are only 44 pieces that could be identified as tools based on technology and morphology (Table 4). The tool types that were identified have also been noted in other Aransas complex sites along the West Gulf Coastal Plain and into Tamaulipas, Mexico (Campbell 1947, 1952, 1958, 1976). The shell tool assemblage includes a variety of cutting, scraping, and pounding tools but is dominated by hafted adzes of two major types: beveled adzes manufactured from a segment of the outer whorl of *Busycon perversum* and those made from a segment of the columella lacking the outer whorl. Pounding and scraping tools represent a minor component of the assemblage.

Hammers. There were two types of whelk shell hammers identified at Morhiss. The first type (Type I; Figure 3a, top) has been documented at other Archaic coastal sites in Texas (Campbell 1947, 1952). It possesses a complete columella and spire minus the outer and part of the inner whorl. The whorl has been broken away by direct percussion. The outer whorl was also removed for the manufacture of other artifact types. Moderate battering produced distinct wear facets along the shoulder. Prehension wear in the form of polish and smoothing is present on the "handle" portion formed by the columella. This hammer type and the prehension wear were initially identified by Campbell (1947) for the Johnson site shell assemblage.

The second type of hammer (Type II; Figure 3a, bottom) has not been identified in previous research. The body is a columella segment that was snapped at one end and heavily blunted at the opposite end.

Figure 3. *Busycon* sp. tools recovered from Morhiss: (a) top, hammer type 1; bottom, hammer type 2; (b) beveled tool type 1.

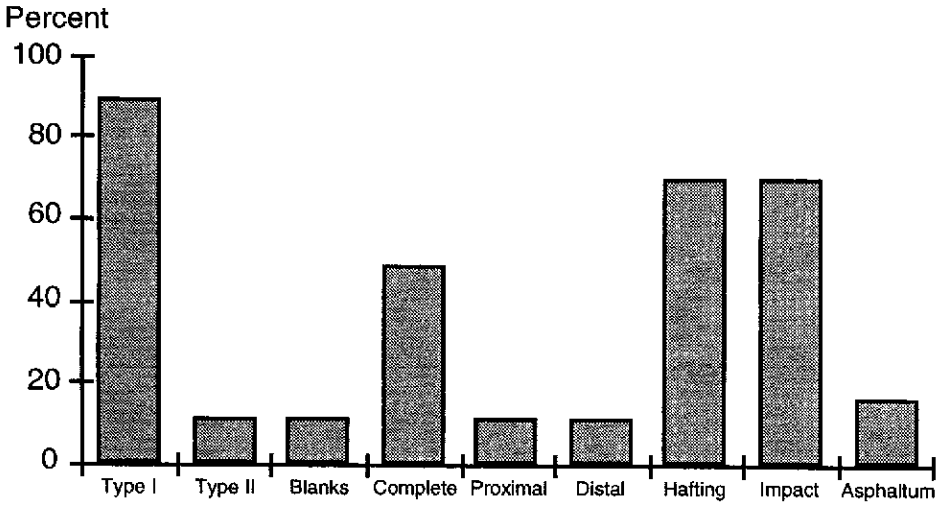

Figure 4. Relative frequencies of beveled shell tools from Morhiss by various attributes.

Associated with this battering is microscopic step fracturing, pitting, and blunting. Both specimens of Type II are extremely smooth by deliberate grinding and abrasion of rough spots and prehension wear. It is possible that these implements could represent expedient billets for stone tool manufacture. Direct percussion was also used to remove the inner whorl from these columella segments.

Beveled Tools. The Morhiss shell assemblage includes two types of beveled tools, both of which have been long associated with the Aransas complex of the Texas coast. The first type has been studied in some detail by Mokry (1980), who identified two distinct morphological varieties based on his analysis of material from sites along Oso Creek in Nueces County. Mokry's Type I and Type II criteria of identification are used here. Type I is roughly rectangular to square in shape (Figure 3b). The bit or cutting edge is ground on the inner or ventral side of the tool blank at a right angle to the long axis and toward the anterior end of the original shell. In most instances, the bit is beveled unifacially, although Morhiss includes at least one with a bifacially beveled bit. The posterior or proximal end of Type I beveled tools often retains nodes present on the shoulder of the original shell. Preparation of the lateral edges ranges from extensively chipped and ground to virtually unmodified. In cross section these tools are concave.

Type II tools are triangular in shape. The bit or cutting edge is located at the posterior end of the original shell and is unifacially ground on the inner or ventral surface at a right angle to the tool long axis. Again, lateral edges are noted to vary from extensively ground to unmodified. The cross section of this type is often sinuous.

The Morhiss assemblage includes one unmodified blank for Type I and Type II tools. Both tool blanks were produced from the outer whorl of *Busycon* sp. using a combination of groove and snap and direct percussion. There are also 17 whole and fragmentary Type I and only one fragmentary type II tools. Beveled bit tools included fragmentary and complete specimens and a large proportion of specimens of

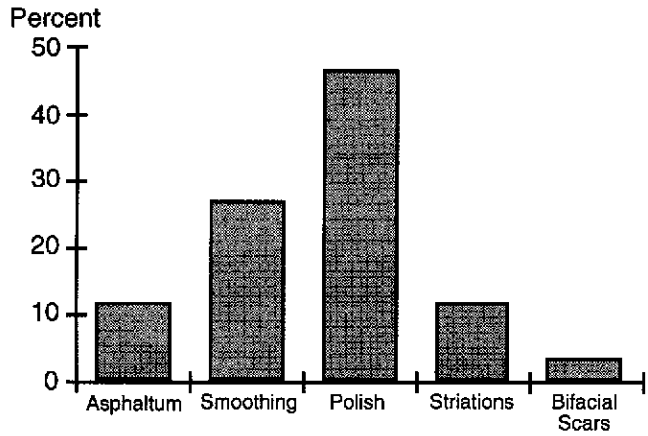

Figure 5. Relative frequencies of beveled shell tools from Morhiss by type of haft wear.

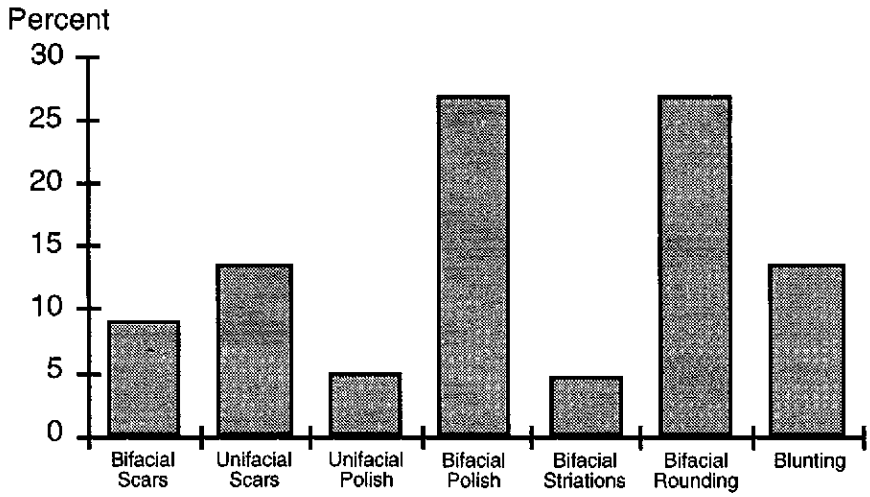

Figure 6. Relative frequencies of beveled shell tools from Morhiss by type of tool bit microwear.

this type exhibited hafting wear and impact damage resulting from use (Figure 4).

Type I and II tools at Morhiss are dominated by unifacially beveled bits with a mean edge angle of 55.6 degrees and a convex bit edge contour. There are also nine complete and five fragmentary specimens. Fragments of tools include two proximal and two distal portions. There are three Type I specimens that retain traces of asphaltum on their proximal ends (Figure 5). Microscopic examination showed that the lateral edges and dorsal and ventral surfaces of the proximal ends exhibit polish and striations indicative of some type of wrapped haft. The location of proximal and bit wear traces on these tools suggest that they were indeed hafted as adzes at an oblique angle to the axis of the handle.

Microwear traces of the bits of these tools also were very patterned (Figure 6), suggesting a dominant mode of use that involved impact against a resistant material such as wood. This is also corroborated by the fracture patterns (Figure 7). The bit wear is characterized by dorsal unifacial microflakes or nicking, bifacial polish and rounding, and in some instances bifacial striations. Fracture patterns are also highly patterned indicating a very specific function for these tools. The predominant types of fracture are diagonal impact and transverse snap. Distal impact, longitudinal breaks and splitting, and nicking were also identified. These and similar fracture patterns have also been identified on hafted shell axes or celts from Florida and the Yucatan of Mexico (Eaton 1974; Masson 1988).

Columella Beveled Tools. The second type of beveled cutting tool was identified by Campbell (1947) from several sites on the Texas coast, specifically the Johnson site. Isolated finds have also been noted from other sites in the region by other researchers. This tool type is manufactured from the columella of either large specimens of *Busycon* or *Pleuroploca gigantea*, the Horse Conch (Figure 8). The majority at Morhiss were

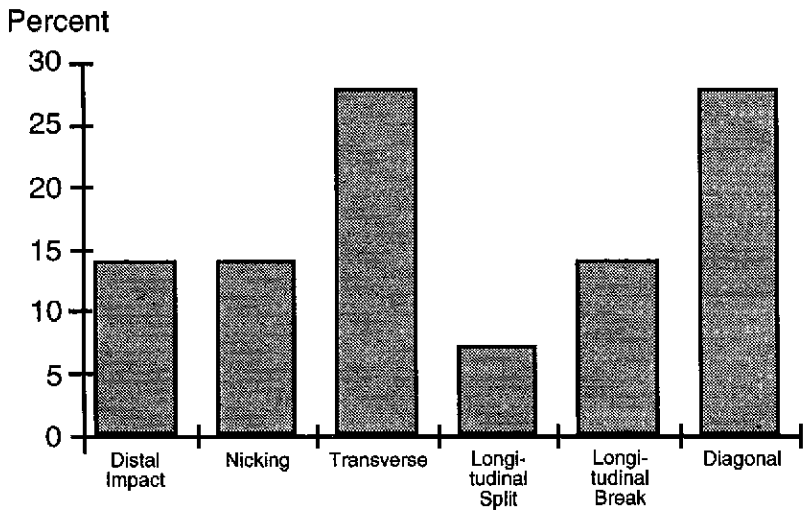

Figure 7. Relative frequencies of beveled shell tools from Morhiss by type of fracture.

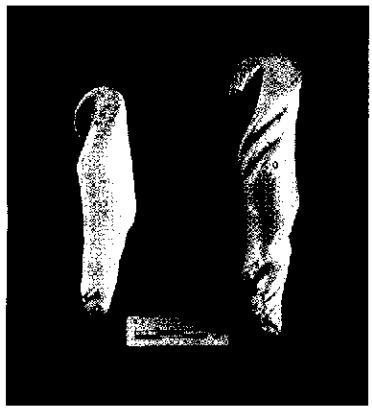

Figure 8. Columella beveled tools from Morhiss: left, *Busycon* sp.; right, *Pleuroploca gigantea*.

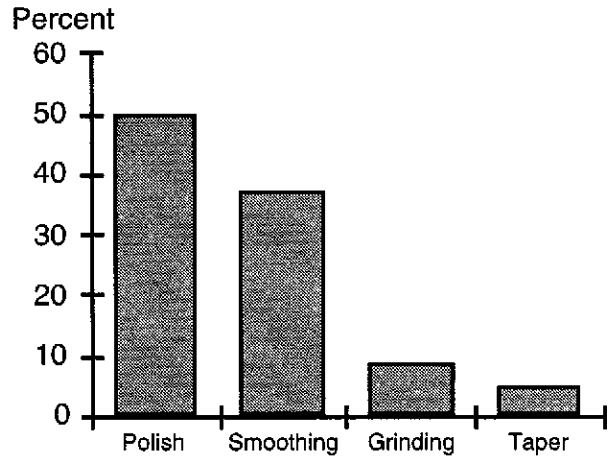

Figure 9. Relative frequencies of columella beveled tools from Morhiss by type of haft wear.

manufactured from larger specimens of whelk. The unifacial bit of each tool was created by grinding the anterior or siphonal canal end of the columella at an angle (mean bit angle = 57.3 degrees). This grinding produced a distinctive beveled convex cutting edge. The size of these specimens suggests that about one half of the whole columella was used in their manufacture. The bit contour on the majority of tools is convex, with one each being flat or concave. Bits usually are beveled unifacially; only three are bifacially beveled. Haft wear was observed on 12 specimens.

Interestingly, the massiveness of these columella tools does not compare with the columella debitage described earlier, suggesting that these columella tools were not manufactured at Morhiss, or that at least, the whole shells yielding these massive columella were not being sectioned at the site. The columella debitage is less massive and lighter than the columellae used for the manufacture of beveled tools. It is highly probable that the columella beveled tools were manufactured away from the site (perhaps closer to or on the coast) and were brought to the site during a seasonal round. Tools of this type discarded at Morhiss may represent the archaeological evidence of replacement of expended implements. Technological and use-wear data of shell tools at Morhiss suggest that there was a degree of coastal contact on the part of the site's inhabitants. This is to be found in the paucity of beveled tool blanks suggestive of on--site manufacture (n = 2) and the proportion of fragments as compared to whole specimens. The abundance of impact damaged and nonfunctional beveled shell tools also suggests on-site discard and replacement of exhausted specimens. Absence of manufacturing debris for these tools suggests replacement with a different material, such as chert. The presence of other manufacturing debris of *Busycon* sp. (n = 14) is also significant evidence of some form of coastal contact. Although the nature of the contact is still unclear, certain mechanisms have been proposed to explain the presence of shell artifacts at inland sites such as Ernest Witte, Blue Bayou, Morhiss, and Loma Sandia. These included individual procurement and direct or indirect trade (Campbell 1976:85, Dreiss 1995:543, Hall 1981:294, Steele 1987). One obvious commodity that coastal inhabitants would have obtained is lithic material (Campbell 1976:67, Dreiss 1995:543, Steele 1987).

Hafting patterns for columella beveled tools were also determined from microscopic use-wear analysis (Figure 9). These tools were dominated by proximal surface and edge smoothing and polish indicative of some type of socketed haft, which may have been similar to adze hafts recovered from Florida (Gilliland 1975:134, 140). One tool also has a distinct proximal taper created by abrasion and smoothing. The purpose of the taper was to adapt the tool to a socketed haft.

Microwear traces on the bits are also highly patterned (Figure 10), suggesting a single function for these tools, at least at Morhiss. Wear appears to represent stages in the development of use wear or the maintenance of the bit. Bit wear includes minor blunting or battering, bifacial edge rounding, polish and striations and unifacial fracture damage. A smaller number of tools also exhibit transversely broken or shattered bits and longitudinal impact scars indicative of impact against a resistant material such as wood.

The patterns of microwear observed on Type I, Type II, and columella beveled tools are similar, again suggesting a similar function and mode of use. The only real difference is in morphology and the specific manner of hafting the tool at an oblique angle to the haft with columella tools reflecting a haft wear pattern suggestive of a socketed as opposed to a wrapped haft using mastic and binding. No asphaltum residue was observed on columella beveled tools from Morhiss.

Miscellaneous Shell Tools. Two miscellaneous speci-

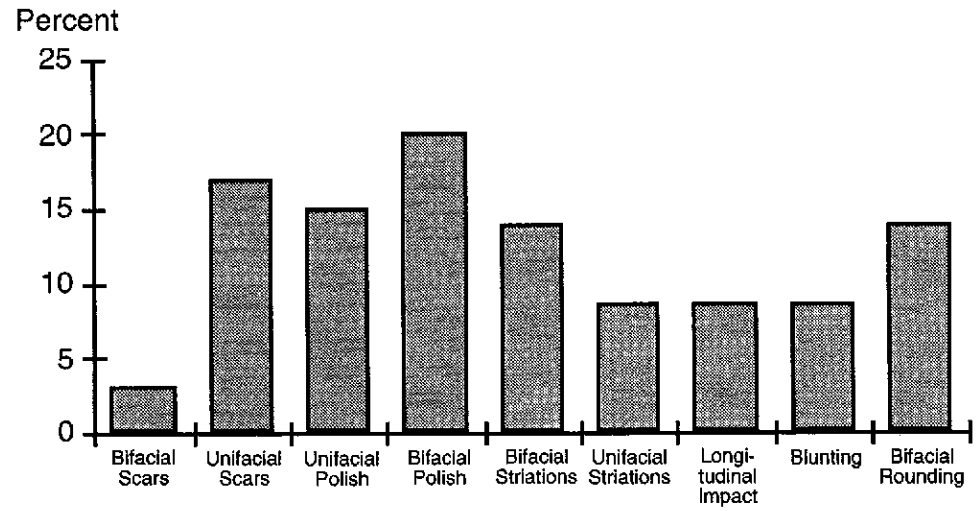

Figure 10. Relative frequencies of columella beveled tools from Morhiss by type of tool bit microwear.

mens were manufactured from the basal portion of the outer whorl of *Busycon* sp. at the siphonal canal (Figure 11a, upper left). The columella has been snapped and removed. The segment was also removed from the original shell by the groove and snap technique after the tool was beveled. Both specimens have well made unifacially beveled bits that are identical to columella beveled tools. Edge angles are 40 and 45 degrees and the observed wear was similar to that of columella beveled tools. Although no hafting wear was observed microscopically, it is possible that these tools could have been hafted in a manner similar to Types I and II and columella beveled bit tools.

A spoon or scoop was manufactured from a triangular outer whorl fragment from a small *Busycon* sp. shell (Figure 11a, upper center). It is broken in what corresponds to the handle portion. All lateral edges except for this area are highly smoothed by abrasion. There is also a moderate use-wear polish along the convex distal margin.

The left valve of the freshwater bivalve *Lampsilis teres* (Yellow Sandshell) was utilized as a scraping implement (Figure 11a, upper right). The ventral margin of the posterior end is use modified, being characterized by a rounded striated, concave area. Striations are perpendicular to oblique to the utilized edge axis. A specimen identical to this one was recovered on a survey of Coryell County (Laurie Zimmerman, personal communication 1994), located approximately 310 km from Victoria County.

Unifacial shell cutting tools manufactured from *Macrocallista nimbosa* (Sunray Venus) have been iden-

Figure 11. Miscellaneous shell tools from Morhiss: (a) modified basal portions of *Busycon* sp. (upper left two specimens), *Busycon* sp. scoop (second upper specimen from right), *Lampsilis teres* scraper (upper right), and unifacially modified *Macrocallista nimbosa* (lower row); (b) notched freshwater mussel shell.

tified from a number of Archaic sites along the Texas coast (Day et al. 1981:343; Headrick 1993:27; Prewitt and Paine 1987:158–160; Prewitt et al. 1987:122–127). All four examples from Morhiss were also manufactured from *Macrocallista nimbosa* (Figure 11a, lower row). One is a left valve and three are right valves. Each valve has also been unifacially modified by scalar percussion retouch along the ventral margin. Microwear traces on these unifacial cutting tools are dominated by bifacial polish, bifacial rounding, and three have fine striations parallel to the worked edge. All also have random, bifacial, obliquely oriented microscars or edge nicking identical to that described by other researchers on lithic tools used in a variety of cutting tasks.

Additionally, there were two specimens of *Crassostrea virginica* (Eastern Oyster) that had deliberate perforations at or near the umbo. The perforation of one oyster shell was punched from the interior of the shell to the exterior and the second specimen exhibits a drilled hole (also originating from the inside). The edges of these shells do not exhibit any form of wear, battering, or deliberate modification suggesting that they were utilized as hafted digging or cutting tools. Campbell (1947:55) noted the presence of six perforated oyster valves at the Johnson site that had no identifiable signs of use wear or modification but speculated that they may have been digging implements. Perforated oyster was a major artifact type recovered from several sites along Matagorda Bay in Texas (Fritz 1975:132) and others have noted that this artifact type is common in sites along the central Texas coast (Campbell 1952, 1958; Corbin 1963). The specimens from Matagorda Bay were interpreted as net weights or sinkers (Fritz 1975:132) and this interpretation was also posited by Campbell (1958) for perforated shells in Aransas complex sites. The possibility that the Morhiss specimens were utilized as net weights cannot be ruled out and is a plausible interpretation given the location of the site near the Guadalupe River. Ricklis (1994:84) noted that three perforated oyster valves were recovered from the Mitchell Ridge site (41GV66). The holes are roughly circular and appear to have been punched through the shell. One specimen at Mitchell Ridge also has heavy damage along the edge and is suggested to have been used as a chopping and cutting implement.

The right valve of a freshwater mussel of indeterminate species from Morhiss has a series of three moderately sized notches along one side (Figure 11b). The edges and point of one notch are very smooth and have a bright polish suggestive of some type of piercing function. Notched freshwater shells have also been encountered at sites along the coast of Texas. Several specimens of notched freshwater mussel were recovered from midden deposits at the Alabonson Road site (41HR273) (Zimmerman 1991:163). The number of notches on these artifacts varied from one to three. Some of the specimens have a very denticulated edge created by numerous regularly spaced notches along one edge that is suggestive of a functional difference compared to mussels with one to three large notches. Hall (1981:212) reported a notched specimen of *Megalonaias gigantea* at the Ernest Witte site (41AU36), in which the edges of the notch have been smoothed by abrasion. Zimmerman (1991: 163) noted similar abrasion wear on specimens from Alabonson Road. Shafer (1971:55) also noted the presence of a notched freshwater mussel from the Gypsum Bluff (41CK76) and Sand Creek (41CK79) sites in west central Texas. The suggested functions of these artifacts and other modified freshwater shell artifacts have included cutting, scraping, perforating and chopping. A systematic study of these artifacts is lacking in Texas. Oschner (1983) summarized functional data pertaining to notched freshwater clams recovered from a number of Fort Ancient Culture sites and reported that these implements have been interpreted as various weaving tools used to separate plant fibers. A similar function may have been served by specimens from Morhiss.

Unmodified Shell

One-hundred-and-twenty-seven unmodified shells, representing at least 15 species, were collected during the WPA excavation of Morhiss. Of these species, nine are of marine origin and five are from freshwater sources (Table 1). In total, 88 percent of the unmodified shells recovered at Morhiss are marine, while only 12 percent are freshwater (Table 5).[2] The highest percentage of unmodified shell (63 percent) consisted of *Oliva sayana*, all of which were found with one burial.

Macrocallista nimbosa was the second most frequently occurring (13.4 percent) unmodified shell at Morhiss. Eleven of these specimens were found in three different caches. One cache consisted of three valves, one left and two right. A second cache was composed of two right and one left *M.nimbosa* valves, as well as an unmodified right *Lampsilis* sp. valve. The last cache identified at the site consisted of five left *M. nimbosa* valves. It is important to note that these were the only shell caches identified at the site, and all contained *M. nimbosa*. This suggests that complete *M. nimbosa* valves were being curated at the site by its occupants for later use. Tools made from *M. nimbosa* were identified at Morhiss, as was a fragment that may have been a pendant blank.

There is nothing in the WPA excavation records that reflects the policy for collecting unmodified shell. Therefore, it is impossible to say whether this assemblage represents all of the unmodified shell present at the site, or just that which was cached, interred

Table 5. Frequency of Unmodified Shell at Morhiss.

Species	Number	Percentage
Marine Shells		
Class Gastropoda		
Busycotypus spiratus	1	0.8
Fasciolaria lilium	2	1.6
Oliva sayana	80	63.0
Neverita duplicata	1	0.8
Class Bivalvia		
Macrocallista nimbosa	17	13.4
Crassotrea virginica	1	0.8
Guekensia demissa	4	3.1
Mercenaria campechiensis	1	0.8
Rangia cuneata	3	2.4
Freshwater Shells		
Class Bivalvia		
Megalonaias nervosa	5	3.9
Lampsilis sp.	3	2.4
Lampsilis teres	2	1.6
Quadrula sp.	4	3.1
Q. apiculata	1	0.8
Indeterminate	2	1.6

with burials, or believed to have been culturally modified. Many of the shells that we determined to be unmodified contained small perforations that had been mistaken by WPA workers as evidence of anthropogenic modification, rather than the result of biogenic factors. No fewer than 10 of these unmodified shells had perforations that we determined to be the result of breakage due to trampling, or the result of epibiont predation on the shell. Evidence that the holes were noncultural included their placement on the shell, lines radiating away from the hole, and roughened edges. Holes produced by epibionts were recognized by smooth and bevelled perforations. An additional three shells (unperforated) were collected because they were believed to have been worked. Our analysis suggests that these shells were not worked, but were fragmented and chipped due to nonhuman taphonomic processes. WPA workers noted on field forms relating to four of the shells that we determined to be unmodified that the specimens were collected because they were believed to be worked. This implies that not all of the unmodified shells were collected from Morhiss.

Evidence for Shell Ornament/Tool Manufacturing

There is limited evidence for shell ornament manufacture at Morhiss. Perhaps the most striking piece of evidence is a ground whelk columella (Figure 12a). This ground columella differs from columellae manufactured as beads at other sites because it is finely ground, smooth, and straight. Long columella beads evident at other sites (such as 41VT9; see Birmingham and Huebner 1991) are not as straight, nor as finely finished. Therefore, we do not believe that this is a long columella bead that has not yet been perforated at the ends. A plausible explanation is that this is a bead blank which would have been segmented to produce beads. Other evidence suggestive of ornament manufacture includes the presence of a whorl segment pendant blank and caches of unmodified *Macrocallista nimbosa* (at least one pendant from Morhiss was constructed out of this species). Additional evidence for marine ornament manufacture is suggested by the presence of a *Busycon* specimen showing definite evidence of a groove-and-snap technique used to remove the outer whorl of the shell. Many of the pendants recovered from the site were constructed from the outer whorl of *Busycon*.

The manufacture of freshwater ornaments is also evident at the site. Stages of freshwater pendant manufacture are represented (Figure 12b), one showing an Ambleminae species in an early stage of manufacture, with only the hole apparent (Figure 12b, left); another appears to have been in a later stage of manufacturing as the sides are beginning to be ground down (Figure 12b, right). The suspension holes were biconically drilled. In addition, another specimen from Morhiss has two sides that show cutting and abrasion. It is possible that the removed pieces were used in ornament manufacture, but that is not evidenced unequivocally from this specimen.

Debitage from shell tool or ornament manufacture, primarily of *Busycon perversum*, was also identified. The whelk debitage is represented by one complete whelk shell in which a portion of the outer whorl had been removed (not illustrated), six complete columellae, five columellae fragments, one whorl fragment, and one complete spire. Even though the sample is small, it demonstrates that whole whelk shells were being reduced through a combination of three techniques: groove and snap, direct percussion, and snapping. These techniques were used in combination to remove both the outer and inner whorls for tool or ornament blanks and to exploit the columellae.

A whelk spire exhibits an incised groove that is transverse from the shoulder to the base (Figure 12c, left). The smoothness of the groove and the absence of a fracture below the groove, as in groove and snap, seems to indicate that it had been cut or abraded completely through the shell. The interior of the spire shows a rough fracture where it was snapped from the columella. After the groove was cut, the spire was then efficiently removed by direct percussion along the suture between the shoulder and base of the spire. The jagged and unsmoothed edges of an outer whorl fragment do not indicate the groove-and-snap technique (Figure 12c, right); rather, the surficial pecked and pitted areas on one edge are suggestive of hammer percussion to remove this portion of the whorl.

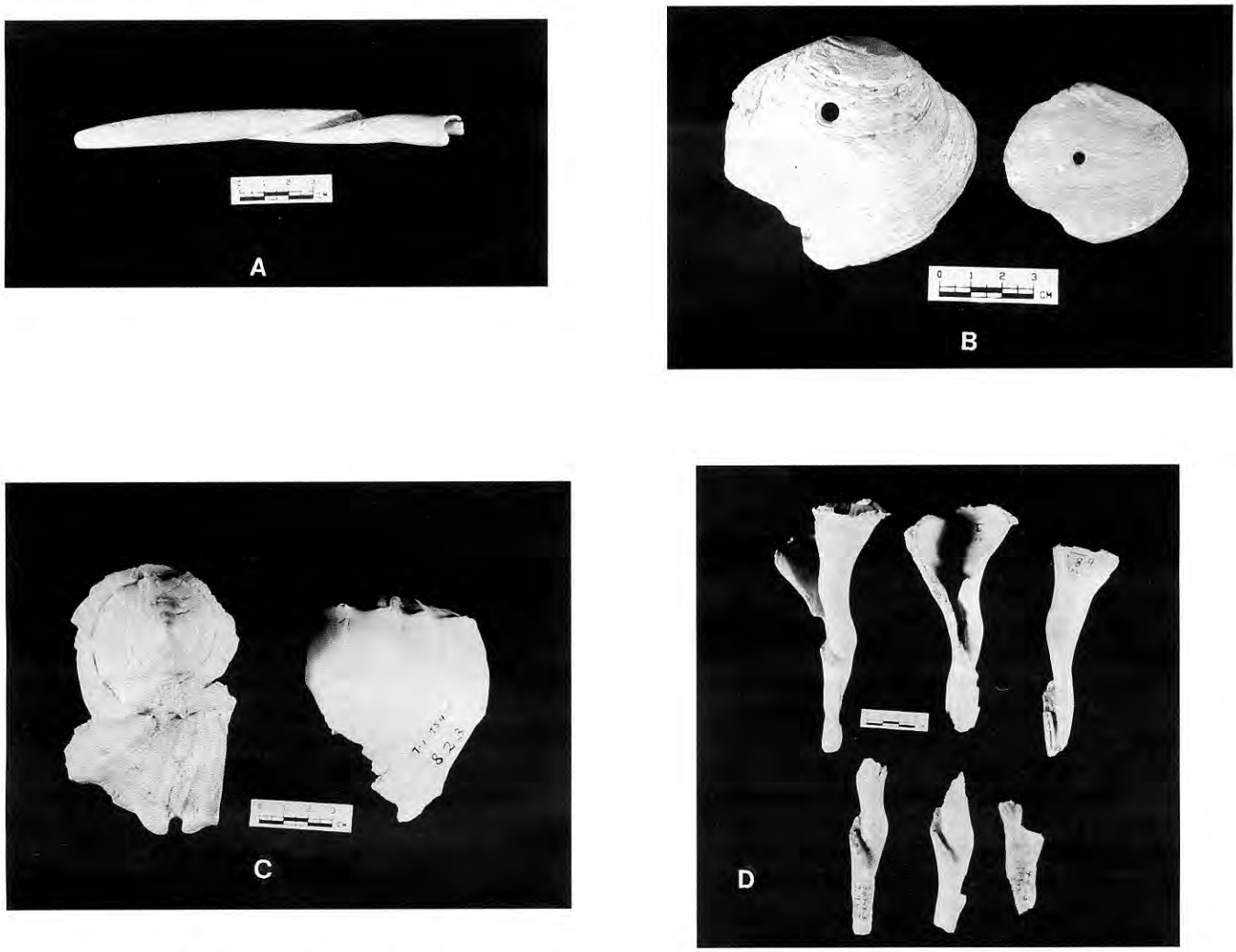

Figure 12. Evidence for manufacture of shell tools and ornaments at Morhiss: (a) ground whelk columella; (b) left, relatively unmodified mussel valve with a biconical perforation; right, mussel with a similar biconical perforation, in addition to finely smoothed and abraded margins; (c) left, *Busycon* sp. spire showing an incised cut; right, outer whorl fragment of *Busycon* sp. removed by a percussion technique; (d) columellae debitage.

The majority of the six complete columellae specimens from Morhiss have a portion of the inner whorl remnant below the spire and a basal portion of the outer whorl that formed the siphonal canal (Figure 12d, top row). Only one of these has evidence of the groove-and-snap technique. All specimens have had the inner whorl removed by direct percussion following the natural spiral of the shell. The goal seems to have been to remove as much of the shell from the columella as possible. Of the five columellae fragments, four specimens are medial or distal portions with both ends snapped and the inner whorl mostly removed by direct percussion following the spiral of the shell (Figure 12d, bottom row). Two fragments, one medial and one anterior end with the siphonal canal, have evidence of the groove-and-snap technique. In addition to the whelk debitage, a single *Busycon* whorl blank was identified in the collection. A portion of the shoulder and a single node are present. Although heavily weathered and cracked, some evidence of grinding of the edges is still present.

Shells as Grave Goods

Shell artifacts were associated with 22 burials at Morhiss, approximately 10 percent of all individuals interred at the site. Because of the poor preservation of the skeletal remains, demographic data are limited. Nine of the individuals could be classified only as adults. One was a young adult (25 to 50 years old based on the classification in Steele and Bramblett [1988]), and one was an adolescent (Table 6). Two could be considered only older subadult/adult indeterminate. One infant was recovered with grave goods, as were three children. Sex could not be determined for 20 individuals, due to either poor preservation or age distribution. The two individuals that could be assessed were males. This is not to suggest,

Table 6. Shells as Grave Goods at Morhiss.

Burial #	Age[1]	Burial: Sex	Burial: Position	Shell Associations
6a	Ind*	Ind	Bundle	106 *Marginella apicina* beads
27	7 years ± 24 mo.	Ind	Partly Flexed	3 columella beads
30*	Ind	Ind	Ind	1 *Oliva sayana* bead
31	Adult	Ind	Fully Flexed	764 *Marginella apicina* beads
35	Adolescent	Ind	Bundle	116 *Marginella apicina* beads
39	Adult	Ind	Partly Flexed	1 *Busycon* pendant
50	Young Adult	Male	Partly Flexed	*Busycon* pendant, 29 columella beads, unmodified *Lampsilis teres*
54	3–5 years	Ind	Partly Flexed	Unmodified *Neverita duplicata* shell
61	Adult	Ind	Bundle	31 *Marginella apicina* beads
87*	Adult	Male	Fully Flexed	3 columella beads
92*	Ind	Ind	Bundle	13 *Marginella apicina* beads
127*	Infant	Ind	Ind	190 *Marginella apicina* beads
128*	Adult	Ind	Fully Flexed	11 *Marginella apicina* beads
139	Adult	Ind	Partly Flexed	80 *Oliva sayana* shells, 1 *Oliva sayana* bead, 4 unmodified *Guekensia demissa*, unmodified *Macrocallista nimbosa*
168*	Adult	Ind	Fully Flexed	580 *Marginella apicina* beads
180	OSA / Adult Ind	Ind	Fully Flexed	27 *Marginella apicina* beads
198	Adult	Ind	Skull only	4 *Busycon* pendants
211a*	Child	Ind	Ind	648 *Marginella apicina* beads
211e*	Ind	Ind	Ind	83 *Marginella apicina* beads, 8 *Neritina vitte* beads
213*	Ind	Ind	Fully Flexed	12 *Marginella apicina* beads, 3 *Neritina vitte* beads
216	Adult	Ind	Fully Flexed	37 *Marginella apicina* beads, 2 *Neritina vitte* beads
219	OSA / Adult Ind	Ind	Fully Flexed	292 *Marginella apicina* beads, 6 *Neritina vitte* beads

[1] OSA = Older subadult (15 years and older) Ind = Indeterminate.

Age and sex determinations of burials marked with an asterisk were made by archeologists in the field. All other age and sex assessments were made by the first author.

however, that no females at the site were interred with shell artifacts, merely that they could not be identified as such based on the preserved skeletal remains. The fact that women were buried with shell artifacts at other Archaic sites on the West Gulf Coastal Plain (see Table 7) argues against the idea that only males at Morhiss were buried with shell grave goods.

Table 7. Age and Sex Distribution of Burials with Shell Grave Goods at Various Sites.

Site Name	N[a]	Age Distribution (%): Child	Age Distribution (%): Adult	Sex Distribution (%): Male	Sex Distribution (%): Female	Ind.
Coastal:						
Morhiss	22	23.5	76.5	9.1	—	90.9
Ernest Witte[b]	45	22.2	77.8	22.2	35.6	42.2
Crestmont[c]	13	15.4	84.6	30.8	23.1	46.2
Blue Bayou[d]	1	0.0	100.0	100.0	—	—
Inland:						
Olmos Dam[e]	6	50.0	50.0	33.3	—	66.7
Loma Sandia[f]	26	7.7	84.6	34.6	19.2	46.2

[a] N represents the number of individuals at each site interred with shell grave goods.

[b] Hall (1981). These data come just from the Group 2 burials.

[c] Vernon (1989).

[d] Huebner and Comuzzie (1992).

[e] Lukowski (1988).

[f] Taylor (1995:Table 42). Age percentages do not sum to 100 percent because some individuals were of an indeterminate age.

Of those individuals for which burial position could be assessed, only 22.2 percent were bundle burials (Table 6). The majority (44.4 percent) of the burials with grave goods were interred in fully flexed position, while 27.8 percent were partly flexed. None of the extended burials located at the site were interred with grave goods.

Fourteen of the burials (63.6 percent) were interred with *Marginella* beads, ranging in clusters from 11 to 764 beads. Of these 14 burials, four also had Virgin Nerite in conjunction with the *Marginella* beads. Only three burials were found to have associated whelk columella beads ranging from a minimum of three with a burial to a maximum of 29. Only two burials had *Oliva sayana* beads, and each contained only one bead of this type. Three individuals were interred with *Busycon* pendants, but one of these (Burial 198) had four pendants.

A unifacially modified left valve of *Macrocallista nimbosa* was recovered as a probable grave good with Burial 27. Burial 27 was a child of about seven years of age, and was also interred with three columella beads. This is the only shell tool at Morhiss that was recovered in burial context.

Only three burials recovered from Morhiss were interred with unmodified shell. Burial 50, a young

adult male, was interred with an unmodified *Lampsilis* shell, a *Busycon* pendant, and 29 columella beads. Burial 54, a 3- to 5-year-old child, was found with an unmodified *Neverita duplicata* shell near a flexed knee. Burial 139, an adult (sex indeterminate), had the greatest frequency of unmodified shell. This individual was interred with at least four *Guekensia demissa* (ribbed mussel) valves, one unmodified *Macrocallista nimbosa* valve, and 80 unmodified *Oliva sayana* shells, representing bead blanks. Interestingly, within the pile of *Oliva* shells there was one *Oliva sayana* bead (described earlier) that was processed in a manner similar to the *Marginella* beads recovered from the site. Burial 139 is particularly significant because it appears to have been interred with personal gear that can be interpreted as a shell artifact manufacturing kit consisting of a bone flaker and four flint flakers. The support for this interpretation is even more plausible when the shell grave goods of Burial 139 are considered. When examining the types of shell used as grave goods at Morhiss, it is significant that only one freshwater mussel was utilized as a grave good. This suggests that a higher value was placed on marine shell as a source of raw material than on freshwater shell.

Discussion

The Origin of Shell Artifacts along the Texas Coast. One of the most pertinent research problems of Texas coastal archaeology involves the scattered geographic distribution of Archaic sites with shell assemblages dominated by utilitarian or ornamental forms, and the ultimate origin of these shell artifacts. Various forms of *Busycon* species have been at the center of this research (Dreiss 1994:429–433) but the debate has addressed pertinent research questions such as regional interaction networks, locations of manufacture, and possible exchange routes for shell from the southeastern Gulf coastal region. These research questions are significant for all shell assemblages along the Texas coast.

Hall (1981) was apparently the first to propose the possibility of extraregional exchange for shell material during the Archaic along the Texas coast. Research at the Ernest Witte (41AU36) and Leonard K (41AU37) sites led Hall (1981:220–222, 306) to propose that artifacts manufactured from large specimens of *B. perversum* originated in Alabama or Florida.

These inferences regarding the existence of a Late Archaic and Woodland interaction network are based on several conclusions developed from an in-depth analysis of the contextual data from Ernest Witte and a number of other Middle and Late Archaic sites on the West Gulf Coastal Plain of Texas (Dreiss 1994: 430–431; Hall 1981, 1992). Some of the evidence used to support this contention has been summarized from Dreiss (1994:431):

1. Hall (1981:220) noted a strong similarity of shell gorgets at Ernest Witte to others noted in sites associated with the Glacial Kame Culture of Ohio, Michigan, and Ontario with lesser presence in Wisconsin, Illinois, and northern Alabama.
2. The presence of boatstones and other stone artifacts manufactured from material from the Ouachita Mountains of Arkansas and Corner-Tang knives of central Texas cherts support Hall's contention that inhabitants of the Texas coast were involved at some level in extraregional exchange (650 B.C.–A.D. 500) with the same interaction system that provided a wide variety of goods to sites in the eastern United States.
3. Hall noted that there were no identified manufacturing localities in Texas for *Busycon* ornaments during this time period. Consequently he suggested that the raw material, possibly even the finished artifacts, may have originated from Florida or Alabama based on an analysis of the distribution and abundance/availability of *Busycon* along the southern Gulf Coast.
4. Manufacturing evidence during the Late Archaic at the Johnson and Kent-Crane sites seems to have been limited to utilitarian items such as adzes, gouges, hammers, and celts to the exclusion of ornaments.
5. There is an apparent clustering of sites that have yielded evidence of shell tools and manufacturing debris on and near Copano and Corpus Christi bays on the south Texas, where *Busycon* is abundant. Shell ornaments, predominately in the form of pendants, have been found primarily at a number of inland sites along the West Gulf Coastal Plain.
6. Cemeteries in central Texas contemporaneous with Ernest Witte that have contained shell grave goods have yielded no evidence of local manufacture.
7. During the Late Prehistoric there is ample evidence for an established shell industry, associated with the Brownsville Complex of the Rio Grande Delta area, that included both utilitarian and ornamental forms.

The results of Hall's shell distribution study and an examination of the Kent-Crane shell assemblage led him to conclude that the Late Archaic whelk shell artifacts at Ernest Witte were not manufactured along the Texas coast (Hall 1981, 1992:7). Certainly, the size differences between whelk shell ornaments at Ernest Witte and other Late Archaic sites having whelk shell ornaments is suggestive of a different manufacturing locale.

Steele (1988:238) supported Hall's contention that nonutilitarian whelk shell artifacts from Ernest Witte

were supplied via exchange networks with people to the east. Steele based his acceptance on the existence of other artifact types that established the presence of trade networks with eastern groups and size differences and workmanship of whelk shell ornaments at Ernest Witte. The strongest evidence was the fact that there was no known locale that contained evidence for the manufacture of whelk shell beads, pendants, and gorgets (Hall 1992:7; Steele 1988:238).

A different interpretation regarding the origin of the conch shell artifacts at Ernest Witte has been proposed by Birmingham and Huebner (1991:17). These authors suggest that evidence for shell artifact manufacture would be expected at occupation sites, but not in the confines of mortuary sites. They emphasize that much of the current knowledge of Late Archaic occupation along the Texas coast comes from mortuary sites. As a result, archaeologists are seeing only the end of the line of the final context of shell ornaments, that is, their use as grave goods. Birmingham and Huebner (1991:17–18) also suggest that the manufacture of locally available shell material would have been more likely than the use of exotic resources during the Late Archaic.

Based on their analysis of the shell assemblage from the Texas West Indies site (TWI), Birmingham and Huebner (1991:17) offered another interpretation for observed differences between TWI and Ernest Witte. They suggested that the people at TWI may have been participating in a different interaction and exchange system than that operating within the lower Brazos Valley (inclusive of Ernest Witte). This interaction system was suggested to have had a similar cultural pattern with differing stylistic traditions. This hypothesis was used to explain differences between Texas West Indies and Ernest Witte shell artifact assemblages.

Other researchers have suggested that dippers and engraved circular gorgets from Spiro Mound, Oklahoma that were manufactured of large *Busycon* similar to Ernest Witte may have been manufactured from shell that originated in the Huastecan area of northeast Mexico (Hall 1981, 1992; Phillips and Brown 1978). Even though the marine shell at Spiro is considerably younger than Ernest Witte, Phillips and Brown (1978) suggested that the Spiro shell originated from the coast of eastern Florida and the coast of northeast Mexico. This suggests both an eastern and a possible western origin for at least some of the shell.

Recently, Dreiss (1994:432–433) reiterated the importance of the Morhiss shell assemblage when she suggested that the site should be considered when discussing the presence or absence of shell ornaments at sites along the Gulf Coastal Plain. The shell assemblage at Morhiss does not seem to fit the distributional model of utilitarian versus ornamental shell artifacts discussed earlier. The *Busycon* sp. manufacturing debris at Morhiss is not reflective of the size of shells that would be necessary to produce blanks for the manufacture of large pendants and gorgets as found at Ernest Witte. Beveled columella tools at Morhiss are larger and more massive than the columella debitage, which suggests that the manufacturing debris is not entirely related to utilitarian tool manufacture. The whorl segments that were used for the manufacture of adzes are also larger than whorl fragments found in the *Busycon* debitage at the site. Since the debitage can account for neither all of the utilitarian tools and *Busycon* sp. at Morhiss, nor for the large pendants and gorgets at Ernest Witte, another interpretation must be sought.

The presence of a few Type I and Type II beveled tool blanks at Morhiss suggests that rarely these were brought to the site for the final stages of shaping. In that respect, we can infer that the later stages of shell tool manufacture were occasionally occurring at Morhiss. A single *Busycon* sp. oval whorl blank was described earlier that is more comparable in size to whorl fragments identified as debitage at Morhiss. This specimen is also comparable in size and thickness to pendants and gorgets at Morhiss. It is hypothesized that the shell pendants and gorgets were being manufactured at Morhiss based upon the size of this blank and the size of finished pendants, as well as the patterning of the debitage which exploited the outer whorl of whole *Busycon perversum* to produce suitable blanks. Needed to fully confirm this hypothesis are more pendant blanks and pendants in various stages of manufacture. Unfortunately, these data are lacking from Morhiss but enough evidence is present to suggest this as a possibility that should be explored at other regional sites.

The site of Morhiss is significant to the current debate of the origins of *Busycon* marine shell in that it does not negate the plausibility of either model. Certainly, the presence of manufacturing debris and unfinished shell artifacts indicates that marine shells from the Texas coast were the most likely source of raw material. However, as stated above, the size and massiveness of the larger *Busycon* specimens from Ernest Witte does not compare to those specimens from Morhiss. For that matter, there have been no *Busycon* artifacts of comparable size described for any other site along the Gulf Coast of Texas. Although Morhiss data seem to support the Birmingham and Huebner (1991) model of exploitation of locally available shell resources, they do not fit expectations regarding the absence of shell artifact manufacturing debris within the confines of a mortuary site. This finding, based on the Morhiss data, suggests that conventional hypotheses regarding the structure, function, and expected material remains of mortuary sites along the West Gulf Coastal Plain need to be reevaluated. The

absence of manufacturing debris at Ernest Witte seems to further support Hall's (1981, 1992) contention that they represent artifacts that had their origin beyond Ernest Witte and possibly the Texas coast.

Birmingham and Huebner (1991) and Hall (1992) have emphasized the need for future chemical and trace element studies of marine shell artifacts in Texas as a partial solution to the problem of origins of marine shell artifacts. Recently, Claassen and Sigmann (1993) have begun a program of sourcing marine shell from a number of inland sites in the United States, including Texas. Their preliminary data on specimens from Texas indicated that *Busycon* sp. shells from Texas are highest in magnesium (Mg) values and shells from tributaries that drain into the Gulf of Mexico yield higher Mg values than specimens from the Atlantic Ocean (Claassen and Sigmann 1993:342). Their continuing research should provide additional data regarding the exchange and manufacture of marine shell ornaments along the Gulf of Mexico.

The Use of Shell as a Raw Material Resource. A number of researchers have suggested that the use of shell as a tool material in coastal regions was a response to the absence or scarcity of suitable sources of raw material for flaked stone tools (Eaton 1974; Mokry 1980; Masson 1988; Steele 1988). Steele (1988) and Mokry (1980) suggested that a major factor affecting the distribution of marine shell tools along the Texas coast was the regional scarcity of lithic materials. Campbell (1947:65) suggested that the inhabitants of the Johnson site could have obtained suitable stone material either through trade with inland groups or through travel. The scarcity of suitable stone raw material can be considered to be a significant factor to explain presence of shell at these sites.

The lithic deposits along the Texas coast are indeed dominated by stream gravels of generally small size insufficient for making large chopping and cutting tools. Banks (1990:49) stated that the coastal regions of Texas contain the least amount of available raw material from in situ geological deposits when compared to Texas as a whole. The inland coastal plain does, however, contain gravels derived from chert-bearing geological deposits at the headwaters of river valleys that flow to the Gulf of Mexico. The character and size of the gravels changes with distance from the headwaters and the source of the raw material. The closer that the terrace gravel deposits are to the geological source, the greater the quality, size, and abundance of raw material for stone tools. This may explain the difference in the character of the lithic assemblage at Morhiss from other Archaic sites closer to the coast. Morhiss is situated on a remnant terrace of the Guadalupe River having abundant terrace gravels of sufficient size and quality to produce a variety of stone tools. This would account for the evidence of large biface manufacture, abundant cores, Guadalupe and Clearfork tools, and projectile point preforms present in the lithic assemblage of Morhiss.

The abundance of terrace gravels at Morhiss indicates that there was no local paucity of lithic material. Certainly, with an abundance of raw material for cores, bifaces, adzing tools, and flake tools, there was virtually no technological need to procure shell for tools. Thus, the presence of shell tools, albeit a very small proportion of the overall tool component, could be attributed to either social and/or logistical factors. Other potential factors include direct procurement, indirect or direct trade, or the replacement of exhausted tools with others. Caches of *M. nimbosa* and the presence of *M. nimbosa* modified cutting tools at the site indicate the utility of these shells as a source of raw material.

Age and Sex Distribution of Shell Grave Goods at Various Sites. To advance our understanding of the age and sex distribution of shell grave goods at Morhiss, several other important Archaic sites from Texas were analyzed (Table 7; Figure 1). Our sample includes Ernest Witte, Crestmont, and Blue Bayou, all Archaic period coastal sites, and Olmos Dam and Loma Sandia, two additional inland sites.[3] Any shell buried with an individual (whether marine or freshwater, modified or unmodified) was considered a grave good and included in Table 7. Grave goods of other materials were not included.

In analyzing the age distribution, all individuals noted as infant or child were included in the "child" category. All individuals noted as adolescent, young adult, or old adult were placed in the "adult" category. An examination of Table 7 shows that the shell grave goods age distribution at Morhiss, Ernest Witte, and Crestmont—all Archaic sites with cultural similarities—are very similar. Interestingly, the Blue Bayou site, located in the same county as Morhiss and with temporal similarities (Huebner and Comuzzie 1992), has a very different distribution of shells as grave goods. Of 52 individuals interred at the site, only one (an adult male) was interred with shell. The two inland Archaic sites differ markedly from the shell grave good distribution that was identified at the coastal Archaic sites, as well as differing significantly from each other in spite of being closely related spatially. At the Olmos Dam site, 50 percent of the children were interred with shell grave goods, while at the Loma Sandia site, only 7.7 percent had shell grave good inclusions.

Assessing the sex distribution of shell grave goods at the sites was difficult given the very high percentage of individuals at each site (with the exception of Blue Bayou) who were of an indeterminate sex, due primarily to exceedingly poor skeletal preservation. Because of that, no pattern was apparent. It should be noted, however, that only at the site of Ernest Witte

were females interred with shell grave goods more often than males. When Hall (1981:87–88) examined the distribution of all categories of grave goods at Ernest Witte (Group 2 burials), he noted that males and females were equally represented in terms of grave goods. However, when he examined the distribution of bone implements, a trend was apparent in that only adults were interred with these items (Hall 1981, 1988). This suggests that status differences at Ernest Witte may be related to age and achieved status rather than to sex.

Comparison of the Shell Assemblage at Morhiss to other Sites in Victoria County. The Texas West Indies site (TWI) is located 10 km to the south of the city of Victoria, west of the Guadalupe River, on McDonald Bayou. It is on the opposite side of the river from the Blue Bayou site (Birmingham and Huebner 1991:8–9). Based on the artifact assemblage, the site is believed to date to the Late Archaic period (Birmingham and Huebner 1991:8). Although TWI is a mortuary site, the distribution of shell artifacts in relation to burials could not be discussed because shell was only recovered during a surface collection of the site. Only 11 shell artifacts were recovered from the site, and all were manufactured from the marine whelk, *Busycon perversum*. Ten large beads (and bead fragments) were manufactured from columellae and all retained the natural spiraling of the columellae. All contained traces of asphaltum and the only complete ones were perforated at each end (Birmingham and Huebner 1991:12). No such beads were identified at the Morhiss site.

Only one item from TWI, a pendant-like disk, was constructed from the outer whorl of a *Busycon* shell. Like a pendant from Morhiss, it had scored lines around the outer edge and was perforated in the center (Birmingham and Huebner 1991:16). However, it did not show the characteristic punctations observed on the pendant from Morhiss.

The shell assemblage from Blue Bayou is notably small, given the number of burials at the site. The site dates primarily to the Late Prehistoric period, but does have a Late Archaic component (Birmingham and Huebner 1992). However, the one burial at the site identified with shell grave goods came from a Late Prehistoric component. The shell assemblage is limited to two freshwater mussel shell pendants identified by Huebner and Comuzzie (1992:109) as possible ear drops. Similar artifacts were not recovered at Morhiss. The only other shell recovered from Blue Bayou consisted of two shell caches. Both caches contained *Dinocardium robustum* shells. Based on the proximity of the caches to burials, Huebner and Comuzzie (1992:110) suggested that these shell accumulations may have represented digging tools for graves or grave markers. We have no reason to believe that these hypotheses apply to the shell caches seen at Morhiss. The caches at Morhiss contained primarily *Macrocallista nimbosa*, as well as some *Lampsilis teres*. Both of these raw materials were used for tool manufacture at the site, as well as (in the case of *Macrocallista nimbosa*) ornaments. Furthermore, none of the caches seemed to be in a direct association with burials. Therefore, we believe that shells cached at Morhiss were saved to be used later in manufacturing shell tools and ornaments.

It is interesting to note the differences in the shell assemblages present at the major mortuary sites in Victoria County. It is expected that a greater similarity would exist among sites that exhibit such close spatial and temporal (in the case of TWI and Morhiss) relationships. The exact meaning of these differences is not known at this time but may reflect differences in occupation intensity in addition to use as mortuary localities.

Conclusions

The shell assemblage from Morhiss is significant for several reasons. First, the size of the shell artifact assemblage makes it one of the largest in the state of Texas, especially along the inland portion of the West Gulf Coastal Plain. Over 3,000 shells were analyzed; most were modified into ornaments or tools. Of the shell modified as ornaments, most were *Marginella* beads. The majority of specimens modified as tools represented hafted adzing tools used in a variety of woodworking tasks.

The second significant finding of this analysis is the identification of some shell tool and ornament manufacture, albeit on a small scale, and the documentation of various techniques for modification and manufacture. The documentation of manufacturing stages of whelk columella tubular beads and pendants of freshwater mussel indicates that at least some ornament production was occurring at Morhiss on a limited scale. This is further supported by the recovery of possible shell artifact manufacturing tool kits with a number of burials (especially Burial 139). Evidence of tool manufacturing is also present, especially for the hafted beveled tools.

The third significant finding pertains to the inland position of Morhiss and the predominance of marine shell species over inland freshwater species as a source of raw material for tools and ornaments. This suggests a preference for marine shell because of its durability and wide range of variation. The presence of caches of *Macrocallista nimbosa* at Morhiss is one indicator that shell raw material was being transported from coastal sources to inland habitation sites. Caching behaviors regarding the *M. nimbosa* and the presence of unifacial tools of the same species suggest that valves of this species served as efficient unifacial cutting tools. There appear to have been distinct so-

cial or residential/settlement factors influencing the procurement, manufacture, and use of particular marine shell species operating at Morhiss that were more significant than the mere presence of suitable stone raw material.

Lastly, the use of shell artifacts as grave goods at Morhiss yielded additional preliminary implications regarding social structure at the site and at other comparative sites. Data from Morhiss indicated that there were distinct pattern similarities with other Archaic sites on the West Gulf Coastal Plain (such as Ernest Witte and Crestmont). Archaic sites located further inland on the West Gulf Coastal Plain (such as Loma Sandia and Olmos Dam) had significantly different shell grave good distributions.

Notes

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Collections. The Morhiss shell assemblage is curated at the Texas Archeological Research Laboratory, J. J. Pickle Research Campus, Building 5, Austin, Texas.

[1] The Aransas focus, first defined by Campbell (1947), is based on three sites, Johnson (41AS1), Kent-Crane (41AS2), and Live-Oak Point (41AS3), located near the Aransas Bay (Campbell 1947:41, 1958). Because the geographic area of the original Aransas focus has been extended past the boundaries established by Campbell, Corbin (1974) suggested that it is more accurate to refer to an Aransas complex rather than an Aransas focus. Corbin's suggestion is followed here. Recent research by Ricklis (1993:64–71, 1995) and Ricklis and Cox (1993) may ultimately refine coastal Archaic chronology. A long-term sequence of both environmental and human adaptative change is suggested by Ricklis (1995:287–290) for a period from ca. 7500 B.P. to after 3100 B.P. The sequence is based on abundant radiocarbon dates from a number of sites in the area of Nueces Bay along the central Texas coast, seasonality data, and reconstructions of environmental characteristics. Although this sequence of environmental and human changes seems appropriate for the Nueces Bay region, it has not been fully articulated with Archaic data from other regions along the Texas coast. Therefore, Ricklis's (1995:268) suggestion to drop the Aransas complex terminology is considered premature. Further research is needed to reevaluate previous Archaic data in light of the Ricklis sequence. Hopefully, such studies will be forthcoming because the model holds considerable promise for refining coastal Archaic adaptive patterns.

[2] This figure was determined by excluding the two shells whose identification as marine or freshwater is equivocal.

[3] Coastal is defined here to include sites on the West Gulf Coastal Plain, which includes sites directly on the costal strand, as well as those on the coastal prairie.

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