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CHAPTER 7
THE ARTIFACTS FROM OCCUPATION AREAS AT MITCHELL RIDGE SITE: DIMENSIONS OF TECHNOLOGY AND STYLE

General Characteristics of the Artifact Assemblage

On the whole, the artifact assemblage from the various occupation areas at Mitchell Ridge is similar to that previously summarized for the later Ceramic Period on the upper Texas coast by Aten (1979, 1983a). The findings from the 1970s and 1992 excavations are summarized in Table 7.1. Ceramics are overwhelmingly the most abundant class of artifact; nearly 25,000 potsherds, representing several hundred vessels, were recovered from the combined investigations of the 1970s and from the main excavations carried out in 1992. The next most abundant class of materials are the flaked lithic artifacts, with chert debitage numerically dominant and finished tools consisting mainly of arrowpoints and small drills/perforators. The bone and shell industries are quite limited, though the small samples contain a variety of artifact forms.

The lithics are of value in defining the chronology of site occupation. Since the great majority of stone projectile points are arrowpoints-- 68 whole and fragmentary specimens are in the combined 1992 and 1970s collections-- it is inferable that most of the occupation of the site took place during the Late Prehistoric. The most useful time markers among the arrowpoints are the Perdiz and Scallorn types, since these are solidly dated in the greater Texas area to ca. A.D. 1250/1330-1700 and A.D. 700/800-1250/1300, respectively (e.g. Prewitt 1981, 1985; Turner and Hester 1993). The Perdiz type greatly outnumbers Scallorn, so it is probably fair to infer that occupation at the site was most intensive during the Final Late Prehistoric Period, a suggestion which is, as noted earlier, supported by the combined radiocarbon data on occupational features and burials.

Functionally, the preponderance of arrowpoints among lithic tools points to some importance for hunting, which finds support in the fact that white-tailed deer is estimated to have contributed the greatest amount of dietary meat by weight to the diet, next to fish. In this light, the paucity of formal lithic butchering tools (1 bifacial knife from the 1970s excavation) is somewhat surprising, as is the scarcity of the unifacial end scrapers (1 specimen, also from the 1970s) generally though to have served in hide-working. Possibly, primary butchering and hide preparation were activities carried out elsewhere, at specialized hunting camps, most of which may have been located on the mainland.

Next to arrowpoints, small drills are the most abundant lithic form, represented by 33 specimens in the combined 1992 and 1970s collections. With the exception of four specimens from Feature 9, which could have served as arrowpoints, these implements probably were in fact used as drills or perforators, since they generally were probably too long and slender to have served well for high-impact penetration. Some specimens exhibit use-wear on lateral edges under low-power microscopy, whereas many others do not; perhaps the latter group represents frequent breakage, whereby many specimens were discarded before appreciable edge wear developed. The function of these implements is, as noted previously by Aten (1983a:252), somewhat problematic. Judging by the common lack of discernable edge wear, some must have been used on soft materials, such as hides. This may be particularly true for expanded-base specimens, since the form matches that of many of the chert perforators found in inland Late Prehistoric contexts (e.g. Prewitt 1981; Black 1986; Highley 1986; Johnson n.d.) which are often thought to have served in perforating hides of deer and bison. At least some of the cylindrical specimens, some of which do show edge-wear, were probably used to perforate hard materials such as wood, and it has been suggested by Campbell (1957) that such drills were used for making holes in shell beads. Aten (1983a) has suggested that small drills appear in the later part of the cultural sequence on the upper Texas coast, and the relative abundance of these items and our chronological data from Mitchell Ridge certainly do not contradict this general temporal placement.

Bone implements are relatively uncommon, consisting of eleven specimens from the 1970s work and ten from our 1992 excavations. Mundane tool forms include four awl fragments, a probable deer metapodial fleshing tool, two bone points, and two rectangular pieces of thick bone (probably bison longbone) with beveled edges which, as discussed earlier, may have been used to smooth surfaces of still-moist, unfired pottery. The dearth of awls, often the most common bone artifact in prehistoric assemblages, may reflect the use of the far more abundant flaked chert perforators for punching holes in

Table 7.1. Artifacts from occupation areas by material categories, 1970s and 1992 investigations.

	Block	Fea. 9	Bayou Lots	1970s (all)	TOTALS
Lithics					
Dart points fragments				2	2
Arrowpoints					
Perdiz	22	5		8	35
Probable Perdiz	2	1		3	6
Perdiz-like	2				2
Scallorn	1			1	2
Triangular				1	1
Sub-triangular		3		2	5
Bulbar stemmed		1			1
Lozenge-shaped	2	1		1	4
Cuney	1				1
Misc. fragments	2	1		3	6
Untyped	2	1		2	5
Drills/perforators					
Cylindrical	2			1	3
Expanded-base	2	1		7	10
Fragments	3	2		11	16
Drill/arrowpoints		4			4
Cores	1			1	2
Bifacial knife				1	1
Miscellaneous bifaces	4			2	6
Unifacial end scraper				1	1
Prismatic blades	17	4		16	37
Retouched flakes	7	5		9	21
Debitage	2241	465	2	434	3142
Rough/ground stone]					
Milling/abrading	2				2
Pumice abraders	1			1	2
Hammerstones	1			1	2
Bone					
Awls	3			1	4
Flesher(?)	1				1
Pottery tools (?)	1			1	2
Rectangular bone				2	2
Socketed point				1	1
Unsocketed point				1	1
Bird bone beads	3			5	8
Whistle frag.	2				2
Shell					
Whelk adze frag.				1	1
Bi-pointed columellae	4				4
Cut whelk shell	1				1
Whelk, chisel-like end				1	1
Perforated oyster	3				3
Possible oyster tool	1				1
Discoidal bead				1	1

Table 7.1, Continued.

	Block	Fea. 9	Bayou Lots	1970s (all)	TOTALS
Aboriginal Ceramics					
Potter's coil	1				
Potsherds	7,018	1,681	734	15,012	24,445
Glass					
Arrowpoint fragments	1			1	2
Flaked glass frags.	5			2	7
Patinated bottle frags.				13	13

soft materials such as hides. Non-mundane or ornamental bone items consist of a total of eight beads made from bird longbone sections and two fragments of bird bone whistles from the 1992 Block Excavation, and possibly the two rectangular bone pieces recovered during the 1970s.

Only 12 artifacts of modified shell are present in the combined collections. All but one are assumed to be tools, including a whelk adze fragment, four bi-pointed whelk columella sections, a section of cut whelk body whorl, a whelk shell with the constricted terminus beveled to a chisel-like edge, three perforated oyster shells, and a possible oyster shell cutting/scraping tool. In marked contrast to findings in certain burials at the site, shell ornaments are extremely rare, consisting of only a single discoidal bead of quahog(?) shell.

The paucity of shell tools is somewhat surprising, considering (a) the coastal location of the site and (b) the absence of locally available stone as raw material for tool production. In part, this is doubtless due to the absence or scarcity of certain mollusc species in the local estuarine environment, species which are known to have commonly served as raw materials on the central Texas coast, where higher average salinity conditions provided suitable habitats (e.g., lightning whelk and sunray venus clams; see Steele 1988; Ricklis 1990). However, the dearth of shell tools may also be more apparent than real. Oyster shell cutting tools are documented as part of the upper coast archaeological assemblage (Aten 1983a), and the fact that only a single possible example was identified at Mitchell Ridge (from the 1992 Block Excavation) may simply reflect the generally weathered condition of oyster shell at the site and the resultant difficulty in identifying the kind of surficial wear which would have been produced by utilization. Indeed, oyster shells could very well have been used as a common surrogate for chert in various cutting and scraping tasks.

The final non-ceramic artifact class consists of a few items of worked glass. The presence of two fragmentary arrowpoints, both of dark green bottle glass, clearly represents aboriginal occupation during the era of European contact, in the Protohistoric or the Early Historic Periods. The same can probably be said about the seven fragments of bottle glass which exhibit intentional edge-flaking for use as cutting/scraping tools. The thirteen unworked fragments of heavily patinated bottle glass probably also pertain to the contact period, since they stand out from modern glass fragments scattered across the site by virtue of their heavy oxidation, which in some cases has completely penetrated the thickness of the glass.

Pottery is abundant, as reflected not only in the total number of sherds recovered but also in the fact that the individual vessels represented (N = 600) are far more abundant than all other tool forms combined. This presumably reflects an emphasis on cooking, and may in fact correlate with the importance of fish in the meat diet, insofar as pottery vessels would have been well suited to boiling and thus to maximum use of fish meat and oils. The relative abundance of pottery may also point to fairly lengthy seasonal residences at the site, since the low-fire aboriginal ceramics probably would not have fared well under conditions of high mobility and frequent camp removals and may, therefore, have been more commonly used during periods of extended residence.

Flaked Chert and the Organization of Lithic Technology

The sample of flaked lithics from Mitchell Ridge provides a unique opportunity to explore the question of how aboriginal people organized the technology of lithic tool manufacture and use on an upper coast barrier island. The Texas coastal barriers are geologically devoid of workable stone, as are the sandy clays and clayey sands of the Beaumont and Lissie Formations of the mainland (Fisher et al. 1972), so that Mitchell Ridge is situated at a considerable distance from natural sources of lithic raw material. The present inquiry provides some degree of insight into how prehistoric peoples met the need for efficient tool technology when operating under the constraint of scarce raw material resources.

A number of researchers have examined various responses of hunting and gathering peoples to limited availabilities of tool raw material, proposing several compensatory responses to the problem. Binford (1979) has shown that when raw materials are distributed fairly evenly throughout the operational area of a population, the procurement of those materials and the manufacture of tools can be readily "embedded" within the seasonal round of mobility that is directed to procurement of food resources. However, in cases in which lithic raw materials are more localized, the scheduling demands of the food quest can create a logistical challenge, insofar as people must be in the right place at the right time to procure biotic resources and yet must also be able to procure sufficient tool raw material to maintain technological efficiency. Several strategies have been detected in the archaeological record by which this sort of problem was overcome. One such strategy is simply the curation and maintenance of tools with relatively long use-life (Schiffer 1975; Binford 1977; Bamforth 1986). Another was the creation of multi-purpose tools, by which a single tool with a reliably long use-life could serve a number of expectable tasks (Goodyear 1979; Bleed 1986; Kelly 1988). Finally, various kinds of tool refurbishing or rejuvenation served to extend the use-life of existing materials and thus postpone the need to return to the source areas for raw material (Wiant and Hassen 1985; Bleed 1986; Kelly 1988).

A recently published model of Late Prehistoric lithic technological organization on the central Texas coast (Ricklis and Cox 1993) provides a predictive framework for interpreting the flaked lithic assemblage at Mitchell Ridge within the regional spatial parameters of technological organization. Transferring the central coast model to the upper Texas coast is justified, since (a) native peoples of both regions operated within a mobile hunting and gathering adaptive system and had similar modes of transportation for movement of people and materials (i.e., foot travel and dugout canoes) (b) the environments of both areas are geologically and hydrologically similar, consisting, from the Gulf inland, of barrier systems, bay/lagoonal estuaries into which empty a series of subparallel streams, and a coastal plain consisting of the same geologic units parallel to the Gulf shore (i.e, the Beaumont and Lissie formations of Pleistocene fluvial-deltaic origin), and (c) chert color and cortex characteristics indicate that similar river cobbles were employed in the manufacture of tools on the central coast and at the Mitchell Ridge Site. In both regions, the closest sources of lithic raw materials would have been in fluvial settings where river downcutting was sufficiently deep to reach the chert gravels of the Upper Goliad formation, an accumulation of fluvial-deltaic deposits of Pliocene age; such locations would have been at some considerable distance from the modern shoreline, where the Beaumont and Lissie deposits are sufficiently thin to permit streams to downcut to and expose the underlying Upper Goliad gravels.

The key points of the central coast model can be summarized concisely here. As mentioned, lithic materials of useable size were not available along the coast, and could have been procured only at some distance inland, along streams. The small- to medium-sized chert cobbles at identified inland locations (some 60-70 km from the mainland shoreline) have fairly distinctive color and cortex, permitting the confident conclusion that virtually all tools and debitage from Late Prehistoric (Rockport Phase) sites were made of material from the known source area along the Nueces River.

As the cost of procurement and transport of raw material increased with increasing distance from/to known occupation sites, several strategies were employed to maintain the overall efficiency of tool technology. First, in response to the decreasing availability of lithic raw material with increasing distance of a given campsite from the lithic source area, the frequency of primary production of stone tools decreased. This is reflected in a linear, distance-related decrease in the ratio of flakes to tools, indicating that increasingly more tools were discarded (or removed from the technological system) that were made

Table 7.2. Flakes and flake fragments from the 1992 Block Excavation and Feature 9

	FLAKES							FLAKE FRAGMENTS			
	P	CP	S	T	Th	R	Total	P	S	T	Total
Block Excavation											
Totals	5	17	48	315	43	805	1233	21	123	864	1008
% of types internally	.41	1.38	3.89	25.55	3.49	65.29	100.02	2.08	12.20	85.71	99.99
Feature 9											
Totals	4	15	16	120	5	75	235	11	52	164	227
% of types internally	1.70	6.38	6.81	51.06	2.13	31.91	99.99	4.84%	22.91%	72.25%	100.00

P = Primary
CP = Cortex Platform
S = Secondary
T = Tertiary
Th = Thinning
R = Retouch

Table 7.3. Adjusted flake type numbers and percentages, numbers of formal lithic tools, and flake:tool ratio forcombined samples from 1992 Block Excavation and Feature 9.

	Whole Flakes				Flake Fragments			Totals	Formal Tools*
	P	S	T	TH	P	S	T		
Block Excavation	5	65	315	43	21	123	864	1436	43
Feature 9	4	31	120	5	11	52	164	387	20
Totals	9 2%	96 16%	435 74%	48 8%	32	185	1028	1823	63

P = primary; S = secondary, including cortex platform;
T = tertiary; TH = biface thinning flakes

* Formal tools include arrowpoints, drills, fragments of apparently finished miscellaneous bifaces.

Flake:tool ratio - 29:1

at a given site (or introduced into the system).

With a decrease in the number of tools being introduced into the system, several compensatory strategies were employed with which to maintain technological efficiency, as follows:

1) Expedient use of an increasing proportion of available (on-site) chert debitage for various cutting and/or scraping tasks, effectively replacing formal tools (i.e, bifacial knives, unifacial end scrapers) with the use of flakes. This is indicated by a linear increase in the percentage of total flake samples which show evidence of edge utilization in the form of unintentional continuous edge microflaking.

2) Increasing rejuvenation/reworking of bifacial tools with increasing distance from the lithic source area. This is suggested to represent the curation and use-life extension of bifaces as compensation for the inability to introduce newly made pieces into the system as the availability of raw material decreased, in the manner suggested by Kelly (1988) for the Great Basin region. The increased edge rejuvenation of bifacial tools is indicated by a general linear increase in biface thinning flakes with increasing distance from the lithic source area. In this connection, it is important to note that the relative proportions of all other flake types (i.e., primary, secondary and tertiary) remain essentially unchanged with distance from the source, suggesting that, with the exception of increased edge rejuvenation of bifaces, the basic kinds of lithic reduction (while decreasing in absolute frequency) did not change proportionately.

3) Further evidence of curation and rejuvenation of existing tools is suggested by a linear decrease in the average length of Perdiz arrowpoints with increasing distance from the lithic source area. Perdiz points at or very near (within 1-5 km) the source average nearly 3 cm in length, and the length drops to approximately 2.4 cm in length at sites farthest (70 km) from the source. This is interpreted to represent reworking of points as a technique for use-life extension; whereas new points were easily made at campsites from which chert was easily procured, at sites some distance from the lithic source greater emphasis was placed on reworking of dull or broken points. The possibility that the decreasing average length represents manufacture of points from smaller flakes (reflecting increasing use of less than optimally-sized material away from the source) was considered, but this does not appear to be supported by the data on average flake lengths from the sampled sites. While there is an initial decrease in the

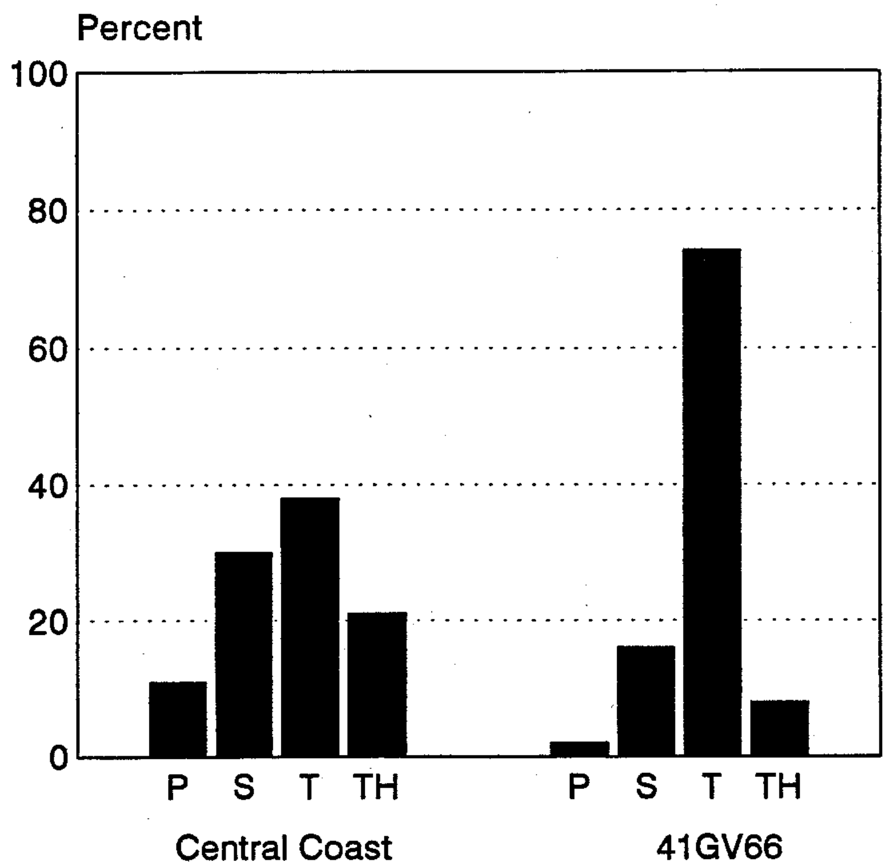


Figure 7.1. Bar graph showing percentages of flake types (primary, secondary, tertiary and thinning) for combined central Texas coast sites (from Ricklis and Cox 1993) and Mitchell Ridge. Note very low proportion of primary and secondary flakes relative to tertiary flakes at Mitchell Ridge.

average length of whole flakes between the source area and a point some 28 km from the source, beyond that point average flake length remains virtually unchanged (at approximately 2 cm), regardless of greater of lesser distance from the lithic source. This is interpreted to reflect use of somewhat larger cobbles at sites at or near the source, and transport of smaller cobbles to sites at some distance, but not transport of cobbles whose sizes fell below a certain threshold of utility (see discussion in Ricklis and Cox 1993). Thus the fact that the average length of Perdiz points continues to decrease to the maximum distance from the lithic source would appear to be an independent variable, one which reflects reworking of the points rather than the size of available flakes for point production.

4) Finally, beyond a certain distance from the lithic source area, the organization of lithic technology *per se* apparently became sufficiently inefficient that surrogate raw materials for tool production had to be brought into the system. These materials consisted of estuarine shell, primarily lightning whelk and sunray venus clamshells. Plotting of the geographic distributions of formal shell tools (whelk adzes, sunray venus knives/scrapers) from Late Prehistoric contexts proved most interesting in this regard: These tools are found on sites along small streams devoid of lithic raw materials (the Aransas River, Oso Creek) and at shoreline locales far removed from the lithic source area, but not at Late Prehistoric sites on the lower Nueces River, where relatively low cost procurement of raw material could be had by direct canoe travel to and from the source area (see Ricklis and Cox 1993, Figure 2).

In sum, the data from the central coast point to three modes of behavior which came into play sequentially as the cost of raw material procurement and transport increased with distance. *Mode I* involved the primary manufacture of lithic tools, and this decreased in importance with increasing distance

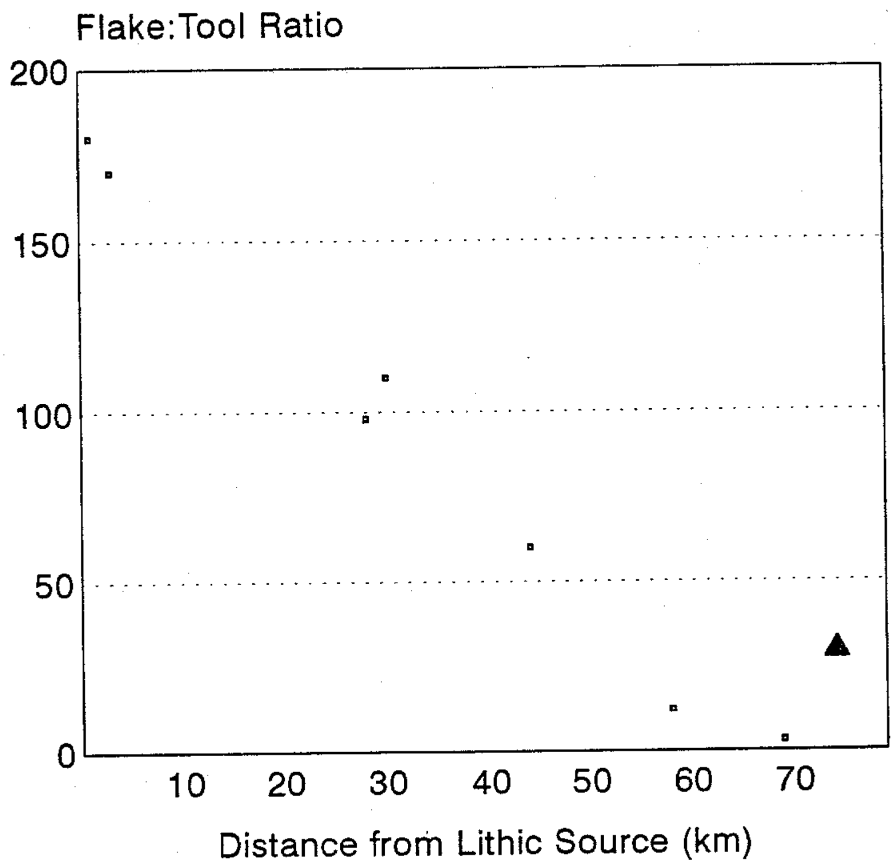


Figure 7.2. Scatter diagram showing relation between flake:tool ratio and distance from lithic source area on central Texas coast (from Ricklis and Cox 1993) and the Mitchell Ridge Site (black triangle).

from the source area. *Mode II* entailed the several techniques of material use-life extension (use of unmodified flakes for cutting/scraping, edge-rejuvenation of bifaces, resharpening of arrowpoints). *Mode III* involved the substitution of shell as a surrogate tool material, inferably when Modes I and II no longer met the adaptive requirements of the technological system.

Hypothetically, if the occupants of the Mitchell Ridge Site were employing a similar kind of technological organization, the various lithic data sets should conform to expectations for a site at the far limits of the lithic procurement/transport system. Although the spatial distributions of chert sources have not been precisely defined for the upper coast, the geologic variables are essentially the same as for the central coast, and Mitchell Ridge was doubtless far removed from lithic source areas, which must have been situated considerably inland along major rivers such as the Brazos and the Trinity. Predictably, then, the lithic data sets used in the central coast study should show the following characteristics for Mitchell Ridge:

1. The ratio of flakes to formal tools should be low, reflecting a relatively high incidence of discard of exhausted or broken tools to on-site production of new tools;

2. There should be a high percentage of utilized flakes in the entire flake sample, indicative of a heavy reliance on expedient use of debitage for cutting/scraping tasks as compensation for a shortage of useable formal tools;

3. The breakdown of flakes into types should show a relatively high percentage of biface thinning flakes, as formal bifacial tools are resharpened or reworked to extend tool use-life;

4. The average length of Perdiz arrowpoints should be relatively short, reflecting frequent resharpening of dulled/damaged arrowpoints as a technique for extending use-life;

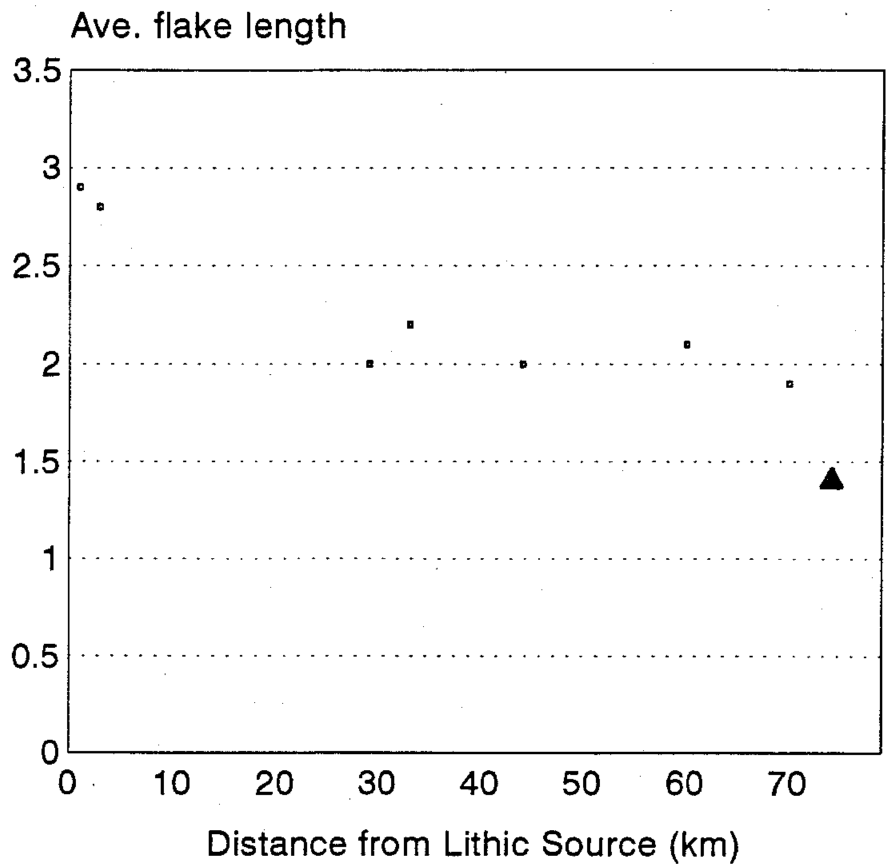


Figure 7.3. Scatter diagram showing relation between average flake length and distance from lithic source area on central Texas coast (from Ricklis and Cox 1993) and the Mitchell Ridge Site (black triangle).

5. There should be significant use of shell as a surrogate material for chert.

Combining the well-provenienced debitage samples from the 1992 investigations of the Block Excavation and Feature 9 for analysis, it is apparent that certain of these expectations are met, while others are not. The breakdown of debitage into flake types for these two areas is shown in Table 7.2. Whole flakes sort into primary flakes (100% of dorsal surface is cortex), flakes with cortex platforms (usually otherwise non-cortical), secondary flakes (with some part of the dorsal surface consisting of cobble cortex), tertiary (interior flakes with no cortex remaining), biface thinning flakes (lipped interior flakes) and small retouch flakes (.75 cm or less in length, interior flakes representing, for the most part, tool edge retouch). Whole flakes are here defined as specimens retaining the striking platform and bulb of percussion, though the distal end is broken off in some cases. Table 7.2 also shows the breakdown by types of flake fragments, defined here as fragments from which the proximal end bearing the platform and bulb is missing.

For comparability with the samples from the central coast, some adjustments are required. In the analysis of the central coast materials, only flakes recoverable on 1/4-inch screen were used. Therefore, in order to achieve comparable results with the Mitchell Ridge material, retouch flakes are eliminated from present consideration; in general these would not have been recovered on 1/4-inch screen. Second, cortex platform and secondary flakes were combined into the single category of "secondary flakes" for the central coast material, so this procedure is followed here for the Mitchell Ridge flakes. Finally, for determination of flake:tool ratios in the central coast analysis, both whole flakes and flake fragments were combined for a total flake count; again, this procedure is followed here for Mitchell Ridge. The results of these

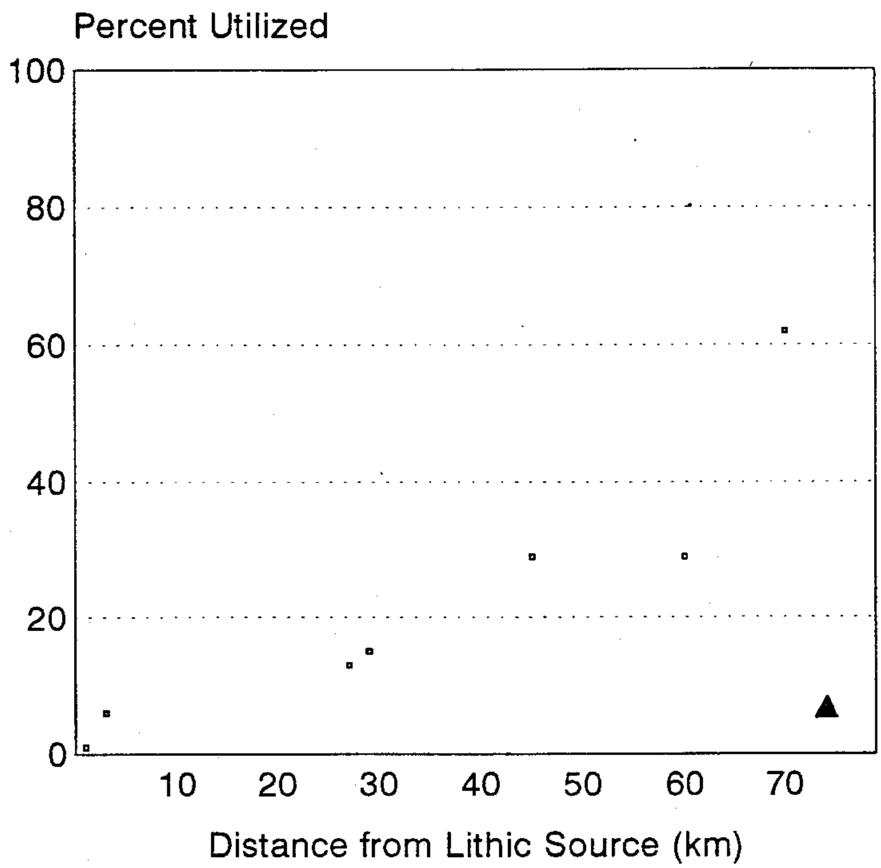


Figure 7.4. Scatter diagram showing relation between percent of flakes utilized and distance from lithic source area on central Texas coast (from Ricklis and Cox 1993) and the Mitchell Ridge Site (black triangle).

adjustments of the Mitchell Ridge flake data are presented in Table 7.3.

Having thus created comparability in the data, the various lithic data sets from the central coast and Mitchell Ridge can be compared, and inferences can be drawn concerning similarities and possible differences in lithic technological organization, as follows:

Flake type percentages. As already mentioned, with the exception of thinning flakes, the proportion of which varies a good deal, the flake type percentages (based on whole flakes) from the sampled central coast sites shows little variation. As may be seen in the comparative graph, Figure 7.1, the percentage breakdown of flake types at Mitchell Ridge contrasts markedly with the combined samples from nine sites on the central coast (combining all site data for the central coast is justifiable, since there is relatively little variability in the flake type percentages; see Ricklis and Cox 1993). At the combined central coast sites, primary flakes account for 11% of the total, secondary flakes are 30%, tertiary 38%, and biface thinning flakes 21%. At Mitchell Ridge, primary flakes account for a mere 2% of the total, secondary flakes are 16%, thinning flakes only 8%, so that the great majority, 74%, are tertiary flakes.

Very generally, the kinds of flakes and their relative numerical significance reflect the kinds of lithic reduction carried out at a given site (e.g. Collins 1975; Ensor and Roemer 1988). However, considering the Mitchell Ridge data in terms of spatial context-- that is, as representing one segment of the aboriginal operational area-- it would probably be erroneous to conclude that the discrepancies in the data reflect different kinds of lithic technology. Certainly, the kinds of finished tools at Mitchell Ridge are the same as on the central coast (i.e., Perdiz points made on flakes, small drills, occasional bifacial tools), so it is apparent that the end goals of lithic reduction were essentially similar in both areas. Also, as noted above, the environmental parameters of technological organization, and the kinds of raw materials

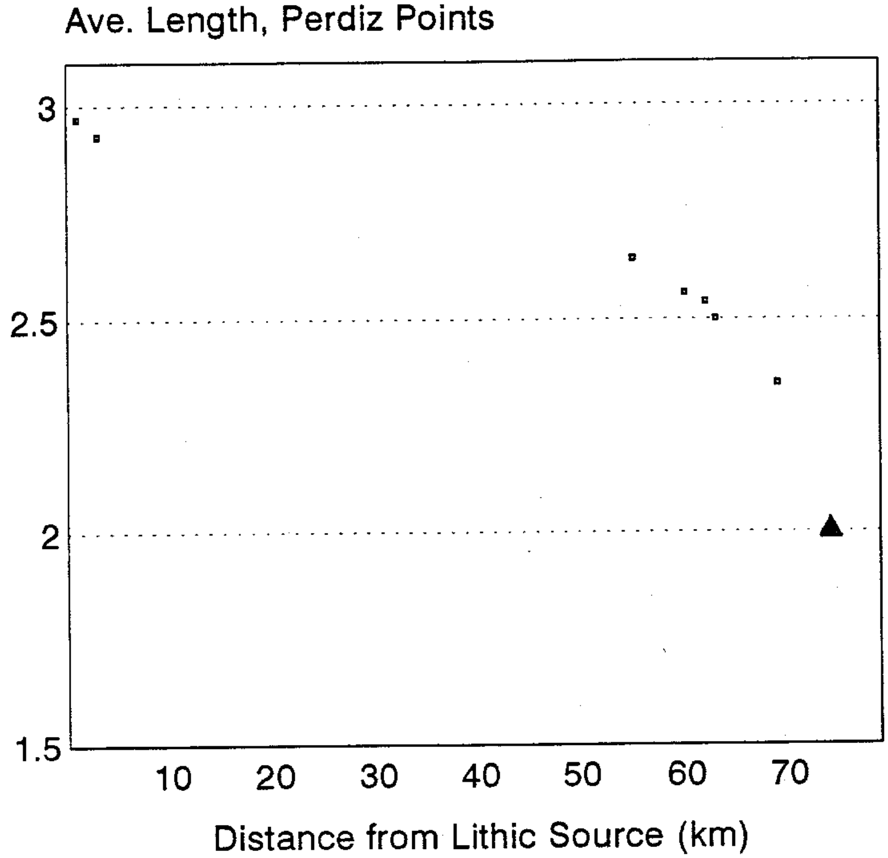


Figure 7.5. Scatter diagram showing relation between average length of Perdiz arrowpoints and distance from lithic source area on central Texas coast (from Ricklis and Cox 1993) and the Mitchell Ridge Site (black triangle).

commonly available, were basically the same.

More likely, the data on flake types from Mitchell Ridge can best be explained, not as representing a different kind of technological organization, but as reflecting a different point on an analogous, distance/cost-related continuum, one in which distance and therefore cost of procurement/transport of raw material was even greater than represented by the data from the central coast sites. For example, the lower percentage of primary flakes could very well indicate that raw material (whole cobbles) rarely reached the site prior to some degree of initial reduction, an inference which is certainly not contradicted by the dearth of chert cores at the site. The relatively high percentage of tertiary (non-cortical) flakes at Mitchell Ridge is in accord with this suggestion, since production of flakes for manufacture of tools such as arrowpoints and drills would have involved mainly the use of material which had already been subjected to some initial reduction (i.e., removal of cobble cortex). Finally, the low percentage of biface thinning flakes could reflect the fact that bifacial tools were generally exhausted by the time they reached the island; that is, there simply were fewer bifaces left to rework than was the case at campsites closer to lithic source areas. The data from the central coast also suggest this kind of pattern, since those sites farthest from the source area have lower percentages of thinning flakes than sites at intermediate distances (Ricklis and Cox 1993).

Flake:Tool Ratio. In the combined lithic samples from the Block Excavation and Feature 9, the ratio of flakes to chipped stone tools is 29:1. In terms of the central coast model, this is similar to sites located away from the lithic source area, as can be expected at a barrier island location (see Figure 7.2).

Average Flake Length. As mentioned above, beyond 25 km or so from the lithic source area, the average flake length at central coast sites is consistently about 2 cm, and this may be a result of the use of cobbles of optimal size for transport and reduction, in the sense that complete cobbles could optimize the choices available to the flint knapper and, at the same time, larger cobbles would have been heavier and, in the aggregate, less efficient to move from one place to another. At Mitchell Ridge, the average flake length is markedly shorter, at 1.38 cm (see Figure 7.3). This can be inferred to reflect either (a) use of even smaller cobbles than may have generally been used on the central coast, or (b) more frequent reworking of previously worked cobbles and tools and a concomitantly less frequent use of whole cobbles. The latter possibility seems the more likely in light of the very low percentage of primary flakes and the rarity of cores at the site compared to the combined sample from the central coast (the ratio of all flakes to cores from the 1992 work at Mitchell Ridge is 1571:1; the ratio in the combined central coast samples is 165:1). Alternatively, the occupants of Mitchell Ridge may have been forced to extend the use of raw material by transporting and then further reducing flakes, in addition to finished tools.

Percent of Flakes Utilized. Once again, the data from Mitchell Ridge diverge from those for the central coast (Figure 7.4). Given its barrier island location, the site should expectably have a very high percentage of flakes with evidence of edge utilization. This is not the case; the combined percentage from the Block Excavation and Feature 9 is only 5.9% (as compared to percentages ranging from about 30% to over 60% at sites in the central coast area which are over 40 km from the lithic source; see Ricklis and Cox 1993, Fig. 5). The Mitchell Ridge figure is remarkably low, and approximates the percentages of flakes utilized at central coast sites which are at or very near the lithic source. One explanation for this is that daily activities at Mitchell Ridge simply involved little in the way of cutting or scraping tasks. Intuitively, this seems unlikely; hunting, fishing, and food processing tasks were clearly important, and all would have required the making and/or repair of appropriate gear. While this could account for some of the discrepancy, perhaps a more satisfactory explanation is that the majority of flakes available as potential expedient tools were simply too small/thin for effective utilization.

Average Length of Perdiz Arrowpoints. The data from Mitchell Ridge do conform to expectations in this case (Figure 7.5). The average length of whole Perdiz (including "Perdiz-like") arrowpoints is 2.0 cm, shorter than any of the averages for sites on the central coast, which range from just under 3.0 cm at the lithic source to 2.34 cm at the site farthest from the source (Site 41NU219 on Padre Island, 70 km from the source). A marked emphasis on resharpening and, perhaps in this case, manufacture of points from smaller-than-usual flakes, is suggested.

In sum, the combined lithic data from Mitchell Ridge, when placed against the central coast findings, suggest that the aboriginal occupants of the site were operating at the extreme limits of efficiency in terms of the organization of lithic technology. While at a general level the same kinds of responses can be inferred-- all involving some sort of extension of material or tool use-life-- at Mitchell Ridge the problems of material shortage seem to have been even more severe than at sampled sites on the central coast. This is reflected in (a) smaller average lengths of flakes and Perdiz arrowpoints, (b) a nearly complete absence of cores, (c) an extremely low percentage of primary flakes (suggesting virtual non-availability of unmodified raw material), (d) a low percentage of thinning flakes indicating little emphasis on biface refurbishing, perhaps because bifaces had already been exhausted before people reached the site (which is congruent with the generally low incidence of bifacial tools at the site), and (e) a surprisingly low incidence of utilized flakes, which is interpreted to reflect the generally very small size of the available flakes. The stress on the technological system must have been further compounded by the dearth of shell material suitable as surrogate material for tool production, assuming that oyster shell was not used far more frequently than can be discerned from the weathered shells characteristic of the site.

These inferences must all be tested by generation of comparable data from other sites in the upper coast region. However, on the working assumption that Mitchell Ridge is in fact one end member of the same sort of spatially determined decision-making process which has been identified on the central coast, it is predictable that sources of lithic raw material are even farther removed (by distance or some other constraining factor) than from sites in the latter area. If all of this is confirmed by additional lithic research in the region, it is noteworthy that it did not seem to ultimately inhibit intensive use of the island locale. Presumably, less than optimal efficiency in lithic technological organization was deemed tolerable by the site's occupants in view of what were probably abundant and readily procured estuarine food resources. The scheduling requirements of biotic resource procurement must have been given higher priority that optimal availability of lithic resources. This is in effect the ultimate implication of the central coast study, in which it was found that sequential shifts in Mode I, II, and III technological behavior operated independently of the subsistence and settlement pattern, which was geared to take advantage of the seasonal and spatial occurrence of important food resources (Ricklis and Cox 1993). Central coast lithic technology operated in an essentially satisficing mode, insofar as settlement pattern was structured in response to the requirements of food procurement rather than the availability of raw materials for tools. On the whole, the same appears to have been the case at Mitchell Ridge.

Aboriginal Ceramics at Mitchell Ridge: Toward an Understanding of Technology and Style

Counting the 24,476 potsherds from the 1970s and the 1992 excavations, plus an additional 2,107 potsherds surface-collected from across the site during 1992, we have a total sample of 26,583 sherds from the Mitchell Ridge Site. This constitutes the largest ceramic sample from a single site on the upper Texas coast, and is in fact over 60% larger than the combined pottery sample from various Galveston Bay area sites that was available to Aten for his seminal studies of regional ceramic typology (Aten 1983a). As such, the pottery from Mitchell Ridge represents an unusually good opportunity to examine upper coast ceramics from the perspectives of both technological and stylistic attributes, and to attempt to (a) systematically describe these attributes and (b) discern temporal and spatial variabilities which may in turn have implications for understanding diachronic and synchronic cultural patterns.

Ceramic analyses presented in the course of archaeological research on the upper Texas coast have generally relied on classification of pottery on the basis of a single technological attribute, namely, the kind of aplastic inclusions included in the potter's clay. The most fundamental typological distinctions developed by Aten (1979, 1983a; Aten and Bollich 1969) were made on the basis of the presence/absence of the two major aplastics, sand and grog (crushed sherd) temper, as well as the much less common crushed bone temper. Therefore, excepting certain minor types in the Early Ceramic Period (e.g. Tchefuncte types, O'Neal Plain, Mandeville Plain), the most basic typological distinctions are based primarily on three different kinds of temper. Sherds in which the sole aplastic consists of sand have been assigned to the Goose Creek typological series; those with grog temper have been designated Baytown Plain or San Jacinto Incised, depending, respectively, on whether they pertain to undecorated or decorated vessels. The relatively uncommon bone tempered sherds have not been assigned a formal typological designation, but have been lumped into a generic bone tempered category which is believed to pertain largely to the more recent part of the ceramic continuum (Aten 1983a).

As a consequence of the emphasis on the technological attribute of temper, stylistic attributes have been relegated to secondary status in the classification of upper coast pottery. Since virtually all vessels are of simple, functional bowl or jar forms, there appears to have been little if any stylistic expression in vessel shapes. Style in upper coast pottery thus must be identified on the basis of surface decoration, which usually takes the form of geometric patterns of incised lines, to which are sometimes added secondary decorative elements executed with small punctations (Suhm and Jelks 1962; Aten 1983a; Black 1989). Most ceramic taxonomy has first sorted sherds according to the technological attribute of temper, and then further subdivided samples according to the sole criteria of the presence or absence of these kinds of decorative elements. Thus, with the minor mentioned exceptions of certain early types, all sherds with sand as the sole aplastic are categorized first as Goose Creek, and subsequently designated as Goose Creek Plain or Goose Creek Incised on the basis of the presence/absence of decoration. In the case of grog tempered pottery, plain sherds are typed as Baytown Plain and decorated ones as San Jacinto Incised. Bone tempered ware has generally been lumped into as single more or less residual category, without formal typological recognition of the presence or absence of decoration.

The secondary status attributed to style in Aten's taxomony is highlighted by the fact that the same designs occur on the two major decorative types, Goose Creek Incised and San Jacinto Incised. In both types decoration consists of various combinations of horizontal, vertical or oblique incisions generally confined to a band just below the vessel rim (Aten 1983a). Further indication of the paucity of attention paid to style is the fact that sherds are classified as Goose Creek Incised or San Jacinto Incised solely on the basis of the presence or absence of incised decoration; no consideration has been to systematic analysis of patterned variability of decorations.

In part, the inattention to stylistic variability is probably due to small samples of decorated sherds at many sites. As a general rule, only a minority of vessels produced by upper coast potters were decorated so that, in small samples, there are few sherds available with which to explore patterned variation in decoration. Also, it must be kept in mind that Aten's primary goal in his ceramic analyses was to construct a regional chronology of ceramic change, and he postulated early-on that long-term changes in clay tempering were chronologically significant (Aten and Bollich 1969). Since the technological attribute of the kind of temper is discernable even in the smallest sherds (whereas fairly good-sized sherds are usually needed to confidently distinguish between different decorative themes), the use of this attribute for basic classification made good sense, since it permitted the use of samples from sites which would doubtless have proven too small had decorative style been of primary concern (see, for example, discussion in Aten and Bollich 1969). Having established a ceramic typology which was apparently useful for assigning site components to a chronological continuum, Aten's taxomony has been followed more or less faithfully by various researchers working more recently in the region, both as a means of placing sherds into typological groups and for assigning site components to temporal positions within the chronological continuum (e.g. Mercado-Allinger et al. 1984; Weinstein et al. 1988; Weinstein et al. 1989; Howard 1990; Weinstein 1991; Nash and Rogers 1992).

Some noteworthy work has been accomplished which examines variability in upper coast pottery beyond kinds of temper and the mere presence/absence of decoration. Howard (1990), working with a fairly large sample of 6,868 sherds and 68 vessel sections from the Peggy Lake area near the mouth of the San Jacinto River, examined ceramic variability in terms of discrete attributes. Vessel sections were examined in terms of attributes of orifice diameter, rim orientation (everted, inverted, vertical), lip form (rounded, flattened, pointed), decoration, temper, thickness, surface finish, base form, estimated volume of the vessel, and evidence of use. Sherds were also examined to determine the kinds of paste constituents. Study of the vessel sections showed that most pots were higher than the diameter of their orifice, indicating vase or jar forms; a minority were shallower bowl forms, though the height:orifice ratio could be determined in only seven cases. Surfaces were either smoothed or burnished. On the basis of the attributes of rim orientation, orifice diameter and mean body thickness, Howard suggested two end-member forms for the Peggy Lake pots: One group consisted of small-mouthed, inverted-rim, decorated, thin-walled vessels, while the other group was made up of large-mouthed, everted-rim, undecorated thick-walled vessels. However, the majority (76%) did not fall into either group, indicating a continuum between the two end-member forms rather than two clearly distinguishable shapes. Twenty-one of the vessel sections were decorated, usually with parallel horizontal incised lines in a band below the lip; the remaining 39 vessel sections were plain, although 11 of these did bear lip modification as notching or scalloping (Howard 1990:248). Interestingly, Howard found no evidence of functional differences between sandy paste and grog tempered vessels (Howard 1990:261).

In a study of 726 sherds from Site 41HR616, also on the San Jacinto River near its mouth, Linda W. Ellis recently attempted to discern variability in what she termed "technological style" (Ellis 1992). Ellis cogently observes that ceramic classification on the upper Texas coast has been designed almost exclusively to serve as a tool for chronology building, and argues that only "those ceramic variable that were deemed chronologically sensitive were considered important", with the result that "ceramic analysis in the Upper Texas Coast area has been severely limited and its full research potential has not yet been realized" (Ellis 1992:15). In an effort to identify the kinds of culturally-informed decision-making with which aboriginal potters of the area operated, Ellis examines variability in paste characteristics, vessel form and attributes of firing; most of her analysis centers around an attempt to identify cultural and individual preferences in paste characteristics. She concludes that certain clay bodies seem to predominate in the sample, and attributes this to cultural selection for certain kinds of clays. However, Ellis' attribution of cultural preference to selection of clay bodies is inherently limited by a lack of consideration of the role of natural geologic variables in determining paste characteristics. For example, a preponderance of certain sand grain sizes in sandy paste pottery cannot be evaluated as a cultural preference unless it is first determined whether or not it merely represents the kind of clays naturally available at or near a given occupation site. The Beaumont Formation, which constitutes the surface geology of the upper coast mainland is, in fact, made up of innumerable lenses of sandy clays and clayey sands (Fisher et al. 1976), resulting in complex localized stratigraphies that represent countless fluvial-deltaic depositional events over many millennia. This author's field examination of numerous exposed profiles of Beaumont sediments indicate that within relatively short horizontal distances, sediments can range from predominantly sand to almost pure clay, and that there is considerable variation in the size of sand grains as well, variations which reflect episodically variable energy levels of river/floodwater sediment transport. Without knowing the precise geologic stratigraphy around a site or the extent/depth of sediment exposures at the time(s) of occupation, it is a daunting task indeed to determine whether a ceramic sample represents preferential human (cultural) selection or simply expedient utilization of suitable available clays. Despite such problems, Ellis' discussion of the limitations of ceramic analysis designed purely for chronology building are insightful, and highlight the need for exploration of culturally meaningful stylistic elements of the regional pottery-making tradition.

A recent attempt to systematically describe design motifs on upper coast pottery has been presented by W. Marshall Black (1989). In order to overcome the commonly encountered problem of too few decorated sherds in a given site sample, Black collected data on a total of 241 decorated sherds from the Dow Cleaver Site (41BO35) on the lower Brazos River, sites reported by Wheat (1953) in the Addicks Reservoir just west of Houston, the Alabason Road Site, 41HR273 near Houston, and Galveston Bay area sites reported by Aten (1983a). He identified the following nine "design families", each consisting of an incised (or infrequently punctated) decorative motif which recurred in his sherd sample: (1) horizontal only, (2) horizontal plus one diagonal, (3) horizontal plus opposing diagonals, (4) horizontal plus vertical, (5) horizontal plus opposing diagonal plus vertical, (6) opposing diagonal, (7) curves, (8) vertical only, and finally, a residual category, (9) miscellaneous. The most common "families" in order of decreasing abundance, were horizontal lines only, horizontal plus one diagonal, horizontal plus opposing diagonals, and horizontal plus vertical. Black's work is useful because it presents in a single place a relatively large selection of decorated sherds (abundantly illustrated with line drawings), and because it highlights the abundance of exterior, sub-lip bands of parallel horizontal lines and shows the variability in other decorative elements which can occur in combination with the common theme of the horizontal lines. The study is also of interest because it shows that the same design families occur on both Goose Creek Incised and San Jacinto Incised pots, suggesting that decorative style was independent of the technological attribute of tempering.

Black's scheme is not followed in the analysis of the Mitchell Ridge pottery because his design families include combinations of decorative elements which may or may not be of primary significance in creating the basic motifs. For example, the commonly occurring "horizontal plus vertical" family includes both vertical-horizontal cross-hatching and decorations which are primarily horizontal incised lines with only a minor border of short vertical incisions. Similarly, the "horizontal plus opposing diagonals" family includes horizontal bands which are crosscut at intervals by diagonal lines and horizontal lines which are underlain by a border element consisting of contiguous incised triangles. In short, primary, highly visual elements are not systematically distinguished from minor or secondary ones, a distinction which analysis of the Mitchell Ridge collection suggests is both analytically feasible and probably reflective to some degree of the stylistic decisions made by aboriginal potters.

Analysis of the Mitchell Ridge Pottery

Goals

Our analysis of the Mitchell Ridge ceramic sample was designed to achieve the following goals:

1. To determine, when possible, the size and shape of vessels, with the goal of identifying possible correlations between the technological attribute of temper and the stylistic attributes of presence/absence of decoration and kind of decorative motif employed.

2. To systematically define the kinds of decorations placed on pots in order to better understand the ways in which aboriginal potters combined various decorative elements to achieve patterned results in decorative style.

The latter component of our analysis receives the greatest attention, for several reasons. First, we concur with Ellis (1992) that too much attention has been directed toward study of upper coast ceramics as a chronological tool, at the expense of understanding potentially more culturally significant stylistic variation. Indeed, the continued emphasis on ceramics as a seriation tool for chronological control becomes largely irrelevant in light of the ready availability of direct, radiometric dating techniques for placing site components within a temporal continuum. The seriation approach had its origins-- and its heyday-- prior to the discovery of radiometric techniques, when chronology builders could rely only on stratigraphically controlled models of relative change in material culture (e.g. Willey and Sabloff 1980).

This is not to say that chronology of material culture is unimportant; clearly it is, since it constitutes a key measure of rates and kinds of culture change and thus ultimately contributes to the understanding of culture process. However, it need not, and arguably should not, constitute the primary approach to defining chronology in the context of modern archaeological research. The construction of independent, radiometric (or "absolute") chronologies, into which synchronic artifact assemblages can then be placed, ultimately provides more accurate and therefore more reliable measures of culture change.

Stylistic analysis of the Mitchell Ridge ceramics is emphasized because stylistic expressions often reflect important social dimensions of past cultures to which archaeological research can gain some access. Although style in archaeological material culture should not be automatically assumed to directly represent prehistoric social realities (e.g. Hodder 1982; Butzer 1990), it is generally recognized that geographically and temporally defined spheres of stylistic redundancy-- particular in ceramics-- reflect some level of past sociocultural reality (e.g. Shepard 1956; Wobst 1977; Graves 1982; Pollock 1983; Rice 1987). In the Texas area, for example, while Caddoan ceramic styles might be mimicked by non-Caddo peoples, or show up on non-Caddo sites as items of trade, it cannot be seriously questioned that, on the whole, there is a readily recognizable ceramic tradition that has a discrete geographic home in northeast Texas and adjacent states, and which represents people who were linguistically, culturally and ethnically Caddoan. In short, ceramic styles represent, at least potentially, prehistoric sociocultural realities, and geographic variability in stylistic expression may reflect degrees of social similarity or difference.

The present analysis does not yield a definition of the sociocultural membership of the people who lived at Mitchell Ridge, nor does it provide a measure of their social relationship with any other such membership grouping in the region. To even begin such an inquiry would require detailed stylistic data from a series of approximately contemporaneous site components located across geographic space; such information is presently unavailable, though it might be possible to begin to generate this sort of data with extant collections (an effort well beyond the scope of this report). However, the analysis of ceramic decoration at Mitchell Ridge can serve as a first approximation of the patterned variability in upper coast ceramics, a task which is justified by the large size of the collection, and which hopefully can contribute to the eventual development of a detailed regional data base for examining stylistic variability.

Approaches

The primary unit of analysis here is the vessel rather than the potsherd. An initial examination of larger sherds, and groups of sherds from the same vessel, indicated that the same decoration was generally applied around the entire circumference of a pot, so that a single sherd or a group of sherds from that pot can be assumed, with considerable confidence, to represent the kind of decoration placed on the entire vessel. The vessel as the unit of analysis is in any case preferable to individual potsherds, since the representation of a particular design can be potentially biased according to how many sherds of the vessel are present in the total sample.

The first step in analysis was, therefore, to segregate sherds into groups according to the vessels to which they pertain. This was done on the basis of macroscopic attributes of color, surface finish, decoration and thickness and, most definitively, on the basis of 20X microscopic examination of fresh edge breaks to determine the quantity, size and shape of sand grains and other aplastic inclusions. While it is probably impossible to completely avoid error in assigning sherds to vessel groups, it is believed that the combined macro- and microscopic observations have yielded essentially reliable counts of the whole vessels represented.

Given the facts that over 26,000 sherds are in the combined collections, and that detailed examination of all sherds would be extremely time-consuming-- and ultimately unnecessary-- only rimsherds were used. This procedure had the additional advantage of permitting observation of attributes which are not present on bodysherds (lip form, rim profile) and thus of considerably increasing confidence in the grouping of sherds according to vessels.

After rimsherds were sorted into vessel groups, the following attributes were recorded for each group:

Technological attributes:

- Thickness
- Coil breaks (presence/absence)
- Firing (oxidation vs. reduction)

exterior
interior
sherd core
Aplastic inclusions
sand
grog
bone
shell
Formal Attributes
Vessel diameter (estimated from sherd curvatures)
Rim profile
straight
inverted
everted
Surface Treatment
Smoothed
Burnished
Scored (with ribbed bivalve shell)
Brushed
Asphaltum coated
Decoration (according to criteria discussed below)

Dimensions of Technology and Form on the Mitchell Ridge Pottery

Examination of the various attributes of the ceramics from the Mitchell Ridge site reveal basic features of the vessel assemblage. These fall into the two broad categories of technology and style. Examination of the basic data for possible correlations between technological and stylistic attributes also permits assessment as to whether in some case technology may have been geared toward achieving certain stylistic ends, and thus, in effect, have been an element of style.

Firing

The majority of vessels at Mitchell Ridge were fired in an oxidizing atmosphere, as indicted by sherd colors of various reddish, orange and light tan hues. While there is some variability in the three excavation areas for which samples were analyzed-- the Block Excavation, Feature 9 and the C. C. Area-- in all areas most vessel exterior surfaces were oxidized, as were approximately half or more of vessel interior surfaces. The inner cores of most vessels, on the other hand, were reduced to various shades of gray, indicating that firings were in most cases too short in duration for oxidation to penetrate the entire thickness of the vessel wall.

Experimental pit firings, using dried sticks, were conducted on small bowls made of local lagoonal clay which matched many of the sherds from the site in terms of quantity and grain size of inclusive sand, and it was found that a rapid firing produced a firing profile similar to that on most of the archaeological specimens; after a 20-minute firing interior and exterior surfaces were oxidized to a red-orange color, while the core was reduced to a dark gray. A bowl made from the same clay was subjected to a firing under similar conditions but lasting 60 minutes. In this case, oxidation completely penetrated the vessel wall so that the entire thickness was fired to the orange-red color. Interestingly, it was noted that the longer firing did not appear to increase the hardness of the fired clay. Therefore, assuming that aboriginal potters at Mitchell Ridge used the same or similar clays, no advantage would have been achieved from prolonged firings. Apparently, vessels were generally fired rapidly, and this probably produced the optimal results which could be expected within the limits of aboriginal firing capabilities and the kind of clay available.

Surface Finish

Four kinds of surface finish were noted on the vessels in the analyzed samples from the Block

Excavation, Feature 9 and the C. C. Area. The majority of vessels in all areas were entirely smoothed on both the interior and exterior surfaces; in the combined sample from all areas, 82% of the vessels were smoothed. A minority of the pots from all three areas bore scoring on the interior and/or exterior surface, a treatment found on 16.7% of the pots in the combined sample. The scoring consists of shallow, parallel striations which appear to have been executed on the still-wet clay with the edge of a ribbed bivalve shell such as bay scallop or Atlantic cockle (see Figure 7.20, c, e). This scoring is identical to that often found on the Late Prehistoric Rockport ware ceramics of the central Texas coast, also believed to represent the used of ribbed bivalve shells (Calhoun 1961). The remaining vessels, making up less than 2% of the combined samples, bear burnished or brushed surfaces.

Vessel Shapes

The ideal approach to determining the variation in vessel shape is examination of a relatively large sample of whole vessels or large sections of vessels. This is not possible at Mitchell Ridge, since no whole vessels were recovered and few pots were represented by enough sherds for reconstruction of sizeable sections. However, there are enough fairly large sherds, and a few reassembled sections, with which to gain some insight into vessel shapes. Examination of these pieces indicates that virtually all pots were made as some variant on the basis themes of simple bowls and jars. The range of shapes indicated is shown in Figure 7.6. While the sample is too small for anything approaching a precise determination of the relative frequencies of the different shapes, it is impressionistically apparent that most pots had either more or less vertical walls with straight rims (see examples illustrated as Figure 7.7 and 7.8), or had slightly constricted necks with slightly to moderately everted rims. Neckless vessels in which the walls constrict at the rim (with inverted rims) are few, as are vessels which had strongly everted or flaring rims. Sherds indicate that, with only one exception, bases of pots were rounded; the exception is a single sherd of a flattened basal section. Occasionally the bases had slight exterior nodes (see Figure 7.19a).

These observations are basically supported by raw data on rimsherd attributes presented in Table 7.4, and expressed as percentages in Table 7.5. It will be seen that in the rimsherd samples examined from the 1992 (Block area and Feature 9) and 1970s (C. C. Area) excavations, straight (vertical) rim profiles are by far the most common. This is the case for 55% of the pots represented in the Block Excavation, 76% represented in Feature 9, and 82% from the C. C. Area. For all areas combined, for which 361 vessels are represented by rimsherds large enough to determine rim profile, 66% of the pots had straight rims. Everted rims comprise the next most abundant category, representing 38% of the vessels from the Block Area, 24% from Feature 9, and 16% from the C. C. Area. Inverted rims are consistently few, representing 7%, 0%, and 2% of the vessels from, respectively, the Block Excavation, Feature 9, and the C. C. Area. For all areas combined, only 4% of the vessels had inverted rims.

It is significant to note that, as may also be seen in Table 7.4, there is no marked correlation between rim profile and the aplastic content of the vessel clay body. In the two excavation areas for which relatively large numbers of pots are represented (Block excavation, C. C. Area), the two major temper groups (sandy paste, grog) show roughly the same proportions of the three rim profiles. For the vessels from the Block Excavation, 41% of the grog tempered pots had everted rims, 53% had straight rims and 5% had inverted rims. Similarly, 37% of the sandy paste pots had everted rims, 58% had straight rims, and 4% had inverted rims (see Table 7.5). Among the vessels from the C. C. Area, 10% of the grog tempered vessels bore everted rims, 88% had straight rims, and 2 % had inverted rims. The breakdown for sandy paste vessels is 19% everted rims, 79% straight, and 2% inverted. The vessels represented from Feature 9 show what may be significant differences; 33% of the grog tempered pots had everted rims as opposed to only 17% of the sandy paste vessels. However, the sample from Feature 9 is relatively small (38 vessels), and may thus be biased accordingly. In all areas, the sample of bone tempered vessels is too small for reliable assessment of correlations between form and temper.

Another attribute of vessel form is lip treatment. Vessel lips, in cross-section, were either rounded, pointed or flat (see various rimsherd profiles shown in Figures 7.14 - 7.23). Rounded lips predominated in all excavation areas (see Table 7.6), comprising 49% in the Block Excavation, 61% in Feature 9 and 63% in the C. C. Area. The balance of the vessels had either flat or pointed lips, the percentages of which are virtually the same in the combined samples from all three areas (pointed, 22%; flat, 24%). The proportions of flat and pointed lips do vary somewhat between the samples from different areas, comprising roughly equal numbers in the Block Excavation (22% and 29%, respectively), but with flat lips about twice as

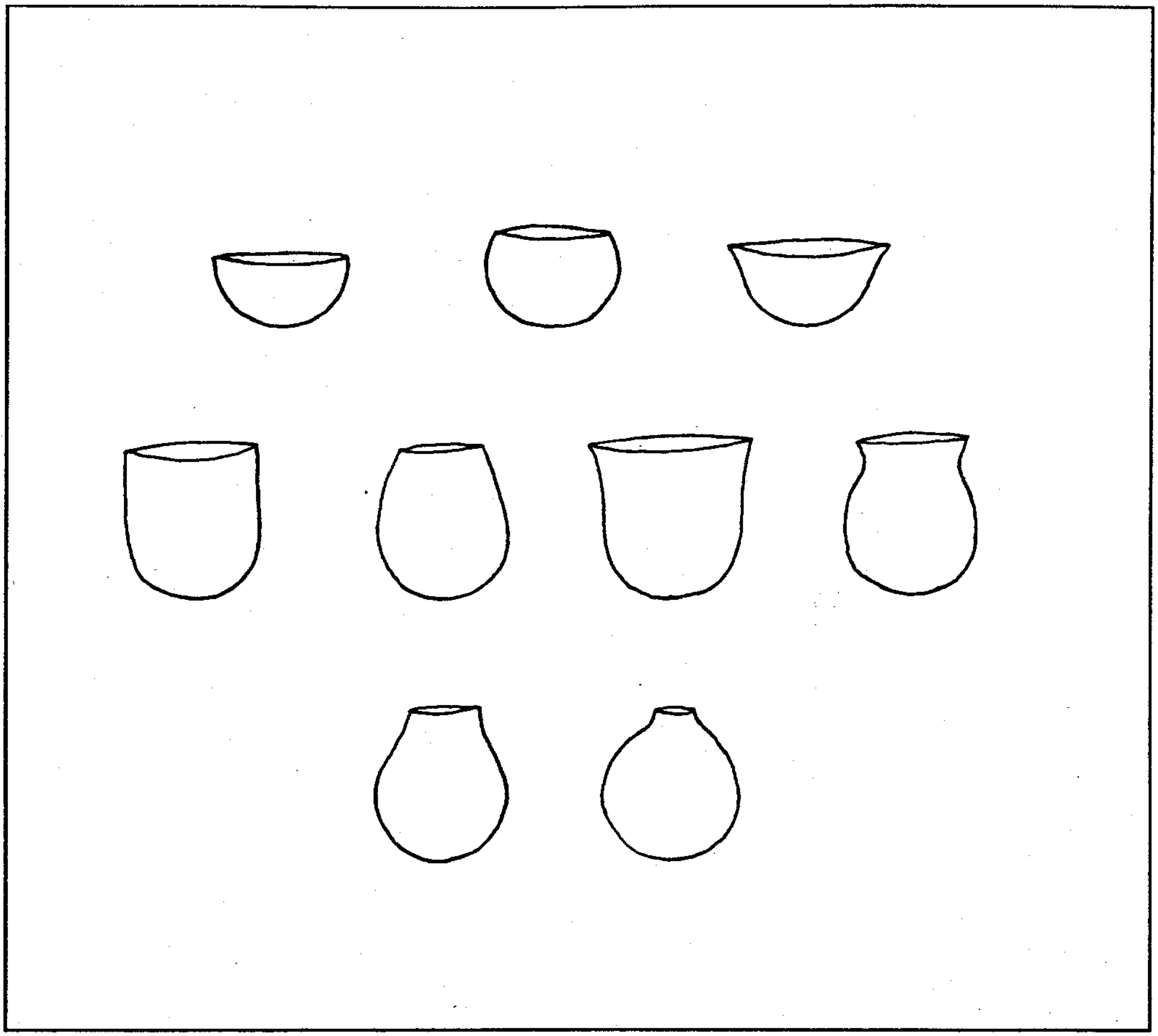


Figure 7.6. Vessel shapes indicated by examination of larger sherds and vessel sections from Mitchell Ridge.

abundant as pointed in Feature 9 and the C. C. Area.

Vessel Size

The size of ceramic vessels very generally tends to correlate with vessel function (e.g Shepard 1956; Rice 1987). For example, very large pots may have been used for storage, whereas small vessels may have functioned as individual serving dishes. Cooking vessels may tend to be large, since meals are likely to be prepared for several or more individuals and larger vessels are more efficient for this purpose.

Rimsherds from the 1992 Block Excavation were examined to determine whether the represented vessels showed significant variations in size, from which functional variability could be inferred. The same dearth of vessel sections which precludes an accurate determination of overall pot shapes also prevents precise calculation of the volume of vessels. An approximate indicator of vessel size, however, is orifice

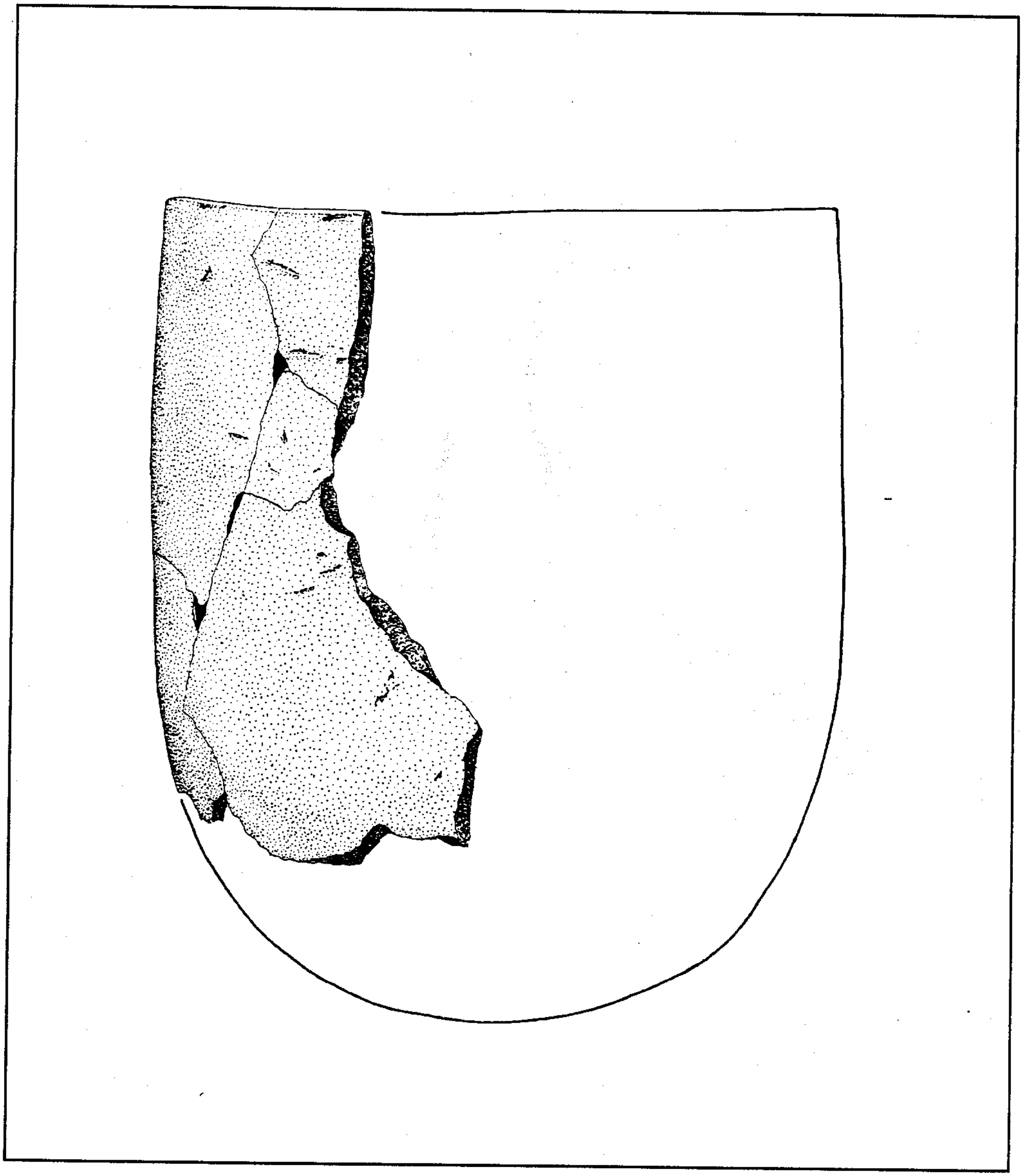


Figure 7.7. Section of Goose Creek Plain straight-sided jar from Block Excavation, with shape of vessel indicated, based on sherd curvatures. Shown actual size.

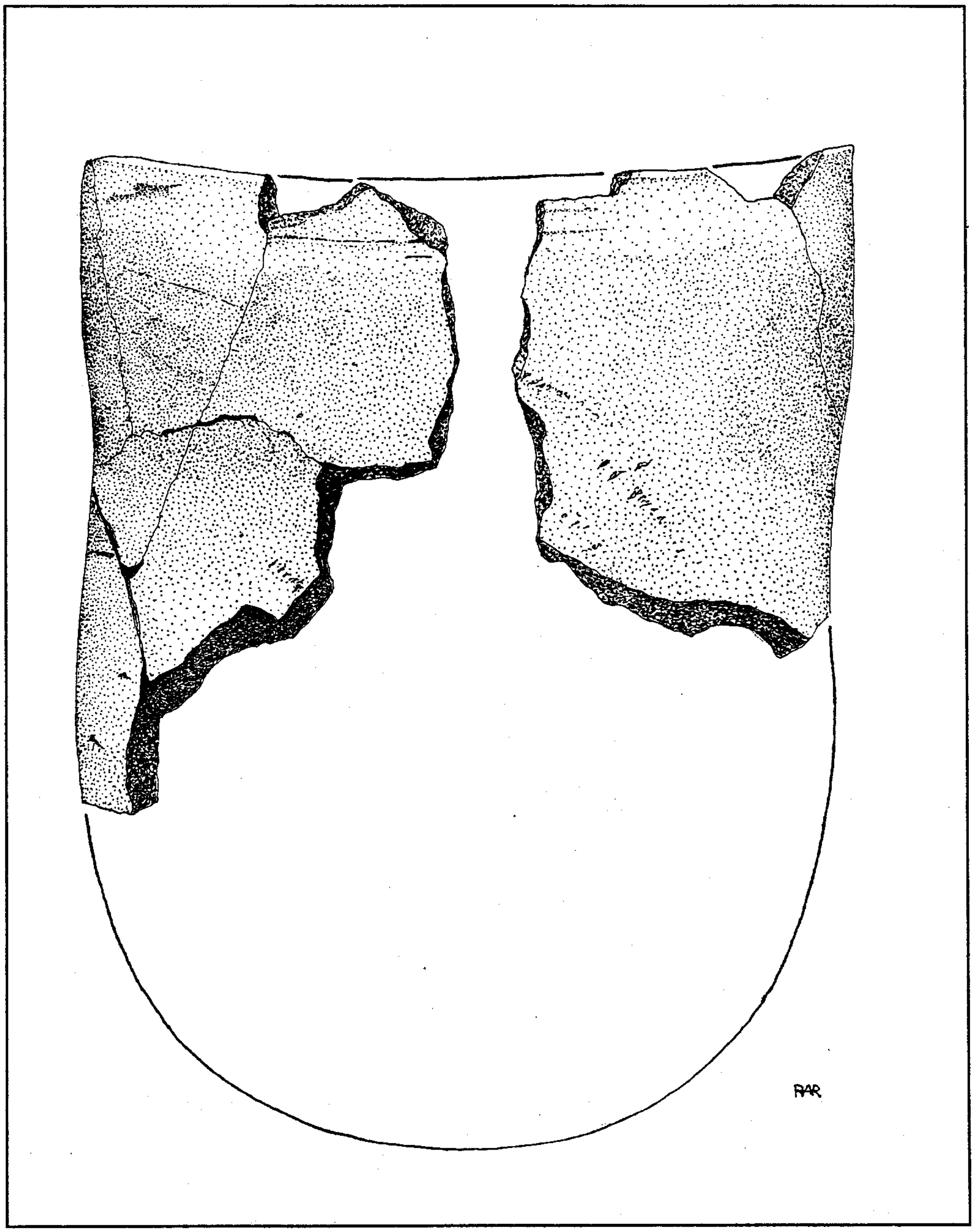


Figure 7.8. Goose Creek jar, partially reconstructed from sherds in shell and sherd-lined hearth, Feature 110-A, Block Excavation.

Table 7.4. Numerical data for assessing correlations between vessel decoration (presence/absence only), temper and form, three excavation areas (R=rounded; P=pointed; F=flattened; EV- everted, SRT= straight; INV=inverted). All numbers represent vessel counts; Lower totals for rim profiles reflect indeterminate status due to small sherd size.

		LIP FORM				RIM PROFILE			
		R	P	F	Total	EV.	SRT.	INV.	Total
BLOCK									
Grog	undec.	35	12	11	58	21	32	4	57
	dec.	4	5	5	14	10	8	0	18
S. paste	undec.	63	35	25	123	33	61	5	99
	dec.	1	7	7	15	10	6	0	16
Bone	undec.	4	4	1	9	2	2	5	9
	dec.	1	0	1	2	1	1	0	2
TOTALS	undec.	102	51	37	190	56	95	14	165
	dec.	6	12	13	31	21	15	0	36
FEA. 9									
Grog	undec.	3	3	5	11	3	8	0	11
	dec.	1	0	0	1	1	0	0	1
S. Paste	undec.	15	0	5	20	4	16	0	20
	dec.	1	2	0	3	0	3	0	3
Bone	undec.	3	0	0	3	1	2	0	3
	dec.	0	0	0	0	0	0	0	0
TOTALS	undec.	21	3	10	34	8	26	0	34
	dec.	2	2	0	4	1	3	0	4
C.C. AREA									
Grog	undec.	17	5	12	34	2	32	0	34
	dec.	13	2	3	18	3	12	1	16
S. paste	undec.	34	5	10	49	8	37	1	46
	dec .	9	1	6	16	5	16	0	21
Bone	undec.	4	1	0	5	1	4	0	5
	ded.	0	0	0	0	0	0	0	0
TOTALS	undec.	55	11	22	88	11	73	1	85
	dec.	22	3	9	34	8	28	1	37
GRAND TOTALS	undec.	178	65	69	312	75	194	15	284
	dec.	30	17	22	69	30	46	1	77

Table 7.5. Percentages of attributes of rim profile (everted, straight, inverted) broken down according to vessel temper, presence/absence of vessel decoration, and for all vessels.

	TEMPER GROUPS			DECORATED VS. UNDECORATED		ALL VESSELS
	GROG	S. PASTE	BONE	DEC.	UNDEC.	
BLOCK						
Everted	41%	37%	27%	58%	43%	38%
Straight	53	58	27	42	57	55
Inverted	5	4	46	0	8	7
FEA. 9						
Everted	33%	17%	33%	25%	24%	24%
Straight	66	83	66	75	76	76
Inverted	0	0	0	0	0	0
C. C. AREA						
Everted	10%	19%	20%	21%	13%	16%
Straight	88	79	80	76	86	82
Inverted	2	2	0	3	1	2
ALL AREAS COMBINED						
Everted	29%	29%	26%	39%	26%	29%
Straight	67	68	47	60	68	66
Inverted	4	3	26	1	5	4

Table 7.6. Percentages of attributes of lip form (rounded, pointed, flat) broken down by vessel temper, presence/absence of vessel decoration, and for all vessels.

	TEMPER GROUPS			DECORATED VS. UNDECORATED		ALL VESSELS
	GROG	S. PASTE	BONE	DEC.	UNDEC.	
BLOCK						
Rounded	54%	46%	45%	19%	54%	49%
Pointed	24	30	36	39	27	29
Flat	22	23	18	42	19	22
FEA. 9						
Rounded	33%	70%	100%	50%	62%	61%
Pointed	25	9	0	50	9	13
Flat	42	21	0	0	29	26
C. C. AREA						
Rounded	58%	66%	80%	64%	62%	63%
Pointed	13	9	20	9	13	11
Flat	29	25	0	27	25	26
ALL AREAS COMBINED						
Rounded	53%	54%	63%	43%	57%	54%
Pointed	20	22	26	25	21	22
Flat	26	24	11	32	22	24

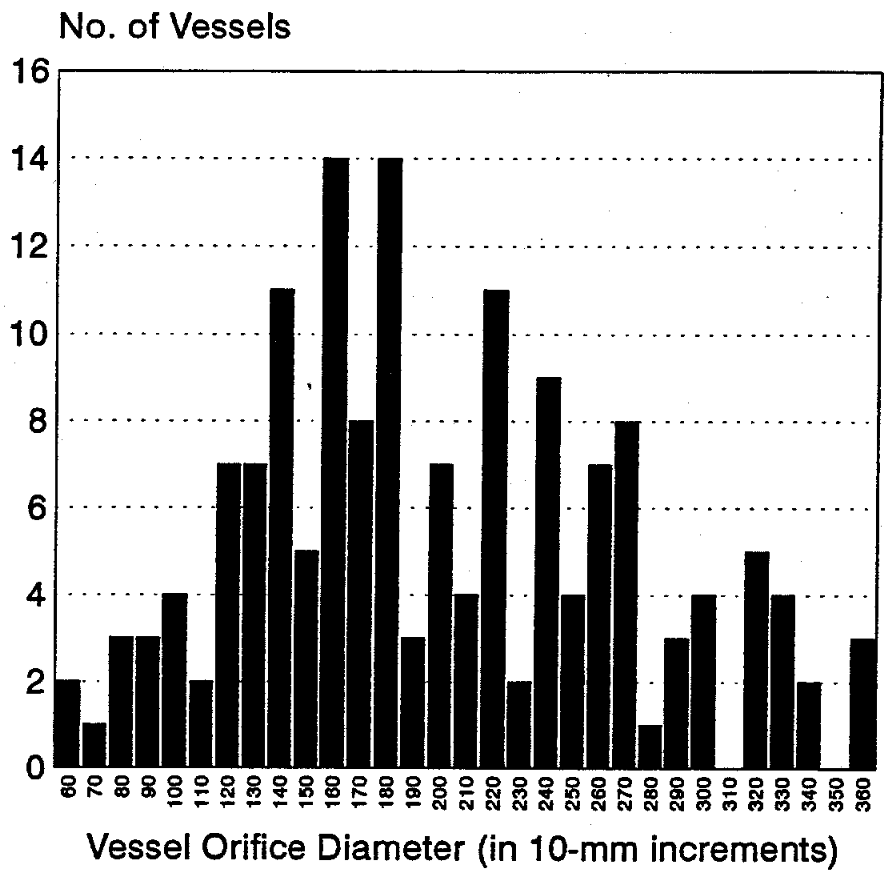


Figure 7.9. Bar graph showing numbers of vessels in 10-cm increment orifice diameter groupings (diameters are estimated from rimsherd curvatures and grouped according to nearest 10-cm).

diameter, a figure which can be readily extrapolated for a given pot from the representative rimsherds (except in the case of rimsherds which are too small for reliable estimation/determination of curvature).

A total of 158 vessels are represented from the Block Excavation by rimsherds sufficiently large for determination of orifice diameter. The largest rimsherd for each vessel was placed against a chart made up of concentric circles drawn in 10-mm increments, and the vessel assigned to a corresponding class of orifice diameter. The vessel was then placed in the appropriate orifice diameter class; the results are presented graphically in Figure 7.9. It is apparent that most pots in the sample had orifices ranging between 120 and 270 mm. This is taken to indicate that the majority of pots were not very large, since, as noted above, inverted rim vessels-- on which small orifices could pertain to relatively large pots-- constitute only a very small percentage of the total number.

The distributions of vessels according to orifice diameter shows an essentially unimodal pattern, a fact which is highlighted in Figure 7.10, where diameters are indicated in increments of 30 mm (thus "smoothing" the distributional curve). It may be concluded on the basis of these data that, if the ceramic vessels in the sample were intended for different functions (e.g. cooking as opposed to serving or storage vessels), this is not reflected in discernable clusterings of vessels by size.

Aplastic Inclusions

Another attribute of ceramic technology which may correlate with vessel function is the kind of aplastic in the clay body. Vessels used for cooking can be expected to be subjected to thermal shock from

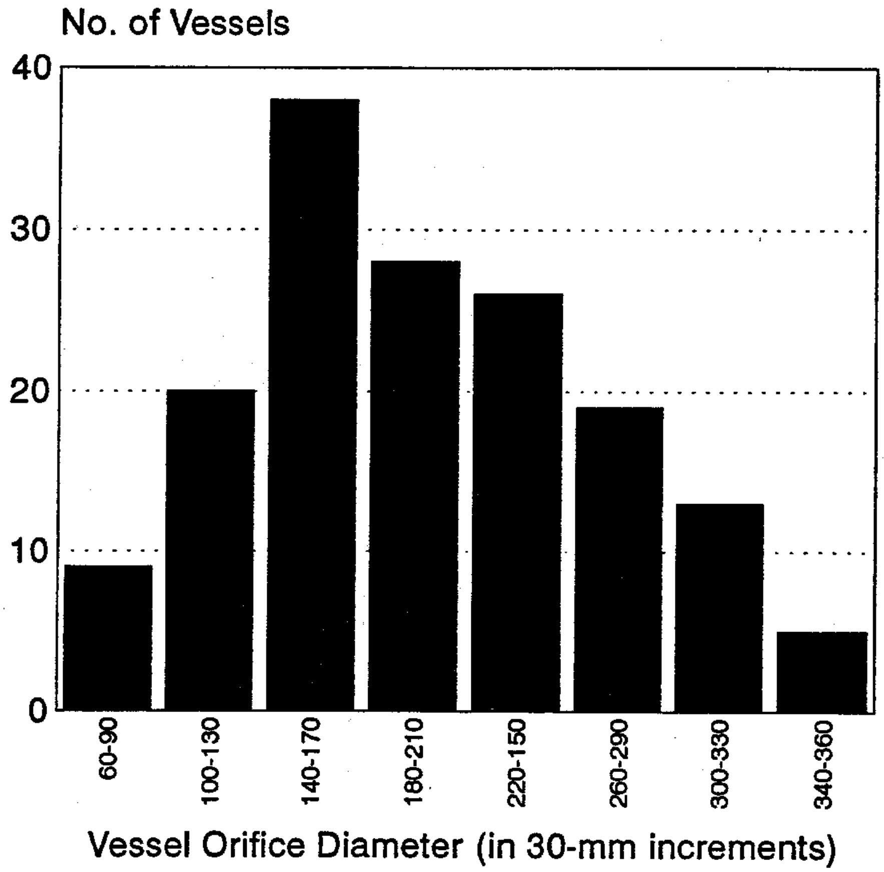


Figure 7.10. Bar graph showing numbers of vessels in 30-cm increment orifice diameter groupings (derived from combining data presented for 10-cm diameter increments in Figure 7.9).

repeated heating and cooling, and the kind of temper added to the clay can increase resistance to such shock, preventing development of cracks, and thus prolonging the use-life of the pot (Rice 1987).

There can be no doubt that sherds containing grog and crushed bone represent vessels made from intentionally tempered clay. The presence of sand in the clay body is, on the other hand, somewhat problematic. The use of sand as an added tempering agent is well-documented ethnographically (e.g. Rice 1987), so the sand in all but a few of the sherds from Mitchell Ridge could, conceivably, represent intentional temper. However, since the clays along the Texas coast invariably contain varying proportions of sand, it is likely that much, if not virtually all, of the sand in the sherds occurred naturally. The difficulty of distinguishing natural, sandy paste clay from clay with added sand temper has been pointed out by various researchers (Aten 1971; Dillehay 1975:110-111; Howard 1990). In fact, microscopically examined fresh edge breaks on Mitchell Ridge potsherds showed sand in quantities and grain sizes indistinguishable from clays of the Beaumont Formation or locally available lagoonal clay. As a general rule, the sandy paste clays with which pots were made were most likely used essentially as they were extracted from the ground.

Assuming this to be the case, the question arises as to why true tempering agents were artificially introduced into the clay body of over 40% of the vessels represented by sherds from the site (35.6% of the vessels listed in Table 7.4 were grog tempered; 4.9% were bone tempered). Since tempering usually has little or no visibility in a finished pot, and thus contributes little or nothing of stylistic value, and since its addition to the clay involves considerable additional time and effort in preparation, it is reasonable to infer that prehistoric potters went to the trouble of adding grog because it proffered a functional advantage to

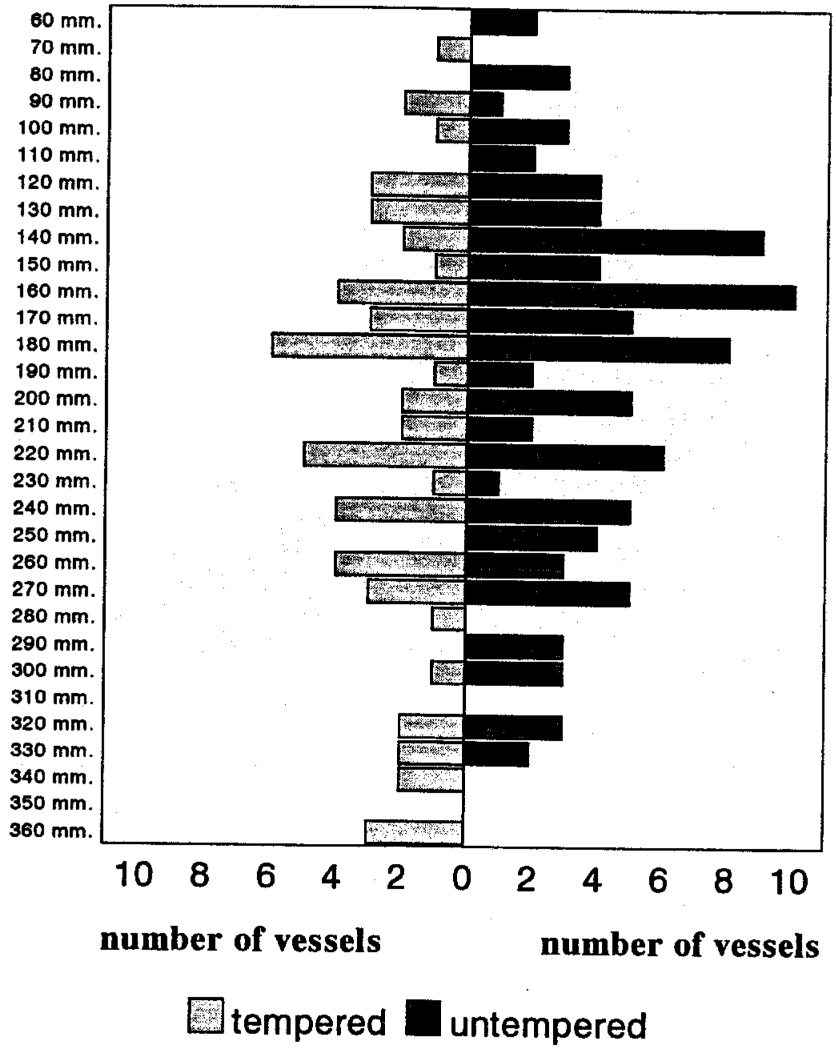
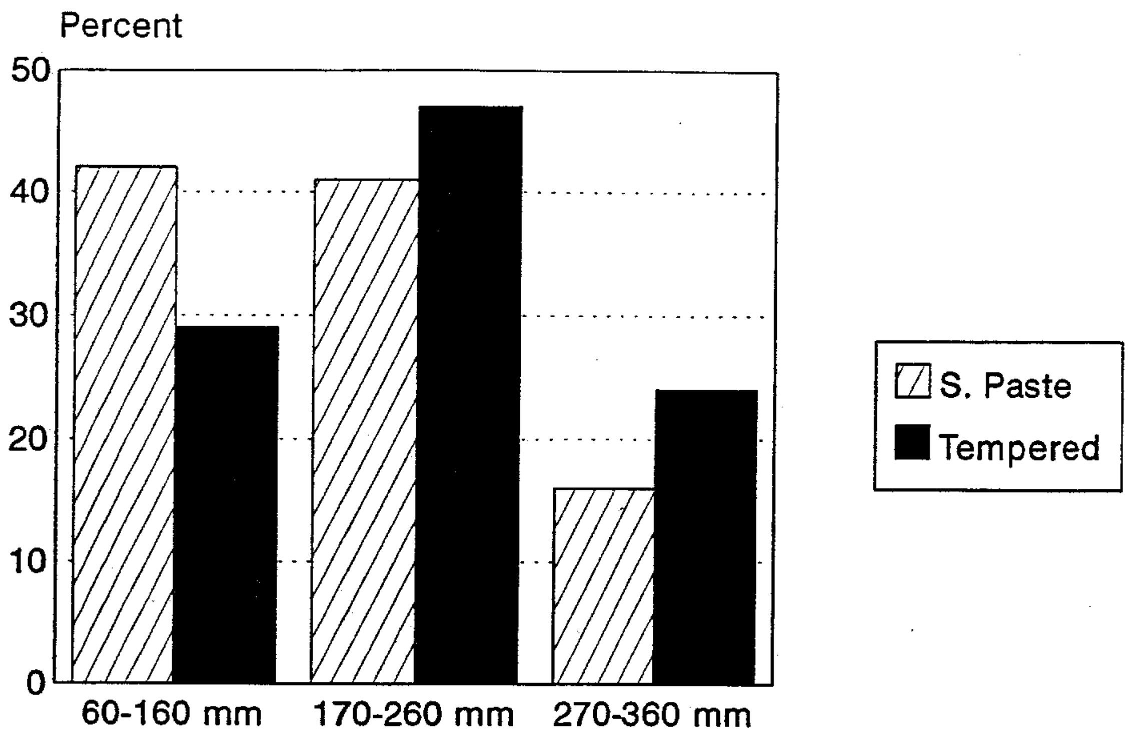


Figure 7.11. Bar graph showing numbers of tempered (grog, bone) vs. untempered (sandy paste) vessels by 10-cm-increment measures of estimated vessel orifice diameter.

the vessel. Although the technical merits of bone tempering have not been explored in detail, it is well established that grog reduces pre-firing cracking of drying vessels, and mitigates the effects of thermal stress (Shepard 1955; Rice 1987). Sand, on the other hand, has a coefficient of expansion and contraction considerably higher than that of clay (Rice 1987:230), and thus is not an ideal tempering material for pots that are to be repeatedly exposed to heat. As Rice (1987:229) notes, "The optimal solution in the manufacture of vessels intended for use with heat would be to have inclusions (temper) with coefficients similar to or less than that of the clay".

Given these facts, it was hypothesized at the beginning of analysis that the Mitchell Ridge tempered (with grog, bone) vessels were designed as cooking vessels. It was further assumed that if this were the case, the tempered pots should, on the average, be larger than untempered vessels, since the latter group would have been better suited to non-cooking uses such as serving dishes. While it is recognized that storage vessels need not have optimal resistance to thermal shock, and that untempered pots could thus be relatively large, it is also true that, ethnographically, storage vessels tend to have



	60-160 mm	170-260 mm	270-360 mm
S. Paste	42	41	16
Tempered	29	47	24

Figure 7.12. Bar graph showing percentages of tempered vs. untempered vessels in each of three orifice diameter groupings.

constricted orifices (Shepard 1956), which most of the vessels at Mitchell Ridge do not, judging by the low numbers of inverted rims and the relatively high percentages of vertical rims. Considering these factors, if tempered vessels were intended for use as cooking pots, then they should, hypothetically, show a marked tendency toward larger orifices than do the untempered vessels.

The numbers of tempered vs. untempered pots in the 10-mm increment vessel orifice size groupings are shown graphically in Figure 7.11. Although there is considerable overlap, the tempered vessels do in fact tend to fall into larger-diameter groupings than the untempered pots; the groupings with the largest numbers of untempered vessels range from 130 to 220 mm, whereas those with the largest numbers of untempered vessels range from 150 to 260 mm. Also, the very largest vessels in the sample are tempered, though this alone is hardly an impressive fact considering the small number of pots in the greater-than-300 mm groupings.

These same data are expressed in Figure 7.12 as percentages of tempered and untempered pots which fall into three arbitrarily selected orifice diameter groupings. Forty-two percent of the untempered pots fall into the smallest orifice diameter group (60-160 mm), 41% are in the middle group (170-260 mm), and only 16% are in the largest group (260-360 mm). In the case of the tempered vessels, 29% are in the smallest group, 47% fall into the middle, and 24% are in the largest group. While these figures are not dramatic, they do show an overall tendency for tempered vessels to have wider orifices than untempered pots. Under the working assumption that cooking pots had relatively large orifice diameters, it can be rather tentatively suggested that tempering was added to pots for functional reasons.

Decorative Style on the Mitchell Ridge Pottery

As indicated above, the analysis of decoration on the Mitchell Ridge pottery was designed to identify, if possible, the system by which the aboriginal potters adorned vessels. In order to maximize the size of the sample available for study, and to thus include the widest possible range of stylistic variations, all decorated vessels from the site were used for which the basic decorative themes could be identified; sherds representing pots from all excavations of the 1970s and 1992 were examined. In most instances, this involved rimsherds, though in some cases sherds representing parts of pots immediately below the rim were also employed. In this way, a total sample of 177 decorated vessels was represented for analysis.

Lumping together of vessels from across the entire site precludes, of course, chronological control of stylistic variability. Since radiocarbon data from occupation areas and burials indicates major use of the site from ca. A.D. 800/1000 into the Early Historic Period, the combined samples can only be assumed to represent ceramic manufacture over that span of time. However, the primary goal here is to explore the range of stylistic variability of the pottery as representing the regional ceramic tradition. Once the *range* of variability is established, the question of the temporal dimension of that variability can eventually be explored.

The approach used here is simple and straightforward. Decorated sherds were sorted into vessel groups, according to the criteria listed earlier. Vessels represented by sherds which were too small for confident identification of decorative themes were noted, but excluded from further analysis. The crucial criteria for inclusion in the analysis were that enough of the decoration was present to (a) identify the primary design element and (b) determine whether a secondary design element was present and, if so, identify its configuration and spatial relation to the primary element. Primary elements are here defined as the main decorative theme which is readily identifiable visually on the vessel. Secondary elements are those decorative components that are readily distinguished from primary elements by virtue of contrasting or opposing geometry or method of execution and which, at the same time, serve to highlight, outline or otherwise complement the primary element. A third kind of element consists of small patterns of incisions or punctations which fill the spatial interstices created by either primary or secondary elements. These are noted here but, because they were relatively few, and patterned correlation with specific primary or secondary elements could thus not be identified, they are not further considered in terms of the systematic combinations of primary and secondary elements.

The primary and secondary design elements observed in the Mitchell Ridge collections are defined as follows:

1. *Primary elements on vessel lips.* This grouping includes all vessels on which the sole decorative theme is confined to the lip of the pot. Though spatially highly restricted on the vessel, these constitute primary decorations because they immediately attract visual attention and identify the pot as decorated. Decoration was achieved either by patterned removal of still-wet clay from the lip or by impressions made in the clay as nicks or incisions. Scalloping (N=45; see Figure 7.17, d, Figure 7.20, g) and lip crenelation (square notching, shown in Table 7.7; N=1) both involved removal of clay. Impressions in the still-wet lip of the vessel include nicking, short impressions made at right angles to the vessel circumference (Figure 7.21, e), and incising. Incised elements consist of short lines at right or oblique angles to the vessel circumference (Figure 7.16, d; Figure 7.20, f) and cross-hatching, created by opposing sets of oblique incisions (see Table 7.7).

2. *Primary elements on vessel exterior below lip.* These elements are incised lines placed in decorative bands immediately below the vessel lips. On all examples from Mitchell Ridge, they are mutually exclusive, so there is no ambiguity as to what constitutes the primary element. The incisions are always quite narrow, having been executed with a more or less pointed instrument. The most simple is a single incised horizontal line, usually immediately below the lip (N=20; see Figure 7.13, a) but in one case 2 cm below the lip (Figure 7.14, a). More elaborate is a series of multiple, parallel horizontal lines which invariably begin just below the lip and extend varying distances down the vessel wall, depending on the number of lines. This element, the most common at the site (N=69), is made up of as few as two to as many as 16 lines (for example, Figures 7.13, b, c).

Contrasting with the use of horizontal lines are vertical, parallel incised lines (N=14). These invariably extend from just below the vessel lip and several centimeters down the vessel wall. Examples are illustrated in Figure 7.16, a, b; Figure 7.18, a-c; Figure 7.17, b, c, and Figure 7.21, f.

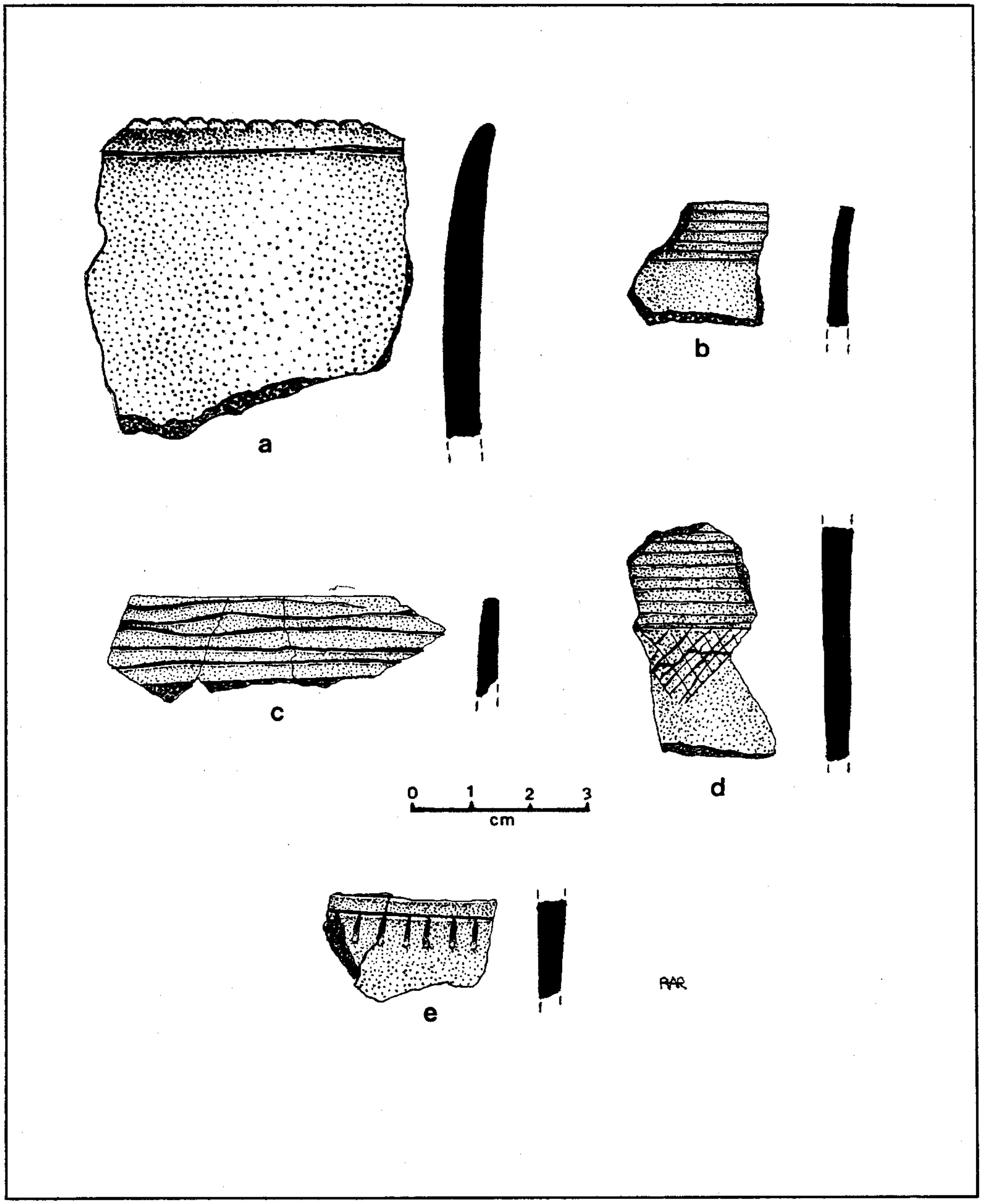


Figure 7.13. Selected examples of potsherds with incised horizontal lines as primary design elements, Block Excavation. Note secondary elements on d (filled pendant triangle) and e (row of short incisions).

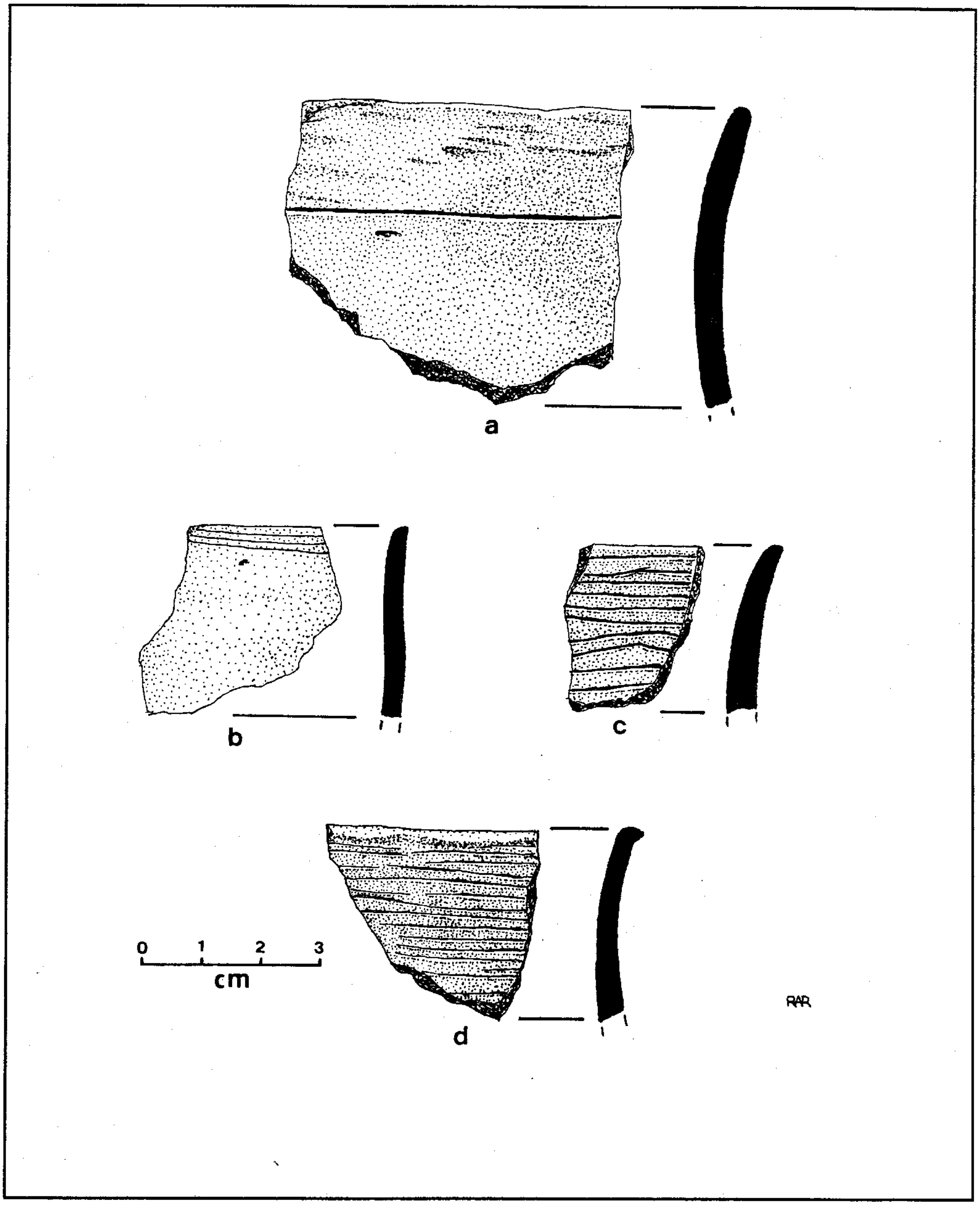


Figure 7.14. Selected rimsherds from the Block Excavation. A, single incised horizontal line; b-d, multiple incised horizontal lines.

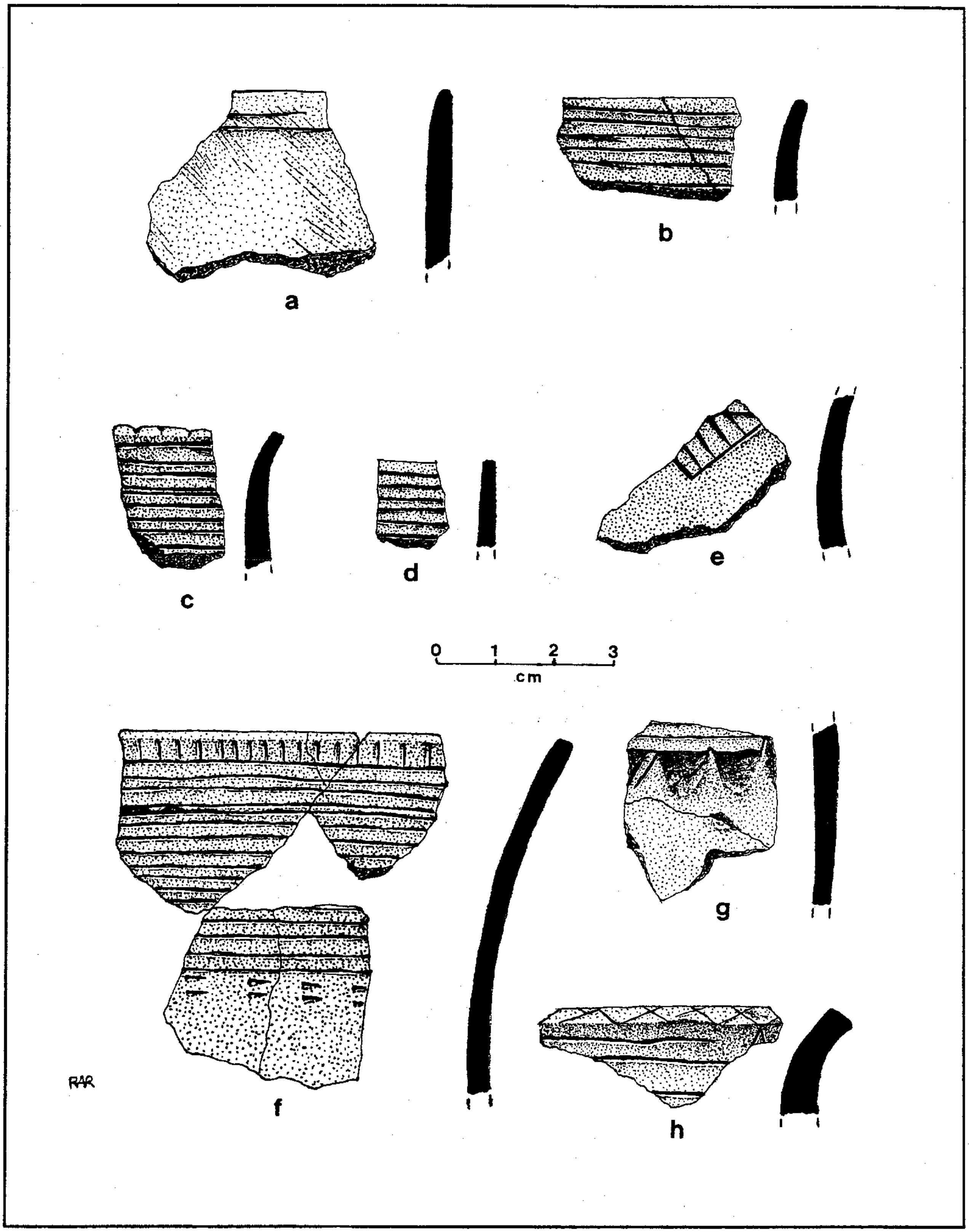


Figure 7.15. Selected examples of potsherds with incised horizontal lines as primary design elements, Block Excavation.

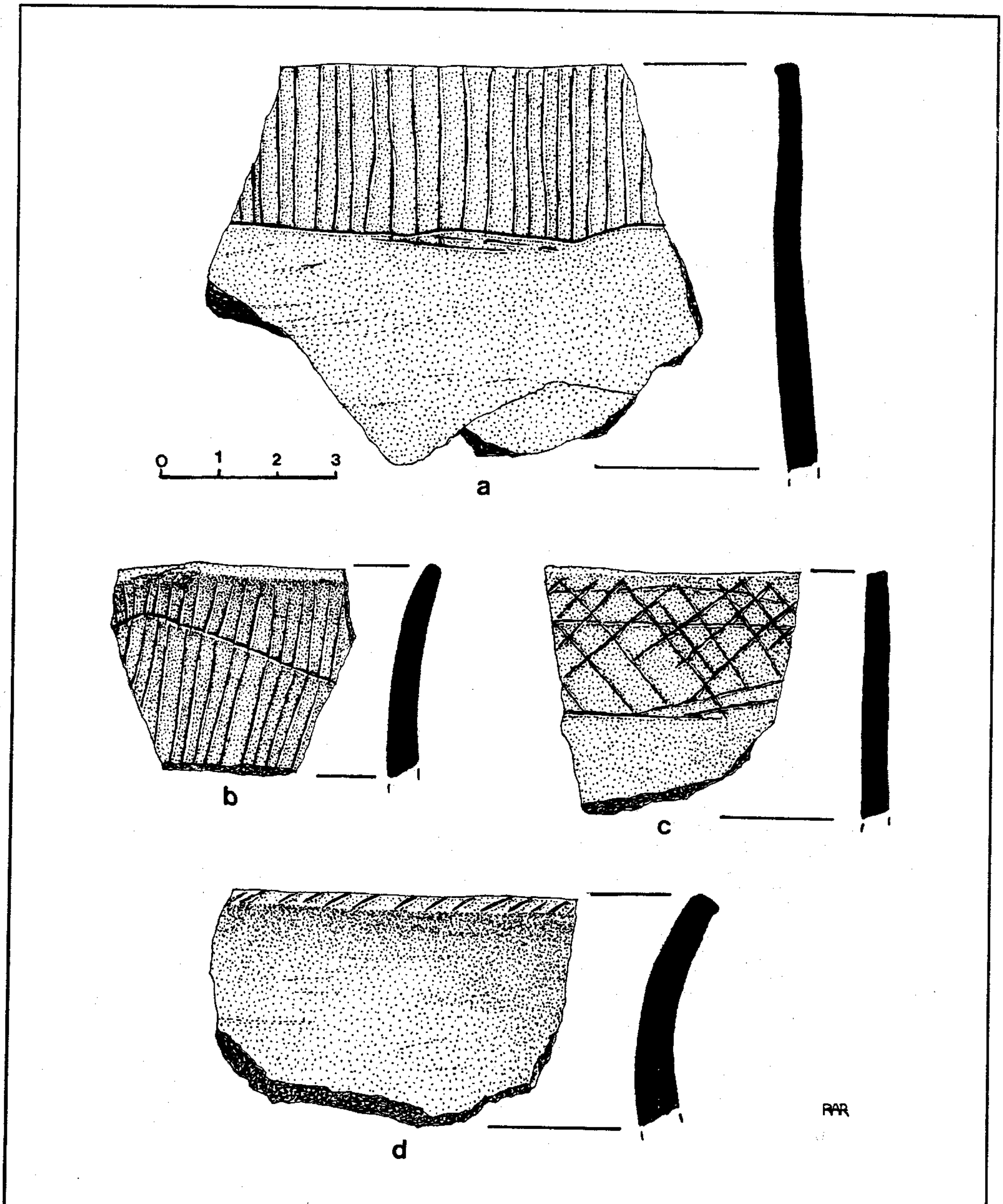


Figure 7.16. Selected sherds from the 1970s excavations. A, incised vertical lines as primary design element; b, vertical sublip incising; c, sub-lip criss-crossed incising; d, lip incised rimsherd.

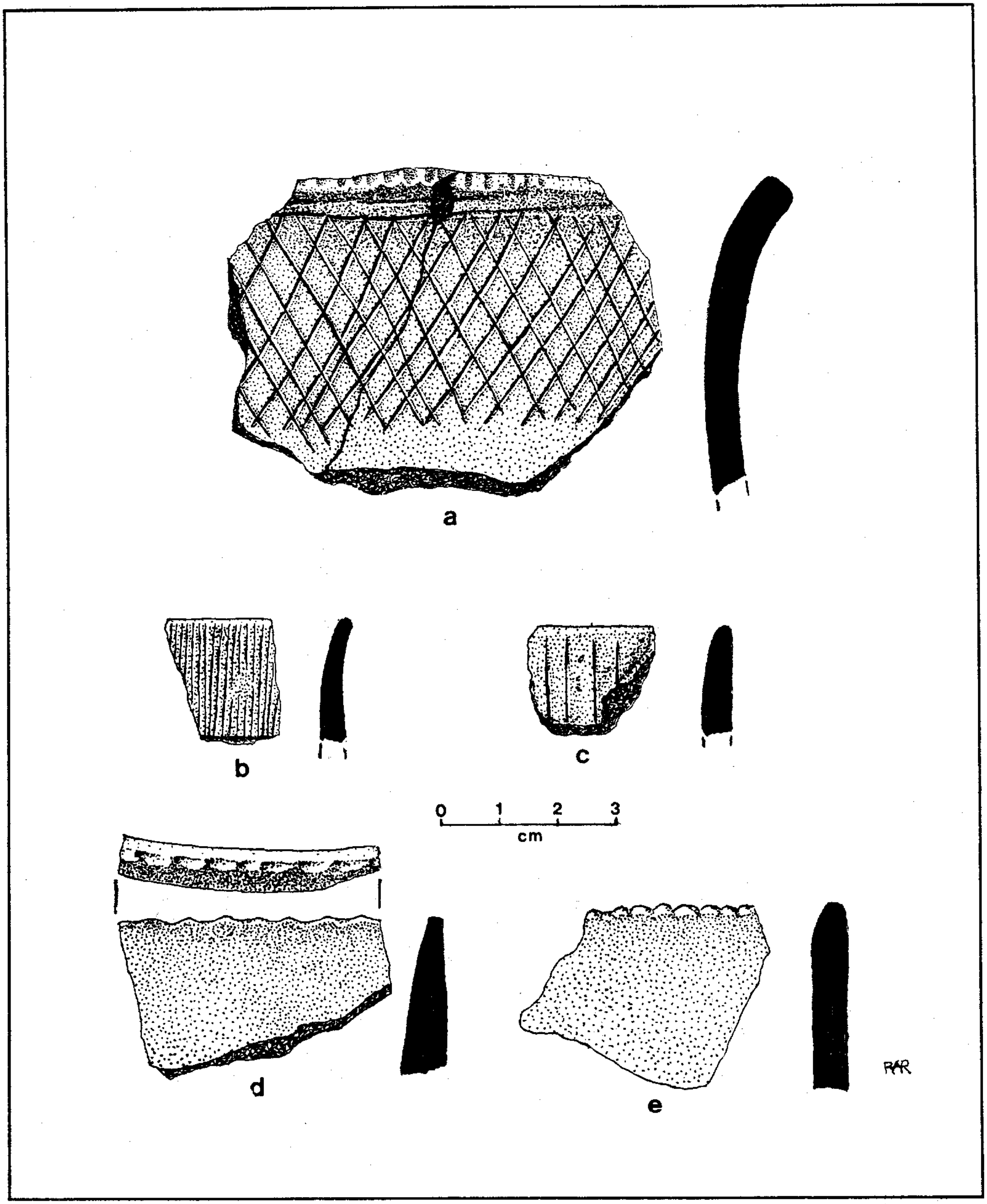


Figure 7.17. Selected sherds, Block Excavation. A, Criss-crossed sublip incising as primary design element (Harrison Bayou Incised); b, c, vertical incising as primary design element; d, lip scalloping as primary design element; e, lip nicking as primary design element.

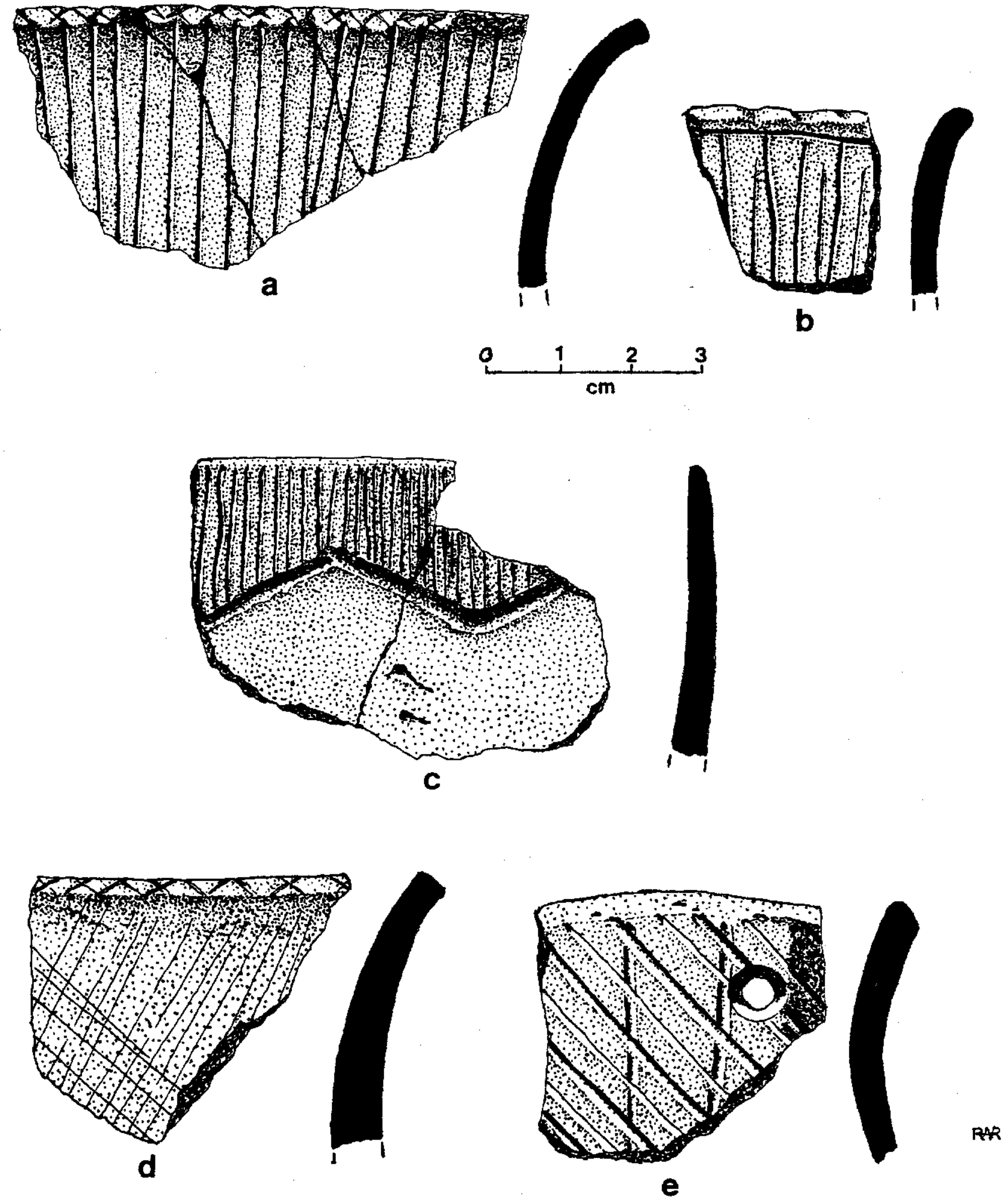


Figure 7.18. Selected sherds with sublip primary design elements of incised vertical lines and criss-crossing. Note drilled crack repair hole and asphaltum crack filler on e.

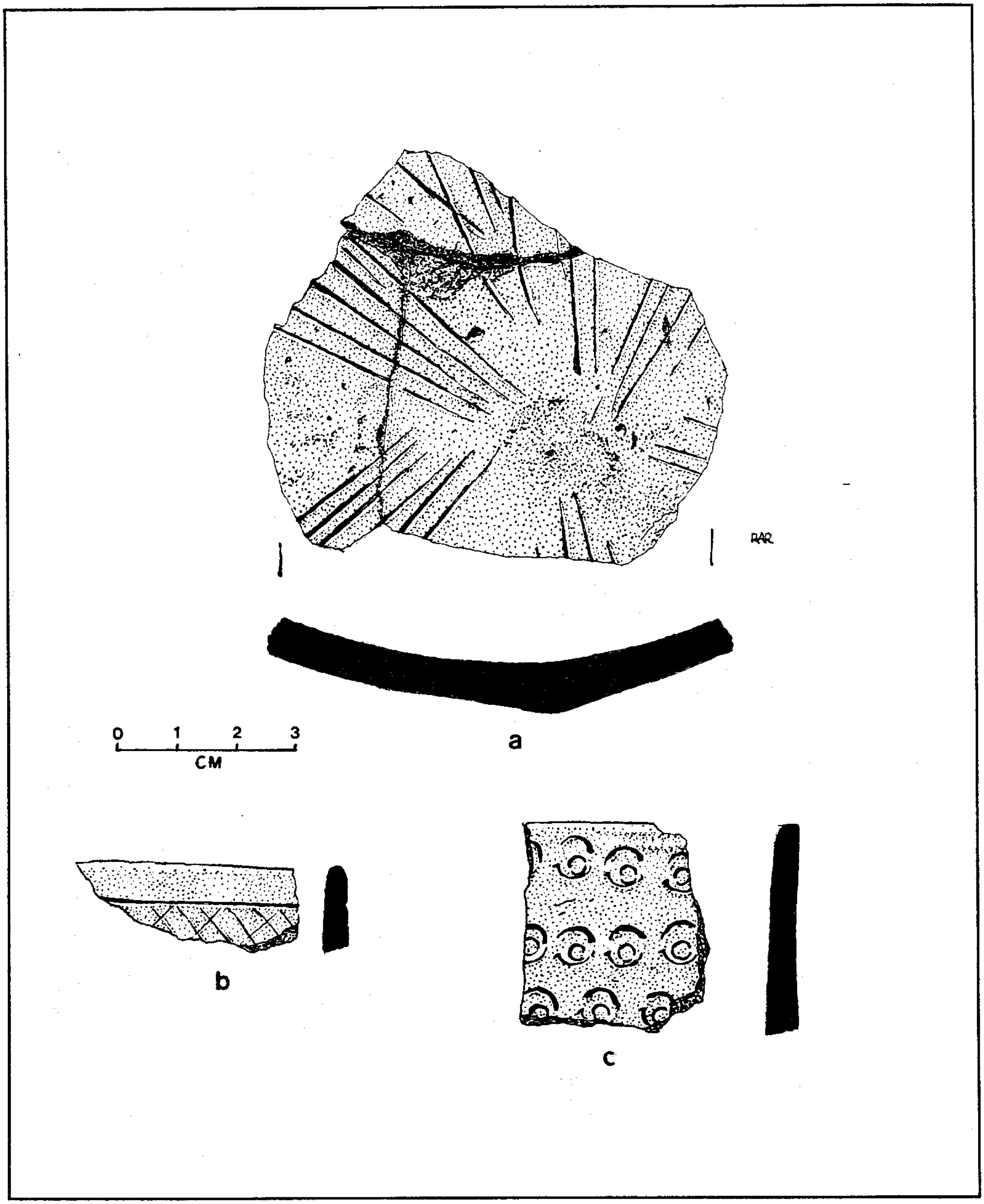


Figure 7.19. Unusual decorated sherds. Slightly noded basal sherd with converging groups of incised lines; b, rimsherd with engraved criss-cross design (possibly Maddox Engraved); c, rimsherd with stamped circular punctations. A and b are from Block Excavation, c is from surface, Area 5.

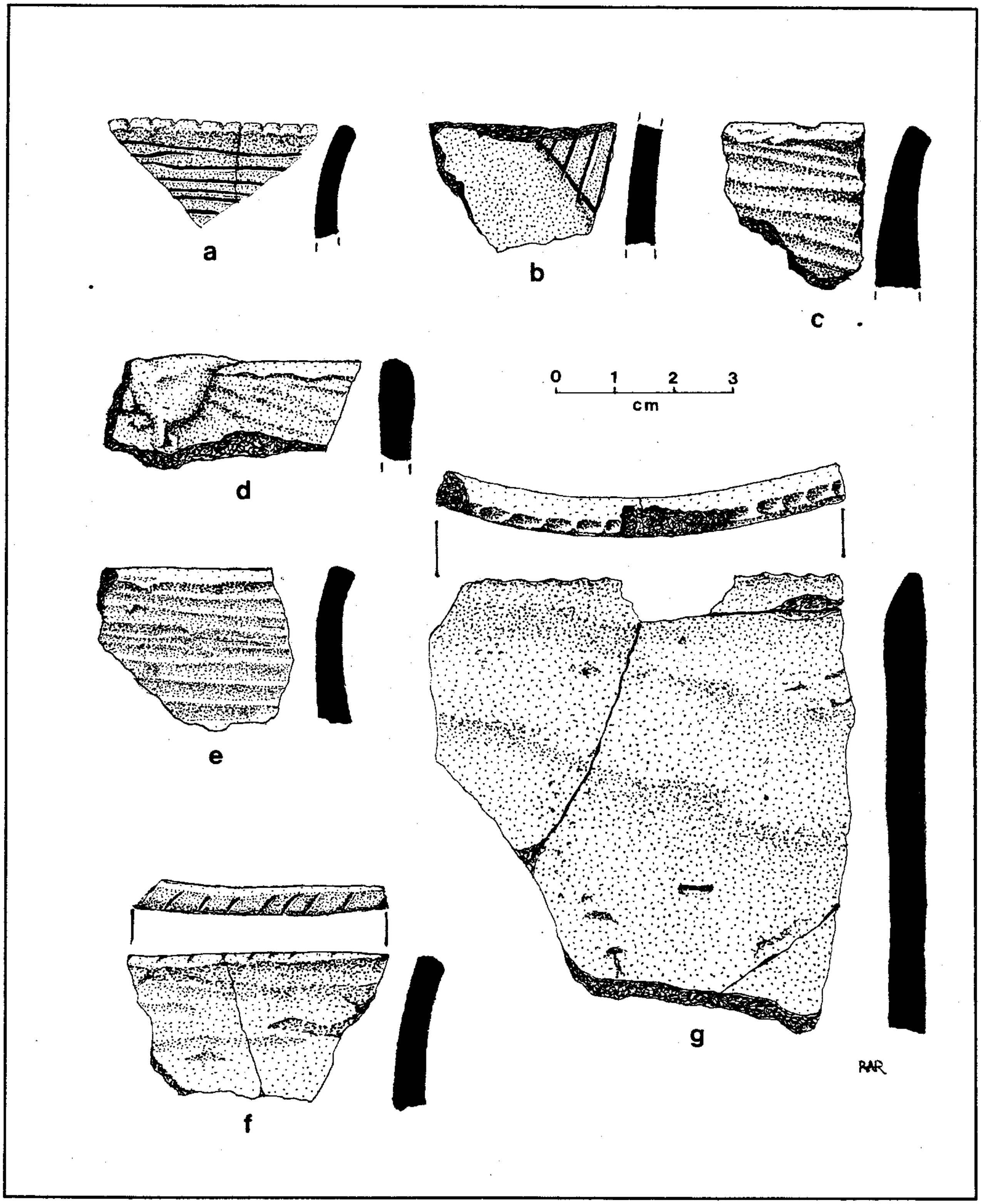


Figure 7.20. Selected sherds from Feature 9. A, multiple incised lines as primary design element; b, incised pendant triangle; c, e, rimsherds with bivalve scoring; d, rimsherd with clay crack repair; f, rimsherd with lip incising as primary design element; g, rimsherd with scalloped lip.

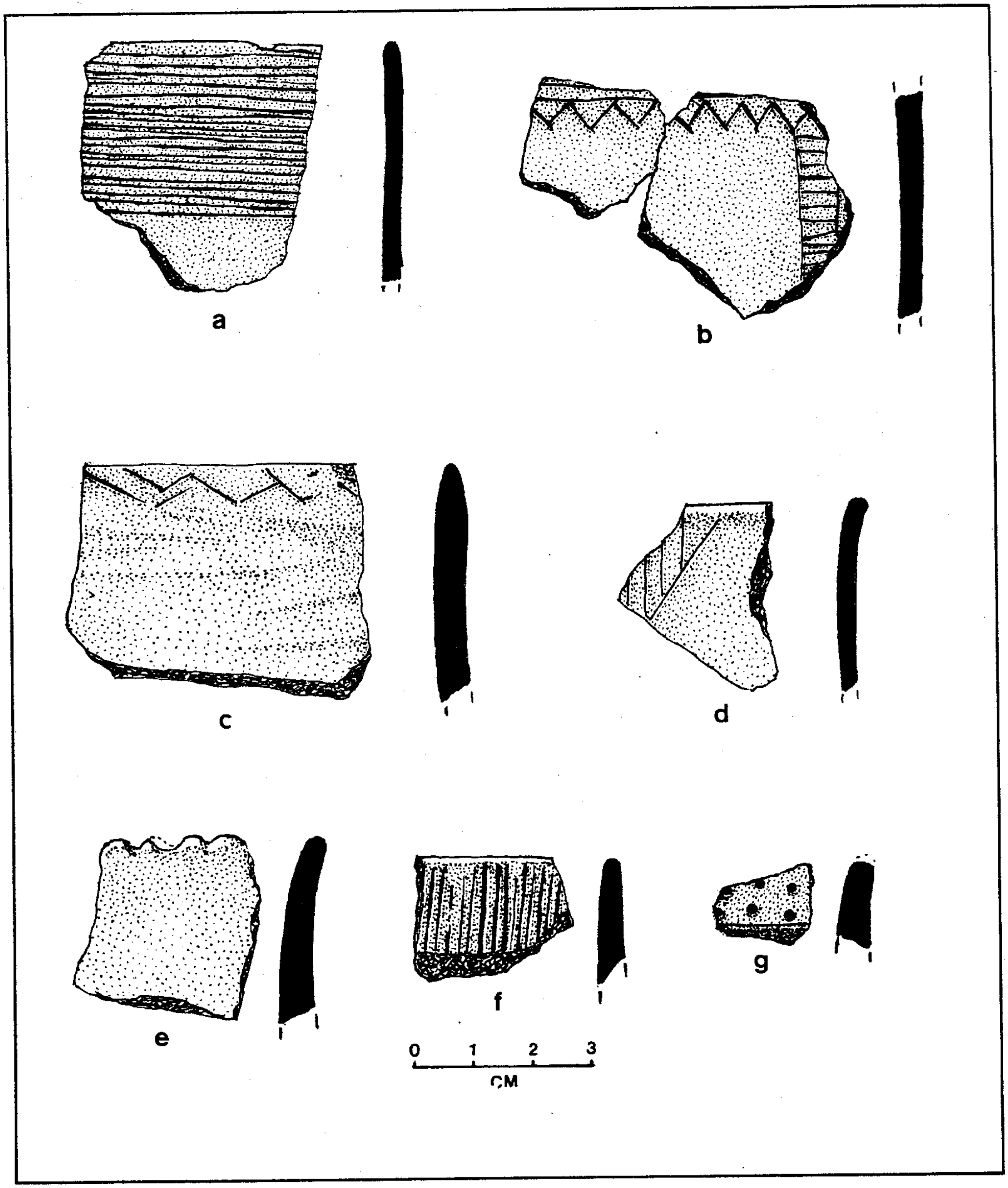


Figure 7.21. Various decorated sherds, 1970s excavations. A, multiple horizontal incised lines; b, multiple horizontal incised lines with secondary element of pendant triangles; c, d, pendant triangles as primary design element; e, nicked lip as primary design element; unusual sherd with vertical brushing; g, sherd with rows of small round punctations.

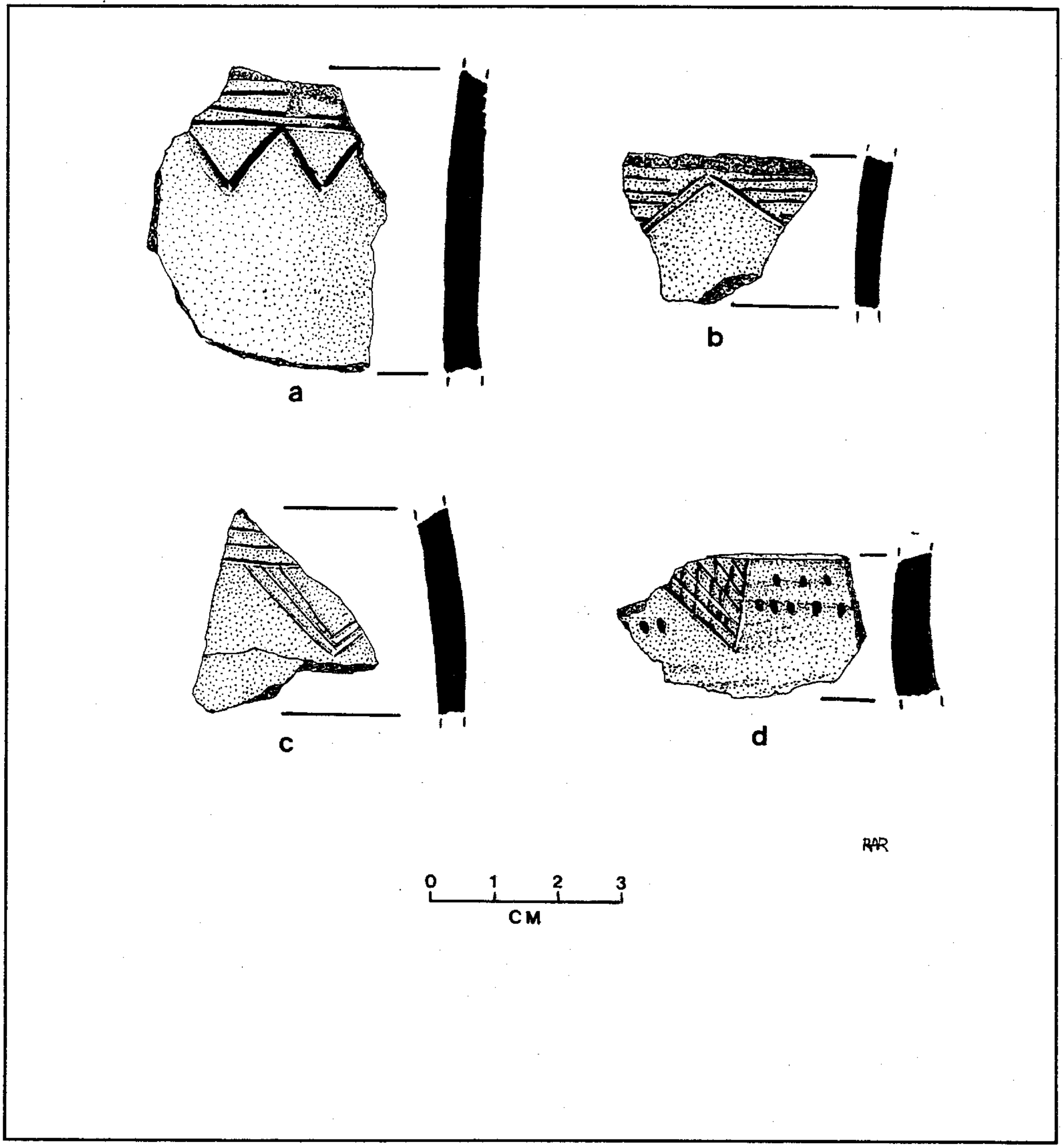


Figure 7.22. Selected examples of potsherds with incised pendant triangles, from 1970s excavations.

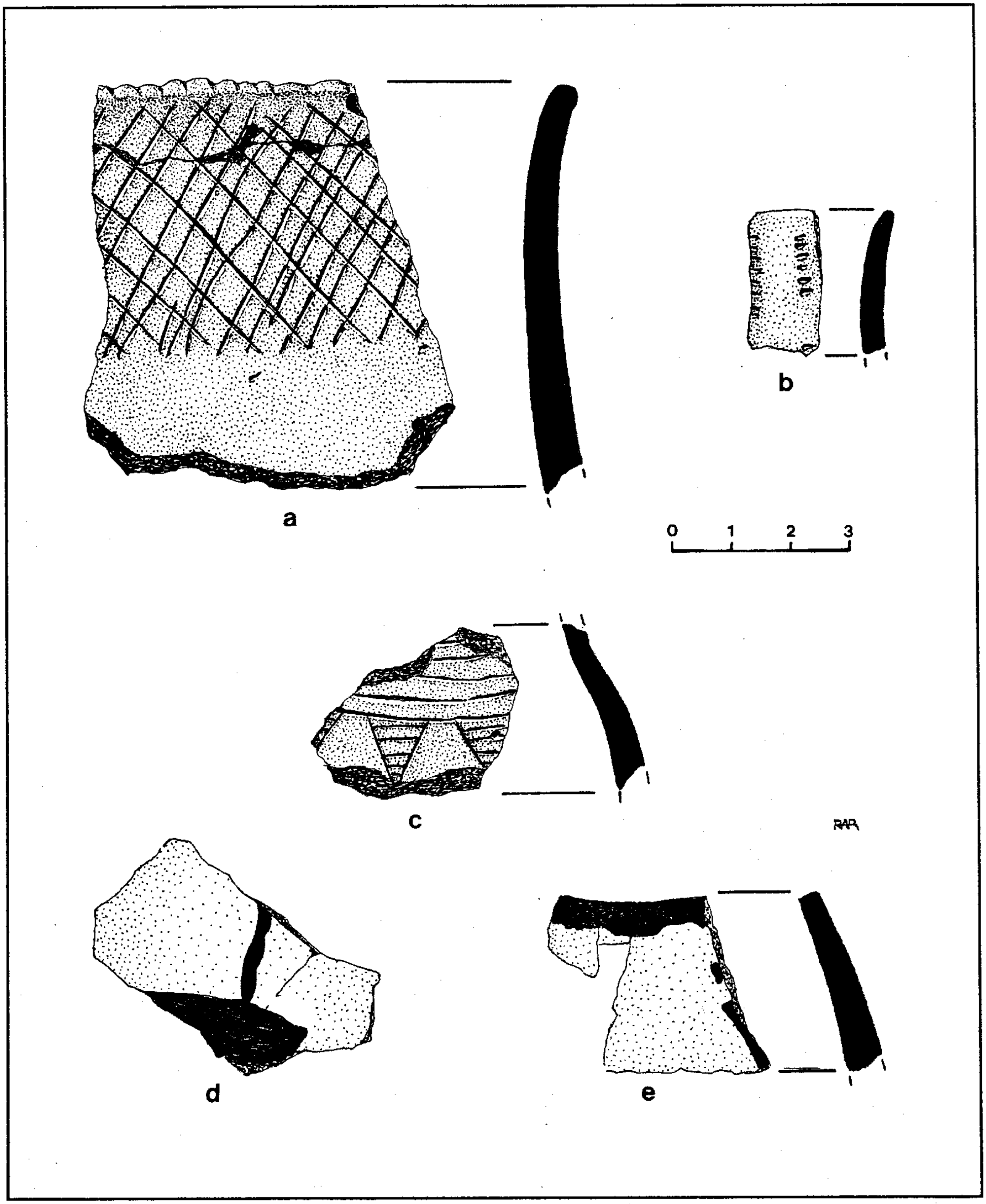


Figure 7.23. Selected sherds, 1970s excavations. A, Criss-crossed sublip incising as primary design element (Harrison Bayou Incised); b, multiple sublip horizontal lines with pendant triangles as secondary element; d, e, examples of aspaltum painted decoration on sandy paste sherds (Rockport Black-on-Gray). as primary design element.

Table 7.7. Correlations of primary and secondary decorative elements, Mitchell Ridge Ceramics.

SECONDARY DECORATIVE ELEMENTS	PRIMARY DECORATIVE ELEMENTS: Scalloped lip	Nicked lip	Oblique incised lip	Cross-hatched incised lip	Interior lip notching
None	45	15	3	2	3
Correlation unknown					
Scalloped lip					
Nicked lip					
Oblique incised lip					
Cross-hatched incised lip					
Single horizontal line					
Wavy line					
Incised pendant triangles					
Excised pendant triangles					
Filled pendant triangles*					
Short vertical lines					
horizontal zig-zag					
triangular punctations					
round punctations					
TOTAL	45	15	3	2	3

Table 7.7, cont.

		PRIMARY DECORATIVE ELEMENTS			
SECONDARY DECORATIVE ELEMENTS		Crenelated lip	Single Horizontal incised line	Multiple horizontal incised lines	Vertical incised lines
None		1	1	29	
Correlation unknown				20	1
Scalloped lip					
Nicked lip			3	4	
Oblique incised lip				1	
Cross-hatched incised lip				1	5
Single horizontal band					5
Wavy line					2
Incised pendant triangles			2	4	
Excised pendant triangles				1	
Filled pendant triangles*			1	3	
Short vertical lines			2	3	
horizontal zig zag				1	1
triangular punctations				1	
round punctations				1	
TOTAL		1	10	69	14

Table 7.7, cont.

SECONDARY DECORATIVE ELEMENTS	PRIMARY DECORATIVE ELEMENTS: Cross-hatched incised lines	Filled triangles	Horizontal zig - zag	TOTAL
None	1	2	1	104
Correlation unknown	2			23
Scalloped lip	1			1
Nicked lip	1			8
Oblique incised lip	1			2
Cross-hatched incised lip	2			8
Single horizontal band	4			9
Wavy line				2
Incised pendant triangles				6
Excised pendant triangles				1
Filled pendant triangles*				4
Short vertical lines				5
horizontal zig zag				2
triangular punctations				1
round punctations				1
TOTAL	12	2	1	177

Only slightly less abundant is cross-hatching (N=12), comprised of two opposing sets of intersecting diagonal lines or, in one case, sets of intersecting vertical and diagonal lines. Examples are shown in Figure 7.16, c; Figure 7.18, d, e; Figure 7.23, a.

Two final primary elements, both very rare at the site, consist of pendant triangles "hanging" from the vessel lip and filled with short incised lines (N=2; see Figure 7.21, d) and a horizontal zig-zag line (N=1; see Figure 7.21, c).

3. *Secondary elements.* Secondary design elements are adjacent to or near primary elements and visually frame or otherwise enhance the primary elements. These are listed in Table 7.7. They include the various forms of lip modification listed above as primary elements (excepting crenelation), but in these cases the design elements do not present the main decoration. Examples of lip modification used as secondary elements are illustrated in Figure 7.13, a; Figure 7.15, c; Figure 7.17, a; and Figure 7.18, a, b and d. Secondary elements found on vessel exteriors in combination with primary elements are executed by means of incised lines and punctations. These elements, also listed in Table 7.7, are horizontal incised lines (e.g. Figure 7.16, a; Figure 7.17, a and b), single horizontal incised wavy lines (see Table 7.7), incised pendant triangles (either filled or unfilled (Figure 7.13, d; Figure 7.15, e and Figure 7.21, b), excised pendant triangles (Figure 7.15, g), bands of short incised lines (Figure 7.13), rows of triangular punctations (Figure 7.15, f) and circular, hollow punctations (see Table 7.7).

Correlations of Primary and Secondary Design Elements

Table 7.7 juxtaposes the primary and secondary ceramic design elements and indicates certain redundant associations or correlations between specific primary and secondary elements. These can be summarized as follows:

1. *Modified lip as primary element, without secondary elements.* By definition, modified lips as primary design elements are not found in association with secondary elements, for two reasons. First, the surface to be decorated, the vessel lip, is too small in area to allow for the thematic complexity inherent in the inclusion of secondary elements. Second, if design elements are place below the lip, they render the lip decoration of secondary importance, since sublip designs are in a more spatially open field and thus tend to automatically attract immediate visual attention.

With the exception of crenelation, which is represented by only one vessel in the entire collection, all of the various kinds of lip modifications could serve as secondary elements. However, it is significant that the two most common kinds of lip modification occur most frequently as the sole vessel decoration. This is particularly true in the case of scalloped lips, which occur as primary elements on 45 vessels and as a secondary element on only one vessel. In general, therefore, it can be concluded that lip scalloping was conceived by the aboriginal potters at Mitchell Ridge as a discrete, independent technique of vessel decoration. The same can be said for lip nicking, which occurs as a primary element on 15 vessels but as a secondary element on only eight pots. Though lip nicking is thus not as nearly independent of other decoration as scalloping, it does tend to be commonly treated as such. These instances suggest that lip-modified vessels represent a definite approach to ceramic decoration, and that such pots should not, strictly speaking, be classified as plain vessels, as has been done in the past (Suhm and Jelks 1962; Aten 1983a).

Other forms of lip modification are comprised of short parallel incisions, either as unidirectional diagonals or opposed sets of cross-hatched diagonals. These are not particularly common, and occur as both primary (N=5) and secondary (N=8) elements.

2. *Horizontal Sublip Incising.* This is the most common primary design element, present on 79 (45%) of the decorated vessels. Although single horizontal lines are included in Table 7.7 as a distinct class, they actually should probably be viewed as one end member of a continuum of from one to as many as 16 horizontal lines. Single line examples are segregated here to (a) highlight their relative scarcity (N=10, compared with 69 for multiple lines), and since (b) there may be chronological significance in the use of a single line, with the number of lines tending to increase over time (as suggested by Aten 1983a, Figure 12.2).

For 20 of the vessels listed in Table 7.7 with this primary element, it is unknown whether secondary elements were present. In these cases, the entire width of the decorated band was not present on representative sherds, so the presence/absence of secondary border elements could not be determined. The presence/absence of secondary elements could be determined in 59 cases. In 30, or 51%, no secondary elements accompanied the incised horizontal lines. Modified lips were present as secondary elements in

6 instances (4 nicked, 2 incised). In 14 cases secondary elements had been executed on the sublip; these form, in all cases, borders above or below the bands of horizontal incised lines. The most common are variations on the theme of the pendant triangle.

3. *Vertical sublip incising*. Fourteen, or 8%, of the decorated vessels bore this primary element. The presence/absence of secondary elements could be determined in all but one instance. In five cases (38%), lip modification is present as incised cross-hatching. Sublip secondary elements consist in most cases of horizontal or wavy lines which bound the top or bottom of the primary element (e.g., Figure 7.16, a; Figure 7.18, b, c). In a single case (Figure 7.16, b) a horizontal zig-zag incised line cross-cuts the primary element of parallel vertical incising.

4. *Sublip incised cross-hatching*. This primary element occurs on 12 (7%) of the decorated pots. Presence/absence of secondary elements was indeterminate in 2 cases. Of the 11 specimens where presence/absence of secondary elements could be determined, all but one bore a secondary element. Five of these consisted of lip modification and four were horizontal incised lines just below the vessel lip which serve to bound the top of the band of incised cross-hatching (Figure 7.17a).

5. *Filled pendant triangles/horizontal incised zig-zag*. In most cases, pendant triangles occur as secondary elements bounding the bottom of primary elements consisting of horizontal incisions. In only two instances do they constitute the primary design element. In a third case, a horizontal zig-zag presents a very similar visual impression. Secondary elements were not placed on these vessels.

Discussion of Ceramic Decoration at Mitchell Ridge

The present analysis is a preliminary effort which only suggests possibilities for further investigations of stylistic variation in upper Texas coast ceramics. While the number of vessels in the combined collections from Mitchell Ridge is relatively large, not all design elements known for the surrounding region are present, suggesting that either (a) the sample is still too small to present the full range of variation in designs employed by resident potters, or that (b) as yet undefinable minor spatial and/or temporal variability existed within the regional ceramic stylistic tradition. Elements recurrently reported from other sites but lacking at Mitchell Ridge include right-angle opposed cross-hatched lines, incised horizontal lines interrupted or traversed by one or several diagonal lines and parallel short vertical or diagonal incisions sandwiched between horizonal lines (as illustrated in Aten 1983a; Black 1989).

Still, most of the commonly recurring themes of upper coast aboriginal ceramic decoration incorporate the same primary and secondary elements identified in the Mitchell Ridge material (c.f. Fox et al. 1980; Aten 1983a; Mercado-Allinger et al. 1984; Black 1989; Howard 1990; Nash and Rogers 1992). Despite the need for thorough analysis of decorative style at the regional scale, the present analysis does indicate that ceramics at Mitchell Ridge (and elsewhere in the Galveston Bay area, judging by the basic similarities in most primary and secondary design elements) were decorated according to known and accepted procedures. A few basic primary design elements were recurrently employed, and these were combined with secondary elements in a redundant, patterned way. Of the 177 decorated vessels represented for analysis, 165, or 93% bore one of only six recurrent primary design elements (scalloped lip, nicked lip, single sublip horizontal line, multiple sublip horizontal lines, vertical sublip lines, cross-hatched sublip horizontal lines). Each of the primary elements occurs on enough vessels, and shows sufficient similarity to other examples of the same element, to be regarded as a culturally informed stylistic expression.

The presence or absence of recurrent secondary elements which tend to correlate with specific primary elements is also largely patterned, again suggesting culturally informed decision making. Pendant triangles most commonly occur as a border element with horizontal incised lines, but never with the sublip primary elements of vertical incising or oblique cross-hatching. In the few instances when pendant triangles occur as primary elements, the potter appears to have used the actual rim of the vessel as the horizontal element from which the triangles "hang". Punctuations and short vertical incisions, though uncommon as secondary elements, appear to correlate almost entirely with horizontal lines, and do not appear in association with vertical lines or sub-lip cross-hatching as the primary element. Horizontal incised lines appear as secondary border elements with vertical incised lines and sublip cross-hatching, and horizontal incised wavy lines or zig-zags are occasionally combined with vertical incised lines. While lip modification appears as a secondary element in association with the three common kinds of primary sublip decoration (horizontal lines, vertical lines, cross-hatching), it is used with proportionately greater frequency with the vertical lines and cross-hatching than with horizontal lines. Of the 58 vessels bearing the primary element of horizontal lines for which the presence/absence of secondary elements could be determined, only 9, or 15.5% had modified lips. Combining the 26 vessels with the sublip primary elements of vertical incising and cross-hatching, 10 or 38% bore lip modification, usually as short incised lines.

The use of design elements involved, then, decisions made by the potter according to largely pre-established notions as to what constituted meaningful, or at least acceptable, patterning; the decoration of ceramic vessels was not executed with random choice of designs. Some apparently unusual design elements or combinations thereof have occasionally been reported from the Galveston Bay area (e.g. Howard 1990, Figure 58, b, Figure 59, a; see also vessel base showing groups of parallel vertical incised lines, Figure 7.19, a, herein). These are, however, relatively rare, and perhaps represent individual experimentations which were departures from established norms. The important point in terms of the stylistic dimension of the regional ceramics is, in any case, that the norms did exist and there must have been a fairly strong sociocultural imperative to follow them. Choice was, for the most part, restricted to a rather limited number of stylistic options involving the use of a fairly small number of primary and secondary design elements.

The underlying social patterns/mechanisms which led a given potter, in a given instance, to choose one of the several design options cannot be determined at the present time. Nor can we determine to what degree "popularity" of a given stylistic theme may have changed through time. The only sherd samples from Mitchell Ridge for which there is some degree of chronological control come from the Block Excavation and Feature 9, investigated in our 1992 work. The 47 decorated vessels from the Block Excavation represent all of the decorative themes identified here, in about the same proportions present in the aggregate sample of 177 pots from the entire site (see Table 7.7). Since, as discussed at length earlier, the Block Excavation represents a mainly Final Late Prehistoric occupation dating between the end of the thirteenth and the early part of the fifteenth centuries, the sample of decorated pots from that area is to some degree representative of the period. However, since we have no other dated sample from the same period, just how fully representative the limited sample might be is open to question. Feature 9 is radiocarbon dated to between the late fifteenth and early seventeenth centuries, but the total number of vessels (N = 38) and the decorated vessel sample (N = 4) are both too small for any reliable interpretation of possible changes in styles.

Future research should, then, incorporate investigation of the systematics of aboriginal ceramic decoration, by expanding the present analytical approach to pottery designs to other sites (or by developing a better approach). Spatial and temporal distinctions in the kinds of designs, or at least in the proportional representation of the designs in adequate samples, will be required in order to determine to what degree styles may have correlated with social distinctions (and possible resultant synchronic, spatial patterning in distributions of different design elements, either at the scale of the site or the region), or long-term changes in preferences, or both. For the time being, we must rely on Aten's suggestion of a general increasing elaboration of ceramic designs through time; according to Aten (1983a:218), there are general trends toward (a) a greater number of incised lines in what is here referred to as the primary design element of sublip horizontal incising, (b) increasing use of what we are terming secondary design motifs, and (c) the addition of sublip cross-hatching and vertical incising as primary elements relatively late in the ceramic sequence (Aten's Old River into Orcoquisac Periods). Most of the incised designs at Mitchell Ridge-- multiple sublip horizontal lines, vertical sublip incising and sublip cross-hatching-- have counterparts in the relatively more elaborate designs which Aten illustrates for the latter part of his ceramic sequence, which is in keeping with the clustering of our radiocarbon dates in the Late Prehistoric, Protohistoric and Early Historic Periods (with, as defined in Chapter 3, a combined temporal range from ca A.D. 700-1800).

Despite the present limitations in our knowledge of stylistic variation in the upper Texas coast region, it is possible to make some broad observations which probably have some sociocultural significance, albeit at a very general level. A striking fact concerning the decorative expression on the Mitchell Ridge pottery (and, by extension upper coast pottery in general) are the basic similarity in all major decorative themes to those of the Coles Creek-Plaquemine ceramic tradition of the Lower Mississippi Valley (LMV) and adjacent coastal Louisiana. All of the common primary elements at Mitchell Ridge, as well as most of the combinations of primary and secondary elements, have parallels in the LMV assemblage, as is represented using actual sherds in Figure 7.24 (in which the LMV/coastal Louisiana specimens are adapted from Phillips 1970 and Weinstein and Kelley 1992).

All of the Mitchell Ridge vessels with horizontal incising as the primary design element have direct counterparts in Coles Creek Incised (see Phillips 1970), an LMV type which extends into south-central Louisiana (Brown 1984; Weinstein and Kelley 1992) and has close parallels as far west as the Pierre Clement Site in Cameron Parish, Louisiana, not far from the Texas state line (Springer 1973). The Mitchell Ridge material is not "classic" Coles Creek Incised (i.e., Coles Creek Incised, variety Coles Creek), since the vessels do not show the range of shapes found in LMV Coles Creek Incised, and the parallel incisions on Mitchell Ridge pottery do not exhibit the "overhang" effect seen on classic Coles Creek Incised, which is attributed to the use of a flat-ended tool held at oblique angle to the vessel wall (Phillips 1970:70). The Mitchell Ridge examples do, however, very closely resemble Coles Creek, *var.* Hardy in both overall appearance and in execution of the horizontal incisions. Further, the use of horizontal rows of punctations or short vertical incisions to bound the horizontal incised lines is commonly found in Coles Creek Incised, *var.* Hardy (see Phillips 1970;73, 196; Weinstein and Kelley 1992, Figures 7.14, 7.17). On the other hand, the pendant triangles on the Mitchell Ridge specimens are strongly reminiscent of prominent triangular punctations found below the horizonal incisions on Coles Creek Incised, *varieties* Coles Creek and Mott. Finally, the single example from Mitchell Ridge with one horizontal incised line about 2 cm below the rim (from the Block Excavation) closely resembles certain specimens of Coles Creek Incised, *var.* Stoner (Phillips 1970:199).

Also very closely reminiscent of LMV and south-central Louisiana materials are the vessels from Mitchell Ridge (and other upper coast sites; e.g. Aten 1983, Figure 12.2; Black 1989) with oblique cross-hatching as the primary design element. In fact, the specimens from Mitchell Ridge are virtually indistinguishable from examples of the Harrison Bayou Incised type reported from the LMV area and south-central Louisiana (compare Figures 7.17. a, and 7.23, a, herein, with Phillips 1970:205; Gibson 1991, Figure 12). Since both the decorative elements and decorative techniques of the Mitchell Ridge specimens are the same as Harrison Bayou Incised, there is no reason not to regard them as examples of the type (other than the established habit of calling virtually all upper coast incised sherds either Goose Creek Incised or San Jacinto Incised). Also supporting the use of a single typological designation is the apparently continuous distribution from the LMV area through south-central Louisiana into southwest Louisiana (R. A. Weinstein, pers. comm. 1993) and the Sabine River basin of the Louisiana-Texas state line (Aten and Bollich 1969).

The primary design element of sublip vertical incising has perhaps a somewhat less direct analog in the LMV-south Louisiana area. It does resemble the type Mazique Incised, though this type is usually characterized by parallel oblique or opposed oblique, rather than parallel vertical sublip incising (Phillips 1970). On the other hand, some sherds from south-central Louisiana with parallel vertical incising have been classified as Mazique Incised (Weinstein and Kelley 1992, Fig. 6-45), and there may well be a genetic relationship between the Mitchell Ridge stylistic expression and Mazique Incised.

The vessels with modified lips as the primary decorative element also have similarities in LMV materials (e.g. Phillips 1970:188). It is not possible to point to correlations with specific types, however, because lip decoration has not been treated as sufficiently significant in LMV studies for designation of separate types. Vessels with lip modification as the sole decoration are not particularly common in the LMV assemblage, whereas they constitute 34% of the decorated pots from Mitchell Ridge. Conclusions concerning any extraregional genetic relationships are not possible, though the upper Texas coast material could have had inspiration from the east with subsequent intraregional development as a popular stylistic expression.

Additionally, two anomalous sherds from Mitchell Ridge have close counterparts in LMV ceramics. A grog tempered rimsherd with engraved cross-hatching bounded by a horizontal engraved line (Figure 7.19, b) closely resembles the Maddox Engraved, a type found in the LMV and Caddoan areas (Phillips 1970:107-108; Suhm and Jelks 1962:99). Another rimsherd (Figure 7.19, c) bears rows of stamped circular punctations strongly reminiscent of decoration on certain LMV types (e.g. Evansville Punctate; see Phillips 1970:202).

It is interesting and perhaps culturally significant to note that southward along the coast the most common lip modification at Mitchell Ridge, scalloping, appears to give way to crenelation, a form of lip modification represented by only a single vessel at Mitchell Ridge. Crenelation is distinguished from scalloping and nicking by relatively deep, square notches which are spaced around the lip so as to create intervening, squared lip segments about the same width as the notches (usually about 3-4 mm). Crenelation is a recurrent decorative theme from the area of the Brazos River delta southward to the Corpus Christi Bay area. It occurs at the Dow Cleaver Site (41B)35) on the lower Brazos River (J.

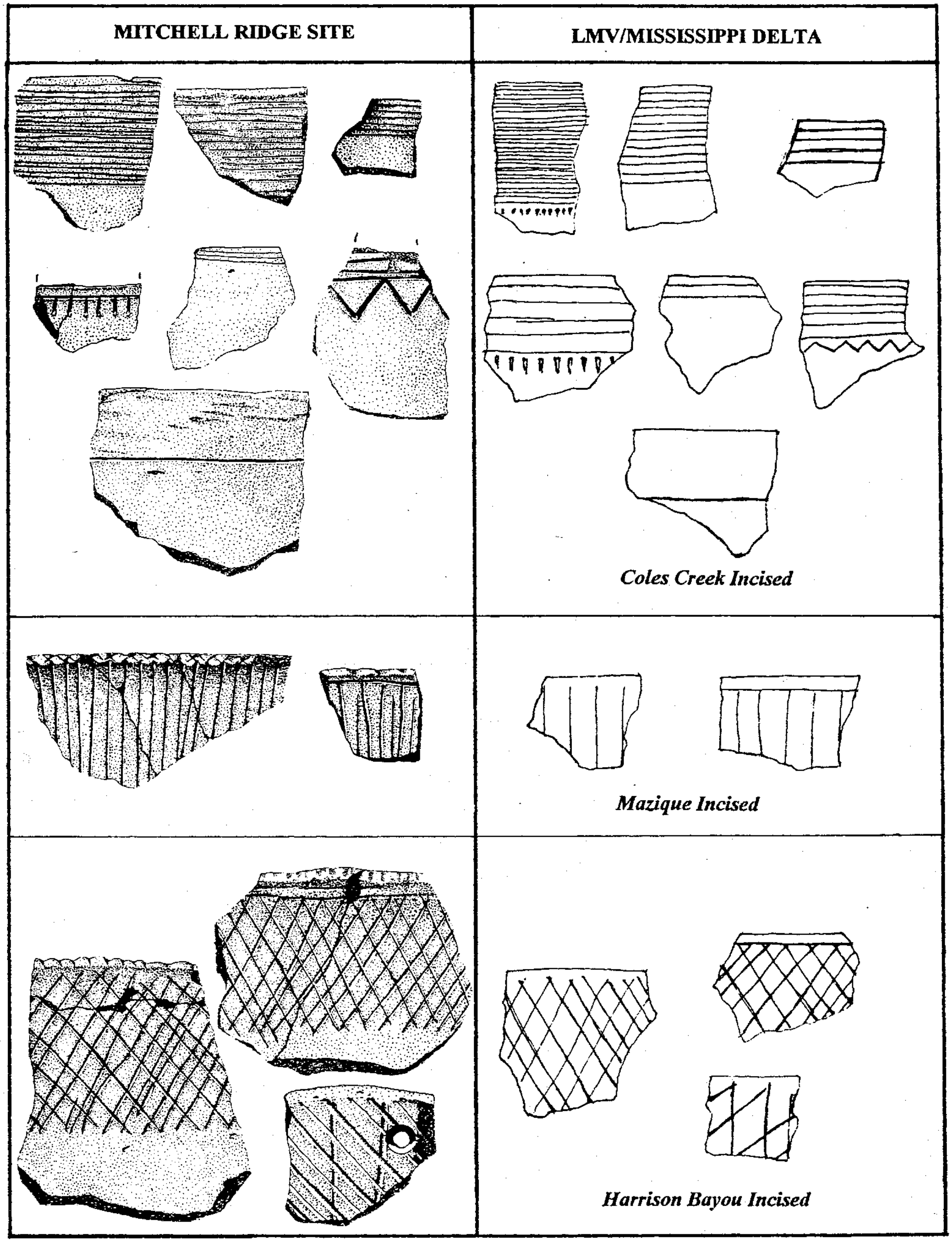


Figure 7.24. Chart showing similarities in decoration between Mitchell Ridge sherds and sherds from the Lower Mississippi Valley (from Phillips 1970) and Southern Louisiana (from Weinstein and Kelly 1992).

Polland, pers. comm. 1985), at the Early Historic Shanklin Site near the lower Colorado River in Wharton County (Hudgins 1984), and at various sites of the Late Prehistoric Rockport Phase such as 41CL2 near the Guadalupe River Delta, the Live Oak Point Site on Copano Bay and Site 41SP120 on Corpus Christi Bay (Ricklis 1990, Appendix A). Crenelation at these sites is usually found as the sole decoration on the pot, suggesting that it is analogous to the use of scalloping as a recurrent primary design element.

It is tempting to infer a broad sociocultural correlation with the largely non-overlapping but virtually contiguous distributions of the two kinds of lip modification. The geographic point along the coast at which crenelation shows up as a recurrent theme, the Brazos River delta, approximates that northern range generally attributed to Karankawan groups (Aten 1983a; Newcomb 1983). The design elements of crenelation and scalloping may thus represent stylistic information flow within linguistically and socioculturally defined bounds representing, respectively, Karankawans of the Brazos delta area and the central Texas coast, and Akokisa Atakapan speakers of the Galveston Bay area.

Typology of the Mitchell Ridge Pottery

As repeatedly noted above, the existing typology for upper coast ceramics is based primarily on the attribute of temper and secondarily on presence/absence of decoration, and thus is inherently limited for examining the spatial and temporal patterns of stylistic variability within the regional ceramic tradition. Nonetheless, the Mitchell Ridge sherd groups (vessels) from various excavation areas (the 1970s C. C. Area, and the 1992 Block, Feature 9 and Bayou Lots) are presented according to types in Table 7.8 for the sake of providing data which are comparable to those presented for ceramic samples from other reported sites in the region.

The types listed in Table 7.8 are, however, somewhat modified from the type/varieties generally presented for the upper coast and formalized by Aten (1979, 1983a). Goose Creek Plain and Baytown Plain are unchanged, representing, respectively, undecorated sandy paste and grog tempered pottery. The Goose Creek Incised and San Jacinto Incised types are also largely unchanged, though it should be noted that these types contain the patterned variability in primary and secondary decorative elements noted above. For reasons already presented, sherds with sublip incised diagonal cross-hatching are classified here as Harrison Bayou Incised, as distinct from the Goose Creek or San Jacinto Incised types into which they have generally been placed. The Goose Creek Red Filmed type, rare at Mitchell Ridge, is unchanged from the type described by Aten, consisting of sandy paste vessels onto which a red clay wash has been applied. It should be noted that the vessels here classed as Baytown Plain, following Aten (1983a), would as a group represent San Jacinto Plain as recently defined by Weinstein (1991:104), since virtually all contain sand as well as intentionally added grog; Weinstein has introduced the type San Jacinto Plain, *variety San Jacinto* to distinguish most upper Texas coast grog-tempered, undecorated pottery from the silty paste, grog-tempered pottery defined as Baytown Plain in the Lower Mississippi Valley region.

On the basis of the redundant occurrence of vessels on which various kinds of lip modification are the primary decorative element, two new types are provisionally defined, since it is believed that the assignment of such vessels to either the Goose Creek Plain or San Jacinto Plain types (according to the presence/absence of grog tempering in otherwise sandy paste pottery) masks the stylistic nature of these vessels. Goose Creek Modified Lip includes sandy paste pots with lip modification, and is subdivided into three varieties-- Scalloped, Nicked, Incised-- depending on the technique by which the lip modification was executed. Grog tempered vessels with lip modification as the primary design element are designated San Jacinto Modified Lip, in accord with the established tradition of designating decorated grog tempered sherds "San Jacinto". The same varieties are applicable.

A glance at the data in Figure 7.8 shows that the various Goose Creek, Baytown and San Jacinto types account for the great majority of the vessels at Mitchell Ridge (421 of a total of 449, or 93.7%). The relatively few residual vessels, pertaining to the Harrison Bayou Incised, Maddox Engraved(?) and Rockport Black-on-Gray types, and a few examples of bone tempered ware, comprise the balance of the sample.

Tempering and Chronology at Mitchell Ridge

The types listed in Table 7.8 express the proportions of sandy paste, grog tempered and bone tempered pots from the four pertinent excavation areas. These proportions are presented graphically in

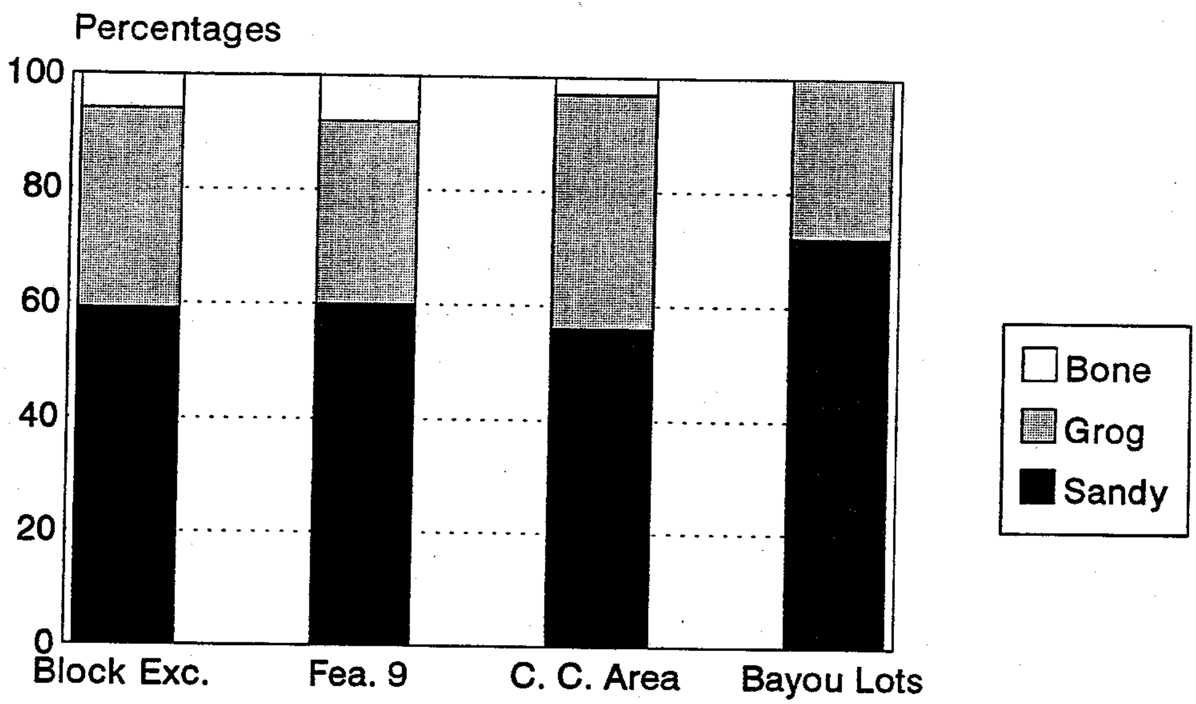
Table 7.8. Pottery types, by Excavation Area, Mitchell Ridge Site. Numbers refer to vessel counts.

TYPES	BLOCK	FEA. 9	BAYOU LOTS	C. C. AREA	TOTALS
Sandy Paste (Goose Creek series)					
Goose Creek Plain	121	19	9	55	204
Goose Creek Modified Lip					
var. Scalloped	8	1	1	13	23
var. Nicked	3	1		2	6
var. Incised	2			1	3
Goose Creek Incised	8	2	2	11	23
Goose Creek Red Filmed	2		1		3
Grog Tempered					
Baytown Plain*	62	9	2	39	112
San Jacinto Modified Lip					
var. Scalloped	6	1	1	4	12
var. Nicked				1	1
var. Incised				1	1
San Jacinto Incised	13	2	2	16	33
Others					
Harrison Bayou Incised	3				3
Maddox Engraved	1				1
Rockport Black-on-Gray	3				3
Bone Tempered					
Plain	11	3		4	18
Incised	3			1	4
TOTALS	246	38	19	148	450

* As defined by Aten (1983a); however, virtually all Baytown Plain sherds at Mitchell Ridge contain sand in addition to grog, and thus also conform to Weinstein's (1991:104) more recent definition of San Jacinto Plain, *variety San Jacinto.*

Figure 7.25. It will be seen that sandy paste pots predominate in all areas, comprising between 59% and 72% of the vessels. Grog tempered vessels are of secondary abundance, making up between 28% and 41% of the vessel total. Bone tempered pots are the least abundant, comprising less than 10% in all areas, and are absent altogether from the Bayou Lots.

In his ceramic seriation for the Galveston Bay area, Aten (1983a, Figure 14.1) indicates that grog tempering appears ca. A.D. 1000 and peaks around A.D. 1400, at which time it represents about 90% of the vessels. Grog tempering then declines in popularity to the point of near non-existence by ca. A.D. 1700. The chronological placements of the ceramic samples from the Block excavation and Feature 9, both of which are radiocarbon dated, do not conform well to expectations based on Aten's seriation. According to the seriation, the pottery from the Block Excavation should consist overwhelmingly of grog tempered



Bone	6		8		3		0
Grog	35		32		41		28
Sandy	59		60		56		72

Figure 7.25. Bar graphs showing percentages of vessels with sandy paste, grog temper and bone temper from four excavation areas, Mitchell Ridge Site.

pots, since four radiocarbon assays on features in that area place occupation in the fourteenth century, give or take a bit. Feature 9, basically dating to the sixteenth century, should have a markedly lower proportion of grog tempered pots, but this is in fact not the case; the proportions of grog tempered vs. sandy paste vessels are almost identical in the two samples. It might be argued that the ceramic sample from the Block is a mix of pottery from different time periods, with some of the pots having been made earlier or later than the radiocarbon-dated features. However, given the fact that the time-diagnostic lithic sample is clearly dominated by Perdiz arrowpoints, it seems reasonable to infer, as already noted earlier, that the great bulk of the artifactual debris can be attributed to the Final Late Prehistoric Period indicated by the radiocarbon assays.

The presence of bone tempered pottery does approximately conform to expectations derived from Aten's seriation: Most of his samples with bone tempered pottery are placed at ca. A.D. 1400 or later. In terms of relative chronology, then, the presence of bone tempered pottery at Mitchell Ridge is generally in accord with Aten's suggestion that it appears largely in the late part of the ceramic sequence. The complete absence of bone tempering from the Bayou Lots may indicate that part of the site saw more relatively early occupation than the other areas represented in Figure 7.24, a possibility which would accord with the greater proportion of sandy paste pots as opposed to grog tempered vessels. However, the sample of vessels from the Bayou Lots is probably too small (N=19) for anything beyond mere speculation. Given the tempering data from the Block Excavation and Feature 9, along with the questionable absolute chronological precision of Aten's seriation discussed in Chapter 3, it seems advisable that additional research should be carried out before sites are assigned to tightly defined temporal slots on the basis of the percentages of vessels with different tempering agents. Large ceramic samples from securely dated contexts will be needed to further test and refine the use of ceramic temper as a tool for the fine-tuning of chronology.