INTERPRETATIONS

This section of the report presents interpretations of the excavation data, as described earlier from all phases of archaeological studies at the Wrangle Hill Site. These discussions focus on site chronology, distributions of artifacts and features across the site, stone and ceramic technologies, and blood residue analysis.

Site Chronology

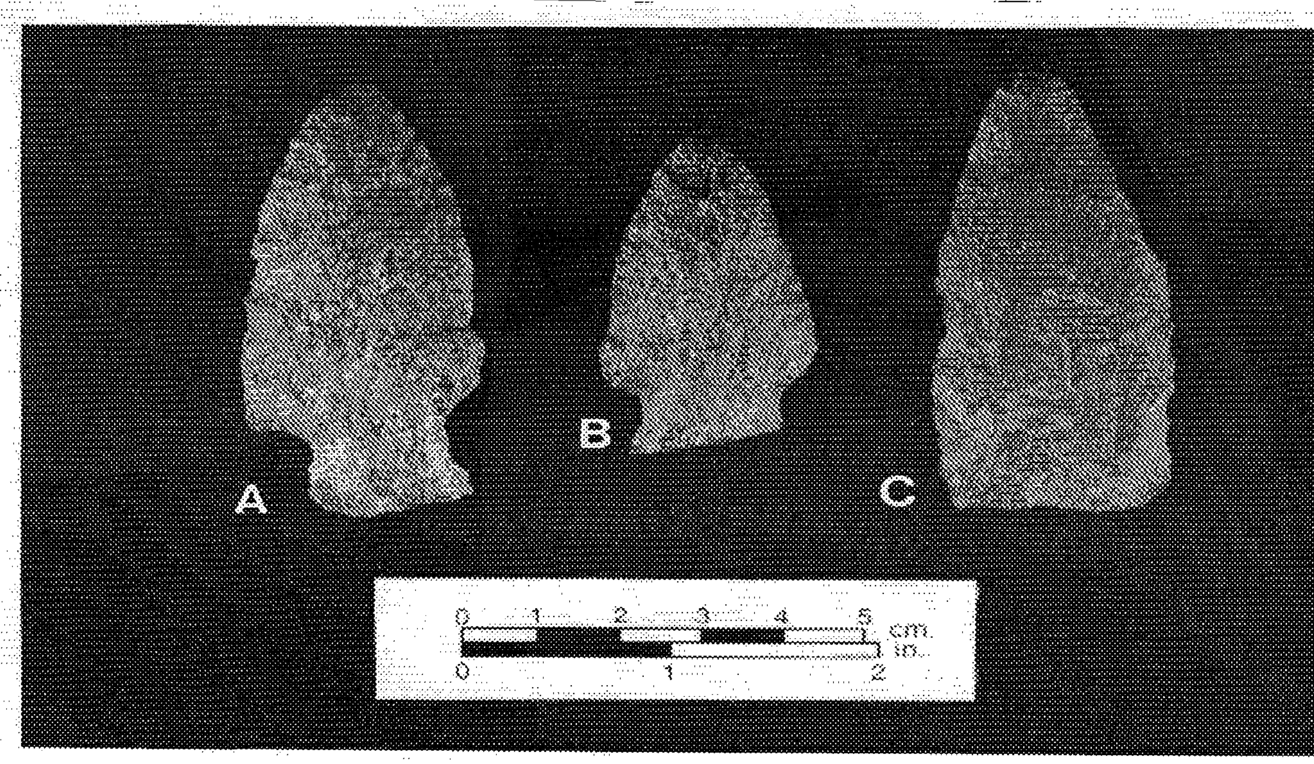
No carbon samples suitable for radiometric dating were recovered from the Wrangle Hill Site. Therefore, chronological interpretations must be based on diagnostic projectile points and ceramics. Date ranges for the diagnostic projectile point and ceramic types noted below come from the work of Custer (1989, 1994).

Plate 9 shows the diagnostic projectile point types found in disturbed plow zone soils. A bifurcate point (Plate 9A) dating to ca. 6500-6000 B.C. was the oldest diagnostic artifact found and indicates use of the site during the Archaic Period. A variety of stemmed point types are present and although not all varieties of stemmed points are useful as chronological markers, some are. Using the stemmed point typology originally devised by Kent (1970) and refined by Custer (1994), Type E (Plate 9B), Type D (Plate 9C - F), and Type B (Plate 9F - L) are present in the plow zone soils of the Wrangle Hill Site. The Type E and Type D points are not particularly diagnostic, and could date to a variety of time intervals within the later part of the Archaic and initial portions of the Woodland I Periods (ca. 4000-1000 B.C.). Type B points are somewhat more diagnostic and date to the period between 2500 B.C. and A.D. 500 of the Woodland I Period. It is interesting to note that all but one of the Type B points found at the site were made from ironstone and use of this distinctive locally available lithic raw material will be discussed later in this report. A teardrop point (Plate 9M) is also present in the plow zone assemblage and dates to ca. 1000-500 B.C. during the Woodland I Period. The final diagnostic point present in the plow zone assemblage is a triangular point (Plate 9N) which dates to the Woodland II Period (ca. A.D. 1000-1600).

Diagnostic projectile points from features are depicted in Plate 10. Only three diagnostic points were found in features with two found in Feature 83 (Type 1) and one found in Feature 73 (Type 4). The two points from Feature 83 (Plate 10A and B) are both Type I stemmed points which date to ca. 5000-2000 B.C. Their presence in a Type 1 pit house-related feature, examples of which are unknown from Archaic occupations, would suggest that they indicate a date of 3000-2000 B.C. for the feature. Also, both points are made from ironstone which is extensively used during that time interval (Ward 1985). However, it is also possible that the house feature dates to the later portion of the Archaic Period. Finally, it should be noted that the two points may indeed date to the later portions of the Archaic Period and were accidentally included in the pit fill of a later feature. However, the presence of

PLATE 10

Proiectile Points from Features



2 cm
1 inch

A: 92-192-267 (ironstone) - Feature 83
B: 92-192-267 (ironstone) - Feature 83
C: 92-192-247 (ironstone) - Feature 73

the two very similar points in the same feature makes their accidental inclusion in a later feature somewhat unlikely. A Type B stemmed point (Plate 10C) dating to ca. 2500 B.C. - A.D. 500 was found in Feature 83, a Type 4 refuse pit.

Only a few diagnostic ceramic sherds were found at the Wrangle Hill Site and with one exception, they were all quite small. The one exception is a large and badly preserved section of a Nassawango vessel tempered with crushed quartz and pieces of other ceramic sherds (Plates 4 and 11). This vessel section was found in Feature 75 and had badly deteriorated. A block of the soil matrix containing the sherds was removed from the feature fill, and conservation and stabilization are still in progress. Table 4 lists the ceramics found at the site, their provenience, and their ages. Plate 12 shows examples of some of the larger ceramic sherds including Nassawango (Plate 12A), Killens (Plate 12B), and Hell Island (Plate 12C) sherds.

Figure 14 shows the composite date ranges of the diagnostic projectile points and ceramics from the Wrangle Hill Site. The majority of the diagnostic artifacts span a fairly long time period of more than 6000 years from the later portions of the Archaic Period, through the Woodland I Period, and into the Woodland II Period, indicating numerous occupations of the site during those time intervals. A single bifurcate point indicates additional occupations of the site at the beginning of the Archaic Period. It is impossible to tell how many occupations may have occurred, and the small number of features with diagnostic artifacts makes it impossible to analyze the spatial distribution of dated features.

PLATE 11
Nassawango Vessel Section

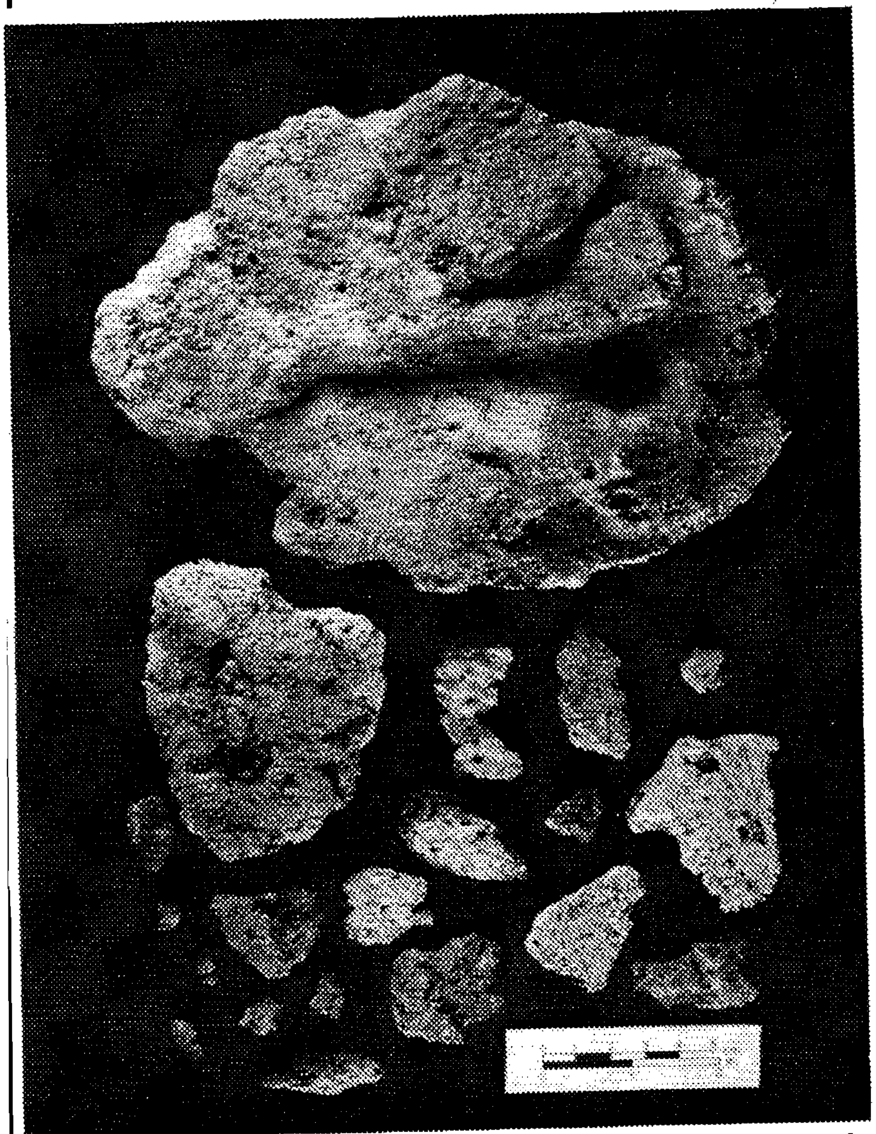


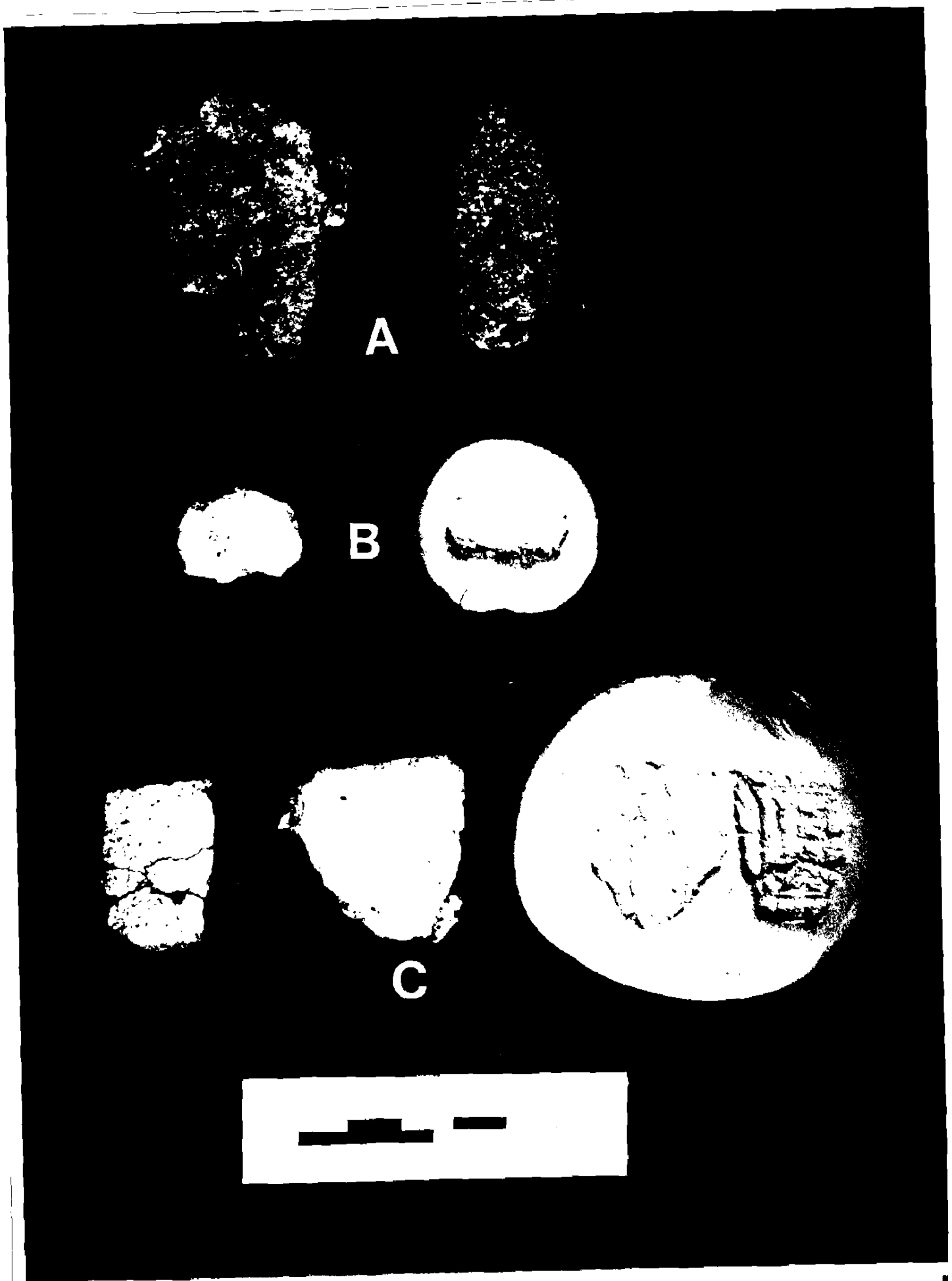
TABLE 4
Diagnostic Ceramic Types and Dates

CERAMIC TYPE*	DATES	PROVENIENCE Plow Zone	Features
Nassawango	700 BC - 400 BC		X
Hell Island	AD 600 - AD 1000	X	X
Killens	AD 1000 - AD 1600	X	X

X - Present
* Source for type descriptions and dates is Custer 1989: 166-176.

PLATE 12

Ceramic Sherds and Textile Impressions



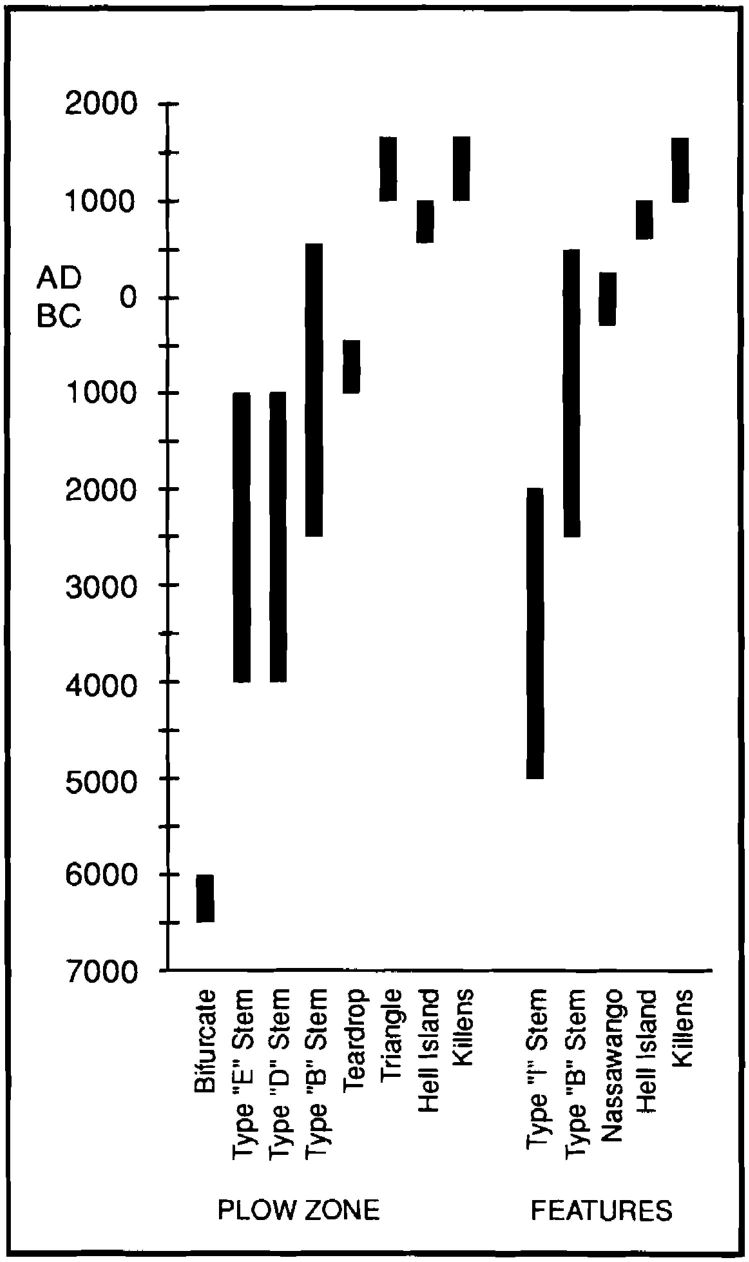
A: 92-192-253 (Feature 75)

B: 92-192-260 (Feature 79)

C: 92-192-264 (Feature 80)

FIGURE 14

Date Ranges of Diagnostic Artifacts



Plow Zone Artifact Distributions

Contour maps of plow zone distributions of total artifacts (Figure 15), and fire-cracked rock by weight (Figure 16) were generated. These maps are generalizations of the discontinuous data obtained from plow zone excavation units and are smoothed estimates of the actual distributions of material; however, because the sampling percentage was high, the distributions are accurate reflections of material in the plow zone of the site.

The total artifact distribution in the plow zone, which consisted primarily of debitage, is concentrated in two areas of the site (Figure 15). The greatest concentration of debitage is in the northeast corner of the core site area. A second concentration is in the south center of the core area. The center and southeast corner of the core area contain relatively low numbers of flakes. Fire-cracked rock (FCR) is discontinuously distributed across the core area of the Wrangle Hill Site (Figure 16) with major concentrations in the northeast and south central portion of the core area.

In general, the artifact concentrations in the plow zone do <u>not</u> match with the location of sub-surface features. Plow zone artifact concentrations are located to the north and west of the areas with the highest feature densities (compare Figures 11, 15, and 16). It is possible that the artifact concentrations adjacent to the pit features are work and artifact disposal areas that were related to use of the features for resource processing. However, it is also possible that the plow zone artifact distribution has been affected by erosion and cultivation.

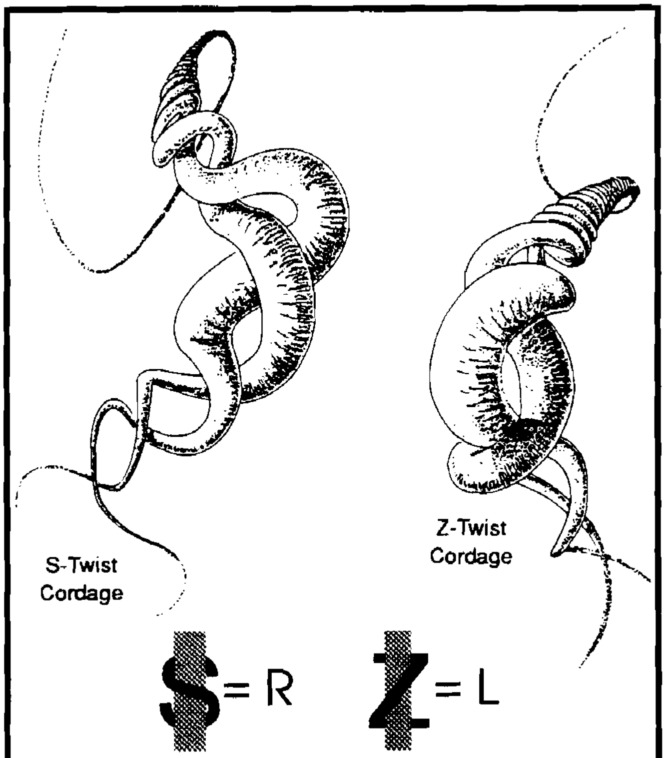
Analysis of Feature Distributions

Figure 17 shows the distributions of the varied feature types at the Wrangle Hill Site, and the potential outlines of the Type 1 house features have been added to the distribution map. The dense cluster of overlapping houses in the southwest corner of the site's core area clearly shows that multiple occupations of the site must have taken place. Furthermore, many of the projected house outlines cross-cut Type 4 and 5 features as well. In sum, the feature distribution map shows that the site was most likely occupied by small individual family groups. The site was not contemporaneously occupied by multiple families. The overlapping nature of the houses and features makes it difficult to gain additional insights from analysis of the feature distributions.

Blood Residue Analysis

A sample of tools and flakes found in features at the Wrangle Hill Site was subjected to blood residue testing using procedures as described by Custer, Ilgenfritz, and Doms (1988). In addition to the artifacts, soil samples from features were also tested to ascertain whether any contaminants, which would result in false positive results, were present at the site. No indications of false contaminants were present indicating that blood residue testing could successfully be applied to the artifacts. Unfortunately, no positive reactions were obtained from any of the artifacts. The absence of positive reactions does not indicate that blood was never present on the artifacts. Instead, the absence of positive reactions simply indicates that blood residues are not now present on the artifacts.

FIGURE 18
Varieties of Cordage Twists



Direction of twist, spin or weft slant and symbols employed in their description (after Hurley, 1979)

TABLE 5
Delaware Cordage Twist Data

CERAMIC TYPE	SITE	TWIST S	TWIST Z
Dames Quarter	Leipsic	1	0
Wolfe Neck	Snapp	1	0
	Pollack	1	0
Nassawango	Wrangle Hill	1	0
Mockley	Leipsic	1	1
Hell Island	Wrangle Hill	1	0
	Leipsic	2	0
	Paradise Lane A	0	1
	Paradise Lane B	1	0
Clemson Island	Leipsic	2	0
Killens	Wrangle Hill	1	0
	Leipsic	4	1
	Pollack	2	7
Townsend	Leipsic	2	1
Minguannan	Pollack	2	9

References
Leipsic Site - Custer, Riley, and Mellin (1994)
Paradise Lane Site - Riley, Custer, Hoseth, and Coleman (1994)
Pollack Site - Custer, Hoseth, Silber, Grettler, and Mellin (1994)
Snapp Site - Custer and Silber (1994)

Analysis of Ceramic Technologies

Most of the ceramic sherds from the Wrangle Hill Site are too small for meaningful analysis. However, the large section of a Nassawango vessel (Plates 4 and 11) does merit more detailed description. The Nassawango vessel is coil-constructed, and is tempered with crushed quartz and small fragments of fired clay. Many of the sherds were badly preserved and the outer surface of some peeled away from the remainder of the sherd revealing the inner consistency of the clay paste. In these sherds, clay temper particles outnumbered particles of quartz temper by approximately ten to one. Some small pieces of garnet were also present and may be natural inclusions in the original clay paste.

Latex casts were made of the exterior surfaces of the ceramic sherds, where possible, in order to study the textiles used to make cordage impressions on the ceramic vessels. Latex impressions for a Hell Island and a Killens sherd are shown in Plate 12. No latex impression of the Nassawango vessel were made due to its fragile condition. However, cordage impressions could be seen in the soil matrix that was removed with the vessel. No examples of net-marking were present on any of the sherds; only cord-marking was present.

The twist direction of the cordages used to make impressions on the vessels was recorded in order to complement similar analyses undertaken at other sites in Delaware (e.g., Custer and Silber 1994). Twist directions of cordage is of interest because some studies (Johnson and Speedy 1992) have suggested that cordage twist direction can be linked to ethnic group affiliations. Cordage twists can be either an S-twist or Z-twist direction (Figure 18). Cordage twist directions could be determined for three vessels from the Wrangle Hill Site: Nassawango vessel (S-twist), Hell Island vessel (S-twist), and Killens vessel (S-twist). Table 5 shows a compilation of vessel-based cordage twist data for Delaware, including the Wrangle Hill

TABLE 6
Total Lithic Artifact Assemblage and Raw Materials

TOOL TYPE	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Other	TOTAL
	RAW MATERIALS								
Flakes	469 (22)	191 (31)	87 (17)	138 (32)	22 (0)	11 (0)	1395 (0)	11 (7)	2324 (109)
Utilized flakes	4 (1)	6 (2)	3 (1)	12 (4)	0	0	4 (0)	0	29 (8)
Flake tools	1 (1)	1 (0)	1 (1)	1 (1)	0	0	3 (0)	0	7 (3)
Points	5 (0)	1 (0)	0	2 (0)	0	1 (0)	8 (0)	0	17 (0)
Early stage biface rejects	5 (1)	2 (1)	0	1 (1)	0	0	9 (0)	0	17 (3)
Late stage biface rejects	1 (0)	0	0	0	0	0	5 (0)	0	6 (0)
Other bifaces and fragments	2 (0)	5 (0)	0	1 (0)	1 (0)	0	11 (0)	0	20 (0)
Miscellaneous stone tools	1 (0)	1 (0)	2 (1)	2 (0)	0	0	2 (0)	3 (0)	11 (1)
Cores	0	0	1 (0)	2 (0)	0	0	3 (0)	0	6 (0)
TOTAL	488 (25)	207 (34)	94 (20)	159 (38)	23 (0)	12 (0)	1440 (0)	14 (7)	2437 (124)

(#) - number of artifacts with cortex

TABLE 7
Total Lithic Artifact Assemblage - Cortex Percentage

TOOL TYPE	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Other	TOTAL
	RAW MATERIALS								
Flakes	5	16	20	23	0	0	0	64	5
Utilized flakes	25	33	33	25	--	--	0	--	28
Flake tools	100	0	100	100	--	--	0	--	43
Points	0	0	--	0	--	0	0	--	0
Early stage biface rejects	20	50	--	100	--	--	0	--	18
Late stage biface rejects	0	--	--	--	--	--	0	--	0
Other bifaces and fragments	0	0	--	0	0	--	0	--	0
Miscellaneous stone tools	0	0	50	0	--	-	0	0	9
Cores	--	--	0	0	--	-	0	--	0
TOTAL	5	16	21	24	0	0	0	50	5

data. At the present time, the data base is quite small, only 42 vessels, and no interpretations of the compiled data are offered here. Nevertheless, these data are available for other researchers to use.

Analysis of Lithic Technologies

Table 6 shows a summary catalog of the flaked lithic artifacts from the Wrangle Hill Site, and notes the raw materials used and the number of artifacts with cortex present. Table 7 is derived from Table 6 and shows the percentage of artifacts with cortex for each raw material. Table 8 is also derived from Table 6 and shows the raw material percentages used for each artifact type.

TABLE 8
Total Lithic Artifact Assemblage - Raw Material Percentage by Tool Type

	RAW MATERIALS							
TOOL TYPE	Quartzite	Quartz	Chert	Jasper	Rhyolite	Argillite	Ironstone	Other
Flakes	20	8	4	6	1	<1	60	<1
Utilized flakes	14	21	10	41	0	0	14	0
Flake tools	14	14	14	14	0	0	43	0
Points	29	6	0	12	0	6	47	0
Early stage biface rejects	29	12	0	6	0	0	53	0
Late stage biface rejects	17	0	0	0	0	0	83	0
Other bifaces and fragments	10	25	0	5	5	0	55	0
Miscellaneous stone tools	9	9	18	18	0	0	18	27
Cores	0	0	17	33	0	0	50	0
TOTAL	20	8	4	7	1	<1	59	<1

Table 7 shows that in the overall artifact assemblage, cortex is present on only five percent of the artifacts. This percentage of artifacts with cortex is rather low considering the fact that abundant cobble lithic resources are present at the site. The highest cortex percentages are seen for utilized flakes, and flake tools. These higher percentages suggest that local cobble resources were used to manufacture some specialized flake tools.

Table 8 shows that ironstone is the most commonly used lithic raw material in the flaked artifact assemblage. Ironstone occurs in flat plates at the site and was the lithic material most commonly used to manufacture stone tools at the site. The preferred use of ironstone probably accounts for the infrequent use of local cobble resources. It is possible that the cryptocrystalline cobble tools were part of a curated tool kit that was brought to the site. As these tools were used and became dull, they may have been discarded and replaced with ironstone tools manufactured at the site. It is also possible that the flake tools manufactured from secondary cryptocrystalline materials were manufactured at the site for special purposes for which ironstone tools were not appropriate.

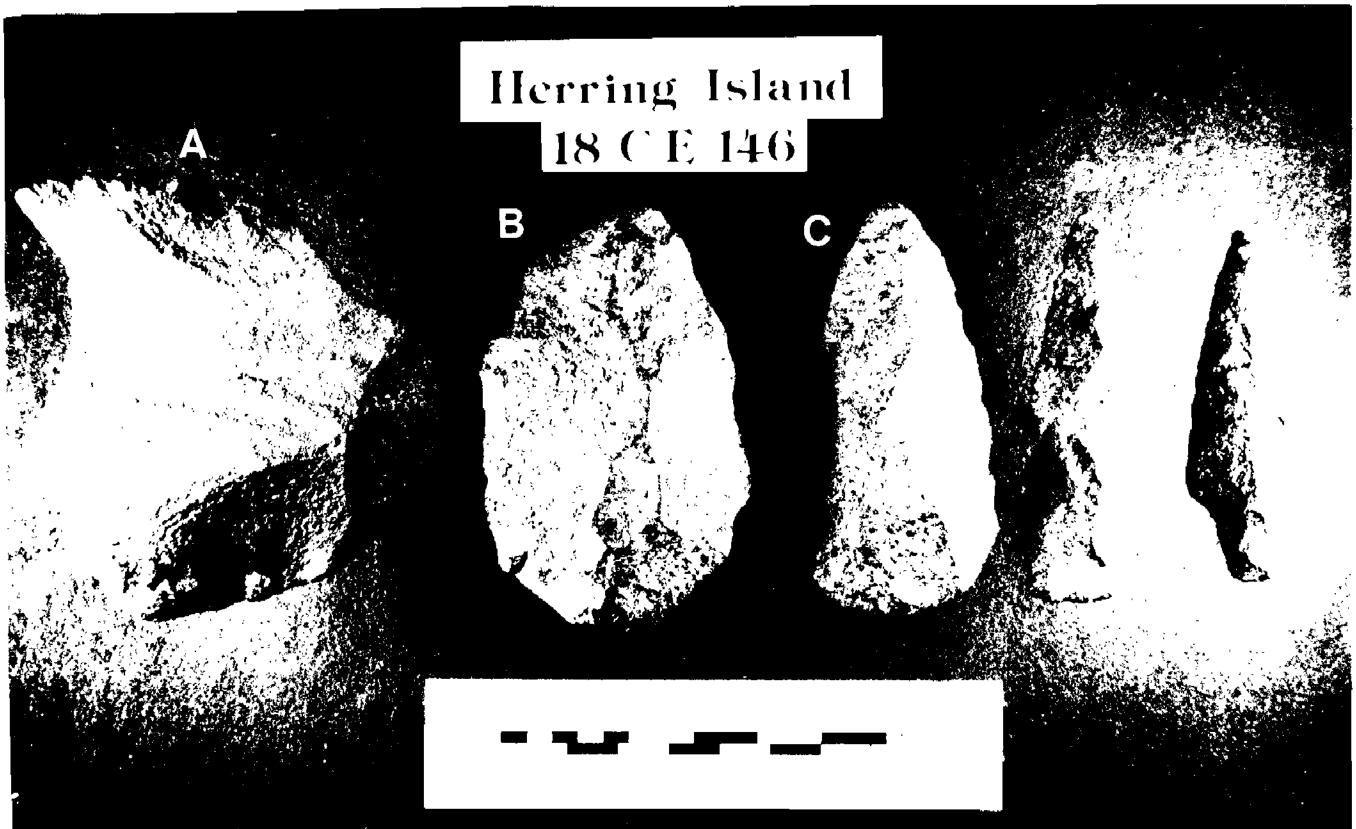
Table 9 lists the tool types present at the site. The sample size is small, and there are very few formalized flake tool types in the assemblage. Undifferentiated pieces of debitage seem to have served the cutting and scraping needs of the Wrangle Hill Site's prehistoric inhabitants. These expedient tools were manufactured at the site using locally available raw materials, especially ironstone.

TABLE 9
Tool Types

Points/knives	17
Late stage bifaces	6
Early stage bifaces	17
Drills	0
Concave/biconcave scrapers	1
Bifacial side scrapers	1
Unifacial side scrapers	4
Trianguloid end scrapers	1
Slug-shaped unifaces	0
Wedges	0
Primary cores	6
Secondary cores	0
Denticulates	0
Gravers	0
Regular utilized flakes	29
Blade-like utilized flakes	0
Total	82

PLATE 13

Ironstone Reduction Sequence - Herring Island Site



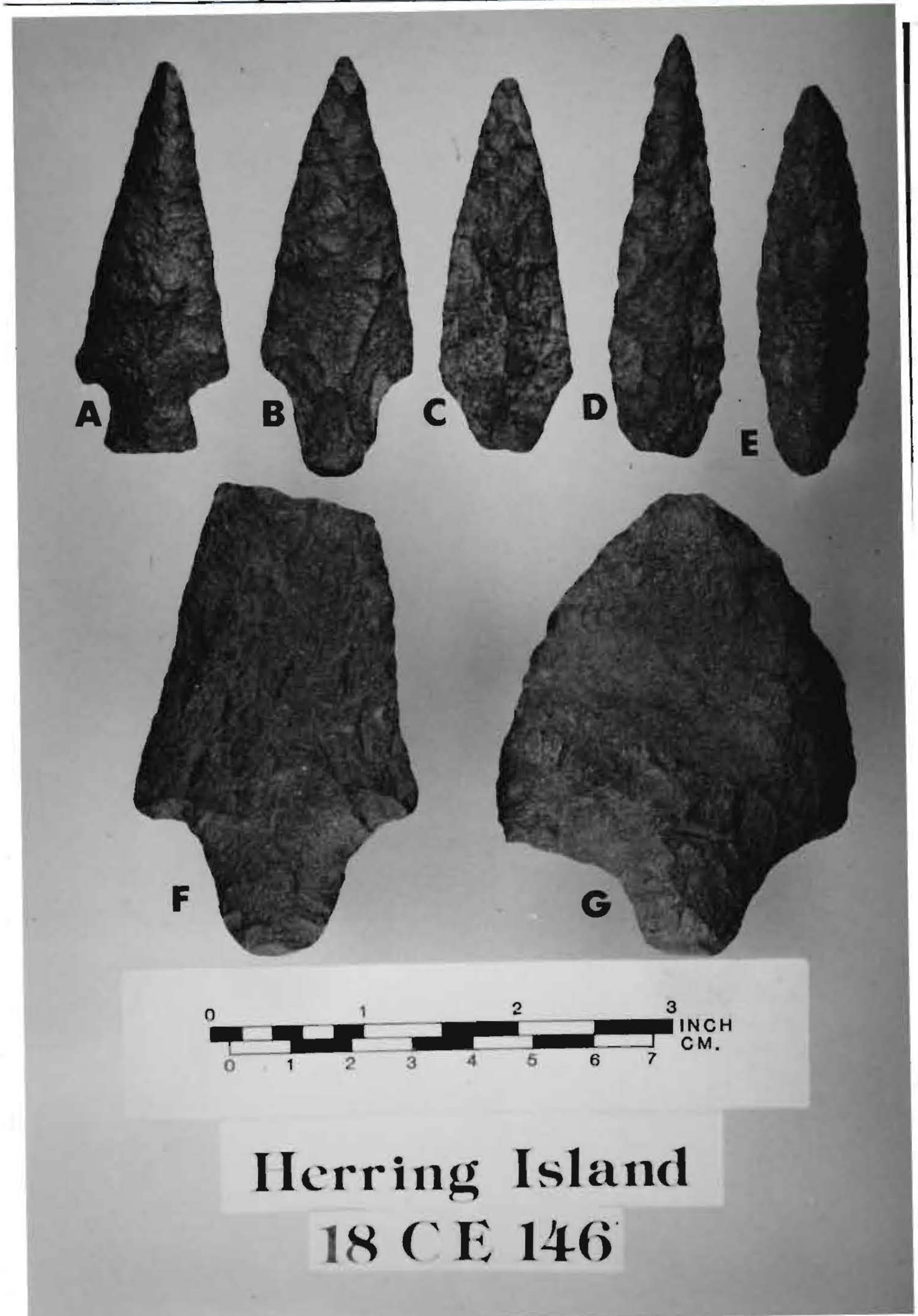
A: Ironstone Plate with Initial Edging
B: Early Stage Biface
C: Middle Stage Biface
D: Projectile Point Preform
E: Finished Type B Stemmed Point

Although ironstone can be found at many sites in the northern Delmarva Peninsula, and is present in most Woodland I artifact assemblages from the area (Ward 1985), the intensive use of this material at the Wrangle Hill Site is not commonly seen. In fact, the only other site in the region with a comparably high incidence of ironstone use is the Herring Island Site (18CE146), a prehistoric ironstone quarry site in the Elk River drainage of Cecil County, Maryland (Ward 1985). Research at the Herring Island Site showed that there was a special series of lithic reduction stages in the production of ironstone projectile points, and artifacts from those production stages at the Herring Island Site are shown in Plate 13. The production sequence begins with a flat plate of ironstone, its natural form of occurrence. The flat plate is in many ways a "biface preform" in its unaltered form because the plates are relatively thin in comparison to their length and width. A critical step in biface and projectile point manufacturing is the production of a tool that is much wider than it is thin (Callahan 1979), and tools are often broken when prehistoric artisans were trying to produce this form. Ironstone plates approximate this shape in their natural form.

After the initial ironstone plate is obtained, flakes were removed from its margins to produce a bifacial edge. Then, the basic shape of the biface, or projectile point, was produced. Plate 14 shows the most common projectile point forms made from ironstone found at the Herring Island Site. Stemmed point Types B, D, and I, and Lehigh/Koens Crispin/Long broadspear forms are present. Finally, the thinned edges of the point were produced to complete the reduction sequence.

PLATE 14

Ironstone Projectile Points - Herring Island Site

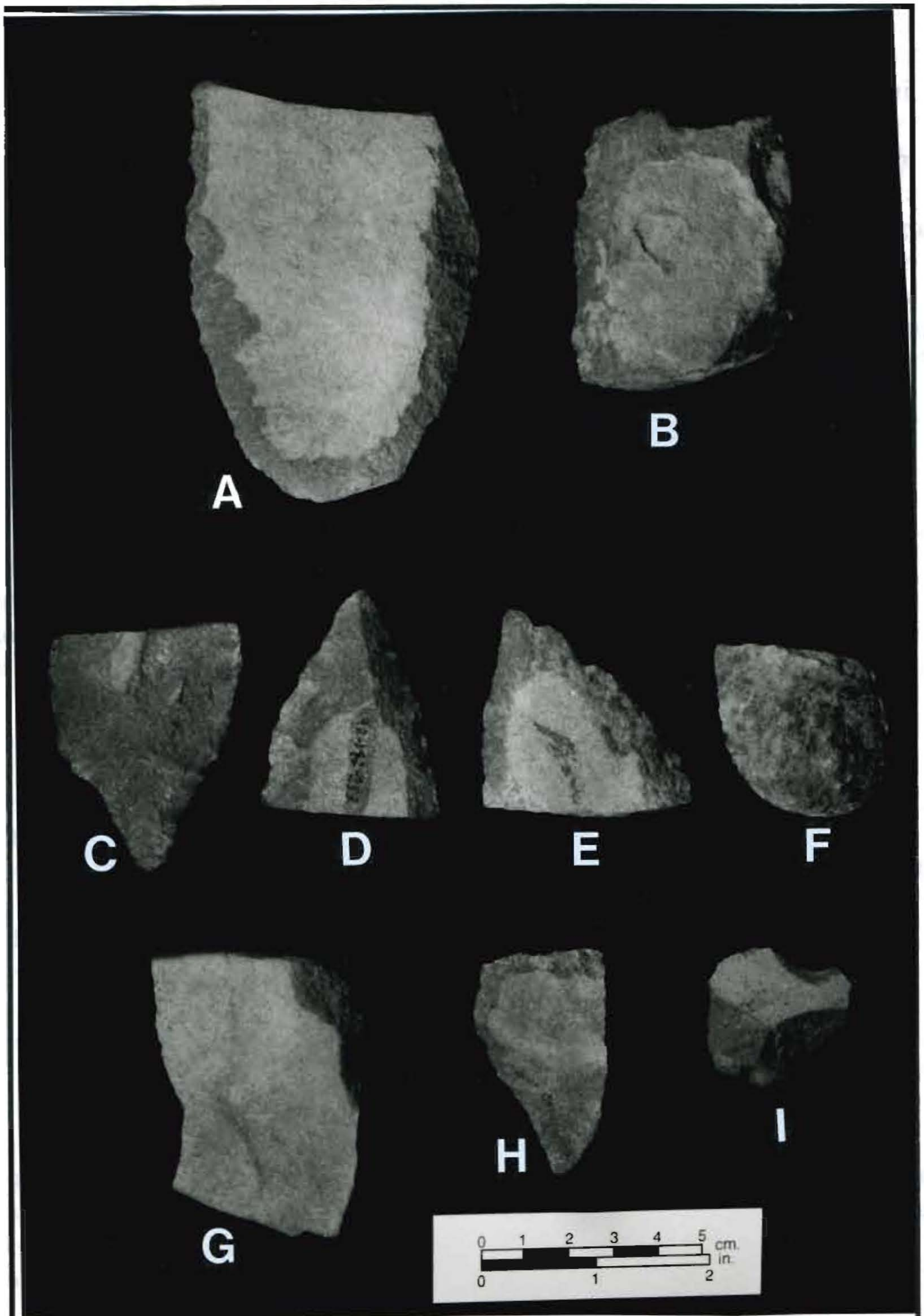


A: Type D Stemmed
B: Type B Stemmed
C: Type E Stemmed
D: Type E Stemmed
E: Type E Stemmed
F: Savannah River/Long Broadspear
G: Lehigh/Koens-Crispin Broadspear

Plate 15 shows a series of ironstone artifacts from the Wrangle Hill Site, and the reduction sequence is identical to that seen from Herring Island. The artifacts shown in Plate 15A and 15B are early stage bifaces and are essentially thin plates of ironstone that were broken in the process of initial

PLATE 15

Ironstone Artifacts - Wrangle Hill Site



A: 92-192-0 (surface)	D: 92-192-253 (Feature 75)	G: 92-192-248 (Feature 73)
B: 92-192-0 (surface)	E: 92-192-165 (plow zone)	H: 92-192-18 (plow zone)
C: 92-192-0 (surface)	F: 92-192-100 (plow zone)	I: 92-192-44 (plow zone)

edging. Ironstone is a relatively "tough" stone material to work in that it is difficult to remove flakes from the plates. Experimental studies conducted by Ward (1985) with the assistance of Errett Callahan showed that a very low striking angles and high energy blows were needed to remove flakes. Nevertheless, ironstone is also rather brittle in addition to being "tough," and the high energy blows sometimes snap off the end of the plates during the biface reduction sequence. The biface depicted in Plate 15A shows one such snap break. The blow which broke the biface was probably delivered to the end of the biface that is missing.

Ironstone bifaces could also be broken during the later stages of reduction and the artifacts shown in Plates 15C-F are all examples of similar snap breaks during final biface production. Two of the later stage bifaces (Plates 15C and D) show the initial shaping of the contracting stems characteristic of Type B stemmed points. These stems were shaped rather early in the biface reduction process, and similar trends in initial shaping of contracting stem points, such as Type B stemmed points and various broadspear varieties (Lehigh/Koens Crispin, Long, Savannah River), are seen in quartzite technologies of southeastern Pennsylvania (Custer 1994).

The range of projectile point types manufactured from ironstone at the Wrangle Hill Site is similar to that seen at Herring Island Site, but there are some differences. No ironstone broadspear forms were present at Wrangle Hill, but are present at Herring Island (Plate 14), and no Type I stemmed points were present at Herring Island, but are present at Wrangle Hill (Plate 10A and B). Stemmed Point Types B, D, and E were present at both sites (Plates 9D, 9F-L, 10C, and 14), with Type B being the most common. The absence of the broadspear forms in the Wrangle Hill assemblage may indicate that its ironstone artifact assemblage does not post-date 2500 B.C. The presence of broadspear forms at Herring Island may also indicate that ironstone assemblages from that site extend to as late as A.D. 500.

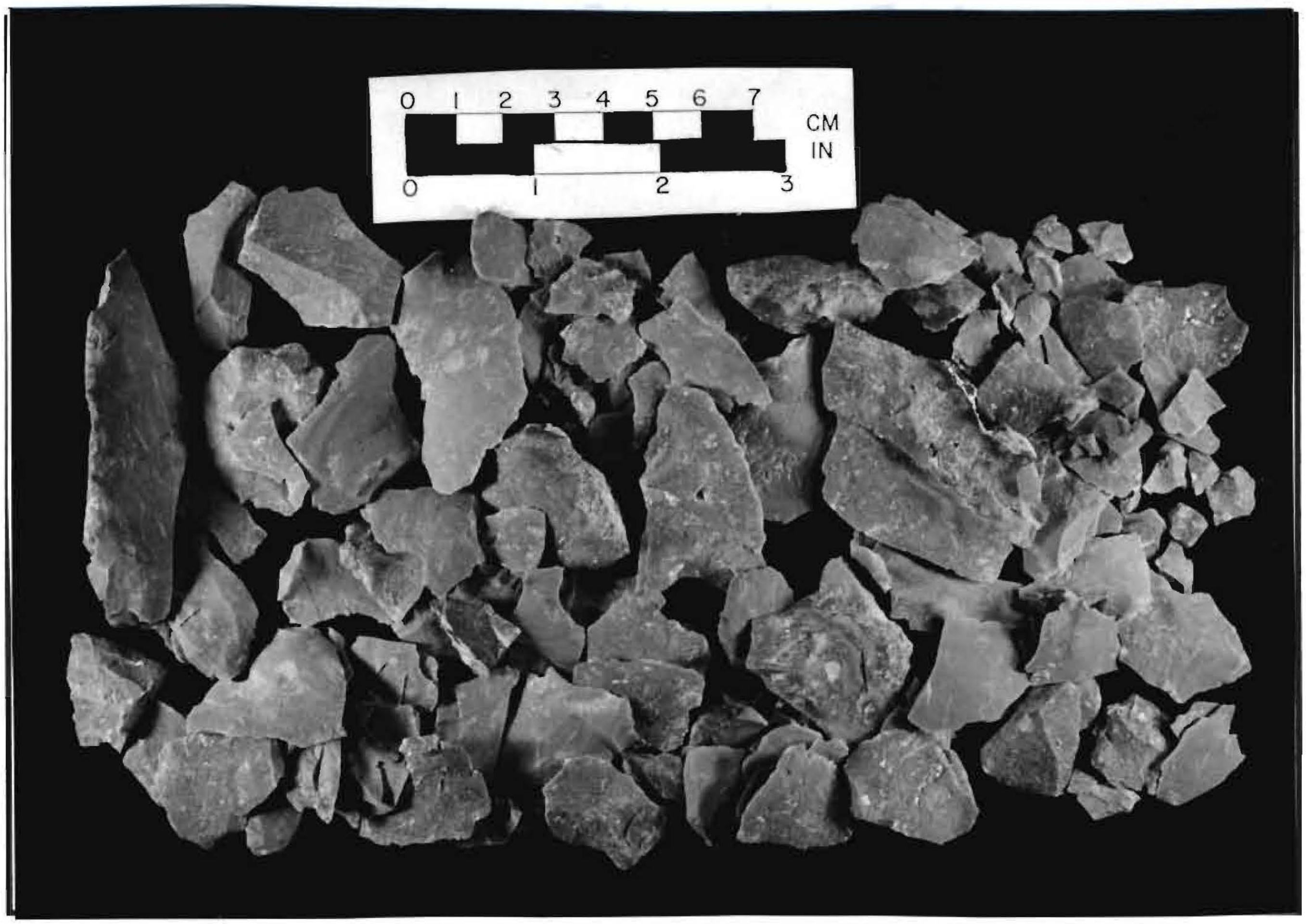
Ironstone was also used to produce flake tools, and three examples are shown in Plate 15G-I. Two examples (Plate 15G and H) have bifacially worked edges that could be used for either cutting or scraping purposes. The squared unmodified edges of the initial ironstone plates located on the sides of the tools opposite to the cutting edges provide convenient and comfortable places to hold the tools similar to the "backed blades" seen in European Upper Paleolithic tool kits, and they may have been used as expedient tools without any kinds of hafting elements or handles. The flake tool shown in Plate 15I has been unifacially retouched to form a concave scraping edge, perhaps for use as a spokeshave. The unmodified edges of the flake on the sides of the tool opposite to the concave scraping area suggest that this tool was also used without any kind of handle. Thus, ironstone flake tools seem to have been used primarily on an expedient basis, perhaps without the benefit of handles.

As part of the analysis of the ironstone assemblage from the Wrangle Hill Site, a sample of ironstone debitage was studied to identify the kinds of lithic reduction activities that produced them. Debitage from other types of lithic raw materials were not analyzed because the disturbed plow zone context of these artifacts makes their aggregation into a lumped sample meaningless. In contrast, ironstone use has a somewhat limited time range of use in the northern Delmarva Peninsula region (Ward 1985).

The flake attribute analysis method used here is based on research presented in other reports in this series (Riley, Custer, Hoseth, and Coleman 1994), and recognizes a variety of attributes that can be used to identify debitage from core or flake reduction. An important point to note is that we have not used these attributes to take individual flakes and identify them as core or biface flakes, as has been done by other researchers. Rather, this research seeks to identify the overall distribution of certain attributes

PLATE 16

Flakes from Experimental Production of Stone Tools



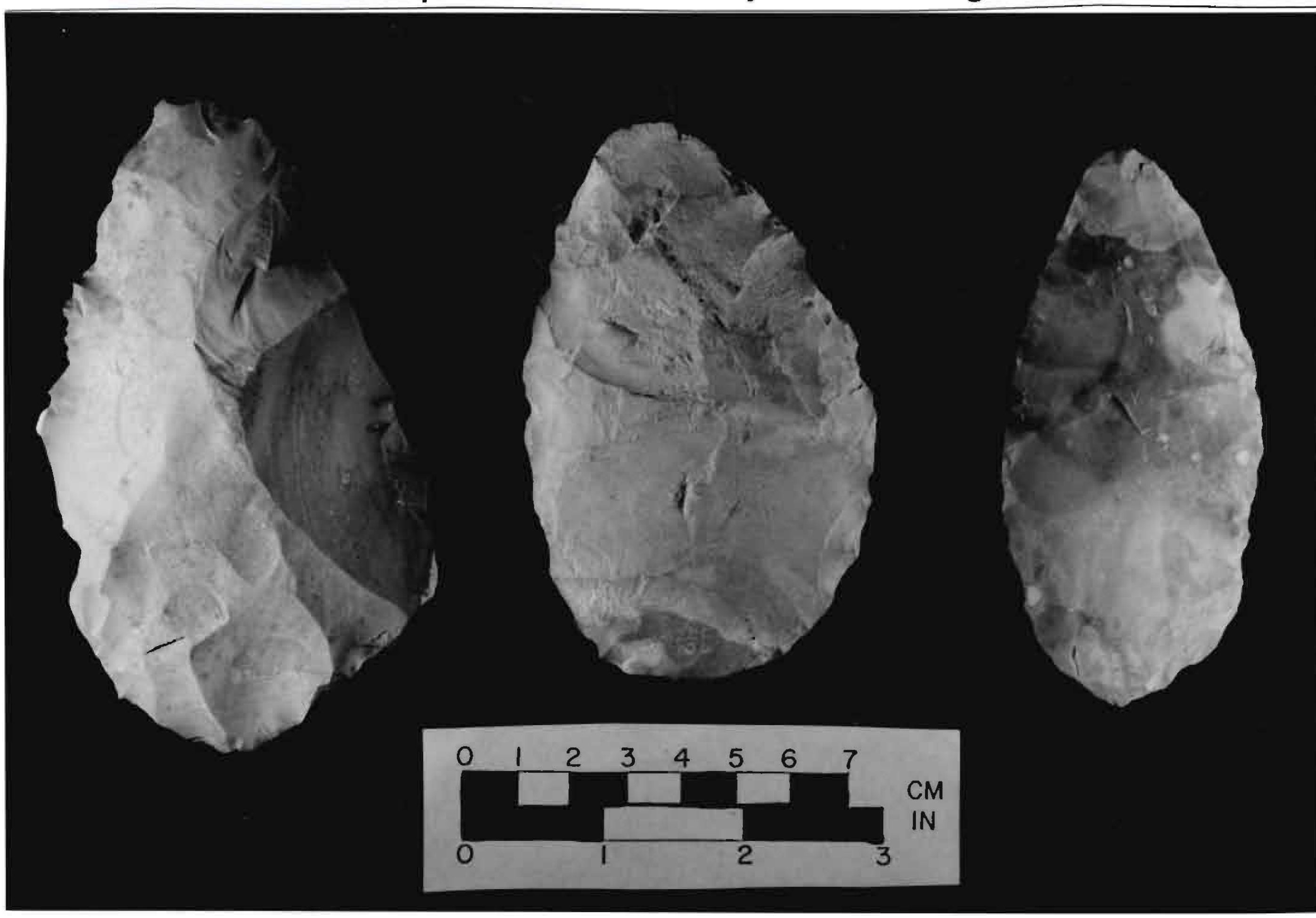
within an assemblage of flakes and then identify the type of reduction activity that most likely produced the assemblage. This assemblage approach has been shown to be more accurate than the individual flake study approach (Lowery and Custer 1990).

As stated above, the standard goal of flake attribute analysis is to determine if the debitage was produced by core or biface reduction. However, an additional goal of this study of only ironstone debitage was to see if there were any characteristics of the distribution of debitage attributes unique to ironstone. Standard flake attribute analysis uses control samples of flakes derived from the experimental production of cores and flakes, but all of the control samples are from cryptocrystalline materials (Plates 16 and 17). Unlike cryptocrystalline materials, ironstone occurs in flat plates. Ironstone is also "tougher," more brittle, and has a more granular texture than cryptocrystalline materials (Ward 1985). Also, it was clear from the remainder of the ironstone artifact assemblage that much of the ironstone reduction involved the production of bifaces from the flat ironstone plates. Thus, the flake attribute analysis sought to see if reduction of flat ironstone plates produced distinctive distributions of debitage attributes that were different from those of the control samples.

Table 10 shows the flake attribute data from the core and biface control samples and a 50-flake sample from the Wrangle Hill Site. An additional 50-flake ironstone sample from the Pollack Site (Custer, Hoseth, Silber, Grettler, and Mellin 1994) was also included for comparative purposes. The

PLATE 17

Bifaces Replicated by Errett Callahan for Experimental Study of Debitage



selection of attributes used is based on the work of Verrey (1986), Magne (1981), and Gunn and Mahula (1977) and syntheses of these studies with respect to Delmarva Peninsula data (Lowery and Custer 1990; Riley, Custer, Hoseth, and Coleman 1994).

The percentage values for the ironstone debitage assemblages shown in Table 10 are virtually identical. Application of a difference-of-proportion test (Parsons 1974) showed no significant differences between the two assemblages. This pronounced similarity between the Wrangle Hill and Pollack ironstone samples would seem to indicate that the shape of the ironstone plate and its physical characteristics produce distinctive debitage characteristics. When the flake type attribute is considered, there are few complete flakes in the ironstone assemblages, as is the case for the biface control assemblage. However, the low number of complete ironstone flakes is as much a function of the brittle nature of the ironstone as it is any kind of concentration on production of ironstone bifaces. Ward (1985) notes that during experimental studies, most flakes crumbled and broke when they were detached from the ironstone plates and this fact probably also accounts for the large number of small flakes in the ironstone assemblages.

With regard to platform shape, the ironstone flake assemblage is dominated by round platforms. Neither the biface nor the core control samples showed similarly high values and, thus, the predominance of round platforms is probably due the particular physical characteristics of ironstone. No remnant biface edges were present in the ironstone assemblages, probably due to the squared shape of the edges of the ironstone plates. Evidence of platform preparation was also rare in the ironstone assemblages and in this respect these assemblages are similar to the core control assemblage. Ironstone flake scar and scar direction counts are both most similar to the values for the core control sample. In sum, the ironstone debitage samples showed similarities to both core and biface control assemblages, and exhibited their own unique characteristics as well. Based on the experimental studies, it seems as if the physical characteristics of the ironstone plates are the most important determinant of ironstone flake attributes. Therefore, we cannot really compare them with the control samples and state that core or biface reduction were predominant. Future flake attribute studies which include ironstone debitage with debitage from other raw materials should consider the fact that the attributes of the ironstone flakes may be skewing the sample attribute distributions.

TABLE 10

Ironstone Flake Attribute Data

Attributes	Biface Control	Core Control	Wrangle Hill Sample	Pollack Sample
Flake Type				
Complete	12	63	18	22
Proximal	28	19	24	24
Medial	26	4	22	14
Distal	35	14	36	40
Flake Size				
Small	78	49	70	75
Medium	20	46	30	25
Large	2	5	0	0
Platform Shape				
Triangular	81	10	0	0
Flat	7	37	4	0
Round	12	35	96	100
Remnant Biface Edge				
Present	19	3	0	0
Absent	81	97	100	100
Platform Preparation				
Present	88	10	2	3
Absent	12	72	98	97
Scar Count				
Mean	2	1	1	1
Standard deviation	1	1	1	1
Scar Direction				
Mean	2	1	1	1
Standard deviation	1	1	1	1

Note: All values are percentages.

The final topic to be considered in the analysis of lithic artifacts from the Wrangle Hill Site is the breakage and use wear attributes of the projectile point assemblage. Many of the projectile points from the site show transverse fractures indicative if knife use (e.g., Plates 9B, D, G, I-L, and 10C). All but one of these artifacts are ironstone stemmed points and similar point breakage patterns were noted for the Hawthorn Site, a transient hunting camp dating to the same time period in northern New Castle County, Delaware (Custer and Bachman 1984). Furthermore, of the eight points with transverse fractures, six (75%) were Type B stemmed points. These findings suggest that ironstone Type B points were special function cutting tools. The transverse medial breakage patterns are usually associated with rather heavy cutting activities that require twisting motions (Truncer 1990) and these kinds of cutting motions have been linked to the initial stages of butchering of game animals (Custer and Bachman 1984). Therefore, the breakage patterns for ironstone stemmed points, particularly Type B varieties, suggest that they were used for the heavy cutting associated with the early stages of butchering of butchering of game animals.

Some projectile points show signs of tip damage indicative of use as true projectiles (Odell and Cowen 1986). Examples include the points shown in Plate 9C, E-F, H, and N. These points tend to be narrower than the points used as knives (compare Plate 9G and H). Past studies of projectile point dimensions seem to suggest that true projectiles are narrower than knife forms to allow better penetration (Custer 1991), and the limited artifact sample from the Wrangle Hill Site seems to confirm these findings.