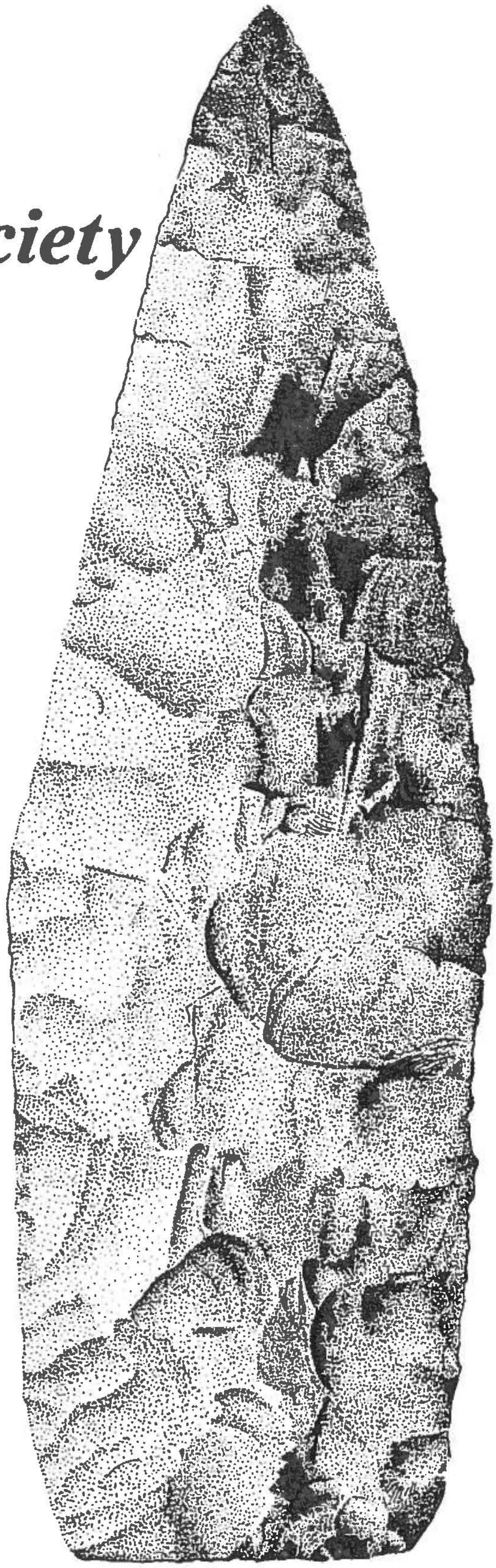
Bulletin of the Archaeological Society of Delaware

Number Twenty-seven, New Series

Winter 1990

Bulletin of the Archaeological Society of Delaware



AN UPDATE ON NEW RESEARCH
AT THE ISLAND FIELD SITE (7K-F-17)
KENT COUNTY, DELAWARE

by

Jay F. Custer, Karen R. Rosenberg,
Glenn Mellin, and Arthur Washburn

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Affiliated with the Eastern States Archaeological Federation

The Archaeological Society of Delaware
P.O. Box 301
Wilmington, Delaware 19889

Acknowledgements

We want to acknowledge the support and the cooperation of the following individuals who made this project possible. Juan Villamarin, Chairman, University of Delaware Department of Anthropology, and Helen Gouldner, Dean, University of Delaware College of Arts and Sciences, helped to coordinate and provide support for the research. John Kern, past Director of the Delaware Division of Historical and Cultural Affairs, and Daniel Griffith, the current director, provided coordination and support through the Delaware Bureau of Museums and Historic Properties. The past and current staff of the Island Field Museum, including Cliff Lefferts, Adrian Morris, and Charles Fithian, made our work at the museum a pleasant task and contributed to the project in innumerable ways. We also thank the Delaware Humanities Forum which provided a grant to support collection research and radiocarbon dates. The following individuals also contributed to the radiocarbon date fund and we thank them for their generosity: Glen Mellin, Blaine McKusick, William Liebknecht, Jay Custer, John Harris, the Archaeological Society of New Jersey, the Archaeological Society of Delaware, the Kent County Archaeological Society (Delaware), and the Lower Delaware Valley Chapter of the Archaeological Society of New Jersey. Ron Thomas provided important useful information on the site's early excavations and without his inspired protection of the site during his tenure as State Archaeologist, there would be no data for us to re-examine. Karen Iplenski, Carol Kretzman, and Dennis Robbins all worked on the laboratory analysis of skeletal remains. We are grateful to Chris Ruff of Johns Hopkins University for cross-sectional analysis of long bones, to Doug Owsley and Robert Mann of the Smithsonian Institution for advice and consultation on paleopathology, to Robert Arm of the Wilmington Medical Center for help with dental x-rays, and to Katherine Moore, now of Bentley College, Massachusetts, for identification of the puma paw. We also thank the following individuals for assistance with museum collection analyses: Bruce Smith (Smithsonian Institution), Charles Hayes (Rochester Museum and Science Center), Robert Funk (New York State Museum and Science Center), Martha Potter Otto (Ohio Historical Society), and Robert Peterson (Mound City National Monument). Finally we thank Colleen De Santis Leithren, Eileen McMahon, Robert Schultz, Paul McCullough, Steve Eisenbrey, Barbara Doms, and Susan Gentile for their help in preparing this manuscript.

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by

Jay F. Custer, Karen R. Rosenberg, Glenn Mellin,
and Arthur Washburn
Department of Anthropology
University of Delaware

Introduction

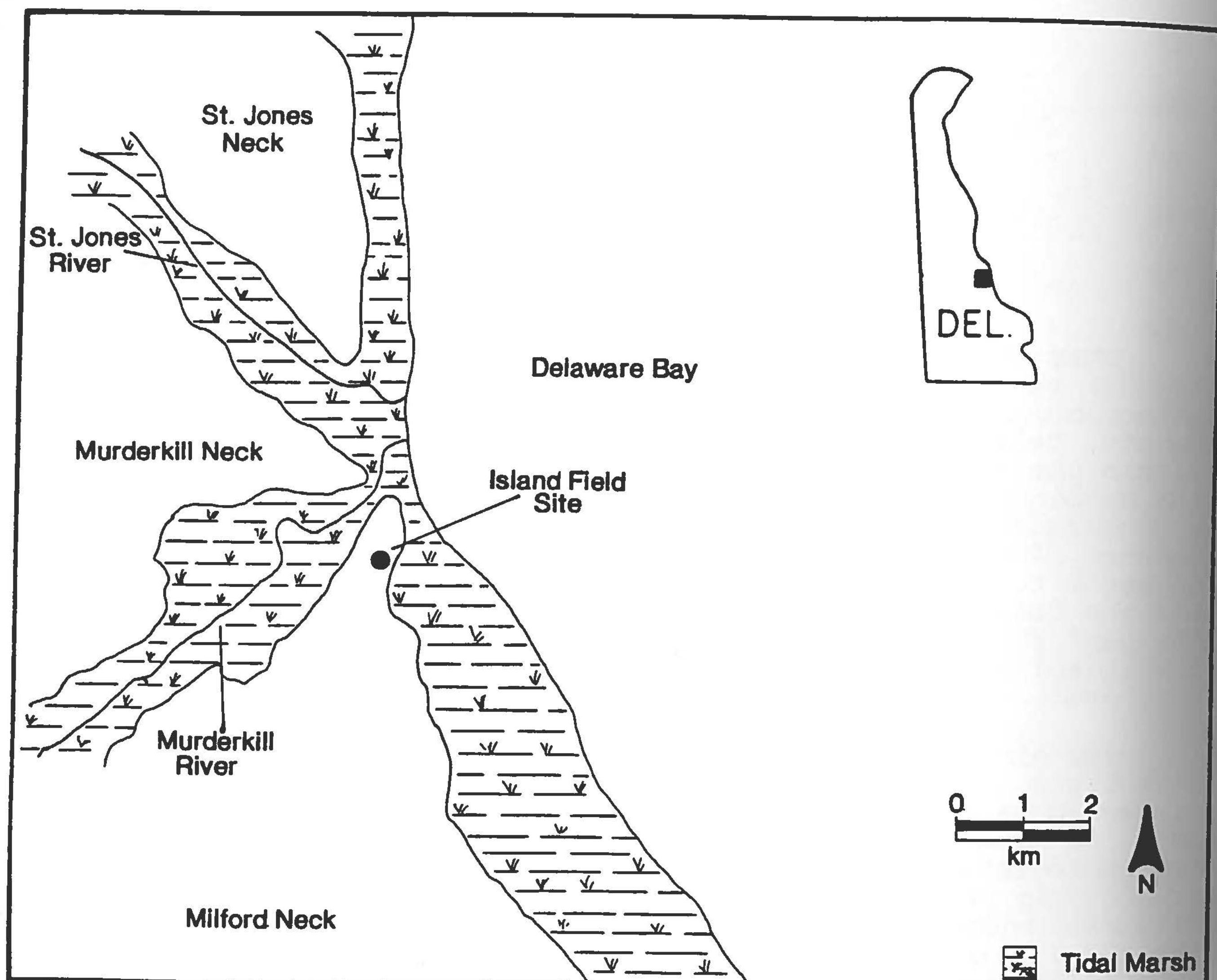
This article is intended to provide a preliminary overview of the results of renewed archaeological and biological anthropological research at the Island Field Site (7K-F-17), Kent County, Delaware (Figure 1). The Island Field Site is located within 5km of the Delaware Bay Coast just south of the mouth of the Murderkill River near the town of South Bowers on a low knoll approximately 2m above sea level surrounded by brackish water marshes (Figure 1). A freshwater spring-fed pond is also located adjacent to the site. The highly productive estuarine marshes and the freshwater pond would have been present at the site for the past 3000 years (Kraft and John 1978:53) and would have made the Island Field site an attractive location for hunter-gatherer settlement.

The history of archaeological research at the Island Field Site began in the 1920s when a number of burials were uncovered at the site by road building activities (Thomas and Warren 1970:2). Subsequent excavations at the site by local avocational archaeologists (Austin et al. 1953) identified a number of late prehistoric pit features. In 1966, intensive excavations of the site were undertaken by the Delaware Section of Archaeology under the direction of Ronald Thomas. The initial focus of the excavations was the late prehistoric component of the site, but as the excavators attempted to define the site limits during the summer of 1967, they encountered a number of burials that clearly predated the late prehistoric component. These burials became the focus of excavations during the summers of 1968 and 1969, and excavations of outlying areas were also continued. A special issue of the **Bulletin of the Archaeological Society of Delaware** (Thomas and Warren 1970) was published soon after the completion of the 1969 field season.

A protective structure was built over the core area of the site and this protective structure became the basis for the construction of a permanent museum at the site with the <u>in situ</u> burials providing the focal point of the exhibits. During the 1980s, a series of research plans for an analysis of the skeletal remains from the site were developed, and renewed excavations of the cemetery's core area, which was only partially excavated, were planned. These plans were brought to fruition more rapidly

FIGURE 1

Site Location



than planned when local Native American groups expressed concern over the display of human remains at the museum. The Delaware Division of Historical and Cultural Affairs agreed to remove the skeletal remains from display and rebury the human remains after they had been studied. Our research involved completing the excavation of the exposed sections of the cemetery so that the skeletal remains could be removed, biological anthropological analysis of the skeletal remains, re-evaluation of the archaeological data from the site, and integration of the complete set of cultural and biological anthropological data.

The main research goal of our archaeological investigations was to obtain as complete a record as possible of the artifacts and skeletal remains within the grave features and to also record the associations of features with one another before the skeletal remains were removed for reburial. We remapped the distribution

of features across the site after trowelling the exposed subsoil surface, photographed all features using both still photography and video tapes, removed the skeletal remains, and completed the excavation of all grave features which contained exposed human remains. This excavation included removal of the soil pedestals upon which the exposed human remains had been sitting.

Grave Features and Burials

Based on our field excavations at the site, a total of 225 pit features were identified and most of these are shown in Figure 2. Many of the pit features are burials as can be seen when the feature map (Figure 2) is compared to the composite map of the burials at the site (Figure 3). However, many of the features did not contain skeletal remains and other features are small intrusions into larger burial features. In some cases these small intrusive features seem to be cultural features and contained small amounts of disturbed fragmentary human remains. In other cases the small intrusive features are more recent disturbances from rodents and possibly tree falls.

Examination of Figure 2 shows that many of the grave features overlap with one another. Figure 4 shows a detailed plot of a sample series of overlapping features and Figure 5 shows their stratigraphic relationships. Earlier interpretations of the site (Thomas 1987:41-44) suggested that the clusters of overlapping features and burials were related to an elaborate series of mortuary ceremonies involving reburial of previously exhumed bodies. However, we feel that the clustering of features is probably accidental in almost all cases. If the overlapping graves were part of a single ritual, they would most likely be excavated in a single contemporaneous event. However, there are clear-cut sets of stratigraphic relationships (Figure 5) showing that the excavations of clustered grave features were a series of events through time. Also, we noted that bones from overlapping features quite often showed signs of impact fractures on long bones in the area of feature overlap. We believe that these impact fractures occurred when earlier graves were accidentally encountered during the excavation of new graves and were probably caused by the pointed ends of digging sticks. In sum, the newer data, which were not available to the original excavators, indicate that the clustered nature of the grave features is more likely to have been accidental rather than purposeful.

One exception to the accidental clustering of graves is seen in the northeast corner of the site in Feature 86 with Burial Nos. 41, 83, 101, 106, 107, 108, 109, and 135 (Figure 6). In this feature, there seems to have been an attempt to place Burial No. 107 deep within Feature 86 even though it was necessary to displace a number of other burials. The bones from the displaced burials were placed in a pile noted as Bone Group A in Figure 6. This one feature is the only clear-cut example of an intentional multiple burial feature at the site.

FIGURE 2
Feature Map

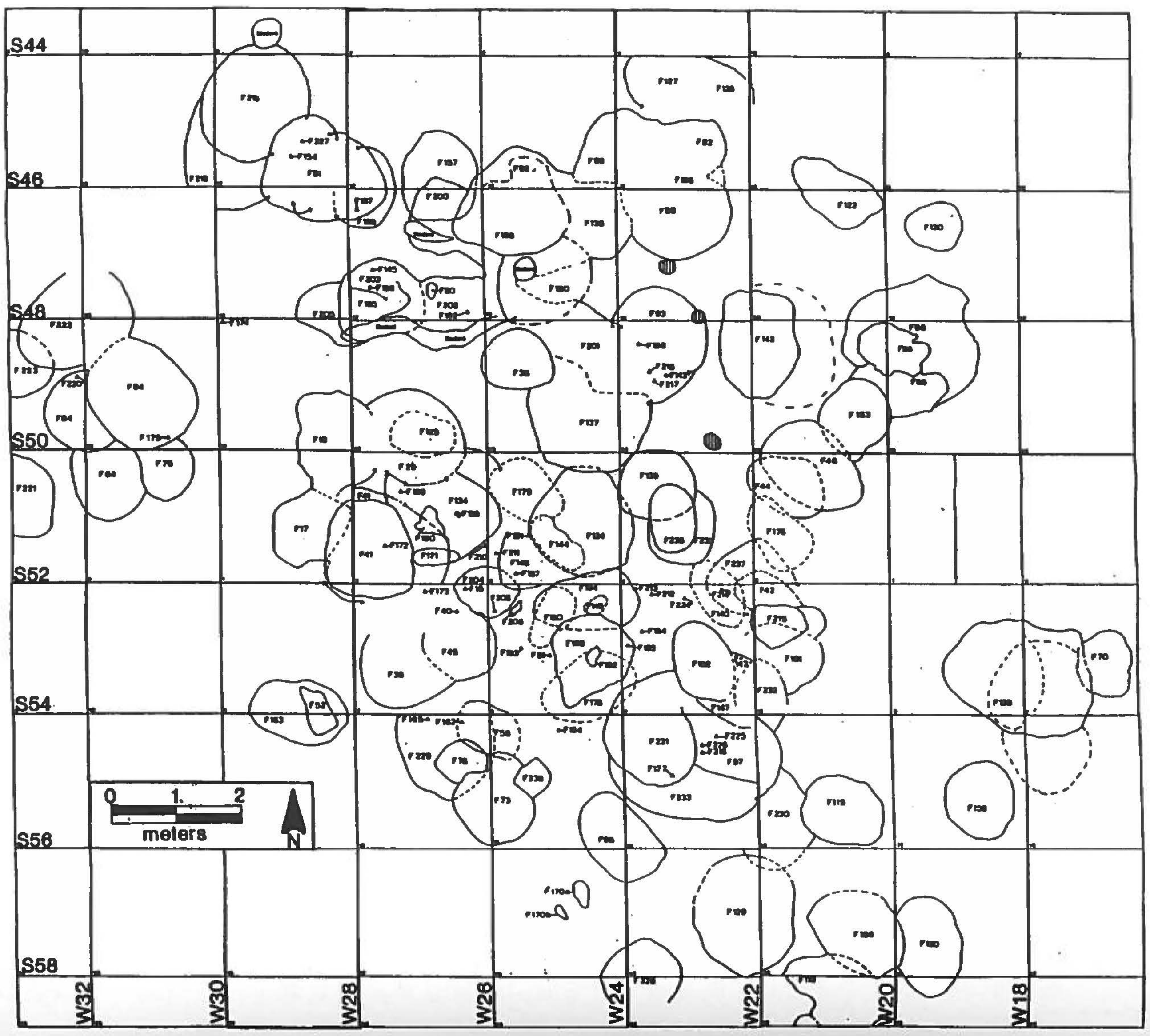


FIGURE 3
Burial Map

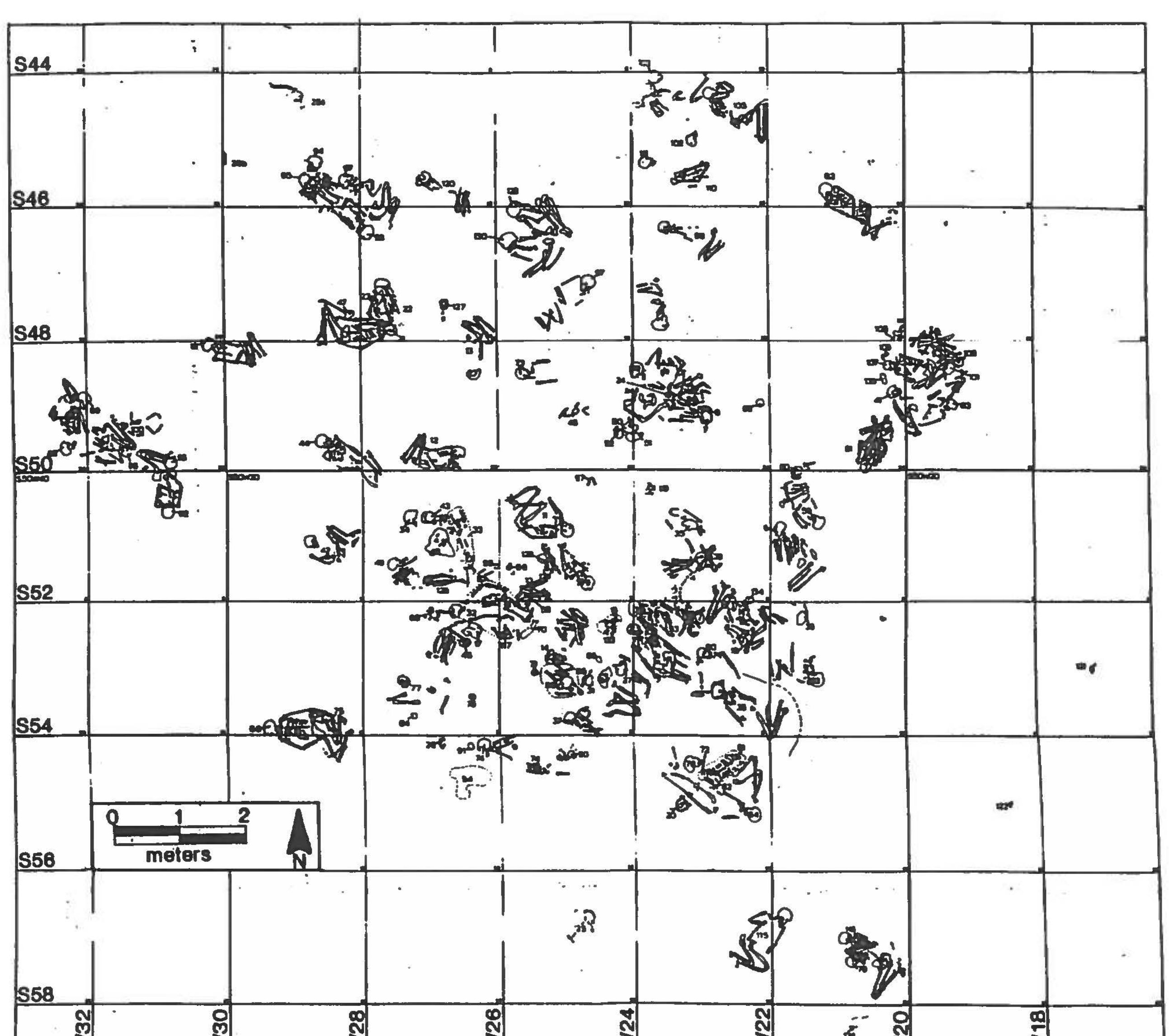


FIGURE 4
Map of Sample Series of Overlapping Features

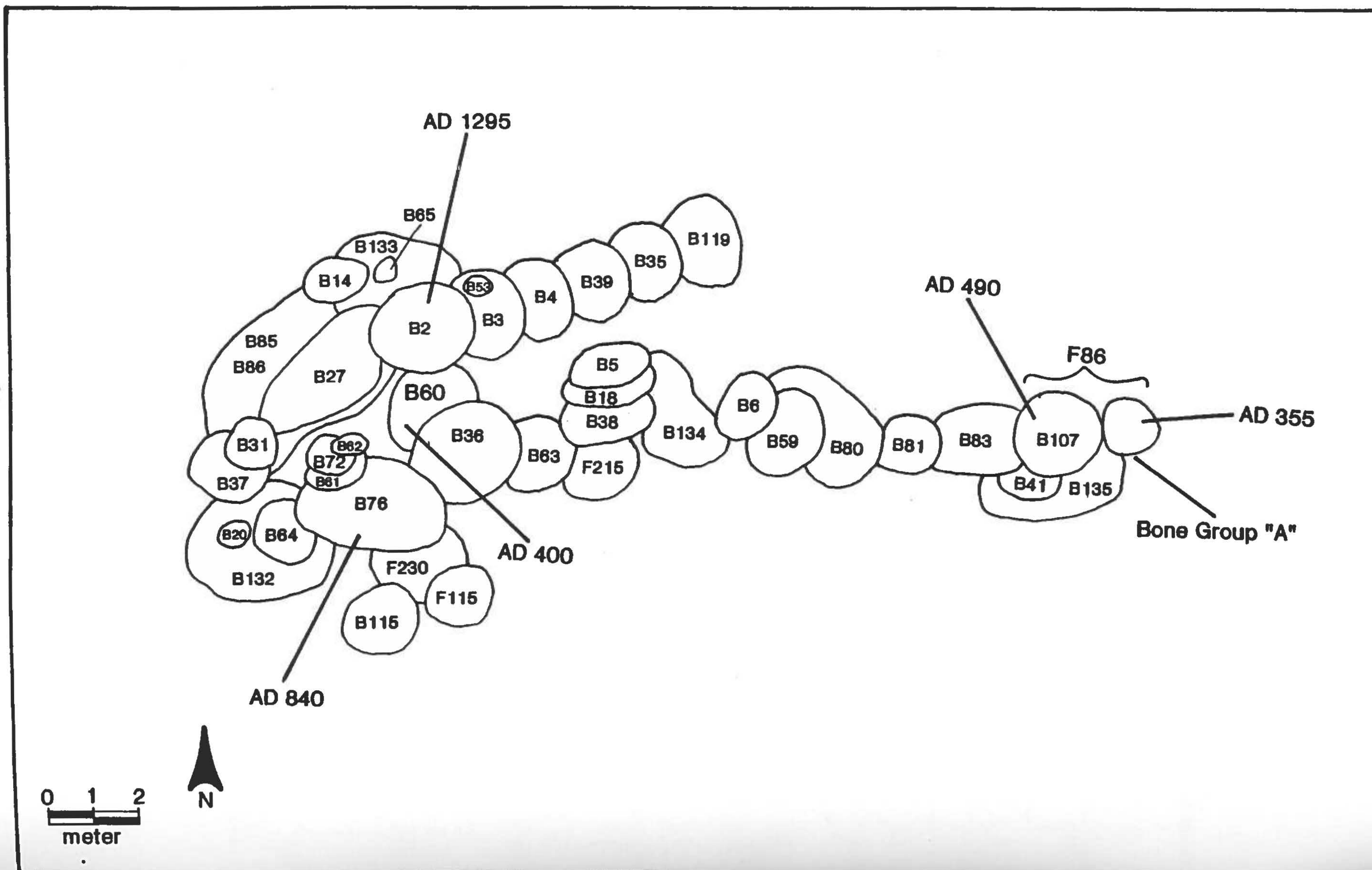


FIGURE 5
Stratigraphic Relationship of Sample Series of Overlapping Features

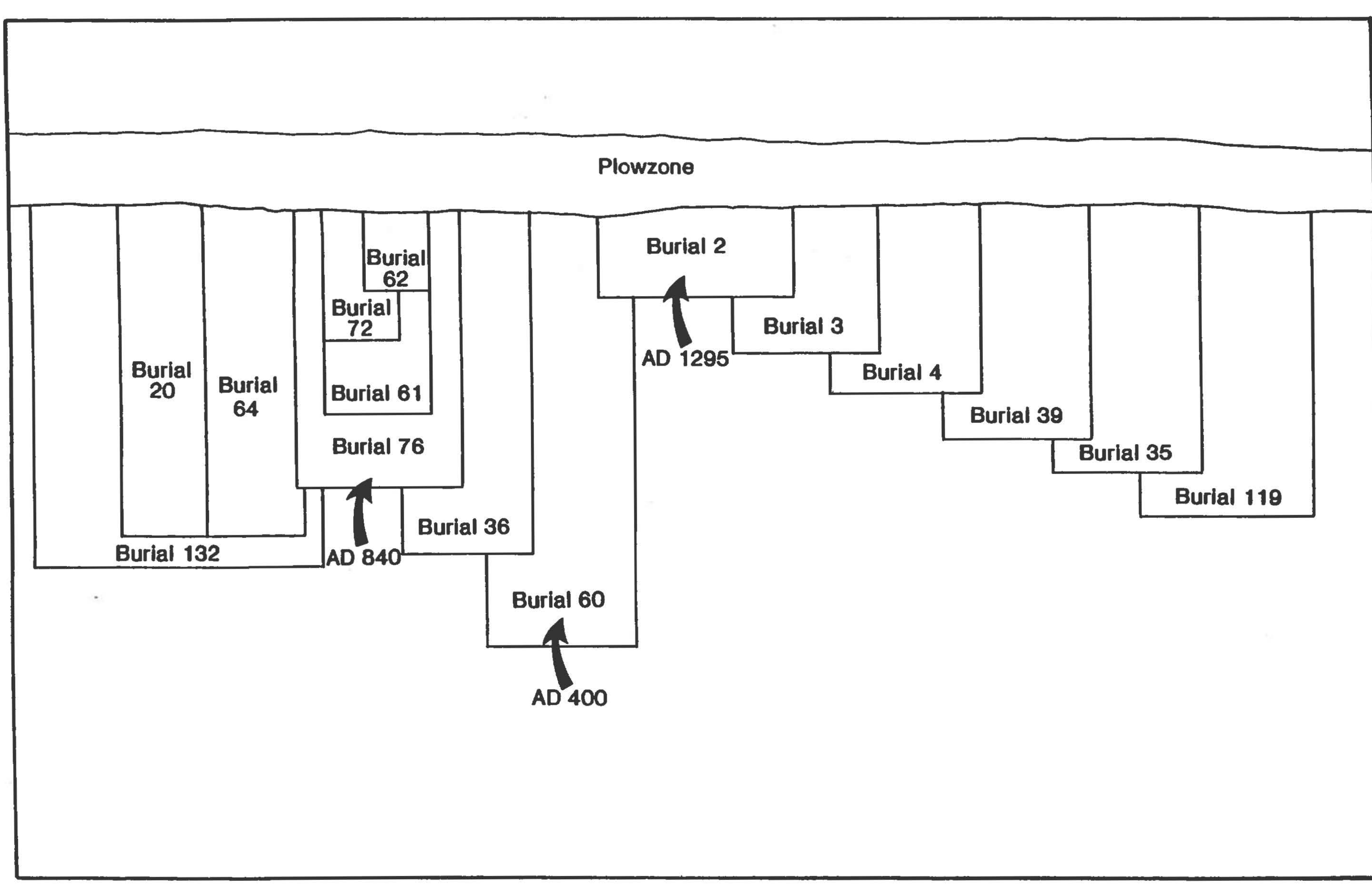
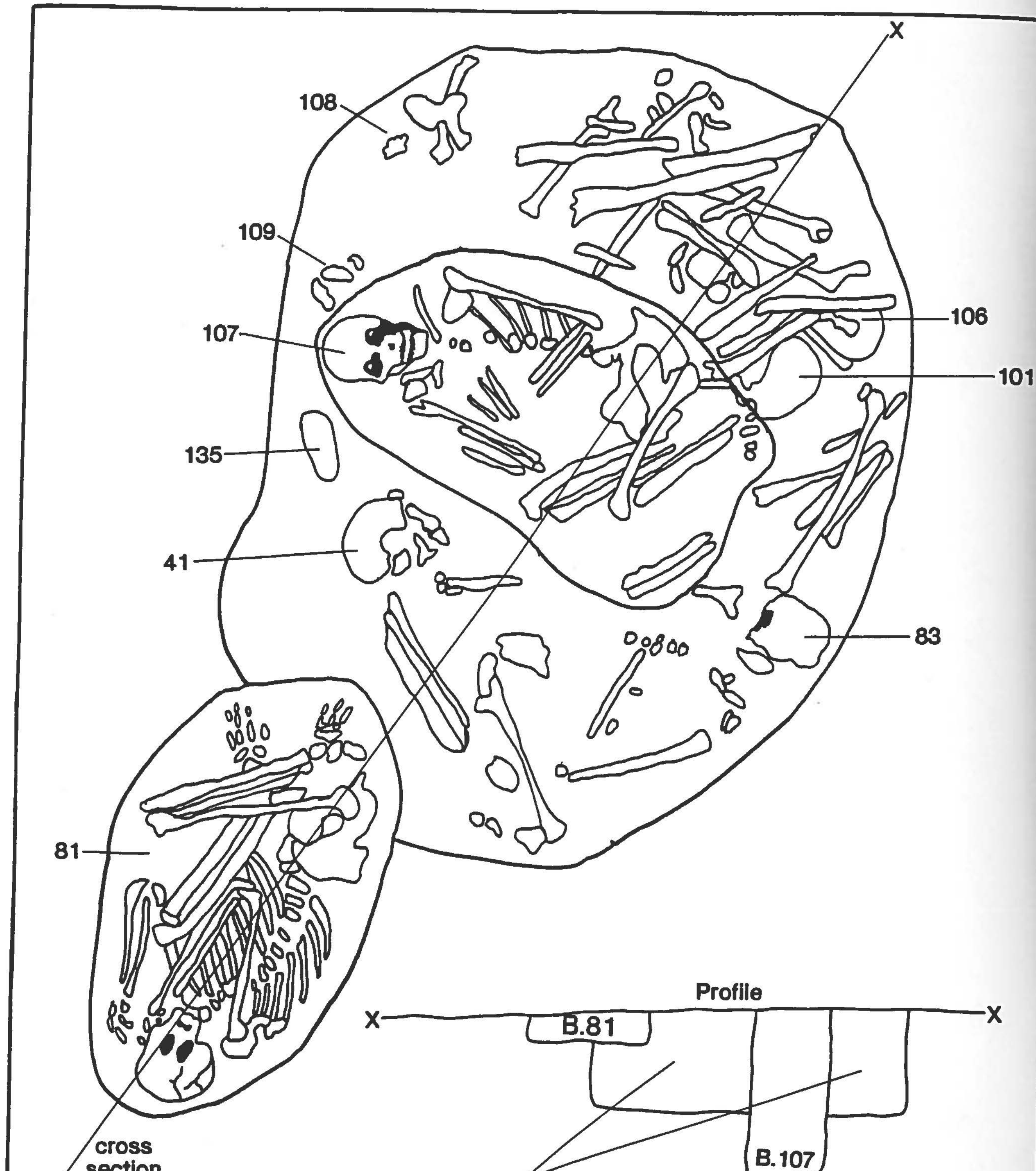


FIGURE 6

Feature 86 Burial Complex



Burial feature 86 with Bone Group A and Burial Nos. 41, 83, 101, 106, 107, 108, 109, and 135

There are a variety of different burial treatments present at the site including extended, loosely flexed, tightly flexed, bundles, redeposited cremations, and <u>in situ</u> cremations. Table 1 lists the treatment of each burial and Figure 7 shows examples of each of the burial treatments. Also included in Table 1 are a preliminary description of the grave goods associated with the burials and the age and sex of the individuals in each burial feature. Figure 8 shows the distribution of the different burial treatments and caches in the cemetery.

TABLE 1

SUMMARY BURIAL DATA

Burial No.	Burial Treatment	Age	Sex	Cache
1	Extended	Adult (>22)	Male	--
2	Extended	Adult (30)	Female	--
3	Loose Flex	Adult (41+)	Male	--
4	?	Adult (30+)	Male	--
5	Tight Flex	15	Female ?	--
6	Loose Flex	Adult (30+)	Male	--
7	Loose Flex	Adult (20+)	Female	--
8	?	Adult (30+)	Male	--
9	Tight Flex	Adult (25)	Female	--
10	?	19	Male ?	--
11	Loose Flex	Adult (30+)	Male	--
12	Loose Flex	Adult (25)	Female	Small
13	Loose Flex	Adult (>17)	---	--
14	Tight Flex	Adult (>40)	Male	--
15	Redeposited Cremation	Adult	---	--
16	Loose Flex	Adult (>30)	Female	--
17	Tight Flex	Adult (~47)	Female	Small

TABLE 1 (cont.)

Burial No.	Burial Treatment	Age	Sex	Cache
18	Tight Flex	Adult (28)	Female	--
19	Tight Flex	Adult (35)	Male	Medium
20	?	Infant (2)	---	--
21	Loose Flex	Adult (25)	Male	Small
22	Tight Flex	Adult (23)	Female	Small
23	?	Infant (1)	---	--
24	?	Infant (6 Mon)	---	Small
25	?	---	---	--
26	?	Child (4)	---	--
27	Tight Flex	Child (8)	Female ?	--
28	?	Adult (>40)	Female	--
29	?	---	---	--
30	?	---	---	--
31	?	---	---	--
32	**In Situ** Cremation	Adult (23)	Male	--
33	?	Child (8)	---	--
34	?	18	Female	--
35	?	Adult (>20)	Female	--
36	Loose Flex	Adult (>20)	Female	--
37	Loose Flex	Adult (>20)	Female	--
38	?	15	---	--
39	?	---	---	--
40	Tight Flex	15	Female ?	--
41	?	15	Female ?	Small

TABLE 1 (cont.)

Burial No.	Burial Treatment	Age	Sex	Cache
42	Tight Flex	Adult (>20)	Female ?	Medium
43	?	Child (4)	---	Small
44	Extended	Adult (35)	Female	Large
45	?	---	---	Medium
46	?	Child (4)	---	--
47	?	Adult	---	--
48	Redeposited Cremation	Child (3)	---	Medium
49	?	Adult (>20)	Female	Large
50	?	Adult (40)	Male	Small
51	?	Adult (>20)	Female	Small
52	?	Adult (>30)	Female	Small
53	?	Child (6 Mon)	---	--
54	Redeposited Cremation	Adult	Female ?	--
55	?	Child (8)	---	--
56	?	Child (4)	---	--
57	Loose Flex	Adult (38)	Female	--
58	?	Adult	---	--
59	Tight Flex	Adult (40)	Female ?	Small
60	?	Adult (35)	Female	Small
61	Tight Flex	Child (6)	---	Small
62	?	Child (5)	---	--
63	?	Child (8)	---	--
64	Extended	Adult (35)	Male	--

TABLE 1 (cont.)

Burial No.	Burial Treatment	Age	Sex	Cache
65	?	17	Female	--
66	?	---	---	--
67	?	19	Female	--
68	Loose Flex	Adult (24)	Female	--
69	?	Infant (1)	---	Medium
70	Redeposited Cremation	---	---	Small
71	?	Adult (20)	Male	--
72	Cremation	Adult	---	--
73	?	Adult (>45)	Male	Medium
74	?	Adult (40)	Female ?	--
75	?	Adult	---	--
76	Loose Flex	Adult (33)	---	Large
77	?	Adult (25)	Female	--
78	?	---	---	Small
79	?	Infant (6 Mon)	---	--
80	Tight Flex	---	---	Medium
81	Tight Flex	Adult (35)	Female ?	--
82	Loose Flex	Adult (28)	Female ?	--
83	?	Adult (47)	Male	--
84	?	Child (3)	---	--
85	?	Infant (7 Mon)	---	--
86	?	Infant (1.5)	---	Small
87	?	Adult	---	--
88	?	15	---	--

TABLE 1 (cont.)

Burial No.	Burial Treatment	Age	Sex	Cache
89	Tight Flex	Adult (42)	Male	--
90	?	Child (6)	---	--
91	?	Infant (1)	---	--
92	Loose Flex	Adult (25)	Female	--
93	Tight Flex	Infant (9 Mon)	---	--
94	Bundle	Adult (40)	Female ?	--
95	Bundle	Adult (47)	Female ?	--
96	Tight Flex	15	Female ?	--
97	Tight Flex	Adult (38)	Female	Small
98	Tight Flex	Adult (47)	Male	--
99	Loose Flex	Adult (>40)	Female	Small
100	?	Child (3)	---	Small
101	?	Adult (23)	Male	--
102	?	Adult (25)	---	Small
103	?	---	---	--
104	?	---	---	--
105	Loose Flex	Adult (24)	Female ?	--
106	?	Adult (>50)	Female	--
107	Tight Flex	Adult (36)	Female	--
108	?	Child (4)	---	--
109	?	Adult (23)	---	--
110	?	Adult	Female	--
111	?	---	---	Small
112	Loose Flex	Adult (25)	Male	Medium

TABLE 1 (cont.)

Burial No.	Burial Treatment	Age	Sex	Cache
113	?	Adult (35)	Female	--
114	?	---	---	--
115	Loose Flex	Adult (25)	Male	--
116	Loose Flex	---	Male ?	--
117	?	Adult	Female ?	--
118	?	---	---	--
119	?	Infant (1.5)	---	Small
120	Tight Flex	19	Female ?	--
121	?	---	---	--
122	?	---	---	--
123	?	---	---	--
124	?	---	---	--
125	?	Child (8)	---	--
126	Loose Flex	Adult	---	--
127	?	Infant (1)	---	--
128	?	Child (7)	---	--
129	Tight Flex	Adult (38)	Male	--
130	Tight Flex	Adult (31)	Female	--
131	?	---	---	--
132	?	---	---	--
133	?	---	---	--
134	Tight Flex	---	---	--
135	?	---	---	--

FIGURE 7

Examples of Burial Treatments

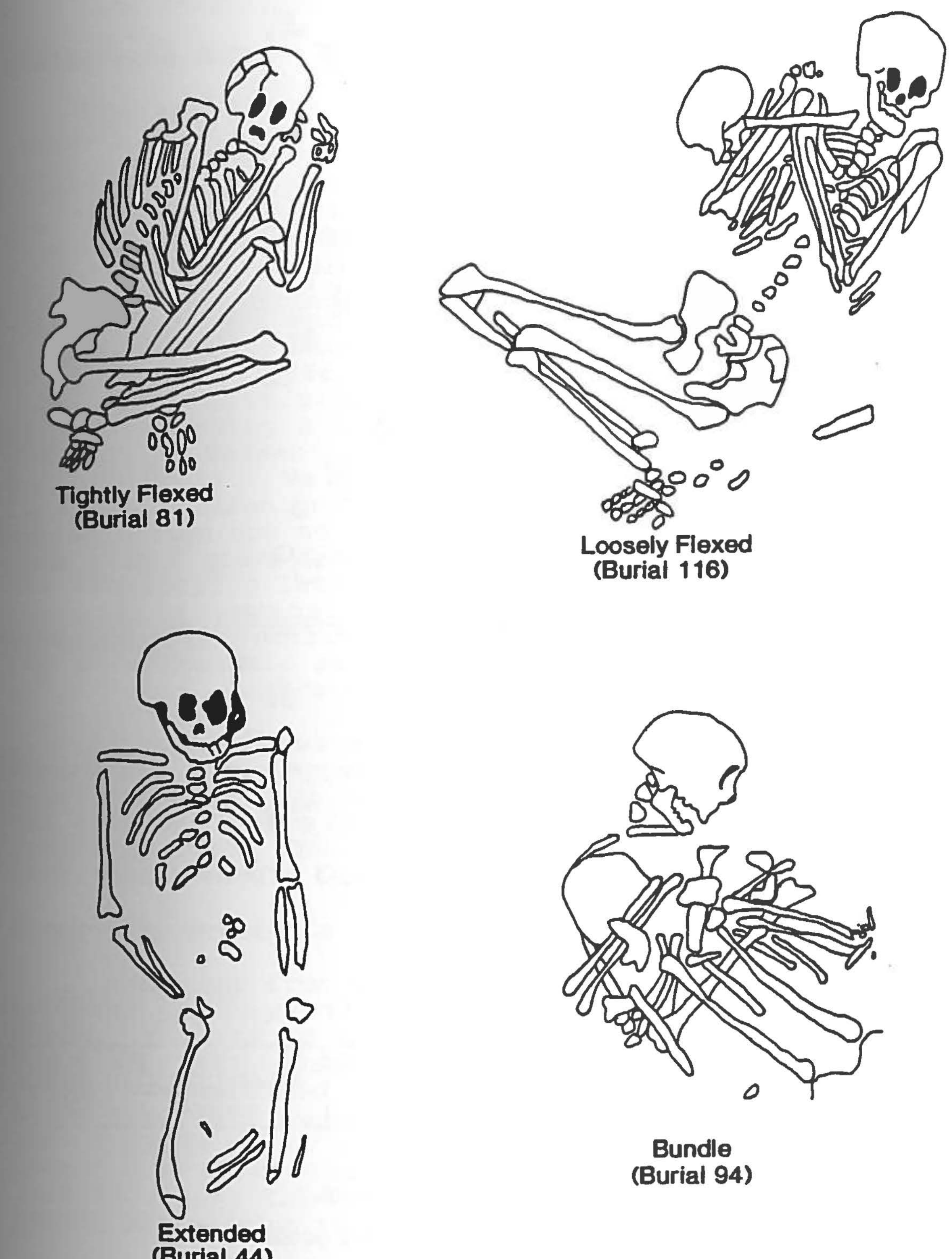
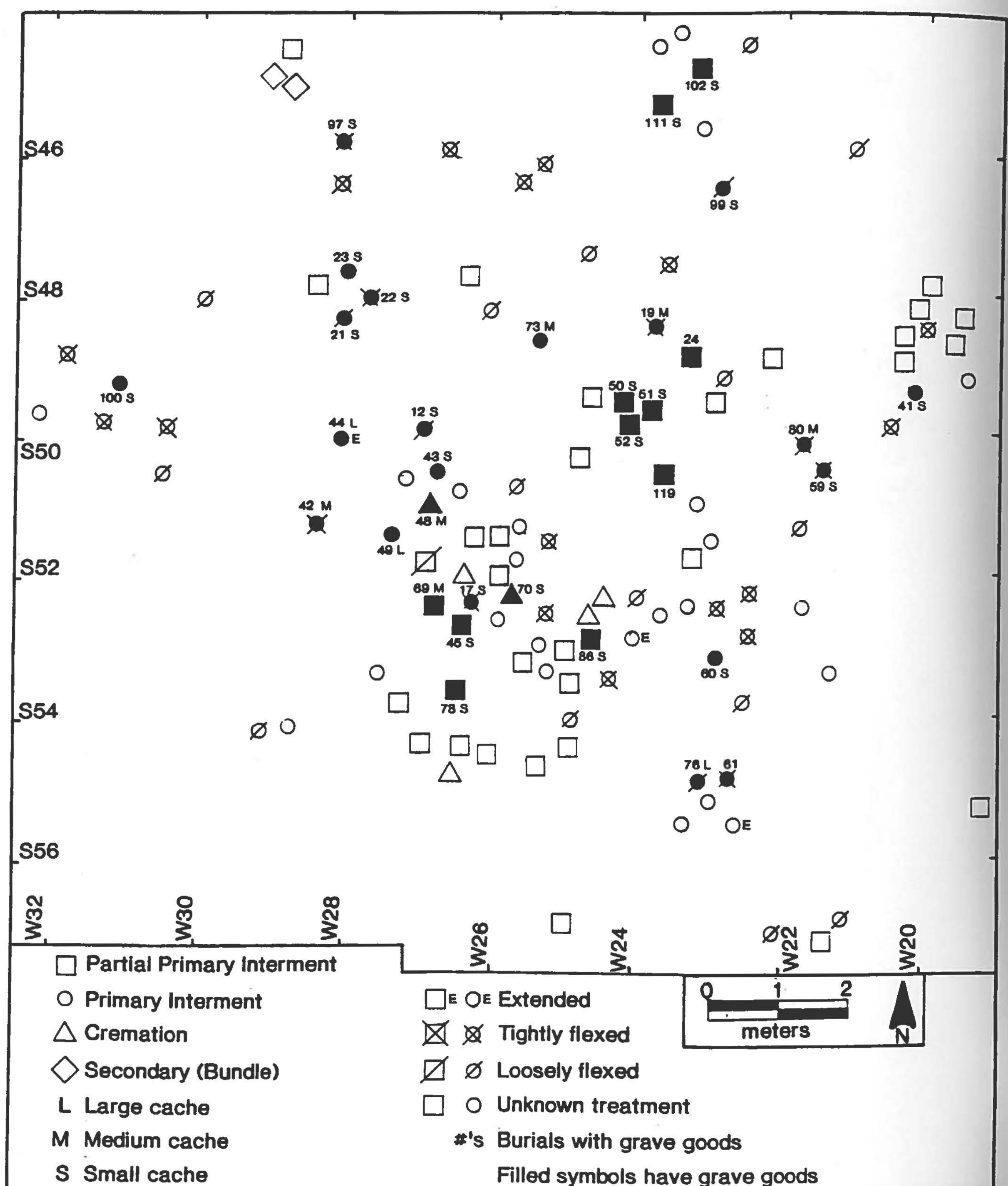


FIGURE 8

Burial Treatment and Cache Distribution Map



Site Chronology

Four basic sets of data will be discussed to determine the absolute and intra-site chronology of the Island Field cemetery: radiocarbon dates, diagnostic artifacts, composition of feature fill, and stratigraphic relationships of features.

Radiocarbon Dates

Table 2 lists the 18 radiocarbon dates obtained from features at the Island Field Site. The dates were obtained from a number of different labs including the University of Pittsburgh, Beta Analytic Inc., the University of Georgia, and the University of Arizona. Most of the dates are based on human bone with a few exceptions including charcoal and shell samples from a refuse feature (Beta 29737, Beta 29738), and a charcoal date from an in situ cremation (I-6338), which was the only radiocarbon date originally reported from the site (Thomas 1974) prior to our more recent studies. The four University of Arizona dates (AA 3957, 3958, 3959, and 3960) are accelerator dates on very small bone samples. Table 2 also shows the dates as calibrated using a calibration computer program described by Stuiver and Reimer (1986) and based on the work of Stuiver and Becker (1986). We feel that one date, Beta-29739, should be rejected. Bones used in this sample had a high potential for contamination due to application of preservatives and this date came from a grave feature whose stratigraphic position in one of the overlapping feature sequences that clearly shows that the feature is younger than a grave feature which contained triangular projectile points which postdate A.D. 1000. Because the stratigraphic setting of the features is clear-cut, Beta-29739 is not considered to be an accurate date.

Figure 9 shows a plot of the calibrated radiocarbon date ranges and there appears to be two separate sets of dates. One group includes Pitt 404, Pitt 399, Beta 29737, and Beta 29738, the youngest dates from the site covering a time span of ca. AD 1220 - AD 1410. The second group includes all of the remaining dates and covers a time span of AD 410 - AD 1180.

Diagnostic Artifacts

The caches from the burials at the Island Field Site include a number of diagnostic bifaces, projectile points, ceramics and pipes. Figures 10 and 11 show four of the five large bifaces found at the site and these bifaces were associated with Burial 76 which produced a radio-carbon date (Pitt 403) with a calibrated date range of AD 889 - AD 983. Similar bifaces have also been found at a number of sites in New York and southern Ontario (Ritchie 1944:125, 133, 135, 141, 151, 172, 180; 1965:221, 223, 232-233) where they are associated with the Kipp Island Phase dated to ca. AD 600 - AD 900.

TABLE 2

ISLAND FIELD SITE RADIOCARBON DATES

Lab #	Years B.P.	±	Uncorrected Range	Corrected Range	Provenience
PITT 404	625	90	AD 1235, (1325), 1415	AD 1279, (1308, 1370, 1385), 1411	Burial 88
PITT 399	655	40	AD 1255, (1295), 1335	AD 1280, (1285), 1388	Burial 2
BETA 29737	710	60	AD 1180, (1240), 1300	AD 1260, (1280), 1377	Fea. 119*
BETA 29738	800	70	AD 1080, (1150), 1220	AD 1219, (1262), 1282	Fea. 119#
UGa 5633	990	120	AD 840, (960), 1080	AD 901, (1021), 1189	Burial 48
UGa 5648	1090	75	AD 785, (860), 935	AD 784, (979), 1016	Burial 94/95+
PITT 403	1110	35	AD 805, (840), 875	AD 889, (902, 918, 955 972, 975), 983	Burial 76
PITT 400	1140	280	AD 530, (810), 1090	AD 640, (892, 925, 936), 1190	Burial 32
PITT 402	1170	60	AD 720, (780), 840	AD 775, (784, 786, 874), 976	Burial 73
I-6338	1210	90	AD 650, (740), 830	AD 681, (778, 792, 800), 943	Fea. 204[a]
AA-3957	1375	75	AD 500, (575), 650	AD 602, (650), 685	Burial 61
AA-3960	1400	55	AD 495, (550), 605	AD 600, (643), 664	Bone Group A

TABLE 2 (cont.)

Lab #	Years B.P.	±	Uncorrected Range	Corrected Range	Provenience
AA-3958	1455	55	AD 440, (495), 550	AD 543, (602, 634, 635), 644	Burial 99
AA-3959	1460	50	AD 440, (490), 540	AD 543, (600), 642	Burial 44
PITT 405	1460	40	AD 450, (490), 530	AD 545, (600), 641	Burial 107
PITT 401	1550	60	AD 360, (400), 460	AD 426, (482, 488, 534), 572	Burial 60
PITT 406	1595	30	AD 325, (355), 385	AD 413, (429), 533	Bone Group A
BETA-29739	2110	80	[Bad Date - See Discussion in Text]		Burial 6

Key: All dates are from bone unless otherwise noted
* - Charcoal date - refuse feature
# - Shell date - refuse feature, recalibrated w/ 10% marine curve
+ - Bundle Burial w/ 2 people
a - Charcoal date from cremation - original site date

20

FIGURE 9
Radiocarbon Date Ranges

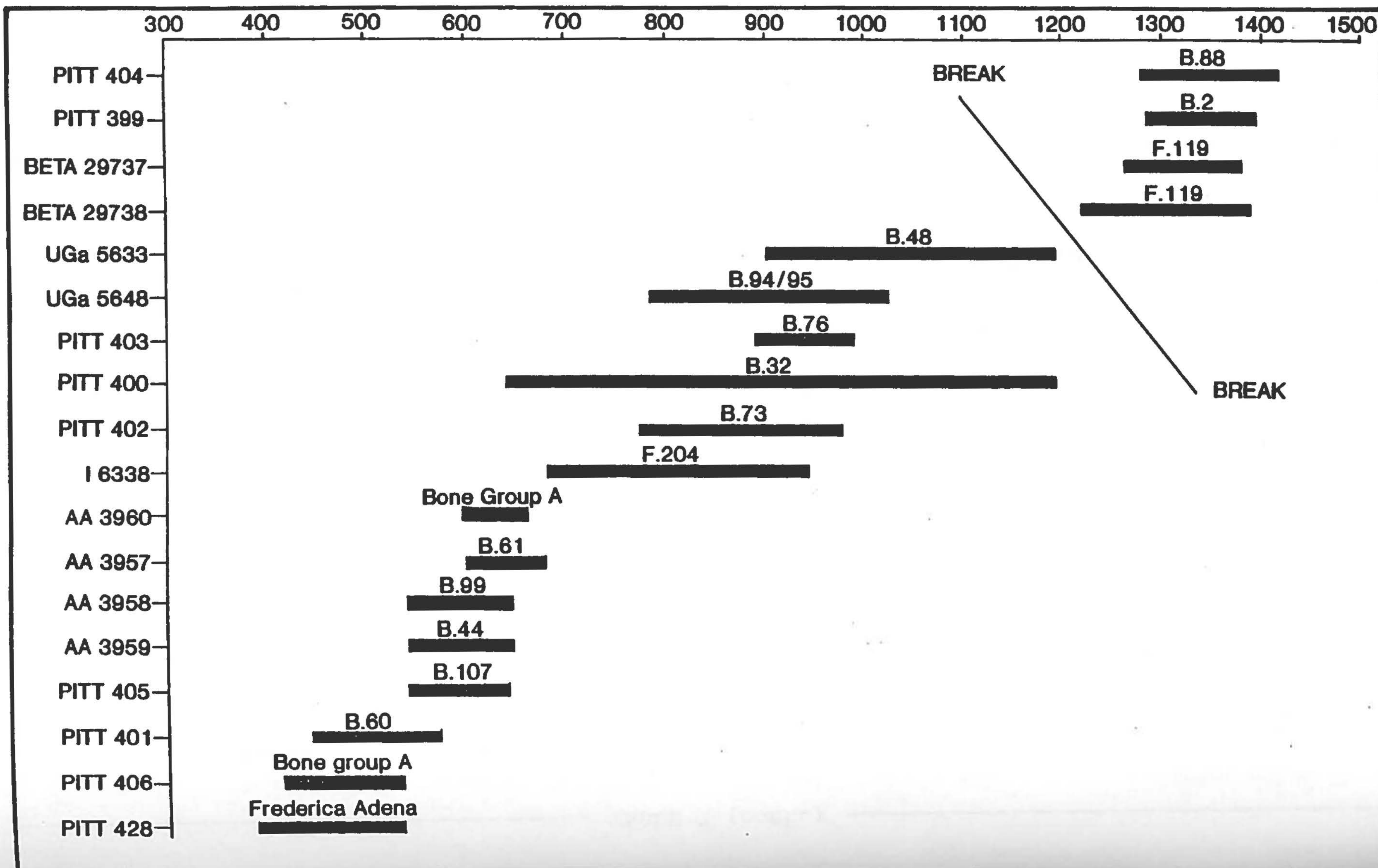


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FIGURE 10
Large Bifaces from Caches

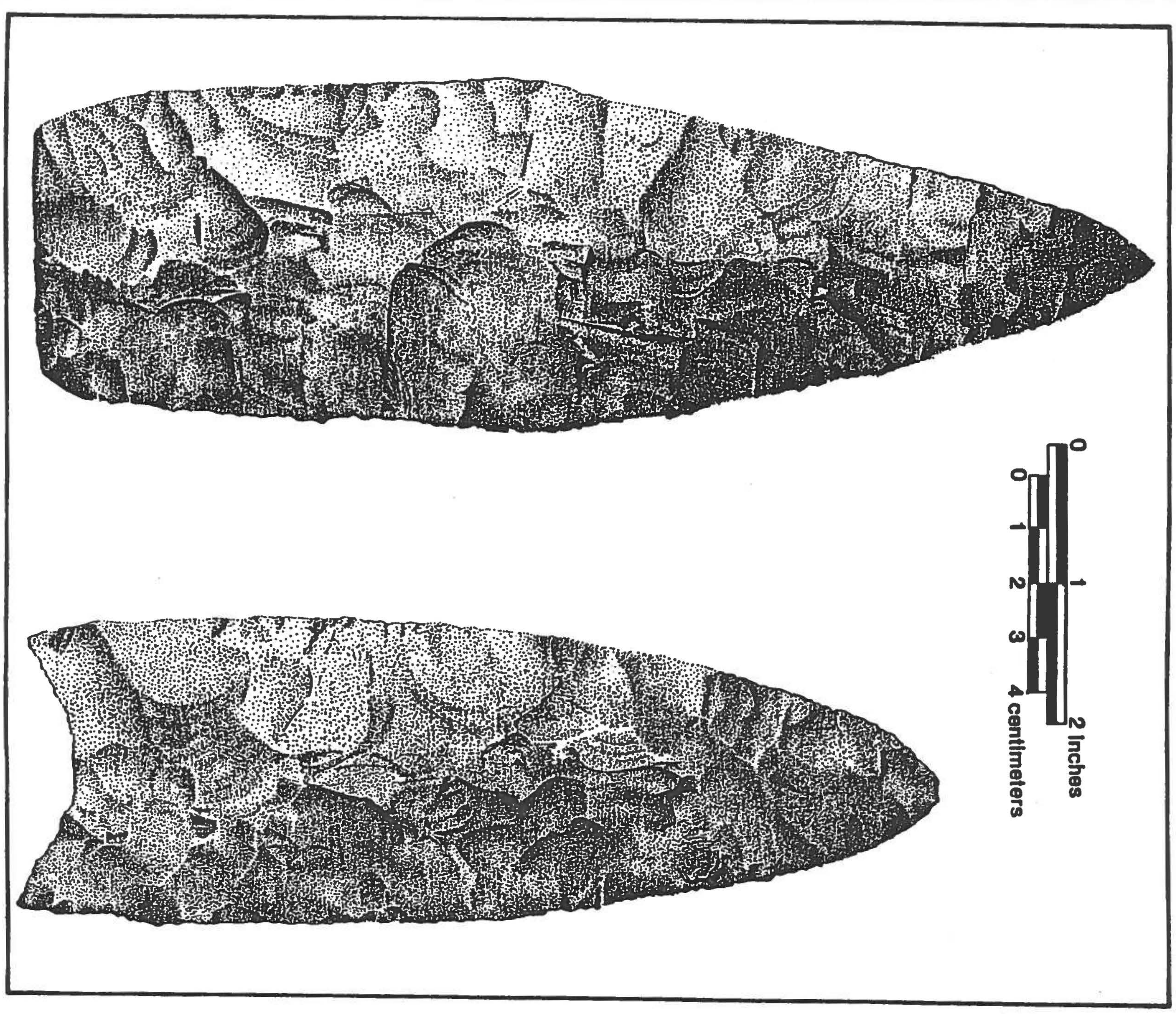
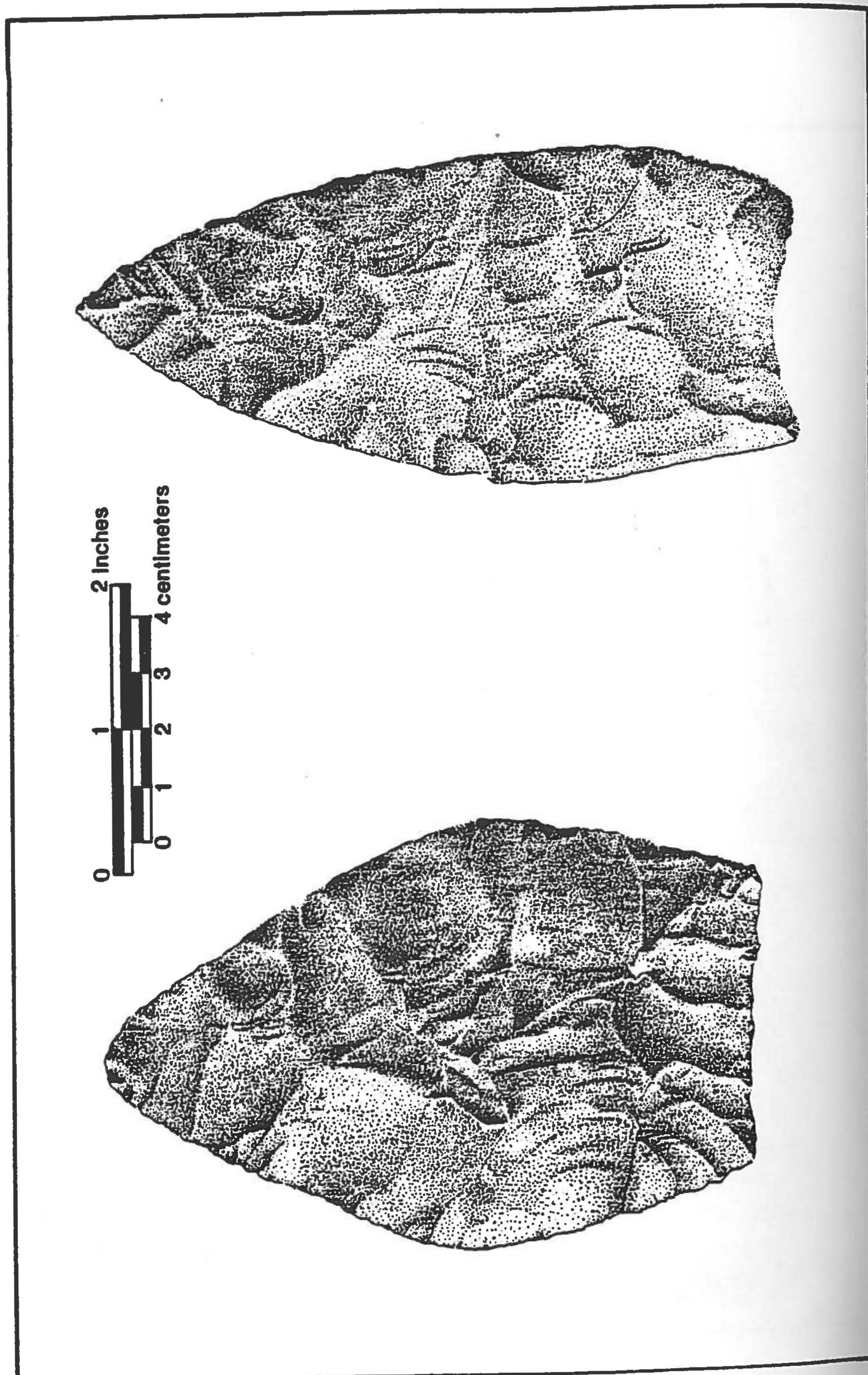


FIGURE 11
Large Bifaces from Caches



Projectile points found with burials can be classified into three main types defined by Ritchie (1961): Jack's Reef corner-notched, Jack's Reef pentagonal, and triangles. Figure 12 shows a series of Jack's Reef corner-notched points from a cache associated with Burial 112 and Figure 13 shows a series of Jack's Reef pentagonal and triangular points all of which were in a cache associated with Burial 76. The date range associated with these types on the Delmarva Peninsula is ca. AD 600 - AD 1000 (Custer 1989:156-160). Similar date ranges are noted throughout the Middle Atlantic (eg. - Kinsey 1972:438) and in New York (Ritchie 1965:234, 258; Funk 1976: 282-283, 296), although Ritchie (1965:234, 258) suggests that the corner-notched varieties could date to as early as AD 300.

Only a few ceramic sherds and one complete vessel were present in the grave features at the Island Field Site. All of these ceramics are varieties of Hell Island corded (Artusy 1976; Griffith 1982) which has been dated to ca. AD 600 - AD 1000 at other sites on the Delmarva Peninsula (Custer 1989:175-176). Similar ceramic varieties in the Middle Delaware Valley (Stewart 1985), the Upper Delaware Valley (Kinsey 1972:458-459), and New York State (Ritchie 1965:230, 253-254; 256; Ritchie and Funk 1973:164; Funk 1976:280-282) are all dated to a similar time frame. Of special significance are the similarities noted between Hell Island corded ware and Jack's Reef Corded (Ritchie and Funk 1973:164), Point Peninsula Corded and Point Peninsula Plain (Ritchie 1965:229, Plate 78) and Vinette 2 (Custer n.d.) wares. All of the New York varieties noted above seem to occur throughout the Middle Woodland Point Peninsula sequence (Funk 1976:281) and their age range in New York matches very closely with that inferred for Hell Island wares on the Delmarva Peninsula.

A number of smoking pipes manufactured from clay and soapstone were part of the grave caches at the Island Field Site. Figures 14 and 15 show two complete steatite platform pipes found at the site and fragments of three similar additional pipes were also found (Thomas and Warren 1970:30). Clay pipes were rare at the site and Thomas and Warren (1970:21) note they are limited to bowl portions. Only the soapstone pipes are really diagnostic and their flat-based configuration is their most diagnostic feature. The two examples illustrated here clearly show the variety of bowl forms. A review of the literature shows that well-documented associations of these kinds of pipes and radiocarbon dates are rare. However, these forms are seen in Intrusive Mound components in Ohio (Morgan 1952:93; Mills 1922:576-577) and similar types of pipes are also noted for Kipp Island and Hunters Home sites in New York and southern Ontario (Ritchie 1965:231; 1944:149, 165, 167, 169) with an identical date range.

Feature Fill Composition

The presence of oyster shell in grave feature fill is a chronological indicator at the Island Field Site. At present,

FIGURE 12

Jack's Reef Corner-Notched Points

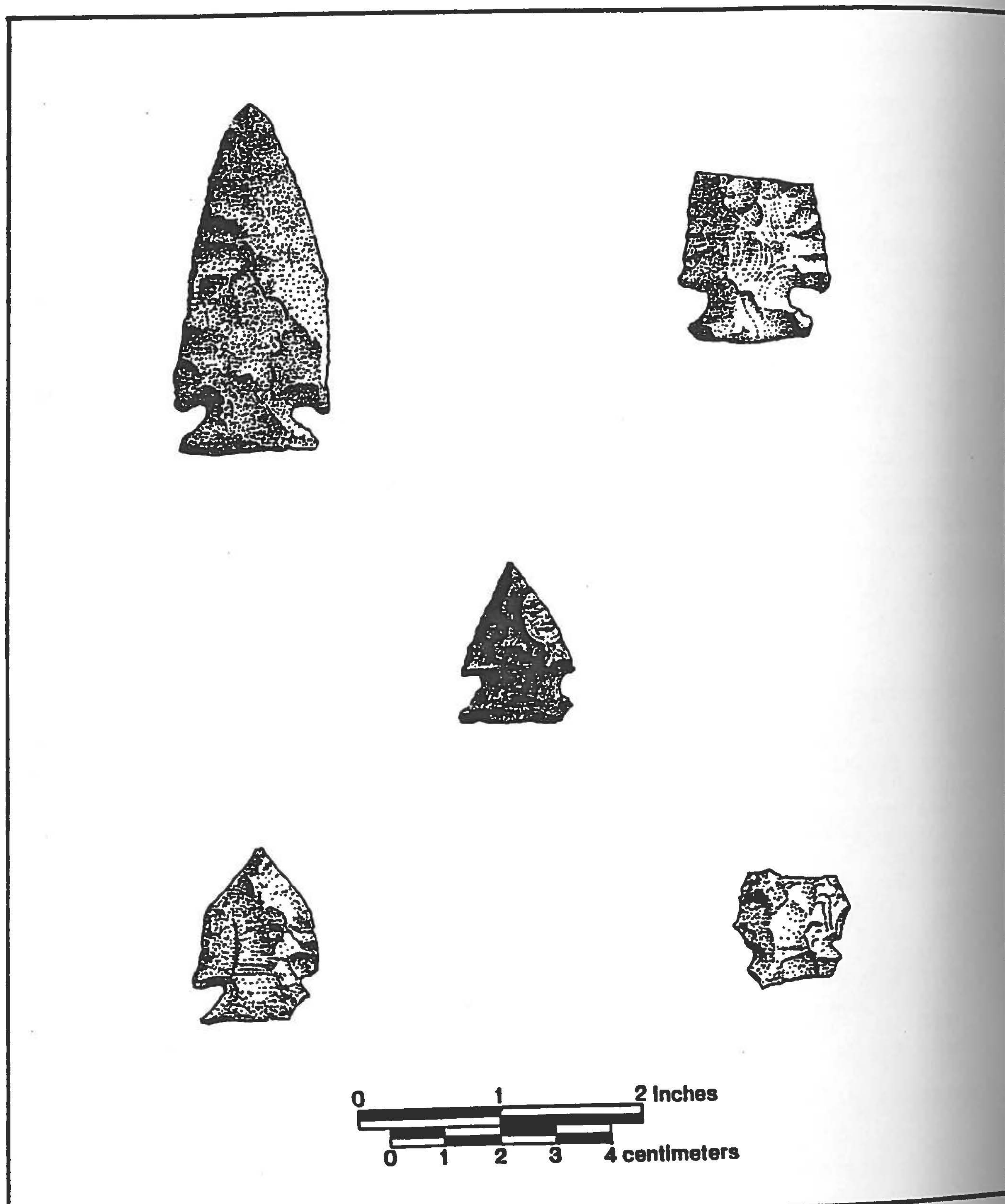


FIGURE 13

Jack's Reef Pentagonal and Triangular Points

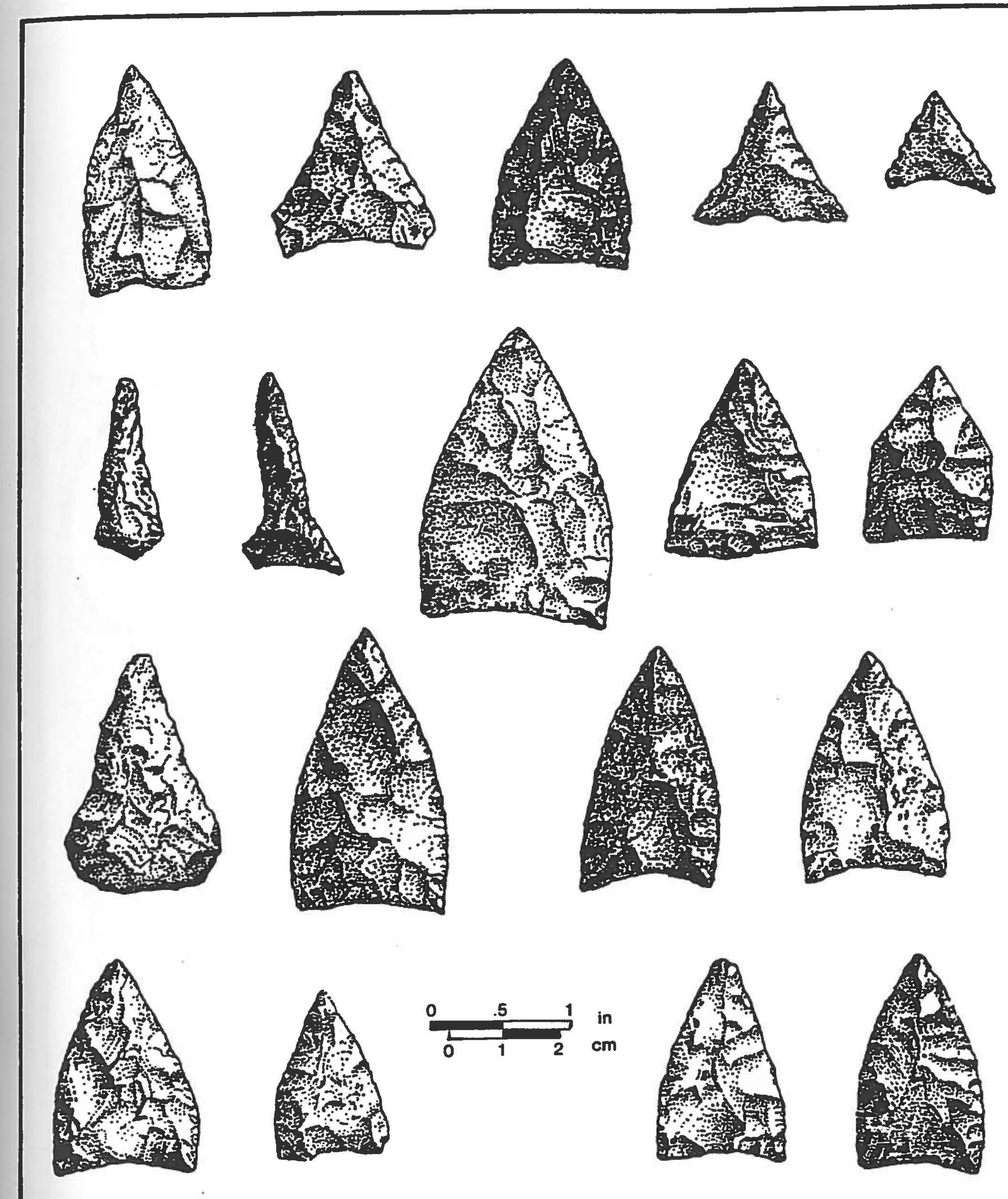
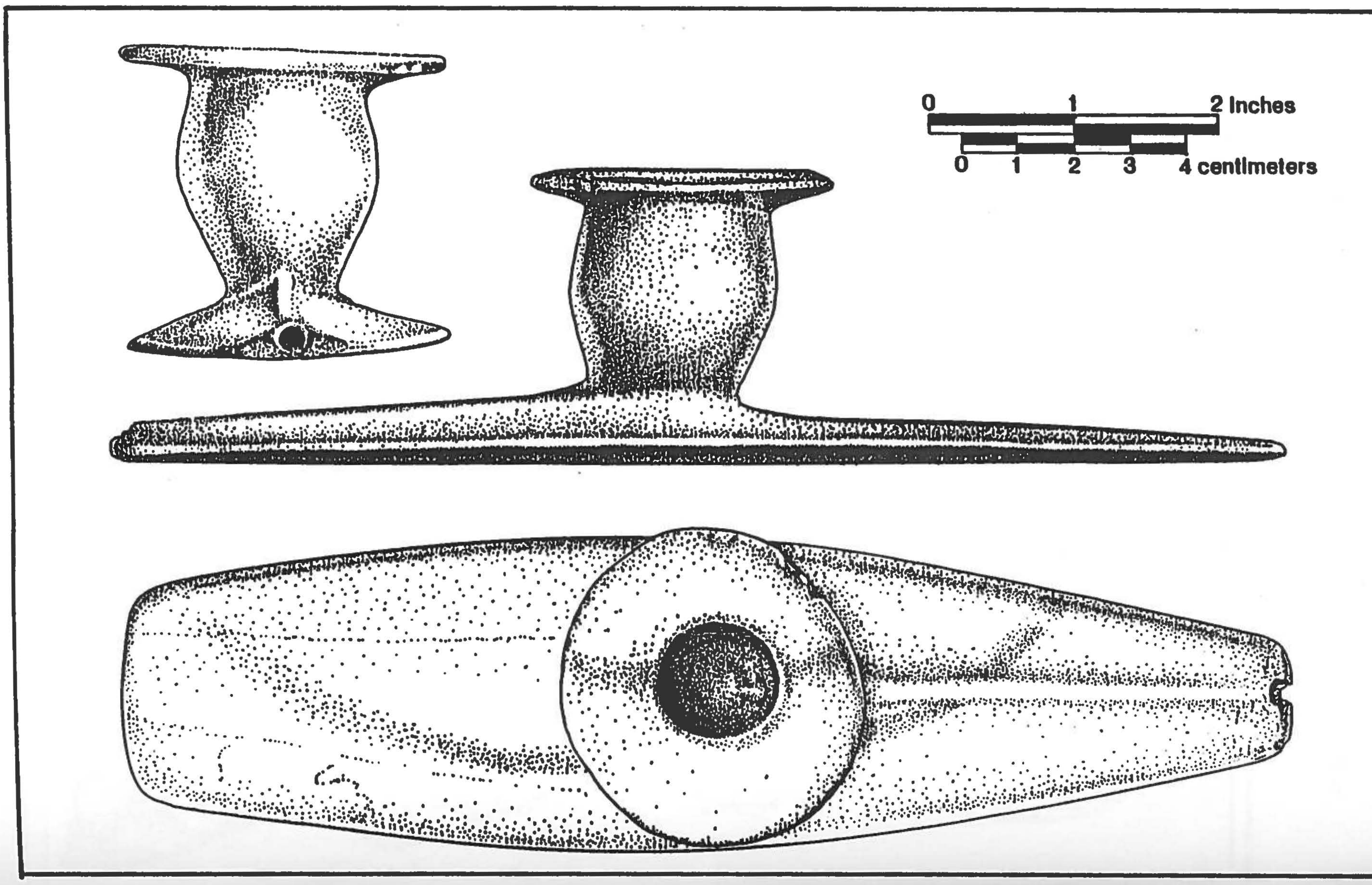


FIGURE 14
Pipe



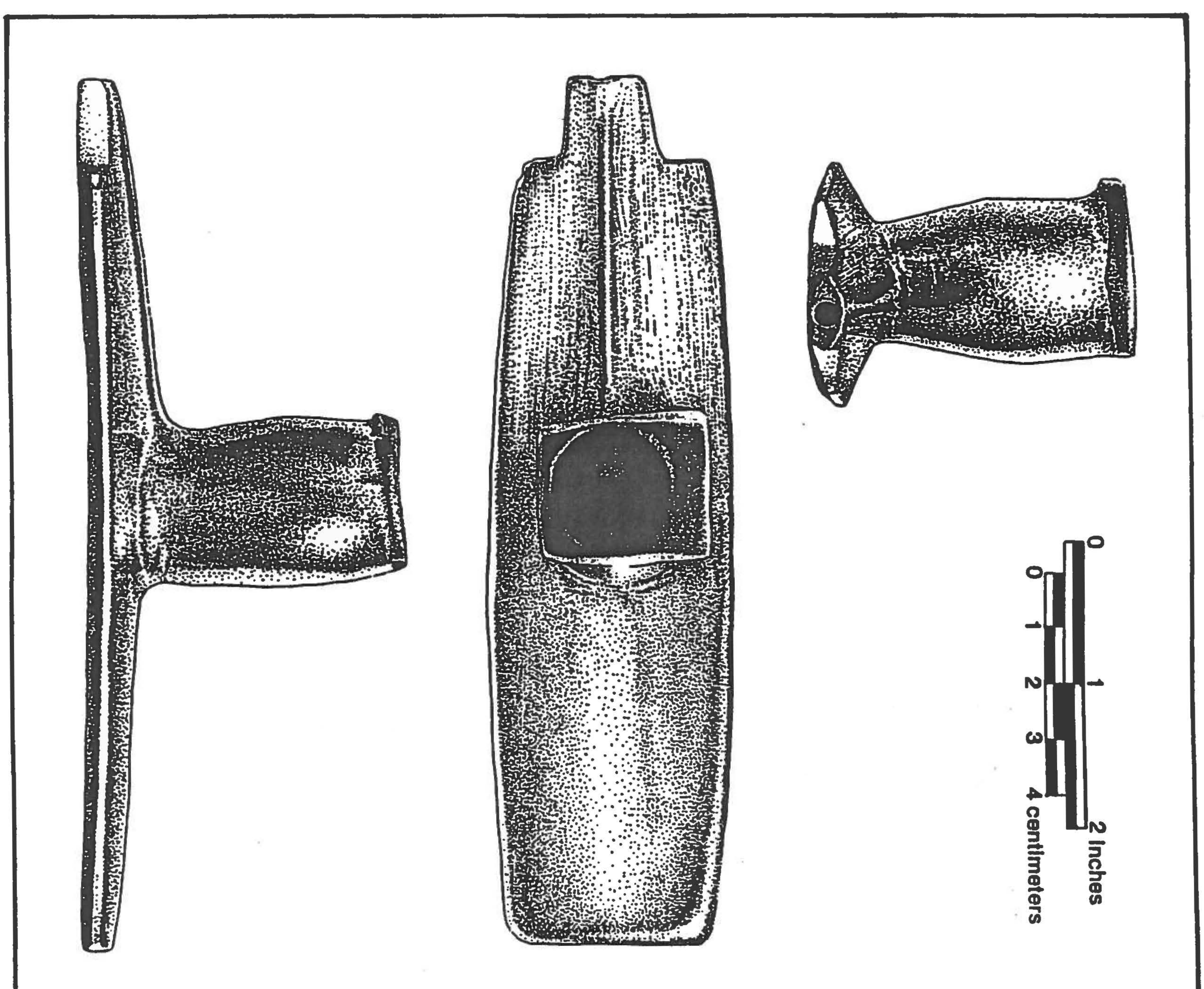


FIGURE 15
Pipe

the Island Field Site is located close to the northern limit of oysters in the Delaware Bay (Daiber et al. 1976). However, the range of oysters has expanded northward through time with Holocene sea level rise. By projecting sea level rise rates and resultant salinity clines back in time, and by looking at the presence of oyster shell in dated archaeological features, it is clear that oysters would not have been present in the vicinity of Island Field prior to AD 1200. The artifact associations and radiocarbon dates from Feature 119 (Doms and Custer 1983) confirm this age estimate. Therefore, any features with oyster shell in their pit fill most likely post-date AD 1200.

Intra-Site Chronology

The various chronological data noted above indicate that there are two separate components at the Island Field Site dating to ca. AD 400 - AD 1150 and AD 1200 - AD 1400. Data on overlapping features, associations of radiocarbon dates, absence of diagnostic artifacts associated with the earlier components and presence of oyster shell in pit fill can be used to identify the burials that can be assigned to the later component. Burials which almost certainly date to the later component include Burial Nos. 1, 2, 9-12, 58, 88, 89, 92, 93, 98, and 105. Burials which may possibly date to the later component include Burial Nos. 3-6, 13, 16-19, 21-24, 40, 57, 68, 75, 82, 96, and 120. Figure 16 shows the distribution of these burials and it can be seen that they are found throughout the cemetery. Prehistoric excavation of the grave pits for these burials produced many of the impact fractures on previous burials noted earlier. The fact that the burials date to a separate later occupation of the site underscores the idea that over-lapping nature of the features is accidental.

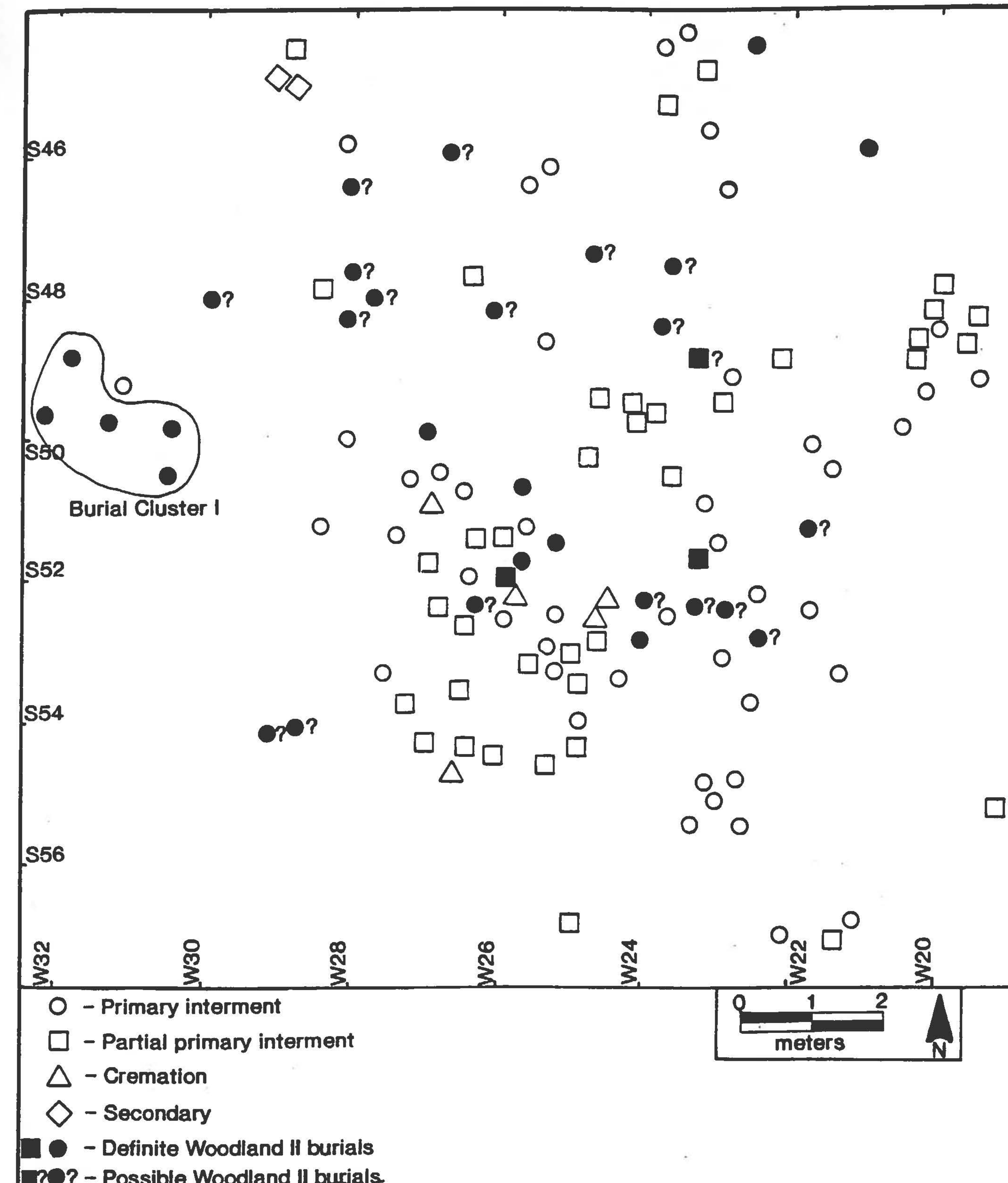
Skeletal Remains

The human skeletal remains from the Island Field Site had never been the focus of a detailed and comprehensive analysis, even though a limited study was undertaken (Neumann and Murad 1970), because they had been left in situ for exhibition. Following the passage of reburial legislation by the State of Delaware in 1987, all the human skeletal material from the Island Field Site was removed and brought to the biological anthropology laboratory at the University of Delaware for analysis. The human skeletal sample from the Island Field Site consists of approximately 158 individuals.

The sex of adults was determined, whenever possible by observation of pelvic morphology. Because of the fragmentary nature of the pelvis, the preferred method of sexing (Phenice 1969) was rarely, if ever, possible and it was necessary to rely on other pelvic features. When no pelvic remains were available, cranial features, such as size and rugosity of the mastoid processes, the nuchal region, and supra-orbital tori were used. Dental or postcranial dimensions were also used. No attempt was made to determine the sex of juvenile individuals using

FIGURE 16

Woodland II Burial Distribution



morphology, although in some cases, dental metrics permitted a tentative identification of sex. Table 3 lists the sex and age assessment for each individual and the basis for those determinations. When the sex of an individual was uncertain, that is indicated in Table 3 by a question mark after the sex assignment. Two question marks indicates considerable doubt. Fragmentary specimens were often not sexed at all. In Table 3, the term "infants" is used for individuals 0-2 years old, "juvenile" for 3-15 years old, and "subadult" for individuals who are 15 years or over, but whose epiphyses are not completely fused.

The sex ratio of adults in the Island Field Sample is clearly somewhat skewed in the direction of females. Males account for only 36% of the sexable adults in the sample. There are several possible reasons for this biased sex ratio. It could represent the true sex ratio in the living population although such a biased sex ratio is extremely unlikely given the range of known adult sex-ratios in pre-industrial populations (Weiss 1972). The sex-ratio bias could also represent differential mortuary treatment of males and females, with males being buried either in a portion of the cemetery not excavated or away from the cemetery.

The ages at death of individuals was determined using dental eruption, when possible, with reference to dental eruption sequences and timing summarized by Bennett (1987). When available, other methods of aging juveniles such as state of fusion of long bone epiphyses (growth centers), were used. Adults were aged using fusion of the spheno-occipital synchondrosis (the suture or joint on the base of the skull, between the sphenoid and occipital bones which fuses at approximately 18-25 years of age), clavicular epiphysis (the growth center of the collar bone which fuses at approximately 18-20 years of age), and degree of dental attrition based on a wear scale given by Smith (1984) and aging standards which we established for this population following a procedure outlined in Miles (1978). Ages for individuals are presented in Tables 1 and 3 and are estimates of age and hence approximate. In some cases it was possible to determine only that an individual had completed the growth process because epiphyses were fused, or bones were of adult size. In these cases, the age is given simply as "adult".

Overall, there is very little evidence of nondental pathology in the Island Field sample. Evidence of iron deficiency or hereditary anemia (such as cribra orbitalia - porosity and/or expansion of bone in eye sockets, or orbits and porotic hyperostosis - thickened cranial bone) is rare. There is one frontal out of 61 (1.6%) which shows evidence of cribra orbitalia. In addition, there is some evidence of porotic hyperostosis, and in all cases it is extremely slight porosity, on 16 out of 65 (24.6%) occipital bones. Although the specific etiology of these skeletal manifestations are not entirely understood, it is recognized that their presence is symptomatic of a range of factors that lead to iron imbalance such as genetic

TABLE 3

SEX AND AGE DATA FROM SKELETAL REMAINS

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
1	male	adult (>22)	overall robusticity	acromial process of scapula is fused
2	female	adult (early 30s)	pelvis, overall robusticity, tooth size	epiphyses fused, tooth wear
3A	male	(41+)	pelvis, overall robusticity, tooth size	tooth wear, suture closure
4A	male	adult (late 30s)	pelvis, overall robusticity, tooth size	epiphyses closed, tooth wear
5A	female ?	15 years	tooth size	tooth wear, epiphyses unfused
6	male	adult (early 30s)	pelvis, cranial robusticity and metrics	tooth wear
7	female	adult (mid 20s)	pelvis, cranial robusticity	epiphyseal fusion, tooth wear
8A	male	adult (mid 30s)	cranial robusticity, pelvis	tooth wear
9A	female	adult (approx. 25)	pelvis, cranial robusticity	tooth wear
10	male ?	19 years	size of acetabulum	M3 root development
11A	male	adult (early 30s)	pelvis	tooth wear

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
12	female	25 years	pelvis	tooth wear
13		adult (>17)		epiphyseal fusion
13A	female		pelvis, cranial robusticity	
14A	male	adult (>40)	overall robusticity	dental wear
15	? (cremation)	adult		long bone size
16A	female	adult (>30)	pelvis, cranial robusticity, tooth size	clavicle epiphysis, tooth wear
17	female	adult (approx. 47)	cranial robusticity	tooth wear
18	female	adult (28)	cranial robusticity	tooth wear
19A	male	adult (35)	pelvis	vertebral lipping, suture closure
20	?	2 years		dental development
21	male	25 years	pelvis, cranial robusticity	epiphyseal fusion, tooth wear
22A	female	23 years	pelvis, cranial robusticity	tooth wear
23	?	1 year		dental development
24	?	6 months		dental development

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
26	?	4 years		dental development
27A	female ?	8 years	tooth size	dental development, epiphyseal fusion
28A	female	adult (>40)	cranial robusticity	tooth wear, TMJ arthritis
31	?			
32	male	adult (23)	cranial robusticity	tooth wear
33	?	8 years		dental development
34A	female ?	18 years		dental development
35	female	adult (late 20s)	cranial robusticity	epiphyseal fusion, tooth wear
36	female	adult (early 20s)	pelvis, cranial robusticity, tooth size	tooth wear
37	female ?	adult (late 20s)	pelvis	tooth wear
38	?	15 years		dental development, epiphyseal fusion
39A	?			
39X	male		overall robusticity	
39Y	female	adult (late 20s)	overall robusticity	tooth wear

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
40	female ?	15 years	tooth size, overall robusticity	tooth wear
41	female ?	15 years	cranial morphology, tooth size	dental development, epiphyseal fusion
42	female ?	adult (early 20s)	sacroiliac articular surface	absence of any vertebral lipping
43	?	4 years		dental development
44	female	adult (35 years)	pelvis, cranial robusticity, tooth size	tooth wear
46	?	4 years		dental development
47	?	adult		size of bones
48	?	3 years		dental development
49	female	adult (late 20s)	cranial robusticity	tooth wear
50	male	adult (approx. 40)	cranial robusticity	tooth wear, suture closure, osteoporosis
51	female	adult (late 20s)	cranial robusticity	tooth wear
52	female ?	adult (late 30s)	cranial robusticity and metrics	tooth wear
53	?	6 months		dental development
54	female ?	adult	pelvis	size of bones

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
55	?	8 years		dental development, epiphyseal fusion
56	?	4 years		dental development
57A	female	adult (approx. 38)	cranial robusticity	tooth wear
58A	?	adult		dental development
58B		child		dental development
59	female ?	adult (approx. 40)	cranial robusticity	tooth wear
60	female	adult (approx. 35)	pelvis, cranial robusticity	tooth wear
61	?	6 years		dental development
62	?	5 years		dental development
63	?	8 years		dental development
64A	male	adult (approx. 35)	cranial robusticity	tooth wear
65	female ?	17 years	pelvis	dental development
67	female ?	19 years	tooth size	tooth wear
68	female	adult (approx.24)	pelvis, cranial robusticity	tooth wear
69	?	1 year		dental development

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
70	? (very fragmentary)			
71	male	adult (approx. 20)	tooth size	tooth wear
72	? (cremation)	adult		osteophytes on vertebral fragments
73A	male	adult (>45)	cranial robusticity	tooth wear
74	female ?	adult (approx. 40)	cranial robusticity	tooth wear
75	? (fragmentary)	adult		size of bones
76		adult (approx. 33)		tooth wear
76A	female ?		pelvis, cranial robusticity	
77A	female	adult (approx. 25)	pelvis, cranial robusticity	tooth wear
79	?	6 months		dental development
80	?	not an infant		size of bones
81	female ?	adult (approx. 35)	pelvis, cranial robusticity	vertebral lipping, suture closure
82	female ?	adult (approx. 28)	pelvis, cranial robusticity	tooth wear, epiphyseal obliteration

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
83	male	adult (approx. 47)	pelvis, cranial robusticity	tooth wear
84	?	3 years		dental development
85	?	7 months		dental development
86	?	18 months		dental development
87	?	adult		size of bones
88	?	15 years		dental development
89	male	adult (approx. 42)	cranial robusticity	tooth wear
90	?	6 years		dental development
91	?	1 year		dental development
92	female	adult (approx. 25)	pelvis, cranial robusticity	tooth wear
93	?	9 months		dental development, epiphyseal closure
94	female ?	adult (approx. 40)	cranial robusticity	tooth wear
95A	female ?	adult (approx. 47)	pelvis, cranial robusticity	tooth wear
96	female ?	15 years		dental development, epiphyseal closure

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
97	female	adult (approx. 38)	pelvis, cranial robusticity	tooth wear, suture closure
98	male	adult (approx. 47)	overall robusticity	tooth wear, osteo-phytes on vertebae
99	female	adult (>40)	cranial robusticity	tooth wear and ante-mortem loss
100	?	3 years		dental development
101	male	adult (approx. 23)	cranial robusticity	tooth wear
102A	?	adult (approx. 25)		tooth wear
105	female ?	adult (approx. 24)	pelvis, overall robusticity	tooth wear, epiphyseal fusion
106	female	adult (50s)	cranial robusticity	tooth wear, suture closure, osteoporosis
107	female	adult (approx. 36)	pelvis, cranial robusticity	tooth wear. suture closure
108	?	4 years		dental development
109		adult (approx. 23)		tooth wear
110	female ?	adult	pelvis	size of bones

TABLE 3 (cont.)

Burial Number	Sex	Age	Basis for Assignment of Sex	Basis for Age Estimation
112	male	adult (approx. 25)	pelvis, cranial robusticity, tooth size	tooth wear
113	female ?	adult (approx. 35)	cranial robusticity	tooth wear
115	male	adult (approx. 25)	pelvis, cranial robusticity	tooth wear
116	male ?		overall robusticity	
117	female ??	adult	long bone robusticity	size of bones
118	?			
119	?	18 months		dental development
120	female ?	19 years	overall robusticity	dental development,
125	?	8 years		epiphyseal fusion dental development
126	?	adult		size of bones
127	?	1 year		dental development
128	?	7 years		dental development
129A	male	adult (approx. 38)	pelvis, cranial robusticity	tooth wear, vertebral lipping
129B	female		pelvis	
130	female ?	adult (approx. 31)	pelvis, cranial robusticity	tooth wear
132	?			

anemias, dietary insufficiencies and infectious disease (Larsen 1987; Mann and Murphy 1990). These pathologies often occur in high frequencies in populations which rely on domesticated plants such as maize and the low levels of these pathologies in the Island Field sample suggests that the diet was nutritionally adequate. However, there is evidence (Larsen 1987) that the inclusion of fish in the diet may increase iron absorption and buffer populations from iron deficiency. The proximity of the Island Field site to marine resources may be a partial explanation for the low frequency of evidence for anemias.

There is also very little evidence for infectious disease. One measure of restricted bony infection is the frequency of periostitis (inflammation of the periosteum or tight outer sheath of bone). In the Island Field sample, two out of 48 individuals (4.2%) have tibias which show signs of periostitis. Otherwise, there are only a small handful of periosteal reactions scattered on a number of different skeletal elements in the Island Field sample. In most cases, the periostitis is very slightly developed. Larsen (1987) reports 4.5% of tibias in preagricultural groups and 15% of agricultural groups from the Georgia Coast showing some periosteal reaction. The Island Field sample is clearly much more similar to the preagricultural group. In general, the low frequencies of either nutritional deficiencies or infectious disease in the Island Field sample is similar to that seen in many other hunter-gatherer populations (Cohen and Armelagos 1984).

Although human stature (height) is known to be partly under genetic control, it is well known that it is also influenced by environmental stress. Environmental stress could include such factors as nutritional deficiency or imbalance, disease, parasite load, or work load which occur during the growth process. Ideally, one would wish to study growth rates by examining a cross-sectional sample of juveniles. Unfortunately, long bone preservation in juveniles in the Island Field sample does not permit this approach. However, it is useful to compare adult stature in the Island Field sample with other prehistoric samples from the region.

Stature of human skeletal material is estimated using long bone lengths and regression equations derived from other skeletal collections of known stature. Because preservation (especially of long bones) was so poor in the Island Field sample it was not possible to calculate stature for more than a small sample of individuals. Their long bone lengths and estimated stature are given in Table 4. Stature was estimated using Genoves' (1967) sex-specific equations derived from living Mesoamericans. Although Genoves' sample sizes were quite small (N= 22 males, N = 15 females) it is appropriate to use these regressions because when the available stature estimation formulae are considered, Genoves' sample probably most closely matches Island Field in body proportions. When more than one bone was available for stature estimation, the estimates derived from the different bones were averaged in Table 4.

TABLE 4

LONG BONE LENGTHS AND ESTIMATED STATURE OF INDIVIDUALS IN THE ISLAND FIELD SAMPLE (ALL MEASUREMENTS IN CENTIMETERS)

Burial Number	Sex	Femur Length	Humerus Length	Tibia Length	Radius Length	Ulna Length	Stature
1	M				24.9		164.5
8A	M		33.8				168.0
11	M	46.5[a]				26.6	166.7
12	F	44.4[a]	30.4	37.2			161.2
16	F	41.3[a]	29.7	34.2	25.0	22.9	157.2
19	M	47.3					171.0
21	M	47.6		39.6			170.2
44	F		28.6				151.5
60	F	43.9					161.1
68	F	45.5					165.0
76	F			37.0			162.0
81	F		30.0				158.5
82	F	46.9					170.0
95	F	45.6					165.2
98	M	44.9	31.5				164.0
105	F	43.6		36.6			160.5
107	F		30.1				157.5
129	M	47.7					172.0

[a] - right and left sides averaged.

The data from Table 5 indicate an average male stature of 168.0 cm or 5' 6" (N = 7), and an average female stature of 160.9 cm or 5' 3" (N = 11). These values are similar to statures estimated, using the same stature prediction equations, for Georgia Coast preagricultural populations (168.4 cm for males and 161.8 cm for females), and agricultural males (167.3 cm) though they are greater than Georgia Coast agricultural females (156.8 cm) (Larsen 1983).

Tooth wear in the Island Field sample is generally similar to that described for other hunter-gatherer groups (Smith 1984, Hinton 1981). The Island Field sample is more similar in tooth wear to the hunter-gatherers (Eskimos and Australian Aborigines) than to the agriculturalists (Amerinds from the Southwest and from Libben) which Hinton (1981) describes.

Because increased reliance on plant food is associated with increased frequency of dental pathology such as caries (the disease process which results in lesions on the teeth popularly known as "cavaties") in many regions of the world, the frequency of dental caries in the Island Field population is of particular interest. In this study, previously reported by Rosenberg, Washburn, and Custer (1988), a total of 1413 identifiable teeth from 79 individuals were available for study. The study on caries frequency was limited to individuals known to be older than 16

TABLE 5

FREQUENCY OF CARIOUS TEETH IN THE ISLAND FIELD SAMPLE

Tooth	N	Carious Teeth (%)	N	Carious Teeth (%)
		Maxilla		Mandible
I1	80	4 (5.0)	65	2 (3.1)
I2	81	4 (4.9)	67	2 (3.0)
C	95	8 (8.4)	80	2 (2.5)
P1	100	9 (9.0)	80	3 (3.7)
P2	101	5 (4.9)	88	6 (6.8)
M1	108	19 (17.6)	108	17 (15.7)
M2	89	22 (24.7)	102	26 (25.5)
M3	82	29 (35.4)	87	26 (30.0)
Total	736	100 (13.6)	677	84 (12.4)

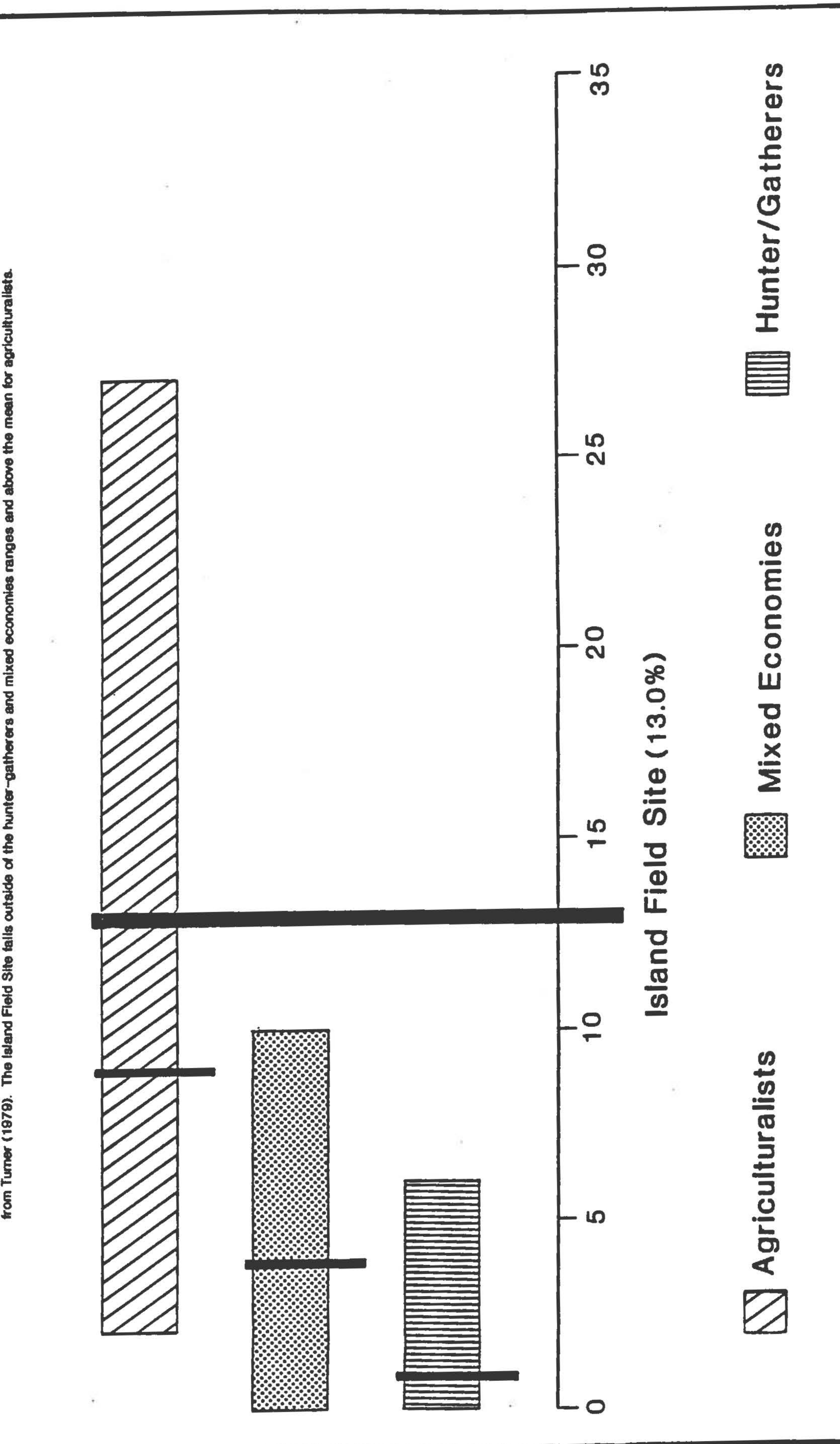
years in order to eliminate unerupted teeth which would not have been exposed to cariogenic agents during life. Caries were identified following Koritzer (1977).

Table 5 shows the frequencies of caries for each class of teeth and caries frequencies in the Island Field sample range from 2.5% to 35.4% depending on the particular tooth, with an overall frequency of 13.0% of all teeth having some carious lesion. An examination of teeth from individuals of known sex shows no significant or even systematic difference between males and females in frequency of carious teeth with a 14.0% value for females and a 11.6% value for males for all classes of teeth combined.

Figure 17 shows a comparison of frequencies of carious teeth from a large number of skeletal samples (N = 19 samples of hunter-gatherers, N = 13 samples of "mixed economies" and N = 32 samples of agriculturalists) described by Turner (1979). The Island Field population has a frequency of carious teeth which is greater than all of the hunter-gatherers or mixed economies in Turner's data. In fact, the Island Field frequency is higher than the median frequency for agriculturalists. This high frequency suggests a high amount of carbohydrates in their diet. Comparison of data from this site to data from another prehistoric North American eastern coastal adapted population from the Georgia coast (Larsen 1983) shows that the frequency of caries in the Island Field sample is greater than that for Georgia coast preagriculturalists, who have overall caries

FIGURE 17

Comparison of Frequencies of Carious Teeth



This diagram shows the frequency of carious teeth (all teeth combined) for the Island Field Site compared to the ranges of carious teeth in hunter-gatherers, mixed economies and agriculturalists taken from Turner (1979). The Island Field Site falls outside of the hunter-gatherers and mixed economies ranges and above the mean for agriculturalists.

frequencies of 1.2% for females and 0.6% for males, and is similar to Georgia coast maize agriculturalists, who have overall frequencies of 15.6% for females and 11.2% for males.

In addition to a relatively high caries rate for hunter-gatherers, the Island Field sample also has a similarly high rate of other dental pathologies such as antemortem tooth loss (the loss of a tooth during life), periodontal disease (pathology of the tissue adjacent to teeth, e.g. gums), and apical abscesses (inflammation or other pathologies of the tip of the tooth root). Finally, a dental pathology which occurs frequently in the Island Field sample is degenerative arthritis of the temporomandibular joint (the joint between the lower jaw and the skull). In several cases, this condition led to severe remodelling of both the mandibular condyle, the surface of the lower jaw that fits into the joint with the skull and the temporomandibular (glenoid) fossa (the depression on the skull into which the mandibular condyle fits). This condition occurs most frequently in older individuals with advanced degrees of tooth wear. Of the 47 adult individuals for whom the temporomandibular joint is preserved so that this condition can be evaluated, degenerative arthritis of this joint occurs in 14 cases (29.8%). This frequency compares with frequencies of 10-29% in post Bronze Age populations from Europe (Griffin, Powers and Kruszynski 1979) and 40% in Australian Aborigines (Richards and Brown 1981).

Although more detailed analysis of the dental pathology is pending, it is clear from this preliminary study that the Island Field population was similar to many other hunter-gatherers in the degree of tooth wear and frequency of degenerative arthritis of the TMJ. However, it differs from most hunter-gatherers in its relatively high frequency of dental caries suggesting that the Island Field population subsisted on a relatively carbohydrate rich diet. The bone chemistry study which is currently underway will provide additional insight into the question of the diet of the Island Field population.

Grave Goods

Table 6 shows a summary tabulation of the major grave goods associations. The inventory is based on the tabulation provided by Thomas and Warren (1970:10-11), but also includes additional artifacts recovered during our more recent excavations. The artifact classes used here are similar to those used by Thomas and Warren, but have been adjusted to some extent to reduce the number of different classes and to reflect newer interpretations of some artifact functions. All of the large and medium category classes of caches are included along with most of the small category class with more than one artifact. Location of the burials with caches are noted in Figure 8. Radiocarbon dates for caches are noted in Table 6. One Cache (Burial 12 - small category) is definitely associated with later Woodland II use of the cemetery and two additional caches (Burial 19 - medium category, Burial 21 - small category) are possibly associated with the later Woodland II component.

TABLE 6

GRAVE CACHE ASSOCIATIONS

Caches	Large			Medium								Small								
				o		*						#					o			
Burial No.	49	44	76	19	48	73	69	42	80	112	45	12	60	99	22	59	21	102	111	97
Age	A	A	A	A	C	A	I	A	?	A	?	A	A	A	A	A	A	A	?	A
Sex	F	F	?	M	?	M	?	F	?	M	?	F	F	F	F	F	M	?	?	F
Burial Treatment	?	E	LF	TF	RC	?	?	TF	TF	E	?	LF	?	LF	TF	TF	LF	?	?	TF
Large Bifaces	1	1	5																	
Projectile Points	12	20	18	7	1		2	1	2	5		1				1	1			
Drills			3																	
Scrapers	3																			
Early Stage Bifaces	3	9	4						1		1						1			
Cores	8	6	4		3			1			1									
Flakes	10	25	3	1	2						2	1								
Hammerstones	2	5	6		2			1			1									
Bog Iron		1				1			2		1									
Pipes	3	3	1		1															
Deer Phalanges	8	23	4		2				1		1									
Ulna Awls	8	6							6											
Antler Flakers	26	49	7	1	4			8	20		4					1	3			
Canine Bones	2	3	1					3	1											

TABLE 6 (cont.)

Caches	**Large**			**Medium**								**Small**								
				o		*						#					o			
Burial No.	49	44	76	19	48	73	69	42	80	112	45	12	60	99	22	59	21	102	111	97
Bone Needles	10	14							1			4								
Harpoons	1	5							1											
Bone Handles	3	8	6		3		1	3		1										
Beaver Teeth	2	6	3				1		1											
Turtle Shell		10							1			1								
Fish Hooks	2																			
Shell Beads								11					3		1					1
Shell Cup						1								1				1	1	1
Whelk Shell Core	4																			
Gorgets/Pendants	2		2							1					1					
Celt/Adze/Axe	3	2	3		1			1		2										
Pestle		1	1			1				1										
Shark's Teeth			3																	

Key: A=Adult E=Extended *=includes antler headress
C=Child LF=Loose Flexed #=Woodland II component
I=Infant TF=Tight Flexed o=Possible Woodland II component
RC=Redeposited Cremation

Radiocarbon Dates: Burial 48 - (AD 901-1189); Burial 76 - (AD 889-983);
(calibrated) Burial 73 - (AD 775-976); Burial 99 - (AD 543-644);
Burial 44 - (AD 543-642); Burial 60 - (AD 426-572)

Before discussing the caches and associations, we will present a brief description of some new artifact finds of special interest which were encountered during the new excavations.

New Artifact Finds

One of the interesting new artifact finds was the discovery in Burial 61 of the five distal phalanges of an American mountain lion (**Felis concolar**), which were identified by Katherine Moore, a research assistant at the Peabody Museum, Harvard University. Burial 61 consisted of a tightly flexed child approximately 6 years old, who was placed directly on top of Burial 76, which contained one of the three large caches associated with a loosely flexed adult whose sex could not be clearly determined. Although the association of those two burials may be accidental, it is possible that the association is purposeful. The presence of only the distal phalanges, which are covered with a horny claw material, suggests that they were part of a skin which still had the claws attached. The five bones seem to represent a single "set" and, because the hind foot of a mountain lion has only four toes, these claws probably came from a front foot. Their size indicates an adult animal. The phalanges were found beside the body and it is possible, although far from certain, that the body might have been wrapped within the animal's skin. Young and Goldman (1946) note that mountain lions were once found in all areas of the Eastern United States in historic times and the marshes and swamps of Delaware represent one of its preferred habitats. Therefore, the bones very likely came from a local animal.

Another recent artifact find is associated with Burial 32, an in situ cremation of an adult male. The original excavators noted the presence of charcoal within the feature and this charcoal was used to provide the initial radiocarbon date (Table 2 - I-6338) for the site. In the course of our more recent excavations, we found three fragments of charred textiles under the pelvis of Burial 32. In fact, some of the textiles were fused to the pelvis. Three kinds of textiles were present and are illustrated in Figure 18. Two of the textile fragments (Figure 18 A and B) seem to be open simple twining (Adovasio 1977:18) with the warp rods composed of reeds in one example (Figure 18A) and bundles of grass fibers in the other (Figure 18B). The third example (Figure 18C) is composed of simple plaiting with one plaiting element per set (Adovasio 1977:104) of some kind of split wood element. These textiles are the first recovered from any prehistoric archaeological contexts on the Delamarva Peninsula, and they seem to have functioned as a lining for the shallow pit feature upon which Burial 32 was cremated. Further research will be undertaken with these materials to more closely analyze the materials and technologies used.

Cache Associations

Eighty percent of the artifacts included in all caches were associated with stone tool production and included products of

FIGURE 18

Textile Varieties from Burial 32

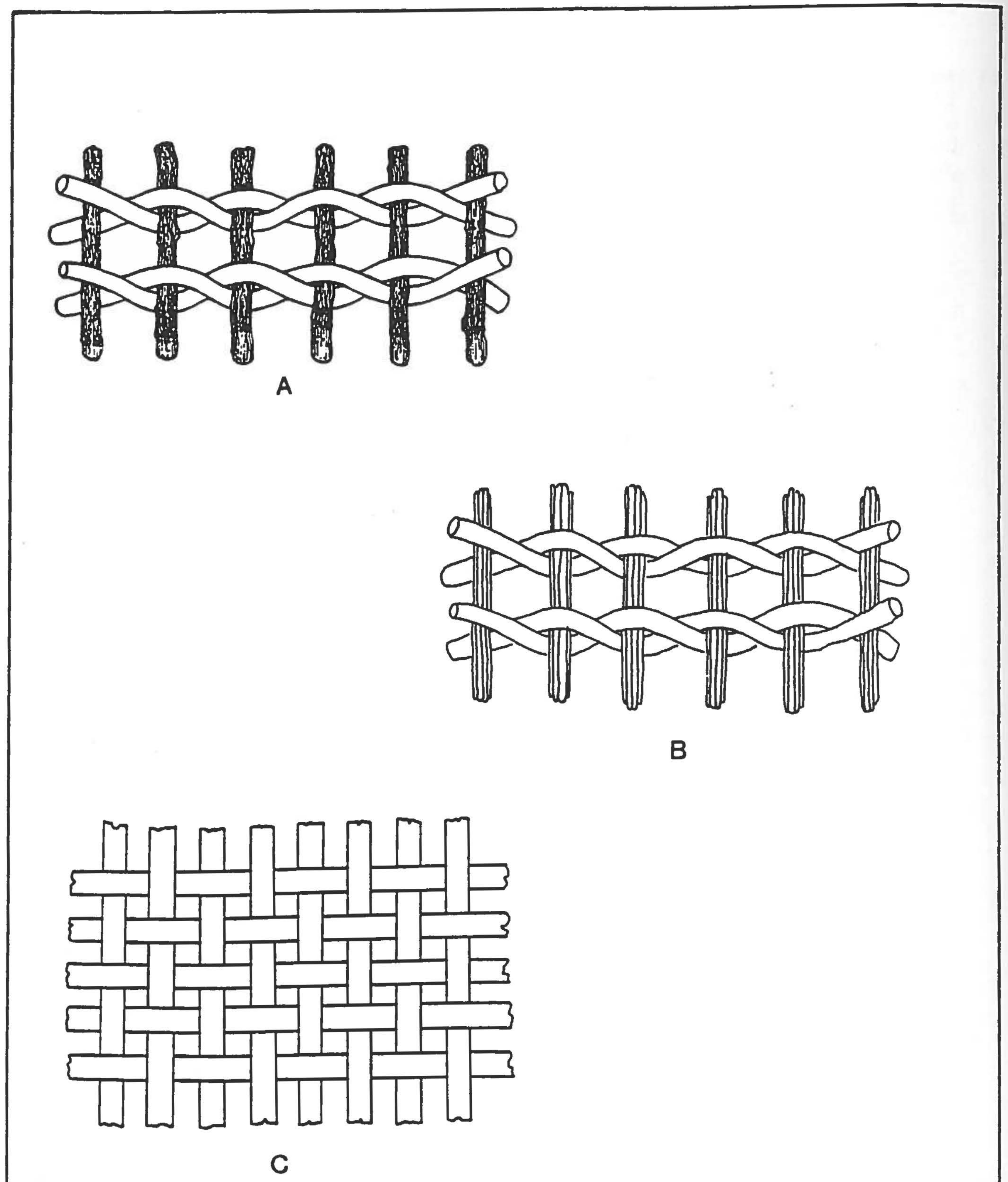


FIGURE 19

Flintknapping Tools from Burial 44

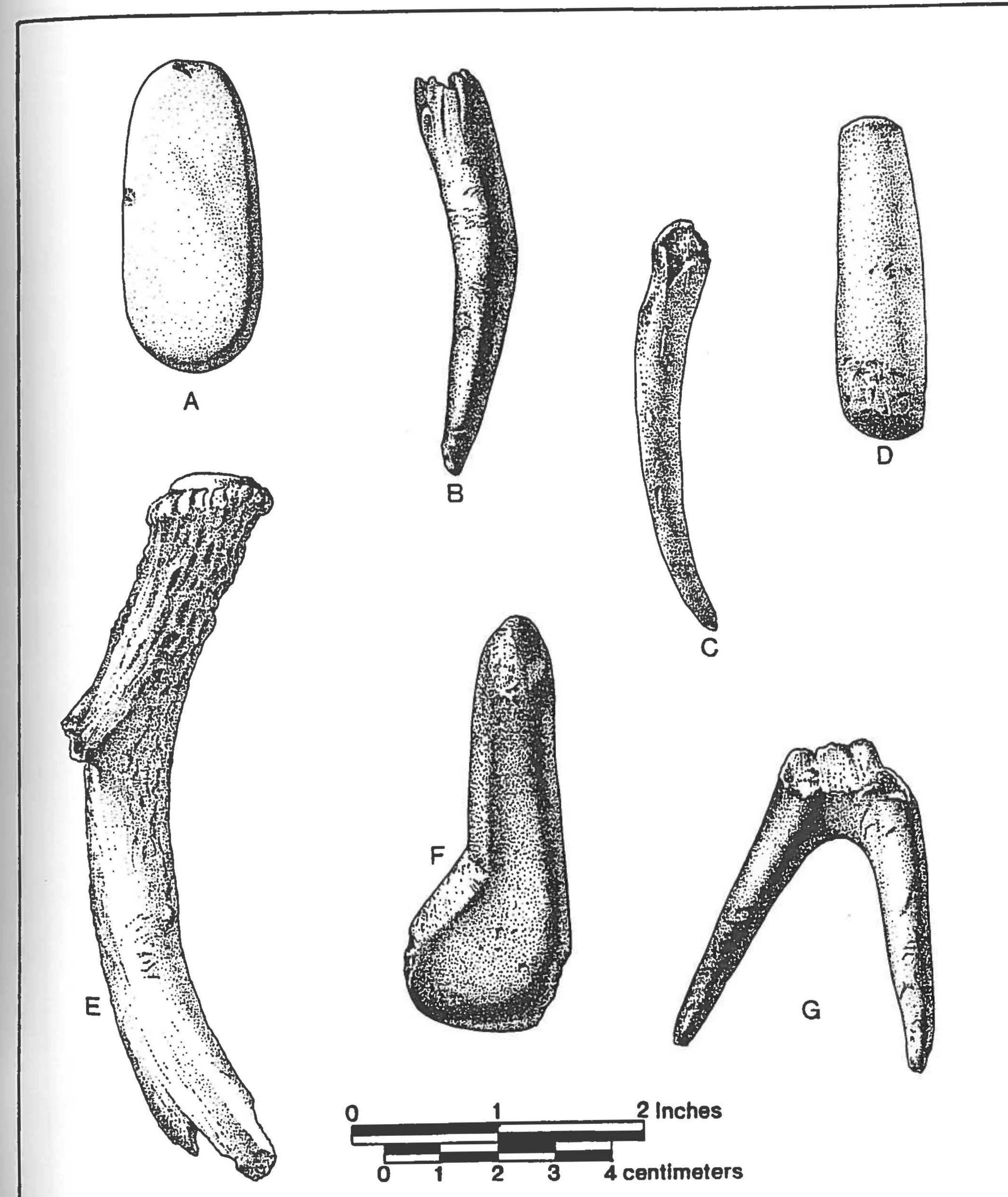


FIGURE 20

Flintknapping Tools from Burial 49

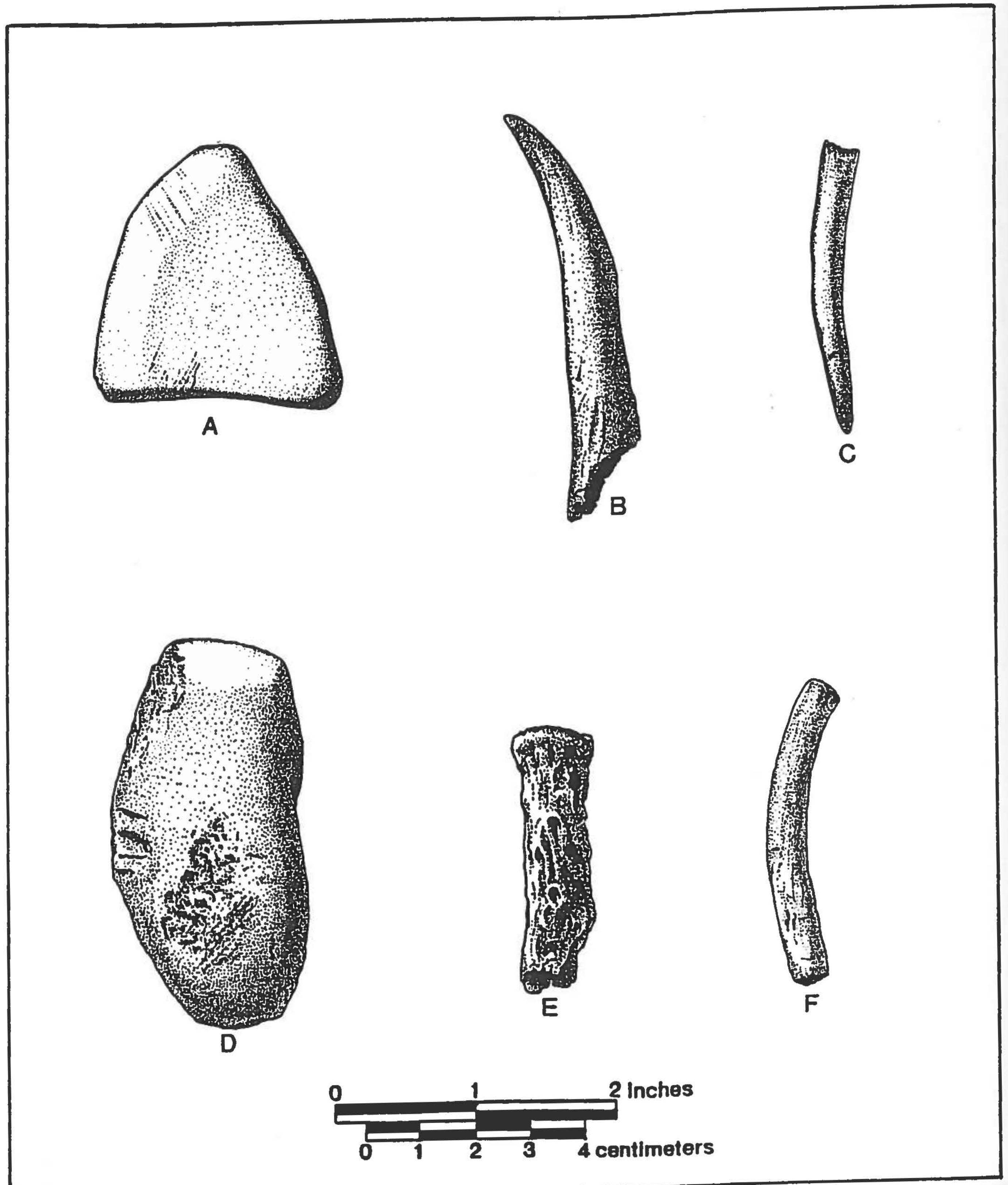
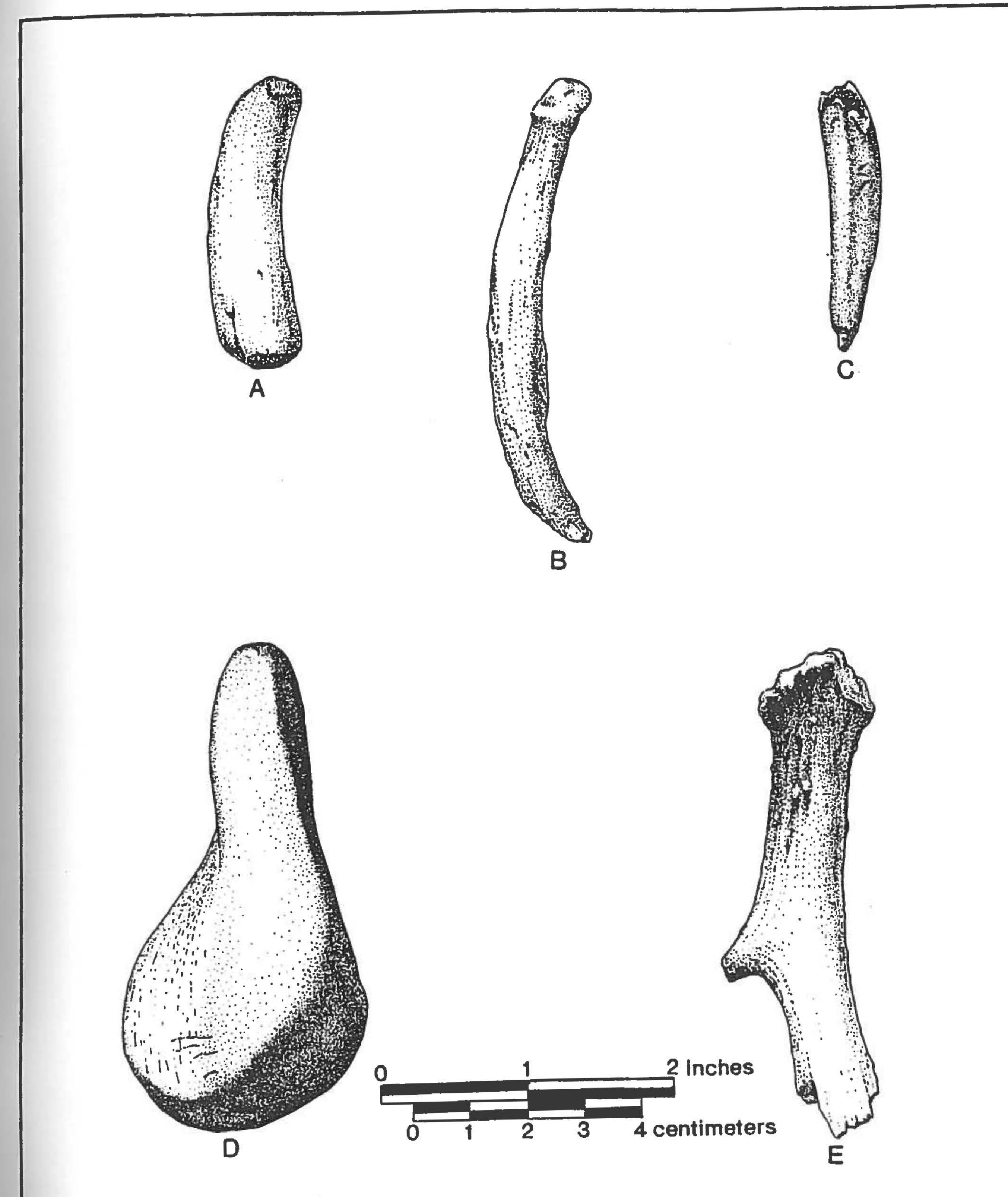


FIGURE 21

Flintknapping Tools from Burial 76



stone tool production (projectile points and bifaces), waste products of stone tool production (debitage and broken bifaces), and flintknapping tools (hammerstones, batons or billets, pressure flakers and punches). Figures 19-21 show three assemblages of flintknapping tools from the three largest caches (Burials 44, 49, 76) and a variety of flintknapping tools are present. Table 7 compares the varied tool forms in each of the large caches.

TABLE 7

COMPARISON OF THE FLINT KNAPPING TOOL KITS

	Burial 49	Burial 44	Burial 76
Large Billet		X	X
Medium Billet	X		X
Small Billet	X		
Handle used as Billet		X	X
Large Hammerstone	X	X	X
Small Hammerstone	X	X	
Pressure Flaker	X	X	X
Punch	X	X	X

All three caches contain antler tines which were used as flintknapping tools of two functions. One tine-based tool form consists of narrow tines which show faceted wear on their tips (Figures 19 C and G, 20C, 21C) and were probably used as pressure flakers. A second tine-based tool form consists of broader tines which show crushing wear on their blunt tips, battering wear on their butt ends, and scraping and gouging wear on their mid-sections (Figures 19B and 20B). These tools are believed to be punches used to remove flakes from prepared cores. Hammerstones, which could have been used with the punches or for direct percussion, are also present in the caches (Figure 19 A and F, 20 A and D, 21D) with two examples (Figures 19F and 21D) having handle-like protrusions opposite the ends with impact wear.

Bone and antler batons, or billets, for soft hammer direct percussion are also present in the caches (Figures 19 D and E, 20E and F, 21 A and E). These billets vary in size and configuration among the caches. Large antler billets with extensive wear on their butt, or articulated ends (Figures 19E and 21E) are present and were most likely used in the secondary reduction of early stage bifaces (Callahan 1979). Similarly shaped, but smaller, billets made from butt ends of antlers (Figure 20E) are also present and may have been used in final stages of stone tool manufacture. A very small mid-section of

antler (Figure 20F) was also found and showed impact damage from billet use. Its small size and light weight almost certainly indicates its use in the very late stages of tool reduction, such as final edge shaping, and it may have been used for very light and controlled direct percussion in lieu of use or pressure flaking. A final type of billet includes a series of bone and antler cylinders which are broad and short (Figures 19D, 21A) and show impact wear from billet use.

Each of the three tool kits listed in Table 7 shows a complete range of flintknapping tools for activities ranging from the reduction of primary bifaces to final projectile point manufacture and reduction of prepared cores. Interestingly, each tool kit shows a slightly different mix of tool forms, especially with regard to hammerstones and billets used in early stage biface reduction. All three tool kits include antler tine pressure flakers and punches. The variability of tool forms within tool kits that fulfill the same range of functions, namely the complete range of biface and core reduction, suggests idiosyncratic variation within personalized tool kits.

The age and sex of the individuals associated with the flintknapping tool kits is of interest because three of the individuals are adult females (Burial Nos. 49, 44, and 42) and one child (Burial 48). Only one flintknapping tool kit, which consisted of only 3 tools, is associated with an adult male (Burial 21), and it may date to the later occupation of the site. Three flintknapping tool kits are associated with burials of undetermined sex (Burial Nos. 76, 80, and 45), although one of these (Burial 76) is clearly an adult. The association of half of the flintknapping tool kits with women and children is of special interest because most ethnographic descriptions of the manufacture of chipped stone tools (e.g. Torrence 1986:50-66; Gould 1969; Gould, Koster, and Sontz 1971; Binford 1983:150-153; McBryde 1978; Vial 1940; Gallagher 1977) and ground stone tools (Cook 1982) all note that these are activities usually undertaken by males.

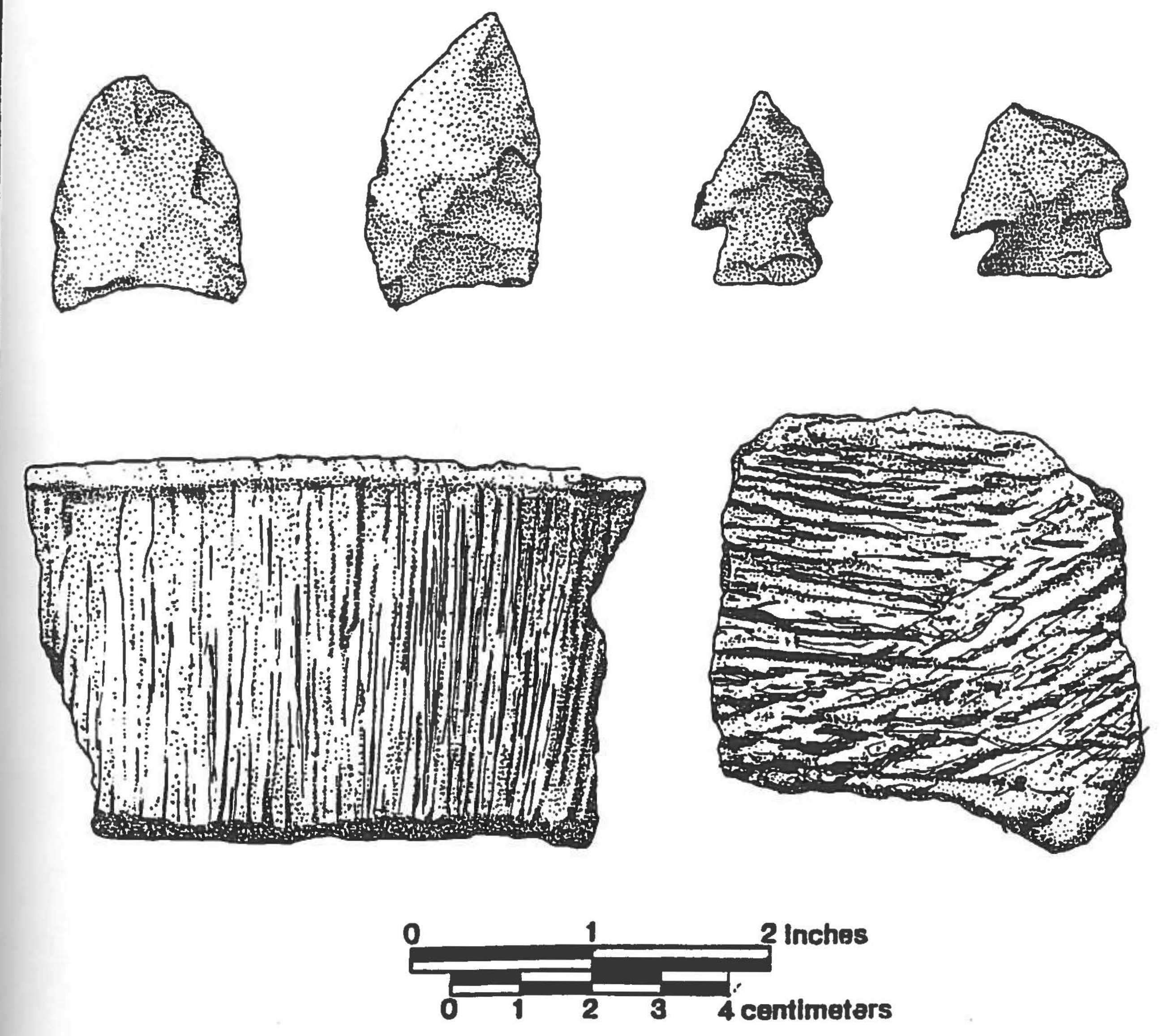
It might be tempting to claim that the flintknapping tool kits associated with females at the Island Field Site belonged to males and were placed in graves of females as mortuary offerings. The flintknapping tool kit buried with the child burial (Burial No. 48) most likely does <u>not</u> represent that small child's tool kit and the notion that grave goods associated with children do not necessarily represent their personal items has been applied to other child burials in the Middle Atlantic (Custer 1985; Wray et al. 1987) and to Kipp Island sites, similar to Island Field, in southern Ontario (Ritchie 1965:233; 1944:176-177). However, because the sample of ethnographic examples of male-dominated flintknapping is neither large nor representative, we feel that there is no reason why the flintknapping tools could not belong to the females with which they are associated. The variability of the tool kits, which is probably related to idiosyncratic and personal preferences in tool form is <u>not</u> consistent with stylized mortuary offerings and in the case of the two largest caches associated with females, the entire range of materials associated with flintknapping are present including raw materials (early stage bifaces and cores), waste products (debitage), production tools, and end products (large late stage bifaces, drills, and projectile points). Other artifacts more typically associated with females, such as bone awls and needles, ornaments of shell and bone, pestles, and basketry tools are also present with these burials. Therefore, we feel that the simplest explanation of the flintknapping tool associations is to view them as personal tool kits belonging to the females with which they were associated. A less likely alternative hypothesis would view these items as male tool kits placed in the graves of females as mortuary offerings. However, we wonder what would happen if we would have found needles, awls, pestles, and other "female" tools in a male grave. Would we view them as female tools placed in a male grave as mortuary offerings? We think that most archaeologists would not view them as such and that it is mainly our own gender biases that cause us to have problems accepting female flintknappers.

Habitation Site Collections

Our renewed research at the Island Field Site also included a cursory review of the available collections from the habitation area of the site. Coventional "wisdom" noted that the habitation site post-dated the cemetery (Custer 1984a:163-164) and that the cemetery and nearby habitation area were not related, even though there was some spatial overlap. Upon review of the artifacts from surface collections, plow zone excavations, and feature excavations of the habitation area, it became clear that a substantial Woodland II Slaughter Creek Complex component was indeed present at the site. All varieties of Townsend ceramics are present, including early (ca. AD 1000 - 1350) complex designs and later (ca. AD 1350 - 1600) simple direct corded designs (Griffith 1982; Custer 1989:303), and these ceramics and triangular points were found in sub-plow zone pit house (Artusy and Griffith 1975) and storage pit (Doms and Custer 1983) contexts. However, in addition to the Woodland II artifacts there were artifacts from every major time period of Delaware's prehistory. As might be expected, the surface-collected and plow zone assemblages showed the greatest variety of diagnostic artifacts, especially projectile points.

A variety of ceramics were also present and the second most abundant ceramic types, after Woodland II Townsend wares, are Hell Island varieties which are present in surface collection, plow zone, and sub-plow zone feature contexts (Figure 22). Jack's Reef pentagonal and side-notched points are also present in similar contexts (Figure 22). As was noted earlier, these are the major diagnostic artifacts for the main use of the cemetery. Therefore, there is a habitation site associated with the Woodland I Webb Complex use of the cemetery. Indeed, given the fact that we have now documented a limited Woodland II use of the cemetery, it is clear that for the entire time period of cemetery use (ca. AD 400 to 1400) an associated habitation site is present.

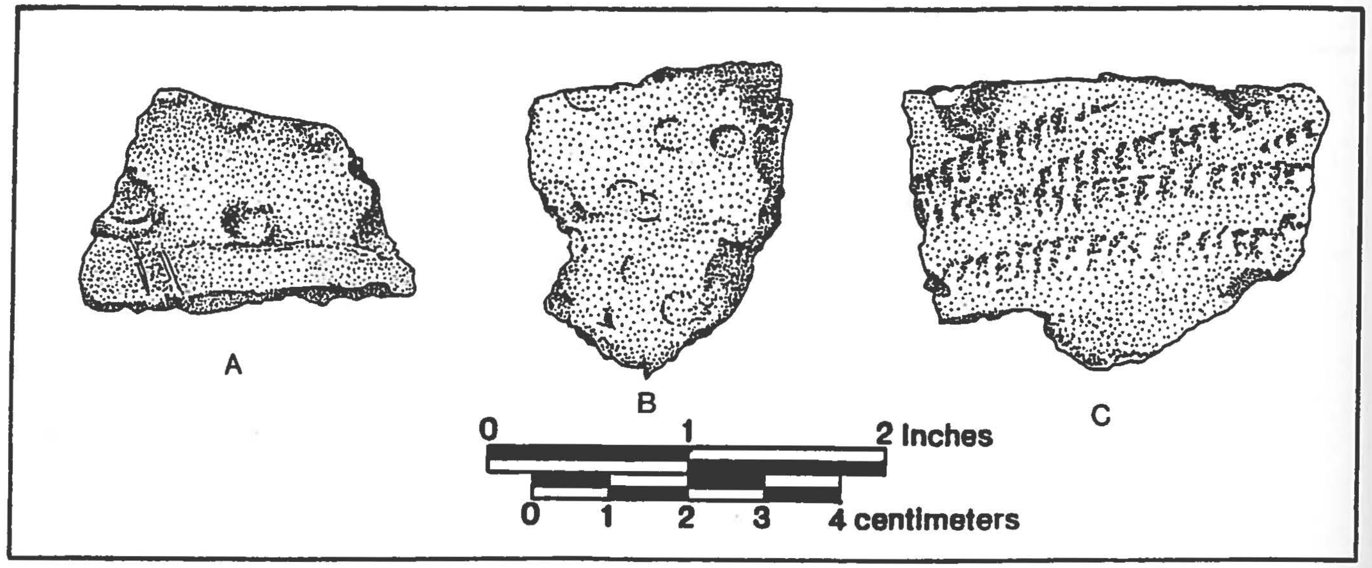
FIGURE 22
Artifacts from Habitation Area



The habitation area also contains some ceramics not commonly seen on the Delamarva Peninsula. Figure 23 shows three non-local rim sherds including two punctuated sherds (Figure 23 A and B) similar to those found at Clemson Island sites in central and northern Pennsylvania (Stewart 1990) and also similar to Jack's Reef Corded Punctate ceramics from central New York (Ritchie and Funk 1973:164). A dentate stamped sherd (Figure 23C) is also present in the assemblage. Dentate stamped sherds are present in assemblages from Point Peninsula sites in New York which date to time periods similar to the Island Field cemetery. Comparable dentate stamped ceramics from New York include Vinette Complex

FIGURE 23

Non-local Ceramics from Habitation Site Area



Dentate, Vinette Dentate, Jack's Reef Dentate Collar, and Point Peninsula Rocker Stamped (Ritchie and Funk 1973:164; Ritchie 1965:230, 238-239; Funk 1976:280-284; Ritchie and MacNeish 1949). Furthermore, recent reanalysis of ceramics from the Kipp Island phase habitation area and Hunters Home phase cemetery of the Kipp Island No. 4 Site (Custer n.d.) shows that both dentate stamped ceramics and plain cord-marked ceramics (Jack's Reef Corded, Point Peninsula Corded) are present at these sites and are quite similar to the dentate-stamped ceramics shown in Figure 23C and the Hell Island ceramics seen in the cemetery and habitation areas of the Island Field Site.

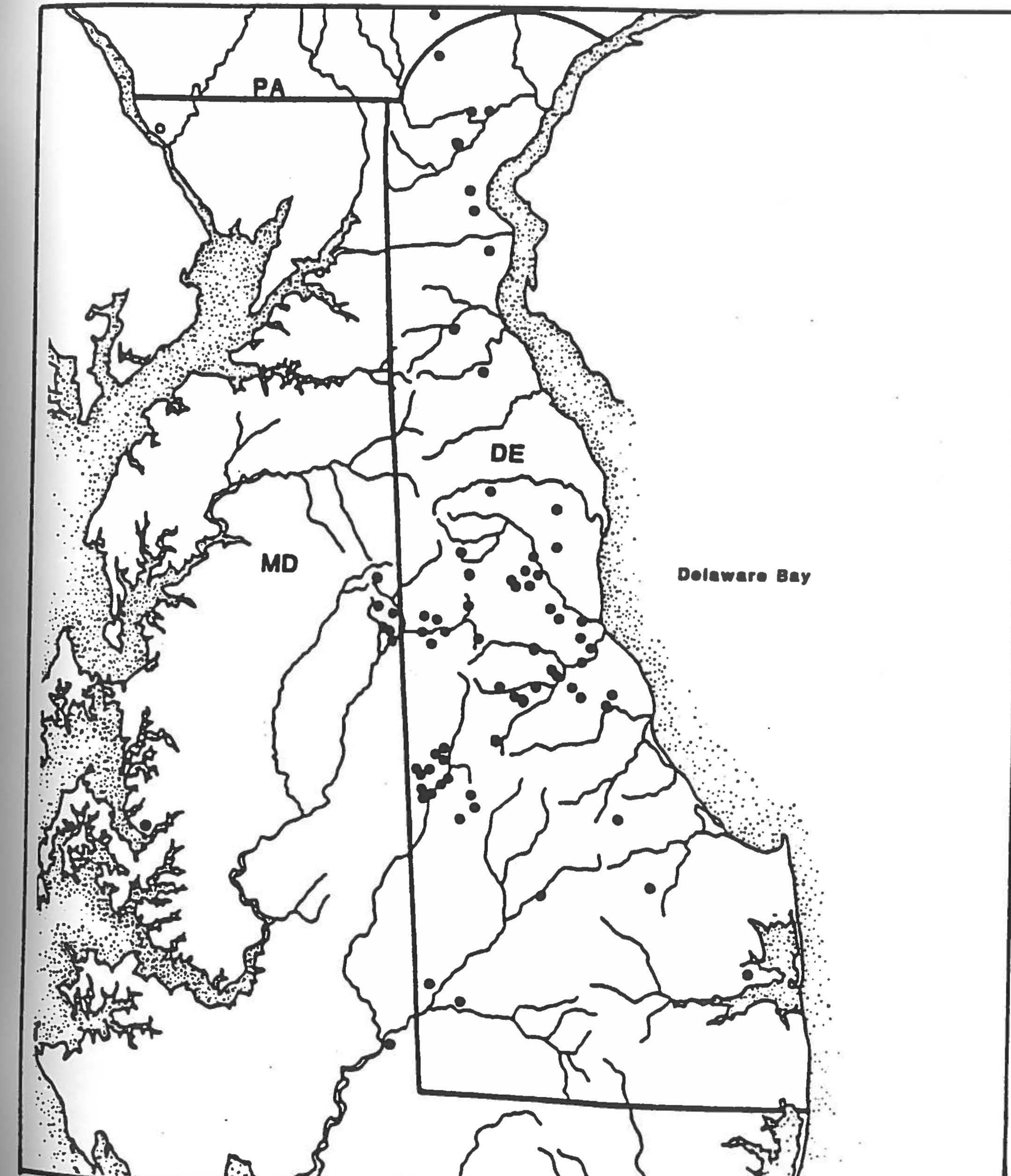
The presence of non-local ceramics similar to varieties seen in northern Pennsylvania and New York at the Island Field Site has been noted previously (Custer 1990) and may be related to population movements. Further discussion of the implications of the similarities to New York materials are noted below.

The Island Field Site in a Regional Perspective

In general, there are few sites on the Delmarva Peninsula and in the general central Middle Atlantic region with which the Island Field Site can be compared. Figure 24 shows the distribution of known Webb Complex sites on the Delmarva Peninsula, based on the presence of Hell Island ceramics or Jack's Reef projectile points (Custer 1989:290). None are cemetery sites and only four sites have produced diagnostic artifacts, other than Jack's Reef point and Hell Island ceramics, which are similar to those found at the Island Field Site. The Oxford Site in Talbot County, Maryland, has been described by Custer and Doms (1984), and two large pentagonal bifaces and a platform pipe were found on an eroding beach at the site.

FIGURE 24

Webb Complex Sites of the Delmarva Peninsula



Similar bifaces have been found at the Riverton Site in Wicomico County, Maryland, along with steatite platform pipes (Custer 1989:287, 294-295). However, the platform pipes from Riverton look more like Hopewell materials than Webb Complex artifacts. At the Hell Island Site in New Castle County, Delaware, a clay platform pipe similar to those from island Field was found in a midden context (Custer 1989:292, Wright 1962, Thomas 1966). Finally, at the Taylor Cedar Creek Site in Sussex County, Delaware, a drilled sharks tooth, a piece of cut mica, a Jack's Reef projectile point, and Hell island ceramics were found in a refuse feature that produced a radiocarbon date of 1305 BP ± 55 (UGa-1441) which calibrates to AD 655-773. The most that can be said about these sites is that they show that artifacts similar to those used in mortuary contexts at the Island Field Site are present at other locations on the Delmarva Peninsula and may indicate the presence of additional cemetery sites.

The earlier discussion of the chronology of the Island Field Site noted that there are important similarities between the Island Field Site and Kipp Island and Hunter's Home Phase sites of central New York (Ritchie 1965:228-266) and Intrusive Mound sites of Ohio (Seeman 1989, Mills 1922, Morgan 1952) and western Pennsylvania (Lantz 1989). It has also been noted that other, less striking, similarities can be noted when the Island Field Site is compared to Lewis Creek Mound culture sites of western Virginia (MacCord 1986; Fowke 1894; Carpenter 1950), Clemson Island sites of north central Pennsylvania (Stewart 1990), and the large array of sites throughout what Mason (1981) calls the "Central and Northern Tiers" of Middle Woodland cultures of the Great Lakes. In all of these cases, the similarities include both artifact forms and their use in mortuary contexts.

Similarities in artifact forms are most pronounced between the Island Field Site and Kipp Island/Hunter's Home sites of New York and Ontario and Intrusive Mound sites of Ohio. Some of these similarities include pentagonal bifaces (Ritchie 1944:125, 133, 135, 141, 151, 172, 180; 1965:221, 223, 232-233; Morgan 1952:93; Mills 1922:579), Jack's Reef corner notched and pentagonal projectile points (Ritchie 1965:234; Funk 1976:282-283, 296; Morgan 1952:93; Mills 1922:579; Seeman 1989; Lantz 1989), ceramics similar to Hell Island varieties (Ritchie and Funk 1973:164; Funk 1976:280-282; Ritchie 1965:230, 253-254, 256; Custer n.d.), flat-bottomed "monitor" pipe forms (Mills 1922:576-577; Morgan 1952:93; Ritchie 1965:231; 1944:149, 165, 167, 169; Seeman 1989), stone pendants (Ritchie 1965:223, 225, 232, 250, 257; 1944:183; Seeman 1989; Morgan 1952:Fig. 93), and marine shell beads including **Olivella**, **Busycon**, **Marginella**, and **Mercenaria** (Ritchie 1965:231; 1944:122, 133, 144-145, 147, 165, 171; Mills 1922:572-573). The use of antler harpoons and bone artifacts as grave goods is an important similarity to Kipp Island/Hunter's Home and Intrusive Mound sites (Ritchie 1965:231-233, 257; 1944:124, 136, 138, 142, 147, 149, 165, 176, 182; Hayes 1963:7; Mills 1922:574). These stylistic similarities are more than fortuitous and probably indicate some kind of cultural connections between the people living at the Island Field Site

and sites in central New York, southern Ontario, and the Ohio Valley.

In addition to similarities in artifact forms, there are also similarities in mortuary ceremonialism. An important similarity is the use of flintknapping tools as grave goods. Ritchie (1965:232-233; 1944:124, 138-139, 142, 165, 167, 171, 176, 191) and others (Hayes 1963:7) note the presence of similar grave goods at Kipp Island/Hunter's Home sites, including one complete tool kit with pressure flakers and billets that was found in a child's grave from Port Maitland, Ontario (Ritchie 1965:233). Also, similar caches, although not necessarily in mortuary contexts, were found at the Abbott Farm Site in central New Jersey (Cross 1956:118-120, Plates 19, 29). Mills (1922:572-573, 581-582) also notes several bone tools which could be flintknapping tools from the Intrusive Mound burials at the Mound City Site including an elk antler mallet (Mills 1922:581-582, Fig. 97). Although Mills describes the mallet as a possible "war club", it looks like it could have been used as a large flintknapping billet.

Table 8 shows a listing of the varied grave goods present at a number of similar sites which date to the same time period as the Island Field Site. A series of these sites are "classic Point Peninsula/Kipp Island/Hunter's Home sites from New York and Ontario including Plum Orchard, Durkee, Sea Breeze, Kipp Island/Kipp Island Phase, Kipp Island/Hunter's Home Phase, Rene Menard Bridge, Jack's Reef/Felix, Point Peninsula, Northrop, Port Maitland, Bluff Point, Rector Mound, Williams, Brock Street, and White. Two sites, Minisink and Abbott Farm, are from the Delaware Valley of New Jersey, the Mound City Site is from southern Ohio, and the Bowman Mound is located in the Shenandoah Valley of western Virginia. All of these sites show some examples of the very distinctive artifact forms noted above and seem to have some kind of cultural connections among them. Recognition of these far-flung similarities is not new and has been noted by Ritchie (1944) and Carpenter (1950).

Examination of Table 8 shows that not all sites have all of the distinctive artifact types. The contexts of the collections vary from completely excavated cemeteries (eg. - Island Field) to individual burials (eg.- Plum Orchard) and these differences in contexts may explain the variability in the stylistic assemblages. However, it should be noted that only a few burials from the Island Field cemetery and Port Maitland Site produced many of the artifact styles noted in Table 8 and the effects of varied contexts may not be all that great. Some of the variability in the artifact assemblages may be related to the fact that many of the grave assemblages seem to be individualized personal tool kits rather than standardized mortuary offerings. The picture that emerges is one of a series of distinctive artifact styles from which certain types of artifacts were chosen for mortuary offerings.

TABLE 8

Point Peninsula Burial Characteristics

Traits	Island Field	Plum Orchard	Durkee	Sea Breeze	Kipp Island/ Kipp Island	Kipp Island/ Hunter's Home	Rene Menard Bridge	Jack's Reef/ Felix	Point Peninsula	Northrop	Port Maitland	Bluff Point	Rectar Mound	Williams	Brock Street	White	Minisink Island	Mound City	Abbott Farm	Bowman Mound	Total Trait Occurance
Bilaterally Barbed Harpoons			X		X	X	X		X						X	X					7
Unilaterally Barbed Harpoons	X	X	X		X	X	X	X	X		X			X	X	X		X	X		14
Flint Knapping Tools	X	X	X	X	X		X	X	X	X	X				X			X	X	X	14
Large Antler Combs			X		X			X			X						X	X		X	7
Animal Bones	X			X	X		X		X		X		X		X				X	X	10
Large Pentagonal Bifaces	X			X	X						X							X			5
Large Triangular Bifaces		X							X		X	X	X			X				X	7
Ovate Bifaces				X	X		X				X			X					X		6
Other Bifaces				X			X				X		X		X	X			X	X	8
Jack's Reef Points	X				X						X	X		X		X		X	X		8
Triangular Points	X				X	X	X	X	X	X	X					X		X	X	X	12
Other Points				X	X		X		X	X	X	X	X	X	X				X	X	12
Celts/ Adze	X	X		X	X		X		X						X	X		X	X	X	11
Pestles	X				X		X						X						X		5
Gorgets/ Pendants	X			X	X				X		X	X	X		X	X				X	10
Platform Pipes	X				X			X	X	X	X			X		X	X	X		X	11
Other Pipes	X				X	X	X				X								X	X	7
Shell Beads	X	X			X		X		X					X				X		X	8
Shell Columns	X				X		X	X	X	X	X							X		X	9
Shell Cups	X																			X	2
Ceramic Vessels/ Sherds	X				X	X														X	4
Shark's Teeth	X	X						X	X							X	X				6
Copper Beads				X															X		2
Hafted Beaver Incisor		X	X	X	X		X		X	X	X							X			9
Total by Site	16	7	5	10	19	5	14	7	14	6	16	4	6	6	8	10	3	11	12	15	

REFERENCES FOR TABLE 8

Plum Orchard (Hayes 1963)

Durkee (Ritchie 1944:124)

Sea Breeze (Ritchie 1944:127; 1940)

Kipp Island/Kipp Island Phase (Ritchie 1944:133, 135, 136, 138, 139; 1965:232)

Rene Menard Bridge (Ritchie 1944:141, 142, 144-145, 147; 1965:233)

Jack's Reef (Ritchie 1944:149)

Point Peninsula (Ritchie 1944:165)

Northrop (Ritchie 1944:167)

Port Maitland (Ritchie 1944:169, 171-172, 176, 179-180; 1965:233)

Bluff Point (Ritchie 1965:223)

Rector Mound (Ritchie 1965:225)

Williams (Ritchie 1965:231, 236)

Brock Street (Ritchie 1965:236-237; Kenyon and Cameron 1961)

White (Ritchie 1965:257)

Minisink (Ritchie 1965:235)

Abbott Farm (Cross 1956:Plates 14-15, 19-20, 29-30, 32)

Mount City (Mills 1972:572-584)

Bowman Mound (Carpenter 1950; Fowke 1894)

Museum Collections

Rochester Museum and Science Center - Sea Breeze, Kipp Island, Rene Menard Bridge, Plum Orchard, Bluff Point

New York State Museum, Albany - Kipp Island

Smithsonian Institution - Bowman Mound

A final point to make in comparing the Island Field Site to other related sites is to consider data on burial treatments. Data from other sites for such comparisons are limited to only a few sites but some comparisons can be noted. A distinctive feature of the Island Field burial treatments is their variety. Burial treatment data are not available for most of the sites listed in Table 8, but are available for Kipp Island/Hunter's Home Phase (Ritchie 1965:261-266). This cemetery shows a very similar variety of treatments and the burial clusterings at Kipp Island (Ritchie 1965:263) are also similar to those seen at Island Field. Similar varieties of burial treatments are also seen at some Clemson Island sites of north central Pennsylvania including the Clemson Island Mound (Jones 1931),the Brock Mound (Turnbaugh 1977), and possibly the Book Mound (Jones 1931). Thus, the similarities with northern sites shown by the Island Field grave good artifact assemblages also extends to burial treatments.

Migrations and the Island Field Site

It has already been noted that the Island Field Site has a number of traits that link it to sites of northern Pennsylvania and central New York including ceramics, grave good assemblages, and mortuary patterns and burial treatments. Data from the Point Peninsula sites in New York and Ontario, as well as related sites in New Jersey, Ohio, and Virginia, also suggest a late spread of a variety of these cultural traits during the middle and latter portions of the Point Peninsula chronology (Custer, Rosenberg, Mellin, and Washburn 1990). Furthermore, the mortuary patterns at the Island Field site seem to be more than a little different from those of the local Delmarva Adena Complex, with which Island Field is partly contemporary (Custer, Rosenburg, Mellin, and Washburn 1990). It has also been noted (Custer 1990) that the appearance of Island Field/Webb Complex mortuary ceremonialism occurs at the same time as a number of other cultural discontinuities on the Delmarva Peninsula including discontinuities in settlement patterns, regional interaction and sociopolitical systems, and ceramic sequences.

Recent historical linguistic studies of Algonkian languages (Fiedel 1987, 1990; Luckenbach, Clark, and Levy 1987) have indicated that distribution of southern Algonkian speakers along the Atlantic Coast of eastern North America is the result of a migration of these peoples in the area ca. AD 500-700. The proto-language source area is identified as the eastern Great Lakes. The source area and dates of the proposed migration based on the linguistic data fit well with the archaeological data from the Delmarva Peninsula. And, based on the analysis of Point Peninsula sites noted above it is consistent with the New York/Ontario data as well. Therefore, the least that we can say is that a migration of Algonkian speakers from the eastern Great Lakes area sometime during the Point Peninsula complex is a hypothesis worth considering when thinking about the prehistoric archaeology of Eastern North America.

In conclusion, this article has really only touched on some of the data recovered from recent excavations at the Island Field Site and has shown only a sampling of the research issues that these data can be used to address. Future reports will explore these areas further and the Island Field Site data will continue to be a valuable resource for regional archaeological research.

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