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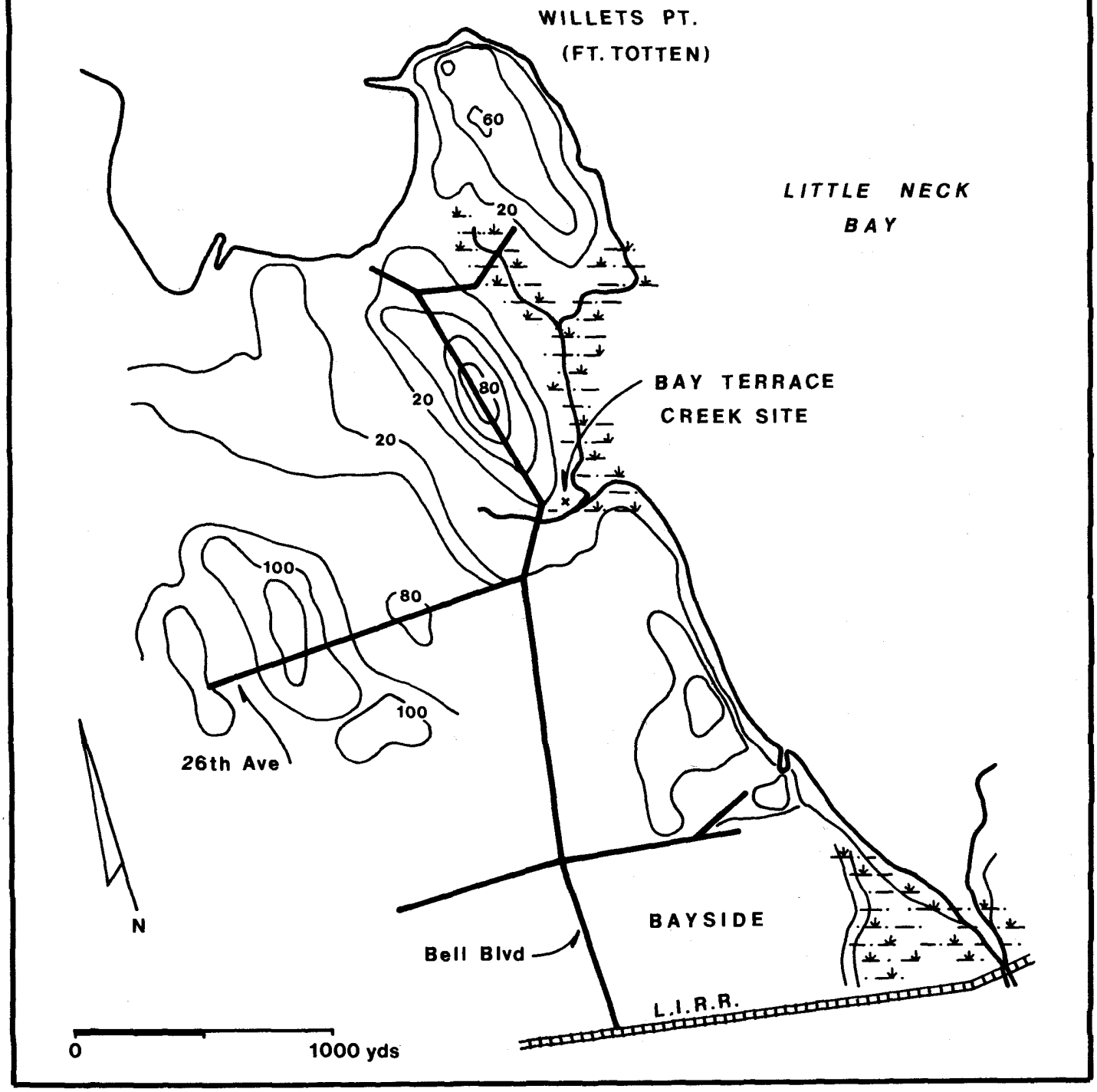

NUMBER 93 The Bay Terrace Creek Site, Long Island, New York FALL 1986

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THE BAY TERRACE CREEK SITE

Stanley H. Wisniewski Metropolitan Chapter

INTRODUCTION

This report concerns one of the many rapidly vanishing sites in the greater New York area. The Bay Terrace Creek site originally was located on part of a private estate overlooking Little Neck Bay. Today there arc three high-rise apartment buildings straddling the site area. The site excavations took place during the spring of 1954 and into the following April of 1955 when the area was placed off limits by fencing and the subsequent alteration by bulldozers.

The late Julius Lopez, Matt Schreiner and the author excavated over 1,300 square feet of the site area during this period, mainly during week-ends. I might add that we were not sunshine archaeologists – one of my field notes taken on January 9th indicates the fact that the frost depth was 7 inches that day. I recall using old carpeting and boards to help keep the ground in a pliable condition for our next digging

The site was located on the north shore of Long Island in the town of North Bayside, about 200 yards west of Little Neck Bay and east of Bell Boulevard (see Figure 1). The contour map was taken from an old U.S. Geodedic Survey Map (1923). The site grid location is Latitude 40°-46'-52" N and the Longitude 73°-46'-32" W. Many of the contours and street grids have been altered since, however it does tend to show why the area was chosen. The site was sheltered on the north and the west and adjacent to a fresh water stream which ran into the marshy tidal creek, providing ready access to Little Neck Bay with its many resources of fish, fowl and shellfish. The presence of deer bones and antler sections attests too the fact that game prevailed in the surrounding wooded areas.

Our attention was first drawn to the site when the, bulldozers cleared some high ground about 500 yards north of the actual habitation site area, exposing four shell pits of the Late Woodland period. Further exploration and testing revealed the site was located north of a small stream which fed into a marsh area on the east. Fill for the construction of the Cross Island Parkway formed a barrier across the marsh, thus isolating it from Little Neck Bay (see Figure 2).

As one can readily note, there has been quite a time lag between the shovel and trowel and the script. However there are certain benefits gained by procrastination, inasmuch as I was able to profit by the many fine reports, especially those on the Transitional period, that have been published in the interim. These reports, needless to say, have helped clarify many aspects of the nature and occupational time periods of the site.

EXCAVATIONS

The site excavations covered two main areas: The Midden area-(see Figure 3). This was a series of trenches dug along a wooded embankment north of the creek, approximately 20 yards from the marsh area, gradually rising some 5 to 6 feet to the terrace on the north. The trenches were divided into 4 foot squares and excavated upward from their low points, thereby backfilling areas previously dug. The overall midden depth ranged from a few inches at the low end to about 28 to 30 inches at the embankment ridge. Four distinct layers were observed along the 20 foot long slope. The top layer, stratum "A", was the dark topsoil overburden which in most cases contained some shell fragments. Stratum "B" consisted of a loose shell mixture in dark soil, similar to the topsoil in texture. The third layer, stratum "C", was a mass of compacted shell which made up the major portion of the midden. This was underlaid by a thin dark brown to tan layer, the result of leaching from the layers above. This was noted as stratum "D", which was the original subsoil line prior to any deposits of midden shell debris. This base layer produced very little in the way of artifactual material, most of the finds occurring in stratums "B" and "C", which also contained most of the debris such as fire-cracked stone, bones and stone debitage. The shellfish

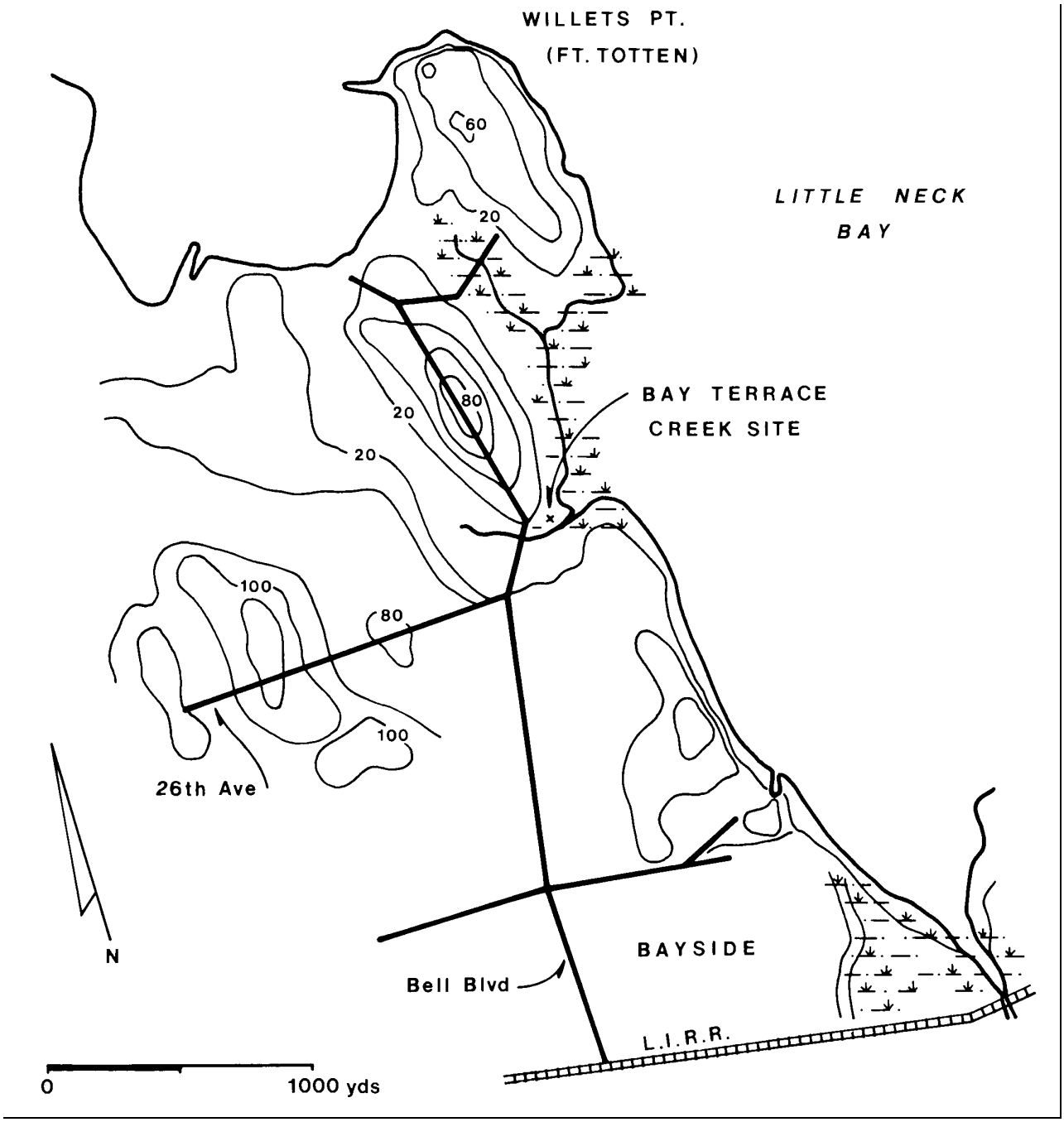

Figure 1. The Bay Terrace Creek Site, Long Island, New York.

mixture was mainly of hard clam, with oyster and some scallop and soft clam present in some areas. Numerous roots interlaced the midden area and the top ridge area appeared disturbed with a rather heavy layer of topsoil deposit-probably due to construction of the old mansion foundation and the entry road adjacent to the midden slope. A total of 43 four foot squares were excavated in the midden area. Habitation Area-The second area was located on the terrace above the midden embankment and north

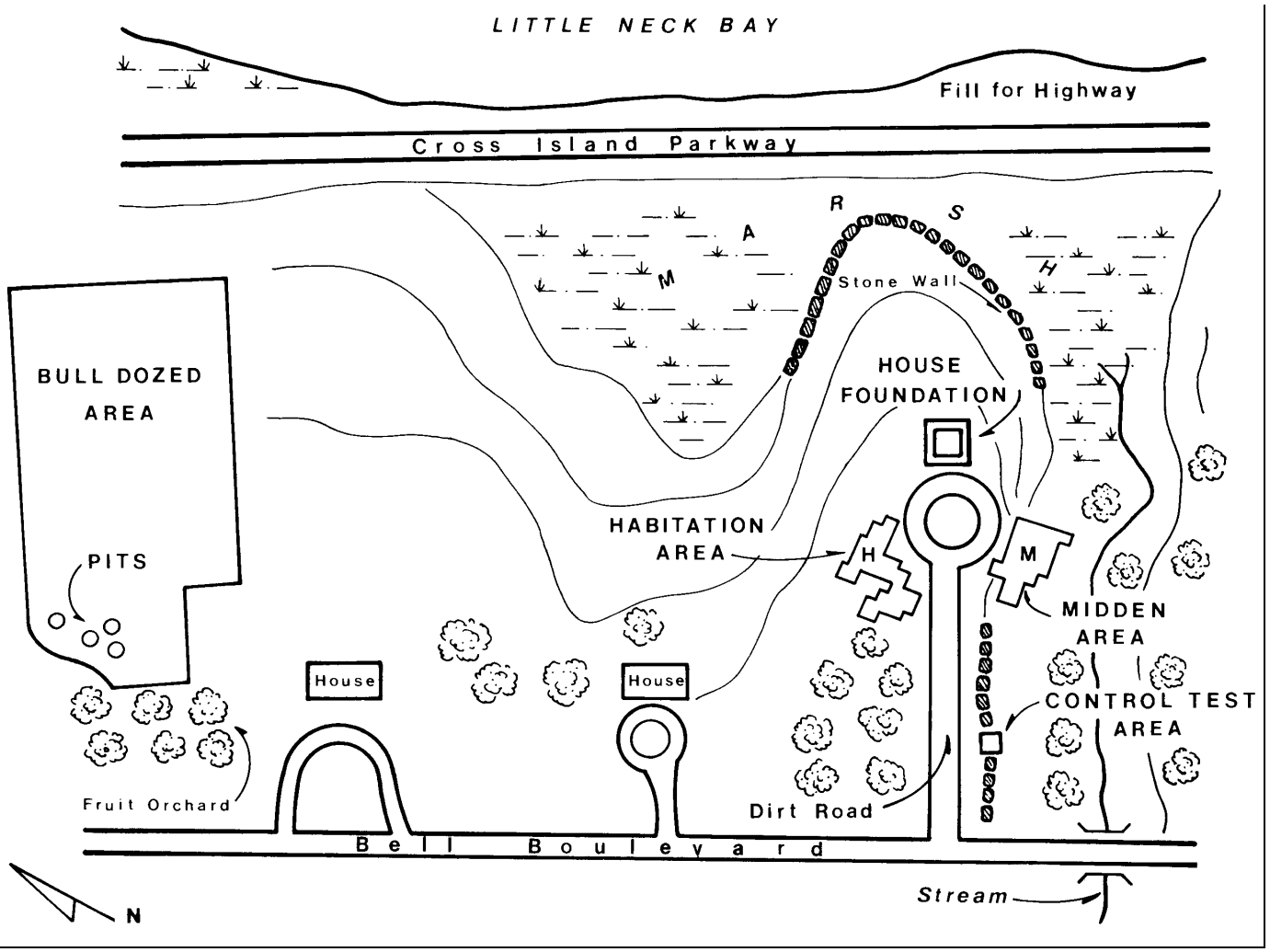

Figure 2. Bay Terrace Site Plan.

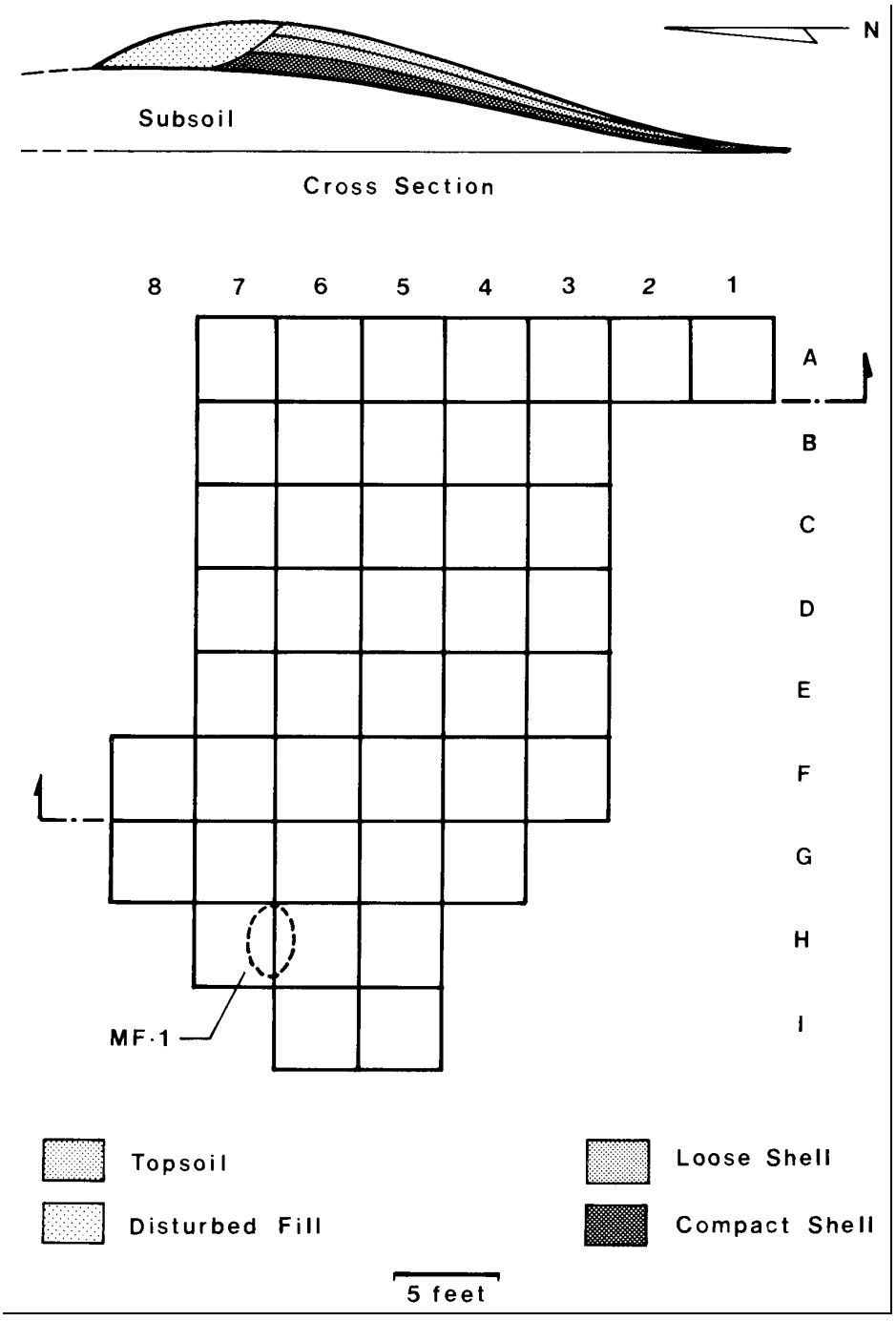

Figure 3. Midden Area-Plan and Section.

of the dirt entry road which looped around in front of the old house foundation (see Figure 2). This was staked off into a 4 X 4 foot grid (see Figure 4). We were able to excavate 39 of these quadrants which ranged from 14 to 22 inches in depth. The area in most cases appeared disturbed, inasmuch as the black shell mixture started under the grass roots and extended down some 10 to 12 inches with the same consistency, therefore suggesting plow activity some time in the past. The topsoil layer, where definable,

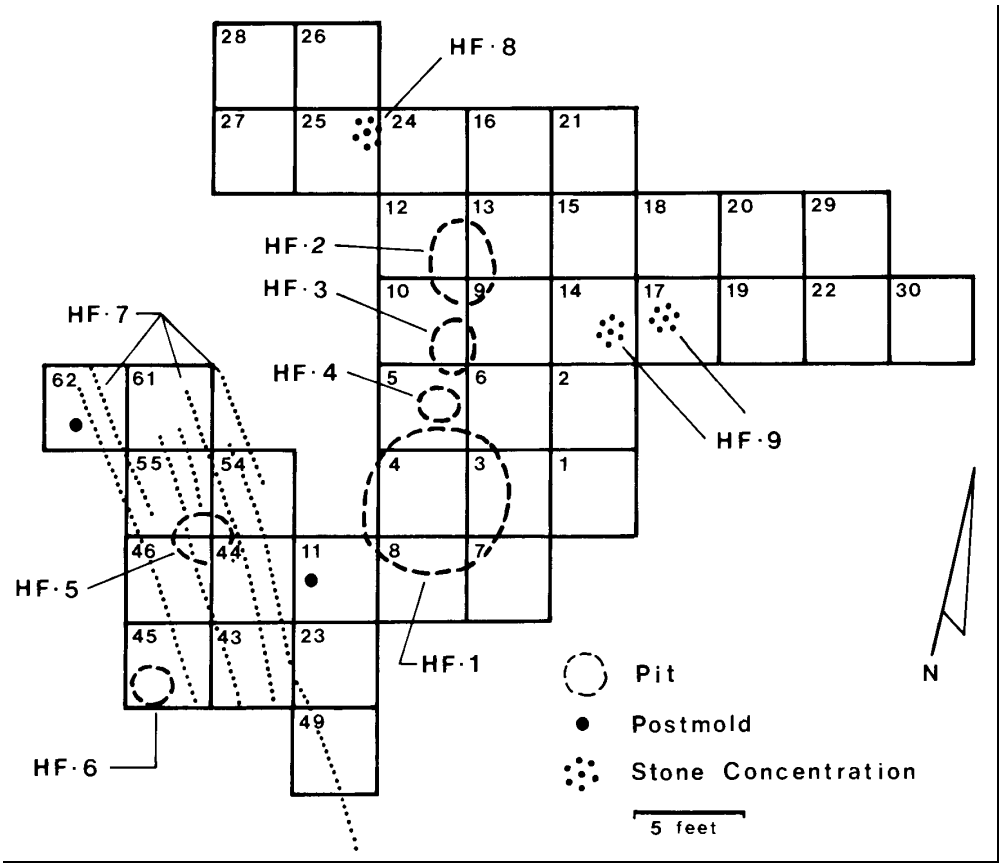

Figure 4. Habitation Area-Plan.

averaged from 9 to 10 inches and is noted as stratum "A". Stratum "B" is defined as the thick shell layer underlying stratum "A".

The plow zone of course negated any meaningful stratigraphic references in the upper layers, leaving only the underlying compacted shell (stratum "B") and the leached sub-soil layer (stratum "C") for reliable depth references and associations. Nevertheless, the find depths of all artifacts were noted and recorded. Table 2 shows the vertical distribution of the various projectile point types found at the site. *Control Test Area*-This was an extension of the midden area that extended under an old stone wall made up of large field boulders. This wall was bulldozed in the course of clearing the site for the building constructions. The bulldozers had cleared a section just under and adjacent to the wall exposing a thick layer of hard clam and oyster shell. We were fortunate in being able to work into and under this shell which was undisturbed. This served as a stratigraphic control for what proved to be a clear indication of Vinette I sherds underlying some Clearview specimens.

The bottom of the shell layer was 15" below ground level. Below this was a four inch dark brown layer which contained the sherds. Three Vinette I body sherds were located at the lower portion of this layer. One rim sherd and five body sherds of the Clearview focus were found in the lower half of the thick shell deposit at minus 10" to minus 12" in depth. The presence of the Vinette I pottery on and slightly above the subsoil line indicated its early origin on the site area.

In an adjacent area a rim section of steatite was present under the shell mass along with the remains of a dog's skull and jawbone. A fire hearth was also revealed nearby at this level. Two pieces of rubbed red limonite, one fragment of black graphite showing rubbed scars, an antler tine fragment, and a thick section of columella core was found in the lower 3 inches of the shell deposit in this section.

FEATURES

Midden Area

MF-1 (zone H 6, H 7) Outside of the fire hearth found in the control salvage area, the only other feature in the midden area was a deposit of what appeared to be at least two sets of deer antlers in a fairly deteriorated condition and broken in many pieces due to the earth compaction. The antlers were resting on dark brown soil, just under what would be the ridge line of the midden slope. The overburden at this point was some 28 inches deep. The antler sections did not show any evidence of parietal bone attachment and most of the tines were missing perhaps being utilized for projectile points or flaking tools.

Habitation Area

HF-1 This was a large rock concentration centered in quadrant 4 and extending into adjoining quadrants 3, 5, 6, 7, 8, and 11. The stones were of fairly large size and covered an area about 5 feet in diameter at the upper portion of the depression. The stones were first noticed at a depth of minus 11 inches under a disturbed topsoil layer and extended to a depth of 42 inches. The pit fill around the stones was a dark soil mixture with very little shell content. A rather high concentration of artifacts, both lithic and ceramic, occurred in and around the pit area. The discovery of several glass fragments in the upper portion of the pit and later the finding of an old scrap of leather with what appeared to be many small tacks imbedded in it (perhaps a remnant of an old shoe) deep within the confines of the rocks, dispelled any notion of an aboriginal origin to the feature. Most likely it was a collecting pit for clearing of farm land, or perhaps during the construction of the old mansion that once stood a few hundred feet north east of the feature. In all probability the topsoil and upper layer in the vicinity was pushed into the rock filled hole thereby negating any stratigraphic integrity to the artifacts found in and around the depression.

HF-2 This was an oval shaped shell pit located mainly in quadrant 12 and overlapping into squares 9, 10, and 13. Ten cobble size stones, some of which were firecracked, were found adjacent to the upper level of the pit which started at minus 10 inches under the topsoil and extended down to a depth of 21 inches. The concentrated shell mass consisted of hard clam and oyster shell and was surrounded by a dark pocket of earth. Two broken quartz stemmed points were found along the edges of the pit areas along with a firecracked section of a rubbed stone and a slate fragment.

HF-3 (quad. 10) This was a pit area about 18 inches in diameter, starting at minus 9 inches in layer "B" and extending down to minus 22 inches into the brown subsoil. The pit was composed of dark greasy earth with some shell fragments present along with several quartz chips. Four small red colored grit tempered sherds were found within the pit area along with a quartz corner-notched projectile point. A pointed sliver of bone and a broken bone awl was also found alongside the feature.

HF-4 (quad. 5) This consisted of a cobble size stone concentration starting at minus 9 inches of layer "A". The stones were massed in a depression of the brown underlying layer. A small densely packed pocket of oyster shells lay adjacent to the stone pile. No signs of carbon or fire stains were evident. A round rubbing stone and a chipped stone adze or hoe were found alongside this feature in quadrant 6 at the same level. A flint fishtail point (Figure 7, 132) and a small grit tempered sherd were in the vicinity on top of layer "B" at minus 10 inches.

HF-5 (quad. 44, 46, 54, 55) This apparently was the remains of what appeared to be a plow disturbed bundle burial. The bones were first noticed around 3 inches below the surface and consisted of a badly broken skull, lower jaw bone, and several long bone sections. The jawbone section had most of the teeth intact and they showed severe wear on the back molars which seemed to indicate that the individual was well advanced y in years. The bones were located in what appeared to be a shallow depression about 28 inches in diameter and some 6 inches deep. This was located over a portion of feature HF-7 and intruded into the subsoil, thus breaking up a section of the horizontal stains.

HF-6 A shell pit deposit about 3 feet in diameter starting at layer "B" (minus 8 inches) and extending down into the subsoil layer "C", composed mainly of oyster shell with some hard clam present. This was located in quad. 45. A broad side notch point made of green coxsackie flint (Figure 8, A3) was found near the edge of the pit. A quartz tapered stem point (Figure 8, 135) was also located nearby in the bottom portion of layer "A".

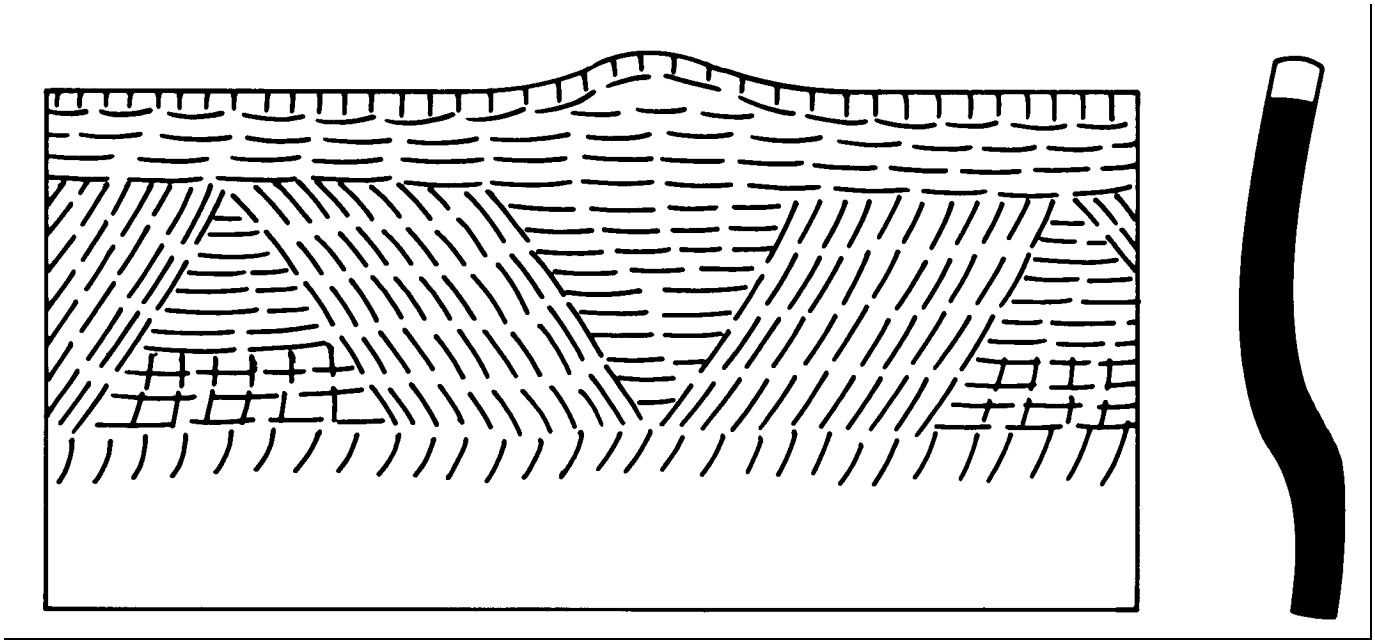

Figure 5. Eastern Incised Collar Decorations-Full Scale.

HF-7 (Horizontal Molds, see Figure 4, HF-7). This was a series of 5 parallel linear impressions in the subsoil running in a S.E. to N.W. direction. They started in the vicinity of quadrants 47 and 49 and extended beyond quadrants 61 and 62 which was the extent of our excavation at that point. They apparently were made by long poles or posts ranging from about 3 inches to 7 inches in diameter trimmed perhaps to serve as supports for a house structure of some sort. They were arranged in four main rows

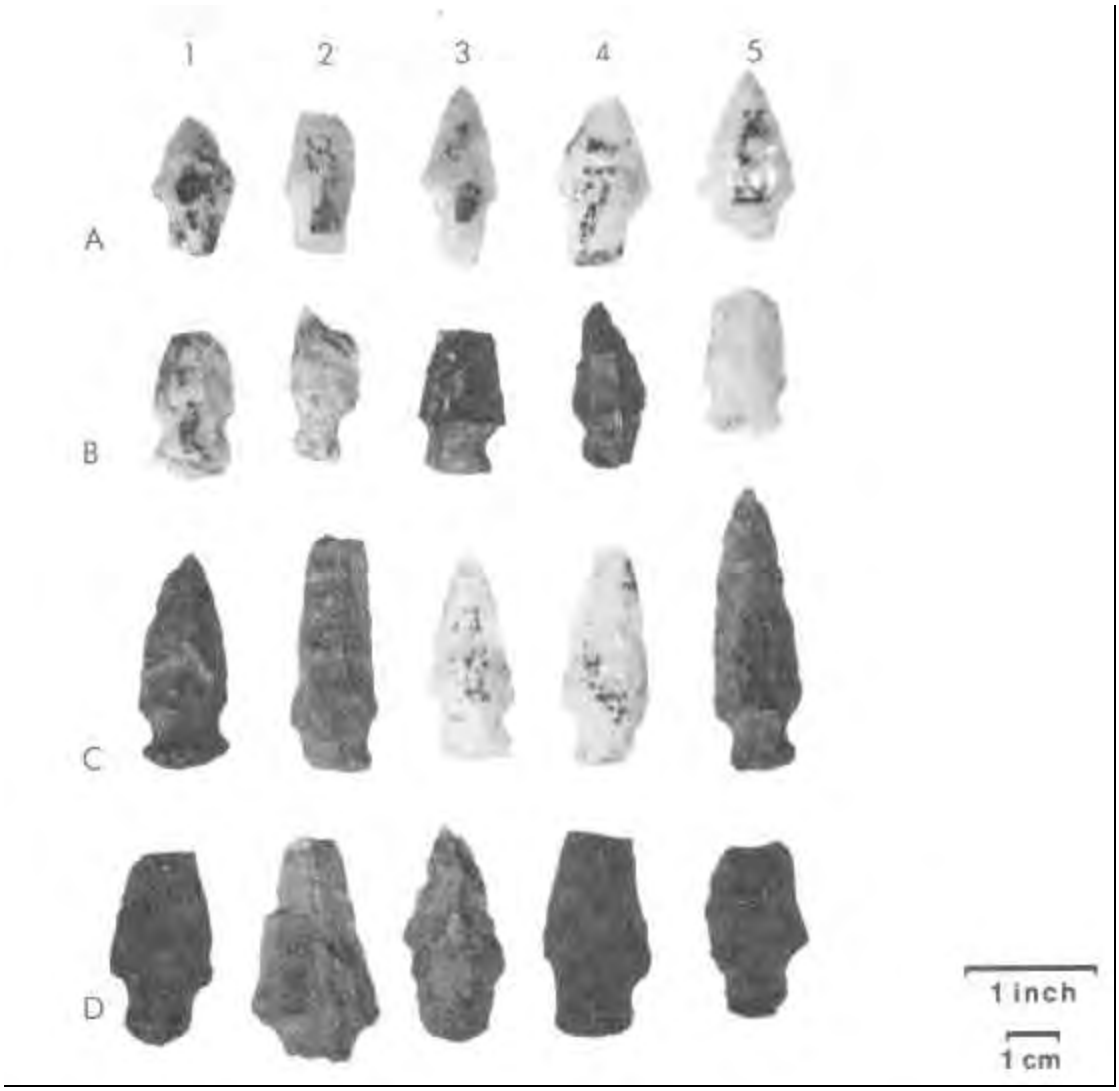

Figure 6. Projectile Points-Narrow Stemmed and Narrow Side Notched: Materials: A1-5, B1, 2, 5, C3, 4, quartz; B3, 4, C1, D1, flint; C5, D4, 5, argillite; C2, D2, compact shale; D3, quartzite.

some 6 inches to 13 inches apart with the fifth impression starting in the northerly portion of quadrant 54. The longest measured about 24 feet in length. Two of the posts terminated with forked sections at one end. They were first noticed at a depth of 11 to 13 inches below the topsoil and were clearly impressed in what was relatively clean subsoil. The cross sections of the molds were semi-circular with maximum depths of some 1 1/2 to 2 inches into the subsoil. I would speculate that this was an ancient stockpile of building material, mainly the long longitudinal spans, perhaps for a long type of house. Only two vertical post molds were discovered in the vicinity of the horizontal molds, one was in quadrant 11 and the other in quadrant 62. Another possibility is that this represented a collapsed house structure. The HF-5 feature was roughly centered amongst the stains but appeared to be intrusive. Unfortunately we were not able to further investigate the surrounding area for more signs and clues pertaining to this feature.

HF-8 (quad. 25). A circular arrangement of cobble stones about 2 feet in diameter. This was on the subsoil some 14 inches below the topsoil. No signs of fire were present. A few fragments of bone and a small piece of red ochre were wedged into the stone mass along with a round rubbing stone. This might have been some sort of a butchering platform.

HF-9 (quad. 14). A group of firecracked stones on top of the subsoil at minus 14 inches along with some quartz and flint chips. There were signs of burnt earth and traces of carbon alongside the stones. The

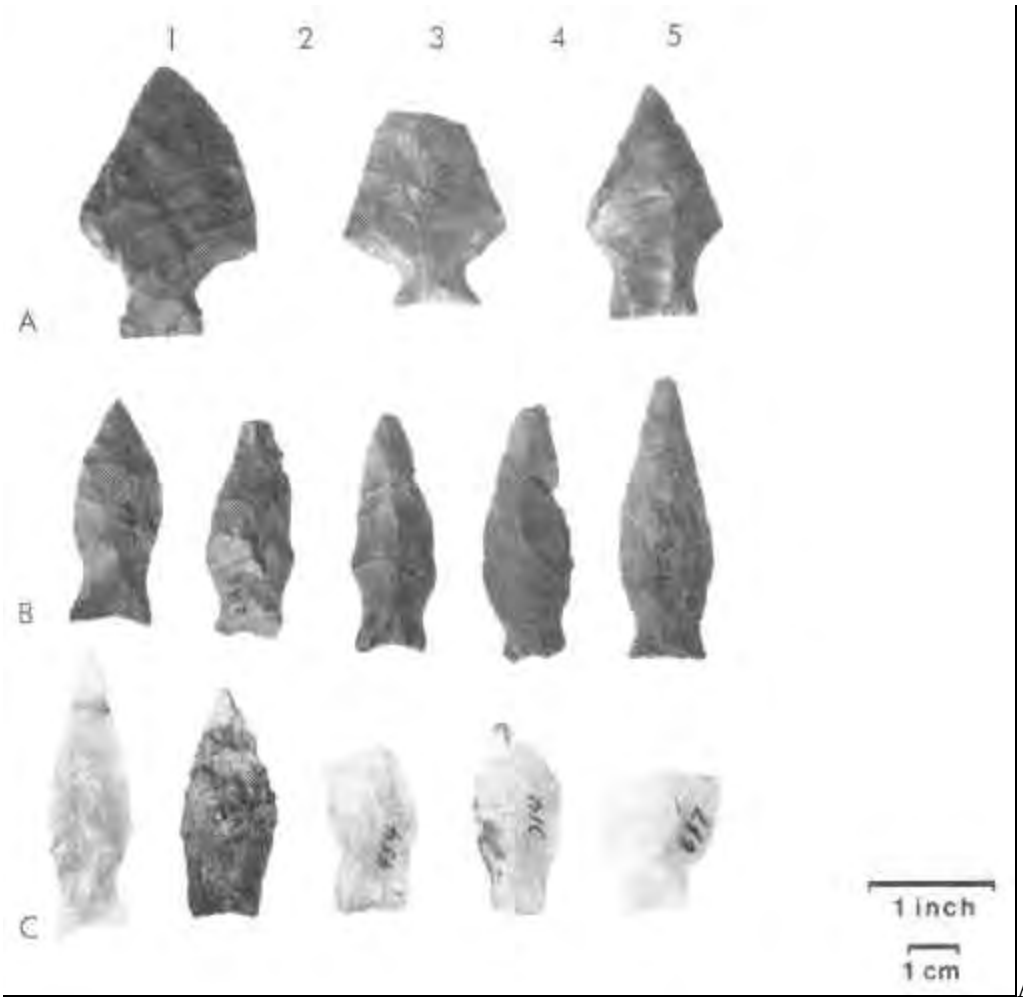

Figure 7. Projectile Points-Transitional Phase: Materials: AI, brown jasper; A2, 3, B1-4, flint; B5 argillite; C2, quartzite; C3-5, quartz.

adjacent vicinity, at the same level, produced a slate fragment, an antler tine, and a few black shell tempered sherds.
HF-10 (quad. 17). This is similar to HF-9, a concentration of 25 fist sized stones most of which were firecracked. They also were situated on the subsoil at the minus 14 inch level in a mixture of carbon traces. No artifacts were found in the immediate vicinity.

PROJECTILE POINTS

There was a total of 75 projectile points which comprised 68.2% of the total chipped artifact yield from the site. These were differentiated into 10 groups as shown in Table 2 where they are analyzed for depth and percentage distribution.

Narrow Stemmed and Side-Notched Points- These were the most common types and comprised 53.3% of the total. The 23 stemmed specimens material-wise were 15 quartz, 4 flint, 2 argillite, and 2 of gray shale. The material breakdown of the 17 side notched points was 11 flint, 5 quartz and 1 argillite.

Orient Fishtail Point-This distinct style was next in the order of frequency (14.7%). Of the 11 specimens only 6 were made of quartz or quartzite. One was of argillite and the balance was of black or gray flint.

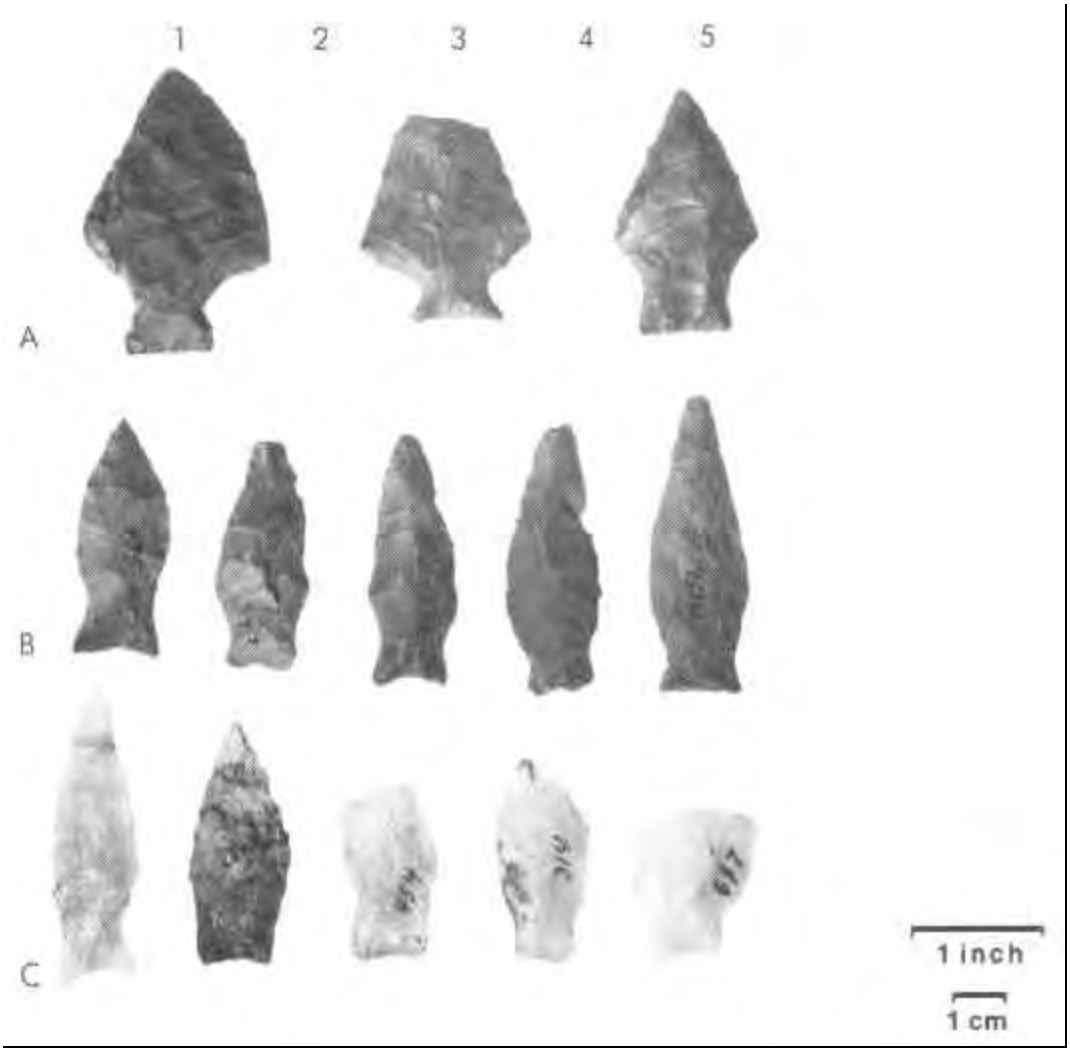

Figure 8 Projectile Points-Side Notched. Tapered Stem: Triangular: Materials: A1-5, B3, C1, 4, 5, flint B1, yellow jasper; B2, argillite; B4, 5, C2, 3, quartz.

This is notable, inasmuch as most of the Orient Point types found on sites to the east on Long island are made from the local, easily obtainable, quartz pebbles. Thus, the Bay Terrace types appear to be more related to the ones found in northwestern New Jersey and the Upper Delaware River valley. At the Miller Field site in New Jersey, although the Orient Fishtail points were identical in general form, not one specimen was made of quartz or quartzite, (Kraft 1970:53)

Broad Stemmed and Side-Notched Points-Eight specimens fall into this category, of which only one small quartz point qualified for the broad stemmed type. The balance were a mixture of four quartz and three flint side notched points, one of which was a gray flint Brewerton type.

Broad Corner-Notched-Only one small black flint point is represented in this type. It was found in the midden area and is similar to Jack's Reef Corner-Notched.

Tapered Stem-Five specimens, several of which could qualify as "Rossville", are present. One is a fine specimen made of yellow jasper, one is black flint, one of weathered argillite, and the remainder of quartz.

Susquehanna Tradition-Three projectile points of this transitional stage were found. One was a typical Perkiomen Broad Point made of brown jasper, the other two Susquehanna Broad Point types were made of dark gray flint.

Triangle- Isosceles-Five specimens, two of which were dark flint and the other three of quartz, were found at the site. The length ranges front 1 1/8" to 1 3/4". The thickness varies from 1/4 to 3/8; of an inch.

Triangle- Equilateral-Only two of this type are represented. Both are small and of dark black flint.

Table. 1. Inventory of Artifacts.

	Midden Area					Habitation Area					
	Zone					Zone					
Item	A	B	C	D	Subtotal	A	B	C	D	Subtotal	Total
Projectile Points											
Stemmed	3	4	1		8	3	11	1	1	16	24
Side notched	4	2	2		8	4	10	2		16	24
Corner notched		1			1						1
Tapered stem	1	1			2	3				3	5
Susquehanna		1			1		1	1		2	3
Fishtail						6	4	1		11	11
Triangle, isosceles		1			1	1	2	1		4	5
Triangle, equilateral		1			1		1			1	2
Knives	2	2	1		5	3	4	4		11	16
Drills						2	3	1		6	6
Scrapers	1	4			5	2	7	1		10	15
Blanks	3	5	1		9		2	1		3	12
Roughstone											
Pebble hammer	2				2		2	1		3	5
Pebble rubbed	2	1	1		4		3	3		6	10
Pebble chopper		1			1	1	1	1		3	4
Pestle (broken)		1			1						1
Adze							1				1
Bannerstone (broken)			1		1						1
Paintstones											
Geode cup		1			1	3	5			8	9
Limonite-hematite			2		2		3				5
Graphite		1			1		1			1	2
Slate	1	2	3		6	1	1	5	1	8	14
Concretion						2	4	4		10	10
Mica		1			1						1
Turtle Shell		3			3		2	1		3	6
Steatite	1	1	1		3		1	1		2	5
Bone Awls		2			2	3	3	3		9	11
Antler											
Tine		2			2		1	2		3	5
Other		1			1		1			1	2
Shell-Columella core		1			1			2			3

They are about 7/8" in length, one having a slight basal concavity, the other a straight base. The maximum thickness being 3/16, of an inch.

The varied projectile types seem to indicate a rather lengthy occupation on the site ranging from the Mid to Late Archaic horizon to a somewhat late Woodland Period. Some of the small stem and side notched types (Figure 6, A1-5, B1-4) readily fall into the Lamoka Point category. The Laurention is represented by several Brewerton Side-Notched specimens (Figures A1-3) as well as the Normanskill Points (Figure 8, A4, 5). Another type, the Bare Island Point (Figure, D1-4) found on numerous Archaic sites in the lower Susquehanna watershed, is believed to be contemporaneous with steatite bowls (Ritchie 1961:15). The Transitional and Late Archaic stage is well represented at the Bay Terrace site by the Perkiomen Broad and the Susquehanna Broad Points (Figure 7, A1, A3, A5) as well as the 11 specimens of Orient Fishtail Points (Figure 7, B1-5, C1-5). The Rossville Point, named after a site in Staten Island (Figure 8, B1-4) has a cultural affiliation with very Late Archaic, Transitional, and Early Woodland periods (Ritchie 1961:46). The seven Triangular types which constitute about 9% of the projectile point category are hard to place in their proper horizon due to the lack of reliable stratigraphic provenience. The isosceles triangulars may relate to the Middle or Late Woodland times. However, I feel the small triangular types (Figure 8 C4, 5) do not fit into the Levanna Point category and belong in the Archaic

Table 2. Vertical Distribution of Projectile Point Types.

Vertical Depth—Inches	Narrow Stemmed	Narrow Side Notched	Broad Stemmed	Broad Side Notched	Broad Corner Notched	Triangle Isosceles	Triangle Equilateral	Orient Fishtail	Susquehanna Tradition	Tapered Stem	% Total
?	2			1							3 4.00
0–3	1 1	2		1				2		1	8 10.67
3–6	2 2	3 1		1		1		4		1 2	17 22.67
6–9	3	4		2	1	2	1 1	2	1 1		18 24.00
9–12	1 1P 3	1		2		1		2		1	12 16.00
12–15	1 3	1 1	1P								7 9.33
15–18		1 1						1P			3 4.00
18–21	1P	1				1P					3 4.00
21–24	1	1P							1P		3 4.00
24–27	1S										1 1.33
	8 15 M H	6 11 M H	— 1 M H	2 5 M H	1 — M H	1 4 M H	1 1 M H	— 11 M H	1 2 M H	2 3 M H	22 53
Total %	23 30.7	17 22.7	1 1.3	7 9.3	1 1.3	5 6.7	2 2.6	11 14.7	3 4.0	5 6.7	75 100%

LEGEND: M = Midden Area; H = Habitation Area; P = Pit Area; S = Subsoil

rather than the Woodland stages. Sites in western Connecticut, producing small triangle projectile points, have been carbon dated between 2235 B.G. and 1500 B.C (Swigart 1978:25).

The number of quartz projectile points (34) was less than those of other lithic materials such as flints, jaspers, and argillites which constituted 54.7% of the total. The quartz which was more easily obtainable was therefore not the preferred material at the Bay Terrace site. The statistics show that more than half of the projectile points (70.7%) were found in the habitation area. None of the Orient Fishtail Points were found in the midden area, which might indicate the re-use of broken points in other tools such as scrapers,

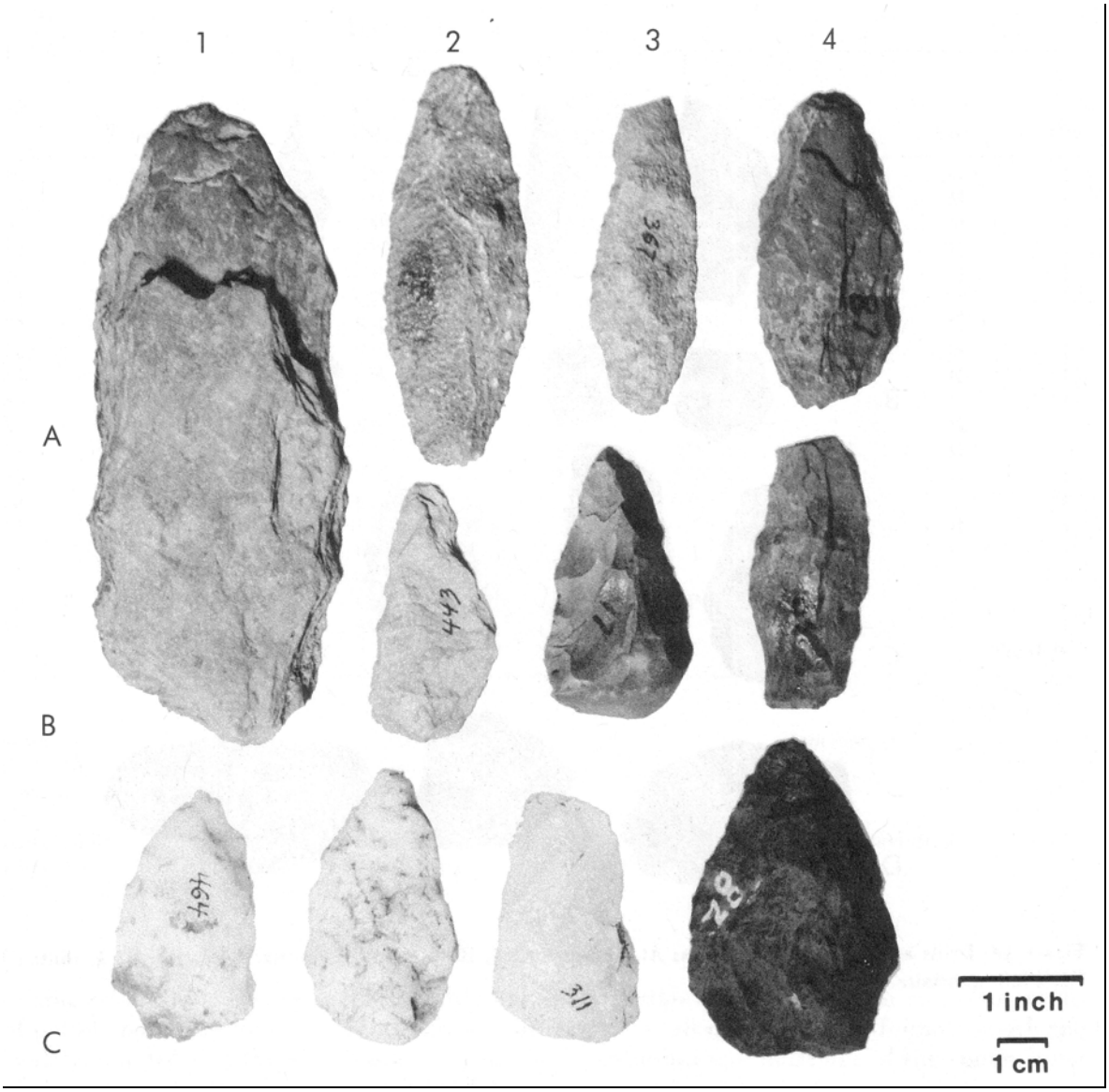

Figure 9. Knives: Materials: A1, 4, B2, slate; A2, 3, argillite; B3, C4, flint: B4, quartzite; C1-3, quartz.

drills or small knives. Many such examples of reworked fishtail points were found at the Miller Field site in New Jersey (Kraft 1970: 70, 71). Another worthy note is that some 163 chips of flint, jasper, slate and other non-quartz materials were found at the site. All of which seems to indicate that some of the non-quartz artifacts were chipped or at least reworked on the site.

KNIVES

A total of sixteen classified knives were found at the site, five in the midden area and eleven in the habitation area. Five were made from quartz, the balance from flint (4), argillite (2), quartzite (2), and three from slate, one of which was a large 5 inch long specimen which came from the lower level of the habitation area. The quartzite knife (Figure 9, B4) associates with the orient focus. Several large core and retouched flake knives were found which might have served as skinning tools.

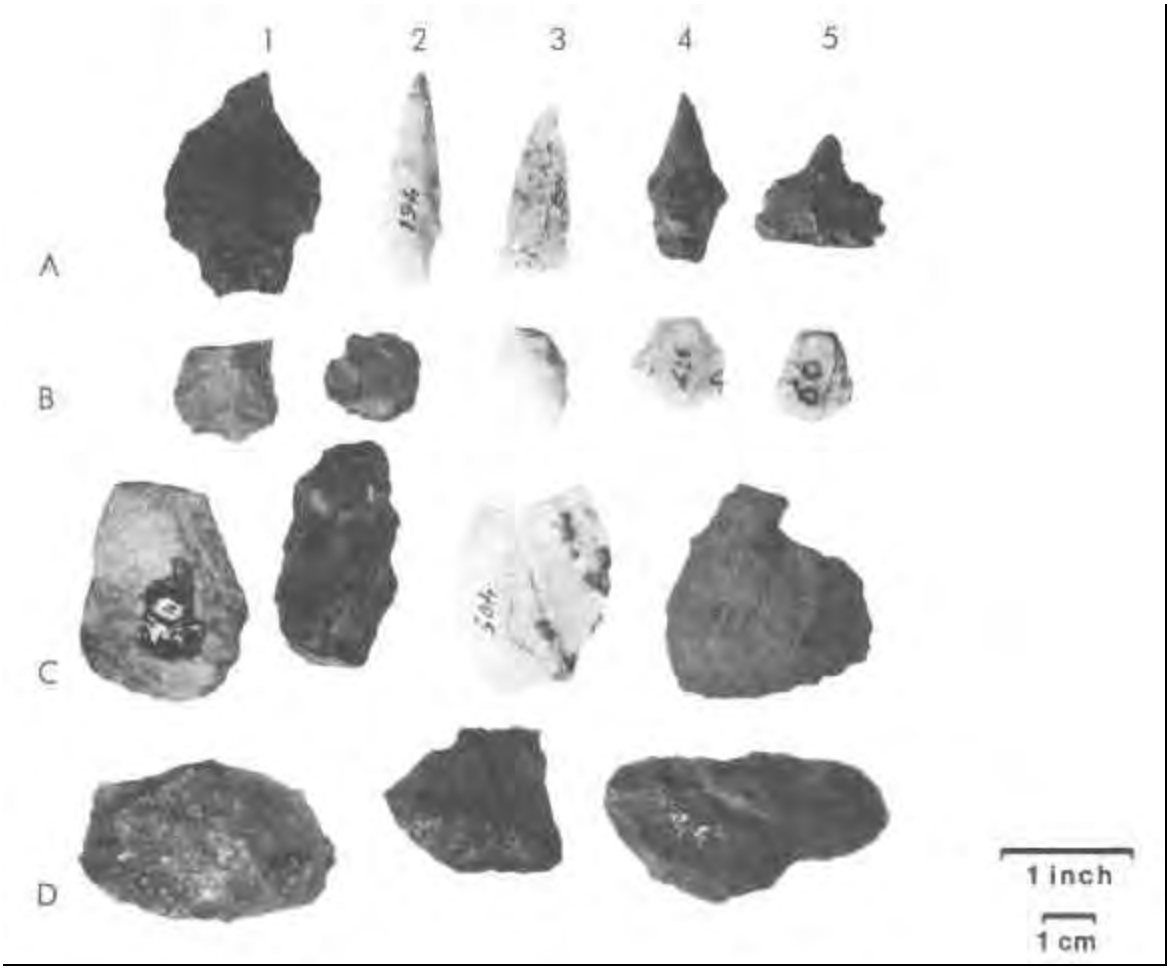

Figure 10. Drills and Scrapers: Materials: Al, argillite; A2, 3, B3-5, C3, D1, quartz; A4,5, B2, C2, 4, flint; B1, chalcedony; C1, D2, 3, quartzite.

DRILLS

Six drills are included in the collection, all coming from the habitation area. Two are quartz, two flint and one a broad stemmed specimen made of weathered argillite. The expanded base type (Figure 10, A5) is made from Onondaga gray flint and was found in the upper level.

SCRAPERS

Fifteen identifiable scrapers of various types were excavated from all areas of the site. Six were of the small thumbnail variety, three were end scrapers, and the balance classified as side scrapers. One was made from chalcedony, four from gray or black flint, and the others from quartz or quartzite. No doubt, many of the other random flakes found, but not listed in the inventory, could have been used as scrapers or cutting tools.

ROUGH STONE

No ground or polished stone artifacts were found on the site. One ovate shaped adze was excavated in the "B" layer of the habitation zone. A broken stone pestle along with what appears to be a broken

Table 3. Rim Sherd Types.

Item Rim	Ident. No.	Temp.	Surf. Int.	Fin. Ext.	Lip	Rim Type	Rim Decor.	Trad.	Loc.	Qty
	116	G	SM	SM	F	INS	SSS	W	M	1
	4	G	SM	SM	R	CH	SSS	W	M	1
	105	G	SM	SM	?	COL	SSS	ER	M	1
	757	G	SM	FM	F	ST	CWS	?	C	1
	20	G	SM	CP	F	ST	P	W	M	1
	621	G	SM	CP	F	FL	CP	ER	H	1
	324	G	SM	SM	R	ST	CWS	ER	H	1
	12	G	SM	SM	?	COL	I	ER	M	1
	304	G	?	SM	R	FL	O	?	H	1
	766	G/S	B	B	R	INS	–	?	C	1
	51	G	SM	SM	T	FL	–	?	M	1
	31	G	B	CP	F	ST	CP	ER	M	1
	56	G	SM	SM	T	FL	SSS	?	M	1
	50	G	SM	CP	R	ST	CP	ER	M	1
	135	G	SM	SM	R	ST	–	?	M	1
	31	G	SM	CP	F	ST	CP	ER	M	1
	85	G	SM	SM	R	ST	–	?	M	1
	29	G	B	CP	F	ST	CP	ER	M	1
	3	G	SM	SM	F	COL	I	ER	M	1
										Total 19

Key

B	Brushed	FL	Flared	P	Punctate
C	Control	FM	Fabric Marked	R	Round
CH	Channeled	G	Grit	S	Shell
COL	Collar	H	Habitation	SM	Smooth
CP	Corded Paddle	I	Incised	SSS	Scallop Shell Stamped
ER	East River	INS	Insloping	ST	Straight
F	Flat	M	Midden	T	Tapered
				W	Windsor

section of a bannerstone were found in the midden area. The balance of rough stone consisted of an assortment of pebble hammerstones, rubbing stones, and choppers; all of which were found in both the midden and habitation areas of the site. Table 1 shows the distribution and locations of the rough stone specimens.

CERAMICS

The archaeological data provided by the ceramics of a site are the best means for establishing the general temporal positions of cultural identities pertaining to the Woodland stage. The Bay Terrace Creek site contained styles of both the East River Aspect and the Windsor Aspect, along with some steatite stone bowl sherds. The overall ceramic inventory was rather meager, consisting of some 240 sherds of which 19 were identifiable rim fragments. The midden area produced 105 specimens, of which 14 "ere rim pieces. The habitation portion of the site revealed 62 sherds, among which 3 were rim sections. The control test area added 21 pieces, 2 of which were rim fragments. Table 3 shows a breakdown of the rim types and their respective traits and characteristics. Table 4 shows the variations and tallies of the body sherd types. The temper of the sherds was mostly grit (93%), a small percentage (7%) showed traces of shell mixed in with the grit aplastic. The grit paste ranged from coarse to medium in texture and most of the body sherds "ere in a rather poor and friable condition, one exception being the portions of the Eastern Incised vessel.

The one area situated under and along side the stone boundary wall (see Figure 2), which is referred to as the control test area, was undisturbed, thereby providing a clean cut stratigraphic observation of the Vinette and Clearview stamped sherds found there.

Table 4. Body Sherd Types.

Type	Temp.	Surf. Int.	Fin. Ext.	Trad.	Area Location			Tot. Qty
					Mid.	Hab.	Cont.	
Vinette Interior Cord Marked	G	CP	CP	W	4	5	7	16
Modified Vinette Interior Cord Marked	G	CP	CP	W	1	2	1	4
Clearview Stamped	G	SM	SM	W	3	8	10	21
North Beach Net Marked	G	SM	NM	W	9	1	–	10
North Beach Brushed	G	B	B	W	1	–	–	1
East River Cord Marked	G	SM	CP	ER	5	7	–	12
Windsor Fabric Marked	G	B	FM	W	2	1	1	4
Incised Linear	G	SM	SM	ER	3	–	–	3
Plain	G&S	SM	SM	?	91	59	–	150* Total 221

* 133 grit, 17 shell

Key

B	Brushed	G	Grit
CP	Corded Paddle	NM	Net Marked
ER	East River	S	Shell
FM	Fabric Marked	SM	Smooth
		W	Windsor

The steatite fragments (5 pieces) were found in both the midden and the habitation areas. One nicely shaped rim fragment was found in the control test area 15 inches below ground level, at the bottom of the shell layer under a portion of a dog's jawbone, along side a flint turtle back. The steatite rim is smooth on both sides and tapers to a rounded edge which has a series of fine tally marks along most of the rim. Another small rim section similar to the above, but without tally marks, was found in the midden area in the lower shell concentration. The other specimens consisted of fairly small body sections with fairly smooth surfaces, some showing scrape marks on the exterior surface.

The sherd types have been mainly based on Smith's (1950) system of typology, along with additional information and interpretations offered by Rouse (1947), MacNeish (1952), Ritchie (1965), Lavin (1980) and from various publications and personal notes compiled by Julius Lopez.

A brief description of the main categories as shown in Table 3 and 4 are given below:

Vinette Interior Cord Marked (Figure 11, A1-3) Paste: Temper generally a coarse grit, consisting mainly of quartz fragments in a granular sandy texture. The thickness averages from 5/16 to 3/8 of an inch. The color ranges from a dark brown to red to buff and the interior on some specimens shows a black carbon-like accumulation on the surface.

Surface Finish: Cord-marking on both the interior and exterior surfaces. The interior cord markings run horizontally while the exterior impressions are vertical or oblique and sometimes run in criss-cross patterns. Some interior areas show an attempt to smooth over some of the cord-markings. This variation was noted by Lopez (1957) and sub-classified as Modified Interior Cord-Marked.

Clearview Stamped (Figure 11, B1-3) Paste: Medium to coarse sandy grit temper, poorly consolidated, coil construction, color ranges from buff to reddish brown. Thickness varies from 5/16" to 3/8". Surface Finish: Interior and exterior surfaces fairly smooth but lumpy. The dentate impression found

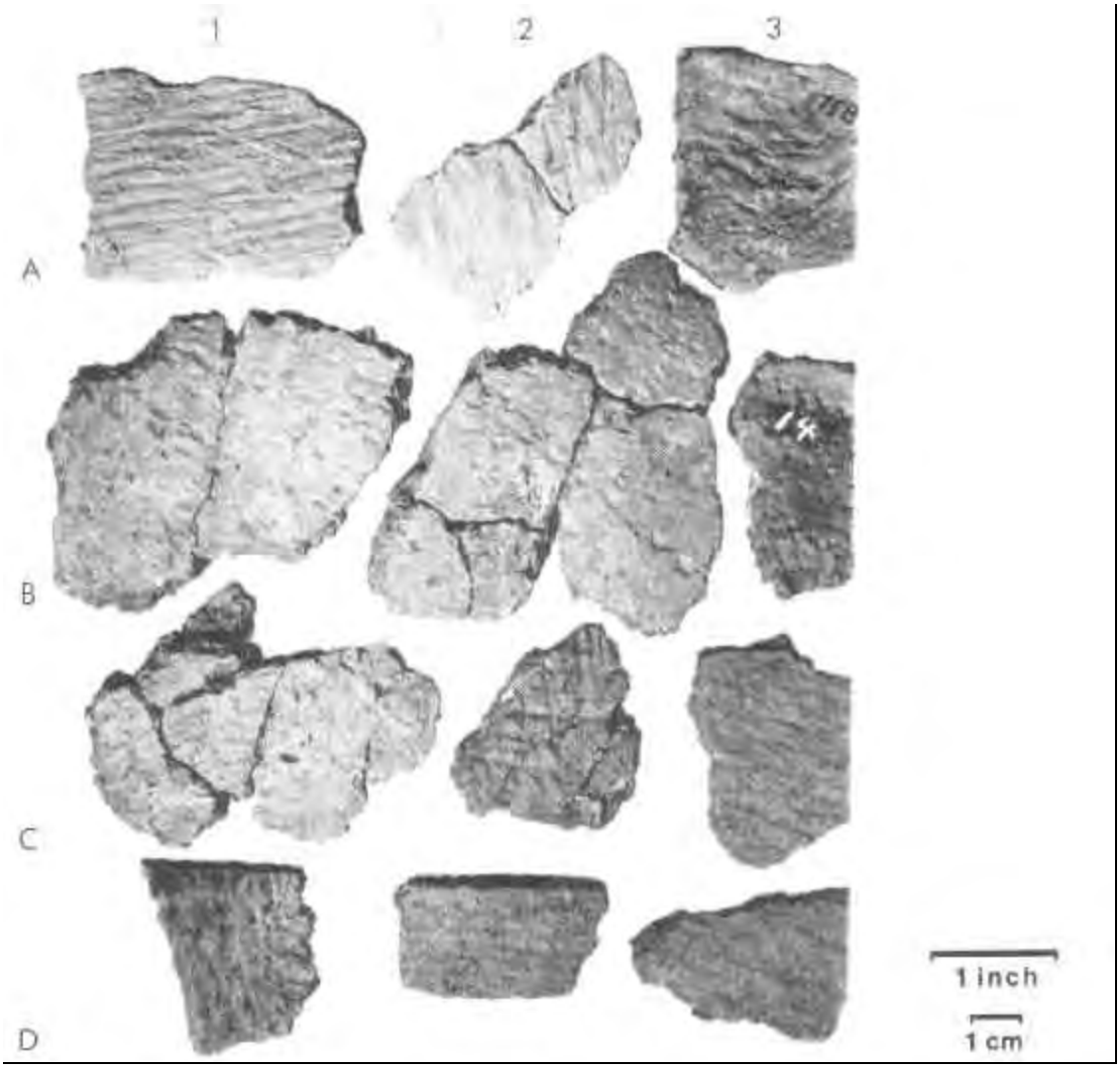

Figure 11. Ceramics: A1, 2 Vinette I exteriors; A3 Vinette I interior; B1, 2, Clearview exteriors, B3, Clearview interior; C1, 2, North Beach Newt Marked; C3, North Beach Brushed; D1, East River Cord Marked rim sherd; D2, Fabric Marked rim sherd; D3, Fabric Marked body sherd.

on both surfaces, in some cases, but mainly on the exterior in most specimens. The dentate size averages almost 1/8" long by 3/32" wide. Most seem randomly placed, however several sherds show linear patterns as if made by a roulette type stamp, similar to the one found at the Baker Hill Site (Smith 1950, Pl. 11 , fig.25).

North Beach Net Marked (Figure 11, C1, 2) Paste: Coarse grit, poorly consolidated, with large quartz particles. The sherds appear poorly fired and in a friable condition. The color runs from dark brown to reddish brown. Thickness ranges from 5/16 to 1/2" thick.

Surface Finish: Exterior is rough with criss-cross net marked pattern with no knots discernable at intersections. The interior is fairly smooth but lumpy.

North Reach Brushed (Figure 11, C3) Paste: Medium to coarse grit texture with fairly compact paste. Color reddish brown, thickness 5/16".

Surface Finish: The interior and exterior surfaces show some medium brush marks.

Windsor- Fabric Marked (Figure 11. D2-3) Paste: Grit temper with medium texture. Color dark brown, thickness 1/4" to 5/16".

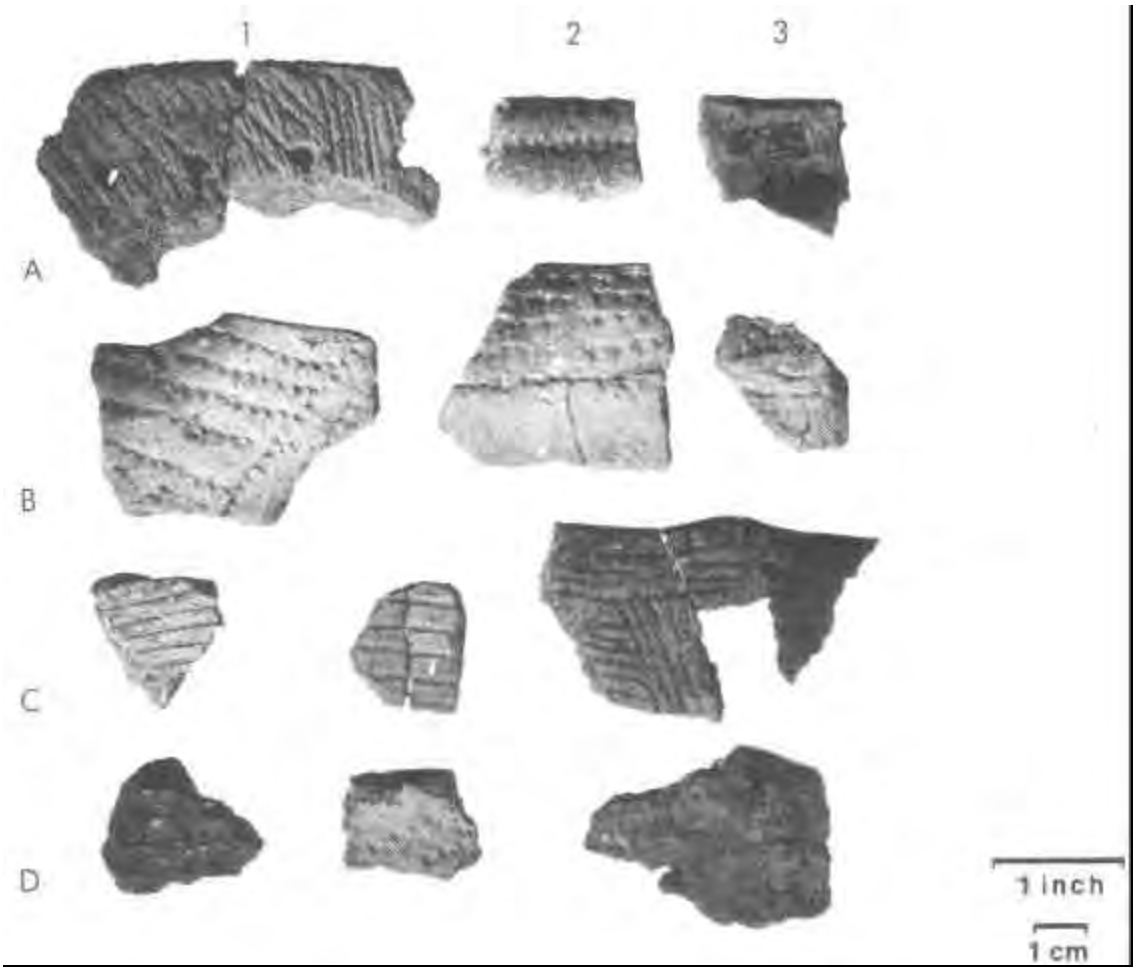

Figure 12. Ceramics: A1, Punctate rim sherd: A2, Cord Wrapped Stick rim sherd; A3, Plain rim sherd interior; B1, 2, 3, Scallop Stamped rim sherds; C1, 2,3 , Incised linear sherds; D1,2, Dentate decorated sherds; D3, unclassified rim sherd.

Surface Finish: Interior shows some brushing, exterior covered with what appears to be fairly fine paddle wrapped textile impressions.

Wickham Punctate (Figure 12, A1) Paste: Grit temper with a rather fine granular texture. The breaks appear irregular with no evidence of coil construction. The exterior color is a dark smoky gray, the interior a dark muddy brown. The rim thickness averages about 5/16".

Surface Finish: The interior surface is smooth with some signs of wiping. The exterior appears to have vertical and diagonal criss-cross cord paddle treatment which also is present on the square lip. Decoration: A series of round punctates running horizontally about ¾" below the lip and spaced approximately 3/4" apart. The punctates are about 3/16" in diameter and made from the exterior face and causing a small bump on the opposite interior face, in one case even penetrating the rim.

Niantic Stamped (Figure 12, B1-2) Paste: Medium to fine sized grit temper with a compact sandy texture. Color ranges from reddish tan to reddish brown. Rim thic kness varies from 3/16" to 5/16".

Surface Finish: Both inner and outer surfaces appear to be smooth with a faint trace of brushing on the interior of one of the larger sherds.

Decoration: All sherds are impressed on the exterior surface with edges of shells which in most cases appear to be made by the back edges of scallop shells. One of the two larger rim sherds has a series of horizontal rows of shell edge stampings, while the other has a combination of horizontal and diagonal

designs. One of the smaller sherds shows a portion of the rim with a number of grooves made by dragging the shell edge across the rim surface.

East River Cord Marked (Figure 11, D1) Paste: Grit temper with a moderate granular texture. Color dark brown to reddish brown. Thickness approximately to 5/16".

Surface Finish: Smooth interior with cord-wrapped paddle exterior treatment with impressions running vertically or diagonally. Some areas show partial smoothing over the impressions.

Eastern Incised (Figure 12, C3; figure 5) Paste: Medium to fine grit temper with compact paste and texture. Some of the thicker sherds show signs of lamination and flaking. Color is buff to dark brown with the thickness ranging from 3/16" at the neck to about 7/16" at the base. Surface Finish: Both the interior and exterior are smooth. Some exterior body areas show faint signs of cord-marked paddle which are fairly well smoothed over.

Form: The collar is pronounced and rises 1 ¾" vertically above a constricted neck. The lip is flat and has four rimpoints equally spaced around a round smooth mouth which is 6 5/8" in diameter. The body is globular with a smooth gradually rounded shoulder and a rounded bottom.

Decoration: The lines are fairly fine finger nail incising and show some slight breaks in their continuity. The design consists of alternate combinations of diagonal and horizontal areas forming a band about 1 1/4" wide above the collar base. Four to six horizontal rows of lines circle the upper rim portion which also has a series of short diagonal lines on the outer lip portion just above the upper most horizontal band. The lower collar edge margin is fingernail notched with about a 3/16" spaced pattern.

Smith (1947) and Rouse (1947) concur that the entire region bordering Long Island Sound on the south and the region north from Narragansett Bay, R.I. on the east, to the Hudson River on the west formed a single culture area. The style and tradition of the Long Island aspect does also occur in Connecticut. Anyone looking at a regional map of Long Island Sound can readily see that passing from one shore to the other presented no great problem. The pioneer work of Smith in "The Archaeology of Coastal New York" (1950) pretty well set up the chronology of the aspects and foci of the area, which in most respects has withstood the test of time. Subsequent site excavations both on Long Island and Connecticut have added to and elaborated on the ceramic sequence set up by Carlyle Smith.

The analysis of Ceramic Vessels from the Ben Hollister site in Hartford County, Connecticut (Lavin 1980) has greatly expanded Smith's Windsor sequences and clarified many of the related associations. The Bay Terrace site with its coastal location at the west end of Long Island Sound is ideally situated to reflect the influences of not only the Connecticut neighbor across the Sound, but also the manifestations from the north by way of the Hudson and East Rivers. This is indicated by the breakdown of Windsor and East River types as shown in Tables 3 and 4.

The transitional stage is evident by the presence of the stone bowl fragments along with the sampling of Vinette I sherds. Ritchie postulates that although the original center of the whole stone-pot industry may have been situated in the Virginia-North Carolina-Piedmont region, there were probably two secondary centers of development and diffusion for the stone vessels of the northeast namely, those of the Orient complex and southern New England stemming from the latter area; those of inland New York, Pennsylvania, and New Jersey, all associated with the broad-point cultures, spreading out from southeastern Pennsylvania. (Ritchie 1965: 170, 171).

The Bay Terrace Site steatite is more likely to relate to the southern New England area. The better known quarry and work shop sites of the steatite industry closest to Long Island are at or near Providence, R.I. and Portland and Bristol Connecticut (Ritchie 1965; 172, 173). The steatite sherds found at the Bay Terrace Site have smooth interior and exterior surfaces which is characteristic of the New England rather than the southeastern Pennsylvania steatite types.

Vinette I is generally regarded as the earliest form of ceramic vessel in the northeast. Some evidence suggests that it might be coeval with flat bottomed clay pots which were imitations of steatite vessels. In the Upper Delaware Valley these are called Marcey Greek Plain (Kraft 1975:101). Similar copies of a stone vessel with Vinette I surface treatment and paste characteristics was found at a Jamesport cemetery and also from a Sugar Loaf Hill burial pit, both sites being located on the eastern portion of Long Island.

The finding of several Vinette 1 sherds at the junction of the bottom zone and subsoil in the Control Area of Bay Terrace testify to their early presence at the site. The close proximity of the Clearview stamped sherds at the lower zone in the same control quadrant indicates a stratigraphic consistency of the two types of Windsor ceramics.

At the Oakland Lake site located about 2 miles south of Bay Terrace, 17 specimens of Vinette I were found in the bottom zone. One steatite rim sherd was recovered in the upper portion of this zone. The lower portion also produced 2 Bare Island; 1 Normanskill; 1 Brewerton Eared Side-notched; 1 Brewerton Eared Triangle, along with 1 socket antler-tip point. The middle zone, assigned to the middle Woodland period, contained 1 Clearview stamped sherd, along with some modified Vinette; exterior cord marked; North Beach net marked; Abbott zoned incised and Abbott zoned net impressed were also well represented in this zone depth (296 specimens) along with 18 Steubenville-like (Cony) projectile points (Kaeser 1968). The latter Abbott ceramic types or Cony points were not found at the Bay Terrace site. Other sites on western Long Island that produced Vinette 1 were North Beach and Matinecock Point. Sites across the East River and Long Island Sound were Throggs Neck and Pelham Boulder (Smith, 1950). The Morris Estate Club site (Kaeser, 1958) and the Schurz site (Lopez 1955) also showed collections of Windsor ceramics along with East River tradition specimens. The Ryders Pond site in southern Brooklyn had an inventory of 66 body and 1 rim sherd, all from one vessel, along with two shell tempered Niantic Stamped sherds. No Clearview stamped sherds were recorded (Lopez-Wisniewski 1972).

The North Beach marked sherds (10), nine of which represent one vessel and the North Beach brushed specimen, along with the four Windsor Fabric marked sherds are also present in many of the adjacent Long Island, Bronx and Connecticut collections. The net-marked variety seemingly to be in the minority.

The single rim specimen of Wickham Punctate represents a type sometimes referred to as "porthole pottery". It appears sporadically on Windsor sites and has been found in eastern Long Island at the Sebonac site which had 3 Windsor foci - North Beach, Sebonac and Niantic. The specimens there, though by no means identical, are based on the Wickham Punctate found by Ritchie at the Wickham site at Brewerton in central New York (Ritchie 1946) which he assigns to the Point Peninsula focus of the Vine Valley aspect. A smooth rim sherd with two punctate impressions was found at the Schurz site, Bronx Co. (Lopez, 1955: fig.31). A pit on this site also produced a large Clearview Stamped body sherd fragment. Punctate type rim sherds have been found on sites near Tottenville on Staten Island along with Clearview Stamped and Bowmans Brook types (Jacobson 1980:41). Rouse stated that they have a number of examples of similar pottery from the Sebonac period in Connecticut (personal Lopez letter, Oct. 1954). The Sebonac focus ran parallel to the more westerly Bowmans Brook and Clasons Point foci (Rouse 1947:19). Niantic pottery, known from Connecticut and eastern Long Island is late, and was named after the Niantic site in eastern Connecticut. The pottery is diagnostic of the final stage of the Windsor Aspect - The Niantic focus.

It was first described in a general way by Dr. Irving Rouse (1947:10-25) and later referred to by Dr. Carlyle Smith (1950:193) who endeavored to give more definition to the principal pottery types of the focus, namely Niantic Stamped. G. D. Pope, Jr. amplified the definition, particularly in connection with the types of decorations which adorn the vessels (1953: 6, 7). Both Niantic Stamped and Clasons Point Stamped have decorations made by stamping with the edge of a shell (mainly scallop). The two are also Iroquois-like in that they embody several designs and general form characteristics found on Iroquois pottery. Thus, in Connecticut and in Coastal New York, there are two closely related pottery types (Lopez, 1957, personal notes). The Niantic focus follows the Sebonac focus in chronological sequence. The earlier components of the Clasons Point focus belong to the Late Prehistoric period, the later components to the Historic period (Smith 1950:151, 152). No Clasons Point type sherds were found at the Bay Terrace Site.

MISCELLANEOUS ITEMS

These are artifacts not covered under the lithic or ceramic sections.

Paint Stones (hematite): Geodes: Nine specimens found in both the midden and habitation areas, all found in the lower zones. These small cup-like receptacles ranged from 3/4' to about 2 inches in diameter with depths from shallow 3/8" to about 3/4 inches. Some show smooth worn edges and others have rough jagged lip breaks. One specimen has a truncated base which permits it to stand on its base.

Rubbed limonite and hematite: Five pieces of rubbed or worked limonite and hematite were found at

the site, three of these coming from zone B of the habitation area. All show rubbed facet areas and two flat specimens show linear multiple scars made by some sharp object.

Graphite: Two fragments of worked graphite cane from zones B of both the midden and habitation areas. Both show extensive scrapping scars resulting from the removal of pigments. It is worth noting that an Orient fishtail point was found in chap proximity to a piece of worked graphite in quadrant 62.

At the prehistoric Smith site on Shelter Island (Latham 1957) 27 pieces id rubbed graphite along with seven sherds of steatite, were found at the lower level. This level, the older of the two cultures present at the site, produced narrow stemmed and side notched projectile points with no fishtail Orient types. Hematite paint stones were present in both cultures (upper and lower levels). Sebonac pottery with various Niantic styles showing Iroquoian influence was common in the later upper level of the site.

Roy Latham also describes a cache containing about a bushel of graphite that was found on Orchard Point, East Quogue, Southampton Town, Long Island (Latham 1956). According to Latham, as recorded in the late shell heap sites on eastern Long Island, graphite was most common during the soapstone period and less in the latest occupation. No graphite deposits, to Latham's knowledge, occur on Long Island, and the only reasonable localities from which the cached lot could have arrived would be either Connecticut or Rhode Island regions.

Paint stones of both hematite and graphite were found in the midden "A" portion of the Stony Brook site, a Late Archaic-Early Woodland transitional site, which produced Orient and Fishtail point types, mainly from the upper level. Paint stones have cultural diagnostic significances since they occur in some numbers in all Orient mortuary assemblages (Ritchie 1959:35). Hematite, limonite and graphite paint stones and the extensive use of powdered red ochre are well documented Meadowood traits (Ritchie, 1965:190). The combination of hematite and graphite also appeared at the Clearview and Matinecock Point sites (Windsor Aspect) as well as the Dosoris Pond site (East River Aspect), all located on Long Island's north shore. Fort Corchaug on the Long Island east end north fork also produced 20 limonite-hematite specimens and 4 graphite fragments (Smith 1950).

Concretions (claystone): These oddities found in the habitation area came in varied shapes and sizes and may have originally been found on the nearby shore areas. They were all found in their various soil or shell mixtures and ranged in depths from zones A thru C. One elongated broken specimen found in the habitation area in zone B shows 2 drill holes at the two broken ends-an indication that it might have been used as some sort of an amulet (Figure 13, A1). No doubt the odd shapes of some of these pieces created speculation and some degree of puzzlement to the finders and perhaps were even used as charms or talisman.

Ritchie (1965:169) mentions several centrally perforated circular claystone pendants that were found on an Orient site. Other sites also show claystone concretions in their inventories; the Jamesport site contained a circular disk form (Ritchie 1959:60) and the Matinecock Point and the Fort Corchaug sites produced brown clay concretions (Smith 1950:141, 161).

Mica - One small rectangular piece of translucent mica about 1/32" thick was found in the midden section of the site. Other sites in the area, namely Dosoris Pond, Clasons Point, Grantville, Pelham Knolls, Pelham Boulder and Throggs Neck (Smith 1950:127-141) show the presence of amorphous fragments of mica which can be obtained from various granite boulders and outcrops in the coastal area. The use of mica is problematical, but does lend itself to decorative ornamentation.

Shell - -Three roughly dressed sections of columellae from the whelk or conch shell (Busycon columellae) were found. One piece from the midden area showed a definite tapered cut off point at one dressed end, indicating shell bead or wampum production at some phase of the site occupation. Smith in his trait table shows that the nearby Baker Hill site produced 50 dressed down columellae cores and two white wampum blanks; the Aqueduct site on the south shore tallied two dressed columellae. (Smith 1970: 128). The wampum industry peaked during the Shantok Aspect as clearly indicated by the large number of dressed columellae cores at both the Fort Corchaug site on Long Island and the Fort Shantok site near Norwich, Connecticut. Over a thousand dressed down columellae were excavated from each site along with a small quantity of wampum blanks and finished wampum bead. The East River Aspect site of Fort Massapeag on Long Island's South shore also produced several hundred columellae and other evidence of extensive wampum industry (Smith 1950: 114, 128).

Bone - A total of, 11 bone sliver awls and worked fragments were found, 9 of which were equally distributed between layers A, B, and C of the habitation area. Two bone punches made of deer bone

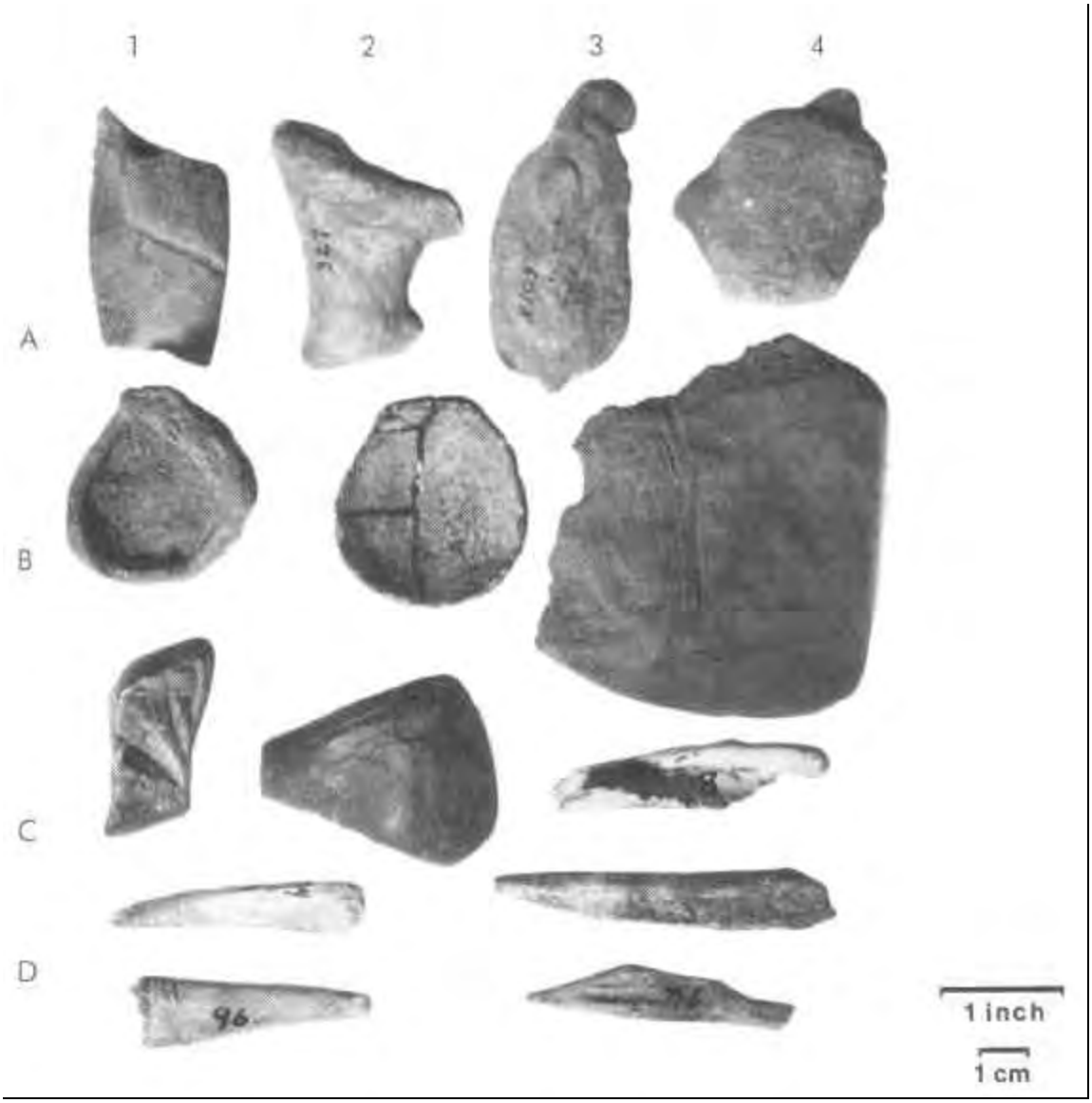

Figure 13. Miscellaneous: A1-4, Claystone Concretions; B1, 2, Geode Cups; B3, worked limonite paintstone; C1, worked graphite; C2, worked hematite paintstone; C3 worked columellae core; D1, antler points; D2, splinter awls.

joint sections present. Bone fragments wore meager, probably due to the soil acidity. The several pieces found in shell context were split to obtain the bone marrow.

Antler-Five antler tine sections were excavated, three of which came from the habitation section of the site. One of these showed definite cut marks at the basal end. The two other specimens included a cylindrical section showing cut marks and a large tine section which could have been used as a flaking tool.

Turtle Shell-Six fragments of box turtle shell were found in both the midden and habitation areas.

DISCUSSION AND CONCLUSIONS

The site represents multi-components based on the inventory of the lithic and ceramic items. These range from the Archaic to the Late Woodland stage, a span of some 4,500 years.

Late Woodland-(A.D. 1,000-1,500) represented by the Eastern Incised collar and globular sections

found in the upper layer of the midden area. This individual pot seemed to be an intrusive isolated specimen, inasmuch as no other similar sherds were discovered either in the midden or habitation areas. A pit in a bulldozed area about 1/2 mile northwest of the site did produce a collared rim section with diagonal incising along with basal rim notches. No deep pits were located at the Bay Terrace site which could relate to the Woodland patterns. The seven triangular projectile points, as previously mentioned, do not represent the true Levanna types that are usually associated with this period. The worked shell core fragments however do fit into the Late Woodland pattern.

The Eastern incised sherds along with the 12 East River Cord Marked samples represent the East River ceramic tradition of the Late Prehistoric period.

The Wickham Punctate rim is somewhat rare in the New York coastal area. M.R. Harrington illustrates several punctate sherds found at the Sebonac site at Shinnecock Hills some eighty miles east of New York City (Harrington 1924, fig. 31 a, g, h,). Carlyle Smith upon reviewing the collection at The American Museum of Natural History found 18 punctated sherds and noted that 22 of the dentate stamped sherds resembled Ritchie's type called Wickham punctate in that deep punctations are combined with lines of stamping. The Windsor style sherds were classified as Niantic, Sebonac, and North Beach (Smith 1950:180,181). Wickham appears to be a development from Point Peninsula culture into an Owascoid type material culture, the easternmost regional variant probably being ancestral to the Mohawk (MacNeish 1952:89). The Eastern Incised rim found at Bay Terrace does have similar overtones to the Fonda Incised types found at the Garoga site along the Mohawk Valley in New York.

The Windsor Aspect which runs from the Intermediate period (1000 B.C.) and continues into the Historic period (A. D. 1700) is represented at the site by the Niantic, North Beach Brushed and Net Marked, Windsor Fabric Marked, Clearview Stamped and Vinette I Interior Cord Marked sherds (Table 4).

The Clearview Stamped sherds consisted of 21 specimens and were found in all areas. Six of these were excavated from the control area and were found at depths of 10 to 12 inches in the "B" layer which was 19 inches thick. Two of these had dentate impressions on both sides, the balance only on the exterior surfaces.

Vinette I interior Cord Marked which represents the lower spectrum of the North Beach Focus was made up of 16 sherds, seven of which came from the control area on or near the subsoil level. Four sherds of the Modified Vinette Cord Marked variety were also found, one corning front the control section at the subsoil line.

Most of the pottery came from the midden area and was located in the upper and middle A and B layers. Aside from the Vinette I and Clearview Stamped sherds found in the control area, no definite stratigraphic reference could be reliably formulated, due mainly to the many tree roots and other disturbed conditions which occurred in most of the midden area. The habitation area, as previously mentioned, was subject to plow zone activity, and except for subsoil stratum, made artifact provenience questionable.

Transitional Stage (c. 1500-1000 B.C.) This is best represented by the eleven Orient fishtail projectile points and the three types of the Susquehanna components, along with the five fragments of steatite. The three Susquehanna specimens consist of a Perkiomen Broad, a Susquehanna Broad, and a type designated as serpent-headed (Figure 7, A1, B3, A5). Witthoft (1953) recognized these in the Pennsylvania and New Jersey areas, and Ritchie (1958) in the Hudson Valley, but as yet they are not clearly defined on Long Island. The Orient fishtail was preceded by the Susquehanna types which in turn followed the narrow- point type tradition. The Miller Field site in New Jersey produced similar types. An interesting note is that all but one of the Perkiomen points at Miller Field were made of brown jasper, the same as the Bay Terrace specimen. A chipped adze found at Bay Terrace also fits into the Miller Field site trait list. There the Orient phase was radio-carbon dated at 1,220 B.C. ± 120 years, and the Perkiomen phase at 1720 B.C. and 1640 B.C. ± 120 years. Other Pennsylvania sites in the Upper Delaware River Valley have yielded comparable dates (Kraft: 60-69). The Orient phase dates on Long Island were in the range of 1043 B.C. ± 300 years at Sugar Loaf Hill and 763 B.C. ± 220 years at the Jamesport site (Ritchie 1959:73-75). This dating variance clearly indicates an easterly migration of the Orient groups from New Jersey and Upper Delaware Valley either through western Long island or across the Sound from Connecticut, to its final maturity on the east end of Long Island. The Bay Terrace site, as evidence indicates, was one of their way stations during, this journey.

A similar comparison can be made in Connecticut of several sites along the Housatonic River watershed, which empties into Long Island Sound some 45 miles northeast of the Bay Terrace site. There a total of 138 Orient fishtail points were excavated from 16 major sites. Three carbon-fourteen dates on associated firepits ranged from 1230 to 1115 B.C. The Perkiomen culture occupation represented by a half dozen specimens was dated from 1850 to 1550 B.C. ± 300 years. The Susquehanna culture consisting of 53 projectile points was occupation dated at 1550 to 1250 B.C. ± 300 years (Swigart 1974:23-25).

The Orient phase seemingly co-existed in New Jersey, Pennsylvania and Connecticut about the same time periods, along with the earlier Perkiomen culture which appears to be less defined and with a wider date spectrum.

The Bay Terrace site without C14 dating can only be conjectured as having an Orient period somewhere between the 1220-1230 B.C. dates of New Jersey and Connecticut, and the 1043 B.C. date of Sugar Loaf Hill on eastern Long island.

The Archaic Period - Following Fowler (1959) and Funk (1979) the Early Archaic is defined as the period of 8000 to 6000 B.C., the Middle Archaic as 6000 to 4000 B.C., and the Late archaic as 1000 to 1500 B.C. A Late Archaic period is indicated by the lithic typology which includes some Lamokoid and Laurentian types. No Early -Archaic forms were found at the site. Some specimens qualify for the Brewerton phase (Pl. 3, A1-3), which is charcoal dated at 2050 B.C. ± 220 years (Ritchie 1967:91). The Lamoka types (Pl. 1, A1-5, B1-5) fall around 2500 B.C. (Ritchie 1965:45). The majority of projectile points are of the narrow-stemmed and side notched varieties (53.3%) and would fit into the Bare Island, Wading River and Squibnocket categories. A small number of untyped broad side notched points are difficult to place in their proper time zone and may tend to be it an earlier occupation. Five of the narrow stemmed and narrow side notched points were excavated at the lower levels between 16 to 22 inches below the topsoil, which was just above or in the subsoil stratum. In western Connecticut, the small stem and side notched narrow point tradition entered the region around 2515 B.C. (Swigart 1978:14). This tradition probably moved north through New Jersey and southern New York from the Middle Atlantic States region (Ritchie 1971:7). I would assume the western end of Long Island would be exposed to this tradition about the same time period. Based on the quantitative analysis, this would appear to be the tradition that had the longest occupation at the Bay Terrace site.

Unfortunately, due to the disturbed nature of most of the site, no definite correlation can be made between the features and the artifacts. Outside of the horizontal molds of feature HF-7, no definite patterns for shelters could be determined. Several identifiable post molds were found on the site but could not relate to any set house pattern, and could have been used for drying or cooking racks.

We do know the site, being situated in a sheltered locale, with ready access to fresh and salt water was an ideal campsite for both summer and winter quarters. The midden and other isolated pits testify to the abundance of shellfish. The evidence of deer bones and hollow bird bones indicates that game was available, and even though no definite signs of fish bones or scales were found, it must stand to reason that the near proximity of Little Neck Bay must have supplemented the inhabitants' diet with an assortment of fish.

We do not definitely know if the Bay Terrace peoples' stay extended into the Contact Period. A bent triangular piece of copper was found in quadrant 3 of the habitation area at minus 11 inches with an 1879 Indian head penny a few inches above it. In the same vicinity a section of brown kaolin pipestem with a bole diameter of1/16 inch also appeared at a depth of minus 10 inches. These items were in the same plane context with artifactual lithic material in the same area. However, due to its close proximity to the HF-1 feature, the relationships were questionable.

Most excavated sites, especially in the New York City area, leave one with more questions than answers. Nevertheless, with all its limitations, we have to interpret what we have at hand, and trust that we have added another piece to the great aboriginal cultural puzzle of Coastal New York.

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Map enhancements by Patricia Miller.
Photography assistance by Dr. Ralph Solecki.

A MANUAL FOR THE IDENTIFICATION OF SMALL ARMS ORDNANCE MATERIAL

Michael S. Sheehan *SUNY Buffalo*

INTRODUCTION

This paper was originally submitted to the Department of Anthropology State University of New York at Buffalo, New York in partial fulfillment of requirements for the degree of Master of Arts.

The purpose of the paper is to present methods of identifying metallic cartridge cases and spherical lead bullets (or "bullets"), collectively referred to as small arms ordnance material, that can be employed by anyone, regardless of their familiarity with firearms. The materials used to test the methods described were excavated at Fort Niagara, Youngstown, New York and Fort Ontario, Oswego, New York (Figure 1). A variety of opinions exist over the usefulness of these materials for the archaeological interpretation of historic sites. Carlyle Smith argued in 1954 that "ordnance material can provide a check on the dating of sites through the use of objects of white origin" (Smith 1954:25). Ordnance materials were used in this way during archaeological research at sites in the vicinity of Fort Sill, southwestern Oklahoma (Spivey et al. 1977). Others feel the use of ordnance materials is limited to establishing a link between civilian traders and military garrisons (Smith 1960a:129). Miller (1960:81) maintained that "ordnance material falls into a category of artifacts of a too general nature, such that they are not useful as time indicators."

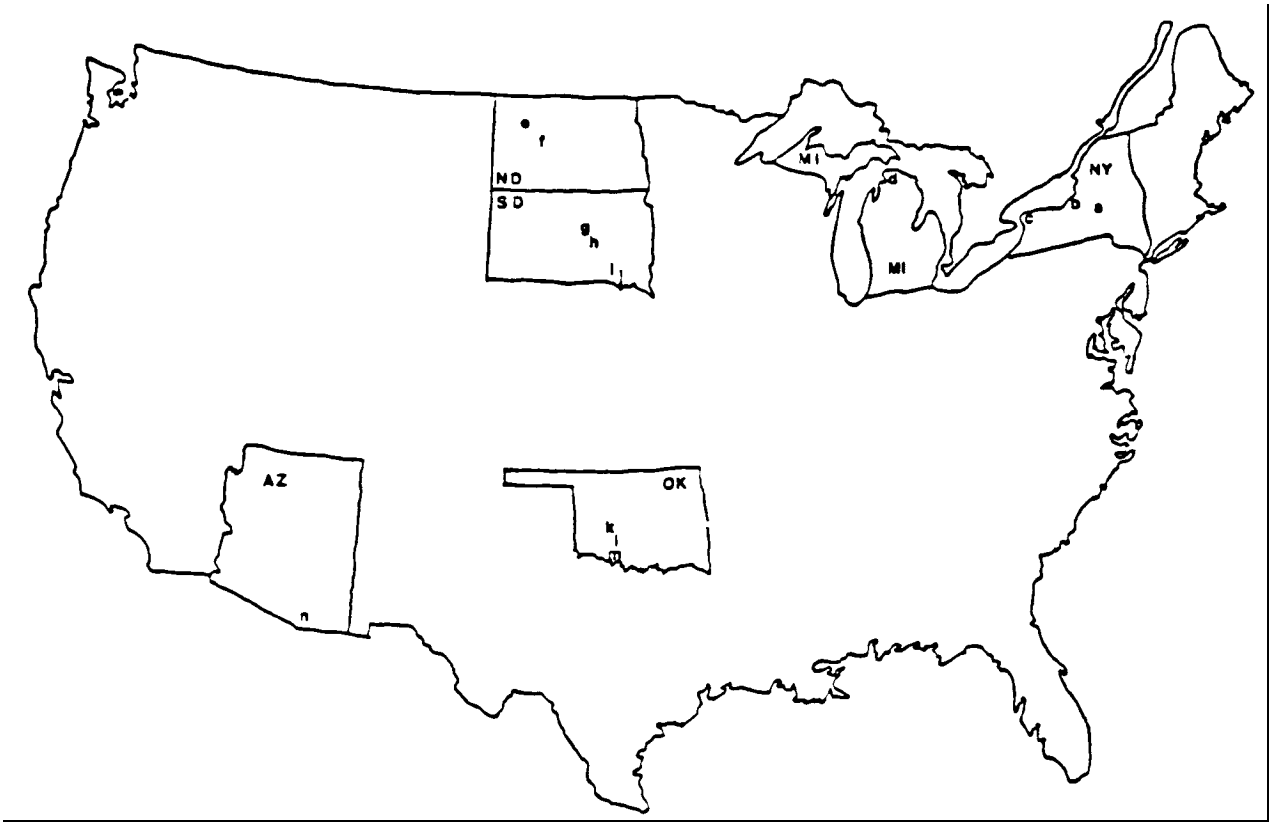

Figure l. Map of United States showing the approximate location of sites discussed in the text: a) Fort Stanwix; b) Fort Ontario; c) Fort Niagara; d) Fort Michilimackinac; e) Kipp's Post; f) Fort Stevenson; g) Fort Lookout: h) Fort Lower Brule; i) Whetstone Agency and Army Post; j) Fort Randall; k) Fort Sill Dump Site; 1) Mathewson Store Site, m) Mathewson House Site; n) Johnny Ward's Ranch.

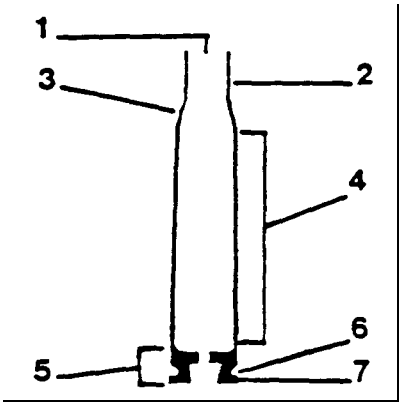

Figure 2. Cartridge Case Nomenclature: 1) Mouth; 2) Neck: 3) Shoulders: 4) Body; p) lead; 6) Extraction Groove; -i Rim. (Redrawn from Speer 1979:29).

My feeling is that ordnance materials are significant factors in archaeological interpretation. After reviewing reports from a variety of sites around the United States (Figure 1), I realized that a great deal of potentially useful information was being lost. This can be traced to two basic problems. First, most identification of ordnance material is done by specialists, individuals with long-standing familiarity with firearms, who recognize the identity of cartridge cases or bullets on sight. While the accuracy of their work is without question, other researchers at historic sites are left without a clue as to how ordnance materials can be identified in the absence of specialized knowledge or expertise. Second, some cartridge cases and bullets are not used to interpret an historic site because they are deformed and unidentifiable by standard methods. My research is intended to help fill this gap.

This report can be broken down into two discrete parts. The first deals with cartridge cases, and the second with bullets. A brief introduction to each section follows.

Cartridge Cases

> Invented in the mid-nineteenth century (Klatt 1981), metallic cartridges may be described as:
> " . . . a container for the primer, propellant charge of powder and the bullet. It is the main body in which components are placed resulting in a self-contained unit of ammunition which can be loaded, fired, and ejected from the breech of the firearm." (Speer 1979:29).

Cartridge cases, usually made of a copper-zinc alloy, have discrete and definable parts (Figure 2). They are identified by caliber. For this paper to serve its intended purpose, total familiarity with the part- of a cartridge case and the terms that are applied to those parts are essential. What follows is a brief review of cartridge case nomenclature.

Cartridge Case Parts:

1) Mouth-opening in top of a cartridge case into which the bullet is placed.
2) Neck-that portion of a cartridge case which grips the bullet. In a bottlenecked cartridge, that portion of the case in front of the shoulder.
3) Shoulder-the sloping or rounded part of a bottlenecked cartridge case. Joins the neck to the body.
4) Body-that portion of a cartridge case between the head and the shoulder. The part of the case that contains the powder.
5) Head-that portion of the cartridge case extending from the bottom of the body to the base of the cartridge case itself.
6) Extraction Groove-indentation surrounding the bottom of a rimless cartridge case that provides the clearance required for the extractor to grip the case rim.
7) Rim-the projecting edge at the base of most cartridge cases upon which the extractor pulls.

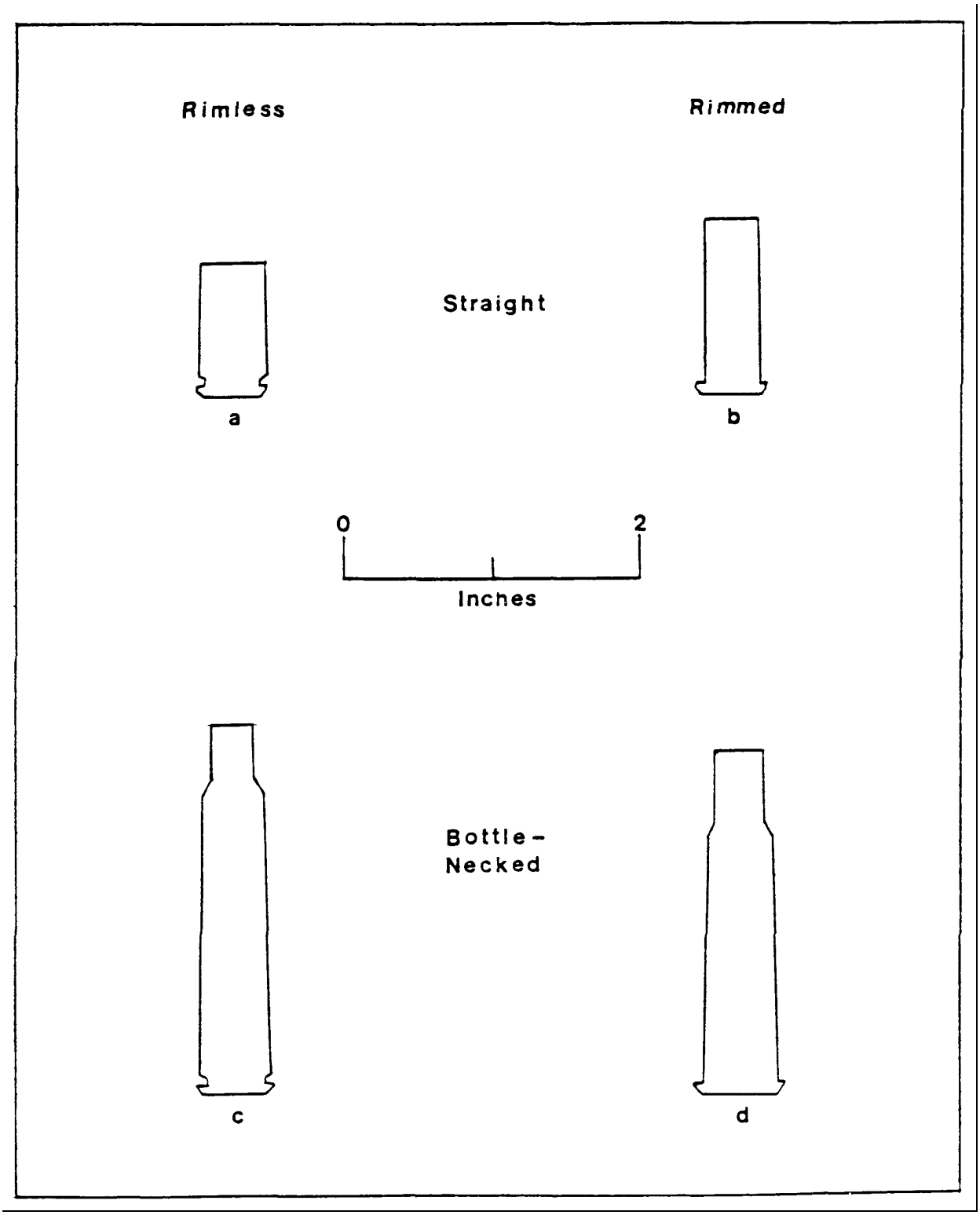

Figure 3 Four Basic Cartridge Case Types; a) Rimless-Straight; b) Rimmed-Straight; c) Rimless-Bottlenecked; (d) Rimmed Bottlenecked.

There are four basic types of cartridge cases found in archaeological contexts: rimless-straight, rimmed-straight, rimless-bottlenecked, and rimmed-bottlenecked (Figure 3). With the exception of "shoulders" and "extraction groove", the terms discussed above apply to all four types as they are illustrated in Figure 2. Straight-sided cartridge cases (Figure 3 a, b) do not have shoulders and rimmed cartridge cases (Figure 3 b, d) do not have an extraction groove.

Later in the text an historical review of methods used to identify cartridge cases, and description of a new method based on diagnostic dimensions of the cartridge case, will be undertaken. For these discussions to be meaningful and to avoid any potential confusion, the reader is reminded that complete understanding of the terms already defined is absolutely necessary.

Bullets

The section on bullets is primarily concerned with the methods used to identify bullets in the past, an example of how information derived from the analysis of bullets can contribute to the archaeological interpretation of historic sites, and the formulation and evaluation of methods whereby hitherto unidentifiable, and archaeologically useless bullets, can be identified.

This type of bullet was used in muzzle-loading rifles, pistols, and muskets, and is usually associated with the time period prior to the widespread dispersal of breech-loading firearms that occurred around 1870. Like metallic cartridge cases, they are identified by caliber. Bullets have two principal diagnostic dimensions. The first and most commonly referred to is its diameter, which equates with caliber. The standard method of identifying bullets that retain their spherical shape is a measurement of diameter (Miller 1960, Woolworth and Wood 1960, Maxwell and Binford 1961, Hanson and Hsu 1975, Spivey et al 1977, and Crouch 1978). However, any degree of deformation from firing, improper casting, or some other equally destructive event, makes simple measurement inaccurate and inconclusive. The second diagnostic dimension is bullet weight. This is significant because bullets of this type exhibit an interesting property: for each caliber there is only one weight (within a very narrow range of variation). This property plays a key role in the method used to identify deformed bullets, to be discussed later.

Glossary

In case there is any confusion over the meaning of terms, or the way they are used, a glossary of relevant terms is provided at the end of this report.

CARTRIDGE CASES

From 1950 to 1960, it was standard practice to submit cartridge cases to one person, a specialist, for identification. That individual's report usually consisted of a thorough, accurate description of the cartridge cases that were identified. More recently, diagnostic dimensions have been included in cartridge case descriptions. However, there is no indication that they were used for anything other than description. Although this is a positive trend, there are inherent problems that must be addressed. In this section I will review the techniques used to identify cartridge cases recovered at these historic sites: Fort Randall; Whetstone Indian Agency and Army Post; Fort Lower Brule; Fort Lookout Trading Post; Fort Stevenson; Kipp's Trading Post; Johnny Ward's Ranch; the Fort Sill Dump Site; Mathewson House Site; Mathewson Store Site; and the Kiowa and Comanche Indian Agency Commissaries at Fort Sill. Some of the major problems manifested in these studies will also be discussed.

A Selected Review of Techniques Used to Identify Cartridge Cases

Fort Randall, the Whetstone Indian Agency and Army Post, Fort Lower Brule, Fort Lookout Trading Post, and Fort Stevenson were investigated under the auspices of the Inter-Agency Archeological Salvage Program (Figure 4), which "was formulated, . . . for the purpose of recovering archeological and paleontological remains that would be lost as a result of the numerous flood control, irrigation, hydroelectric power and navigation improvements in the river basins of the United States" (Roberts

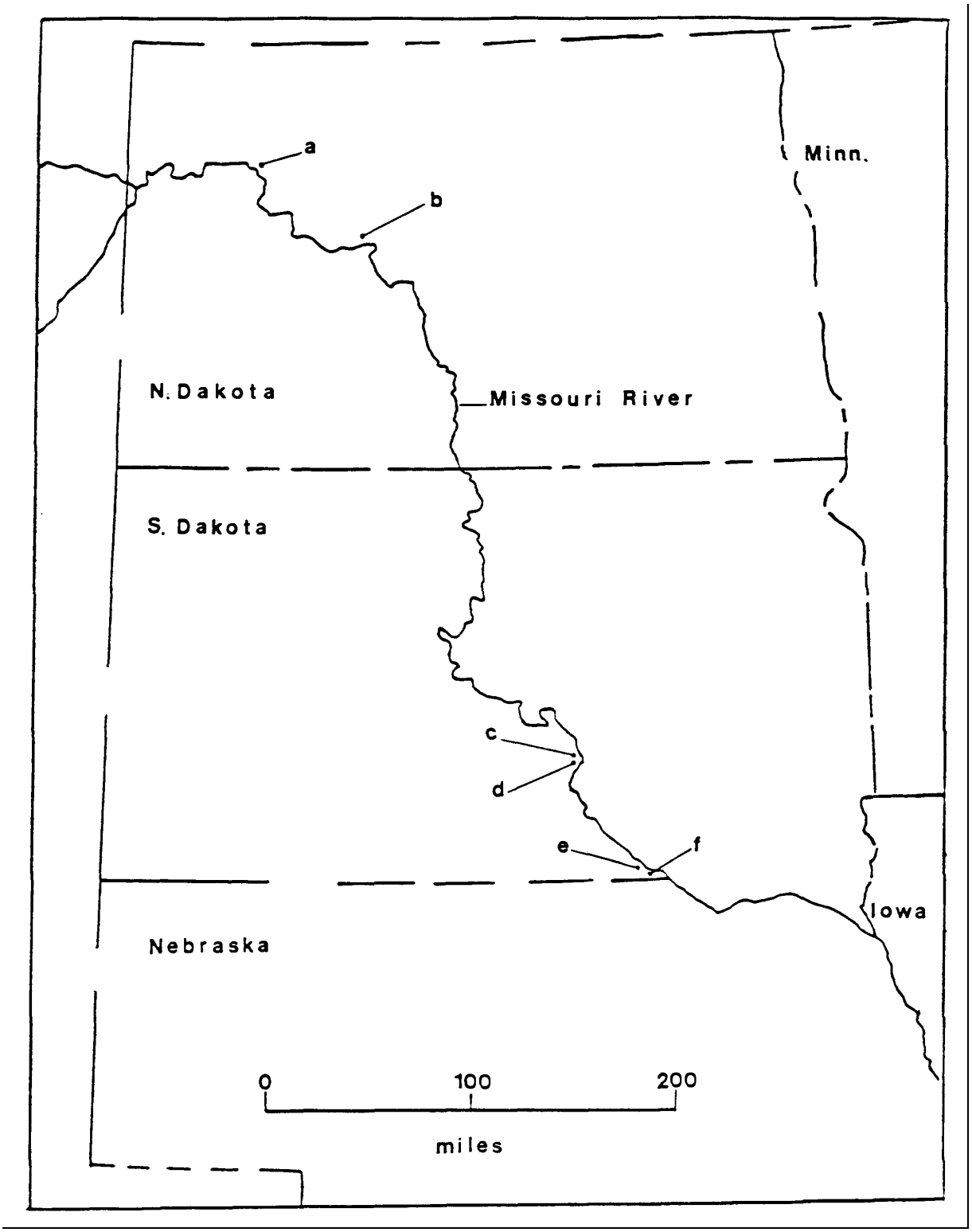

Figure 4. Map of Missouri River Basin Showing Relevant Nineteenth Century Military and Trading Posts: a) Kipp's Post; b) Fort Stevenson; c) Fort Lookout; d) Fort Lower Brule; e) Whetstone Agency and Army Post; f) Fort Randall. (Redrawn from Smith 1960b).

1960:III). These sites were directly affected by implementation of the Flood Control Act of 1944 (Mattes 1960).

Located in South Dakota on the west bank of the Missouri River five and one-half miles north of the Nebraska State line, Fort Randall was an official military installation from 1856 to 1892. During that time it played a key role in hostilities that followed the Sioux uprising of the early 1860's. Fort Randall also served as a major supply base for posts upriver and inland (Mills 1960).

The Whetstone Indian Agency and Army Post was established in 1868. Situated "on the first terrace of the right bank of the Missouri River, one-half mile north of the confluence of Whetstone Creek and the Missouri" (Mills 1960:37), the Army Post was garrisoned by troops from Fort Randall until 1872.

Fort Lower Brule was established in 1870, in conjunction with the Lower Brule Indian Agency (established 1868) on the west bank of the Missouri River approximately 50 miles north of the Nebraska State line. The functional lifetime of the military post continued through "the last third of the nineteenth century" (Mills 1960:45).

The list of relevant artifacts from these sites is limited to eight cartridge cases, all dating to the last third of the nineteenth century. It is assumed that someone with specialized knowledge, able to identify° these artifacts through visual inspection alone, conducted the analysis.

In present day South Dakota, the French Fur Trading Company established Fort Lookout three-quarters of a mile west of the Missouri, approximately 60 miles north of the Nebraska State line. From 1831 to 1840 it functioned primarily as a company post. After 1840 until 1851, Fort Lookout continued as a trading post under the direction of private interests (Miller 1960:50, 81). Only three cartridge cases were recovered at Fort Lookout Trading Post. Identification of these cartridge cases was done by the Curator of the Department of Armed Forces History, U. S. National Museum. The following diagnostic dimensions were included in the description of these cases: diameter at the base, barrel diameter, and height. Inclusion of these diagnostic dimensions represented a significant advance over contemporary reports from other sites I examined.

In June 1867, Fort Stevenson was established in North Dakota on "a segment of the first bench of the valley of the Missouri River . . . " (Smith 1960b:168) approximately 120 miles north of the South Dakota boundary. It was an active military post until 1883 when it was converted into an Indian school, in which capacity it functioned until 1884. After 1884 it did not serve any official government capacity. The inventory of cartridge cases recovered at Fort Stevenson is fairly limited. In all, 25 were identified. “Identifications were made on the basis of familiarity with firearms" (Smith 1954:25).

Occupied from 1859 to 1913, Johnny Ward's Ranch in southern Arizona may have been one of the oldest remaining structures in the state (Fig. 5). The extended period of occupation combined with damage from the widening of State Highway 82, and the dilapidated condition of the extant structure resulted in an archaeological salvage operation.

Excavations at Johnny Ward's Ranch yielded a sample of cartridge cases that was large in number and wide in variety. Twenty-nine cartridges of civilian and military manufacture were identified. For each cartridge case the caliber, date of manufacture, and manufacturer are provided. Less often, standard load data and the specific firearm associated with a particular cartridge case are given. This is all valuable information, but diagnostic dimensions are discussed only once, and that is with regard to a cartridge case that could not be identified (Fontana 1962:79-82).

It would appear that as of 1962, the identification of cartridge cases was left to the specialist. Typically this individual had substantial experience with firearms, and could recognize by visual inspection alone, the wide variety of cartridges used since the middle of the nineteenth century. But the period 1950 to 1962 saw the introduction into published descriptions of cartridge cases, of information regarding their physical structure. This represented tacit recognition of the potential utility of certain diagnostic dimensions.

The "assessment of archaeological resources along the water conveyance portions of the Waurika Lake Project in Southwestern Oklahoma resulted in the location of 13 sites" (Spivey et al. 1977:1). In the project report, cartridge cases from three of these sites are discussed in detail. These three are: the Fort Sill Dump Site, Mathewson House Site, and the Mathewson Store Site (Fig. 6).

Fort Sill, established in 1869, is located adjacent to Medicine Creek in southwestern Oklahoma. From 1869 to 1911, the primary function of the garrison at Fort Sill was to maintain peaceful relations between

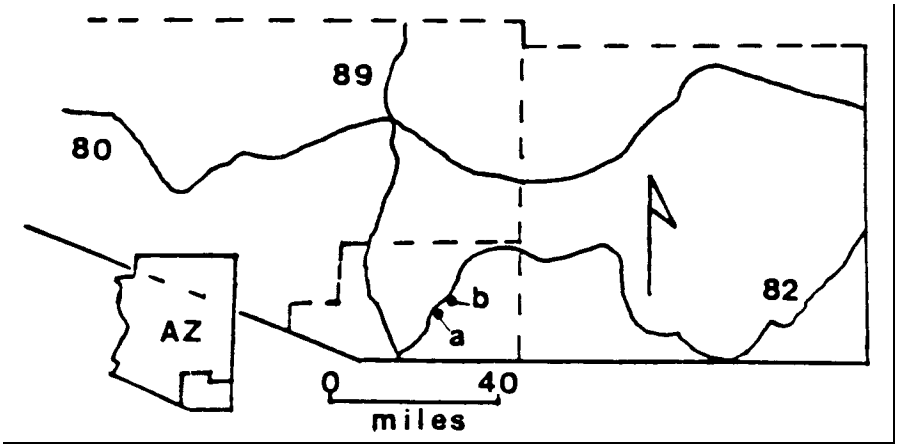

Figure 5. Modern Map of Southeastern Arizona Showing the Location of: a) Ward's Ranch; b) Patagonia; and state and federal highways 80, 82, and 89. (Redrawn from Fontana 1962:4).

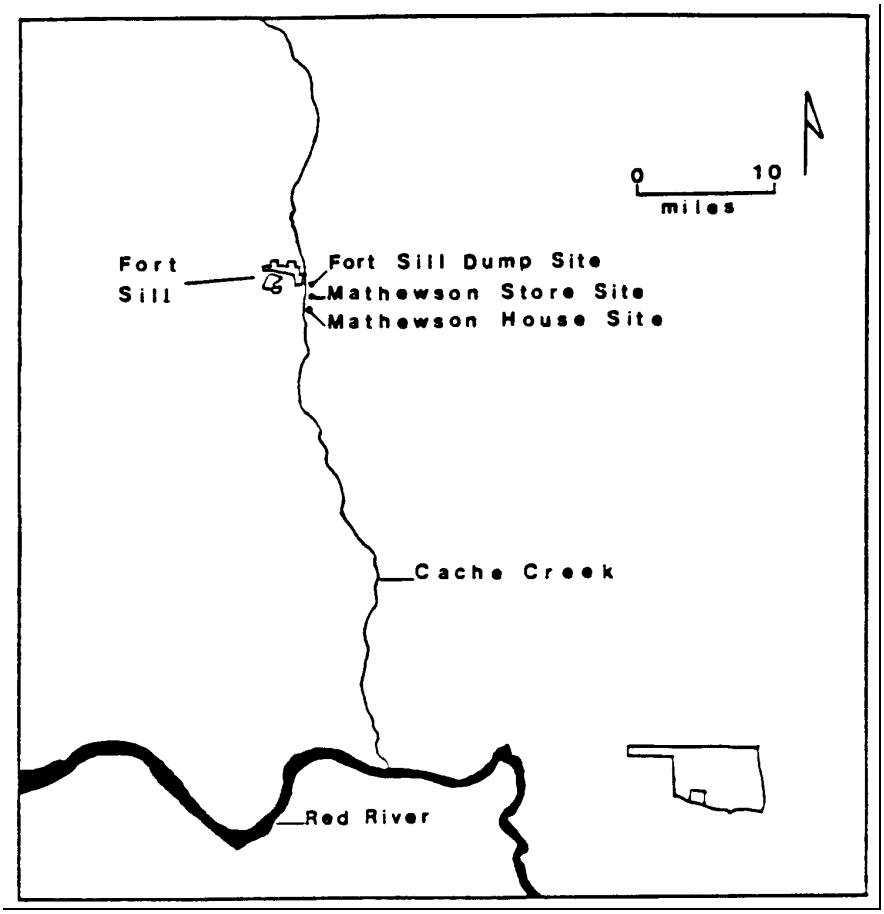

Figure 6. Sites in the Vicinity of Fort Sill, Southwestern Oklahoma. (Redrawn from Spivey et al. 1977:2).

local white and Indian populations. After 1911, it became a training center for field artillerymen (Ferring 1978:23).

The Mathewson House and Store Sites are the remnants of structures occupied by William Mathewson from 1869 to 1874, on the Kiowa and Comanche Indian Reservation. The store was a typical frontier post trading "flour, sugar, coffee, etc. with the Indians for furs" (Spivey et al. 1977: 169).

The number and variety of cartridge cases recovered at these sites was extensive. Taken together, 208 cartridge cases of 16 different calibers were recovered. With few exceptions, three diagnostic dimensions are provided with each cartridge case, they are: head diameter, which is "the basal portion of the casing opposite the mouth or opening"; shoulder diameter, "that portion of the casing immediately above the head"; and the case length (Spivey et al. 1977:123).

Despite provision of these diagnostic dimensions, reliance is placed on primer type (a variety of which have been used since introduction of metallic cartridges in the mid-nineteenth century) for purposes of identification:

> "Although caliber has been used by many in the past, because of industrial tolerances and also the fact that cartridges can provide only an indirect measure of caliber, it is not as definitive as the primer." (Spivey et al. 1977:123)

The logic behind this concept is at variance with the fundamental principles of the manufacture and use of modern firearms. The caliber of a firearm is established on the basis of the bore diameter of its barrel. Bullet diameter must match bore diameter very closely for the firearm to be accurate (accuracy is the measure of functional utility of any firearm; one that is inaccurate is little improvement over a more primitive weapon). Therefore the neck of the cartridge case, that portion of the case that holds the bullet, must have an internal diameter virtually equal to the bore diameter. Unless a priming system is caliber specific, which is clearly not the case on the basis of the published report (on two occasions different calibers are discussed that use the same priming system (Spivey et al. 1977:124-129), I fail to see how caliber determination based on priming system can be more reliable than measurement of the diagnostic dimensions of the cartridge case.

A related study was undertaken at the Kiowa and Comanche Indian Agency Commissaries of Fort Sill. The primary function of the Commissaries was the issuing of rations and annual annuities (Crouch 1978). Forty-seven cartridge cases of 14 different calibers were recovered. The following diagnostic dimensions were included in their description: head diameter, or the outside base diameter; shoulder diameter, which refers "to the casing outside diameter as measured immediately above the base"; and case length (Crouch 1978:118). The relevance of these terms, and those used in Spivey et al. (1977), will be discussed in addition to some comments regarding the use of specialists for identification of cartridge cases in the next section.

After reviewing the ways cartridge cases have been identified over the past 35 years, two major weaknesses become apparent. The first is reflected in the reliance on ordnance specialists to identify these artifacts. While there is little doubt that their conclusions are accurate, two issues are raised which must be addressed. The first relates to verification. When caliber designation is the only information about a cartridge case that is reported, a researcher in another place and/or time has no means of verifying that identification. By providing certain diagnostic dimensions (to be discussed in detail later) of the cartridge case this problem can be eliminated. Second, and perhaps more important, is the instructional value of identifications completed by specialists. Reports of these analyses often contain a great deal of data pertaining to the site in question, but they are often of little use to individuals working at other sites who may need basic information applicable to identification of cartridge cases they have recovered. Consequently, in the absence of a specialist, an individual unfamiliar with cartridge cases may encounter significant difficulty identifying them.

The second major weakness is manifested in the terms applied to various parts of cartridge cases. Non-standardization is a fairly common problem. As it relates to cartridge cases it is perfectly illustrated in the reports of archaeological research along the Waurika Pipeline and at the Kiowa and Comanche Indian Agency Commissaries, Fort Sill Oklahoma. The diagnostic dimensions employed in the report of the Waurika Pipeline Project were: head diameter, or the basal portion of the casing opposite the mouth or opening; shoulder diameter, or that portion of the casing immediately above the head; and case length. Terms applied to diagnostic dimensions of cartridge cases recovered at the Kiowa and Comanche Indian Agency Commissary were: head diameter, or the outside base diameter; shoulder diameter, which refers to the casing outside diameter measured immediately above the base; and case length.

In theory, the same diagnostic dimensions are being discussed in both reports. With head diameter and case length it is fairly clear which case dimensions are under consideration. The definitions of shoulder diameter however, are examples of the non-standardization already alluded to. In neither report are the definitions of this term consistent with standard usage in the firearms industry. It is obvious that

in each report, shoulder diameter could apply to different parts of a cartridge case. In the Speer Manual # 10 (1979), the case shoulders are defined as the "sloping or rounded part of a bottle-necked cartridge." Not only are the definitions of this term inconsistent in each report, but both are technically incorrect (Fig. 7).

This discussion has provided a selective review of the methods used to identify cartridge cases during the past 35 years at 12 historic sites across the United States. Several problems that cross-cut the studies conducted at each of these sites are also discussed. In the next section a method of identifying cartridge cases that does not require specialized knowledge will be outlined.

An Improved Method for Identifying Cartridge Cases

In this section a means of identifying cartridge cases will be described that combines the accurate use of standardized terms, and a simple process that can be applied by anyone, regardless of their familiarity with firearms. The method involves comparison of a combination of certain cartridge case diagnostic dimensions with their analogs in manuals published by the firearms industry. Since the process of identifying cartridge cases using this method can be rather tedious, some potential shortcuts are discussed. Recommendations regarding the equipment needed to accurately measure cartridge cases are also provided.

The method advocated here involves reliance on those parts of the cartridge case that are the strongest and most durable, such as the rim and head. By design, these must be heavily constructed to withstand the heavy breech pressure generated by the burning gunpowder. Even the most badly damaged cartridge cases will retain the rim and head shape. In addition to its length, the head and rim measurements of a cartridge case are most reflective of its caliber.

A combination of three diagnostic dimensions, external rim diameter, external case diameter, and cartridge case length can be used to establish cartridge caliber. Some variation in these dimensions, particularly external case diameter and case length, can be expected due to case expansion during firing. Although the dimensions of a cartridge case match closely the chamber of the firearm, they are of necessity slightly smaller. When the cartridge is fired, it expands to fill the space between the outside of the case and the inside of the chamber. This expansion is the cause of case splitting that occurs when a cartridge is discharged in a firearm of larger caliber. That these dimensions differ among cartridge calibers is illustrated in Tables 1 and 2.

External rim diameter is measured across the bottom-most portion of the cartridge case (Figure 8, a). External case diameter is measured immediately above the cartridge rim on rimmed cartridge cases, and immediately above the extraction groove of a rimless cartridge case (Figure 8, b). These two diagnostic dimensions are of singular importance. On most occasions they provide sufficient information for accurate identification.

This should not be taken as an implication that case length is unimportant. Because the upper portions of a cartridge case are less heavily constructed than the lower portions they are quite often damaged or missing. That this measure may be unattainable does not decrease its value. When the entire cartridge case is intact, length can be very important in determining its caliber. The case length measurement is illustrated in Figure 8, c (do not include the bullet in the measurement if it is present). Actual identification of the cartridge case is done by comparing these measurements with their analogs in manuals published by the firearms industry.

Other characteristics of cartridge cases that are important in the identification process include: internal case-neck diameter (Fig. 2:1, 2), case-head type (Fig. 2:5), and head-stamp. I have already indicated that the upper portions of a cartridge case are often damaged or missing. In the event a complete and undamaged cartridge case is recovered, its caliber can be established by measuring the internal diameter of the case neck. Obtaining this dimension is usually very helpful, and sometimes essential, in the identification process. A situation may be encountered where cartridge cases with identical diagnostic dimensions (Fig. 8) are in fact quite different. This is particularly true when dealing with "families" of cartridges. It is not unusual in the firearms industry to modify an existing, or parent, cartridge case to form a new, or offspring, cartridge. Thus families of cartridge cases are created. The .30-06 and .30-30 Winchester are excellent examples of parent cartridges. By simply reducing the diameter of the case neck ("necking down"), the .30-06 has given rise to such popular cartridges as the

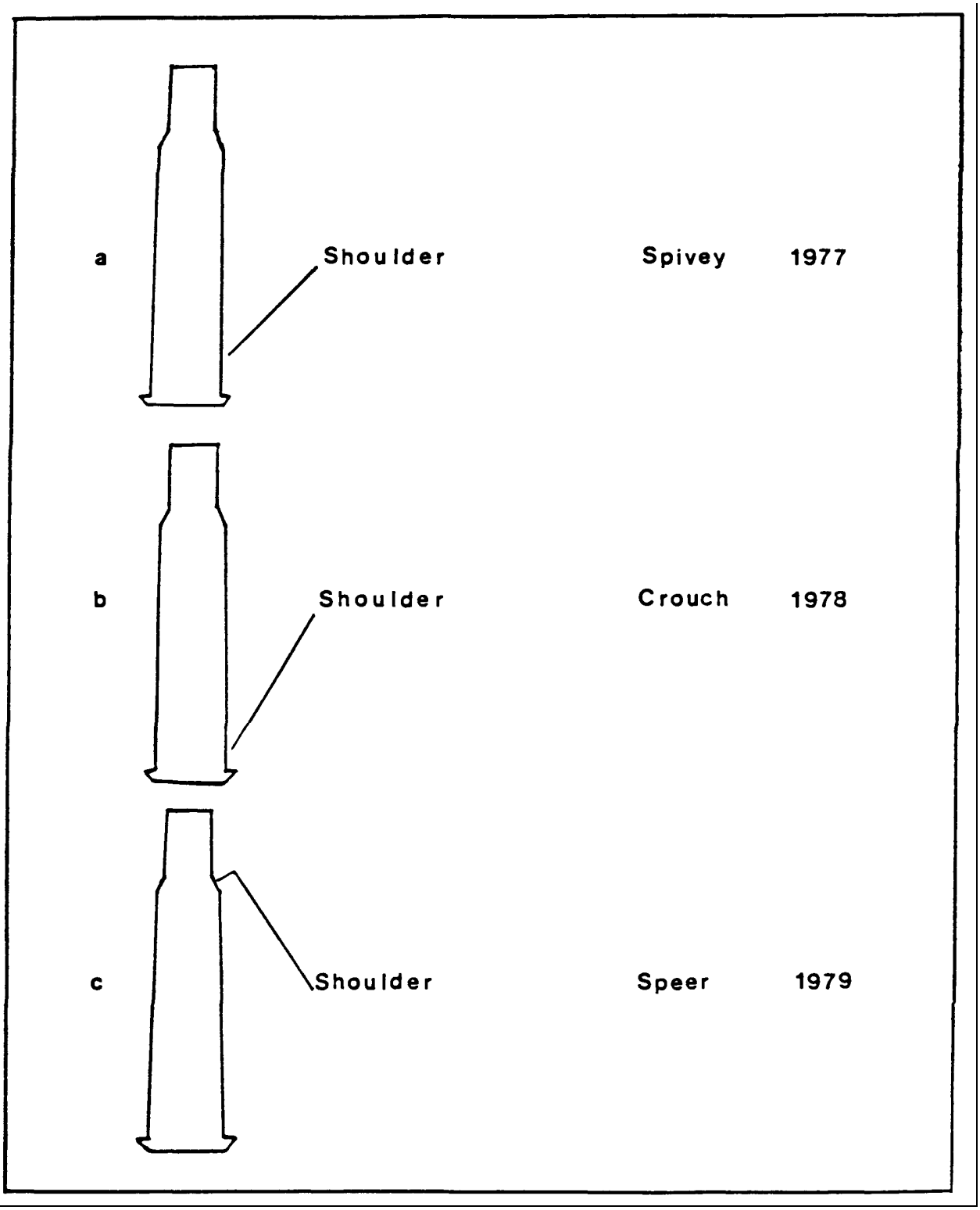

Figure 7. Illustration of Cartridge Case "Shoulders" as defined by: a) Spivey et al. (1977); b) Crouch (1978); and c) Speer (1979).

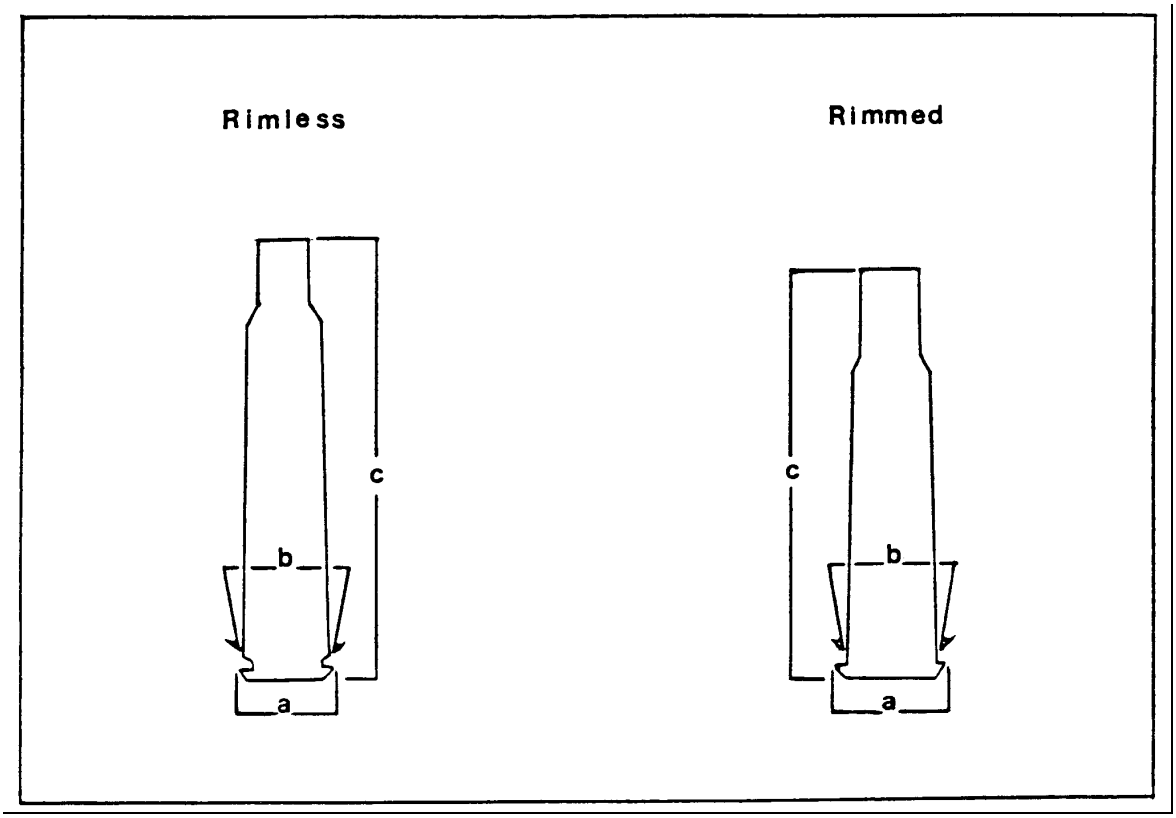

Figure 8. Critical Points for Measurement of Diagnostic Dimensions on Rimless and Rimmed Cartridge Cases: a) External Rim Diameter; b) External Case Diameter: c) Case Length. (Redrawn from Speer 1979:229, 234).

Table 1. Basic diagnostic dimensions for three standard issue U S. military rifle cartridges.

	External Rim Diameter	External Case Diameter	Case Length
.45–70 Springfield	.608″	.505″	2.10″
.30–40 Krag	.545″	.457″	2.31″
.30–06 Springfield	.473″	.470″	2.49″

Table 2. Basic diagnostic dimensions for a small random of non-military cartridges.

	External Rim Diameter	External Case Diameter	Case Length
.243 Winchester	.473″	.470″	2.04″
.30-30 Winchester	.506″	.422″	2.04″
.444 Marlin	.514″	.470″	2.22″

.270 Winchester, .308 Winchester, and .243 Winchester. The external base, and external case diameter of all these cartridges are the same, .473" and .470" respectively. Although the .308 Winchester and .243 Winchester haw similar case lengths, 2.015" and 2.045" respectively, they are much shorter than either the .30-06 (2.494") or .270 (2.540") Winchester. A similar, and perhaps more disturbing, example is

provided by the .30-30 Winchester and the .32 Winchester Special. The diagnostic dimensions for these two cartridge cases are Identical (external base diameter: .506": external case diameter: 422": case length: 2.040"). The principal difference between the .30-30 Winchester and the .32 Winchester Special is the internal case neck diameter (.331" and .331" respectively). When trying to distinguish a .308 Winchester from a .243 Winchester, a .30-06 Springfield from a .270 Winchester, or a .30-30 Winchester from a .32 Winchester Special, internal case neck diameter is critical. Since most reference manuals published by the firearms industry are organized by caliber, using the internal case-neck diameter in this "ay will give an indication of where to look for a cartridge case whose published dimensions match those of the one being identified.

Case-head type is a vital characteristic of any cartridge case. Employing the case-head type simplifies the task of locating the desired cartridge case in the reference manual being used. Isolating cartridge cases with similar case-beads hells reduce the time required to search, page by page, for a cartridge case whose published diagnostic dimensions match those of the one being identified. Another useful aspect of the case-head is the headstamp. The headstamp consists of a series of letters and numerals impressed in the bottom of the case-head. The identity of civilian cartridge cases is usually provided by the headstamp. For example, the headstamp on the .243 Winchester cartridge discussed earlier will read "243 Win". Any difficulty identifying civilian cartridge cases can be resolved by careful examination of the headstamp. Although headstamps on military cartridge cases provide important Information regarding the date and location of manufacture, they do not reveal the identity of the case.

Employing any of the additional cartridge case characteristics reviewed in the preceding discussion will substantially reduce the amount of time required to identify a particular cartridge case. It is important to remember however, that internal-case neck diameter or case-head type is insufficient for complete cartridge identification. Because they do not correlate as closely with caliber designation as the diagnostic dimensions already discussed, internal case-neck diameter, and especially case-head type, must be used in conjunction with external rim diameter, external case diameter, and case length.

The proposed method of identifying cartridge cases can be summarized as follows:

Basic Information:

1) Thoroughly clean the entire cartridge case, making certain that all dirt and corrosion are removed.

2) Measure external rim diameter. This dimension is most important because it is almost always recovered in its original condition.

3) Measure external case diameter. This dimension is second in importance only to external rim diameter. This ranking results from the fact that some cartridge cases are so badly damaged accurate measurement of external case diameter is Impossible.

4) Measure case length. Case length is least important of the three diagnostic dimensions because accurate measurement of it is frequently not possible.

Additional Information

5) Measure internal case-neck diameter if possible.

6) Note case-head type.

Comparison:

Using the information derived from steps one through six, isolate a cartridge case III a standard firearms reference manual (Lewis 1972; Logan 1918; Peterson 1964; Speer 1979; Suydam 1960, 1965a, 1965b, 1965c; White and Munhall 1950, 1963) whose physical configuration matches precisely that of the archaeologically-recovered cartridge case. Some minimal variation in the measured dimensions can be expected. Casehead types must be identical.

This method can be used to identify any cartridge case for which published information exists. Table 3 gives the results obtained when this method was applied to cartridge eases from Fort Niagara and Fort Ontario. Included in the table are diagnostic dimensions of archaeologically-recovered cartridge cases and analogous dimensions from published sources. The mean obtained value of each diagnostic dimension for

Table 3. Comparison of diagnostic dimensions from archaeologically-recovered cartridge cases with analogous published dimensions.

Cartridge Case	External Rim Diameter*	External Case Diameter*	Case Length*	Complete
.30–06 Springfield	.470	.473	2.49	Y
	.472	.470	2.48	Y
	.472	.468	2.47	Y
	.471	.471	2.48	Y
	.472	.470	2.49	Y
	.473	.471	2.18	N
	.470	.470	2.19	N
	.470	.472	1.86	N
	.470	.470	2.48	Y
	.471	.473	2.49	Y
	.469	.470	2.49	Y
	.470	.469	2.49	Y
	.467	.465	2.49	Y
	.471	.467	2.48	Y
	.470	.468	2.49	Y
	.469	.468	2.49	Y
	.471	.471	2.48	Y
	.470	.469	2.49	Y
	.470	.471	2.49	Y
	.470	.472	2.50	Y
	.471	.467	2.50	Y
	.470	.469	2.48	Y
	.472	.473	2.50	Y
	.470	.470	2.48	Y
	.469	.470	2.49	Y
	.472	.468	2.49	Y
	.471	.468	2.49	Y
	.471	.470	2.49	Y
Published Dimension	.473	.470	2.49	–
Mean	.471	.470	2.49**	–
Standard Deviation	0	.008	.006**	–
.308 Winchester	.468	.470	1.99	Y
	.469	.470	2.01	Y
	.468	.472	2.00	Y
	.469	.471	2.01	Y
	.468	.471	2.00	Y
	.470	.468	2.01	Y
	.468	.470	2.01	Y
	.468	.471	2.01	Y
	.469	.471	2.01	Y
	.468	.471	2.01	Y
	.468	.472	2.01	Y
	.470	.472	2.01	Y
	.468	.470	2.01	Y
	.468	.471	2.01	Y
	.468	.470	2.00	Y
	.468	.472	2.01	Y
	.468	.470	2.01	Y
	.468	.472	2.01	Y
	.468	.471	2.01	Y
	.468	.472	2.01	Y
	.469	.470	2.01	Y
	.468	.473	2.01	Y
	.468	.471	2.01	Y

Table 3. Continued.

Cartridge Case	External Rim Diameter*	External Case Diameter*	Case Length*	Complete
.30–06 Springfield	.470	.473	2.49	Y
	.472	.470	2.48	Y
	.472	.468	2.47	Y
	.471	.471	2.48	Y
	.472	.470	2.49	Y
	.473	.471	2.18	N
	.470	.470	2.19	N
	.470	.472	1.86	N
	.470	.470	2.48	Y
	.471	.473	2.49	Y
	.469	.470	2.49	Y
	.470	.469	2.49	Y
	.467	.465	2.49	Y
	.471	.467	2.48	Y
	.470	.468	2.49	Y
	.469	.468	2.49	Y
	.471	.471	2.48	Y
	.470	.469	2.49	Y
	.470	.471	2.49	Y
	.470	.472	2.50	Y
	.471	.467	2.50	Y
	.470	.469	2.48	Y
	.472	.473	2.50	Y
	.470	.470	2.48	Y
	.469	.470	2.49	Y
	.472	.468	2.49	Y
	.471	.468	2.49	Y
	.471	.470	2.49	Y
Published Dimension	.473	.470	2.49	–
Mean	.471	.470	2.49**	–
Standard Deviation	0	.008	.006**	–
.308 Winchester	.468	.470	1.99	Y
	.469	.470	2.01	Y
	.468	.472	2.00	Y
	.469	.471	2.01	Y
	.468	.471	2.00	Y
	.470	.468	2.01	Y
	.468	.470	2.01	Y
	.468	.471	2.01	Y
	.469	.471	2.01	Y
	.468	.471	2.01	Y
	.468	.472	2.01	Y
	.470	.472	2.01	Y
	.468	.470	2.01	Y
	.468	.471	2.01	Y
	.468	.470	2.00	Y
	.468	.472	2.01	Y
	.468	.470	2.01	Y
	.468	.472	2.01	Y
	.468	.471	2.01	Y
	.468	.472	2.01	Y
	.469	.470	2.01	Y
	.468	.473	2.01	Y
	.468	.471	2.01	Y

Table 3. Continued.

Cartridge Case	External Rim Diameter*	External Case Diameter*	Case Length*	Complete
.45 ACP	.482	.490	.890	Y
	.478	.488	.900	Y
	.473	.478	.880	Y
	.475	.482	.670	N
	.471	.480	.890	Y
	.475	.487	.900	Y
	.484	.492	.900	Y
	.475	.480	.790	N
	.480	.489	.750	N
	.475	.481	.890	Y
	.469	.473	.820	N
	.475	.482	.890	Y
Published Dimension	.480	.476	.900	–
Mean	.478	.485	.890**	–
Standard Deviation	.009	0	.030**	–
.38 Special	.440	.377	1.16	Y
	.432	.378	1.06	N
	.432	.377	1.07	N
	.434	.379	1.09	N
	.435	.381	1.15	Y
	.435	.378	1.15	Y
	.433	.379	1.16	Y
	.433	.380	1.15	Y
	.434	.377	1.05	N
	.434	.376	1.10	N
Published Dimension	.440	.379	1.16	–
Mean	.434	.378	1.15**	–
Standard Deviation	0	0	0**	–

* Dimension given in inches
** Includes only intact, undamaged, cartridge cases

the cartridge eases listed in Table :3 showed a direct Pearson-Product correlation (r= 1.0) with the same dimension taken from the Speer Manual #10 (1979).

The close correlation of the observed diagnostic dimensions with their analogs in Speer 1979, and the same narrow range of variation among each type of cartridge in the sample, provides conclusive evidence that the caliber of an archaeologically-recovered cartridge case can be predicted based on measurement of the diagnostic dimensions described earlier.

It should be clear that accurate measurements are absolute prerequisites if this method is to be effectively utilized. The recommended measuring instruments are vernier calipers or micrometers that have a readable scale accurate to 1/1000th of an inch. It is important that measurements be taken in "English" units, because the traditional expression of caliber is in decimals of English units. Use of metric units would necessitate conversion into English units at the comparative stage of this method. This conversion introduces an unnecessary source of potential error.

Throughout this discussion the use of these measurements in combination has been stressed. This practice helps eliminate the possibility of erroneous identification in the unlikely event that one, or even

two, measurements are the same for different cartridges. Were such a situation to occur, the third dimension would point to the true identity of the cartridge case.

This section has been devoted to discussion of a method of identifying cartridge cases that can be applied by anyone, regardless of their familiarity with firearms. Several cartridge case diagnostic dimensions are defined, and their role in the identification process is described. In addition, some shortcuts are provided that should reduce the amount of time required to identify a particular cartridge case. Recommendations regarding the equipment needed to accurately measure cartridge cases are also provided.

BULLETS

Traditionally, bullets whose caliber could not be determined by simple measurement were either eliminated from further analysis, or their identity was guessed at. The weight characteristic alluded to earlier suggests a method for identifying deformed bullets that implies this need not be the case. After a brief discussion of the role bullets can play in archaeological interpretation this method will be described in detail. The following discussion is provided to illustrate the widespread nature of the problem presented by deformed bullets. Methods used to identify archaeologically-recovered bullets from the following sites were examined: Kipp's Trading Post; Fort Michilimackinac; Fort Stanwix; sites along the Waurika Pipeline (the Fort Sill Dump Site, Mathewson House Site, and Mathewson Store Site); and the Kiowa and Comanche Indian Agency Commissaries.

A Selected Review of Methods Used to Identify Bullets

Like other sites examined by the Inter-Agency Archaeological Salvage Program discussed earlier, archaeological investigations at Kipp's Trading Post were undertaken in response to the threat of inundation from reservoirs created pursuant to the Flood Control Act of 1944. Kipp's Post was constructed at the mouth of the White Earth River in North Dakota, in the fall and winter of 1826-27 (Fig. 4). This work was supervised by James Kipp, for whom the post was named, a representative of the Columbia Fur Trading Company. Kipp's Trading Post "was abandoned in 1829 or 1830" (Woolworth and Wood 1960:255).

Twenty-two bullets, from .47 to .58 caliber, were recovered. Of these, only six were in perfect condition. Twelve were cast in a poorly adjusted mold resulting in misalignment of the bullet's hemispheres. One was crushed, either through firing or some other shape-altering event. Less than one-half of the sample could be identified by measuring bullet diameter. The remaining 13 were identified in a way that appears to be little more than an educated guess ",.all of the imperfect specimens resemble those in the .545 to .566 group" (Woolworth and Wood 1960:268).

Fort Michilimackinac was constructed on the Straits of Mackinac in northern Michigan (Fig. 9), some time between 1715 and 1720 by the French. It was turned over to the British by treaty in 1761 (Maxwell and Binford 1961:10, 13). The only military action at the Fort occurred in 1763, during Pontiac's Rebellion. By a clever ruse, Chippewa and Sac Indians gained entry into the stockade and massacred the British garrison (Eckert 1970:304-311). Fort Michilimackinac was abandoned in c. 1781. The archaeology program at Fort Michilimackinac represented the initial phase of a project that would lead to complete and accurate reconstruction of a frontier post that was vital to the western fur trade in the eighteenth century.

Three-hundred and sixteen bullets were recovered during the 1959 field season. To obtain caliber designations "..we measured the diameter of all the musket balls" (Maxwell and Binford 1961: 107). The range of variation was from .20" to .72". Two-hundred and seventy-four are identified by caliber, the remaining 42 are not discussed. The reader is left with the burden of explaining the absence of 13% of the bullet sample. These bullets may have been eliminated because they were perceived as being unidentifiable. The authors indicate that the results of their analyses were not what was expected. Had the unaccounted for bullets been included in the sample, their results might have conformed with predictions.

Fort Stanwix was constructed near the west end of the Mohawk River Valley, in present day Rome, New York (Fig. 9). It played a major role in the American colonies' successful struggle for independence.

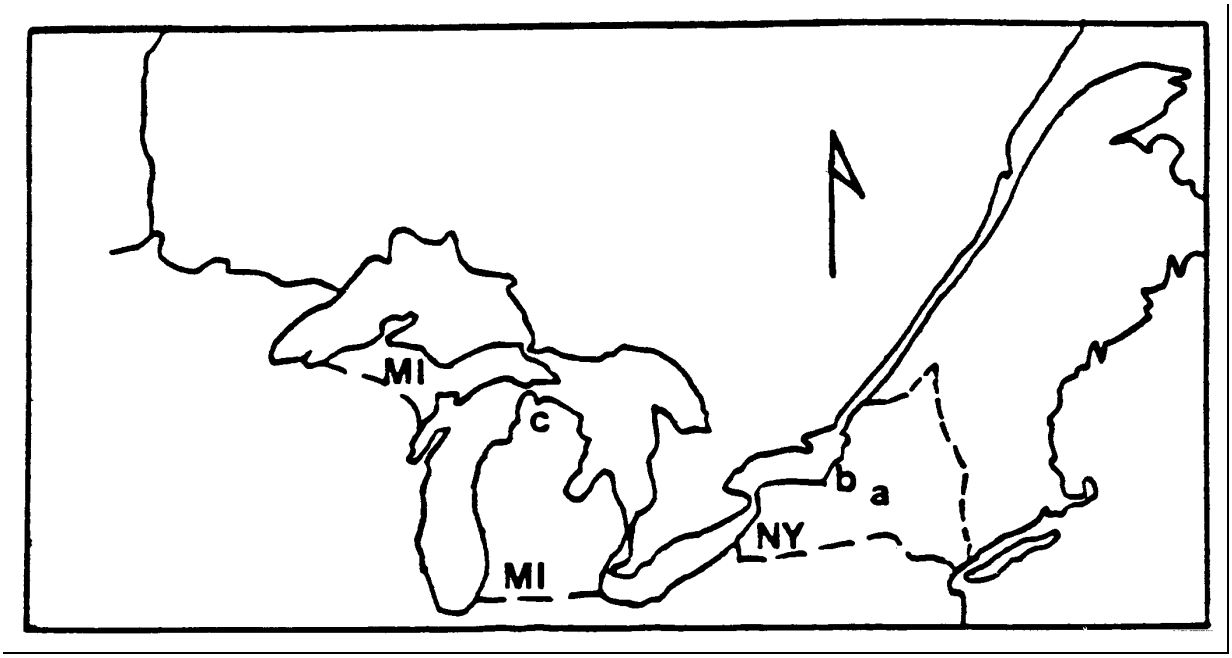

Figure 9. Location of: a) Fort Stanwix; b) Fort Ontario; and c) Fort Michilimackinac. (Redrawn from Eckert 1970:90).

By preventing the western element of General Burgoyne's three pronged plan for bisecting the colonies from proceeding down the Mohawk Valley, the British attempt to divide the colonies failed. Fort Stanwix was abandoned in 1781. Archaeology at this site was undertaken as part of an urban renewal project "encompassing 12 city blocks in downtown Rome" (Hanson and Hsu 1975:1).

One-thousand and eight bullets were recovered at Fort Stanwix ranging in size from .47" to .75". Five-hundred and seven of these were .69", making that size the most numerous. Three-hundred and forty-eight exhibited damage from being chewed, fired, miscast, or were otherwise mutilated. There is no indication of how these were identified by caliber. Another part of the analysis shows the spatial distribution of bullets by caliber. Sixty-seven of the 1,008 bullets recovered were not identified by caliber.

Two-hundred and forty-one deformed bullets are identified by caliber and are included in the aforementioned spatial analysis. There is no discussion of the methods used to ascertain the caliber designation of these bullets. If primary reliance was placed on measurements of post-mutilation diameter, the conclusions are subject to significant error because any change in diameter results in a proportional change in caliber.

The reported results of archaeological investigations along the Waurika Pipeline (Spivey et al. 1977) and the Kiowa and Comanche Indian Agency Commissaries include weight in the description of archaeologically-recovered bullets. It is not clear from these reports if this second diagnostic dimension was associated with bullet diameter to establish a caliber designation. The inclusion of weight in published descriptions makes these reports significant because they are among the earliest to do so.

Before continuing, the role bullets can play in the archaeological interpretation of historic sites should be discussed. If utilized effectively bullets can provide an indication of site function, and be reliable horizon markers. This is particularly true if the site under consideration was a military post. Research conducted at Michilimackinac provides an example of the ways archaeologically-recovered bullets can substantiate or contradict written history. You will recall that Michilimackinac was constructed by the French between 1715 and 1720, and turned over to the British in 1761. It was, and still is, the habit of independent countries to standardize their military equipment. Of primary relevance here is the caliber of standard issue French and British muskets. Although there was minor variation in bore diameter, the French musket was .69 caliber and the British musket was .75 caliber. Operating under the assumption that only the French and British military occupations would be reflected, the researchers expected a

bi-modal distribution with peaks at or near .69" and .75". Surprisingly the distribution was uni-modal with a peak at .57" (Maxwell and Binford 1961:107).

These results suggest bullets are not reliable for archaeological interpretation. The variance of actual results from expected results may be explained by the sampling error alluded to earlier, or factors that contributed to the archaeological assemblage at Michilimackinac and the assumptions upon which its analysis was based. The assumption that .69 and .75 caliber bullets would be most numerous in the bullet sample does not take into consideration the continuous civilian presence at Michilimackinac. While it was garrisoned by French and then British troops, the Fort functioned as a main post in the western fur trade. The weapons used by trappers and traders did not necessarily conform to French and British military specifications for small arms. An analysis of firearms used in the western fur trade during the seventeenth and eighteenth centuries indicates that the majority ranged from .50 to .62 caliber (Hamilton 1968). This information indicates that the distributional analysis of bullets from Michilimackinac was not a failure. Even though it did not reflect the national succession that occurred in 176 1, it did reflect the importance of trading activities and the homogenizing effect the civilian presence may have had on the archaeological assemblage.

The potential importance of information gleaned from bullets indicates that they should be utilized more effectively than in the past. This cannot be done if significant portions of the bullet sample are deformed to the extent that they are unidentifiable. Using the weight characteristic discussed earlier a method, whereby bullets barely recognizable as such can be accurately identified, will be outlined in the following section.

A Method for Identifying Deformed Bullets

Considering the potential contribution of information derived from the analysis of bullets to archaeological interpretation, every attempt should be made to identify as many bullets in the assemblage as is possible. In the following discussion two methods of identifying deformed bullets will be reviewed. The first, based on the weight characteristic, was evaluated in an experiment using three different muzzle loading firearms of three different calibers. The second is based on deformation patterns observed during the shooting phase of the experiment.

It was hypothesized that, since bullets have caliber specific weights, the original diameter (its caliber) of a bullet could be predicted based on its post-deformation weight. To test this hypothesis an experiment was conducted that involved systematic firing and recovery of bullets of three different calibers. Each bullet was weighed before firing.

Bullets were fired into a bullet trap, a wooden box 18" x 18" x 18", filled with soft alluvial soil. One-half inch thick steel plates were placed in the trap, parallel to its front (target) side, for trials eight through fifteen. This was done to introduce some variability into the observed deformation patterns. The position of the steel plate was changed after each trial.

The three firearms used in this experiment were a .75 caliber "Brown Bess" musket, a .45 caliber "Kentucky-style" rifle, and a .58 caliber 1863 Springfield rifled musket. The powder charge used in each was equivalent to what might have been used in it during the eighteenth and/or nineteenth century. A typical powder charge for a "Brown Bess" musket in the eighteenth century was 80-100 grains of black powder, 60 grains of black powder for a nineteenth century .58 caliber rifled musket, and 60-70 grains of black powder for "Kentucky-style" rifles used in the eighteenth and nineteenth century. For this experiment I used a 90 grain charge in the "Brown Bess" musket, a 60 grain charge in the .58 caliber rifled musket, and a 60 grain charge in the "Kentucky-style" rifle (Nonte 1976). All shooting was done at a range of 30 yards.

The shooting test was conducted without incident except for the "Brown Bess" musket. With the original 90 grain charge, the .75 caliber bullets passed entirely through the bullet trap, and were not recovered. To correct this situation two changes were made. First, the powder charge was reduced to 80 grains; and second, the steel plates were set in the bullet trap for all fifteen trials. These modifications successfully solved the problem.

After each bullet was recovered it was thoroughly washed and weighed. To ensure accurate weight measurement, scales were recalibrated after each bullet was weighed. Three different types of cross-sectional deformation were observed: oblong, hemispherical, and flat. The maximum and

minimum diameter was recorded for each bullet. In most cases, the axis of maximum diameter was perpendicular to the axis of minimum diameter. Pre-firing and post-firing weights, and the pre-firing and post-firing diameter are provided in Tables 4a and 4b. Also in Table 4a is the type of deformation observed in each trial, and an indication of whether or not the bullet in each trial struck the steel plate insert.

Post-firing analysis of the bullets revealed close correlation (Pearson-Product) between pre and post-firing weight. and between pre-firing diameter and mean post-firing diameter. Pre-firing weights of bullets from each caliber exhibited a very narrow range of variation. With the exception of the .75 caliber bullets, the post-firing range of variation was not significantly greater. Weight variance among the .75 Caliber bullets can be attributed to the incomplete recovery of three bullets (#'s 3, 9, and 14 in Table 4a). If these are not included in calculation of mean weight and standard deviation, the mean post-firing weight jumps from 504 grains to a much more acceptable 535 grains. Similarly the standard deviation is reduced from 98.36 grains to 3.87 grains, a figure that is consistent with results obtained from .45 and .58 caliber bullets.

The observed deformation patterns were directly related to the relative position of the steel plate inserts. Oblong deformation was produced when bullets struck only the alluvial fill used in the bullet trap. Hemispherical and flat patterns were produced when the steel plates were placed in intermediate positions inside the bullet trap. Placement of the steel plates nine to fifteen inches from the front, or target, side of the bullet trap produced hemispherical deformation. Flat deformation resulted from placement of the steel plates three to eight inches from the front side of the bullet trap.

Analysis of the deformation patterns obtained in this experiment led to formulation of a second method of identifying deformed bullets. It was discovered that averaging the maximum and minimum diameter of each bullet resulted in a figure only marginally different from its original diameter. The range of means was .42" to .58" among .45 caliber bullets, .54” to .74" among .58 caliber bullets, and .70" to .80"' among .75 caliber bullets. The average of the means for .45 caliber bullets was .46", with no significant deviation; .59" with a deviation of .06" for .58 caliber bullets; and .74" with a deviation of .03" for .75 caliber bullets.

It is clear from the analysis of these results that post-firing weight and mean post-firing diameter can be used to accurately predict the original diameter (caliber) of a deformed bullet. When the pre-firing and post-firing correlation coefficient (Pearson Product) was calculated for weight it equaled .94. Similarly, the correlation coefficient of post-firing mean diameter and pre-firing diameter was .93.

The true significance of these conclusions lies in the applicability of the method to bullet deformation without regard to the source of deformation. I selected bullets deformed by shooting because it was the most expedient "ay of gathering relevant data in a controlled situation. As long as a deformed bullet is recovered in its entirety, its original diameter can be accurately predicted based on its post-deformation weight or post-deformation mean diameter.

The foregoing discussion has been concerned with a historical review of methods used to identify bullets, suggestions regarding the potential utility of bullets in the archaeological interpretation of historic sites, and the formulation and evaluation of methods that can be used to identify deformed bullets. Bullets that would otherwise be eliminated from the bullet assemblage, and not considered in the analysis or interpretation of an historic site. The methods outlined will hopefully lead to more effective utilization of a type of artifact often recovered at historic sites.

CONCLUSION

In this research I have attempted to do two things: review the methods used to identify small arms ordnance material in the recent past and to point out the problems inherent in them; and to present methods that address and resolve those problems. I think that I have achieved both of these goals.

Identification of cartridge cases can be completed by a novice armed only with an accurate measuring instrument, such as a vernier caliper or micrometer, and a reliable reference manual. Using this method is educational in the sense that anyone using it on a regular basis will become an “expert" in their own right. It also promotes the scientific method in historical archaeology by encouraging publication of data

Table 4a. Pre- and Post-firing bullet weight for each trial.

Caliber	Trial #	Before*	After*	Deformation
.45	1	128	128	Oblong
	2	128	128	Oblong
	3	127	128	Oblong
	4	129	127	Oblong
	5	128	127	Oblong
	6	128	126	Hemis.
	7	128	126	Oblong
	8	128	124	Hemis.
	9	129	127	Hemis.
	10	128	125	Oblong
	11	128	118	Flat
	12	128	126	Oblong
	13	128	126	Oblong
	14	128	125	Hemis.
	15	128	126	Oblong
Mean		128.1	125.8	–
Standard Deviation		.46	2.46	–
.58	1	287	287	Oblong
	2	284	284	Oblong
	3	284	284	Oblong
	4	285	285	Oblong
	5	285	285	Oblong
	6	286	286	Oblong
	7	283	282	Oblong
	8	287	284	Hemis.
	9	284	284	Oblong
	10	284	285	Oblong
	11	284	282	Hemis.
	12	286	281	Flat
	13	287	285	Hemis.
	14	286	285	Hemis.
	15	289	285	Hemis.
Mean		285.4	284.3	–
Standard Deviation		1.64	1.58	–
.75	1	545	542	Oblong
	2	551	539	Oblong
	3	546	155	Flat
	4	548	532	Hemis.
	5	548	532	Hemis.
	6	549	534	Hemis.
	7	546	535	Hemis.
	8	546	535	Oblong
	9	545	517	Oblong
	10	546	531	Hemis.
	11	549	531	Hemis.
	12	549	534	Hemis.
	13	548	463	Hemis.
	14	545	542	Oblong
	15	549	535	Oblong
Mean		547	504	–
Standard Deviation		1.87	98.36	–

* Weight given in grains

Table 4b. Pre- and Post-firing bullet diameter for each trial.

Caliber	Trial #	Before*	After Max.*	After Min.*	After Mean	Contact Insert
.45	1	.44	.61	.31	.46	N
	2	.44	.56	.28	.42	N
	3	.44	.54	.32	.43	N
	4	.44	.58	.31	.45	N
	5	.44	.58	.29	.44	N
	6	.44	.65	.26	.46	N
	7	.44	.56	.29	.43	N
	8	.44	.84	.16	.50	Y
	9	.44	.71	.19	.45	Y
	10	.44	.56	.31	.44	N
	11	.44	1.04	.11	.58	Y
	12	.44	.66	.28	.47	Y
	13	.44	.67	.23	.45	N
	14	.44	.84	.16	.50	Y
	15	.44	.57	.32	.45	N
Mean		.44	.63	.29	.46	–
Standard Deviation		–	.22	.06	0	–
.58	1	.58	.63	.50	.58	N
	2	.58	.60	.54	.57	N
	3	.57	.63	.48	.56	N
	4	.58	.60	.52	.56	N
	5	.58	.60	.51	.56	N
	6	.58	.62	.51	.57	N
	7	.58	.60	.53	.57	N
	8	.58	.82	.34	.58	Y
	9	.58	.62	.50	.56	N
	10	.58	.60	.52	.56	N
	11	.58	1.23	.25	.74	Y
	12	.58	1.30	.16	.73	Y
	13	.58	.63	.44	.54	Y
	14	.58	.78	.36	.57	Y
	15	.58	.94	.32	.63	Y
Mean		.58	.75	.43	.59	–
Standard Deviation		0	.23	.12	.06	–
.75	1	.72	.74	.68	.71	N
	2	.72	.72	.70	.71	N
	3	.72	1.30	.18	.74	Y
	4	.71	1.18	.42	.80	Y
	5	.72	.99	.48	.73	Y
	6	.72	1.20	.36	.78	Y
	7	.72	.90	.59	.74	Y
	8	.72	.72	.70	.71	N
	9	.71	.74	.66	.70	Y
	10	.71	1.10	.46	.78	Y
	11	.72	1.07	.47	.77	Y
	12	.72	1.13	.38	.75	Y
	13	.72	.80	.65	.72	Y
	14	.71	.72	.71	.72	N
	15	.72	.72	.70	.71	N
Mean		.72	.94	.54	.74	–
Standard Deviation		0	.27	.16	.03	–

* Dimensions given in inches

diagnostic dimensions) heretofore deemed less important than they really are. Similarly, publication of diagnostic dimensions provides a basis upon which to challenge identifications, or conclusions based oil those identifications, that are reached by others. The methods outlined for identifying deformed bullets are significant for the same reasons, in addition to allowing complete, high quality, analysis of all bullets regardless of their condition.

At this time a brief word about the studies that formed the historical background for my research is in order. None of the researchers involved in the studies I examined can be faulted for using the methods they did. They were using the best techniques available to them. My point is that methods are now available, that permit anyone to complete the identification of small arms ordnance material, 1 have discussed each of them in detail.

The following section is a glossary that is provided to clear tip any lingering confusion about certain terms or the way they are used.

I hope this manual will prove useful to anyone choosing to use it.

Note: The author and the editors would like to thank H.J. Swinney, retired Director of the Margaret Woodbury Strong Museum in Rochester, for his helpful comments oil the manuscript. The author won]d like to thank Dr. Stuart Scott and Patricia K. Scott for making the materials recovered at Fort Niagara and Fort Ontario readily available for analysis. Their cooperation has been great appreciated.

GLOSSARY OF SELECTED TERMS

Bore: the inside of the barrel of a gun of any kind.

Brass: a term often applied to empty cartridge cases. An alloy of copper and zinc of which cartridge cases are usually made. See "cartridge case."

Breech: the part of a firearm at the rear of the bore. Breechloader: a firearm that receives its ammunition at the breech.

Breech Pressure: the pressure exerted by a burning charge of powder in the breech of a gun.

Caliber: refers to the diameter of a projectile, or the bore diameter of a gun, expressed (in English) in decimals of an inch. Frequently compounded to indicate powder charge; to show case length; or to show proprietor or designer e.g. 30/40 Krag, .30-06, 8 x 57 min, .375 Holland & Holland, or .257 Roberts.

Cartridge: a complete unit of ammunition assembled i.e.: case, propellant, powder, printer, and bullet. Usually applied only to rifle and pistol ammunition, but occasionally to shot shells.

Cartridge Case: the paper, metal, or plastic container which bolds all other components of a round of ammunition. Sometimes called "bull" or "shell'". See also "brass".

Centerfire: refers to centrally located primer in base of metallic cartridges.

Chamber: that part of a firearm which holds the charge.

Diagnostic Dimension: measure of some physical configuration of an artifact that reflects its identity.

Extractor: the part of a breech loading gun that withdraws the cartridge case from the chamber.

Grain (s): in weight measure 7,000 grains equal one pound; 437.5 grains equal one ounce.

Gauge: the size of a shotgun bore determined by the number of spherical balls of bore size which comprise one pound of lead.

Gun: a weapon consisting of a tube of metal (barrel), fixed in a stock from which projectiles are fired by the force of an explosive (gunpowder).

Musket: a smoothbore, long-barreled hand-held firearm, used especially by infantry soldiers before the invention of the rifle.

Muzzle: the front end of a barrel. The point at which a projectile leaves the barrel.

Muzzleloader: any firearm that must be loaded through the front end of the barrel.

Primer: in a centerfire cartridge it is the small metal cup containing a detonating mixture which is used to ignite the propellant powder: in rimfire cartridges the priming mixture is contained within the rim of the case.

Projectile: a bullet, or any other object projected by force and continuing in motion by its own inertia.

Rifle: any firearm whose barrel has rifling in it. See "rifling".
Rifling: parallel spiral grooves cut or impressed into the bore of rifles and pistols in order to make the bullets spin, insuring steady, point on, flight to the target.
Rifled Musket: firearm having only three rifling grooves cut into the bore, instead of the usual six to eight found in rifles.
Rimfire: cartridges which contain the priming mixture within the rim of the cartridge case.

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MINUTES OF THE 70TH ANNUAL MEETING
NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION FOR 1986
HOLIDAY INN, MIDDLETOWN NY 10940 APRIL 11, 12, 13, 1986

EXECUTIVE COMMITTEE MEETING

The meeting of the Executive Committee of the New York State Archaeological Association was held on Friday, April 11, 1986 at the Holiday Inn of Middletown, New York. President Gordon C. DeAngelo called the meeting to order at 7:57 P.M. After a brief opening address, the Secretary was directed to call the roll. The following voting members, including state officers, chapter presidents and secretaries or their alternates were present:

President: Gordon C. DeAngelo
Vice-President: Richard McCracken (alternate)
Secretary: John H. McCashion
Treasurer: Carolyn O. Weatherwax

Auringer-Seelye Chapter:
President: Louise Basa (alternate)
Secretary: Carolyn Weatherwax (alternate)
William Beauchamp Chapter:
President: Gordon C. DeAngelo (alternate)
Secretary:
Chenango Chapter:
President: Richard Bennett (alternate)
Secretary: Monte Bennett (alternate)
Frederick M. Houghton Chapter:
President: Dolores Lalock (alternate)
Secretary: Elaine Herold
Incorporated Long Island Chapter:
President: Walter Smith
Secretary: David Elliston (alternate)
Incorporated Orange County Chapter:
President: Tom Brannan
Secretary: Bill Ehlers
Lewis Henry Morgan Chapter:
President: Charles F. Hayes III
Secretary: Annette Nohe
Louis A. Brennan Lower Hudson Chapter:
President: Stuart Fiedel
Secretary: Geary Zern (alternate)
Metropolitan Chapter:
President: Ralph Solecki (alternate)
Secretary:
Mid-Hudson Chapter:
President: A1 Wanzer (alternate)
Secretary: Rosalind Stark
Triple Cities Chapter:
President: Richard Jackson
Secretary: Dolores Elliott
Incorporated Upper Susquehanna Chapter:
President: Helen Gutierrez
Secretary: Ruth Wakeman
Van Epps-Hartley Chapter:
President: Kingston Larner
Secretary: Don Rumrill (alternate)

Committee Chairpersons

1. Awards and Fellowships:	Peter P. Pratt
2. Chapters and Memberships	John H. McCashion (alternate)
3. Constitution:	Richard McCracken (alternate)
4. Finance:	John H. McCashion
5. Legislative:	Gordon C. DeAngelo (alternate)
6. Nominating:	Richard Bennett
7. Local Program:	Gordon C. DeAngelo
8. NYSAA/NYAC Liaison:	Dolores Elliott
9. Public Archaeology:	Dolores Elliott
10. Publications:	Reverend John R. Lee
11. NYSAA Editor:	Charles F. Hayes III
12. ESAF Representative:	Roberta Wingerson

Roll call having been taken and the required quorum (11) being present, the next order of business called for the reading of the previous Executive Committee Minutes from the 1985 NYSAA annual meeting at Oneonta, New York. Since these had been previously printed and mailed to the Executive Committee between May 22 and 28, 1985, Richard Jackson made the motion to suspend the reading of the minutes and accept them as printed. Kingston Larner seconded the motion which went to the floor and was accepted unanimously. The Executive Committee then proceeded to the next order of business.

Report of the Officers

President: Gordon C. DeAngelo gave the following report: The past two years of our tenure have been a mixture of "highs" and "lows".

During the past few years we seem to have lost an inordinate number of long time friends and members. Their contributions to New York State archaeology and the internal workings of this organization will be sorely missed.

Our attempt to provide a monthly newsletter (The Backfill) including meeting/conference notices, new publication announcements and technical data was discontinued after three issues (May, June, July, 1984). The primary problem was the inability of many Chapters to get copies to their members. Thus the limited distribution did not appear to serve the membership. The $4.00/month mailing costs were subsidized by one of our members.

The Chapter Survey sent with The Backfill was intended to collect data relating to the operations and problems of the Chapters. The response of 10 out of 13 chapters was analyzed and reported at the 1985 Annual Meeting in Oneonta and published in Bulletin 91.

The following revised percentages represent degrees of concern to the chapters:

1.	Important collections that may be lost from the local area	91%
2.	Uncatalogued collections	85%
3.	Getting programs for chapter meetings	82%
4.	Getting new members	80%
5.	No contact with the Association between annual meetings	55%
6.	Raising money for chapter projects, publications and other obligations	49%
7.	Professional/Amateur relations	32%
8.	Contents of NYSAA Journal/Bulletin	31%
9.	Other concerns	21%

The above figures were based on 10 chapters (144 individuals present) responding.

We feel that the above data represent more than an academic exercise, and we would respectfully submit that these concerns be addressed under the leadership of our incoming officers.

During the past several years we have been concerned with the possible loss of the Incorporated Long Island Chapter. Since Long Island together with the Morgan and Van Epps-Hartley Chapters constitute the three remaining chapters of 1916, we felt that our loss would be symbolic as well as physical. Fortunately, they are still with us although in reduced numbers. For this we are thankful and trust that we will someday be able to attend another Long Island Annual Meeting as delightful as the one at Southold in 1977. This spring we almost did not have our 70th Annual Meeting. Although this was our responsibility, it was complicated by both the past gerrymandering of New York State and our inability to secure an invitation at the 1985 executive and business meeting.

We are here today primarily due to John McCashion, who made our plight known to the chapters with a letter of beautifully "controlled hysteria" and to the incorporated Orange County Chapter who "picked up the gauntlet", and met the challenge within a remarkably short lead time. We thank you all.

Thanks are also due to our speakers who also responded on short notice in order

to allow us to present this year's program. As an aside, after organizing the programs in four of the last six years, we feel we have called in all our "markers" and gratefully pass on that pleasure to others.

With regard to the location of future meetings, we would suggest that the organization consider the abandonment of the gerrymandering as a rigid guide and consider invitations from all localities. We also believe that the location of next year's meeting should be reasonably certain before the adjournment of the Executive Committee Meeting - or at least by the end of the weekend. It should also be noted that the sharing of responsibilities between smaller chapters (facilities/program) has been successful in the past.

We have on final observation on the future of archaeological preservation and the NYSAA. During the past two years your organization, in conjunction with the William M. Beauchamp Chapter, has attempted to involve ourselves in the review and preservation of archaeological sites through rules and regulations promulgated under the New York State Quality Review Act (SEQRA).

Acting as an early warning system, an advisory source to lead agencies and, on occasion, as an adversary, we have been instrumental in the following actions:

l. Causing the prehistoric Robinson Site (Brewerton, NY) to be added to the National Register.

2. Causing a Phase II cultural resource survey to be done on a potential prehistoric site.

3. Causing a topsoil stripping operation to halt pending a cultural resource survey.

4. Causing two subdivisions on known archaeological sites to be considered for cultural resource surveys.

5. Causing a cultural resource survey to be done on a major extractive industry site.

While, at first, our position was adversarial, by cooperation with both Onondaga County and some of the Towns (lead agencies) we have established a reputation as a reasonable organization able to provide information to aid in meeting SEQRA requirements.

We feel that this type of approach can make a major statewide impact on the identification and preservation of our prehistoric and historic resources.

While the professional archaeologist conducting cultural resource surveys is often put in a possible conflict of interest situation at public meetings, our avocational members are not so burdened. In addition, local members may also be residents of the area and thus be known to local officials as reasonable individuals-and voters. In one town in Onondaga County, we have located a member of the Environmental Advisory Committee who wishes to join NYSAA.

In view of the increasing construction activity falling under the control of SEQRA (as well as the 1969 National Environmental Policy Act and the 1980 State Historic Preservation Act), we would suggest the following:

l. That NYSAA avocational members participate in local hearings and/or seek membership on local Planning Boards or Environmental Advisory Committees.

2. That Chapters develop contacts with local planning groups, offering early warning information in order to avoid last minute problems.

3. That the Executive Committee provide guidelines and examples of letters that reflect professionalism in NYSAA contacts with various lead agencies.

4. That the Executive Committee develop a form that can be filled out by the local Chapters containing the data necessary foe the President to draft a letter supporting the Chapters' concerns.

In summary, it has been our experience that the loss of many of our prehistoric and historic sites has been due to lack of knowledge and communication. NYSAA members possess the knowledge-we think it is time we communicated our concerns."

The President's report was accepted as read.

Vice-President: Due to the absence of Charles E. Gillette, no report was given.

Secretary: John H. McCashion gave the Secretary's report: We wish to welcome several new chapter secretaries to NYSAA; Gail Merian serving Chenango chapter; old time acquaintance Harold Zoch, serving Van Epps-Hartley chapter; Dr. Elaine Herold, serving Houghton chapter and Annette Nohe serving the Morgan chapter. Our deepest appreciation and heartfelt thanks go out to Kingston Larner, Robert Gorall, Vivian Cody and, sadly, Earla Burton whom we shall never forget.

Therefore, enclosed in the chapter and officer packets will be found one copy of the Constitution and a copy of the old blue Informational Handbook, both of which contain sufficient information to conduct the new secretarial positions.

Also, find one copy of the proposed agenda, a copy of the 1985 NYSAA complement, the Annual Reports of the Chapters most of which finally arrived and courtesy of the U.S. Postal Service (the safest way to send valuable mail) a copy of the brochure, Mailer's Guide.

With me are plenty of membership cards and membership forms for those running short. Those who are not versed in secretarial procedures or whose stocks are running short can see me immediately following this meeting.

Concerning the membership of the Association, 1985 ended with 646 memberships or a total of 789 members. 1984 ended with 704 memberships or 981 total members. Due to the adjustments in the Incorporated Long Island Chapter we experienced a decrease of 52 memberships and a total of 192 members. At present, our complement remains at 464 memberships and 518 total members. In 1985, Long Island memberships dropped to 56 with members totaling 68 and at present their membership total is at 43 with total members at 55.

According to our treasurer, we are still fiscally healthy and there are no proposals to raise the dues.

With regards to this office, the first large mailings began on May 22, 1985. Contained within were the flyers for Gil Hagerty's important volume (still not published), Dean Snow's project, four copies of the Executive Committee reports and the cover letter. This distribution was completed May 29, 1985. Very active correspondence continued until November 16, 1985 when the second large mailing took place. Included were the newsletters and the 1986 white membership cards.

The largest and final mailing, consisting of the cover letter Ballots and final notices for this meeting were dispatched between February 10 and 19, 1986. Packages were sent to members-at-large, chapter secretaries, individual officers and all concerned.

Expenses for this office for fiscal year 1985 totaled $300.00.

Richard Bennett made the motion that the Secretary's report be accepted, Dr. Larner seconded it and the report was approved by the membership.

Treasurer: Carolyn Weatherwax gave the Treasurer's report: With two Bulletins and Journals being published yearly at a cost of about $3000.00 apiece, we have also received a bill for another. There is about $4300.00 in the checking account which will have to be used for this Bulletin. We have had to borrow about $1000.00 from our saving account to pay Braun-Brumfield. We still have $4,322.21 as a total for the fiscal year.

President DeAngelo opened the Treasurer's report for discussion and as there was none asked for a motion to accept the report as printed. Richard McCracken made the motion which was seconded by Herb Kraft and was accepted unanimously.

Committee Reports

Awards and Fellowships: Dr. Peter P. Pratt reported that the awards and fellowship committee had met and the presentations would be deferred until the banquet. Accepted; deferred.

Chapters and Memberships: In lieu of Gloria Miller, John H. McCashion gave the membership condition report which he included in the Secretary's Report. Report was previously accepted.

Constitution: Due to the absence of Charles E. Gillette there was no report.

April 8, 1986
NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION
REPORT OF THE TREASURER

Adirondack Trust Co.

3/29/85		4/08/86		
MMDA #7922385	$12,349.00	Int. 4/01/85–3/31/86	$849.36	$12,198.46
(−$1,000.00 to Acc't. #2945406 8/14/85)		Int. 4/30/85–4/03/86	84.86	4,322.21
NOW Acc't. #2945406	4,182.84	(Now) TOTAL ASSETS		$16,520.67

CASH RECEIPTS '85–'86	
Dues	4,639.08
Publication Sales	667.53
Int. NOW Acc't #2745406	84.86
TOTAL CASH REC.	5,391.47

DISBURSEMENTS '85–'86	
1985 ESAF Dues	138.00
Bulletin #89	2,920.08
Bulletin #90	2,766.95
Storage Neg. Flats	111.00
Secretarial Exp.	300.00
RMSC Postage, etc.	6.07
TOTAL DISBURSEMENTS	6,242.10

Total Receipts '85–'86	5,391.47
Bal. Ck. Acc't (4/04/85)	4,182.84
Transfer of funds (8/04/85)	1,000.00
TOTAL	10,574.31
Disbursements '85–'86	6,242.10
Service Charge	10.00
TOTAL	6,252.10
BALANCE (4/08/86)	$4,322.21

NYSAA Editor: Our editor Charles F. Hayes began with reporting that Bulletin 91 cost $2685.00 and there were enough papers for Bulletin 92. It was suggested that Bulletin 94 might contain the papers in honor of Charles Wray as a memorial tribute. The discussion on that was deferred. Editor Hayes gave great credit to Brian Nagel and Patricia Miller for their invaluable assistance, Report was accepted as given.

ESAF Representative Report: Bert Wingerson addressed the major issue that has been plaguing her for years, lack of communication. She specifically requested that those chapters who have newsletters send them to her. Her address is in the accompanying Informational Handbooks. You will be receiving forms from her in the future. Report accepted.

Finance: In the absence of Mandaly Grems, the Secretary reviewed the financial records and found them to be in order. Report accepted.

Legislative: In the absence of Paul Huey, Gordon C. DeAngelo gave the legislative report.

REPORT ON LEGISLATION TO THE NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION
April 11, 1986
by Paul R. Huey, Van Epps-Hartley Chapter

State

Governor Cuomo has placed before the state legislature his $1.45 billion Environmental Quality Bond Act of 1986. Under this act $1.2 billion would be used in a 13-year program to clean up hazardous waste sites. The additional $6250 million would be available for state acquisition of environmentally sensitive lands. It would provide matching grants to municipalities to acquire and develop recreational facilities as well as matching grants to government and not-for-profit owners for preservation, rehabilitation, and/or restoration of historic properties. If the bill passes both houses of the legislature, it will be subject to public referendum in November.

The Department of Environmental Conservation has revised the statewide regulations implementing the State Environmental Quality Review Act. The regulations have included sites that are on the State Register, in addition to the National Register, as resources which can require the preparation of an environmental impact statement. Unfortunately, sites that may be eligible for the State and National Registers or which are listed only in the statewide inventory of sites are not included, so that often the SEQRA is interpreted to protect only sites actually listed on the Registers. This is inconsistent with the environmental assessment form which is filled out by the project applicant and agency reviewer and which asks if a project would impact sites which may be eligible for the State or National Registers. Other changes have been favorable to archaeological resources, for which the Department of Environmental Conservation should be commended.

The Religious Properties Landmark Designation Exemption bill (A. 8819; S. 6521) is again proposed. It would allow religious properties to be exempt from provisions of local landmark and historic district laws.

A bill for reimbursement for cultural resource surveys (A. 1407; S. 1019) would appropriate money to Parks, Recreation, and Historic Preservation for reimbursement to municipalities and private organizations which undertake surveys of historic sites and/or cultural resources. Up to $200,000 would be available, and 50 per cent of the cost of each survey project could be reimbursed.

Assembly bill 3599 would require that a registered site owned by the state or a municipality cannot be sold, leased, or have development rights transferred without recommendation of the commissioner and approval of the legislature.

The Historic Preservation Fund bill (A. 8120; S. 6520) would provide grants for technical assistance and matching funds for construction to not-for-profit owners of historic properties.

The City of Albany is interested in developing an ordinance for the protection of archaeological resources in the city during new development. This is a result of the discovery in March of remains of a late 17th century building in a block that had been an original part of the city in 1652. The remains were discovered by amateur archaeologists during construction of the new Keycorp headquarters building, a project privately funded and not subject to state or federal review. The timber remains had survived in one location where the 19th century structure built over the site did not happen to have a deep cellar hole.

Federal

The federal budget for FY 1987, submitted to Congress on February 5, contains a zero request for historic preservation funding. This is the sixth consecutive year this has occurred. In addition, the budget document proposes to rescind about 9615 million of the current year's preservation funding from the states, which was about $20 million nationally. These proposals, if approved, would have a drastic effect on state historic preservation programs, which include project review and the protection of archaeological resources. In New York State, the federal appropriation of $760,000 has been reduced by $90,000 to $670,000 this year because of a federal $1 million cut by Congress in preservation funding and because of an additional 4.3 per cent cut mandated by the new Gramm-Rudman-Hollings deficit reduction law. New York State has so far received only 21 per cent of its $670,000 appropriation this year. This is because of a proposal now in Congress to rescind 79 per cent of the 1986 historic preservation program funding nationally! Congress had 45 Congressional days, or until about the end of April, either to approve or disapprove this proposed decision. Congress can also defeat the proposal by taking no action on it.

The Cultural Property Repose Act of 1985 (H. R. 2389; S. 1523) is a bill intended to protect collectors or museums who have acquired works of art or other artifacts from sites in foreign countries. Many

archaeologists oppose the bill, however, on the grounds that it weakens laws protecting foreign sites from exploitation and controlling the acquisition of cultural objects from foreign countries.

The federal Advisory Council on Historic Preservation has proposed new regulations for the Council's procedures in the review of federal agency actions affecting historical and/or archaeological resources. The proposed regulations would require a federal agency undertaking a project which could endanger archaeological sites to meet the requirements only by "substantially fulfilling the purposes of section 106 of the preservation law. The term "substantially fulfilling" suggests that federal agencies would be allowed less than full compliance with regulations for the preservation of sites. Furthermore, the proposed regulations state that after initiating consultation with a state historic preservation officer to seek ways to avoid or reduce effects on sites, a federal agency undertaking a project may end consultation and request comments from only the Advisory Council. Such a provision would not specifically require federal agencies to work with the state historic preservation officer in the review process.

The Abandoned Shipwreck Act of 1985 (H.R. 3558; S. 676) is a bill which would assert U.S. title to shipwrecks and then transfer that title to states when the shipwrecks are buried or embedded in submerged lands of a state or when shipwrecks on submerged lands of a state are included in or determined eligible for the National Register. The bill would declare that the law of salvage does not apply to these abandoned shipwrecks but would retain existing federal admiralty law for all other shipwrecks. The Advisory Council would be directed to develop guidelines to assist the states and the federal government in carrying out their responsibilities to protect and manage shipwreck sites in the public interest.

The above information is compiled from a variety of sources:
The Legislative Update of the Federation of Historical Services.
The Legislative Alert of the Preservation League of New York State, April 1986.
The Society for Historical Archaeology *Newsletter*, March 1986.
The National Trust for Historic Preservation *Preservation Advocate*, Winter 1986.
Society for :American Archaeology, Committee on Public Archaeology memo of November 5, 1985.

After reading the above, President DeAngelo asked for comments or discussions and when there were none commented on the necessity of greater participation in legislative affairs by the entire membership. Report accepted as read and included in this report.

Local Program: President DeAngelo thanked all of those speakers who responded in such short notice and regretted that Dr. Funk could not be present. The NYSAA thanked President DeAngelo for his participation these many years as local program chairman and the Secretary suggested that the incoming President give the replacement of this valuable committee top priority. Report accepted as given.

NYSAA/NYAC Liaison: Dolores Elliott deferred to NYAC President Charles Hayes who was pleased with the program listing. He reported on the meeting which included the archaeology of urban New York City and stated that the next NYAC meeting would be in Rochester in September and in Albany, in January, and then tentatively in Syracuse April 10, 11, 12. Report accepted as given.

Committee Reports

Public Archaeology: Dolores Elliott reported that for several years the idea of a traveling exhibit had been foremost in her mind but evidently not in anyone else's. Funding was not available and the curator who was handling the project moved to California. A reevaluation of the necessity of having the committee was brought for discussion. Richard McCracken stated that since there was no support for the project it was useless to keep bringing it up and he suggested that the committee be dissolved. Father Lee, however, had different thoughts which he expressed in a motion to retain the committee. There was no discussion or opposition and Vicky Jayne seconded it.

Publications: Father Lee suggested that the Publications Chairman's report should precede the Editor's report and the Secretary replied that the committee reports were given in alphabetical order, but could make the change without any adverse effect. Vicky Jayne discussed a point of giving awards for best newsletter and Bill Ehlers brought up the point of newsletter exchanges with

definite emphasis on getting them to the publications committee as well as the ESAF representative. Other matters concerning publications would be brought up under new business. Report accepted as given and Committee Reports were concluded.

Old Business

President DeAngelo opened this segment at 9:01 P.M. The first question to arise from the floor came from Richard McCracken who inquired into the nature of the Louis A. Brennan festschrift. Stuart Fiedel, President of the Louis A. Brennan Lower Hudson Chapter began the discussion by stating that the festschrift was in the planning stages. The Secretary reminded Herb Kraft that he was selected in absentia when Resolution 83-1 was approved. Richard McCracken continued the discussion when a matter was brought up concerning a memorial volume for Charles Wray. It was decided that a memorial volume to Lou Brennan had precedent and that if possible the direction for both volumes would come from two different chapters working independently, more or less, in concert with the rest of NYSAA. Discussion arose among Roger Moeller, Charles Hayes, Dolores Elliott and Richard McCracken. President DeAngelo interceded by asking what the timing was concerning the Brennan versus the Wray papers. More discussion continued in the realm of Researches and Transactions procedures. Finally, President DeAngelo restated the proposition, "unless there is something wrong with the proposal of using Lou Brennan's specific interests as leads for papers relating to them, we allow the committee to continue on this and that any discussion of content be handled by the Executive Committee between now and the next annual meeting." The Secretary stated that the original Resolution was 83-1 and Bert Wingerson noted that an amendment was needed to Resolution 83-1. Geary Zern made the motion to amend Resolution 83-1 as stated by President DeAngelo. To it he asked Stuart Fiedel to steer the committee and report at the next annual meeting. Stuart agreed and at 9:16 P.M., the motion was seconded by Richard McCracken.

The next order of "old business" was feedback on the raising of the price of the Bulletin and Journal to five dollars. As it was still one of the best deals around there was no discussion.

The status of the Long Island chapter was next on the agenda. Happily, we had Walter Smith with us who explained the problems with the museum and how it was solved. There were no discussions.

Next on the agenda was the outcome of Resolution 85-1 proposed by Bill Ehlers, to wit, "BE IT RESOLVED THAT, the committee of the New York State Archaeological Association be directed to investigate the feasibility of a common insurance policy covering all chapters, and to report their findings at the next annual meeting." Bill Ehlers, Dick Bennett and Walter Smith discussed what they had learned over the past year. On site insurance usually cost around one hundred dollars and that only protected the owner of the property. A person could sue if injured.

The next item under "old business" was the status of the NYSAA library at MALFA. Geary Zern reported that material was still coming in from Rochester and plans were still in the formulating stages for computerizing the data.

The final item on the "old business" agenda was another request by the secretary for Annual Meeting programs prior to 1965. The secretary thanked Ted Whitney who responded immediately with several prior programs. Charles Hayes stated that he would attempt to search his vast resources for some of the earlier ones. With that, "old business" terminated at 9:31 P.M.

New Business

The first order of "new business" was the exchange of publications. President DeAngelo stated that there was nothing we could do enforce the exchange of newsletters or publications simply urge those to refer to the Informational Handbook and hope for a reciprocal trade agreement. No action was required.

The second order of "new business" entertained a discussion and motion to abandon the gerrymandering system as a strict rule. Richard Bennett stated that he would like to see it as it used to be "by invitation." President DeAngelo asked Mr. Bennett if he would settle for a less stringent application of the gerrymandering system but keep it as a guideline. Mr. Bennett agreed and offered the motion to do so. Dolores Elliott seconded it and there was no opposition from the floor.

The third order of "new business" began with a discussion of Roger Moeller's services and how they could be applied to NYSAA. He discussed the advantage of simultaneous mailings and the ability to reach out and touch someone who may be interested in joining NYSAA but did not know how. Also, it would get a lot of the chapter secretaries off the hook and relieve the overburdened office of Charles Hayes. Needless to say a step in this direction evoked much discussion and almost everyone was involved. President DeAngelo seemed to favor the idea as it was stated that most of the people who responded to this meeting heard it by word of mouth, not from the mailed meeting notices.

Roger Moeller then summed up the advantages. Points of discussion were raised by Vicky Jayne, Richard - McCracken, Geary Zern, Kingston Larner. Bert Wingerson brought forth a motion that this matter be discussed in committee and brought up before the entire membership in the morning. An amendment was made by Vicky Jayne and seconded by Monte Bennett. The officers would appoint a committee and President DeAngelo appointed Father Lee and Charles Hayes and directed that the officers and the appointed committee meet with Roger Moeller immediately after the conclusion of the Executive Committee meeting. This motion was voted on and accepted by the committee.

The fourth order of "new business" was directed towards making preparations for hosting the 75th Annual Meeting. The secretary suggested the making of an enameled organizational pin with the NYSAA logo in the middle of which would be a seventy five. He also suggested that our "home office" Rochester be the place for our diamond jubilee. In any event, the time to get started on it was now. President DeAngelo asked for the formation of the committees. The Secretary volunteered Bill Ehlers, Carolyn Weatherwax, Father Lee and Dolores Elliott also volunteered.

The fifth order of "new business" was directed towards the 71st NYSAA Annual Meeting in 1987. President DeAngelo read an offer from Buffalo to host the 1987 Annual Meeting. A lively discussion of pros and cons resulted. The prime complaint as it always has been was the inability to house the whole show in a single complex. Vicky Jayne suggested that Beauchamp host the 71st. The President requested a show of hands for either Buffalo or Syracuse. Most favored Syracuse. The President entertained a motion. Kingston Larner made the motion that we accept the invitation of the Beauchamp chapter to host the 71st NYSAA Annual Meeting. Geary Zern seconded the motion and the "ayes" had it.

The sixth order of "new business" was Resolution 86-1, the resolution thanking the host chapter. Richard McCracken was directed by the President to present this at the business meeting in the morning.

Finally, at 10:30 P.M., President DeAngelo asked for a motion to adjourn which was quickly stated by Kingston Larner and seconded by Richard Jackson and the Executive Committee Meeting of the 70th NYSAA was concluded except for the officers and two volunteers who met shortly thereafter to consider using the services of Roger Moeller. After a lengthy and dry discussion, it was so moved that there would be definite advantages in obtaining Roger's services and it was so ordered to be brought up at the business meeting.

General Business Meeting

The General Business Meeting of the New York State Archaeological Association was called to order by President Gordon G. DeAngelo at 9:12 A.M., April 12, 1986. After a brief welcoming address, the Secretary was asked if a quorum were present. With eleven present, the Secretary was next directed to read the minutes of the 1985 NYSAA Executive Committee Minutes from the Oneonta meeting. Since these had been printed and distributed, Richard Jackson made the motion to waive the reading and accept them as printed. Peter Pratt seconded the motion which was accepted by the membership.

The treasurer's report was given by Carolyn Weatherwax. There was no discussion and Richard Bennett made the motion to accept it. Seconded by Peter Pratt, the membership accepted the Treasurer's Report as printed.

Charles Hayes gave the Editor's report and once again emphasized the need for clear sharp photographs. There was no discussion.

President DeAngelo then summarized the legislative report. There was no discussion and it was accepted as given.

President DeAngelo asked the Secretary if there was any old business to be voted on. Since there wasn't, President DeAngelo, in retrospect, summarized by discussing the memorial volumes to Charles

Wray and Lou Brennan, status of the Long Island Chapter, report of Resolution 85-1, "on-site" insurance, status of the NYSAA Library and the secretary's request for previous NYSAA Annual Meeting programs prior to 1965.

Under "New Business" Gordon C. DeAngelo discussed the exchange of publications.

The next order of "New Business" came forth as a motion to accept the services of Roger Moeller. Richard Bennett made the motion and President DeAngelo briefly discussed the services. There was little discussion from the floor and the motion was seconded by Richard Hosbach at 9:38 A.M. Accepted unanimously by the floor.

The next order of "New Business" concerned the hosting of the 1987 NYSAA Annual Meeting where it was decided that we accept the offer from the William Beauchamp chapter which would host it in Syracuse.

The final order of "New Business" was the motion made by Richard McCracken under RESOLUTION 86-1, to wit, "BE IT RESOLVED THAT, NYSAA extend its most profound and sincere thanks to the membership of the Incorporated Orange County Chapter for providing excellent service and facilities in the organization and presentation of the 1986 NYSAA Annual Meeting. Specific thanks are due, again, to General Chairman Harold R. Decker and Committee Members Thomas F. Brannan, J. Thomson Fuller, Laurence Hansen, Doris Hanson, Lillian Price, Wes Price, Helen Tolosky, John Tolosky and a particular note of thanks to Program Chairman and Association President, Gordon C. DeAngelo. Father Lee seconded the motion and there was a round of applause.

Election

Eighty-two ballots were cast. The results were as follows:

Father Lee:	78	Bill Ehlers: 4	President
Richard McCracken:	82		Vice-President
John H. McCashion:	82		Secretary
Carolyn Weatherwax:	82		Treasurer
Bert Wingerson:	79	Peg Brennan: 3	Delegate to ESAF

There was no opposition from the floor and President DeAngelo turned the gavel over to Father Lee who asked for a motion to adjourn which was made by Richard Jackson and seconded by Ed Lenik who took over the microphone to once again begin the program by introducing the President Thomas Brannan of the Incorporated Orange County chapter who in turn introduced for the second time in two years, Harold Jonas at 9:44 P.M.

Awards

Deferred until the NYSAA Annual Banquet, Chairman Peter P. Pratt announced the results of the Awards Committee.

FELLOW: Donald A. Rumrill, Van Epps-Hartley Chapter

MERITORIUS SERVICE:

Gordon C. DeAngelo, William Beauchamp Chapter
Eleazar Hunt, Frederick M. Houghton Chapter
Laurence Hansen, Incorporated Orange County Chapter
Russell V. Hallock, Sr., Incorporated Orange County Chapter

MERIT: Gary Elliott, Chenango Chapter
Michael Gramly, Frederick M. Houghton Chapter.

ROYAL ORDER OF THE MASK: Herbert C. Kraft,

Respectfully submitted,
John H. McCashion
Secretary, NYSAA

PROGRAM
SEVENTEENTH ANNUAL MEETING
NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION

April 11, 12, 13, 1986
Holiday Inn
Middletown, New York

Host: Inc. Orange County Chapter

FRIDAY, APRIL 11, 1986

11: 00 A.M. NYAC BOARD MEETING
1:00 P.M. NY AC BUSINESS MEETING
2-5 P.M. NYAC GENERAL MEETING (Guests welcome)
EXCAVATIONS AT THE ASSAY SITE: A LATE 18TH AND EARLY 19TH CENTURY LANDFILL IN LOWER MANHATTAN
Diana Wall, New York University
URBAN ARCHAEOLOGY IN NEW YORK CITY: AN OVERVIEW
Bert Salwen, New York University
4-9 P.M. NYSAA REGISTRATION
7:00 P.M. NYSAA STANDING COMMITTEE MEETINGS
7:30 P.M. NYSAA EXECUTIVE COMMITTEE MEETING
9:30 P.M. WINE AND CHEESE PARTY

SATURDAY, APRIL 12, 1986

8:15 A.M. NYSAA REGISTRATION
8:45 A.M. NYSAA BUSINESS MEETING
9:20 A.M. WELCOMING ADDRESS
Harold J. Jonas, Inc. Orange County Chapter

MORNING SESSION
CHAIR Edward J. Lenik. Director
The Archaeological Research Laboratory, Van Riper-Hopper Museum, Wayne, New Jersey, Inc. Orange County Chapter

9:30 A.M. A RARE PALEO-INDIAD STONE CHAMBER AND ASSOC1ATED TENT-SITE FROM WESTERN MAINE
R. M. Gramly, Buffalo Museum of Science

9:55 A.M. SOME OBSERVATIONS ON FIVE-NATION IROQUOIS SYMBOLS ON CANVAS
Peter P. Pratt, SUNY College at Oswego

10:15 A.M. ART OF THE SEVENTH GENERATION: IROQUOIS SYMBOLS ON CANVAS
Dolores N. Elliott, Triple Cities Chapter

10:30 A.M. COFFEE AND DANISH

10:50 A.M. THE 1985 RESEARCH PROGRAM AT' THE PUBLIC ARCHAEOLOGY FACILITY, SUNY, BINGHAMTON
Daniel F. Cassedy, Public Archaeology Facility, SUNY, Binghamton

11:10 A.M. EARLY WOODLAND FEATURES AT THE JAMBA SITE, CHENANGO COUNTY, NEW YORK
James G. Gibb, Public Archaeology Facility, SUNY, Binghamton

11:30 A.M. ARCHAEOLOGICAL INVESTIGATIONS AT THE PORT DICKENSON SITE ON THE SUSQUEHANNA RIVER
Alan D. Beauregard and Christine A. Kula, Public Archaeology Facility, SUNY, Binghamton

11:50 A.M. LUNCH-(Place of your choice)

AFTERNOON SES SION
CHAIR-Roberta Wingerson, Cultural Resource Surveys Inc.
Louis A. Brennan, Lower Hudson Chapter, MALFA

2:00 P.M. SYMBOLS, SAINTS AND SCENES; JESUIT CHRISTIANIZATION RINGS ON SENECA SITES
Adrian Mandzy, Lewis H. Morgan Chapter, St. John Fisher College

2:20 P.M. A COMPARISON BETWEEN TWO 17TH CENTURY INDIAN FORTS ON LONG ISLAND: FORTS CORCHAUG AND MASSAPEAQUA
Ralph Solecki, Inc. Long Island and Metropolitan Chapters, Columbia University

2:40 P.M. EFFIGY FACES AND MASKS OF THE LENAPE INDIANS
Herbert C. Kraft, Inc. Orange County Chapter, Seton Hall University Museum

3:10 P.M. RECENT RESEARCH CONCERNING NEW YORK CAVES AND ROCKSHELTERS
R. Funk and Beth Wellman, New York State Museum

3:30 P.M. PRELIMINARY RESULTS OF ARCHAEOLOGICAL INVESTIGAT1ONS CONDUCTED AT THE MULTI-COMPONENT TAMARACK SITE HUDSON RIVER VALLEY
Jack and Donna Vargo, Mid-Hudson Chapter

6:30 P.M. COCKTAIL HOUR-CASH BAR

7:30 P.M. INVOCATION by The Reverend David Monroe
BANQUET
MASTER OF CERMONIES: Gordon C. DeAngelo, President NYSAA
PRESENTATION OF AWARDS: Peter P. Pratt
KEYNOTE ADDRESS: PREHISTORY OF SOUTHERN NEW ENGLAND: A VIEW OF THE EARLY ARCHAIC TO TERMINAL ARCHAIC CONTINUUM
John Pfeiffer, President, Archaeological Society of Southeastern Connecticut, Vice President, Archaeological Society of Connecticut, Doctoral Student at SUNY, Albany

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SUNDAY, APRIL 13, 1986
MORNING SESSION
CHAIR-Thomas F. Brannan, President, Inc. Orange County Chapter

9:30 A.M. WHAT NEXT IN ARCHAEOLOGY? Louis C. Raymond, MALFA

9:55 A.M. THE EVOLUTION OF FIREARMS AND ITS RELATIONSHIP TO SEVENTEENTH CENTURY MOHAWK CHRONOLOGICAL ANALYSIS
Donald A. Rumrill, Van-Epps Hartley Chapter

10:20 A.M. CHERT PETROGRAPHY AND PREHISTORIC PROCUREMENT-EXCHANGE PATTERNS IN THE DELAWARE AND LOWER HUDSON VALLEYS
Lucianne Lavin, New York University, Peabody Museum of Natural History at Yale

10:45 A.M. COFFEE
11:00 A.M. THE HISCOCK SITE: PLANTS, ANIMALS AND PALEO INDIANS IN WESTERN NEW YORK
David W. Steadman, Sr. Scientist, Zoology, New York State Museum

SUNDAY AFTERNOON TOURS
1:00 P.M. TOUR OF THE SUGAR LOAF MASTODON AT ORANGE COUNTY COMMUNITY COLLEGE

TOUR OF DUTCHESS QUARRY CAVES (WEATHER PERMITTING) MAPS AVAILABLE AT THE REGISTRATION DESK
HIKING SHOES AND FIELD CLOTHES FOR DUTCHESS QUARRY CAVES

Corrections to the REPORT ON LEGISLATION TO THE NEW YORK STATE ARCHAEOLOGICAL ASSOCIATION. April 19, 1985. By Paul K. Huey, Van Epps-Hartley Chapter. Published in *Bulletin* 91.

State

The Religious Properties Bill has not been re-introduced this year. However, there is a movement in the Assembly to find a sponsor for the bill, and the situation should be watched. The bill would exempt religious properties from compliance under provisions of local preservation laws.

Federal

Remove the sentence: "To us, $21 million is a lot of money, but it is a mere fraction on the federal scale. It is 21 millionths of a billion, that is, .000021 billion. It can't affect the deficit."

THE ACHIEVEMENT AWARD

Charles M. Knoll (1958)
William A. Ritchie (1962)
Thomas Grassman O.M.F. (1970)
Robert E. Funk (1977)
Louis A. Brennan (1960)
Donald M. Lenig (1963)
Paul L. Weinman (1971)
Peter P. Pratt (1980)

FELLOWS OF THE ASSOCIATION

Roy Latham
William A. Ritchie
Charles F. Wray
Alfred K. Guthe
Julius Lopez
Marian E. White
Donald M. Lenig
Thomas Grassman O.F.M.
Bruce Rippeteau
Franklin Hesse
Gilbert Hagerty
Donald A. Rumrill
Richard L. McCarthy
R. Arthur Johnson
Stanley Vanderlaan
Robert E. Funk
Edward J. Kaeser
Robert Ricklis
Charles F. Hayes III
Bert Salwen
Herbert C. Kraft
Peter P. Pratt
William Engelbrecht
Louis A. Brennan
Paul Weinman
Thomas Weinman
Audrey Sublett
Theodore Whitney
William S. Cornwell
Gordon K. Wright
James A. Tuck
Paul Huey
Dolores Elliott
Monte Bennett

CERTIFICATE OF MERIT

Franklin J. Hesse
Stanford J. Gibson
Peter P. Pratt
Monte Bennett
Richard E. Hosbach
Gordon DeAngelo
Neal Trubowitz
William F. Ehlers
Dolores N. Elliott
R. Michael Gramly
George R. Walters
Elizabeth Dumont
Marjorie Pratt
George R. Hamell
John H. McCashion
Roger Ashton
William D. Lipe
Marilyn C. Stewart
Beth Wellman
Lewis Dumont
Henry Wemple
James Walsh
Charles Vandrei
James Bradley
Daniel M. Barber
Harold Secor
Albert D. LaFrance
Gwyneth Gillette