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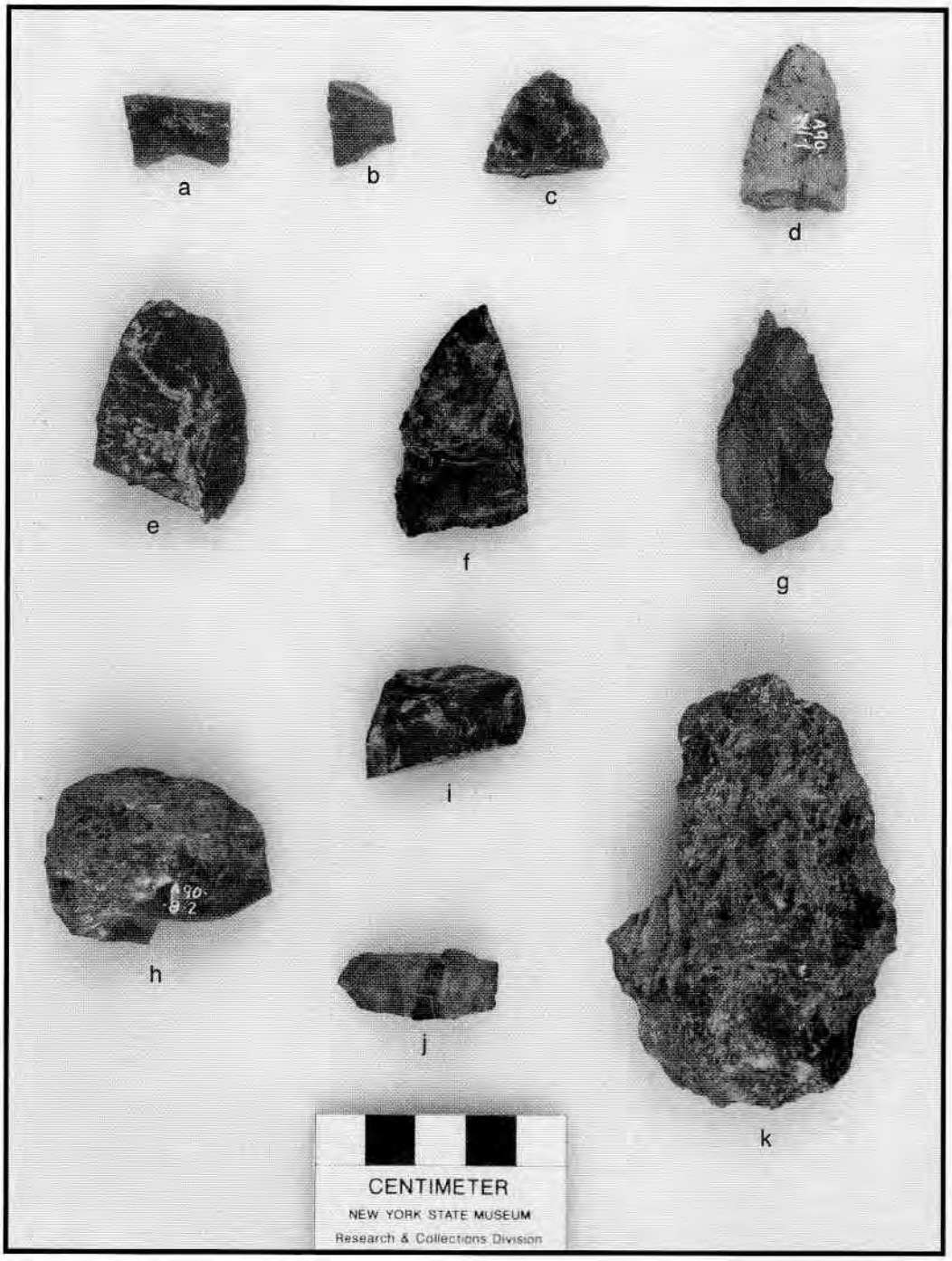
Journal of the New York State Archaeological Association



Bifaces from the Zappavigna Site

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Contents

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Preface

This issue of *The Bulletin* is dedicated to the memory of the late Dr. Robert E. Funk, former New York State Archaeologist. Just before his death on September 25, 2002, he had submitted to *The Bulletin* the report on the Zappavigna Site. This report and two others written by colleagues in this issue are fine examples of the kind of cooperation that he encouraged between professional and avocational archaeologists during his tenure at the New York State Museum. The editors are indebted to Beth Wellman of the New York State Museum for her included tribute to him and for gathering remembrances from several members of the New York State Archaeological Association who had been involved in research with him over the years.

Robert E. Funk was born in Rome, New York, on February 8, 1932. His anthropological training was obtained at Columbia University where he received a M.A. degree in 1956 and a Ph.D. in 1966. His dissertation was on the Archaic Period in the Hudson River Valley. Before he came to the New York State Museum in 1960 to work with Dr. William A. Ritchie, State Archaeologist, he did fieldwork in Mexico, but his interest in the Northeast was the focus of his career at the New York State Museum. Although eastern New York State was the primary area of his research, his influence extended all the way to Buffalo. He made visits both to conduct fieldwork and to review museum and private archaeological collections.

Robert Funk routinely participated in the Annual Meetings of the New York State Archaeological Association and the New York Archaeological Council. These meetings kept him in touch with the individual research interests of all concerned. Following his death there were many tributes to his career and a research fund set up with a major contribution from the NYSAA. In addition, NYAC published in its Newsletter (Fall 2002-Winter 2003) tributes from many colleagues. For his many research efforts the NYSAA made him a Fellow and awarded him an Achievement Award in 1977 and again in 1994.

It has been a privilege to bring this issue containing some important aspects of his career to the NYSAA membership.

The Editors

A Small Paleo-Indian Encampment in Orange County, New York

Robert E. Funk, New York State Museum.[1]
Beth Wellman, New York State Museum.
Harold Raymond Decker, Orange County Chapter, New York State Archaeological Association
William F. Ehlers, Jr., Orange County Chapter, New York State Archaeological Association[2]

In 1988 the Zappavigna Site was brought to the attention of Robert E. Funk and Beth Wellman by Harold R. Decker and William F. Ehlers, Jr., officers of the Orange County Chapter, New York State Archaeological Association. Local collector Russell Hallock had shown them flaked stone tools found on the surface of the site following plowing. The collection suggested the rare occurrence of a Paleo-Indian site unmixed with later materials. This possibility encouraged Funk and Wellman to plan systematic excavations at the site.

Introduction

In the summers of 1988 and 1989, Robert E. Funk and Beth Wellman completed work at the Dutchess Quarry Caves No. 1 and No. 8, Paleo-Indian sites located near the village of Florida, Orange County. The 1988 investigation was carried out in collaboration with vertebrate paleontologist David W. Steadman, of the Biological Survey, New York State Museum, assisted by various members of the Orange County Chapter. The explorations at the quarry over 29 years were later described by Funk and Steadman (1994). The present writers began work at the Zappavigna Site in July 1989.

Permission for investigations was granted by the owner, Sam Zappavigna, and by his realtor, David Hawkins. The property was up for sale, with the intention of dividing it into building lots. We went to the site on July 5 with a small crew of volunteers, planning to set up a grid before commencing excavations. We were surprised to find that the field containing the site was under cultivation by Henry Smith, who, however, kindly granted permission for the work to proceed.

Because the field was planted in corn we were unable to disk the site and conduct a systematic surface collection as the first phase of work. Instead, we began excavating one-meter squares along the E0 line, or north-south baseline (Figure 1), later expanding the grid to the periphery of the site. Although much excavation was accomplished during the summer of 1989, we returned in the summer of 1990 in order to fill in as much of the gridded area as possible. As of this writing, the property has not been sold or developed.

[1]The editors deeply regret the sudden and unexpected death of Dr. Robert Funk shortly after he had submitted this article to us for publication.

[2]William Ehlers passed away in late 1990 following the second season of work at the Zappavigna site, devastating his many friends in New York archaeology.

Location, Description, and Geology

The Zappavigna Site is located in the Town of Hamptonburgh, Orange County, New York. The adjoining countryside consists of rolling terrain with little sharp relief, at elevations ranging from 360 to 600 ft above mean sea level. The Wallkill River lies 1 mi to the northwest, and the mountainous terrain of the Hudson Highlands is about 5 mi to the east.

The archaeological site occupies a low (elevation 400 ft) southwest-northeast trending ridge approximately 3000 ft (900 m) in length (Figure 2). Located 600 ft (180 m) west of the site is a shallow swale about 300 ft (90 m) wide; closely adjoining the eastern foot of the ridge is a broad, low marshy area. The marsh drains south into the Otter Kill, which is part of the headwater system of Moodna Creek, a tributary of the Hudson River.

The ridge is composed of a cobble till rich in clay. It is possible that bedrock underlies the till mantle at a relatively shallow depth. Broken rocks and cobbles occur abundantly in the plow zone and the subsoil is a till containing many pebbles, cobbles, and broken slabs of shale. Bedrock underlying glacial deposits at the site and adjoining areas is the Snake Hill Shale (Isachsen et al. 1991).

The natural (pre-cultivation) soil cover on the ridge is Mardin Gravelly Silt Loam, a deep, moderately well drained soil formed in tills composed of sandstone, shale and slate. It is typically found on hilltops and ridges. The adjoining broad, low depression contains areas of Alden Silt Loam and Erie Gravelly Silt Loam, both poorly drained and derived from tills made up of sandstone, shale, and slate (Olsson 1981).

The sources of the cherts used to make prehistoric tools are of continuing interest to archaeologists because their procurement must have been an important, even crucial, aspect of Native American life. The distance from an archae-

ological site to a bedrock outcrop of chert can determine the method of procurement, whether direct or through trade, and can aid our understanding of band movements, social interaction spheres, choice of site location, and the like.

The Zappavigna Site presented a mystery since the majority of cherts used there were not of a type commonly seen in other parts of the Hudson Valley by either Wellman or Funk. Many tools and pieces of debitage were of a pale and often translucent blue gray appearance. In the Munsell charts this material matches the light gray color designated 2.5Y N7. Numerous pieces grade into the nearly white Munsell 2.5Y N8. Occasionally darker patches are also seen which are closer to Munsell 2.5Y N5. All three shades are seen to occur on a few larger pieces and at least two shades occur on many.

Although much of this material shows some flaws including joint fractures, small voids, and some scattered small quartz crystals, other pieces have a homogeneous waxy appearance typical of the high quality material valued for toolmaking. Both high quality, as well as poor quality, material was used at the site.

On the New York State Geological Map (Isachsen et al. 1991) the closest chert-bearing rocks are of the Copake Formation or Wappinger Group. These are mapped in large areas of southern Orange County from about Unionville on the west to Wickham Lake on the east and north to just south of Goshen. Areas of the Wappinger Group occur as occasional small outliers from this area northeast to Newburgh where more extensive deposits also trend to the northeast.

Copake and Wappinger rocks are largely limestones and dolostones but only one series within the Wappinger, the Halcyon Lake Dolostones, is listed as chert bearing. Halcyon Lake is described as locally cherty but no specific locations are indicated on the map.

In the late 1980s the investigators saw bedrock cherts at two quarry-workshop sites reported by members of the Orange County Chapter, New York State Archaeological Association. Both sites are in the Wappinger Group (Halcyon Lake Formation) area in southern Orange County. Cherts occur in bedrock exposures at the famous Dutchess Quarry Cave Sites (Funk and Steadman 1994) and also at the nearby Schoolhouse (Houston Road) Quarry. Cherts from both areas are however very dark colored and do not appear to be from the same formation as the light cherts composing many artifacts from Zappavigna. Possible sources of this lighter material were reported by Orange County Chapter members.

A single large block of chert recovered from the Zappavigna Site measured up to 10 cm thick and 24 cm long. This block and some smaller pieces of debitage were examined and described by Edward Landing, New York State Paleontologist in the Geological Survey, New York State Museum. He noted rusty-weathering dolomite crystals embedded in the chert. These occurred along one side of the large chert block adjacent to the eroded matrix. He also identified styloites in the material. In cross-section these appear as very fine dark "squiggly" veins. Styloites are actually solution cavities where limestone or chert has dissolved away and less soluble dark material has accumulated.

Much new information on the cherts of Orange County and the Wallkill Valley is available as a result of many years of intensive field work by geoarchaeologist Phil La Porta (1996). He has located over 300 quarries and workshops in Orange County, New York and Sussex County, New Jersey. Most important to the delineation of chert-bearing rocks in Orange County and adjoining areas is the Halcyon Lake Formation, which is equivalent to the Beekmantown Formation defined to the north and south of the study area. These formations are of Lower Ordovician age. Within the Halcyon Lake are members that contain cherts. Gray cherts are also found in the older Leithsville and Allentown formations, of Cambrian age. Faulting and thrusting uptilted some previously buried strata, and erosive processes have exposed rocks from different parts of the sequence in different locations, thus presenting abundant sources of generally high-quality chert to the aboriginal inhabitants of the region. La Porta has outlined a "folk geology" that may have been used by the Indians to find and evaluate sources of chert for their tools and weapons. He has also described the technology of quarrying raw lithic materials and producing artifacts from them.

The chert-bearing sequence in the study area begins with the oldest formations, the Leithsville and Allentown. These stratigraphically underlie the Early Ordovician Rickenbach, Epler, and Ontelaunee Formations within the Halcyon Lake group. Late Ordovician cherts are to be found in the Martinsburg Formation. Rickenbach, Epler, and Ontelaunee are the most common cherts in prehistoric assemblages of the area. The Beaver Run unit of the Ontelaunee outcrops at Lookout Mountain, where the Dutchess Quarry Caves are located (La Porta 1996).

Research Design

Our first objective at the Zappavigna Site was to define its boundaries; the second was to acquire a representative artifact sample. Our third objective was to find and expose features in the hope of obtaining datable organic material and subsistence remains. And fourth, we hoped to find evidence of internal structure as revealed by house patterns, features, lithic workshop areas, and other clues to activities on the site.

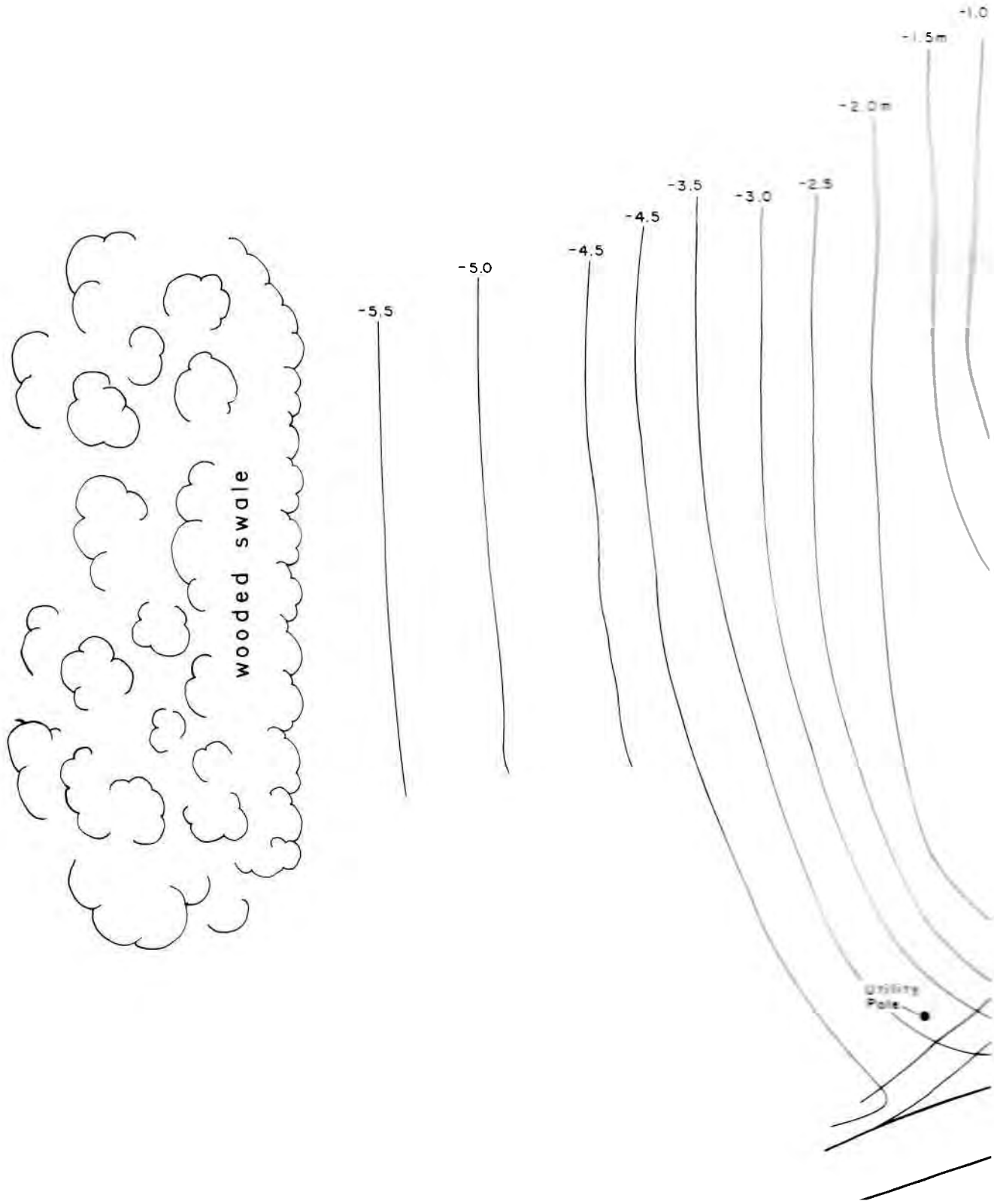
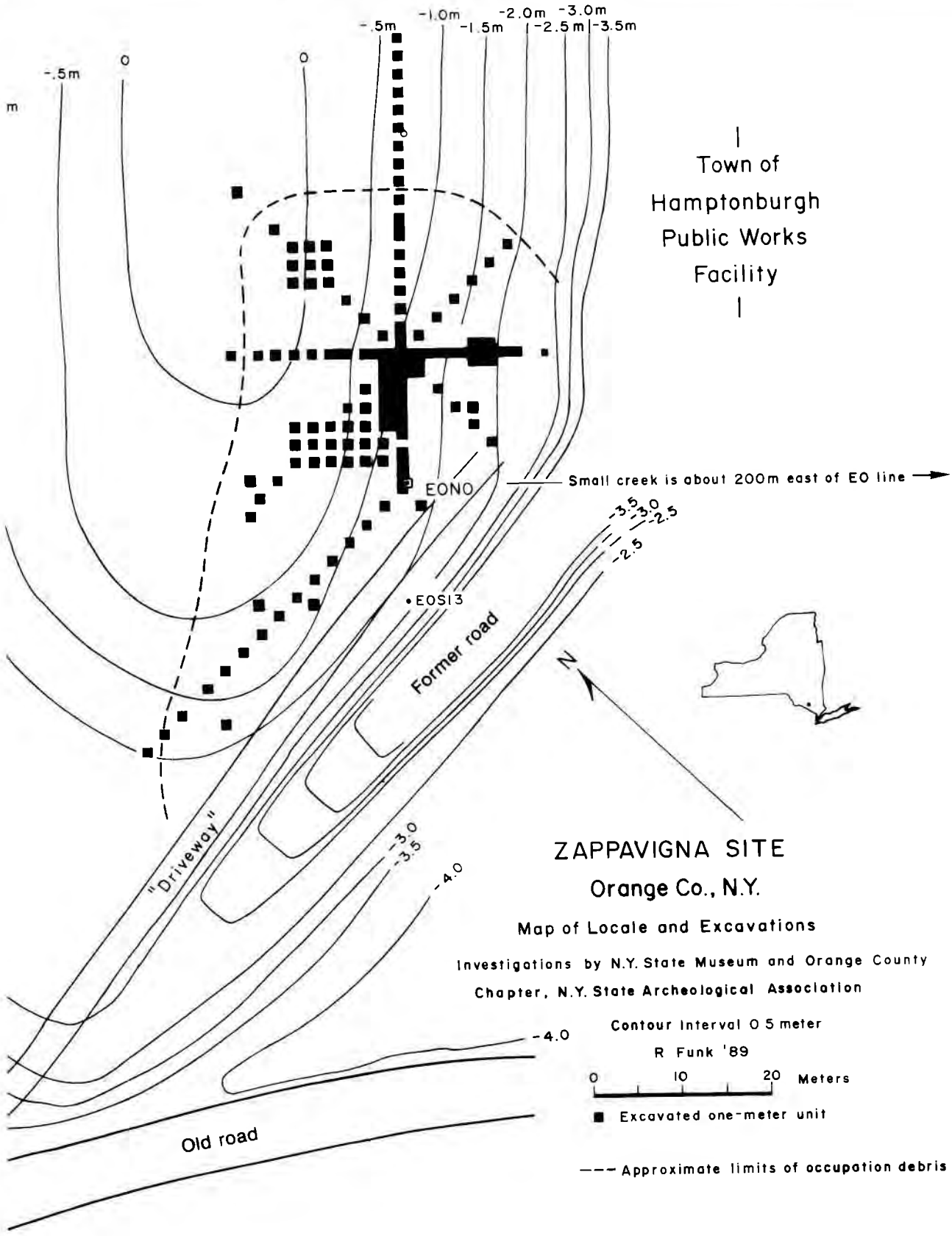


Figure 1. Map of the Zappavigna Site and environs.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Old road
ZAPPAVIGNA SITE
Orange Co., N.Y.
Map of Locale and Excavations
Investigations by N.Y. State Museum and Orange County
Chapter, N.Y. State Archeological Association
Contour Interval 0 5 meter
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0
10
20
Meters
Excavated one-meter unit
Approximate limits of occupation debris

Figure 2. View of excavations at the Zappavigna Site, looking east from the adjoining swale. Site lies atop the ridge in the middle distance and toward the center of the photograph.

Figure 3. View of excavations at the Zappavigna Site (cluster of crew members in middle distance). Looking north from parking area.

Knowing that the site was small, and that our volunteer crew would vary in size from day to day, we planned to sample ten percent of the total occupied area. By walking over the plowed field between cornstalks and observing surface indications of cultural activity, we estimated the area producing cultural remains to be around 1800 sq m. This was later confirmed by excavation. Approximately 400 sq m had been destroyed many years before by grading for a road that crossed the southeastern part of the site. In the 1950s that section of the road was relocated 130 ft (40 m) south of the site in order to eliminate a sharp turn.

Excavation Methods

Before Henry Smith picked his first planting of corn, we limited our excavations to the area on, or adjacent to, the E0 line (north-south baseline), which was oriented 47° east of north. After the picking, we expanded the grid along both the E0 line and the major axis on the N14 (east-west) line, also adding four diagonal lines at 45° from the two main axes (Figure 3). In this manner we created a radial pattern that served as the skeleton for a systematic geometric sample (Mueller 1975). We intended to define the site's boundaries by excavating units distributed at standard intervals, thus acquiring an unbiased sample of cultural materials, plotting the occurrence of artifacts, debitage, and features, and observing where the quantities of those remains declined to negligible values. With enough time and help, we hoped to be able to excavate a large majority of units (one-meter squares) between the major axes. We were only partly successful in achieving this goal.

Our excavation technique was to remove the plow zone with shovels and pass it through a 1/4 in mesh screen, saving artifacts and debitage and discarding naturally occurring stones, sand, and gravel. After the plow zone was removed from each unit, the subsoil was carefully scraped with a sharp trowel in order to look for hearths, pits, post molds, and other features. At the close of excavations in the fall of 1990, we had opened 154 one-by-one meter units and sampled approximately 11% of the 1400 sq m area of the site that remained after road construction.

Stratigraphy

Test pits and excavation units showed the site had been plowed to an average depth of 10 in (25 cm). The plow zone was a brown-colored mixture of fine-grained soil, humus, pebbles, cobbles, and angular fragments of rock, including gray chert and shale. Underlying the plow zone was a heavy, compact yellowish-brown till containing abundant pebbles, cobbles, and broken shale slabs. In places our excavations penetrated to over 60 cm below surface, without reaching bedrock. This suggested the rise is largely glacial in origin, perhaps even classifiable as a drumlin.

Cultural materials (artifacts, debitage) were abundant in the plow zone. No occupation zones, per se, were observed below the junction of plow zone and subsoil. During the excavations, chert flakes were occasionally recovered from the top of the subsoil, easily explained as intrusive from plowing, root action, animal burrowing, and other disturbances. Soil pH tests on samples from plow zone and subsoil gave values of 6.2, mildly acid, which helps to explain the absence of animal refuse bone and tools of bone and antler.

Features

Seven possible features were observed at the top of the subsoil in as many excavation units. Feature 1 was a very amorphous depression containing till-derived sand and gravel fill, reddish-brown to orange-brown in color. This color did not appear to be the result of a fire. More likely it was from the oxidation of iron salts in weathered till. Feature 2 was a definite post mold; three other features were possible (but unconvincing) post molds; one was an animal burrow; and one was a small saucer-shaped depression containing brown sand and gravel fill and tiny charcoal flecks. No artifacts or chert fragments occurred in any of these features, although angular rock fragments in the fill of Feature 1 resembled fire-cracked stones.

The definite post mold (Feature 2) was very well-defined, 8.5 cm in diameter at the top, extending 29 cm below the junction of plow zone and subsoil. It was nearly straight-sided in cross-section, narrowing gradually to a blunt, rounded tip at the bottom. It contained a dark brown, homogeneous fill of sand and pebbles, devoid of charcoal, bone, or any other cultural material. The post mold was unquestionably genuine, resembling numerous molds seen by the writers on Late Woodland sites. It was the only feature almost certainly of prehistoric age. It lacked the attributes of historic post holes which are generally square in horizontal cross-section and larger and deeper than prehistoric molds.

One of the possible molds measured 15 cm in diameter at the junction of plow zone and subsoil and was 7 cm deep, but it was rather amorphous in cross-section, lacking a well-defined tip. The fill was mottled brown sand with a few charcoal flecks. Another possible post mold was conical in cross-section, 9 cm in diameter and 9 cm deep, with a pointed base. It contained olive-brown sandy fill, lacking any charcoal or other evidence of human activity. The third possible mold was a vaguely defined soil stain and was 20 cm in diameter, 20 cm deep, containing brown sand of the

same color and texture as the plow zone. It lacked a definite shape at the base, blending into the mottled brown and yellow-brown subsoil. There was nothing of obvious cultural origin in the fill. These features were widely separated on the site. There is no way of knowing whether any of molds were, in fact, of Paleo-Indian origin.

Artifacts

Only those items recovered from the 1400 sq m area of the Paleo-Indian locus are listed below, with the exception of a side-notched projectile point found outside the site proper. Hallock and others reported finding Late Archaic artifacts on the surface of the ridge several hundred meters from the Paleo-Indian locus. It is also rumored that he found a bannerstone and pestle on or near the site, both of which items would be consistent with a light Late Archaic occupation overlapping with the area of Paleo-Indian occupation.

The identification of cherts used in the manufacture of the artifacts from the Zappavigna Site must be credited to Philip La Porta, who spent two days examining the collection.

Artifacts Recovered by the New York State Museum-Orange County Chapter Excavations of 1989-90

Chipped Stone

Projectile Points

Three fluted point basal fragments were found during the 1989-90 excavations. Three biface tips were also recovered. Although lacking evidence of fluting, the tips are similar in size and workmanship to the basal fragments and to whole fluted points. A small triangular point, of the Late Archaic Beekman Triangle type was found on the periphery of the site. A possible Brewerton Side-Notched point, also presumably of Late Archaic age, was found well off the site at a second minor locus.

Descriptions of the fluted points and probable fluted point fragments are listed below (see Table 1 for statistical summary of the dimensions):

Fluted Point- basal fragment, finely made with indented base (Figure 4a). One face was flnted, the other appears to have been basally thinned only. Fragment is 13 mm long, 19 mm wide, and a maximum of 4 mm thick. The basal concavity is 2 mm deep. Slight grinding is evident on the edges, but not on the base. Material: translucent gray Epler chert. New York State Museum accession number A90-14-1.

Fluted Point, basal fragment. one tang with part of adjoining blade and base (Figure 4b). Finely made. Bifacially fluted, parts of channel flake scars present on each face. Base was indented. Moderate grinding on base and edges. Maximum thickness 5 mm. Material: gray Ontelaunee chert. Accession number A90-6-1.

Fluted Point, basal fragment, one tang with part of adjoining blade and base. Bifacially fluted. parts of channel flake scars present on each face. Base was indented. Moderate grinding on base and lower edges. Maximum thickness 4 mm. Material: Gray Epler chert. No accession number.

Possible Fluted Point, biface tip section (Figure 4c). No evidence of channel flake scars above break. Present length 34 mm, width 20 mm, maximum thickness 7 mm. Biconvex cross-section. A stage 4 biface, workmanship (symmetry, evenness of flaking) good, but not as fine as the three basal portions described above. No use-wear was observed under microscopic examination. Material: gray. translucent Epler chert. Accession number A90-11-1.

Possible Fluted Point, biface tip section (Figure 4d). No evidence of channel flake scars above break. Present length 21 mm, width 25 mm. maximum thickness 6 mm. A stage 4 biface. workmanship good. No use-wear observed. Material: gray translucent Epler chert. Accession number A90-61-1.

Statistic			
Mean	43.7	21.7	5.13
Median	46	21.3	5
Mode	N/A	19	4
Standard deviation	6.8	3.3	1.2
Range	13	8.3	3.5
Minimum	36	17.5	4
Maximum	49	25.8	7.5
Count	3	7	9

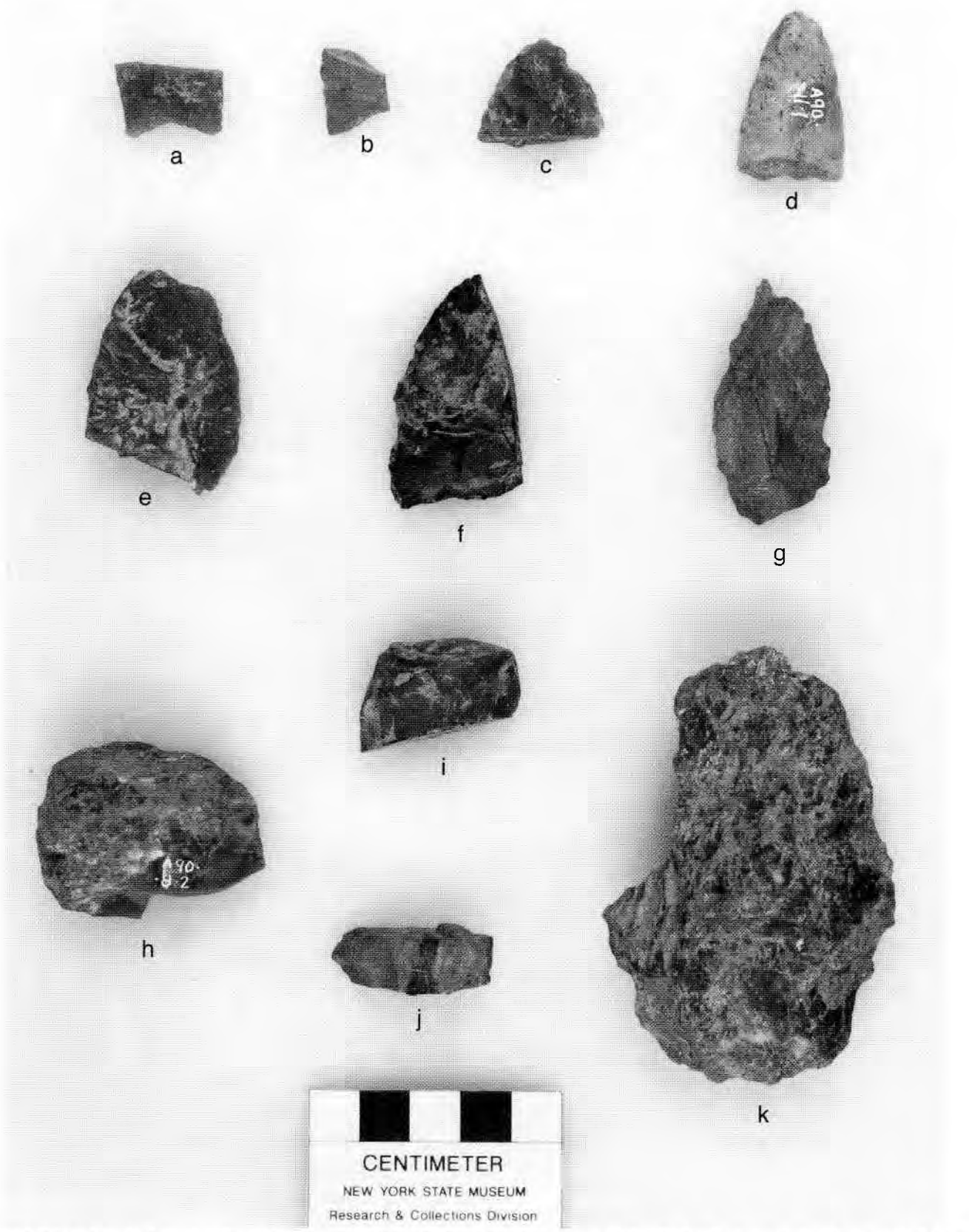


Figure 4. Bifaces from the Zappavigna Site. a) base fragment of bifacially fluted point; b) fragment of bifacially fluted point consisting of a tang and adjoining parts of the channel flake scars and base; c-d) tip (distal) portions of broken stage 3 bifaces possibly from fluted points; e-j) fragmentary bifaces in process (stage 1)(biface e was broken and retouched along the right edge for use as a side scraper); k) whole biface in process (stage 1). Material: a, c-e, g-i, k, Epler chert; b, Ontelaunee chert; f, eastern Onondaga chert; j, Normanskill chert.

Possible Fluted Point, biface tip section. No evidence of channel flake scars above break. Present length 35 mm, width 30 mm, maximum thickness 8 mm. A stage 4 biface, workmanship good. Light use-wear (rounding/gloss) on one edge. Material: gray Allentown chert. No accession number.

The following is a description of the two other points found near the site:

Beekman Triangle (1). A single example was found on the periphery of the site. This type is associated with Laurentian assemblages in eastern New York. The point, also a stage 4 biface, is whole, of black, homogeneous chert with small brown inclusions, and has a straight, rubbed base. The base was thinned by removal of short flakes from each face. Length is 21 mm, width is 19 mm, and maximum thickness is 4 mm. The weight is 1.4 g.

Side-Notched (1). This point, a stage 4 biface, is listed here although it was found approximately 100 m north of the site. It is whole, medium in breadth of blade, and relatively thin. The base is straight, not rubbed, and the blade is biconvex in cross-section. It is of dark gray eastern Onondaga chert. An impact fracture is evident at the tip. The specimen is 38 mm long, 27 mm wide in the midsection, the basal (tang) width is 21 mm, and the notches are 3 mm deep. The weight is 5.4 g. This point resembles the Brewerton Side-Notched type, except for the absence of basal grinding (Ritchie 1961).

Other Bifaces

The great majority of items in this category can be described as "bifaces in process." All but four of these are fragmentary, and so thick that they suggest, at best, a very early stage of biface manufacture. They are classified as bifaces primarily because they are very roughly biconvex in cross-section, thinner in one dimension than the others, and because the two faces bear flake scars not attributed to previous reduction of the core. In practice, however, it was sometimes difficult to distinguish an exhausted core, or core fragment, from an early stage of biface production.

With this caveat, we placed 17 items in the "other biface" category. These conform to stage 1 bifaces in the classification used by the writers. Stage 1 bifaces represent the initial stage of reduction from a core or flake and are relatively thick, asymmetrical and "crude" in the sense that they display large expanding flake scars and stepped flake scars resulting from hard hammer percussion. Stage 2 bifaces are thinner, more symmetrical, and more evenly flaked. Stage 3 bifaces represent the nearly finished tool, lacking only final shaping by pressure retouch which characterizes stage 4. In practice, stage 2 bifaces may be difficult to distinguish objectively from stage 1 bifaces, a problem especially acute in the small sample of fragmentary bifaces from the Zappavigna Site. No stage 2 or stage 3 bifaces were identified in the collection.

Table 2. Summary Statistics for Stage 1 Bifaces (dimensions in mm).

Attribute	N	Range	Mean	Standard deviation
Length	4	44-85	57.25	18.7
Width	9	13-57	30.3	12.0
Thickness	13	6-24	12.2	4.5

Of the 17 items, 8 are "possible" stage 1 bifaces. The others are "definite" stage 1 bifaces, 1 is a broken stage 1 biface retouched as a side scraper, and 1 is a biface edge fragment. Examples of stage 1 bifaces are shown in Figure 4e-k. Summary statistics for stage 1 and possible stage 1 bifaces are presented in Table 2. The weights of three whole bifaces, from largest to smallest, are 100.5 g, 24 g, and 9.5 g, respectively. It should be noted that classic Paleo-Indian ovate or lanceolate knives, assignable to stage 4 in the manufacturing process, are not present in the collection.

A majority of bifaces in process are of locally available cherts, including Epler (7), Ontelaunee (2), Rickenbach (1), and Allentown (1). From more distant localities came gray New Scotland chert (1), gray mottled eastern Onondaga chert (2), and Normanskill chert (1). Two biface fragments are of unidentified gray chert.

Unifaces

End Scrapers

The assemblage comprises 47 of these tools (Figure 5a-f, 6). They are divided into seven subclasses based on the general form as viewed from the dorsal (flake scar) side up). The seventh subclass consists of fragmentary specimens, whose original form is uncertain. The subclasses, and the number of items in each are as follows. See Table 3 for statistical summary of dimensions:

Trianguloid – 20
Trapezoidal – 10
Elongate – 2
Squarish – 1
Crescentic – 1
Ovoid – 2
Broken – 11

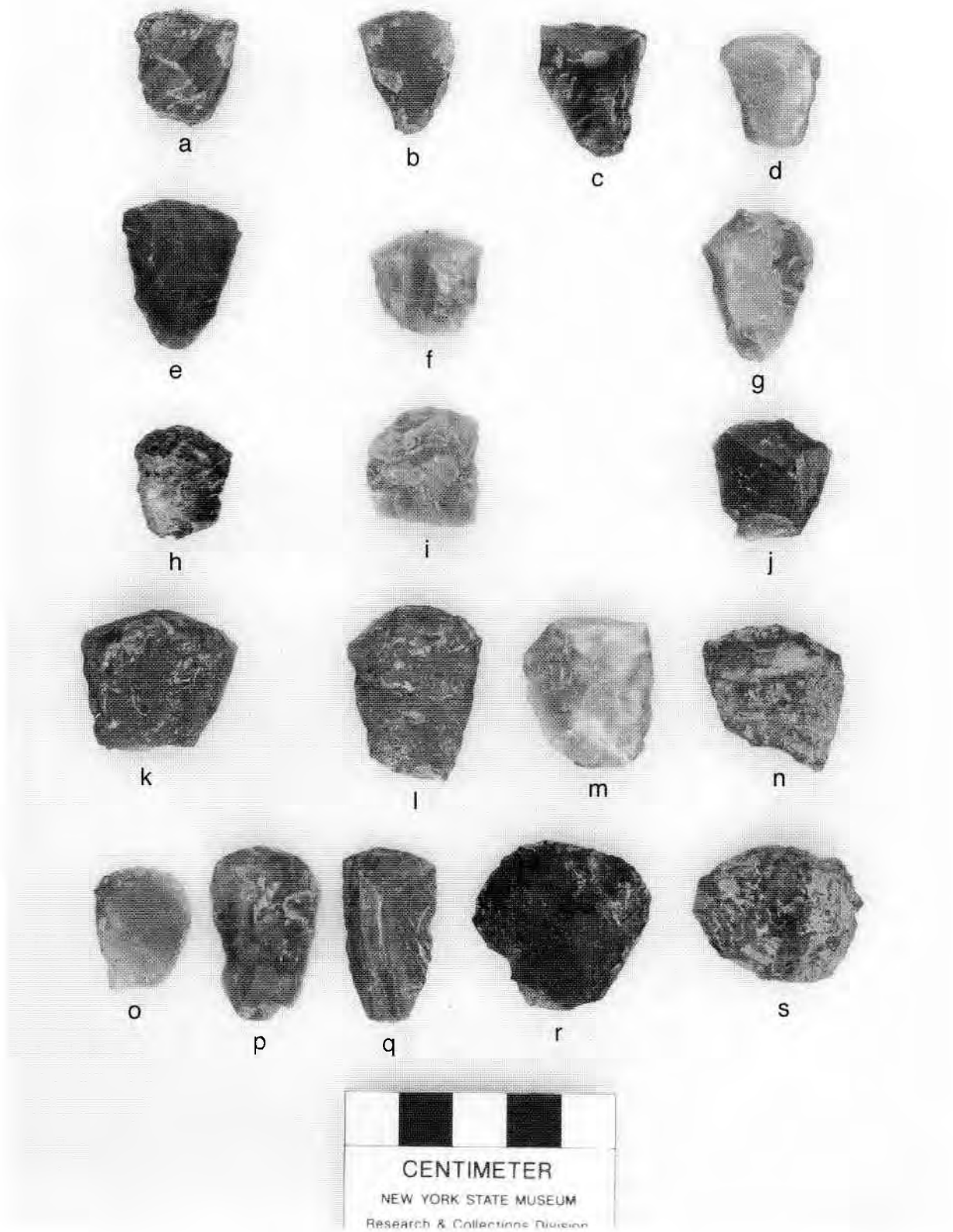


Figure 5. End scrapers from the Zappavigna Site. Note well-developed graving spurs on all but i. Material: a, e, q, Ontelaunee chert; b-d, f, g, i-p, s, Epler chert; h, eastern Onondaga chert; r, Rickenbach chert.

Figure 6. End scrapers from the Zappavigna Site. Note graving spurs or sharply angled corners on the bits (working edges) of most of the scrapers. Material: a, c, f, Epler chert; b, d, h, Ontelaunee chert; e, g, Western New York Onondaga chert.

Table 3. Summary Statistics for End Scrapers (dimensions in mm, weight in g).

Attribute	Number	Range	Mean	Standard deviation
Length	36	16-38	26.5	5.9
Width	36	15-33	23.1	4.38
Thickness	42	5-14	8.1	2.07
Weight (g)	35	2.0-13.2	5.46	2.7

End scrapers were made from expanding secondary flakes, detached from cores rather than based on natural nodules and spalls. Scars from flakes previously detached from cores were usually retained on the dorsal surfaces. The distal end (opposite the striking platform) and usually the adjacent sides are unifacially retouched, thus removing parts of the dorsal flake scars. A majority of the lateral edges were retouched to achieve a symmetrical, trianguloid or trapezoidal form and the broad end (opposite the striking platform) was retouched to form the main working edge or bit. In some cases a lateral edge was not retouched because it had the required shape when struck from the core.

There is almost always no flaking of the ventral (bulbar) face. The rare exceptions are tiny flakes removed just behind the bit in order to isolate a graving spur (3 examples from the Zappavigna Site). The striking platform is absent from 20 of 42 whole scrapers and basal fragments. Within the group of 20 are 4 cases on which the base is a flat, unmodified fracture plane, indicating that the part bearing the platform was snapped off. In 5 cases the basal area shows step-flaking, often quite deep, as if the blow that removed the striking platform was struck with hard hammer directly against the base and major axis of the piece. On 1 example the base was retouched in the same fashion as the bit and edges; and in 8 cases the striking platform was trimmed off by removing one or more flakes by soft hammer. In 2 cases the treatment of the striking platform is indeterminate.

As is typical of Paleo-Indian end scrapers, those from the Zappavigna Site are usually characterized by sharply angled (about 80-90°) front corners (i.e., the junction of the bit with the sides of the tool). The corners are frequently extended by deliberate retouching to form short spurs or nubs. Rarely seen are spurs on the lateral edges between bit and base. Spurs are generally assumed to have been used to work bone, antler, and hard wood, in addition to the scraping function of the bit. To summarize the occurrence of spurs and sharp corners:

Both corners spurred - 5
One spur, left front corner, right corner sharply angled - 11
One spur, right corner, left corner sharply angled - 1
Sharp right corner, rounded left corner - 3
Sharp left corner, rounded right corner - 1
Two sharp corners - 11
Rounded junction of bit and sides - 3
Indeterminate (fragmentary or damaged) - 12

Wear patterns on the scrapers were studied at 20 and 40 magnifications with a stereomicroscope. The results are as follows:

1. Edge-crushing or step-flaking, on right part of bit, no other wear visible - 1

2. Rounding/gloss on bit and on edge adjacent to the bit, all types - 33
   a. R/g with smoothing and rounding of adjoining dorsal flake arrises - 5
   b. R/g heavier on spur or corner of bit - 7
   c. R/g, with crushing - 5
   d. R/g on corner or spur, and also on adjoining ventral surface - 2
   e. R/g with crushing and ventral polish - 1
   f. R/g, full circumference of bit, no other wear associated - 13

3. No wear visible on bits - 7

4. Rounding/gloss on lateral edges - 5

The degree of rounding/gloss on the bit, where present, was assessed subjectively on a scale of 1 to 10. The result was that on 15 scrapers the rating was 1-2, on 13 scrapers 2-4, on 3 scrapers 4-5, and on 2 scrapers 6-7. The highest ratings of 7 to 10 were obtained on the sharp corners of 3 scrapers.

Experiments by various researchers (Semenov 1964; Keeley 1980; Wilmsen 1968) indicate that the predominant types of wear on the scrapers resulted from application to relatively soft materials such as animal hides, wood, and bark, but bone is also a possibility.

The edge angles of the bits were measured on 34 end scrapers. This analysis is complicated by the varied angles made by different flake scars on the same bit, with the ventral surface. Some scrapers showed a difference of as much as 25° front one part of the edge to another. In many cases, bits that had lost their effectiveness due to wear on the working edge were resharpened by percussion directed

against the ventral part of the edge. Repeated sharpening often resulted in an irreducible dorsal hump above the flake scars in the center of the bit. Sometimes these projected so far as to overhang the juncture with the ventral surface. In general, these parts of the bit were steeper than adjoining parts.

The overall range in edge angles was 35 to 90°; higher angles of around 80-90° were measured at the humps referred to above. A more typical (modal) range on bits was 45 to 70°, but on any individual scraper the variation was usually no more than 10°.

Lithic material used for end scrapers was predominantly local gray cherts, including Epler (24), Ontelaunee (12), and Rickenbach (2). There were also 4 scrapers of western New York Onondaga chert, 1 of eastern Onondaga chert, 1 of Normanskill chert, 1 possibly of Esopus chert, and 2 of unidentified gray cherts.

Side Scrapers

Only three items were assigned to this category. The first is double-edged, on a broad, tabular, relatively thin trapezoidal flake of dark gray Allentown chert (Figure 7d). At first glance, it appears to be a biface midsection. One face (dorsal) is flaked over the whole surface, perhaps representing the removal of flakes from the original core. Two opposed sides are retouched to form scraping edges. But the other face (ventral) has not been worked. The retouching on the dorsal face was struck off from this face. The flat ends of the piece are unmodified fracture planes, perhaps deliberately snapped off. From flat end to flat end the length along one edge is 33 mm; along the shorter edge it is 30 mm. Width at the narrowest end is 27 mm; at the broadest 35 mm. On the longest edge the retouch is 17 mm long; the remaining 16 mm on this edge show tiny utilization flake scars. The other edge is retouched for 24 mm. Maximum thickness of the piece is 7.5 mm. It weighs 12.3 g. Microscopic examination of the tool's edges at the junction of retouch flake scars and ventral surface disclosed moderate use-wear in the form of rounding/gloss (level 3–4). Smoothing and gloss overlapped onto the ventral area adjoining the edge, and the flake scar arises on the dorsal face showed heavy smoothing/rounding.

Another tool on a small, irregular secondary flake (Figure 7e) still has its striking platform. The material is a dark gray Rickenbach chert. The end opposite the striking platform was not modified. The opposing long edges are retouched, one steeply for 23 mm on the dorsal face. The other edge is retouched for 14 mm on the dorsal side, 12 mm on the ventral side. The tool is 30 mm long, 21 mm wide, and 7 mm thick. It weighs 5.3 g. No wear was seen at 20 and 40 magnifications.

The third side scraper (Figure 7c) is based on an irregular, tabular, fragment of gray Epler chert, measuring 42 mm long, 24 mm wide. It is not worked except for one retouched edge 31.5 mm long. The edge is 7 mm thick but the maximum thickness of the item is 12 mm. It weighs 13.7 g. Level 2 rounding/gloss is apparent on the retouched edge with several small bright spots, possibly representing phytolith smears.

Retouched Flakes

This is a "catch all" for 12 objects showing varying [illegible] and degrees of intentional modification (Figure 7a, b, f). Six are made of Epler chert, 1 of Rickenbach chert, 1 of Upper Allentown chert, 4 of eastern Onondaga chert. Retouched flakes vary in length from 16 to 37 mm, in width from 14 to 20 mm, and in thickness from 4 to 10 mm. Three of them are fragments, possibly from end scrapers. The others are irregular flakes, including two from nodules. Three bear two subparallel retouched edges, the remainder have one retouched edge. Little evidence of use-wear is evident on these tools. There were three tools bearing such evidence: two have slight rounding/gloss on the retouched edge, a third has slight nibbling on the working edge. The weight of these tools ranges from 1.4 to 7.5 g, averaging only 3.0 g.

Gravers

These three tools share one feature, a projecting spur or graving tip created by retouching one end of a flake (Figure 7g). One is made of Martinsburg chert, 1 is of Epler chert, and 1 of eastern Onondaga chert. These items range in length from 37 to 62 mm, in width from 17 mm to 37 mm, and in thickness from 10 mm to 17 mm. The item of Martinsburg chert shows level 5 round
and on the adjoining underside [illegible]

Side Scraper/Graver

This tool is based on a tabular piece of Allentown chert. The fragment is irregular in outline, but has been rudely shaped by removal of large flakes around the whole periphery. One edge was deliberately retouched steeply for scraping and is 38 mm long. At one end of this edge is a long point or spur, created partly by retouch from the ventral face. Overall the tool is 39 mm long, 17 mm in maximum width, and 10 mm thick. No signs of use-wear were observed at 20 and 40 magnifications. The tool weighs 6.3 g.

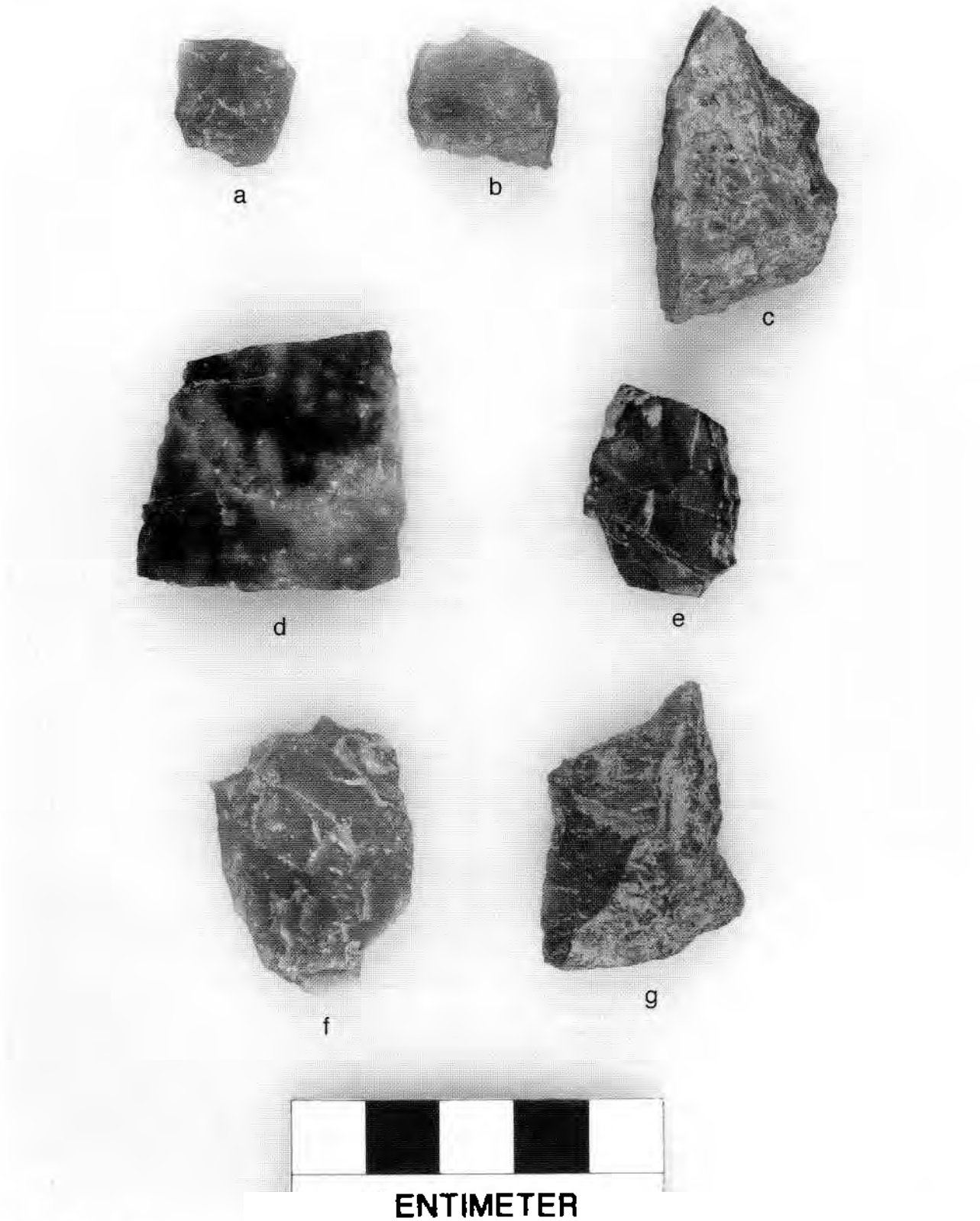


Figure 7. Other unifaces from the Zappavigna Site. a-b) retouched flakes showing retouch along both lateral edges (these may be broken end scrapers) c-e) side scrapers; f) denticulate tool showing three graving spurs; g) graving tool with single spur. Material: a-c, f, g, Epler chert; d, Allentown chert e, Rickenbach chert.

Denticulate Tools

Three specimens are in this class. All are based on irregular flakes with retouched working (scraping?) edges and two or more graving points. One item of either Epler or Rickenbach chert shows a flat, broad end (produced by "snapping off" the striking platform?), and the other, narrower end is irregularly flaked in an attempt to reduce a "hump." Both lateral edges are retouched, and each one features a prominent graving spur; the spurs are at opposite ends of the tool. The object is 31 mm long (from snapped off end to rudely flaked end), 35 mm wide at one end and 24.5 mm wide at the narrow end. One retouched edge including spur is 22 mm long, the other 30 mm long. The weight is 11.3 g. No wear is visible under the microscope.

The second tool is on an irregular, thin flake of Epler chert. It is 20 mm long, 18 mm wide, and 4 mm thick. It bears a prominent striking platform. One lateral edge is incurvate, finely retouched for 10 mm to create two graving spurs. The other edge is retouched for 19 mm creating three spurs. The spurs display slight wear, in the form of level 1 rounding/gloss and tiny flakes pressed off. Weight is 1.0 g.

The third tool (Figure 7f) is also on an irregular flake of Epler chert. It measures 37 mm in length, 26 mm in width, and 6.5 mm in thickness. It weighs 11.2 g. At the broad end, fine retouch produced three graving spurs. The two outer spurs display level 5 rounding/gloss. The tip of the middle spur appears to have broken off.

Utilized Flakes

These 11 items show ad hoc use-wear in the form of nibbling or crushing on at least one edge. No retouch is evident. The lithic materials were identified as eastern Onondaga chert (2), Epler chert (4), Allentown chert (1), Ontelaunee chert (2), Rickenbach chert (1), and either Epler or Rickenbach (1).

Debitage

The collection includes cores, core fragments, and flakes representing the chert-knapping activity on the site. Not counted as debitage are various unmodified nodules and blocky fragments of limestone with small areas of gray chert mingled with crusty, gray areas devoid of chert. These unmodified objects may have occurred naturally in the cobble till soils at the site, or they may represent culls and rejected fragments of blocks brought to the site by the knappers. There is no doubt most of the chert on site was produced by the Paleo-Indians' stone-working, and most of the raw material must have been imported from quarries somewhere in the Wallkill Valley.

Phil La Porta was able to examine in detail a small portion of the total quantity of debitage in the collection, which amounts to about 1550 pieces. He looked at 87 items from several excavation units, and identified 23 pieces of Epler chert, 34 pieces of Ontelaunee chert, 14 pieces of Allentown chert, and 16 of eastern Onondaga chert. There were both core fragments and flakes, none of the flakes clearly identifiable as biface retouch flakes. Despite the use of Normanskill chert in 2 artifacts and Western Onondaga chert in 4 items, La Porta did not note any flakes or cores of these materials in the debitage. Furthermore, no items of those materials were observed in our cursory inspection of the sample not seen by La Porta.

Heat Treatment of Lithic Material

Philip La Porta's close inspection of all the chipped stone artifacts, apart from debitage, resulted in a detailed characterization of attributes including color, internal and external structure, presence or absence of cortex, surface features, and presence or absence of evidence for heat alteration. There was a high frequency of items showing evidence of heat alteration. What LaPorta interpreted as heat treatment was manifested as crazing and reddening on at least 25 objects, the majority of which were end scrapers. The predominant chert type of these artifacts was from the Epler Formation, Big Springs member.

Deliberate heat treatment of chert is rarely reported for northeastern archaeological assemblages, perhaps because the resultant attributes are not familiar to archaeologists. Features where such treatment may have been performed are almost unknown in the literature. Possibly some of the heat alteration on these tools was the result of accidental exposure to fires in hearths or from exposure of these shallowly buried items to the intense heat of forest fires.

Rough Stone Tools

Only seven rough stone tools were found at the Zappavigna Site. Four objects are hammerstones. All are based on oblate spheroidal or semi-discoidal glacial cobbles: one of quartzite, two of sandstone, one of conglomerate. Each of them displays one or more battered areas on the periphery. In three cases the battered area is limited in size and so shallow that the tools are barely distinguishable from natural, unmodified cobbles. But the conglomerate cobble is rather heavily battered over about 50% of the circumference. The conglomerate hammer weighs 753 g, the sandstone hammers weigh 140 and 218 g, and the quartzite cobble weighs 627 g.

A single anvilstone was identified. It is based on a cobble of quartzite or sandstone, with an oval area of well-

defined battering on one face rather than on an edge, and weighs 628 g.

Two pitted stones were recovered. One is a typical bipitted stone, on a semi-discoidal sandstone cobble showing deep conical pits on each flat face. Weak edge-pitting may indicate some use as a hammer, but this remains uncertain because the object is much weathered. Weight is 470 g.

The other specimen is multipitted, on a box-shaped much-weathered sandstone cobble. On each of the four main faces is a single conical pit. This resembles a common Late Archaic "nutting stone." Weight is 412 g.

Summary of Artifacts in the New York State Museum Collection (Total: 112)

Bifaces

- Fluted Points, Basal fragments: 3
- Possible Fluted Points, Distal (tip) fragments: 3
- Beekman Triangle Point: 1
- Broad Side-Notched (Brewerton-like) Point: 1
- Bifaces in Process: 17

Unifaces

- End Scrapers, all forms: 47
- Side Scrapers: 3
- Side Scraper/Graver: 1
- Retouched Flakes: 12
- Gravers: 3
- Denticulates: 3

Utilized Flakes: 11

Debitage:

- Approximately 1550 pieces

Rough Stone Tools

- Hammerstones, Cobble: 4
- Anvilstone, Cobble: 1
- Pitted Stones, Cobble: 2

Note: The Beekman Triangle from the site and the broad side-notched (Brewerton-like) point found c. 100 m north of the site are not considered intrinsic parts of the Paleo-Indian component.

Fluted Points Found on the Site by Russell Hallock and David Decker

The Hallock collection includes 2 fluted points, both complete, bifacially fluted with indented bases. These are classified as stage 4 bifaces.

The first point is 49 mm long, width at midpoint 24 mm, at base 21 mm, thickness 6 mm. Each side has a single channel flake scar; they are 27 mm long, 9 mm wide, and 29 mm long, 9 mm wide, respectively. The base is indented 3 mm. It is slightly ground. The lower lateral edges are ground, extending 19 mm and 20 mm. There is slight rounding on the other parts of the edges, indicating use as a knife. The tip is round, rather than pointed, and shows a probable impact fracture there. The material of this point is chiefly a banded gray in color with light brown mottling, sandy to the touch, and may be an argillite.

The second point is 36 mm long, width at base 19 mm, thickness 6 mm. Base indented 2.5 mm. The lower edges are ground, for 14 and 16 mm, respectively. Each face bears a single flute; 19 mm long, 7 mm wide, and 17 mm long, 11 mm wide, respectively. The material is of gray Epler chert.

The Decker Collection includes one complete fluted point and 3 basal fragments. They are all stage 4 bifaces.

The whole point is bifacially fluted, with an indented base (Figure 8, right). Grinding is evident on lower lateral edges and base. The length is 46 mm, maximum width 21.3 mm, maximum thickness 7.5 mm. Base indented 3 mm. Material: a light yellowish-brown chert, with yellow, orange, and red mottling, and a quartz vein running across the basal area. This may be a jasperoid that occurs in the vicinity of Staten Island and adjacent coastal locations. No other data available.

Basal fragment, indented base (Figure 8. left). Bifacially fluted. Lower lateral edges and base ground. Width 25.8 mm. Thickness 5 mm. Base indented 3 mm. Material: Opaque gray chert with tiny red inclusions. No other data available.

Basal fragment. indented base. Bifacially fluted. Lower lateral edges and base ground. Width is 25 mm. thickness 4.7 mm. Base indented 4 mm.

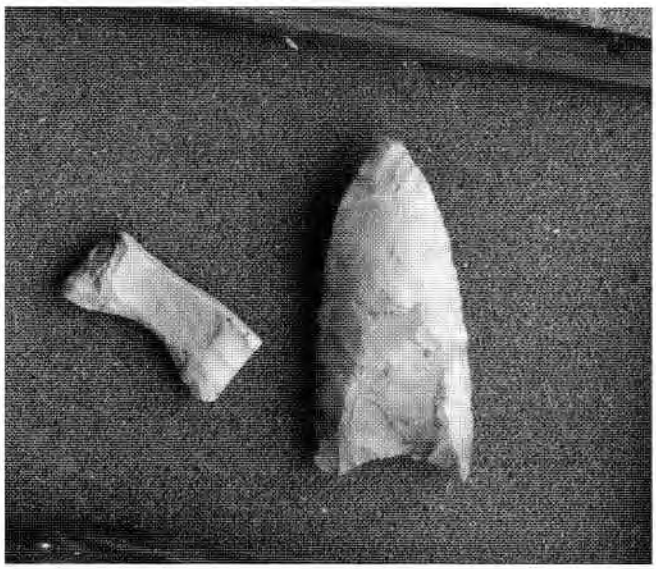


Figure 8. Fluted points in the David Decker collection.

Material: Vitreous gray chert with small red and yellow inclusions. No other data available.

Basal fragment, indented base. Bifacially fluted. Lower lateral edges and base ground. Width is 17.5 mm, thickness 4 mm. Base indented 2 mm. Material: Blue-gray chert with mottling. No other data available.

Intra-Site Distributions

Artifacts that were collected by unit provenience are plotted on Figure 9. Eight items were assigned to "General Surface." Debitage items are plotted on Figure 10. The dashed line overlapping outer parts of the grid represents the estimated boundaries of the site based on tool distribution (Figure 9). The map showing debitage distribution (Figure 10) suggests a somewhat larger area.

The distribution of tools and debitage recovered by excavation confirmed our estimate from surface indications that the occupational remains formerly extended over an area of 1800 sq m. The part that remains after it was impacted by the former bend in the old road is about 1400 sq m in extent. At first glance, there is an impression of high tool density near the center of the grid and the intersection of the two main axes (Figure 9). This is partly because so many contiguous squares were dug in that area. Subsidiary clusters appear to be located to the north, northwest, and southwest of the main cluster. Very few items are seen east of the E0 line. From the E2N14 unit to E15N14, no tools were found. The area south of section E9N4 was destroyed by the road.

Based on the actual figures, the highest ratio of artifacts to size of excavated area is to be found in two areas situated on the north-south grid axis. In the cluster at the grid center, where 35 contiguous one meter squares were excavated, there are 1.3 items per square meter. To the north between E0N23 and E0N29 the density is 1.8 items per square meter, but the area sampled was only 5 sq m.

Densities are significantly lower in the nine squares on the north and west, in the 15 units that adjoined the south end of the main grid area, in the 14 units farther to the south and west, and elsewhere in the investigated area. Possibly further excavation and an enlarged artifact sample would have shown an even, though light, distribution of tools, especially end scrapers, within the dashed boundary. The preliminary impression that there were three primary groupings of tools in the northern, central, and southwestern sectors of the site might not hold up with additional data.

On the map of debitage distribution (Figure 10), items appear superficially to cluster in the central, northern, and southwestern parts of the grid, tending to reinforce the impression gained from study of tool distribution. The differences are relatively small, however, since in no case does the number of identified debitage items per unit exceed 45 and it is generally lower than 30. As in the case of artifacts, the debitage values drop off sharply on the periphery of the grid system, indicating that the site's boundaries were successfully defined.

Although there may be areas of higher and lower artifact concentration within the site, there seems no basis for inferring differential localization of particular activities such as lithic manufacturing, hide-working, or food preparation. The typological range of objects is limited and bifaces and unifaces were present within all of the vague "clusters." Furthermore, the site has been plowed for many years, doubtless dispersing former clusters of associated items as well as expanding the boundaries of tool and debitage distributions beyond their original limits. No features assignable to the Paleo-Indian component were encountered to aid in defining activity areas or associating particular activities with the vague clusters mentioned above.

In addition, the site has been subjected to collecting activity by a number of persons for some years. That activity increased after the site was first reported by Russell Hallock. Six fluted points were removed from the site by Hallock and David Decker alone, although Hallock reputedly never collected scrapers from the site. It is impossible to know how many items were removed through the years by other collectors, thus compromising the original artifact assemblage at the site.

Discussion

Questions might be raised about the single-component status of the site. The recovery of a Beekman Triangle point, pitted stones, and possibly a bannerstone and pestle, suggest the presence of a Late Archaic component, perhaps affiliated with the Laurentian tradition. But years of collecting followed by our excavations have not yielded additional evidence of such occupancy, and if there was a Laurentian occupation of the site it was rather weak and of short duration. Conceivably the Late Archaic items were deposited during casual visits to the immediate locality from more substantial campsites located elsewhere in the region.

The case for nearly exclusive association of the lithic assemblage with Paleo-Indians is threefold: first, the small area of the site (thereby reducing the probability of "contamination" from visits by later groups moving along the ridge); second, its isolation from other sites known to be located on or near the ridge; and third, the preponderance of fluted points over other point types (i.e., the single Beekman Triangle found on site) along with abundant end scrapers of classic Paleo-Indian form. Although Archaic groups may have briefly visited and knapped chert on site long after the previous occupation, it would be difficult if not impossible to distinguish debitage of the one from the other.

Even though the bannerstone and Beekman Triangle are certainly of Archaic origin, the cultural provenience of the rough stone tools is not so straightforward. We could make a case for the Archaic origin of the pitted stones because they are typical of that period and almost unheard of in Paleo-Indian assemblages, and because they are generally assumed to represent the processing of mast foods, not commonly available in the terminal Pleistocene epoch. However, acorns may have been available since fossil pollen data from bogs show that oak trees were present in the spruce-fir forests of the era (Connally and Sirkin 1970 1986). Possibly therefore the pitted stones pertained to the Paleo-Indian occupation. It is far easier to make the case for association of hammerstones and anvilstones with the fluted point occupation because they would be needed to knap chert, because they did occur in abundance on the Paleo-Indian quarry-workshop at West Athens Hill in the middle Hudson Valley (Ritchie and Funk 1973:27, 30), and are sporadically found on other campsites of the period.

The manufacture of bifaces seems to have been a minor activity at the site, because the number of bifaces in process is rather low (only 16.3% of chipped stone tools). Further, some objects tentatively assigned to stage 1 are fragmentary, rather amorphous and nondescript, not well suited to any classification. The raw material for biface manufacture had to be imported to the locality from quarries only a few miles away. It might be conjectured that bifaces were roughed out at workshops near the local chert-bearing outcrops, and brought to the site for finishing. One purpose was presumably to replace the broken fluted points, damaged on the hunt and brought to the site with the basal portions still attached to their shafts. But the absence of finished or nearly finished advanced bifaces is puzzling. Given the relatively large number of unifaces (77% of chipped stone tools – end scrapers constituting 45.2%), one might suppose that their manufacture was the principal stone-working activity on site. This notion can only be resolved by detailed study of the debitage.

The favored explanation for site selection lies in its proximity to subsistence resources, here postulated to have been caribou and other large game. The recovery of the bones of caribou and other species in association with Paleo-Indian campsites in Massachusetts, New Hampshire, and elsewhere in northeastern North America supports this hypothesis (Gramly and Funk 1990).

Comparisons

Detailed comparisons of New York Paleo-Indian sites and assemblages will not be presented here, but will be integrated into a forthcoming report on the West Athens Hill Site, Greene County (Ritchie and Funk 1973; Funk 1976, n.d.). This section therefore will be brief. We have reviewed the data on eleven sites located in central and eastern New York: Zappavigna in Orange County, Duchess Quarry Caves 1 and 8, also in Orange County (Funk and Steadman 1994), "Hallock" in the same county, Port Mobil on Staten Island (Kraft 1977), Twin Fields in Ulster County (Eisenberg 1978), Potts in Oswego County (Gramly and Lothrop 1984), Corditaipe in Oneida County (Funk and Wellman 1984), West Athens Hill in Greene County (Ritchie and Funk 1973), Kings Road and Swale, the latter two also in Greene County (Funk et al. 1969; Funk 1976). The sites vary considerably in location, elevation, topographic context, size, physical character, local resources, relation to bodies of water, incidence of features, evidence for activity areas, and the size and typology of artifact assemblages.

All of these sites are classified as "open-air," except for the Dutchess Quarry Caves. Dutchess Quarry Cave No. 1 (45 sq m), Cave No. 8 (30 sq m), Twin Fields (area 230 sq m), Kings Road and Swale (area 400 sq m each) are the smallest of the sites, and Zappavigna is rather larger at 1800 sq m. Port Mobil is probably the next largest, followed by Potts (5500 sq m), Corditaipe (6730 sq m), and West Athens Hill (totalling 8100 sq m). No information is presently available for "Hallock." The open air sites are located on terrain of low to moderate relief, such as stream terraces, old lake

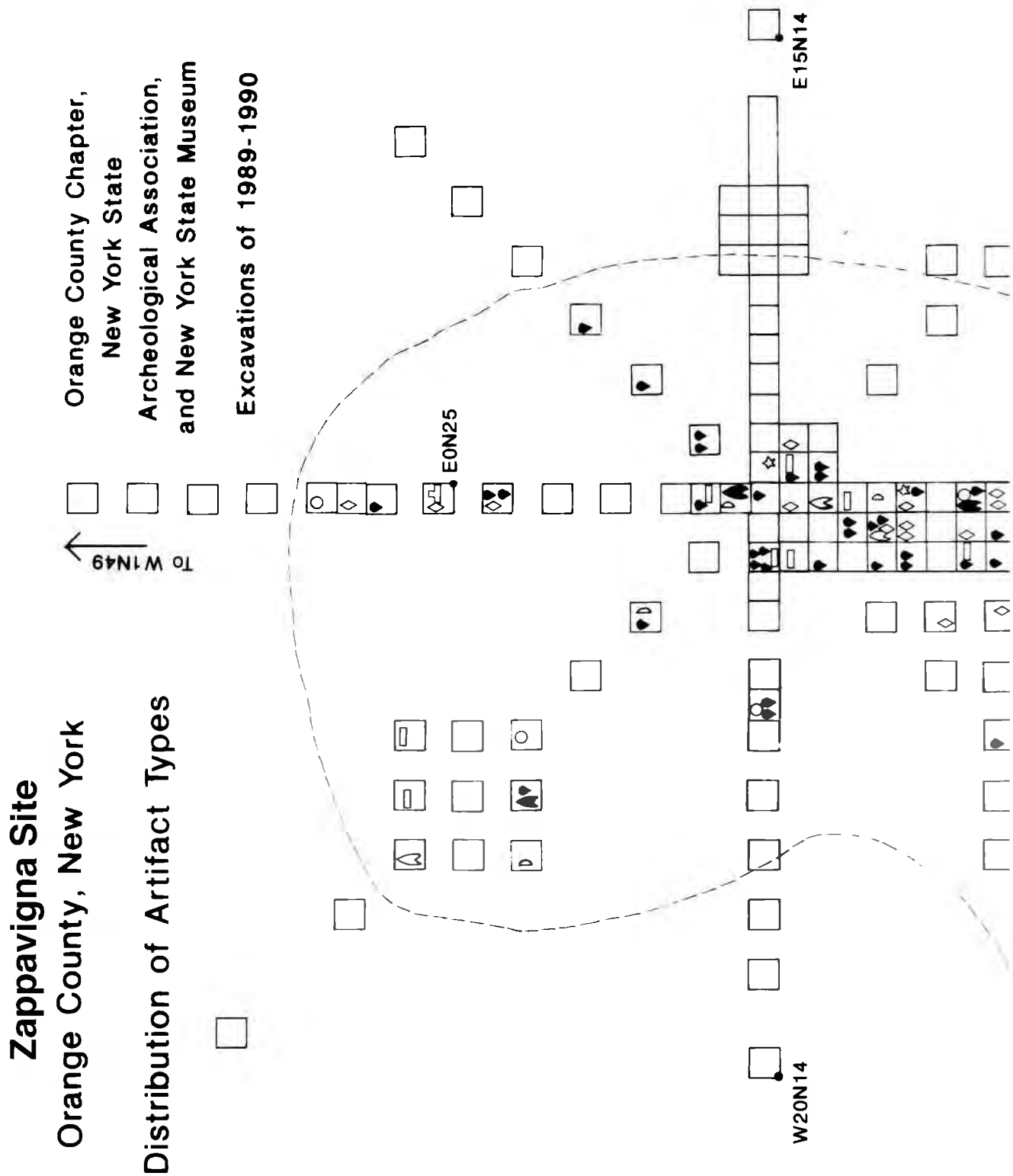
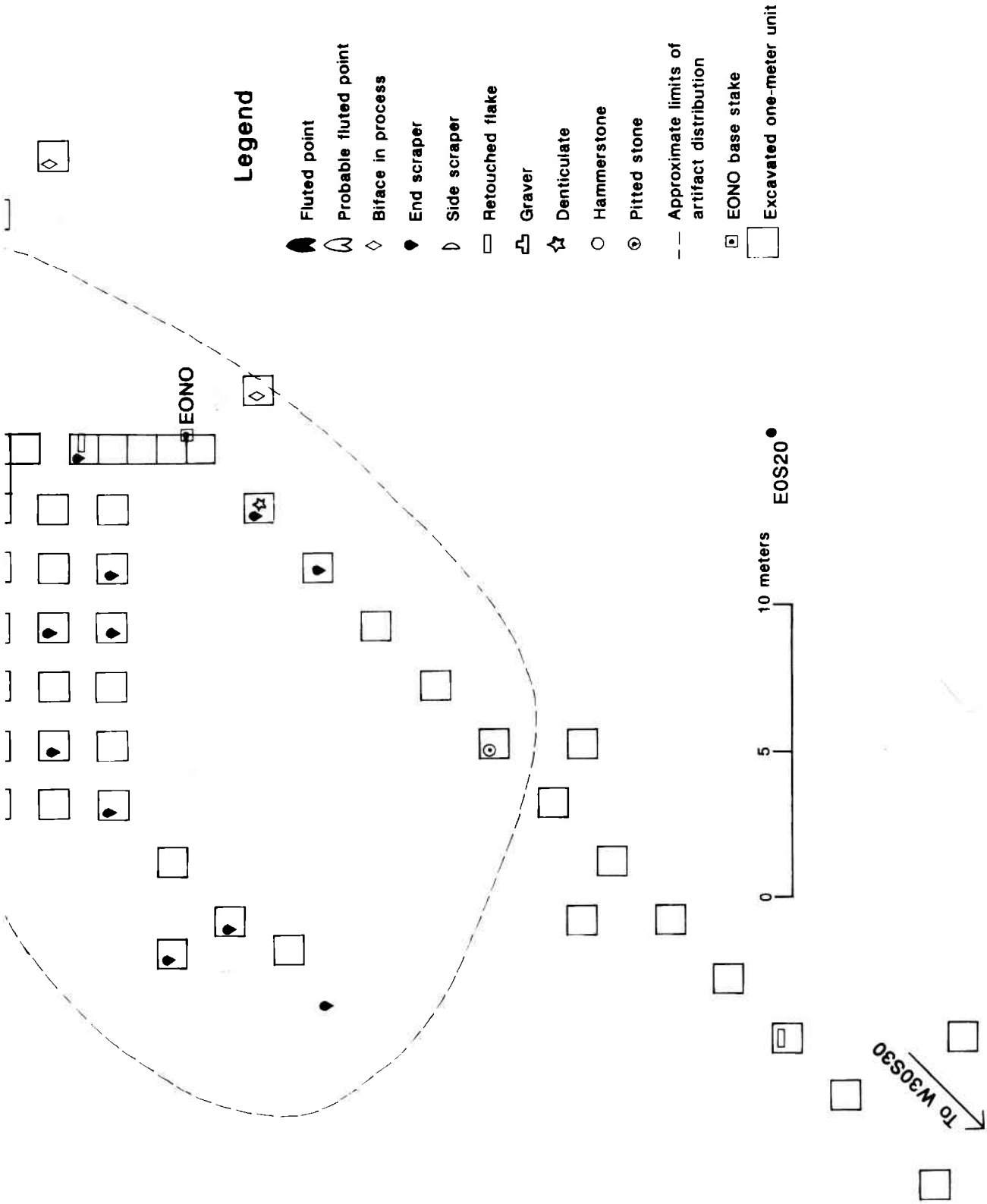


Figure 9. Map of the Zappavigna Site showing the distribution of artifacts.


Legend
Fluted point
Probable fluted point
Biface in process
End scraper
Side scraper
Retouched flake
Graver
Denticulate
Hammerstone
Pitted stone
Approximate limits of artifact distribution
EONO base stake
Excavated one-meter unit
EONO
E0S20
0
5
10 meters
To W30S30

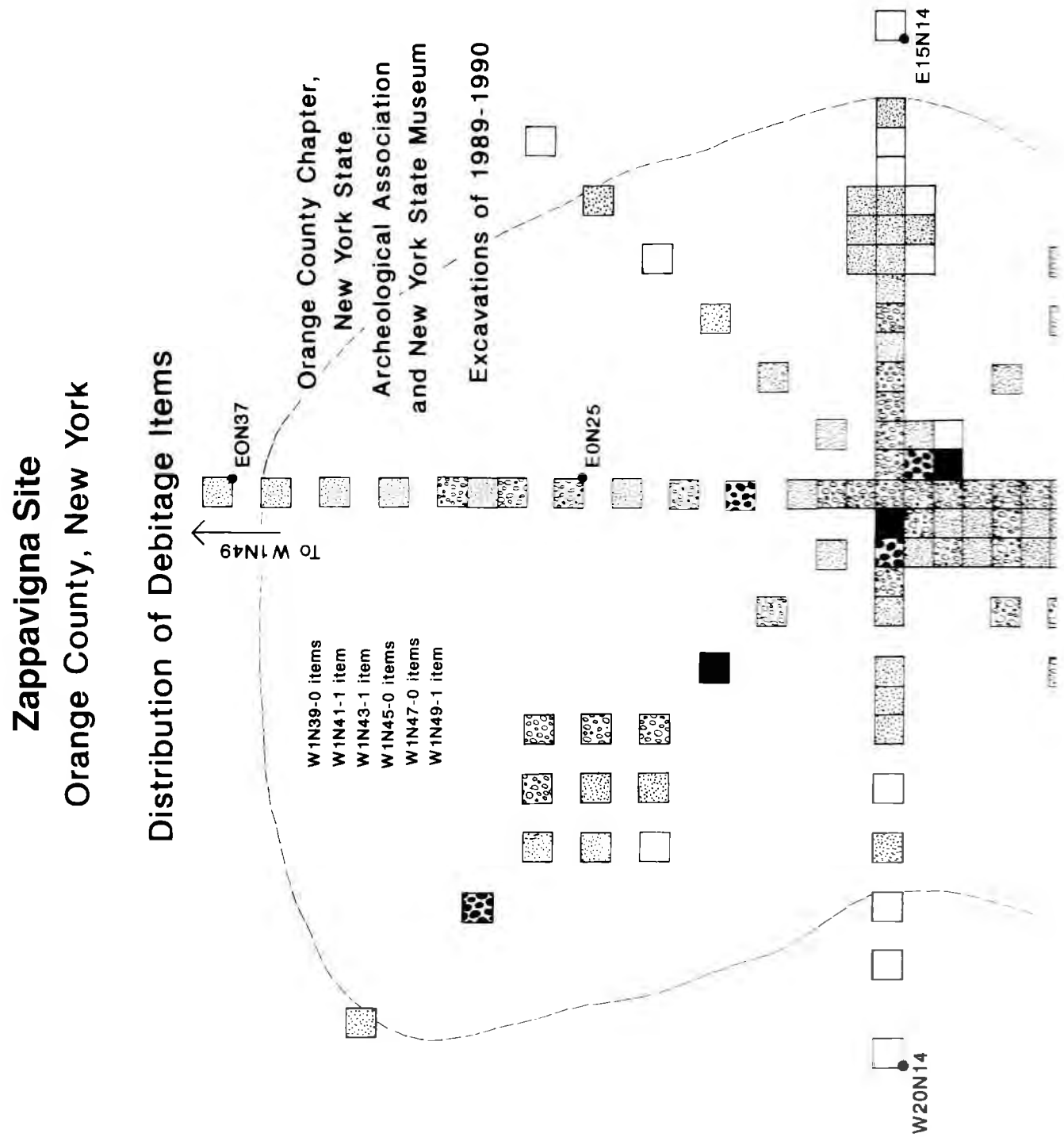
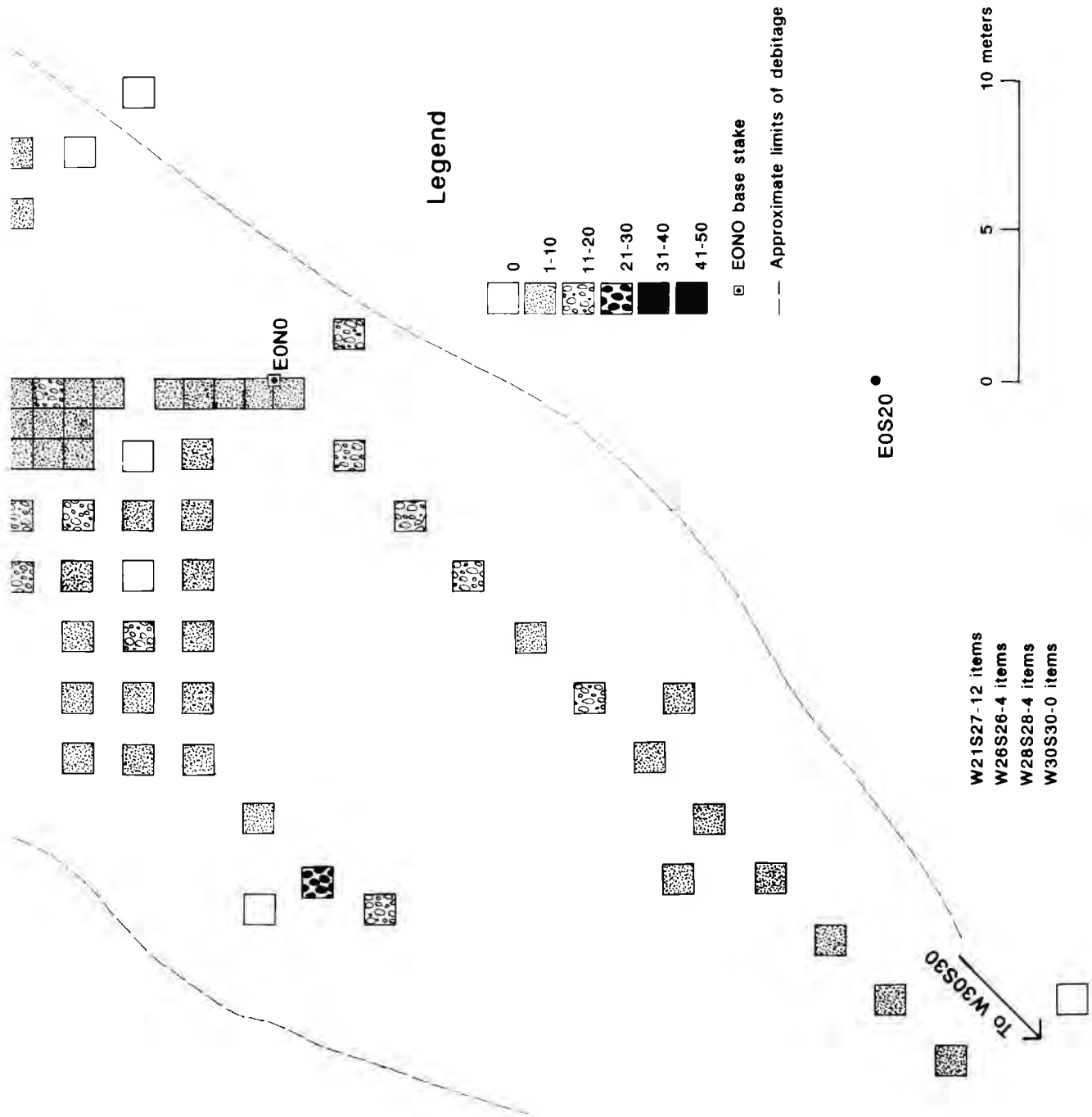


Figure 10. Map of the Zappavigna Site showing the distribution of debitage.


Legend
0
1-10
11-20
21-30
31-40
41-50
EONO base stake
Approximate limits of debitage
0
5
10 meters
EONO
E0S20
To W30S30
W21S27-12 items
W26S26-4 items
W28S28-4 items
W30S30-0 items

plains, drumlin fields, and valley bottom knolls and are close to a source of fresh water. West Athens Hill and the Dutchess Quarry Caves 1 and 8 are on hills well above surrounding flatlands and therefore at some distance from water (no springs are known to be presently active on these hills). Like the majority, Port Mobil is on low-lying terrain and near a small stream, but the nearby Arthur Kill, now a part of the Hudson River estuary, was probably a fresh water stream due to lower sea level in late Pleistocene times.

All of the low-lying open-air sites are assumed to have been primarily hunting stations, even though none have produced associated faunal remains. The Dutchess Quarry Caves were apparently short-term refuges rather than strictly campsites, although they did contain some faunal remains attributed to Holocene period Archaic and Woodland occupations. There is some doubt concerning what the Paleo-Indian occupants hunted and consumed, because direct dating of the bones of flat-headed peccary, giant beaver, and caribou from the sites by tandem accelerator mass spectrometer indicates they were dragged in by predators and scavengers rather than humans (Steadman et al. 1997). West Athens Hill is the only quarry-workshop in the group and failed to produce any subsistence remains.

Stone tool assemblages from the sites show a general similarity, but also evince interesting variability. The sample from Zappavigna is the smallest in the open-air group. In nearly every site sample, unifacial tools heavily predominate over bifaces. The key biface type is the fluted projectile point, which with other items such as biface knives and bifaces in process varies considerably in frequency. For instance, the Zappavigna sample lacks stage 4 lanceolate and ovate knives. Port Mobil lacks identified bifaces in process, and only two such items were recorded at Twin Fields. The proportion of unifacial end scrapers to side scrapers also differs widely from site to site. And some assemblages have a greater diversity of unifaces than others, although classes other than end and side scrapers, including gravers, drills, and denticulates are feebly represented in the collections. Rough stone tools occurred at Zappavigna, Kings Road, and Potts. Though few in number, most of these were cobble hammerstones. As might be expected at a quarry-workshop, hammerstones were far more abundant at West Athens Hill (234 were recovered) and the site also produced anvilstones and grooved stones believed to be specialized abraders.

Based chiefly on the evidence of site locations and the frequencies of artifact types, it seems obvious that the relative importance of activities differed from site to site. Thus for example, apart from the obvious emphasis on chert extraction and lithic manufacture at West Athens Hill, Paleo-Indian components at Port Mobil and the Dutchess Quarry Caves lacked bifaces in process and therefore evidence of biface manufacture. Evidence of biface manufacture is nearly absent at Twin Fields. Although three bifaces in process were recovered from Archaic levels at Dutchess Cave No. 1, none were found in the lowest stratum that produced the fluted point. No bifaces in process occurred in Cave No. 8. Chert debitage was almost entirely lacking in the caves.

Nearly all of the lithic assemblages showed a preponderance of locally obtainable raw materials. There are, however, small quantities of exotic cherts or jaspers in the assemblages. The highest percentages of exotics were seen at Twin Fields (13.2%), Corditaipe (21%), Kings Road and Swale (c. 52%). Most items of non-local stones consisted of red, brown, and yellow jasper, and all, or nearly all, of this material must have been obtained from the well-known quarries in present-day eastern Pennsylvania. A small amount of red chert definitely came from the Munsungan sources in Maine. These differences reflect variable, but often wide-ranging, trade relations between Hudson Valley groups and bands in surrounding regions. At times, groups may have actually traveled from the Hudson drainage to bedrock sources located in what are now Pennsylvania, western New York, and Maine, quarried what they needed, and carried blocks or even stage 1 bifaces made of the materials back to their home territories. But it seems likely that most of the exotic lithics were obtained through trade (exotic lithics are defined as those with sources outside the drainage basin where a particular site is located).

The very high percentage of Pennsylvania jasper at the Swale Site suggests the occupants were newly arrived immigrants from the south and west, perhaps from eastern Pennsylvania, the middle Delaware Valley, or the lowermost Hudson Valley, who were carrying tools made from jasper newly mined at the quarries in Bucks and Berks Counties. Once arrived, the Paleo-Indians at the Swale Site ferreted out the best sources of high quality Normanskill chert in the Greene County area.

Unfortunately for this scenario, the Swale and Kings Road Sites were in close proximity and may represent the same occupation by one band. Nevertheless, the high proportion of exotic cherts to other cherts is striking.

The rather drab aspect of local cherts in the Zappavigna lithic assemblage indicates a population well-established in the Wallkill Valley long after pioneering groups had arrived. This population apparently engaged in very limited efforts to obtain exotic cherts.

Summary and Conclusions

The Zappavigna Site was a small encampment of Paleo-Indians who occupied the ridge crest some time between

11,000 and 10,000 years ago. This chronology is based on cross-dating from typological similarities of fluted points in the assemblage to radiocarbon-dated Paleo-Indian manifestations located elsewhere in the Northeast and over a large area of North America. Stylistic and metrical attributes of the nine recovered fluted points, despite the fragmentary condition of most of them, are strongly reminiscent of the relatively small and thin Cumberland-Barnes style, which is assigned to the middle period of Early Paleo-Indian occupation in the Northeast (Gramly and Funk 1990). Unfortunately, no features were found containing charcoal or other organic remains that might have assisted in radiocarbon dating the site.

Subsistence remains such as mammal bones were also lacking, doubtless long ago destroyed by the moderate soil acidity. We might suggest that the local bands hunted and ate mastodont, caribou, and other late Pleistocene fauna, but we can no longer rely confidently on the data from the nearby Dutchess Quarry Caves to support that assumption. Nevertheless, the association of caribou with Paleo-Indian subsistence has been established beyond reasonable doubt at the Whipple Site in New Hampshire (Curran 1984), Bull Brook in Massachusetts (Grimes et al. 1984) and elsewhere (Spiess et al. 1985). In addition, there is good reason to believe that these early people hunted, or perhaps scavenged, and ate the mastodont, as exemplified at the Hiscock Site in western New York (Laub et al. 1988), and at the Kimmswick Site in Missouri (Graham and Kay 1988). There is little doubt that other large and small mammals, birds, and fish were part of the Paleo-Indian diet.

We can only hypothesize, therefore, that the Paleo-Indians who occupied the Dutchess Quarry Caves, the Zappavigna Site, and other early sites in eastern New York also relied on the caribou and perhaps the mastodont as well as other creatures for sustenance. We return to the question of why the particular location of the Zappavigna campsite was chosen by the occupying band or bands. There are no particular clues in the artifacts, which are very typical of Paleo-Indian assemblages generally (i.e., a large predominance of unifaces as compared to bifaces). Hunting is clearly implied by the points, but what animals were hunted?

A review of the U.S.G.S. 7.5 minute Goshen Quadrangle, and our personal inspection of the area adjoining the site, demonstrated that the local topography does not stand out in comparison to other landforms within the region; there is little indication of what attracted the Indians to that part of Orange County or to the immediate location. Geomorphological and paleobotanical data suggest that environmental change in the vicinity has been minimal since the end of the Wisconsinan glaciation. Possibly a clue is to be found in the position of the site, on the eastern slope of the ridge crest, overlooking a large, semicircular depression. The nearly flat bottom of the depression is 12 m lower in elevation than the site. The depressed area is several acres in extent, bordered by the ridge on the west and on the north and east by terraces at the same elevation as the ridge. On its south side, the depression is open to a shallow, marshy area containing a small brook at the headwater drainage of the Otter Kill. Therefore the depression had the appearance of a natural amphitheater.

Fishing does not seem to have been a likely attraction in that part of the drainage, and during the terminal Pleistocene epoch mast foods, principally acorns, would have provided only minor sustenance. We speculate that the flat area, though marshy in places, was favored as a place where mammals such as caribou tended to congregate and browse on vegetation. Paleo-Indians occupying the ridge would have been able to monitor the movements of game on the flats below. Occupation may have been seasonal, in winter for example. We can readily imagine animals taking shelter from bad weather in the depression, huddling close together at the foot of the ridge to escape frigid prevailing winds, blowing in from the north and west and bringing rain and snow. The animals would have provided easy prey for Paleo-Indian hunters.

The unifaces in the assemblage display evidence of application to tasks that would create mild abrasion, smoothing, and polish, rather than heavy abrasion, step-flaking, and crushing. The type of wear observed is more likely from use in working pliant materials such as animal hides, bark or soft wood rather than bone, antler, and other hard, resistant substances.

The small size of the site, the limited range of artifact types, and the weak evidence of activity clusters within its bounds, suggest Zappavigna was a short-term camp, occupied just once by a small Paleo-Indian band, composed of at most a few families. We hypothesize that the locality was chosen for its access to game in the nearby low, flat-bottomed depression. A successful hunt was followed by butchering of carcasses and the processing of hides for clothing, skin containers, and other needed items. There may have been some working of bone for tools and ornaments. Some chert-knapping took place, and broken weapon tips were discarded. If any projectile points were made on site, most of them were fitted to shafts and carried off to hunting grounds, leaving behind the discarded fragments of points previously broken on the hunt. The site was abandoned after a short time, perhaps just a few days.

The Zappavigna Site is the ninth Paleo-Indian station so far reported in the Hudson Valley[3]. Although it has not pro-

[3]The list comprises Zappavigna; the Dutchess Quarry Caves 1 and 8 (Funk and Steadman 1994); a second surface site in the Wallkill

vided any surprises, it has contributed to the growing body of knowledge about the earliest humans to live in the Northeast. It is increasingly obvious that many other small, inconspicuous sites of the period exist throughout the area, suggesting that Paleo-Indians were more numerous than archaeologists suspected as recently as 15 years ago.

Acknowledgements

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Valley (here referred to as "Hallock" to protect the site pending permission to investigate); the Port Mobil Site on Staten Island (technically in the lowest Hudson drainage; Kraft 1977); Twin Fields on the Dwar Kill in Ulster County (Eisenberg 1978); the Kings Road Site (Funk et al. 1969), the West Athens Hill Site (Ritchie and Funk 1973), and the Swale Site (as yet not published), all in the middle Hudson Valley.

[4]It is with great sadness that we mourn the loss of George R. Walters who died after a short illness.

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A Fluted Point from the Wallkill River Valley

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One of the most compelling issues in contemporary anthropology is the nature, timing, and origin of the "First Americans." This question is asked not only of the Americas in general, but geographically specific areas as well. In the Northeast the First American, or Paleo-Indian, presence is known from an ephemeral scattering of artifacts. On June 16, 1999, a small, well-made fluted projectile point was found in southeast New York near the Wallkill River (NYSM 9473) in the Town of Clintondale, Ulster County during an archaeological field survey. It was a surface find on the floodplain of a formerly cultivated field about 200 ft above sea level. While an unprovenienced projectile point cannot be accurately dated, its apparent style, if diagnostic, can suggest a stylistic influence or a cultural affiliation. An analysis of this point's attributes revealed that it is a Barnes-style point, a signature projectile point of Paleo-Indian in the Northeast. Barnes points are associated with the Parkhill Complex of Southern Ontario, with sites dating to about 10,500 years before present. It was recovered directly along a 113-mile corridor used by Paleo-Indians between northern New Jersey and the upper Hudson River Valley in New York. Using this point as a focus, I will review what is known of the Paleo-Indian presence in the Wallkill Valley in the late Pleistocene. There are seven primary sites with four peripheral sites that may be related.

Introduction

At the end of the Pleistocene epoch the Wallkill River Valley was still rebounding from the effects of the Wisconsinan glaciation. The nearby Hudson River, of which the Wallkill is a tributary, was becoming an estuary and Paleo-Indians had become a nomadic presence in the Northeast. The Wallkill Valley is about 65 mi long and 20 mi wide. From its origin, the Wallkill River flows 70 mi northeast from northern New Jersey to Rosendale, in Ulster County, New York, where it meets Rondout Creek. From there, the convergence heads northeast for 5 mi where it meets the Hudson River, 100 mi from the sea, at Kingston. The Wallkill Valley is bounded on the west by the Kittatiny and Shawangunk mountains and on the east by the Marlboro Mountains and the Hudson Highlands (Eisenberg 1978:152). And it was here, 10,500 years ago, that a small fluted point became separated from its owner along the floodplain of the present-day Wallkill River. All dates reported here are expressed in radiocarbon years before present.

Ecology of the time

The Wallkill Valley paleo-environmental setting was the product of the protracted effects of the 9,000 ft thick Laurentide ice sheet. Following glacial maximum in southeast New York, c. 21,750 B.P. (Cadwell 1986, personal communication 2001), deglaciation began in the Wallkill Valley about 17,000 years ago (Connally and Sirkin 1970; Connally and Sirkin 1986:50). The final glacial retreat left high ground to the south (terminal moraine dams, i.e., hills of glacial debris) that prevented drainage and formed a series of proglacial lakes. The last of these, Lake Albany, occurred at the 200 ft level, inundating the lower Wallkill Valley (Funk 1976:208; Eisenberg 1978:19). All proglacial lakes drained to the Hudson River by 12,000 years B.P. leaving much of the Wallkill Valley covered by lake sediments: sand, silts, and clays (Connally and Sirkin 1970:3299; Eisenberg 1978:152; Funk and Steadman 1994:13; Schuldenrein 1995:48). This led to the Wallkill Valley of 10,500 years ago, amidst boggy wetlands, well-drained uplands, and mixed forests of spruce, fir, pine, cedar, and oak. Pollen analyses show that the adjacent Hudson River valley contained spruce-fir woodlands and a mixed assemblage of arboreal and temperate taxa (Maenza-Gmelch 1995:1).

Paleo-Indians

Sea level was still considerably lower at the end of the Pleistocene, and glacially exposed coastal plains, river valleys, and game trails provided Paleo-Indians with a road map into the Northeast. They were drawn here by a moderating climate, the ease of passageways, an abundance of high-quality lithics, the increasing reliability of resources such as anadromous fish, waterfowl, upland game, and various wild fruits and nuts. Of course their entry may also have been abetted by curiosity and the human spirit of exploration. Ultimately, an early human entry into the Northeast is tied inexorably to the timing of glacial retreat, presumably the most recent Wisconsinan glaciation. Other factors such as the wasting and re-advance of ice sheets, the formation and draining of pro-glacial lakes, the dramatic drop and subsequent modest rise in sea level, isostatic rebound of the land, and the succession of ecological

communities that could support human existence, all played a major role.

Paleo-Indian presence in New York State was first documented by William Ritchie (1957) in his report on their major diagnostic tool, the fluted point. Their lifeways in the Northeast have been described as consisting of bands of restricted wanderers (Ritchie and Funk 1973:336; Eisenberg 1978:139), groups of 4-5 nuclear families, perhaps fifty individuals, effectively working a wide variety of resources within regular spatial and seasonal cycles of availability, within a relatively confined geographic area (Ritchie 1957:6-7; Ritchie and Funk 1971, 1973:71; Eisenberg 1978:139). Ultimately, fluctuations in resource availability—abundance and scarcity—may have taken them farther afield. Like many river valleys in the Northeast, the Wallkill is glacially aligned southwest to northeast and has been characterized as a Paleo-Indian passageway, a least-cost route, following game herds to chert quarries from northern New Jersey to Greene County, New York, and on into the upper Hudson watershed (Kraft 1973:64; Ritchie 1994:8). It is logical to assume that these movements ran in both directions.

How old is the Paleo-Indian presence? A significant problem in dating late Pleistocene sites in the Northeast has been the lack of datable organics for radiocarbon analysis (Curran 1996:2). Archaeologists must rely on deposits from known (datable) geologic events, such as glaciation, terminal moraines, and glacial lake drainage. One example of this correlation is the Davis Site in New York's Essex County. Paleo-Indian artifacts found at the Davis Site have an apparent association with a late Pleistocene Champlain Sea strand line that has been dated to about 11,300 years B.P. (Loring 1980:32). The Davis Site notwithstanding, there is little unambiguous evidence of humans in the Northeast prior to 11,000 years B.P. (Gramly and Funk 1990:6).

Fluted Point Chronology

Fluted points, relatively rare and emblematic of Paleo-Indians, who are believed to be the first people to enter the continent, have been a holy grail for American archaeologists. Lanceolate form and fluting from the base in manufacture gives these tools a distinctive look. While there are many regional variations, the original fluted point, or Clovis form, is named for its type site, Blackwater Draw, in Portales, near Clovis, New Mexico. The first Clovis points were discovered by Ridgely Whiteman in 1929 and are associated with extinct Pleistocene mega-fauna such as mammoth and mastodont. Clovis, as well as some intermediate forms, comprise the Llano Complex and the generally accepted temporal range of this form is 11,200-10,800 years B.P. (Taylor et al. 1996; Boldurian and Cotter 1999:10).

An overlapping but slightly later variant on the basic fluted form is the Folsom point, first discovered by George McJunkin in 1908 at Wildhorse Arroyo, near Folsom, New Mexico. Folsom points are associated with bison, including the extinct giant bison, *Bison bison antiquus* (Thomas 2000:155). The generally accepted temporal range of this form is 10,800-10,000 years B.P.

Both of these fluted point forms have become generic terms to include many stylistically and temporally similar forms throughout North America and the Northeast. The type-names of these similar forms, Bull Brook, Debert, Holcombe, Shoop, Simpson, Suwannee, Reagan, Redstone, Ross County, and Vail, among others, are often based on whether we are inclusive or exclusive when categorizing stone tools—the "lumpers vs. splitters" issue that is pervasive in the typologies of natural history.

Eastern Fluted Points

There is some question as to whether western fluted points were ancestral to, coeval with, or followed the eastern forms. Dates in the greater Northeast are generally equal to the oldest dates found in the Southwest, a provocative thought that leads some archaeologists to consider the possibility that the first humans in the North America came not from Asia, but from Europe (Chandler 2002:11). A few of the older dated sites are Bull Brook in Massachusetts, 11,300 years B.P. (Byers 1959), Vail in Maine, 11,300-9,800 years B.P. (Gramly 1982:58,60; Levine 1990:59), and the Debert site in central Nova Scotia, 10,701-10,600 years B.P. (McDonald 1968; Levine 1990:59). In Pennsylvania, on the periphery of the Northeast just below the extent of terminal moraine, radiocarbon dates of 14,000 years B.P. have come from the Meadowcroft Rockshelter (Adovasio et al. 1977:152-153).

The eastern fluted point chronology, as we know it, mirrors the limited radiocarbon dated evidence of humans in the Northeast. The most widely cited Northeast typology of eastern fluted points spans an 800 year range from 11,000 to 10,200 years B.P. (Deller and Ellis 1992:126; Gramly and Funk 1990:5; Curran 1996:3), representing Early through Late Paleo-Indian phases (Table 1). These styles cover an area stretching from the Great Lakes to the Canadian Maritimes to southeast New York, northern New Jersey, and northern Pennsylvania.

This Eastern fluted point sequence is a combination of two very similar typologies, one proposed by Deller and Ellis (1992), and the other by Gramly and Funk (1990). It is inclusive only in the degree to which archaeologists interpret the artifacts; it is likely that the total range of variation of the many intermediate forms in the eastern fluted point assemblage is not adequately represented in the current typology. William Ritchie, in his *New York Projectile Points: A Typol-*

Table 1. Eastern Fluted Point Chronology.

Type	c. years B.P.
Shoop-Debert-Gainey	11,000-10,700
Barnes/Cumberland	10,600-10,500
Crowfield	< 10,500

ogy and Nomenclature (1971:21-22) uses the overarching generic "Clovis" type for all New York State fluted points.

Cumberland and Its Allies

As the fluted point style became widespread across North America by the late Pleistocene, the range of variation included obvious differences as well as many shared traits. Some of these shared traits were found to exist between the Northeast and Southwest forms. There is a typological relationship, or stylistic influence, between Cumberland and Barnes points, and a stylistic similarity between both of them and Folsom points from the High Plains and Southwest. Dragoo considered the Cumberland, and the Barnes variation, as the eastern temporal equivalent of the western Folsom point (1990:8-9). Deller and Ellis observed that the Barnes point's general morphology suggests the Folsom style (1992:126), and that it had a somewhat "Folsom look" to it. Curran remarked that some Barnes points resemble "miniature Cumberland fishtails" (1996:4), while Wright and Roosa noted that the "fluting techniques on the [Barnes] points were similar to that on Folsom points, [but] the point type was otherwise unique" (1966:850), and "...certainly Folsom and probably Cumberland points were similarly fluted" (1966:859). In commenting on the Cumberland/Barnes association, Deller and Ellis noted the similar narrow basal width (<20mm) and long flutes (1992:36). Justice (1995:27) includes the Cumberland-Barnes as a variant in the Folsom cluster, or family, of late Paleo-Indian projectile points.

Barnes Point

Although the type site for the Barnes point is in Michigan, it is a diagnostic part of the Parkhill Complex that included much of the late Pleistocene spruce-pine dominated forests of southern Ontario (Deller and Ellis 1982,1992:1). Parkhill-Barnes complex sites are associated with the ancient shoreline (main strandline, c.11,200-10,400 years B.P.) of glacial Lake Algonquin (Deller and Ellis 1988; Ellis and Deller 1990; Dincauze 1993:288), with most sites dating 11,000-10,000 years B.P. (Deller and Ellis 1992:7). Although the Cumberland point is more common, the Barnes variety is not unknown in New York State. William Ritchie recovered a Barnes point from near Gowanda, in Erie County, New York (Ritchie1957:PL.10B,b).

The specific Barnes-style fluted point found along the Wallkill in June 1999 (Figure 1) had been heat-treated in order to facilitate its manufacture. Geologist Phil La Porta identified the lithic as a rosy-white, high quality chert, from a Big Springs member of the Epler Formation (La Porta 1994:59, personal communication 2000). The chert had originated in a quarry 55 mi south of where it was found, at the lower end of the Wallkill Valley corridor near Branchville, Sussex County, New Jersey. David Meltzer (personal communication 2000) and David Hurst Thomas (personal communication 2000), in separate analyses, observed that its relatively short length and numerous retouch scars indicate that this point was once longer and that, since it is not ground on its edges or base, it may be an unfinished, broken, reworked, or resharpened javelin or atlatl (spear-thrower)

Table 2. Morphometric Comparison: Wallkill "Barnes" Fluted Point vs. Barnes

		Wallkill "Barnes"	Parkhill Barnes
Weight		8 g	
Total Length (TL)		46 mm	Medium to small
Basal (proximal) width		22 mm	Basal ear flaring
Midpoint width		26 mm	
Height to midpoint width		24 mm	
Distal width		10 mm	
Basal concavity depth		4 mm	3-5 mm
Flute length(s):	side 1	19 mm	Well-fluted, not as well as Folsom
	side 2	39 mm	–nearly to tip one side.
Thickness		5 mm	
Sides		~75°	Parallel (90°)

Figure 1. Barnes fluted point. Photograph by Dan Duvall.

tip. New York State Archaeologist emeritus, Robert Funk, identified it as a probable Cumberland-Barnes point variant (Funk, personal communication 2001). Table 2 compares metric data for the Wallkill "Barnes" point with descriptive data regarding Parkhill Barnes points.

Paleo-Indian Sites

The framework for the Wallkill Valley corridor and the Wallkill-Barnes find consists of some major Paleo-Indian sites over approximately 113 mi, from the Plenge site in northern New Jersey to the Kings Road site in Greene County, New York (Kraft 1973:58,60). Many Paleo-Indian sites tend to be quarry sites and quarry-camps (Ritchie 1983:30), possibly because these sites are selectively available for discovery based upon their elevated and well-drained location. Floodplain sites, such as the location of the Wallkill-Barnes point find, may no longer be intact or accessible due to differential preservation, seasonal inundation, erosion, or human disturbance. The Wallkill-Barnes point, almost certainly not found in situ, may have been carried naturally to this location on the floodplain from upstream.

Some archaeologists have described Paleo-Indian habitation sites as being dry, level, well-drained, and generally elevated above flood plains (Gramly and Funk 1990:12). Others have proposed a combination of lowlands and wetlands as well as upland bluff or ridge sites (Eisenberg 1978:138). While Paleo-Indians may have avoided sandy floodplains for elevated landforms with good drainage for camps, the distributional pattern of sites and isolated finds in the Wallkill Valley, from floodplain to uplands, as well as the broad range of tools in artifact assemblages, suggests that Paleo-Indians had a broad economy. This included hunting and fishing, foraging and gathering, as well as the procurement and processing of aquatic resources. These likely took place on the river floodplains and in coastal areas. Taken in total, the sum of these opinions is that Paleo-Indians probably lived anywhere they pleased.

Mid-Hudson, Wallkill Valley Paleo-Indian sites

1. Twin Fields, a multi-component site in Ulster County, is located 10 mi southwest of the Wallkill-Barnes find. The site is 320 ft above sea level on a high bluff overlooking the Dwaar Kill (Eisenberg 1978:123,150). The Paleo-Indian component contained a total of four broken fluted points. One has been described as being of "light gray, high-grade chert" (Eisenberg 1978:153), a description nearly identical to the Wallkill-Barnes fluted point. The Paleo-Indian period component remains undated.

2. Dutchess Quarry Caves in Orange County is 33 mi southwest of the Wallkill-Barnes point find. This site overlooks a former flood plain of swamps and wetlands. It is now a "black dirt" agricultural area with onion fields and other produce. The site consists of a series of eight caves aligned northeast to southwest at 500 ft above sea level along Mount Lookout, 1.5 mi north of Florida, New York (Guilday 1969:24; Funk and Steadman 1994:10).

Three of these caves, numbers 1, 2, and 8, contained artifacts and faunal material. George R. Walters and William F. Ehlers Jr. discovered and conducted some preliminary excavations at Dutchess Quarry Cave No. 1 in 1964; John S. Kopper discovered Dutchess Quarry Cave No. 8 in 1977-1978. These two caves contained a mix of artifactual material, evidence of both late Pleistocene and Holocene human occupation, and have provided the sum of what is known about the site with regard to a Paleo-Indian presence.

Cave No. 1 was excavated from between 1965 and 1967. The remains of woodland caribou (*Rangifer tarandus*), now extirpated in New York State, were common at the site. A ^{14}C date of 12,530 ±370 years B.P. was obtained from caribou bone collagen from Stratum 2 (Funk and Steadman 1994:73). A Cumberland fluted point was found in the same stratum, though not in direct association with the caribou remains. Later analysis of purified caribou collagen by accelerator-mass spectrometer (AMS) produced a range of 12,720 ±70 to 13,840 ±80 years B.P. AMS bone collagen analyses were also made of two extinct mammal species found at the site, flat-headed peccary (*Platygonus compressus*), 12,160 ±80 to 12,430 ±70 years B.P., and giant beaver (*Castoroides ohioensis*), 11,670 ±70 years B.P. (Funk and Steadman 1994:73).

While the recovery of fluted points at the site indicates a Paleo-Indian occupation, the temporal variance between the point style (c. 10,500 years B.P.) and the AMS dates, makes a reliable correlation untenable. Considering the presence of a Cumberland fluted point, one interpretation of Dutchess Quarry Caves makes it a Late Paleo-Indian site, and that the bones of caribou, peccary, and giant beaver came as a result of bioturbation, brought onto the site by predators or scavengers, and were not associated with Paleo-Indians.

3. West Athens Hill, located on a rocky ridge 400 ft above sea level, is located in Greene County 40 mi

northeast of the Wallkill-Barnes point find. R. Arthur Johnson discovered this site in 1962, 2.3 mi west of the Hudson River near Athens, New York (Funk and Johnson 1964; Funk 1976:205; Eisenberg 1978:92,139;). It has been interpreted as a "quarry-workshop-campsite" for green, black, and gray Normanskill cherts (Funk et al. 1969:1; Funk 1973; Eisenberg 1978:92). Although no hearths were discovered, semi-circular artifact clusters in peripheral areas have been interpreted as possible camps and possibly evidence for nuclear family domiciles (Funk 1976:205). Thirty-eight whole or fragmentary fluted points were among the over 1400 stone tools recovered (Eisenberg 1978:94). Like many of these sites, West Athens Hill in the Paleo-Indian period remains undated.

4. Kings Road, in Greene County, is located on a small rise in a cultivated field 43 mi northeast of the Wallkill-Barnes point find. Thomas Weinman discovered this small site in 1966. It is situated on clay flats—deposited by glacial Lake Albany—southwest of Coxsackie and only a few miles north of the West Athens Hill site. Funk observed that the artifact assemblage here, over 400 stone tools, was very similar to those at West Athens Hill (Funk 1976:206). An outcropping of high-grade Normanskill chert is very near the site (Eisenberg 1978:107). Although there were many artifacts fashioned from Pennsylvania jasper, there was no evidence of lithics from northern New Jersey (Funk et al. 1969:12; Funk 1976:206; Weinman and Weinman 1978; Funk, personal communication 2002). Three broken fluted points were recovered here, but the Paleo-Indian occupation period is undated. An extension of the Kings Road location is the Swale site. Nearly 50% of the artifact assemblage collected here are of exotic Pennsylvania jasper (Funk, personal communication 2002).

5. Flint Mine Hill, located 5 mi north of West Athens Hill near Coxsackie in Greene County, is 46 mi northeast of the Wallkill-Barnes point find. Flint Mine Hill is a multi-component quarry site surrounded by extensive workshops and small camps. Although two fluted points were recovered from this site, the lack of debitage has led to the interpretation that it was strictly a quarry, and not a workshop for finishing tools (Ritchie and Funk 1973:333; Funk, personal communication 2002). The Paleo-Indian occupation period is undated.

6. Zappavigna, a small encampment near Hamptonburgh in Orange County, was discovered by Russell Hallock. It was excavated in 1989-1990 by Robert Funk, Beth Wellman and the Orange County Chapter of the NYSAA. The site was confined to the plow zone, producing fluted points and scrapers. Since there were no features with datable organics, this site is undated (Funk, personal communication 2002).

7. The "Hallock" site, also discovered by Russell Hallock, sits on high ground overlooking the Wallkill River in Orange County. This site has yet to be fully investigated (Funk, personal communication 2002) and, as such, is undated.

Peripheral Paleo-Indian sites

1. The quarry from which the chert for the Wallkill-Barnes point was procured is located near Branchville, Sussex County, New Jersey, 55 mi southwest of where it was found. This quarry's contribution to the Paleo-Indian economy in the Wallkill Valley corridor is yet to be determined

2. The twenty-three acre Plenge Site, located on a gently sloping terrace adjacent to the floodplain of the Musconetcong River in Sussex County, New Jersey (Eisenberg 1978:49) is 70 mi southwest of the Wallkill-Barnes point find. It was known as a source of Indian artifacts for many years and credit for its discovery must be distributed among many individuals (Kraft 1973:59). The recognition and analysis of Paleo-Indian artifacts began in 1972 and as many as 117 fluted points and preforms have been recovered (Eisenberg 1978:59). The Paleo-Indian period component remains undated.

3. The Port Mobil Site, on Staten Island in Richmond County, consists of three small contiguous sites: North Beach, Charleston Beach, and Port Mobil. It is located 89 mi southeast of the Wallkill-Barnes point find. The Port Mobil site, discovered in 1967 by Joseph Bodnar and others, is on an eroding slope above a tidal beach of the present-day Arthur Kill, a Hudson River tributary. It is currently 10-52 ft above present sea level. Recovered fluted points range in length from 23.5 to 51.0 mm, one of which has been described as a "miniature Cumberland variety" (Kraft 1977:7). The Paleo-Indian period component of the Port Mobil Site is undated.

4. The Shawnee-Minisink Site, situated on an alluvial terrace above the Delaware River near Stroudsburg, Pennsylvania, is 76 mi southwest of the Wallkill-Barnes point find and outside of the Wallkill Valley corridor (Carr and Adovasio 2002). However, it is the only reliably-dated Paleo-Indian context in the region. The ^{14}C dates from the Paleo-Indian component of this site cluster around 10,500 years B.P. (McNett et al. 1977:284; Eisenberg 1978:120; Dent 2002:72). Levine's analysis of radiocarbon data from this site suggests 95% confidence rate that there was a Paleo-Indian presence at Shawnee-Minisink between 9,900-11,190 years B.P. (1990:59).

Paleo-Indian and Pleistocene Mega-fauna?

There is the intriguing possibility that the first humans in the Northeast came face-to-face with many of the so-called mega-fauna that eventually disappeared at the end of the Pleistocene. This association is well documented in the American Southwest (Haury 1953). Extinct taxa such as the woodland musk-ox, flat-headed peccary, giant beaver, stag-moose, mastodont, and mammoth, as well as others that have become extirpated, like the woodland caribou, American elk, mountain lion, and the California Condor, may have shared the landscape, however briefly, with Paleo-Indians in the Wallkill Valley corridor (Kurtén and Anderson 1980; Funk and Steadman 1994; Laub 2000). There is ample evidence for the presence of a late Pleistocene mega-fauna on the exposed Atlantic continental shelf, but these now lie under many fathoms of seawater. Evidence of a Paleo-Indian presence on these coastal plains may likewise lie buried (Whitmore et al. 1967; Funk 1991).

Radiocarbon dates from four mastodont sites in southeastern New York and northern New Jersey range from 10,000-11,000 years B.P. (Kraft 1973:63), coeval with the presence of Paleo-Indian. Some mastodont sites, such as Hyde Park in Dutchess County at 11,480 ±60 years B.P. (David Burney, personal communication 2000), date slightly beyond the oldest known Paleo-Indian presence. Others, such as the Hiscock Site in Genesee County, with associated bone tools dating 10,810-10,990 years B.P. (Laub et al.1996; Laub 2000; Laub, personal communication 2001), fall within a known period of Paleo-Indian occupation. Their shared ecological zone was probably a mix of spruce and coniferous lowland bogs and swamps, as well as deciduous vegetation in well-drained uplands (Eisenberg 1978:122). The attraction of mastodonts to the boggy ecotones would favor their entrapment, predation, or scavenging by humans, and the preservation of their remains (Eisenberg 1978:121).

Summary

What can we know about the people who made the Barnes-style fluted point that was found on the floodplain of the Wallkill? It is estimated that 95% of all Paleo-Indian artifacts were perishable (Adovasio, personal communication 2001). Therefore we are left to make assumptions about their lifeways with the 5% that remains. Putting a human face on them is left to the interpretation of fluted points, other stone tools, and the remainder of that small percentage of their material culture that has survived ten millennia.

The placement of this point in time is very imprecise. If interpreted as a Barnes-type fluted point, then it dates stylistically to about 10,500 years ago; however, inferring anything from a single fluted point find is problematic. Coupled with the fact that Paleo-Indian sites in the Northeast have not provided much datable context, its cultural, as well as temporal interpretation becomes pure conjecture. David Hurst Thomas makes the point that not every find indicates a site. An isolated artifact is not unusual for material culture of non-sedentary people (Thomas 1975:81). Gramly and Funk add that on stable glacial landforms artifacts may lay ou or near the surface for millennia (1990:13). While further investigation of the Wallkill-Barnes find "site" may occur, none are currently planned.

Although this fluted point likely lost its primary context and original provenience, and it would be easy to view it as an isolated find, we can still frame the location in the context of the Wallkill River valley corridor between peri-glacial areas of New Jersey and Pennsylvania and the chert quarries of the Wallkill and Hudson Valleys. What we know for certain is that we have a point of a style that was common to the northwest of where it was found, and it was manufactured from a lithic found to the south. The Wallkill River Valley has provided another bit of evidence of its function as a regional late Pleistocene conduit for Paleo-Indian.

But are these even the tools, Barnes points or otherwise, of the first humans in the Northeast? There is currently a renewed interest within American archaeology in reconsidering the validity of the Clovis-first paradigm. John Cotter (Bouldurian and Cotter 1999:xviii) expresses the sentiments of many when he says that the first human entry into North America "...could have extended as far back in time as the sea level and ice extent made passage possible. 20,000-50,000 years ago." Presently, there is no irrefutable evidence of a pre-Clovis presence in the Northeast. It may be that we are looking in the wrong places, that we have yet to recognize tools of an earlier tradition, or that the scouring effects of the Wisconsinan ice coupled with sea level rise may have erased the evidence of such a culture.

Acknowledgments

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I would like to dedicate this work to the late Dr. Robert E. Funk, the consummate scientist, the epitome of a professional, and a good friend. Those of us who were weaned on New York State Archaeology through Bob's "Blue Funk" (1976) will always share a common bond. No matter how busy he was, Bob always had time for us.

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The Lieberman Site: A Multi-Component Wallkill River Valley Site

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In the early 1960s the Orange County Chapter excavated a site located in the Town of Warwick, Orange County, New York, on the Pochuck Creek. It was called the "Hallock Site" after its finder, Russ Hallock, a dedicated field walker. No report has been produced to date. Some of the artifacts and most of the catalog cards are in the chapter's possession. When an opportunity arose to test a site only a few hundred yards to the north, we expected to find materials linking the occupation of the two locations. The current site, known as the Lieberman Site, was investigated in 1998 and 1999 by members of the Orange County Chapter of the New York State Archaeological Association: Tom Boyle, Bill Carroll, Ray Decker, Larry Hansen, and the author.

Location

The location of the Lieberman Site, at 40° 17'47" North Latitude and 74° 28'24" West Longitude and 420 ft above sea level, is south of County Route No. 1 just west of Pine Island, Orange County, New York, situated on the west side of the Pochuck Creek on a bench 20 ft above the creek (Figure 1). The land rises to the west to an elevation of 480 ft, protecting the site's occupants from the prevailing west winds. To the north and east the site overlooks the large "black dirt" area, which is the remnant of a proglacial lake. Today the land is used for produce farming. Dutchess Quarry Cave, which is a few miles to the north, overlooks the same area (Funk and Steadman 1994).

The site, which is within and outside the horse paddock of a riding school, has been surface hunted for many years, producing a lot of chert flakes and artifacts. The Orange County Chapter of the NYSAA felt that it should excavate a small part of this location, as many known sites in the area have been lost to residential development in the last ten years. We are grateful to the owners, Nina and Scott Lieberman, for their permission to dig on the property.

Excavation Methods

A datum point was established on a large rock outcropping in the center of the paddock and was marked with yellow-green paint. The grid system (Figure 2) was set up according to the cardinal directions. The grid was laid out using iron pins, string, and yellow tape marking the corners of the squares. During the fall of 1998 the area was surface collected. A large quantity and variety of chert flakes were recovered. Then three test squares, 3 ft x 3 ft, were started but not completed at this time as the site was closed for the winter. In the spring of 1999, fourteen five-foot squares were laid out south of the paddock (Figure 2). The grid went to the edge of the drop-off above the Pochuck Creek going from south 100, west 0 on the east to south 130, west 30 on the west as measured from the datum. We worked thirty days from April to October, with two to five workers a day, finishing twelve squares. The squares were dug in quarters and kept as level as possible. The position of each artifact was measured from the two closest iron pins and its depth was measured from a level line instead of using the 3 in arbitrary level method. All soil was screened through 1/4 in hardware cloth.

Stratigraphy

The soil is classified by the U.S.D.A. as "Pittsfield gravelly loam" (Olsson 1981). The topsoil is a very dark brown gravelly loam, averaging 7 in to 12 in in depth, noted as Stratum 1. The subsoil, Stratum 2, is a yellowish brown gravelly loam running from 4 in to 22 in below the junction, going to limestone bedrock or to a darker yellow gravelly soil, noted as Stratum 3. This third stratum was very intermittent, overlying bedrock (Figure 3).

Feature

A feature, designated as FE-1, was located below Stratum 2 in square EU-9. It was oval in shape 10 in x 12 in across and 12 in deep (Figure 4). In the feature, we found 33 pieces of calcined bone, some of which was deer. Fourteen pieces of fire-cracked rock, four pieces of charcoal, two pieces of smooth pottery, eleven pieces of chert flakes, one broken biface knife, four fragments of slate, and one-half of a very small charred fruit pit were also recovered.

Artifacts

We recovered and cataloged 110 artifacts along with 20 pounds of chert flakes (Figures 5, 6, 7)(see Tables 1 and 2). Strata 1 and 2 yielded all the artifacts and flakes, while Stratum 3 showed no evidence of occupation. Most of the artifacts were found just below or just above the junction of

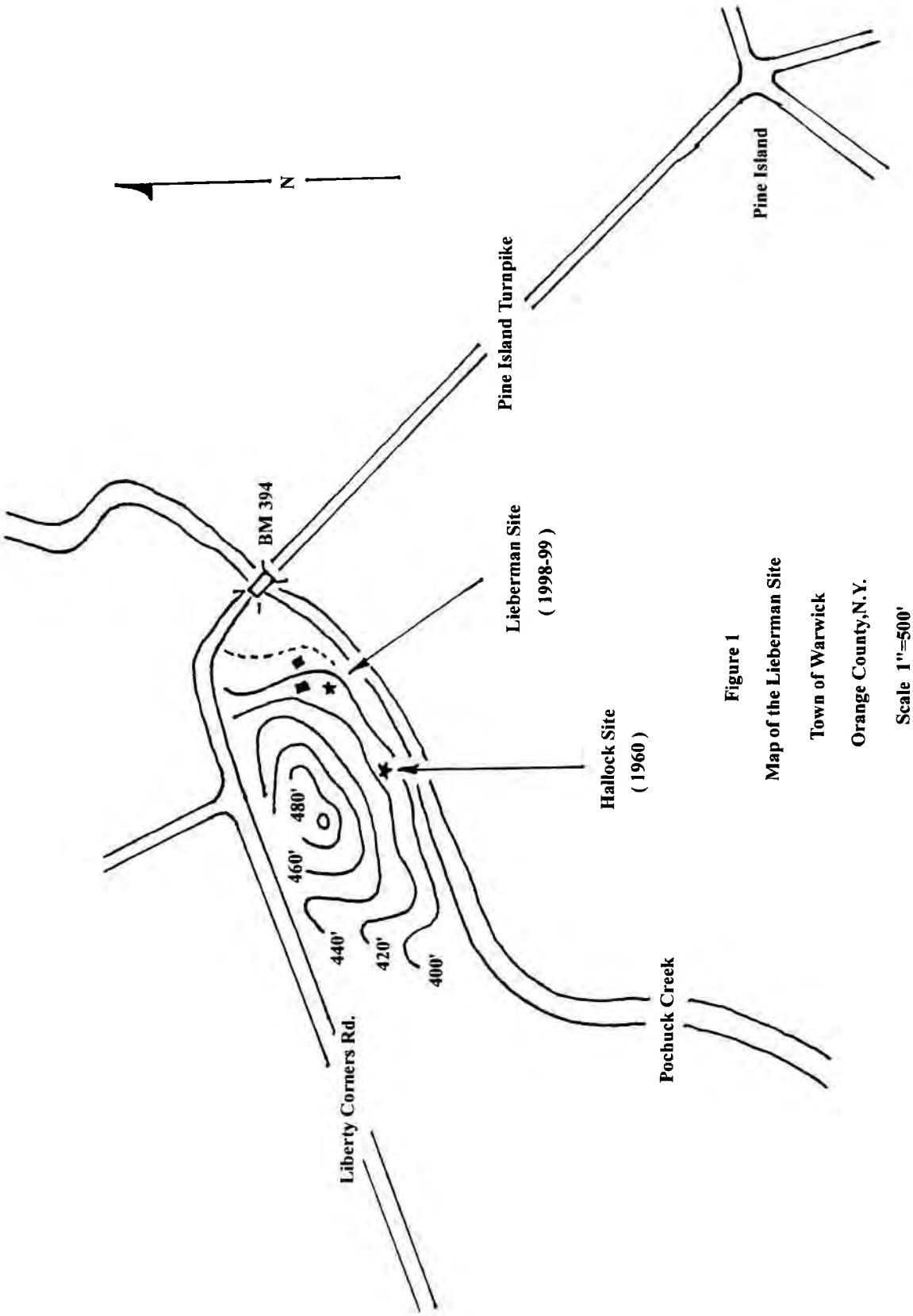

Figure 1. Map of the Lieberman Site.

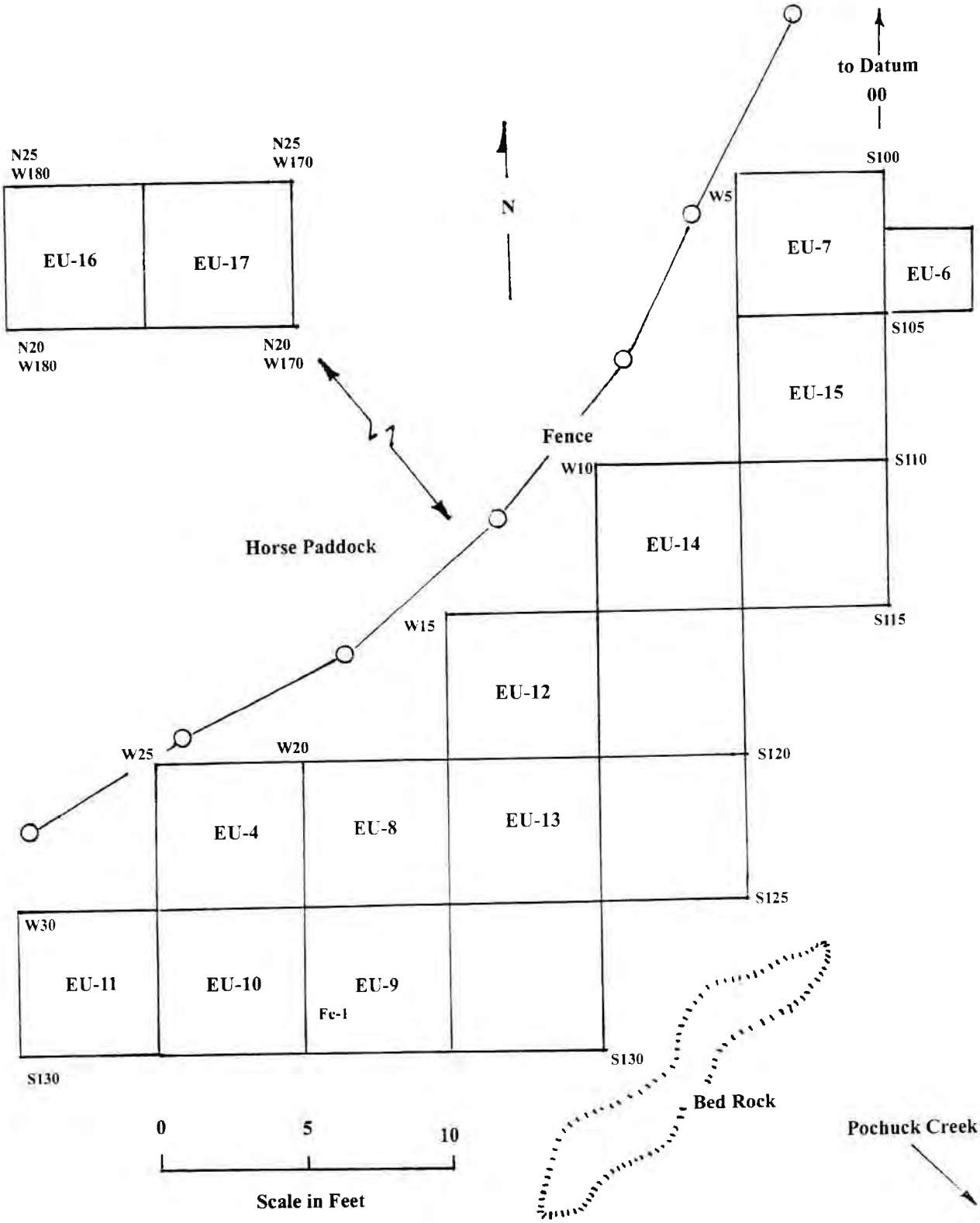

Figure 2. Map of the Lieberman Site excavations.

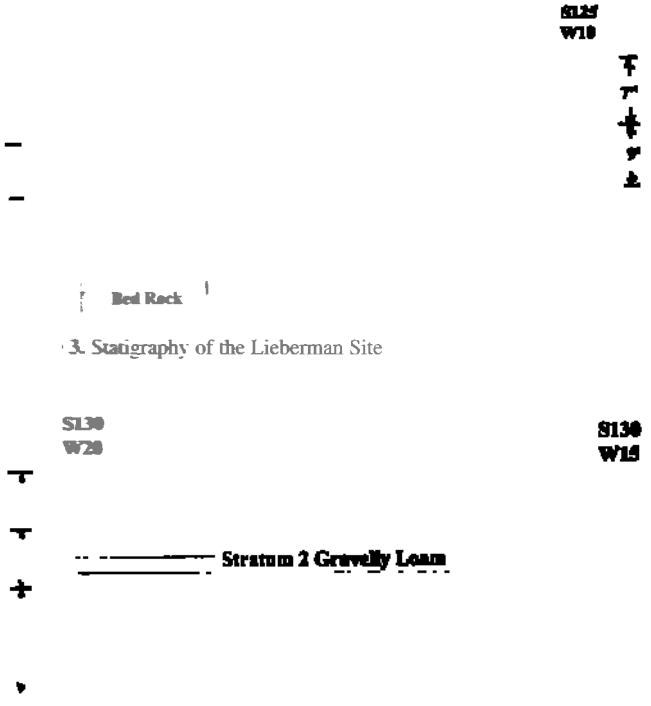

Figure 4. Feature FE-1 at the Lieberman Site.

Strata 1 and 2. In Stratum 1, we found six Levanna points from 4 in to 8 in, three Fox Creek points at 6 in, 7 in, and 8 in, one Jack's Reef Pentagonal at 7 in, and two Jack's Reef Corner Notched projectile points at 4 in and 5 in (Types used here are described in Ritchie 1961).

Other artifacts from this level included five drills, nine thumbnail scrapers, nine biface knives, two possible gravers, one hammerstone, two netsinkers, two choppers (one quartz), two steep-edge scrapers, one celt (in-process), three quartz crystals and fifteen pieces of kaolin pipe stems and bowls. Stratum 2 produced six Lamoka points at 8 in to 10 in deep and one Orient Fishtail at 12 in deep. One drill, one muller, two hammerstones and two biface knives complete the inventory.

Thirty-seven potsherds were recovered as well. Two rim sherds of similar style were incised "Iroquoian," one of which was obliquely incised and collared. In addition, there were 18 corded body sherds, 11 plain, thin body sherds, and 5 plain, medium-thick body sherds. The ceramics are all readily attributed to the Late Woodland period, in particular the latest phase, probably dating to about A.D. 1500 to 1600. This is indicated by later attributes such as collared, incised sherds with notches at the base of the collar (one sherd has the notches). The body sherds are rather thin. These attributes are common in the late assemblages of the Eastern Iroquois, the Mahicans, and the Delawares. This area of Orange County was occupied historically by Algonquian-speaking Delawares. The pottery was almost certainly associated with the Levanna points.

Table 1. Trait Table-Lieberman Site (Orange County Chapter NYSAA No. 298).

Category	Figure	Trait	Quantity
Projectile Points	5	Lamoka	6
	5	Sylvan Side Notched	2
	5	Orient Fishtail	1
	5	Jack's Reef Corner Notched	2
	5	Jack's Reef Pentagonal	1
	5	Fox Creek	3
	5	Madison	2
	5	Levanna	4
Celt	6	Thin-Poll (in process)	1
Drills	7	Expanded Base	2
	5	Trianguloid Base	2
Scrapers	7	End – Thumbnail	9
	7	End – Steepedge	2
Knives	6	Biface	4
Gravers	6	Delicate Point Chipped	2
Hammerstones	—	Unpitted	2
		Pitted	2
Net Sinkers	6	Notched, Flat	4
Chopper	6	Round Flat Quartz	1
Muller	—	Single Flat Surface	1
Pipe Stems	7	Kaolin	4
Rim Sherds	7	Iroquoian Incised	2
	7	Obliquely Incised Collard	1
Body Sherds	—	Corded	18
		Plain, Thin	11
		Plain, Med.	5

Interpretations

The distribution of flakes, hammerstones, and drills at all levels indicate that the site was used for chert knapping and tool making. The lithic material comprises Normanskill and Kalkberg chert from the Hudson Valley, Pennsylvania Jasper and possible Saugus Jasper from Massachusetts. Wallkill Valley cherts are well-represented. Hunting and fishing would have been major activities. Today the land still holds a large game and water fowl population. Fish, turtles, and mussels would have been readily available. A large number of fire-cracked rocks and broken pottery may indicate that groups larger than hunting parties used the site in the warmer weather before the stream froze and the winter wind swept down the slope from the west. During the terminal Late

Table 2. Pottery-Lieberman Site No. 298.

No.	Excavation Unit	Rim Incised "Iroquoian"	Rim Obliquely Incised Collared	Body Corded	Body Plain Thin	Body Plain Med.
L015	7		1			
L059	10				1	
L060	10			1		
L084	14	1				
L085	14	1				
L121	4			1		
L122	4			1		
L123	4					1
L124	4					1
L125	13					1
L126	13					1
L127	13			1		
L128	13			1		
L129	8			1		
L130	8			1		
L131	8				1	
L132	8			1		
L133	8					1
L134	8			1		
L135	8			1		
L136	5			1		
L137	5			1		
L138	5			1		
L139	5			1		
L140	5			1		
L141	15			1		
L142	15			1		
L143	9				1	
L144	9				1	
L145	15				1	
L146	15				1	
L147	15			1		
L148	15				1	
L149	15				1	
L150	15			1		
L151	15				1	
L152	15			1		
Totals		2	1	18	11	5

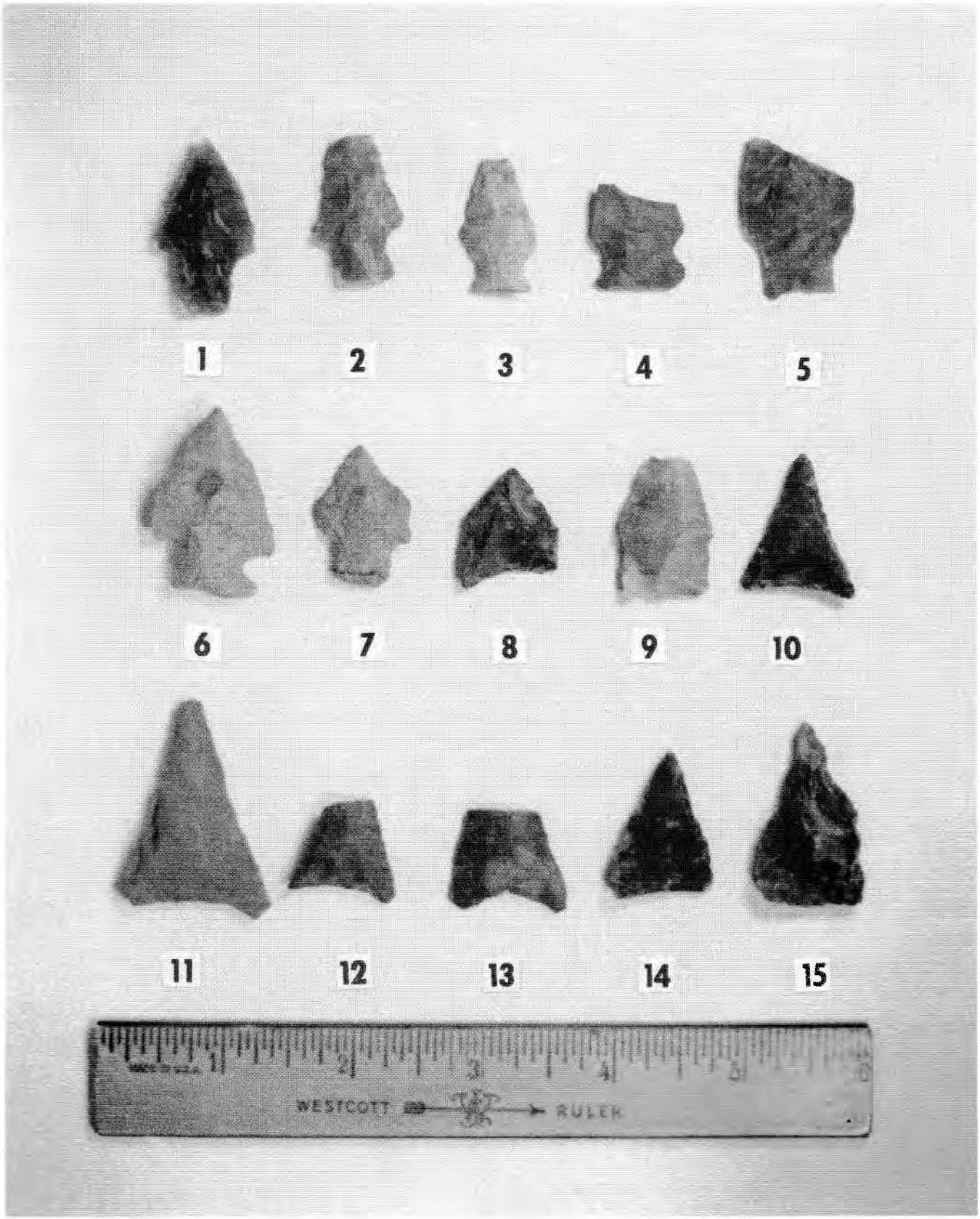

Figure 5. Projectile points: 1-3) Lamoka; 4) Sylvan side notched: 5) Orient fishtail; 6-7) Jack's Reef corner notched; 8) Jack's Reef pentagonal; 9) Fox Creek; 10-11) Madison; 12-14) Levanna; 15) drill.

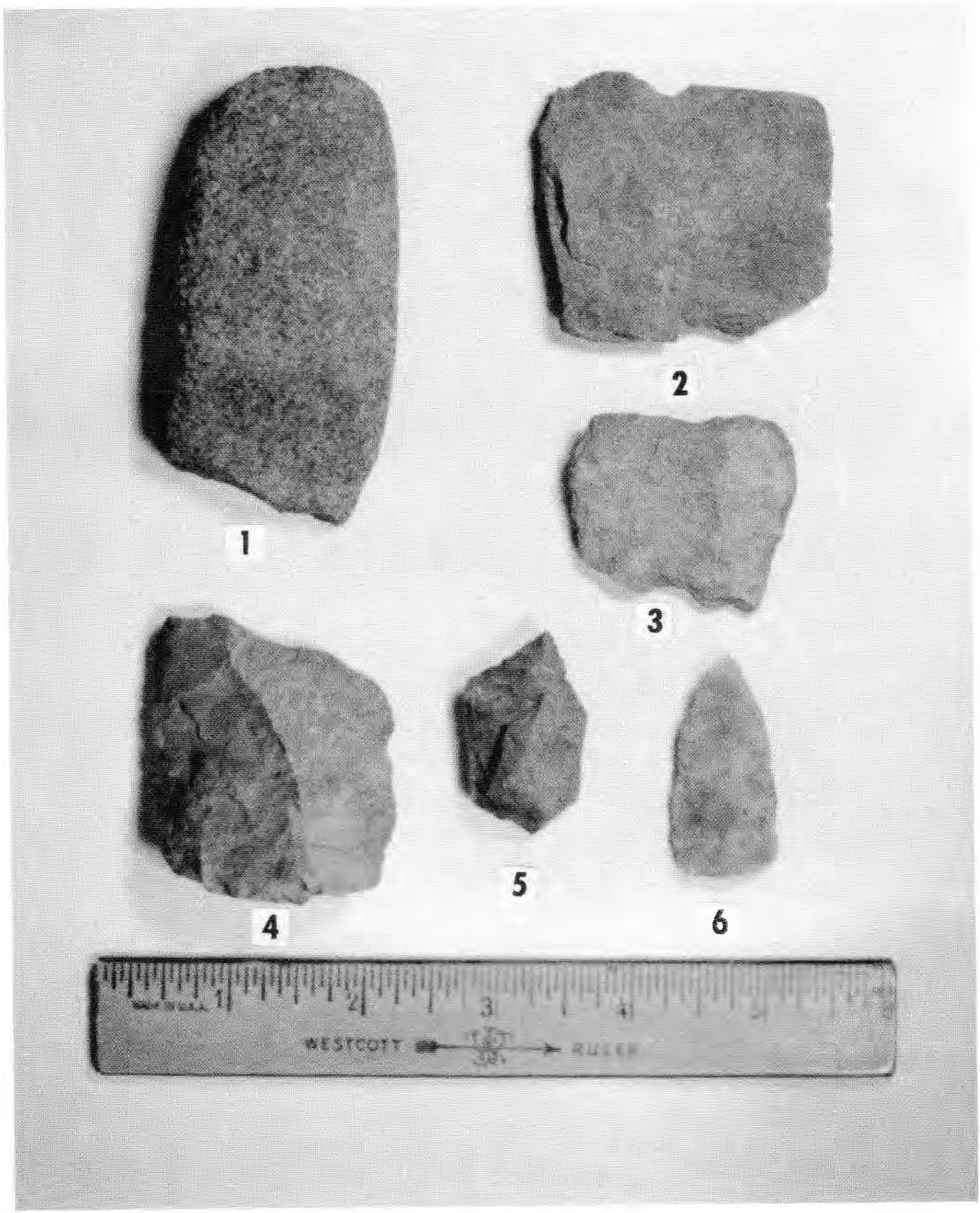

Figure 6. 1) Celt (In Process); 2-3) net sinkers; 4) chopper; 5) graver; 6) knife.

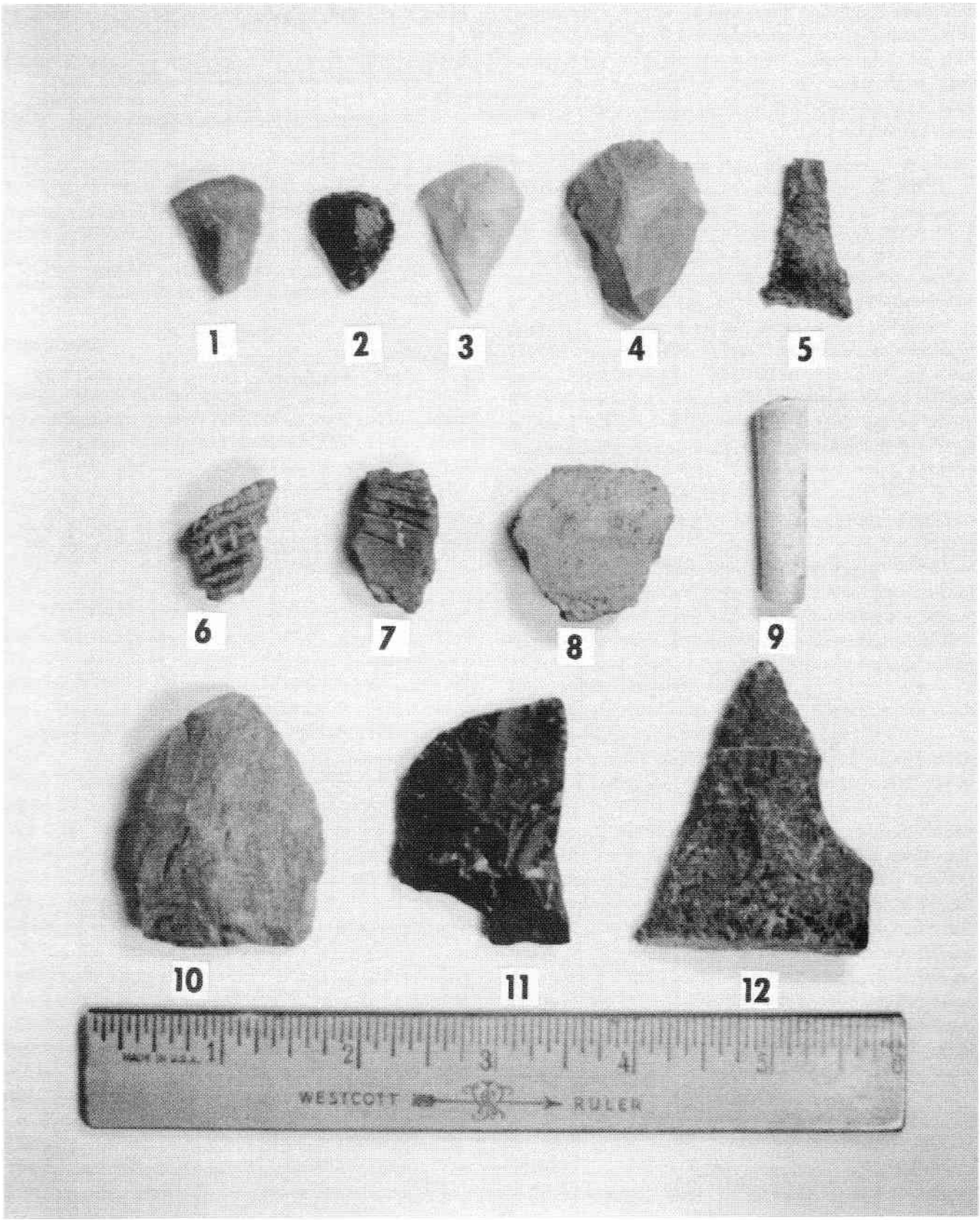

Figure 7. 1-4) End scrapers; 5) drill; 6-7) incised pottery; 8) smooth pottery; 9) pipe stem; 10-12) knives.

Woodland occupation there must have been some contact with Europeans, which would account for the broken kaolin pipe parts. Fortunately, the site was not disturbed by plowing. The limestone outcroppings throughout the site would have made it very difficult for historic Euro-American occupants to plow the land.

Conclusions

From the projectile points inventory it appears that this site was used by many cultures starting with the Late Archaic Sylvan Lake people with their stemmed Lamoka and Sylvan Side Notched points. The Transitional period is represented by the Orient Fishtail point. The largest number of artifacts represents the Middle and Late Woodland periods, as indicated by Fox Creek, Jack's Reef and Levanna points and pottery. The data suggest intermittent occupation by small native groups over a period of 4,000 to 5,000 years, in keeping with the larger picture for the Hudson Valley (Funk 1976).

Acknowledgements

We are very grateful to former State Archaeologist Dr. Robert Funk for his artifact identifications, guidance, and review of the material and of this report. His willingness to help has enabled the Orange County Chapter to bring this project to a productive conclusion.

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An Eighteenth Century Seneca Iroquois Short Longhouse from the Townley-Read Site, c. A.D. 1715-1754

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1999 excavations at the Townley-Read Site (NYSM 2440; RMSC Plp-16) revealed a post mold pattern interpreted as a short longhouse dwelling 7.5 m long and 5.3 m wide. The site, located near Geneva, New York, was occupied by the Seneca Iroquois from approximately A.D. 1715 to 1754. This paper details how the structure was found and excavated, provides information on the archaeological features and artifacts recovered, and discusses the implications of the Townley-Read structure for the commonly-accepted "cabin" model of eighteenth century Iroquois housing and the larger issue of culture change in eighteenth century Iroquoia.

Introduction

This paper reviews the excavation of what is interpreted as the traces of an eighteenth century Seneca Iroquois dwelling at the Townley-Read Site (Figure 1; NYSM 2440: RMSC Plp-016) near Geneva, New York. Townley-Read Structure 1, classified as an intercultural/creolized short longhouse, was excavated by the Townley-Read/New Ganechstage Project in 1999. On present evidence, the Seneca occupation of the site took place from approximately A.D. 1715 to 1754 (Jordan 2002:274-291).

The Townley-Read/New Ganechstage Project has conducted archaeological investigations at the Townley-Read Site from 1996 through 2000. Project fieldwork, co-directed by Dr. Nan Rothschild of Columbia University and the author, included Columbia University Summer Archaeological Field Schools in 1998 and 1999 and a Hobart and William Smith Colleges Field Course in Iroquois Archaeology in Spring 2000. The Project has been supported by grants from the National Science Foundation and the Early American Industries Association and advised by Peter Jemison of the Seneca Nation of Indians. The major findings of the Project at Townley-Read to date include: (1) surface artifact densities indicating a dispersed eighteenth century community with houses 60-80 m apart in a non-defensible location; (2) the post mold outline of the 7.5 m x 5.3 m Seneca short longhouse (Structure 1) detailed in this article; (3) the sub-plowzone remnant of a 3.5 m x 1.7 m external storage pit (Feature 5) that contained over 3,400 pieces of animal bone; (4) a buried plowed eighteenth century trash deposit of at least 15 m x 10 m in size that contained animal bone, glass beads, brass, and smoking pipe remains; and (5) a previously unknown prehistoric component at the site. Our search for a documented eighteenth century European-run smithy at the site was unsuccessful. Additional information on the Project can be found in the author's doctoral dissertation (Jordan 2002).

Archaeological Fieldwork

The main focus of the Townley-Read/New Ganechstage Project has been to isolate and excavate domestic-context archaeological deposits from the eighteenth century Seneca village at Townley-Read. Unpublished records of previous research undertaken at the site (Conover c. 1889; Wray 1979-1982) offered conflicting opinions about the location of the eighteenth century village. The Project first investigated local historian George S. Conover's (c. 1889) claim that the village was located on a western ridgetop overlooking an elbow in Burrell Creek. This ridgetop is one of the more defensible spots in the locality and has relatively easy access to water and good floodplain soil. Although these factors frequently were key to the placement of Iroquoian sites occupied during the fifteenth-seventeenth centuries, excavations on the ridgetop (Figure 1: Areas A, B, and C) produced no definite evidence for an eighteenth century occupation, proving that Conover's claim was in error.

The ridgetop contained a light scatter of prehistoric and post-1788 Euroamerican artifacts. The most substantial concentration of prehistoric artifacts was found in Area A, interpreted as the byproducts of one or more short-term uses of the ridgetop as a lithic core-reduction location, camp site, and/or hunting station by prehistoric (minimally Late Woodland) groups. The prehistoric artifacts recovered on the ridgetop may be the traces of resource-procurement forays by residents of the nearby Late Woodland Woodley Village site (RMSC Plp-078; see MacNeish 1952 and Niemczycki 1984 for contrasting interpretations of the Woodley Site's place in the Seneca and Cayuga sequences).

The lack of eighteenth century residential deposits on the ridgetop had several interesting implications. First, it shifted the focus of the project to the low-lying eastern fields at Townley-Read (Figure 1: Areas D, F, and H), where

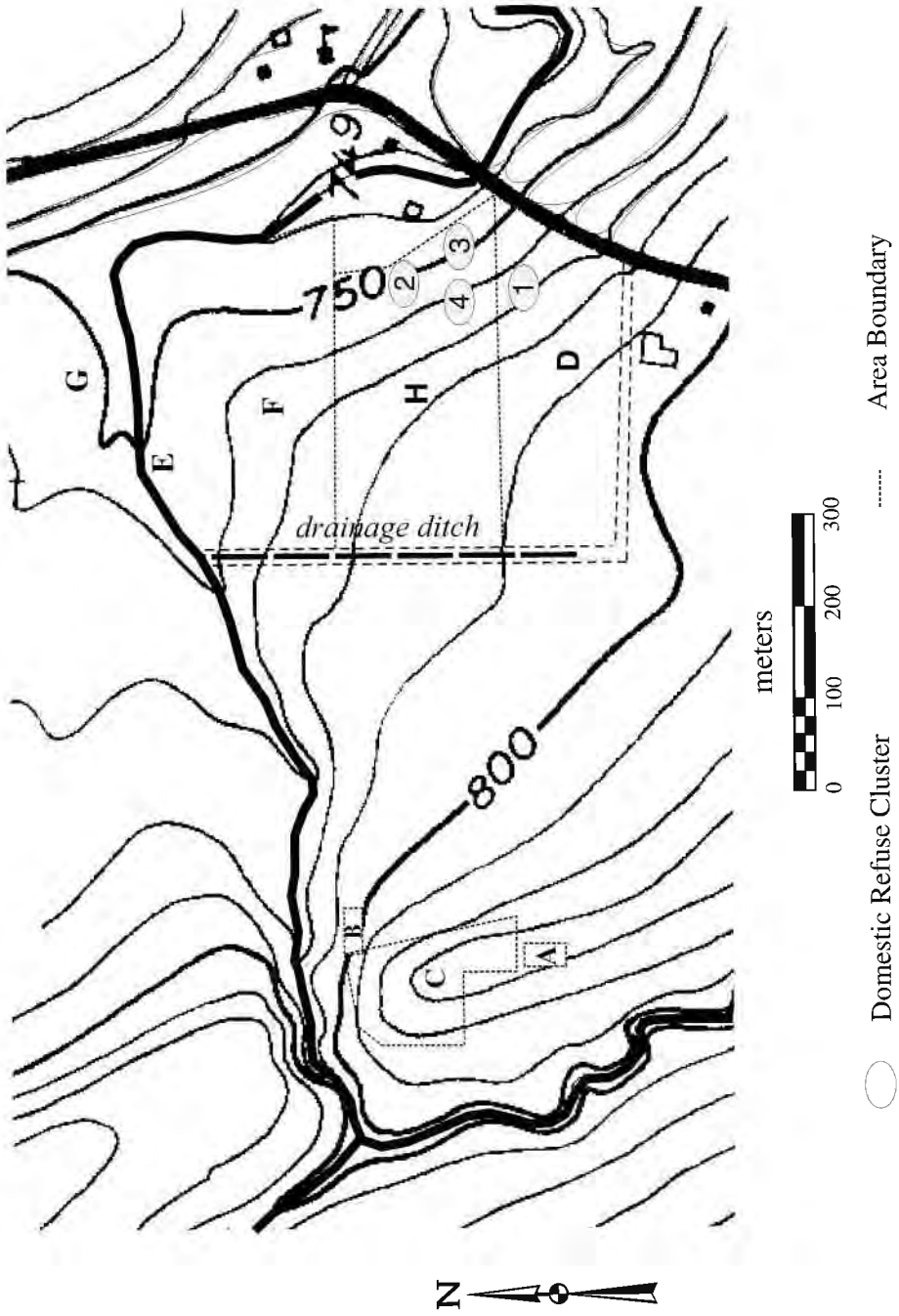

Figure 1. Topographic map of the Townley-Read Site (NYSM 2440; RMSC Plp-16), occupied c. A.D. 1715-1754. Letters mark areas that have been investigated or considered by the Townley-Read/New Ganechstage Project. A, B, and C are ridgetop areas with prehistoric deposits. D and H are low-lying areas with eighteenth-century domestic deposits. F is known to contain eighteenth-century materials but has not been investigated systematically. E and G were examined by the Project but did not contain substantial cultural materials. Elevations are given in feet; contour interval 10 ft (3.0 m). Base map taken from USGS topographical map, 7 5' series, Stanley, New York quadrangle.

avocational archaeologist Charles Wray and others had excavated at least thirty-three eighteenth century burials between 1979 and 1982 (Wray 1979-1982). Second, in terms of settlement pattern it meant that the Seneca residents at Townley-Read had ignored a defensible, traditional-looking site location on the ridgetop and settled only 700 m away in a low-lying area with essentially no defensive value. Third, it meant that Seneca houses and burials were located in fairly close proximity. Since it was a priority of the Project to avoid disturbing Seneca graves, we needed a reliable method for determining where domestic deposits were likely to be found before we started digging.

Although the Project experimented with a range of non-intrusive field techniques including geophysical surveys using ground-penetrating radar, magnetometry and conductivity instruments and systematic metal-detection, the most successful method proved to be simple surface examination of the plowed portions of the site. We employed a number of different variations, ranging from point-proveniencing each surface artifact in a given area using a total station, to counting artifacts within 20 m x 20 m squares. Use of 10 m x 10 m collection units with diagnostic artifacts point-provenienced within the site grid appears to offer the best compromise between maximizing the level of detail acquired about spatial relations and minimizing the amount of time and money spent.

To date a total of 6.5 ha (16 acres) have been surface-stripped within Areas D and H at the site. These surface investigations have allowed us to define four of what I have termed "Domestic Refuse Clusters," or DRCs. DRCs primarily were defined by surface concentrations of small pieces of burned and unburned animal bone and tooth fragments. Any 20 m x 20 m square in which 20 or more animal bone tooth fragments were found was defined as a DRC. These areas also contained most of the white ball clay smoking pipe and olive bottle glass fragments we found, items which are almost never found in early eighteenth century Seneca grave assemblages. Project excavations to date have supported the idea that such surface artifact concentrations are reliable indicators of subsurface domestic remains. The manufacture of bone grease by Seneca women likely to account for the highly fragmented character of the food bone refuse found at the site (Jordan 2002:482-486; Watson 2000).

1999 excavations in DRC 1 revealed it to be a definite houselot containing the footprint of a short longhouse (Structure 1) and Feature 5, a large external firepit. 2000 excavations in DRC 3 located a buried plowed midden horizon of at least 15 m x 10 m in size, so Domestic Refuse Clusters cannot automatically be assumed to be houses, although they have not been adequately investigated to date, DRC 2 and DRC 4 likely represent houselots based on their similarity to DRC 1 in terms of their distance from Burrell Creek and placement half to three-quarters of the way down the slope toward the creek.

Within DRC 1, a 10 m x 40 m grid of shovel test-pits at 5 m intervals, sampling of a set of metal detector "hits" in a separate 10 m x 30 m area, and a series of 1 m x 1 m test units helped us to locate Post Molds 4 and 5, later determined to be the northwest and southeast main support posts for Structure 1. At this point a bulldozer was brought in to strip off the plowzone in an area of roughly 14 m x 43 m, which enabled us to recover much more information about the broader houselot area than would have been possible using hand excavation alone. Initially we left an island of plowzone soil around Post Molds 4 and 5 that turned out to enclose just about the entirety of Structure 1; we did not discover the size and alignment of the dwelling until mid-November when this soil was removed by a backhoe. The weather did not permit much more work during that field season; the Project was able to fully clean and map the structure area, but the majority of wall posts were not excavated. Although we found several post molds and features likely to date to the eighteenth century outside Structure 1, their positioning was neither dense nor patterned enough to suggest that another structure was present within DRC 1 (Jordan 2002:248-258).

Structure 1

The post mold pattern recovered at the western end of DRC 1 (Figure 2) is interpreted as the remains of a "short longhouse" dwelling used by the Senecas for part or all of the period between 1715 and 1754, termed Structure 1. To date the Townley-Read house is only the fourth full house plan recovered in the Seneca region from the period between A.D. 1550 and 1779, the others being located at the (1) Factory Hollow (Guthe 1958); (2) Cornish (Hayes 1967); and (3) Ganondagan (Dean 1984) Sites, although I am skeptical that the Ganondagan remains represent a domestic structure (see Jordan 2002:395-396).

A total of 53 dark, post mold-sized soil stains were present in the area of the structure. Of these 15 were excavated, 9 of which are interpreted as probable or definite, 4 as possible, and 2 as unlikely eighteenth century post molds. Of the 38 unexcavated posts, 21 are interpreted as probable or definite, 9 as possible, and 8 as unlikely post molds based on their location, color, and/or the presence of small pieces of bone or charcoal within their fill. Two larger soil stains (Features 6 and 20) were located within the structure area; neither is thought to be cultural. Three smaller unnumbered features not thought to be cultural were also excavated.

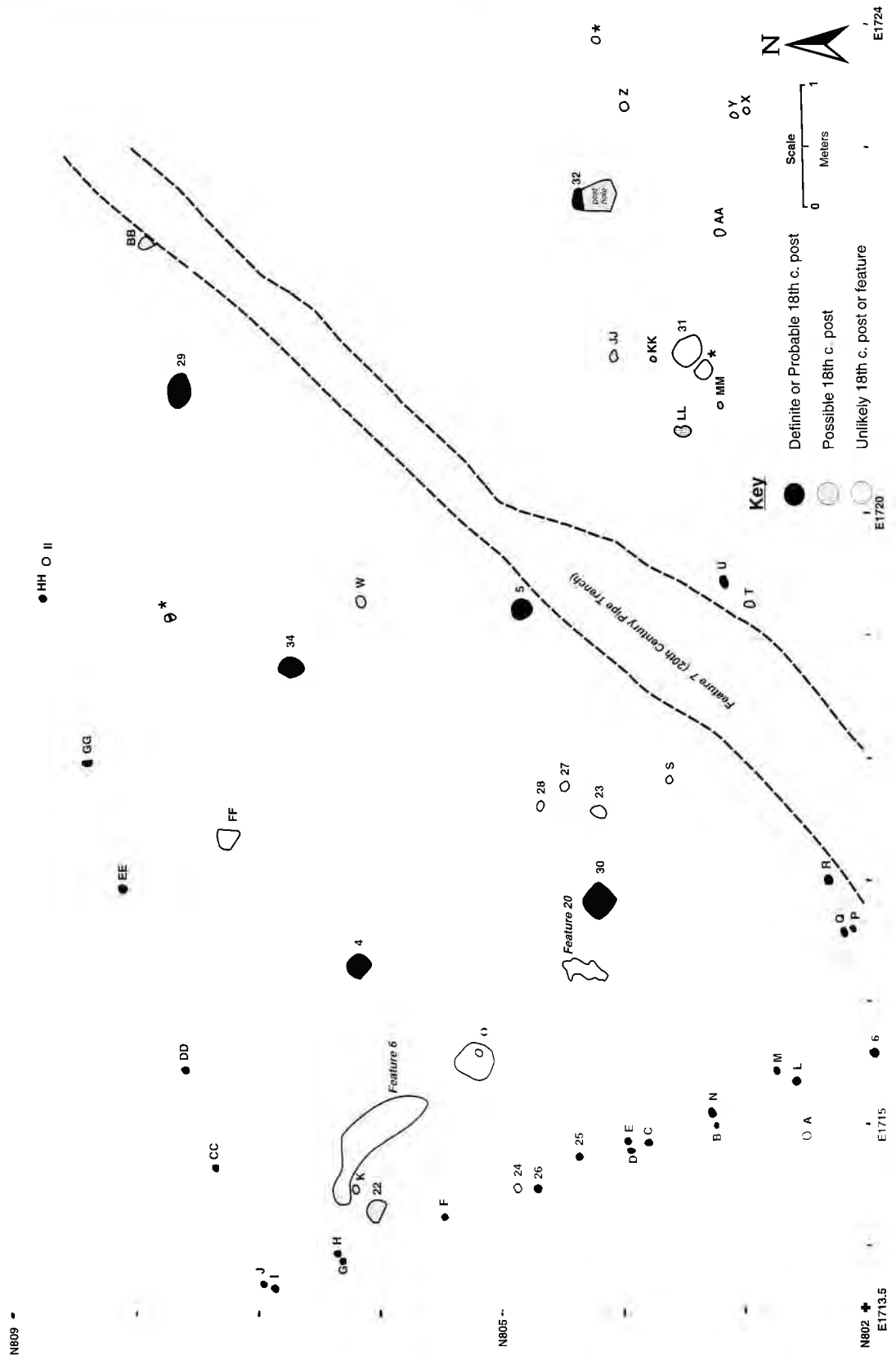

Figure 2. Structure 1 post molds and features from the Townley-Read Site, Area D, Domestic Refuse Cluster 1. Posts numbered or marked with an asterisk were excavated; posts marked with a letter were not excavated. Portions of Features 6 and 7 were excavated; Feature 20 was not excavated.

Additional details regarding the post molds and non-cultural soil stains can be found in a draft site report (Jordan 2001a).

As I interpret it (Figure 3), Structure 1 at Townley-Read was 5.3 m wide and 7.5 m long (17.3 ft x 24.6 ft). The width measurement is fairly certain, since it is based on the western wall which contains 14 definite and 2 possible posts, five of which were excavated. Post molds were found at close to right angles to the presumed corners of the west wall, making it unlikely that the structure extended beyond the 5.3 m dimension. The length figure has less evidence to support it. The north wall contains 6 probable posts, none of which were excavated. The south wall is even less substantiated, with only 4 definite and 5 possible posts. It also appears that part of the south wall was obliterated by a twentieth century pipe trench (Feature 7). However, the large Post Mold 32 is on the line of the south wall and its position has been used to mark the eastern end of the structure. During November and December 1999 we made some attempt to chase out the north and south walls and the interior lines established by the two sets of main support posts. None of these attempts located any additional posts. Time constraints did not allow us to clean and map these areas as completely as I would have liked, but impressionistically I am 85% certain that we found the end of the house. Based on my interpretation of its size, Townley-Read Structure 1 is defined as a "short longhouse" using Kapches (1984) typology for Iroquoian houses, or, less formally, as a "shorthouse." I have interpreted Structure 1 as a two-family dwelling based on the presence of four main support posts and a central corridor, which suggest that the dwelling contained two sleeping platforms.

The architecture of the Townley-Read house is in many ways fairly traditional in form. The largest posts are located in the interior of the dwelling, where they provided the main structural support for the house and presumably framed a central corridor and anchored sleeping platforms. These four main support posts (PMs 4, 5, 30, and 34) ranged from 18 to 25.5 cm in diameter, averaging 19.9 cm, and extended from 21 to 36 cm below subsoil surface. All of these posts had rounded bottoms. Only three definite small external post molds (PMs 6, 25, and 26) were excavated. These posts extended from 11 to 18 cm below subsoil surface; the bottom of PM 6 (the southwest corner post) was fairly round in cross while the bottoms of PMs 25 and 26 from the west became to relatively sharp points. The surface diameter of 31 definite, probable or possible wall posts ranges from 3.0 to 13.0 cm, averaging 6.3 cm.

Post Molds 29 and 32, both of which are located at the eastern extreme of the structure, do not fit either the interior post category particularly well. PM 29 is more or less in line with the northern set of main support posts: PM 32 is on line with the southern wall of the structure. Both posts are close to an equal distance from the western wall, prompting the interpretation that these posts formed part of the eastern wall of the house. PM 29 is 24.5 cm in diameter but extended only 10 cm below subsoil surface. To date, PM 32 is a unique find at the site: it was a rectangular post 18 cm x 7 cm in size that had been inserted into a dug post-hole. Its position in line with the south wall and the fact that we found no similar features makes it almost definite that PM 32 was part of the structure rather than an intrusive feature such as a Euroamerican fence post. This use of large posts to support a wall represents a departure from the fairly traditional construction methods seen in the rest of the house.

Although we did not recover direct evidence for a central hearth, indirect evidence supports the claim that one was present. Flotation sample heavy fraction charcoal density was highest in PMs 32 and 34, intermediate in PMs 5, 6, and 29, and low in PMs 4 and 30, which suggesta that the hearth may have been located somewhat to the east within the structure. In contrast, fire-cracked rock was concentrated to the west: large pieces of fire-cracked rock were present in the matrix of PMs 4 and 30 and smaller pieces were present in PMs 6, 29, and 34. Additionally, fire-cracked rock was recovered in the plowzone from three test units dug within the house area. Any non-central firepit or hearthstone fireplace with a chimney probably would have been located along the doorless western wall, but the low charcoal density in PMs 4, 6, and 30 weighs against this idea.

Data from the post mold flotation samples provide a solid foundation to the claim that Structure 1 was a domestic dwelling. A total of nine soil samples were taken from possible or definite post molds within the house: two of these samples were taken from PM 32 (one from the dark post remains, and one from the post hole fill). The contents of post mold fill recovered from flotation and/or dry screening with 3 mm (0.125 in) mesh hardware cloth have a very "lived in" look, containing many small artifacts that represent the byproducts of household activities and lost items. Seven of the thirteen excavated possible or probable post molds contained glass seed beads, including all four main support posts and Post Molds 6, 25, 29, and GG. A single tubular white wampum shell bead was found in the matrix of PM 4. Fish scales were recovered from PMs 4, 6, and 29 and from Feature 6: PM 6 contained a single muskrat tooth; four pieces of sheet brass kettle scrap were found in PM 4; and a single hand-wrought nail was recovered from PM 30.

There was some variety in the amount of cultural material found within individual post molds. The western main support posts (PMs 4 and 30) contained significantly more bone and other artifacts than the other post molds. Although these posts were larger and were driven deeper into the

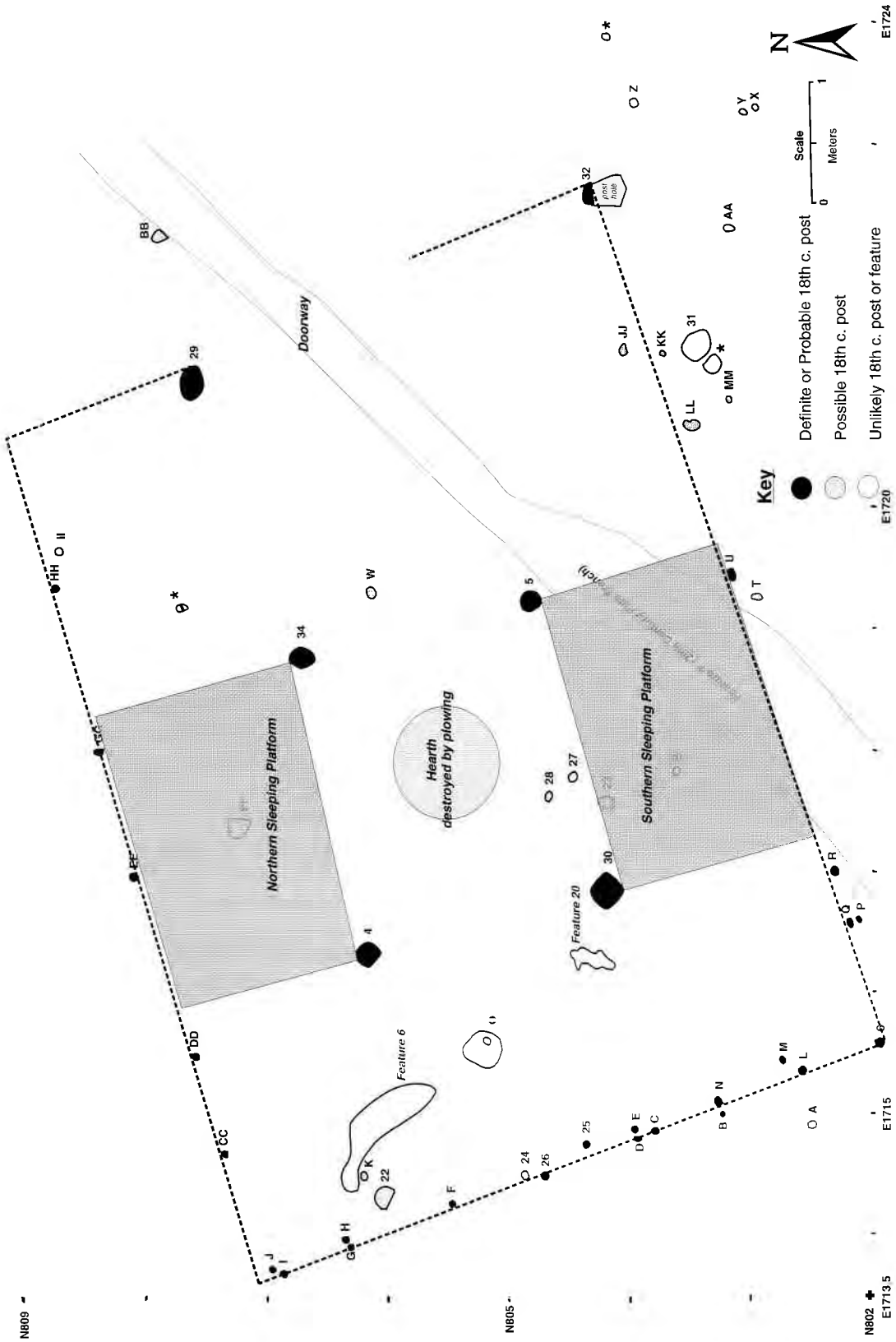

Figure 3. Interpretation of size and internal features of Structure 1 at the Townley-Read Site, Area D, Domestic Refuse Cluster 1.

ground than the other posts within Structure 1, there were ..gnificant differences in artifact density as well as overall ..antity PM 4 contained 117 pieces of bone (including ..hite-tailed deer and the only porcupine specimens found at ..e site to date) while PM 30 contained an astounding 394 ..eces of bone (including deer bones, raccoon maxilla frag-..ents. and fish ribs) and a raccoon tooth. Heidenreich ..971:154) and Snow (1995:100, 124) have interpreted post ..olds filled with large pieces of refuse as evidence that ..ese posts were pulled when the structure was abandoned. ..llowing this argument, the high concentrations of bone in ..Ms 4 and 30 make it likely that they were pulled while PMs ..29. 32. and 34 rotted in place. PMs 4 and 30 were clearly ..uctural supports (in contrast to Snow's contention that ..ly decorated, non-structural posts were pulled at abandon-..ent: their removal would imply that the structure was at ..st partially dismantled upon abandonment or at some ..int subsequent to abandonment.

Plowzone soil from the shovel test-pits and test units ..cavated within Structure 1 contained a variety of material ..es (see Jordan 2001a for a full inventory). Items indica-..e of consumption were animal bone and tooth remains ..cluding specimens identified as white-tailed deer and ..ack bear), two eighteenth century olive bottle glass frag-..ents. and native-made ceramic pipe and European white ..ll clay pipe fragments. Complete items of personal orna-..entation consisted of two drawn round black glass beads ..d a rolled sheet brass cone bangle. There is evidence for ..ssible manufacture of adornment items in the form of one ..rned blue and white glass pendant fragment that appears ..have been discarded during production. a tabular frag-..ent of possible red slate manufacturing debris, one shell ..gment, and six pieces of scrap sheet brass (which also ..ay reflect utilitarian usage). Other artifacts consisted of ..e sheet brass projectile point, possible eighteenth century ..eramic sherds (one aboriginal and eleven European-made), ..o pieces of clear flat glass that may be mirror fragments, ..on nails and iron objects of indeterminate function, char-..al. ten pieces of lithic debitage, fire-cracked rock, and as-..ted intrusive nineteenth and twentieth century materials.

The Construction of the Townley-Read Short Longhouse

..terms of house plan, the Townley-Read shorthouse ap-..ears overall to have been built using a fairly traditional ..eme. The main supports for the house were located in the ..ddle of the structure with lighter posts around the outside ..central hearth and sleeping platforms were likely to have ..en present. Some of the indeterminacy of the eastern ..tion of the structure may be due to the existence of a covered storage compartment (Snow 1997:70), another traditional feature. Given the layout of the shorthouse, it probably housed two families, maintaining the multiple-family norm of earlier houses, although in abbreviated form. The Townley-Read structure looks very much like one free-standing segment of a longhouse.

Townley-Read Structure 1 can be compared to a completely traditional short longhouse plan recovered at the protohistoric Onondaga Atwell Site (Ricklis 1967; this discussion relies on the summary and figure provided in Tuck 1971:165-170, Figure 7). The Atwell structure was constructed entirely with traditional non-metal tools before the onset of direct contact with Europeans: a small number of European brass items but no iron tools have been recovered from the site, which is dated to the last half or quarter of the sixteenth century by Tuck (1971:165, 169-170) and to c. A.D. 1525-1550 by Bradley (1987:50). The Townley-Read short longhouse manifests a surprising number of continuities with the Atwell structure despite at least 140 years between their construction dates. The dimensions of the Townley Read house (7.5 m x 5.3 m) are close to that of the Atwell structure (9.1 m x 5.5 m per Tuck 1971:167), especially in width. Both structures have more or less square corners, frequent large internal posts, and presumably both structures had central hearths. The dwellings each have the characteristic double layer of wall posts signifying that the posts were used to brace siding. According to Tuck (1971), an unusual circular pattern of posts at the west end of the Atwell house may have supported a corncrib or granary, so both short longhouses may have had only a single eastern door.

At the same time, the Townley-Read structure incorporated a number of innovations that were not present in the Atwell structure or most other earlier houses. The data from Townley-Read Structure 1 also can be compared to the detailed information available on structural features excavated at four other Iroquoian sites occupied during the A.D. 1670-1779 era, including: 1) Ganondagan, a Seneca site occupied from approximately 1670-1687 (and in which some of the residents of Townley-Read may have spent their early years) where one structure plan has been excavated (Dean 1984); 2) Conestoga, a multiethnic (in part Seneca) community near Lancaster, Pennsylvania occupied from 1690-1740 where one incomplete and two complete house plans have been uncovered (Anderson 1995; Kent 1993); 3) Primes Hill, an Oneida site dated to approximately 1696-1720 where a variety of post molds were found but no structural pattern could be discerned (Bennett 1988, personal communication 2001); and 4) Egli, a multiethnic community on the Susquehanna river occupied from 1753-1779 where again posts were excavated but no structural pattern was

Table 1. Post Mold Diameter Figures (cm) for Selected Iroquoian Sites

Site	Occupation Dates	Overall Average (all posts)	Smallest Wall Post	Largest Wall Post	Wall Post Average
Ganondagan:					
Trench 4 Structure	1670-1687	9.5	6.1	15.2	9.5
Primes Hill	1696-1720	7.8	5.1	12.7	7.3
Conestoga: House 1	1690-1740	7.0	n/a	n/a	n/a
Conestoga: House 2	1690-1740	12.7	n/a	n/a	n/a
Townley-Read:					
Structure 1	1715-1754	8.3	4.0	13.0	6.3
Egli	1753-1778	17.8 by 22.8	n/a	n/a	n/a

Sources: Anderson 1995; Monte Bennett, personal communication 2001; Dean 1984; Hesse 1975.

determined (Hesse 1975). Differences between the Townley-Read shorthouse and more traditional Iroquoian structures are most apparent in terms of post type and location, iron nail use, post frequency, and the allocation of organized and unorganized space within the structure.

With regard to post size (Table 1), the posts used in Townley-Read Structure 1 fall within the range of sizes used at other Iroquoian sites from the 1670-1779 era, although there is a great deal of variation and no clear-cut trend emerges over time in these figures. The Townley-Read post size figures are quite comparable to those found at Primes Hill and what Anderson (1995) has termed House 1 at Conestoga (located to the southwest in Kent 1993: Figure 107), which appears to have used internal support posts and paired wall posts to brace semi-rigid siding. The Townley-Read posts are somewhat smaller than those excavated at Ganondagan, and much smaller than the posts employed in Conestoga House 2 (a non-Iroquoian or non-traditional structure in the center of Kent 1993:Figure 107) and the massive rectangular posts used at Egli.

However, the *type* and *location* of some of the posts used in Townley-Read Structure 1 are quite atypical and unparalleled at any of the earlier sites. Novel post use at Townley-Read is illustrated by the shape of Post Mold 32, an unusual squared-off post with a dug post-hole, and the use of large Posts 29 and 32 as part of the eastern wall. These features suggest some departure from traditional construction methods.

Iron nail use can be estimated through calculation of the ratio between nails recovered and the area excavated at a given site (Table 2; for additional details regarding nail use see Jordan 2001b). Comparable nail density figures can be calculated for Townley-Read, Ganondagan, and Primes Hill since all three sites were plowed and likely had plowzones

Table 2. Iron Nail Density Per Square Meter of Excavated Area at Selected Iroquois Sites.

Site	Occupation Dates	Excavated Area (m^2)	Number of Eighteenth Century Nails Recovered	Nails/m^2
Ganondagan: Trench 4	1670-1687	157.9	22–28	0.14–0.18
Primes Hill	1696-1720	88.3	30	0.34
Townley-Read: Structure 1 Area	1715-1754	11.8	10–16	0.85–1.36
Townley-Read: Area D Total	1715-1754	37.4	25–42	0.67–1.12
Townley-Read: East Fields Total	1715-1754	57.6	31–53	0.53–0.92
Egli (estimated)	1753-1778	455.2	118	1.04–1.30

Sources: Bennett 1988; Dean 1984; Hesse 1975. Iron "hardware" was recovered at Conestoga but not quantified (Kent 1993:389).

of roughly the same thickness: excavations at each site sampled portions of houselots: and each site contained subplowzone features To make the data consistent with the other sites. the Townley-Read figures only include nails found in shovel-test pits or test units, excluding artifacts found by surface collection and from the bulldozer trench.

At Egli. 118 hand-wrought rosehead, L-head, T-head, and headless nails were recovered in an area greater than 455.2 m^2 (4900 ft^2). However, the raw nail density figure of 0.26 nails/m^2 is not comparable with the other sites since most of the topsoil in the examined area at Egli was cleared away by a bulldozer; nails were recovered only from topsoil

:: behind by the bulldozer and from features. I have arbi- :rily increased the Egli density figure four- to five- fold to . mpensate for the lost topsoil.

Although the estimated figures of 1.04 to 1.30 nails/m^2 : Egli must be used with caution, current evidence indi- ..es that the structures at Townley-Read and Egli used a ..bstantially greater number of nails than dwellings at the :rlier Primes Hill and Ganondagan Sites. All of these :gures probably underestimate Iroquois nail use since iron :ils may have been collected for re-use when a site was .ndoned and/or systematically removed from the archae- ogical record by modern collectors with metal detectors.

Warrick (1988) has proposed a method for calculating :e occupation duration of a given Iroquoian house based on :e amount of wall post replacement that took place. How- : er. the very low wall post density in the Townley-Read :orthouse suggests that the Warrick method cannot be used : Townley-Read. Even in the western wall of the short- - se. where preservation and post recovery was quite good, :ginal wall post density was only about 2.5 posts/m, well :low almost all of the original, pre-repair density figures : pre-1650 Huron and Neutral longhouses cited by Warrick -SS) Post density in the more or less straight line of posts :e north wall is even more sparse, with approximately 1 - :m It would seem a logical conclusion that the Townley- :ad structure used a different construction type and/or :erials that needed substantially less reinforcement than :e typical bark-sided longhouse. The Townley-Read - elling also may have differed from more traditional bark- :ed short longhouses used at contemporaneous Iroquois :es such as Onondaga (Bartram 1966 [1751]:41).

Kapches' (1990) conceptualization of the "spatial - namics" of Ontario Iroquoian longhouses contrasts the :egree of organized versus unorganized space within a struc- :e's interior. Kapches classifies sleeping bench areas and :e enclosed storage areas behind partitions (either in the :se's interior or at the ends) as permanent allocations of :ace hearth areas as semipermanent, and storage and :ruse pits as temporary. Permanent and semipermanent :eas together are considered to be "organized space." The :alysis of the spatial dynamics of the 39.75 m^2 Townley- :ad Structure 1 is restricted to the contrast between the :ganized" sleeping bench and hearth areas and the "unor- - :ized" rest of the house since there is no definite evidence : a cubicle area beyond the east wall. Sleeping benches— :e only permanent features—took up about 7.85 m^2, or - :% of the total interior area. Since no intact hearth :mains were recovered, I estimated the length of the pro- - ed central hearth at one-half of the average length of the - sleeping benches (1.16 m) and its width at approxi- :ely 1.0 m, resulting in a semi-permanent hearth area of .- m^2, or 2.9% of total internal space. In total. the Townley-Read short longhouse contains 9.01 m^2 of organized area representing 22.7% of the total and 30.74 m^2 of unorganized area representing 77.3% of the total area of the structure.

The 22.7% organized area figure is substantially lower than Kapches' (1990) figures for most prehistoric to early historic true longhouses in Ontario. However, the Townley-Read shorthouse itself is smaller than almost all of the houses in Kapches' study. The closest parallel would be in Category I cabins (sized 110 m^2 or less) from the protohistoric or early historic Ball Site (c. A.D. 1600). The Ball Site Category I averages of 16.5% sleeping benches and 1.9% hearths are quite close to the Townley-Read figures of 19.7% and 2.9%. Kapches defines the Ball Category I cabins as "special purpose structures with late Iroquoian organization [i.e., matrilineality]" (Kapches 1990:64). The range of artifactual materials recovered from the Structure 1 area at Townley-Read argues against a special-purpose function for the shorthouse. As with Warrick's occupation span estimates, the conclusions reached by Kapches regarding the spatial dynamics of seventeenth century houses may not apply to Iroquoian houses of the eighteenth century.

To summarize, in comparison to traditional Iroquoian houses the Townley-Read shorthouse exhibits different post types and post placement, a lower density of wall posts, increased nail use, and a lesser proportion of space dedicated to permanent and semi-permanent features. The primary innovation at Townley-Read was probably that new siding materials had replaced bark. A number of first-person descriptions of eighteenth century Iroquois housing describe the use of logs, hewn timbers or split-log planks for siding (e.g., James Smith [1755] in Drake 1855:193-194; Richard Smith [1769] in Halsey 1989:131-132). Many of the non-traditional construction elements exhibited by the Townley-Read shorthouse were probably a consequence of the new siding materials. Log or plank siding would have been more sturdy and durable and would not have required as many posts for bracing as bark. Nails of various sizes provided additional reinforcement for the structure. However, it is important to emphasize that although the Townley-Read short longhouse and other Iroquois houses of the mid-eighteenth century were in part made of logs, these houses remained recognizably Iroquoian in floorplan and construction, and logs were used in ways fundamentally different than European methods of log construction.

The Classification of Eighteenth Century Iroquois Houses

The archaeological and ethnohistorical literature on eighteenth century Iroquois housing often claims that "bark longhouses" were abandoned in favor of "log cabins"

(Grumet 1995:346; Wallace 1969:23, 1978:442; Wray 1983:41), and not infrequently eighteenth century Iroquois houses are described as "European-style log cabins" (e.g., Aquila 1983:32; Graymont 1972:10; Richter 1992:260-261; Snow 1995:472; 1997:72; Weslager 1969:59-62). This terminology should be amended, since these terms are at best misleading and at worst simply inaccurate. First, the word "cabin" can be used to refer to three different things:

> (1) a more or less temporary structure.
> (2) the size of a dwelling, regardless of its method of manufacture. Obviously this is the sense of the word used by Kapches (1984), who defines an Iroquoian-style cabin as a residential structure with a length:width ratio of 1.25:1 or less.
> (3) a dwelling made from notched logs laid parallel to the ground, or in other words a "European-style log cabin" (T. Jordan 1985; T. Jordan and Kaups 1989).

Archaeologists and historians must be careful not to conflate these three meanings, in particular guarding against taking the use of the word "cabin" (or the French *cabanne)* in historical sources to mean more than it should. Seventeenth and eighteenth century Europeans often used the term "cabin" only in the sense of a temporary structure, with no implications as to the size of a dwelling or the materials from which it was built. This point is clearly illustrated by the 1616 use of the word *cabanne* by Champlain to describe bark-covered longhouses with up to 12 hearths (Snow 1997).

"Cabin" still has a productive place in ethnohistorical and archaeological parlance, but scholars need to exhibit considerable caution and precision in its use. Many Late Historic Period Iroquoian structures described as "cabins" in the literature are in terms of size true or short longhouses. For example, what John Bartram described as two-family "cabins" at Onondaga in 1743 were almost definitely short longhouses built using Iroquoian architectural principles (1966 [1751]:41). Similarly, the proportions of the structures recovered archaeologically at Townley-Read, Ganondagan (Dean 1984), and Conestoga (Kent 1993), make them true longhouses or shorthouses rather than cabins in Kapches' terms. Since "cabin" can refer to structures constructed in either European or traditional Iroquois styles, the term should *always* be preceded by "Iroquoian-style" or "European-style" when used in the context of seventeenth-nineteenth century Iroquoian sites, and its use should be preceded by a careful consideration of the architectural principles used in the construction of the dwellings in question.

Were Iroquois houses of the mid- to late-eighteenth century built in a "European style"? Assertions of this sort need to be made very carefully. We all readily can conjure up an image of a "European-style log cabin" in our minds, consisting of a dwelling made of logs set parallel to the ground and held together by notches at the corners, with a central eave-side door, windows on either side of the door, and a chimney at the gable end. This image has been a powerful symbol of Euroamerican pioneering since the nineteenth century (e.g., William Henry Harrison's 1840 "log cabin-hard cider" Presidential campaign) and it is reinforced through many forms of popular culture. The issue is complicated by the fact that Iroquois people did in fact construct dwellings that looked just like this on reservations in the nineteenth century for which there is substantial photographic (Snow 1994:Figure 8.1; Tuck 1971:Plate 44) and some archaeological (Lantz 1980) evidence. But did mid- to late-eighteenth century Iroquois houses look like the popular stereotype? I argue that they did not.

Many eighteenth-century Iroquois construction practices remained quite traditional and upon closer analysis almost all look decidedly non-European. Take for example the use of logs: the preponderance of documentary and archaeological evidence indicates that logs were used as a substitute for bark, not in corner-notched European-derived forms. Logs, whether whole, hewn, or split into planks, were stacked one upon the other and braced by posts. Archaeological evidence from every reported eighteenth century Iroquoian site includes a large number of post molds, suggesting that post supports were the predominant or even the exclusive construction type.

Perhaps the most telling construction detail is how the weight of a structure is distributed. As Kapches notes, European houses bear weight on corner posts or along walls, while traditional Iroquoian structures were supported by large posts in the interior of the structure (1993:145-147). A modern log-builder estimates that properly-done corner notches support 70 to 80 percent of the weight of a European-style log building (Langsner 1982:121). Many documentary and archaeological sources demonstrate the continued use of decidedly non-European large interior supports in eighteenth century Iroquois houses, further substantiating the idea that many Iroquois log dwellings were built using a core of Iroquoian architectural principles.

This is not to argue that there were no true European-style houses in eighteenth century Iroquois villages. The post-1762 Dutch style Brant House at Indian Castle (Guldenzopf 1986; Snow 1995) is a case in point. But European-style houses were introduced much later than is implied by the secondary archaeological and ethnohistoric literature and there was no widespread independent adoption of European house forms across Iroquoia. In the parts of Iroquoia more remote from European settlement, European-

style houses were rare and were introduced at a later date. This is illustrated by a survey of the documents from the 1779 Sullivan-Clinton expedition describing the destruction of Seneca settlements (contained in Conover 1887; Division of Archives and History 1929). The Sullivan-Clinton documents indicate that in 1779 most Seneca houses were sided with rounded or squared logs or hewn boards and contained an array of Native features, such as bark roofing, interior support posts, gable-end doors, end storage compartments, smoke holes, and berths on each side of a central fireplace. However, the soldiers also mention what they called "Tory Houses" or houses "built by white people" or describe definite European structural details (such as frame construction) in seven of the seventeen Seneca villages destroyed by the expedition. These houses were found either in the easternmost Seneca settlements located along the Chemung River or in settlements described as "new." No European-style houses were mentioned at the two largest settlements, Kanadesaga and Genesee Castle, which would have been natural locations for Tories to settle if they wanted to influence Seneca affairs. I conclude that Senecas themselves resided in at least some of the so-called "Tory houses," that proximity to Europeans was a factor in their construction, and that most European-style houses in the Seneca region were constructed after about 1765.

Instead of European construction styles inevitably belonging to Iroquois populations after their introduction, their adoption by the Iroquois appears to have been based on specific material factors. The first was proximity to Europeans, with the "directed culture change" of houses built by missionaries (Fenton 1967) and colonial officials playing a significant role. Emerging Iroquois elites such as the Brant family used European framed house forms as an expression of growing social inequality. The widespread adoption of European-style dwellings by the majority of Iroquois populations appears to be linked to their taking up intensive agriculture and stockraising, something that took place most completely on post-Revolutionary Reservations (Wallace 1969) but may have occurred earlier in the Mohawk Valley where substantial European territorial encroachment began earlier (see Jordan 1997, 2002:444-467).

But does it suffice to say that most Iroquois houses after 1800 (especially outside the Mohawk Valley) were simply using traditional architectural principles, and that by the eighteenth century they coexisted with a small number of European-style houses within the same communities? On one level this opposition between "traditional" Iroquois and "European-style" houses seems misplaced. Eighteenth-century houses like the Townley-Read shorthouse clearly fit within the Iroquoian architectural tradition, but at the same time they differ: they were *much* smaller than traditional longhouses, utilized a variety of European tools, construction techniques, and hardware in their construction, and some contained an occasional chimney or window. It would seem to be a more productive position to treat these houses as hybrid, intercultural, creolized, or "mutualist" (Orser 1996) artifacts, adding eighteenth century houses to better-known examples such as shell bead wampum, wooden ladles, antler hair combs, brass ornaments and tools, and splint basketry that show a *convergence* of cultural values instead of the envelopment of one culture by another (see Engelbrecht 2003). In my dissertation (Jordan 2002:431-440) I propose that the "intercultural/creolized" Iroquoian house be treated as a formal architectural type, distinguished both from more wholly traditional bark-sided Iroquois houses and fully European-style dwellings.

A more subtle typology of house forms that incorporates the intercultural/ creolized house type results in a more detailed picture of Iroquois society and culture than the previous bifurcation between "traditional" and "European" forms allows. This shift in perspective, one that much better fits the available documentary and archaeological evidence than the predominant "European-style log cabin" model, has important implications. As an experiment, go back to some of the secondary sources that discuss eighteenth century Iroquois culture and substitute the words "log- or plank-sided shorthouse" wherever you see the word "cabin" and observe how this subtly modifies the overall picture of eighteenth century culture change. The transformation in house forms can no longer be taken as automatic and seemingly devastating evidence for the disintegration of Iroquois culture. Instead it becomes something more complex that demonstrates much more continuity with traditional architecture and culture.

Acknowledgements

This paper differs substantially from my paper given at the 1997 Rochester Museum and Science Center Conference on the Iroquois Longhouse. In that paper (Jordan 1997), I argued that multiple family longhouse dwellings were likely to have been common at eighteenth century Iroquois sites outside the Mohawk Valley, based on the fact that the dynamics of household formation were likely to have differed in the Mohawk region due to European territorial encroachment. The 1997 paper was given before substantial fieldwork had taken place at the Townley-Read Site. While I stand behind the conclusions stated in that paper, the excavation data recovered at Townley-Read have complicated the issue and I felt that this presentation of recent field data would be more useful to readers than my original, more theoretical argument. I would like to thank the organizers of

the Longhouse Conference, and I am grateful to Charles F. Hayes III for allowing me to present this different approach. A version of this paper was given at the 2000 Northeast Archaeological Symposium held at the Cayuga Museum, Auburn, New York, and portions of it appear in my doctoral dissertation (Jordan 2002:Chapters 5 and 8). Special thanks to Adam Watson and Michael West, who analyzed the faunal materials from the site, and to Monte Bennett for providing unpublished excavation data from the Primes Hill Site. Don Cameron, Bob DeOrio, Bill Engelbrecht, George Hamell, Peter Jemison, Julie Jordan, Bob Kuhn, Nan Rothschild, Nerissa Russell, Lorraine Saunders, Martha Sempowski, Dean Snow, and Nina Versaggi made comments and suggestions that greatly improved this paper. My use (and abuse) of their comments is of course strictly my own doing.

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A Tribute to Dr. Robert E. Funk 1932-2002

Beth Wellman, New York State Museum

During his long and productive career as an archaeologist at the New York State Museum, Dr. Robert E. Funk became a mainstay in the lives of archaeologists in the region. After his retirement in 1993 and until his death in 2002 he remained active in research and in the community. His many publications are filled with the results of his extensive field research. These report on most known prehistoric periods and describe new ones. Many have become primary references for researchers and students. The loss of Bob, his work, and his help were felt throughout the Northeast, and especially by the many people whom he had befriended.

For those who knew him personally, Bob was a special friend. His affection and respect for others was evidenced by his insistence on a first name relationship with everyone. His good nature and enthusiasm turned colleagues and acquaintances into friends. He was well liked for his generous sharing of knowledge. Bob was available to anyone who walked into the museum for identifications, information, or advice. He was equally available when traveling to excavate, visit and advise at the excavations of others, or to study collections. After retirement he continued to respond to all who called on him.

Bob established many co-operative relationships with the archaeological community. He researched and co-authored with professional and avocational archaeologists alike. He encouraged avocational archeologists in scientific work and participation in the scientific community. He trained more than a generation of archaeologists, teaching field school students and others in excavation techniques, advising research, and sitting on thesis committees.

Bob began his work as a researcher at the New York State Museum in 1960 when he was hired by New York State Archaeologist, William A. Ritchie. In 1973 he succeeded Ritchie as New York State Archaeologist. Throughout his career he pursued the goal, established by his predecessors at the museum, of producing a full prehistory of human occupation of the state, attempting to identify, describe, and explain every period. Using Ritchie's masterful outline, Bob strove to gain better control of time and space. He wished to validate diagnostic projectile point types and other time markers that are used to identify occupation periods. He worked to fill in all of the missing periods. He hoped that descriptions of each culture would be the foundation for studies of changes through prehistory. He wanted to discover the driving forces of cultural change.

Bob's publications are data rich and include a wealth of important contributions to understanding the prehistory of New York State and the greater region. He was a cultural historian who looked for evidence of successive periods, applying rigorous scientific control to their identification. He knew that each bit of information and each new discovery must be grounded in careful and well-recorded work.

Bob sought stratified sites, where successive occupations were separated by natural deposition. In the system he came to employ, several radiocarbon dates were obtained for each occupation, and these were also tested against the ordering seen in the stratigraphy. The resulting more accurate dates for specific cultures could be applied with greater confidence to other undated occupations in the region. Summaries of cultures could then be based on groups of sites of the same time period. Bob also felt that control must be grounded in space. He understood cultures to be regional expressions and he put tremendous effort into studies that would describe historical changes within a region. The goal of this method was to create regional histories that could be compared in order to discover the nature of change across regions.

Bob conducted two major regional studies in his career, the first in the Hudson Valley and the second in the Upper Susquehanna. The earlier work resulted in his book, *Recent Contributions To Hudson Valley Prehistory*, New York State Museum Memoir 22 published in 1976. This book includes

numerous important site reports, several newly defined cultural periods and diagnostic types, and useful treatments of summary data that continue to provide baseline data. Especially important information was discovered at the Sylvan Lake Rockshelter Site. On the basis of this site, Bob established a revision of William Ritchie's Late Archaic sequence. Results at Sylvan Lake placed Laurentian expressions earlier than "narrow stemmed" expressions similar to Lamoka. This site also produced samples used to create two new diagnostic projectile point types—the Sylvan Side-Notched and the Beekman Triangle. The Beekman point is an Archaic form that could easily be mistaken for Late Woodland triangular points. Bob used Hudson Valley Middle Woodland sites to create descriptions of new phases, Vernt Hill and Four Mile, which reflect regional differences during the period that led to the development of village agriculture.

This book also has sections that make full use of all available data. Although many researchers fail to find value in general site collections, Bob compiled the data to illustrate important regional and environmental variability. He used simple tables and seriation charts to show associations of site activities, as represented by tool types, with different regional and environmental locations. The results of these compilations are an instructive resource, useful for stimulating current research. Seriation was also successfully used to illustrate artifact style variability on Middle Woodland sites.

The Upper Susquehanna Valley project followed the Hudson Valley work. Fieldwork for this project lasted for seven excavation seasons and resulted in a massive two-volume publication, *Archaeological Investigations In The Upper Susquehanna Valley*, New York State published by Cornell Press in 1993 and 1998. These volumes have detailed reports of numerous sites, compilations of a range of survey and general collections data, and extensive environmental data.

In the Upper Susquehanna project, Bob directed the excavation of numerous stratified sites. These produced a wealth of information, especially for the Late Archaic and Transitional periods, but also for earlier Archaic as well as Woodland times. Among the important sites excavated is the Bass Site which had Early and Middle Archaic occupations. Bass Site assemblages included projectile points that Bob assigned to a new type called Wells Bridge Corner-Notched. The Fortin Locus 2 Site showed successive occupations that spanned the Middle Woodland period. The Gardepe Site produced points newly defined as Sand Hill Stemmed which are expected to be Early Woodland in age. Bob suggested (personal communication) their possible relationship to the southerly Bush Kill types.

Volume 2 in the Susquehanna Valley set contains charts comparing the resulting cultural sequence of the Upper Susquehanna area with other sequences, from southern Ontario through New York to northern New England. Volume 1 contains chapters on the environment of the study region. These include a description of prehistoric vegetation change developed from pollen samples taken from bogs in the region. Volume 1 also includes extensive descriptions of settlement and subsistence evidence and the relationship of sites of different periods to environmental variables. Tables and charts are used to support apparent population changes and these are compared to the results of studies in the Hudson Valley.

In 1985 Bob began a study of the prehistory of a coastal region of New York, Fishers Island. The project was co-directed by John Pfeiffer and included ten years of limited excavation seasons on the Island. During the study, numerous sites were tested and excavated. The information acquired is a valuable resource for studies of coastal areas where development has damaged many archaeological sites. Bob completed the manuscript for the final report, co-authored by John Pfeiffer, in 2002 and it is in preparation for publication by the New York State Museum.

Bob also conducted a research project on the prehistory of the Iroquois. He directed extensive excavations on three Late Woodland village sites in the Mohawk valley. This work was begun by Ritchie and developed by Bob as a study of Iroquois culture just before European contact. The final report of this work is co-authored with Robert Kuhn and was published by the New York State Museum late in 2003.

Bob's special interest in prehistory was in early occupations, particularly the Paleo-Indian period. Bob made an effort to learn of the discovery of Paleo sites, visit sites, study collections, and excavate on these sites when possible. He directed three years of excavations at a major quarry-workshop of the period, the West Athens Hill Site. In 2002 Bob completed a manuscript summarizing the excavations at West Athens Hill and comparing the results with other important Paleo sites in New York. The manuscript is in production for publication at the New York State Museum

Bob's special expertise was in stratigraphic excavation Throughout his career Bob recognized the importance of geo-archaeology to excavators. He was trained in stratigraphic excavation techniques and kept up with the topic eagerly reviewing European works on stratigraphic models and excavation methodology.

As well as the books on his major regional studies Bob authored or co-authored over 50 other publications and directed numerous other excavations On his retirement Bob spoke about his experiences in archaeology at the 62nd annual meetings of the Eastern States Archaeological Federation. Bob expanded the talk, Forty Years in Archaeology: Or What Happened to the Good Old Days?, for inclusion in *A Golden Compendium to Robert E. Funk*

published in 1996 as No.15 of the Occasional Publications in Northeastern Anthropology. This paper also contains a bibliography of Bob's publications through 1994.

Since 1994, Bob added the following publications to his bibliography:

Funk, Robert E.

1996 Holocene or Hollow Scene? The Search for the Earliest Archaic Cultures in New York State. *The Review of Archaeology* 17 (1):11-25.

1997 A Tribute to William A. Ritchie. *The Bulletin and Journal of the New York State Archaeological Association* 113:1-3.

1997 An Introduction to the History of Prehistoric Archaeology in New York State. *The Bulletin*, Journal of the New York State Archaeological Association 113:4-59.

Funk, Robert E., Beth Wellman, Harold R. Decker and William F. Ehlers, Jr.

2003 A Small Paleo-Indian Encampment in Orange County, New York. *The Bulletin*, Journal of the New York State Archaeological Association No. 119.

Kuhn, Robert D., and Robert E. Funk

2000 Boning Up on the Mohawk: An Overview of Mohawk Faunal Assemblages and Subsistence Patterns. *Archaeology of Eastern North America* 28:29-62.

Steadman, David W., Thomas W. Stafford Jr., and Robert E. Funk

1997 Nonassociation of Paleoindians with AMS-Dated Late Pleistocene Mammals from the Dutchess Quarry Caves, New York. *Quaternary Research* 47:106-116.

After his retirement, Bob also completed manuscripts for the three books listed below. These are or will be published by the New York State Museum.

Funk, Robert E., and Robert D. Kuhn

2003 *Three Sixteenth Century Mohawk Iroquois Village Sites*. New York State Museum Bulletin 503. University of the State of New York, Albany, New York

Funk, Robert E.

n.d. *The West Athens Hill Site Revisited*. Manuscript in production at New York State Museum.

Funk, Robert E., John E. Pfeiffer, Leslie A.Sirkin, and Gordon C. Tucker

n. d. *People, Ponds, And Beaches: The Archaeology And Paleoecology Of Fishers Island, New York*. Manuscript in preparation at New York State Museum.

It is a tribute to Bob that, given his senior position as a researcher and extensive professional contributions, many people respond to the mention of him first with affection. Bob was blessed with a love of life and a boundless enthusiasm. He could be counted on for an interesting, and often excited, discussion of prehistoric periods or sites, baseball, philosophy, science fiction, classical music, or a million other topics. Bob had a keen sense of humor and when conversation lagged or the work was tiring, Bob engaged in, let's face it, silly activities like reciting scenes from Star Wars. Bob loved people and connected with them, seeking out common interests and experiences. A sampling of the experiences of a few people who worked with Bob over the years follows, with apologies to Bob's many other friends who are not listed.

Remembering Dr. Robert E. Funk

The Orange County Chapter, NYSAA was organized at just about the same time that Dr. Funk began his tenure at the New York State Museum. In response to our persistent questioning, Dr. Funk suggested that we go and look for a Paleolithic rock shelter. No problem we said, innocents that we were. Member Henry Maly recalled his childhood, playing in caves on Lookout Mountain. There, a small opening beckoned. Tons and tons of rock and dirt came out, and then one day in 1965, a perfect Cumberland fluted point lay in the screen. From that day, our Chapter enjoyed a close relationship with Dr. Funk.

The ongoing saga of Dutchess Quarry Cave led to our being privileged to work with Dr. Funk at other sites. And, he was there to advise us when we recovered both the Sugar Loaf and the Arborio Mastodons. He edited site reports for us, most recently the Lieberman Site. Dr. Funk was a natural teacher. As we worked, it seemed we were immersed in a constant stream of information. Advice and guidance flowed from him in his easy, uncritical manner.

Dr. Funk became Bob Funk to us, he wanted it that way. He was interested and interesting. When he asked, "How are you?" he not only meant it, he recalled your answer the next time he saw you. Bob Funk was never casual within his profession. He never speculated or gave an ill-considered answer. Still, he enjoyed a good joke or a good story or really good music. All were part of our worksite experience. When he retired, we hardly noticed. He was still there for us.

Whether phone calls, letters, meeting for lunch at Woodstock or visiting sites with us, Bob remained involved. As the scientific community joins to salute the contributions of Dr. Robert E. Funk, we salute Bob Funk, a man for all seasons.

Harold R. Decker, Orange County Chapter New York State Archaeological Association

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Surely there was no greater friend to avocational archaeology than Bob Funk. Bob had a zest for life and a zeal for archaeology that was contagious. He was extremely generous with his time and expertise, and his door was always open to anyone with an interest in archaeology. He was ever ready to examine artifacts, listen to research proposals, visit sites and offer assistance in every way to Chapter members. He was a true "elder statesman" of the NYSAA.

Personally, Bob was ever a friend and mentor to me as my museum career progressed. He was always willing to review papers, critique exhibit proposals, and the like. Quick to praise, slow to criticize, but usually able to offer insights to guide me to better results...my work always the better for it.

During the last few years, Bob and I had many a lively discussion regarding our thoughts on the "afterlife." Our most persuasive arguments had no effect on each other and our debates would always end in a stalemate. Old and cherished friend, on this matter alone I hope you were wrong. I hope that now all of your philosophical questions have been truly answered and, when we meet again at trail's end, you will lead me to the place of your eternal reward, where pies, of infinite variety and exquisite deliciousness, are baked fresh daily.

Peter P. Walsh, Auringer-Seelye Chapter, New York State Archaeological Association

~

Bob Funk was a friend to all. He was a friend to the members of the Triple Cities Chapter from its formation. In fact, it was Bob who first told me about the New York State Archaeological Association when I was his student in a Field School at Garoga in 1964. His admiration of the NYSAA prompted me to form, with Bill Lipe, a local archeology club. It was accepted as the Triple Cities Chapter in 1967.

He offered support and encouragement to Chapter members during our difficult salvage excavations at the Otstungo, Comfort, and Apalachin Creek Sites. His friendly door was always welcome. Bob's honesty and generosity in sharing information on Susquehanna Valley prehistory prompted Chapter members to do the same.

Bob Funk was a friend to students, avocationalists, and professionals: men and women alike. We all miss him.

Dolores N. Elliott, Triple Cities Chapter, New York State Archaeological Association

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Soon after his arrival in Albany, Bob Funk became a member of the Van Epps-Hartley Chapter. In the early 60s, we would see him two or three times a year at local and statewide NYSAA meetings. During that early phase of his career Bob directed excavations at several Mohawk and Schoharie valley sites. Many Van Epps-Hartley members got to know him through regular visits and volunteer work at those digs. On weekends Bob could often be found lending a hand at the ongoing chapter-sponsored dig at the Bent Site, or assisting with individual chapter members' projects such as Kingston Larner's excavations at the Cold Spring Site and Art Johnson's continuing effort at the Dennis Site. After assuming the position of State Archaeologist, Bob continued the tradition Dr. Ritchie had begun by "holding forth" at the winter Van Epps-Hartley meeting, usually held at the New York State Museum.

Bob taught us field techniques, kept us abreast with his most current work and reported news of many other important discoveries in the Northeast. He was an enthusiastic and caring human being who always had time to listen and somehow managed to make everyone feel special. In many ways Bob Funk was the soul of the Van Epps-Hartley Chapter during the 1960s and 70s. We will always miss him.

Wayne Lenig, Van Epps-Hartley Chapter, New York State Archaeological Association

~

If you are fortunate during your lifetime you will meet one special friend who you never see as often as you would like. When you do meet, however, you "pick up" exactly where you left off at the last encounter. And when that friend shares many of your own interests—it's magic! Such a friend was Bob Funk.

Bob was within a few months of my own age and thus we shared exposure to the same past times. This meant we could converse on a number of topics without having to create a "background." And what conversations they were—Bob was a true Renaissance man and could hold forth on any number of topics besides his life's work, archaeology.

For those of us who had been lured into the realm of Avocational Archaeology, he was always willing to clear up questions and get us back "on the right track." I will remember him best sitting in the hall at so many NYSAA annual meetings sharing his insight and wisdom with both

his peers and the next generation.

Finally, Bob had a wonderful sense of humor, which not only sustained him through difficult times but spread over those of us who knew him.

I'll miss him.

Gordon De Angelo, William M. Beauchamp Chapter , New York State Archaeological Association

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We come together today to celebrate the life of our good friend, husband and father—superb archaeologist—Bob Funk. Bob was one of the most delightful people I've ever met. He became a dear friend.

I found that Bob could really relax over a thick juicy sirloin steak, and not one, but several exquisite desserts—each one quite different from the last—and each savored with great pleasure, as the near conclusion to a sumptuous repast. I truly believed that Bob made everything disappear as if he were a master magician especially so since, as we dined, we were so busy in spirited conversation and gesticulating that we hardly seemed to notice the food. It was as if the world stood still, and all creatures great and small harkened to Bob's erudition. Before we knew it, hours had passed.

Whatever he the subject: social or natural science, baseball, science fiction movies, politics, old Ritchie stories, or his colleagues—be they professional, amateur or laymen in most any walk of life—Bob was animated and unstinting in praise of good people, whether learned or not. Correspondingly, he was heavily critical of those who abused their power, or otherwise did harm. At the same time, Bob was consistently forgiving and understanding of those whom he wished might do better. He was generous with his time and advice. In that guise, he was a most kind and unassuming mentor. He gave credit where credit was due and deserving people loved him for it. They not only respected him, as all of us do, but he inspired the very best, that they might earn Bob's praise and continued gentle guidance.

Bob had a lighter side too, he could fantasize about space and enjoy to the hilt the science fiction he shared, especially with Galen Ritchie, as they swapped books and enjoyed related movies together. Bob loved baseball and when a baseball game was not in the offing, there was always stick ball. Marjorie, my wife, fondly remembers back in the mid 60s when Bob had his State Museum crew at the Candee Site near Phoenix and Jim Tuck had a field school at the Furnace Brook Site. There were lunch time stick ball games between the Candee A's and the Furnace Brook Heat.

Bob was a prodigious mover of dirt in the field. He was a field person's field man. Nothing could stop him. Dan Weiskotten observed that on an especially hot steamy day, Bob could be witnessed shoveling like mad in his skivvies. Well, it might have been the "altogether."

Bob loved us—and we loved him. What a startling and wondrous experience to be suddenly discovered by Bob at a social gathering as we were dressed to the nines or at an archaeological site digging in our grubbies. Wherever you were when he discovered you, you were held fast in his embrace, a memorable body-hug, as he exclaimed, beaming all over, "Hey! It's so good to see you!"... and then he'd banter. You melted. Bob really, really cared. So did I...so did you. He encouraged us by superb example, coupled with deep affection to do our very best.

He is, and will continue to be, sorely missed—one of the greatest archaeologists in the Northeast, an archaeologist who represents a PAST TIME, before CRM—before which archaeologists could more often pursue research questions. That was when you could dig hoping to find something — NOT hoping NOT to find something. Bob was a most fitting sequel to William Ritchie as State Archaeologist, another in a long line of distinguished New York State Archaeologists, an exquisite model for us all as professionals, and for all concerned human beings to emulate. We will cherish his memory as we pay lasting tribute to a wonderful person. Bob's works are an incredibly rich heritage produced by physical stamina, courage surmounting every adversity, and unremitting love for archaeology and for mankind.

As Bill Ritchie might well have said on this occasion, quoting one of Bill's favorite poets, Adelaide Crapsey:

> With soft dry sound,
> Like step of passing ghost,
> The Autumn leaves, Frost crispt,
> Break from their stems And fall.

As Shakespeare might have added "Good night, sweet prince!"

Peter Pratt, William M. Beauchamp Chapter , New York State Archaeological Association

Guidelines for Manuscript Submissions

The *Bulletin* is a journal devoted to the dissemination of scholarly articles relating to the archaeology of New York State and its environs. It is published annually by the New York State Archaeological Association. Authors should submit an original and two copies of each article, including an abstract and a complete list of references cited in the text, to the editor, Charles F. Hayes III, 250 Commodore Parkway, Rochester, NY 14625-2032. The editor may reject or return an article to the author for revisions, on the basis of either content or style. Upon acceptance, authors are asked to submit their article in electronic format —either DOS/Windows or Macintosh format. Most current word processing programs can be accommodated.

Manuscript Organization

Please organize your manuscript as follows:

- Title, author, institutional or chapter affiliation
- Abstract - a single paragraph of 100 to 150 words
- Text
- Acknowledgements
- References cited
- Tables (with captions)
- Figures (with captions listed on a separate page)

Manuscripts should be written as clearly and succinctly as possible. They should be unjustified and double-spaced, on one side of 8 1/2" x 11" paper. Only one space should follow periods. Pages should be numbered in the upper right hand corner. Endnotes are to be used instead of footnotes, but they should be used sparingly.

Headings

Primary headings should be flush left, bolded, and at 2 point larger font size than the text, with only the first letter of each word capitalized. Secondary headings should be flush left, unbolded, and the same font size as the text, with only the first letter of each word capitalized. Tertiary headings should be flush left, in italics, and at the same font size as the text, with only the first letter of each word capitalized.

Measurement Units

In order to avoid errors in translation, measurements may be given either English or metric units, as appropriate to the content of the article; however, for further clarification, one may wish to include conversions in parentheses. Commonly used units of measurement such as feet, yards, miles, meters, centimeters, kilometers, and hectares are abbreviated as follows (without periods):

inches	in	meters	m
feet	ft	centimeters	cm
yards	yd	kilometers	km
miles	mi	hectares	ha

In-Text Reference Citations

In-text reference citations should follow the simple *American Antiquity* style within parentheses immediately following the material to which the citation refers (for particulars, see *American Antiquity*, Volume 57, number 4, pp. 749-777). Simple citations should include author's last name and year of publication unseparated by a comma, and if appropriate, the page number(s) preceded by a colon (Smith 1978:222) or Smith (1978:222). Citations involving two authors should include both names; those involving three or more authors should use the first author's name followed by et al. (e.g., Brown et al. 1987). Where more than one publication is being referenced, they should be ordered alphabetically within the parentheses and separated by semi-colons (e.g., Barton 1986; Davis 1975; Wilson 1999). Where there are several references for the same author within a set of parentheses, these are separated by commas (e.g., Adams 1975, 1985; Brown 1988).

Quotations

Quotations of five lines or less should be included in the text: double quotation marks are used. The citation should follow the form indicated above for in-text reference citations, but should always include page number(s). Quotes of more than five lines should be inset in a block and double spaced without quotation marks. Citations, including page numbers, should follow in brackets.

Tables

If at all possible tables should be set up in the same word processing format as the text. They should be as simple as possible and include a short descriptive title above the table itself. Tables should be numbered consecutively as they will appear in text. All tables should be referenced in the text.

Figures

All photos and line drawings are designated as figures and numbered consecutively as they are referred to in the text. Captions should be submitted on a separate page, not as part of the illustration. A light pencil marking on the back of the photo or drawing should identify the particular illustration. Photos and drawings should be high quality images reproducible at sizes appropriate to the journal. Authors bear the responsibility for obtaining written permission for the reproduction of any materials protected by U.S. copyrights.

References Cited

The list of references cited should include all references cited in the text (except personal communications), and conversely only references cited in the text should be listed. Authors bear the responsibility for double-checking the accuracy of each and every citation used. The list should be alphabetized by the author's last name, then first name and middle initial. Multiple entries by the same author should be in chronological order with the earliest first. Do not use n.d. unless absolutely necessary—if the date is truly unknown. The format for references should follow the *American Antiquity* Style Guide (see *American Antiquity*, Volume 57, number 4, pp. 749-777). Examples of the most commonly needed formats are listed below:

1. Book with single author

Bradley, James W.

1987 *Evolution of the Onondaga Iroquois: Accommodating Change 1500-1655 A.D.* Syracuse University Press, Syracuse, NY.

2. Book with multiple authors

Burt, William H. and Richard P. Grossenheider

1976 *Peterson Field Guides: Mammals.* 3rd ed. Houghton Mifflin, Boston.

3. Edited book (author is editor)

Morris, William (editor)

1978 *The American Heritage Dictionary of the English Language.* Houghton Mifflin, Boston.

4. Translated book

van den Bogaert, Harmen Meyndertz

1988 *A Journey into Mohawk and Oneida Country 1634-35.* Translated and edited by Charles Gehring and William Starna. Syracuse University Press, Syracuse.

5. Reprinted book

Hale, Horatio E., editor

1963 The Iroquois Book of Rites. Reprinted with an Introduction by William N. Fenton, University of Toronto Press, Toronto. Originally published 1883, D.G. Brinton, Philadelphia.

6. Multivolume set

Thwaites, Reuben G., editor

1959 *The Jesuit Relations and Allied Documents: Travel and Explorations of the Jesuit Missionaries in New France, 1610-1791.* 73 vols. Reprinted, Pageant, New York. Originally published 1896-1901, Burrows Brothers, Cleveland.

7. Titled volume in a series

Wray, Charles F., Martha P. Sempowski, and Lorraine P. Saunders

1991 *Tram and Cameron: Two Early Contact Era Sites.* Charles F. Wray Series in Seneca Archaeology, Vol. II, edited by Charles F. Hayes III. Research Records No. 21. Rochester Museum & Science Center, Rochester, NY.

8. Article in an edited book

Wade, Mason

1988 French Indian Policies. In *History of Indian-White Relations*, edited by Wilcomb E. Washburn. Handbook of North American Indians, Vol. 4, William G. Sturtevant, general editor, pp. 20-28. Smithsonian Institution, Washington, D.C.

9. Article in a journal

Murray, Jean E.

1938 The Early Fur Trade in New France and New Netherland. *Canadian Historical Review* XIX:367.

10. Article in edited volume in a series

Noble, William C.

1992 Neutral Iroquois Smoking Pipes. In *Proceedings of the 1989 Smoking Pipe Conference*, edited by Charles F. Hayes III, Connie C. Bodner, and Martha L. Sempowski, pp. 41-49. Research Records No. 22. Rochester Museum & Science Center, Rochester, NY.

11. Presented paper

Ceci, Lyn

1985 Shell Bead Evidence from Archaeological Sites in the Seneca Region of New York State. Paper presented at the Annual Conference on Iroquois Research, Rensselaerville, NY.

12. Dissertation or thesis

Drooker, Penelope B.

1996 *The View from Madisonville: Continuity and Change in Late Prehistoric Protohistoric Western Fort Ancient Interaction Patterns.* Ph.D. dissertation, State University of New York, Albany. University Microfilms, Ann Arbor, MI.

13. Manuscript in press

Brown, William T.

2000 Early Days in Livingston County. New Horizons Press. In Press.

14. Unpublished manuscript

Wray, Charles F.

1978 Field notes: Fugle Site. MS on file, Rochester Museum & Science Center, Rochester, NY.

Past and Present NYSAA Award Recipients

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Charles M. Knoll (1958)
Louis A. Brennan (1960)
William A. Ritchie (1962)
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Paul L. Weinman (1971)
Robert E. Funk (1977, 1994)
Peter P. Pratt (1980)
Herbert C. Kraft (1989)
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Martha L. Sempowski (1999)

Theodore Whitney Commendation

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