The Bulletin

Number 41 November 1967

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NEW YORK STATE ARCHEOLOGICAL ASSOCIATION

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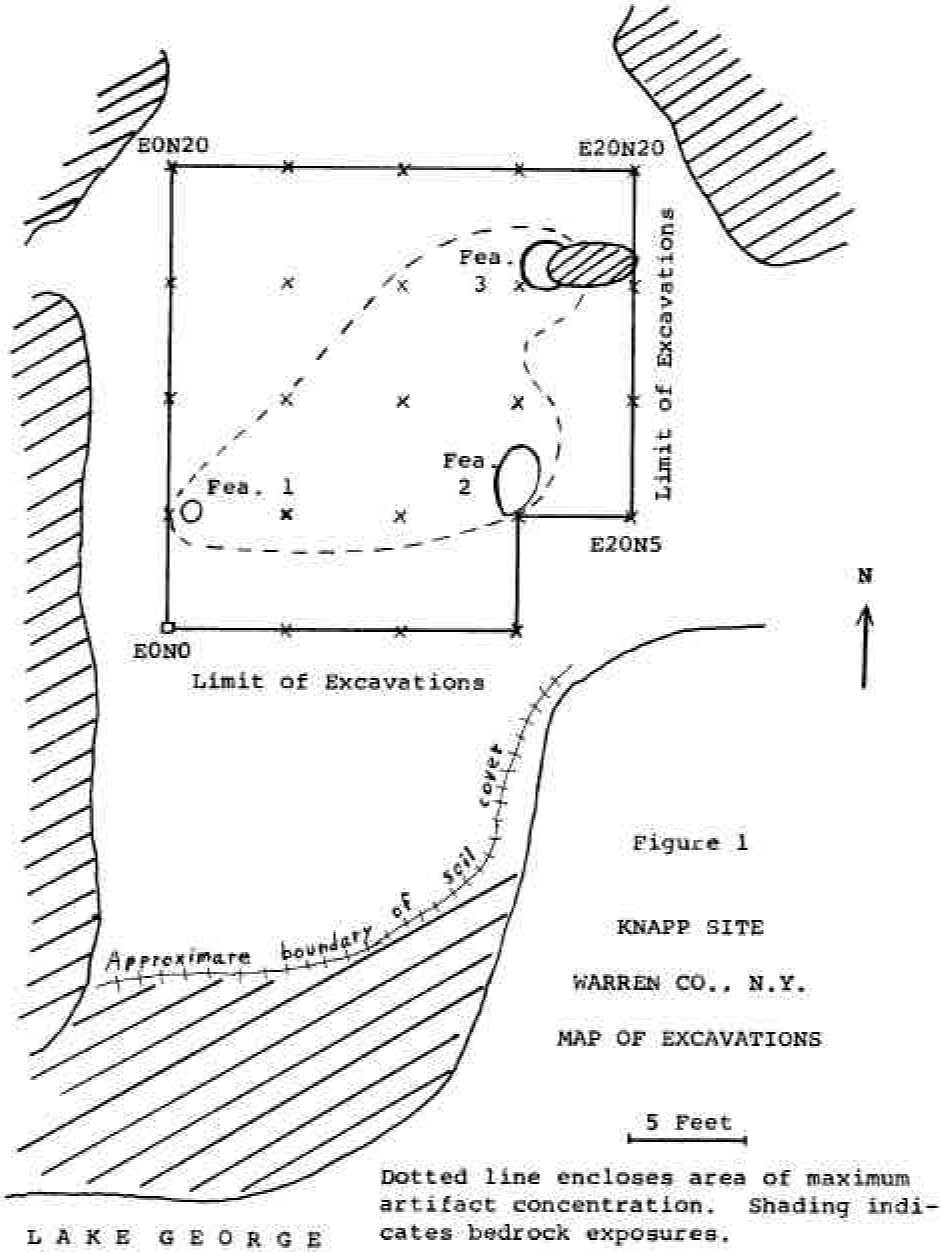


Figure 1

KNAPP SITE

WARREN CO., N.Y.

MAP OF EXCAVATIONS

Dotted line encloses area of maximum artifact concentration. Shading indicates bedrock exposures.

THE KNAPP SITE: A SMALL MULTICOMPONENT CAMP ON LAKE GEORGE, NEW YORK

Robert E. Funk — Van Epps-Hartley Chapter
Thomas P. Weinman — Auringer-Seelye Chapter
Paul L. Weinman — Auringer-Seelye Chapter

DISCOVERY AND EXCAVATION

In the spring of 1966, while conducting a survey by motorboat along the east shore of Lake George, Warren County, N.Y., Thomas Weinman noted a low, fairly flat area along the north shore of Shelving Rock Bay which seemed a likely place for an Indian site. Closer examination on the ground disclosed that the surface of a small spot close to the water's edge was littered with moderate quantities of flint chips. Later, test pits dug by the present writers produced several potsherds, projectile points, and fragments of refuse bones. It was decided that the locus merited more thorough investigations.

The camp site (plate 1) is confined to a little bench several feet back from the lake, and about 5 ft. above the water level. A few hundred feet to the east is the mouth of a small mountain stream, Shelving Rock Brook, which empties into the Bay. In the background looms the steep, imposing facade of Shelving Rock Mountain (elevation 1200 ft.).

The occupied part of the bench, about 600 sq. ft. in area, is bounded on east and west by ledges and boulders of syenite. This rock outcrops along the lake side of the site. At the northern border of the site is a small ramp-like slope, which rises to a large, level expanse of slightly higher ground. The forest which envelops the site and its environs consists largely of oaks, pines, birches, maples, and hemlocks.

The site is owned by Mrs. W. J. Knapp, whose summer home is situated north of Shelving Rock Mountain. Mrs. Knapp and her son, George O. Knapp, generously consented to systematic investigation of the site.

On Sept. 10, 1966, Thomas Weinman staked out a small grid of five-foot squares, 20 ft. on a side, and commenced excavations. He was assisted for one day by Gus Sporrer, of the Auringer-Seelye Chapter, N.Y.S.A.A. At the conclusion of the work on Sept. 18, the explorations had covered an area of 375 sq. ft.

Cultural refuse was found entirely within stratum 1, the brown, root-laced, humic topsoil, which averaged 7-10 in. thick. Stratum 2, the red sterile subsoil, containing eroded syenite fragments, thinly overlay bedrock.

FEATURES

Three refuse-filled features were excavated. Feature 1 was located in square EONO. It was a small conical pit 10 in. in diameter which apparently originated in stratum 1 at a depth below surface of 6 in., and extended into stratum 2 to a depth of 12 in. The dark brown fill contained rocker-stamped potsherds, an ovate knife (plate 2, fig. 27) and a knife fragment. Near the edge of the feature were 2 Jack's Reef Pentagonal points (figs. 21, 23) and a retouched flake side scraper (fig. 24).

Feature 2 was an oval depression 36 in. long, 18 in. wide and 8 in. deep, confined to stratum 1 and located in adjacent portions of squares ElON5 and E15N5. The fill was black in color; scattered through it were numerous flint chips, bits of refuse bone (frequently calcined), 1 bone awl, fragments of 2 thin notched points, and a number of dentate-stamped, rocker-stamped, cord-decorated and smoothed-over-cord sherds.

Feature 3, overlapping parts of squares E15N10 and E15N15, consisted of refuse clumped against the end of a large boulder. In the deposit were 3 Levanna-type points, a few dentate-stamped sherds, and 63 sherds from an incised and punctate pot (plate 3, fig. 1).

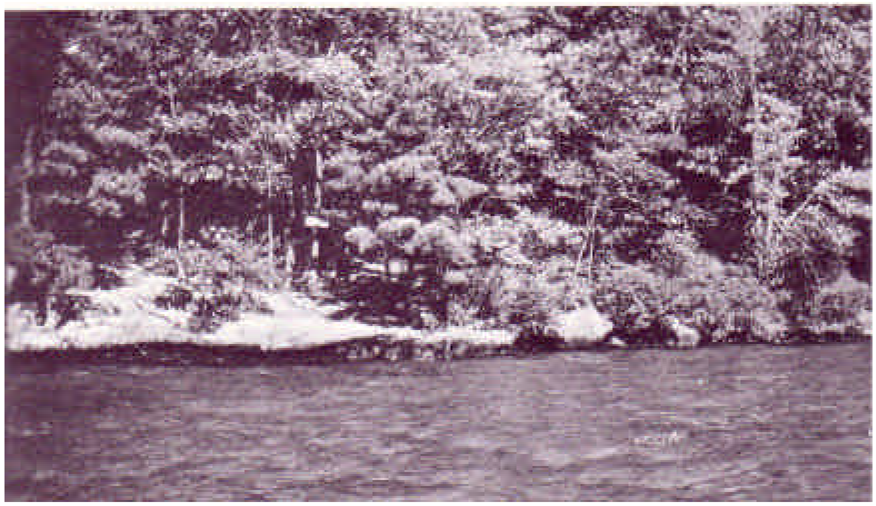


Plate 1. Knapp Site, Lake George, New York, view looking north

ARTIFACTS

The collected items of human manufacture reveal several different occupations of the site, intermittent over a period of many centuries. The artifacts will first be described, after which an attempt will be made to distinguish the various components. Our typology for projectile points rests in large part on that developed by Ritchie (1961), as does the analysis of ceramics (Ritchie and MacNeish, 1949). Comparisons with other cultural assemblages draw of necessity on the framework established by Ritchie (1944; 1951; 1965) for central New York, and on the researches of Ritchie (1958) and present writers (Funk, Weinman and Weinman, 1965; 1966) in eastern New York

Most projectile points are of the broad triangular Levanna type (21) (plate 2, fig. 3-6, 8-10, 12, 13). Other typed points include Jack's Reef Corner-notched (3) (fig. 17, 18, 20), Jack's Reef Pentagonal (3) (fig. 21-23), Adena (2) (fig. 31, 37), Orient Fishtail (1) (fig. 36) and Bare Island (1) (fig. 34). The basal portion of a well-chipped lanceolate point (fig. 14) appears to represent the Greene type, characteristic of a late Middle Woodland complex in the middle Hudson Valley (Funk, n.d.). An untyped large, thin corner-notched point (fig. 19), a badly fire-spalled thin side-notched point (fig. 16), a pentagonal point minus base (fig. 15), and fragments of 2 thin notched points resemble forms which have been found on many Middle Woodland sites in New York. Two broad stemmed points (fig. 32, 39) are reminiscent of the Lagoon type, recently discovered and named by Ritchie (n.d.) in Early Woodland contexts at Martha's Vineyard, Mass. A thick, tapered-stem form (fig. 38) may have a similar affiliation. Other projectile points in the collection are 1 small, thick, Lamoka-like side notched (fig. 35), 1 Lamoka-like stemmed, 1 un-typed thin triangular, and 1 crude, thick, eared triangular (fig. 7). The remaining chipped stone items are as follows: 1 Levanna point modified to a side scraper (fig. 11); 2 ovate knives (fig. 27), 4 retouched flake side scrapers (fig. 24); 5 small simple end scrapers (fig. 28-30); 1 crude flake scraper; 2 retouched flake knives (fig. 25); 1 utilized flake; 1 trianguloid strike-a-light (fig. 26); 1 biface reject; 1 unique bifacial object, unfortunately broken, with incurvate edges showing heavy wear (fig. 33); 2 gunflints (fig. 1, 2); and 31 fragments of bifacial points or knives.

Few rough stone tools were found. They comprise 2 pebble hammerstones, a quartzite spall knife or chopper, and a chipped celt blank.

One bone awl was recovered.

The material most utilized for chipped stone artifacts was Fort Ann flint, in gray, mottled, and black varieties (45 specimens). Gray to black white-weathering Normanskill chert was second in importance (27 examples). Also employed were gray Onondaga flint (10 artifacts), gray quartzite (9 items), black speckled South Long Island flint (2), and crystal quartz (1). The Fort Ann and South Long Island stones were available in outcrops not more than a few miles from the Knapp site. Normanskill and Onondaga cherts could be obtained from formations farther south in the Hudson Valley.

Quartzite was used for the celt blank, the spall chopper, and the pebble hammerstones. The two gunflints had been exposed to intense heat, so that their material had been transformed to a white color. Its original color and source cannot therefore be determined.

Excluding badly weathered and broken fragments, a total of 216 potsherds were recovered on the site. Of this number, 205 are of Middle Woodland origin.

Seven rim and 30 body sherds are dentate-stamped. The rim sherds (plate 3, fig. 5-7) display transverse dentate impressions across the lip, and occasionally the interior surface just below the lip is marked by vertical impressions. The exterior decoration consists of parallel, vertical, oblique, or horizontal dentate lines, sometimes crowded together. Five rim sherds have broad, flat lips, which in four cases are thicker than the rim itself, being thickened, crimped, or even splayed out. There are two round-lipped rims. The dentate-stamped rim sherds vary from 5/16 to 3/8 in. thick on the lip, and from 3/16 to 5/16 in. thick below the lip. The body sherds (fig. 13) measure from 3/16 to 3/8 in. in thickness, with a mean thickness of 5/16 in.

Rocker-stamping was applied to 37 body sherds (fig. 8, 12, 14). No rim sherds were associated. The sherds range from 3/16 to 3/8 in. thick; the majority (25) are evenly divided between being 1/4 or 3/8 in. thick.

Three body sherds display a zoned dentate pattern (fig. 15). All come from the same vessel, and are 5/16 in. thick.

The type, Point Peninsula Plain, is represented by 3 rim sherds (fig. 4, 10). Two of the sherds, which possess thin pointed lips and derive from one small pot, appear to have been corded and smoothed over. The plain rims are 1/4 in. thick.

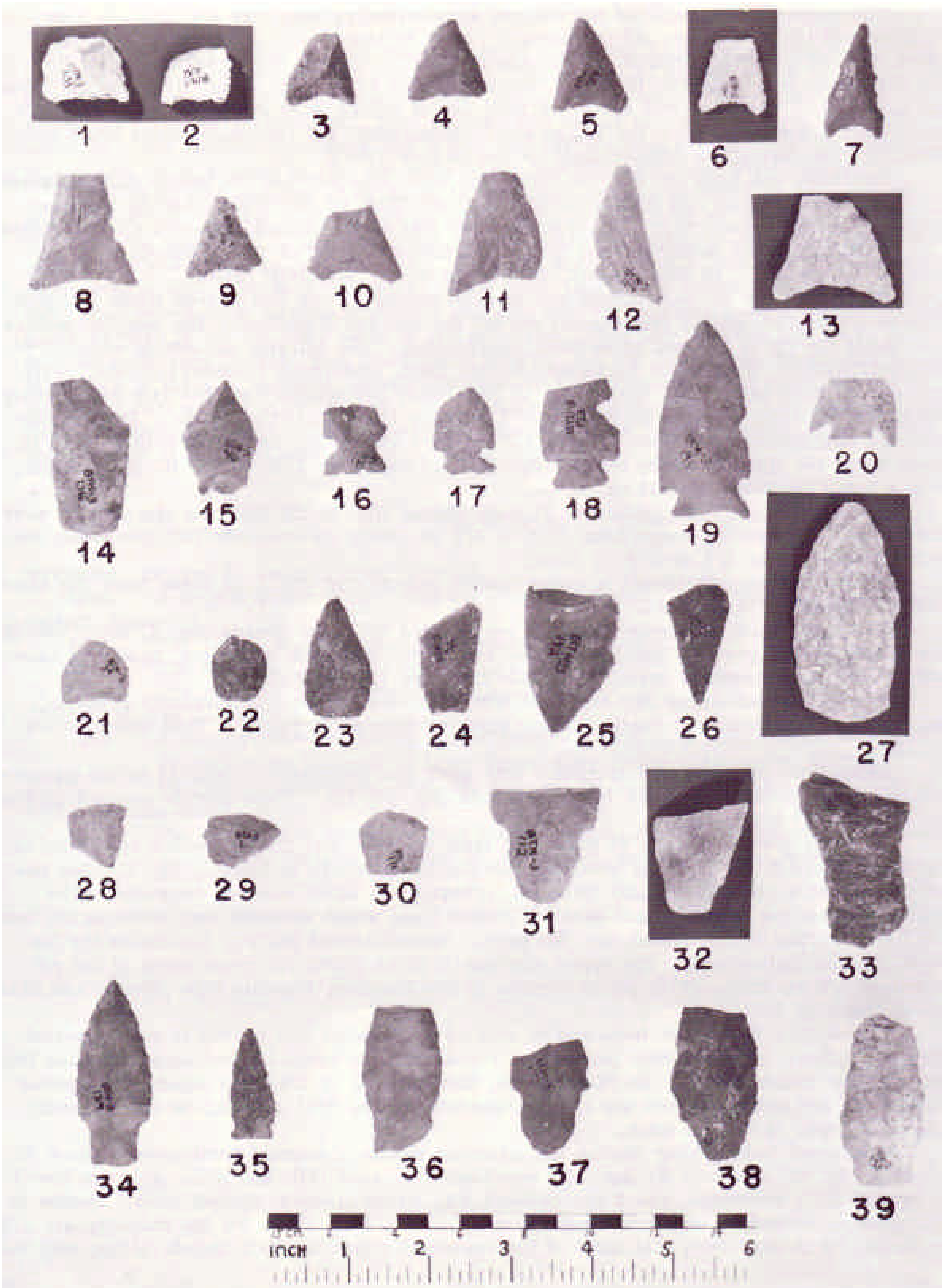
A small, round-lipped rim fragment with channeled interior is vertically cord-malleated on the exterior, and bears a single circular punctation (fig. 9). This sherd is 1/4 in. thick.

Seven body sherds are ornamented with wavy-line impressions, similar to the pseudo-scallop shell technique of early Point Peninsula (fig. 17, 18). These sherds are 1/4 to 3/8 in. thick (4 are 1/4 in thick).

Sixty-six sherds (5 rim, 61 body) are from a single pot, most of which was found in or near feature 3. A partially restored rim section is shown in plate 3, fig. 1. The vessel possessed a round to slightly flattened, crimped lip, which was not decorated. The slightly flared rim bore vertical parallel incised lines which extended well down on the body; the lower portion of the vessel was left plain. Spaced around the rim just below the lip were circular punctations. The upper rim was 5/16 in. thick, but other parts of the pot averaged 3/8 in. thick. This pot is similar to the Wickham Punctate type (Ritchie and MacNeish, 1949, p. 104).

Yet another decorative technique is evinced by 2 small rim sherds from one vessel (fig. 11). Short, narrow linear punctations run across the round lip and also embellish the interior just below the lip. On the exterior, oblique lines of the same punctations applied end-to-end are spaced around the rim. These sherds are 5/16 in. thick at the lip, while the rim proper is 3/8 in. thick.

Unadorned body sherds display the following modes of surface treatment: corded (5) (plate 3, fig. 16), brushed (4) (fig. 19), smoothed-over-cord (11), and plain (9). One sherd is corded-stick decorated, and 2 are covered with criss-crossed incised lines. Sherds in all of these categories combined range from 3/16 to 1/2 in. thick, but the majority are 1/4 in. thick. It seems likely that most of the smoothed-over-cord body sherds belong with the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2 smoothed-over-cord rim sherds.

The pottery so far described is considered to pertain to a Middle Woodland component. The available rim sherds indicate that whole vessels usually had slightly contracted necks and gently flared rims. Occasionally the lip was reverted. Unfortunately most rim sherds are small, and no basal sherds were found. However it seems likely that bodies were elongate, the bases sub-conidial. The plain vessels seem to have been straight-walled.

Interior channeling is rare in the series; only 6 sherds, or 3 percent of the total, have this trait.

Our analysis suggests that the great majority of sherds were manufactured by the paddle-and-anvil method. Only 11 sherds evince coiled construction, and most of these are from the smoothed-over-cord vessel (plate 3, fig. 4).

Particles of quartz, syenite and other rocks, of medium to coarse size (1/16 to 1/4 in. diameter) were employed as temper in nearly all sherds. The paste in most cases is soft and flaky, perhaps due partly to centuries of ground-water leaching in the slightly acid soil (pH 6.0). Surface color ranges from buff to brown to gray.

Three small sherds, corded on both interior and exterior, are of Vinette 1 type (plate 3, fig. 20, 21). They are 3/16 in. thick, medium grit tempered, and show coiled construction.

A group of sherds, several of which fit together to form a large rim section, pertain to a collared, incised vessel which is very similar to the late prehistoric Mohawk Iroquois type, Cayadutta Incised (plate 3, fig. 3) (MacNeish, 1952). The Knapp specimens differ from the type, as defined, in the peculiar overhang at the base of the collar, and in the broad shallow notches.

Finally, a kaolin pipe stem fragment of European origin was unearthed near the surface (plate 3, fig. 2).

In plotting the distribution of artifacts on the site map (fig. 1) it quickly became evident that by far the greater number were either clustered within the triangular area bounded by features 1, 2 and 3, or occurred in the features themselves. This area was the central and most level portion of the small bench, and was therefore the most suitable place for occupation.

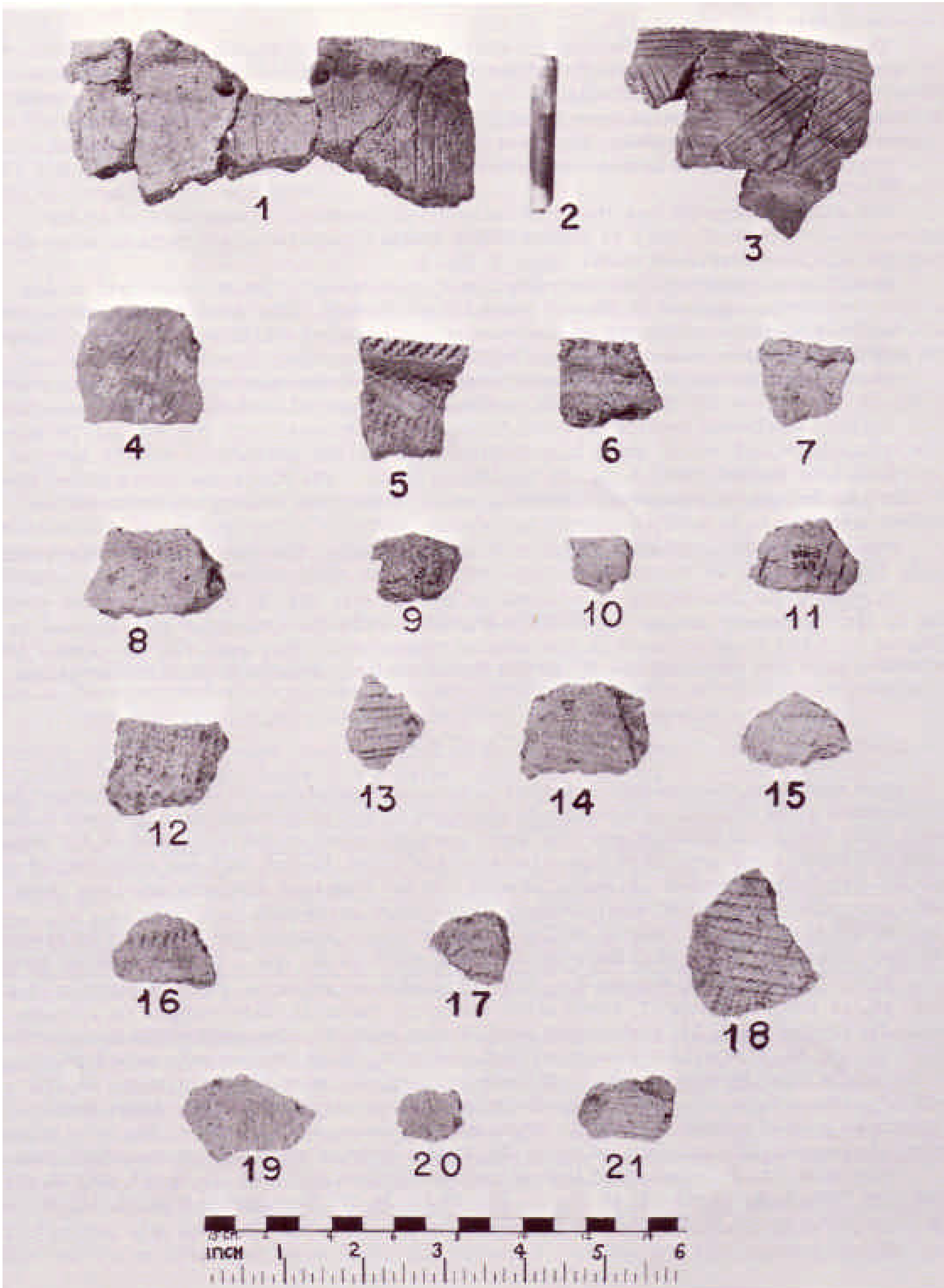
SUBSISTENCE REMAINS

Most food refuse on the site consisted of long-bone splinters, (650) few of which could be identified as to species. Twelve bones pertained to the white-tailed deer, 9 bones to the black bear; and 3 fragments of snapping turtle carapace were recovered. Most of the bones attributed to deer and bear were metatarsals or phalanges, so that only one individual of each species may be represented. It seems certain that the long-bone splinters are from these large mammals. No bird or small mammal bones were recovered.

At the present time snapping turtles and fresh water mussels are numerous in nearby Log Bay. Canadian geese stop there on their way south in the fall. These resources were

Plate 2. Knapp site, Warren Co., N.Y. Chipped Stone artifacts. Fig. 1, 2 gunflints; 3-6, 8-10, 12, 13 Levanna points; 7, crude eared triangular point; 11, side scraper on Levanna point; 14, Greene point; 15, pentagonoid point lacking base; 16, fire-spalled thin side-notched point; 17, 18, 20, Jack's Reef Corner-notched points; 19, large thin corner-notched point; 21-23, Jack's Reef Pentagonal points; 24, side scraper, 25, retouched flake knife; 26, triangular strike-a-light; 27, ovate knife; 28-30, simple end scrapers; 31, 37, Adena points; 32, 39, broad stemmed points; 33, bifacial object showing heavy wear on edges; 34, Bare Island point; 35, Lamoka-like side-notched point; 36, Orient Fishtail point; 38, tapered-stem point.

Materials: 1, 2, transformed flint of unknown source; 3, 5, 12, 22-24, 33, 38, 39, Fort Ann flint; 4, 7, 10, 14-16, 19-21, 25, 26, 28-31, 34-37, Normanskill flint; 8, 11, 17, 18, Onondaga flint; 6, 13, 27, 32, quartzite.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Doubtless available to the Indians in prehistoric times.

COMPARISONS AND CONCLUSIONS

Five basic cultural components can be suggested for the Knapp site. In temporal order, these are (1) late Archaic, (2) Early Woodland, (3) late Middle Woodland, (4) very late prehistoric, and (5) historic. By far the heaviest occupation took place in Middle Woodland times. To this component can be attributed all three features.

Bare Island points and Lamoka-like points have so far been recovered only from late Archaic contexts in eastern New York, and probably date to about 2200 B.C. (Funk, 1966; Funk, Weinman and Weinman, 1965). The Orient Fishtail point type represents terminal Transitional influences in coastal New York and the Hudson Valley; it has not yet been found in association with steatite at Lake George. The single specimen at the Knapp site is therefore assigned to a generalized late Archaic.

Adena points and Vinette 1 pottery are Early Woodland index traits, often found together throughout the Northeast. Probably from the same assemblage at Knapp's are the broad stemmed points, similar to the newly isolated Lagoon point type of southeastern Massachusetts (Ritchie, n.d.), and the single tapered-stem point.

It is of some interest to note that four of the points mentioned above (the Bare Island, the Orient Fishtail, 1 Adena and 1 Lagoon-like) were tightly clustered in a small area about 2 feet square near the heart of the site. A few Middle Woodland items were found nearby. Also, the other Adena point and a broad-stemmed point were in close proximity to each other near the northern limits of the site. The other early artifacts were more or less randomly scattered. None of the objects in this group occurred in the features.

The features yielded potsherds exclusively of Middle Woodland provenience. Levanna points, the predominant projectile type, were found. in and near the features, as well as scattered over the site. The same distribution applies to thin notched points and Jack's Reef Pentagonal points. There can be little doubt that the Levanna points, Jack's Reef Pentagonal points, and Jack's Reef Corner-notched points constitute a single assemblage with the Middle Woodland ceramic styles. Similar associations have been recorded at numerous sites in central and eastern New York.

Directly relevant manifestations have been excavated at other locations on Lake George (Funk, Weinman and Weinman, 1965; 1966). These manifestations have been assigned to a Burnt Hill phase of late Middle Woodland, guess-dated at about A.D. 800. It seems clear that Burnt Hill people lived, albeit briefly, at the Knapp site. Projectile point styles and their relative frequencies at this site and in stratum 1 at the Weinman site, type station for the Burnt Hill phase, are nearly identical. Of equal significance, the small ceramic collection at Knapp's is intimately related to the Weinman industry. Dentate stamping, rocker stamping, incising, punctation, and wavy line stamping are ornamental techniques, common to both components. Both share a few plain and cord-malleated rim sherds, flat,

Plate 3. Knapp site, Warren Co., N.Y. Ceramics. Fig. 1, restored rim section of Wickham Punctate (?) pot; 2, kaolin pipestem; 3, incised rim similar to Cayadutta Incised type; 4, plain (smoothed-over-cord) and wedge-lipped rim sherd; 5, dentate-stamped rim sherd with flat everted lip; 6, dentate-stamped rim sherd with flat splayed-out lip; 7, dentate-stamped rim sherd with flat crimped lip; 8, rocker-stamped neck sherd; 9, corded rim sherd with round lip and channeled interior; 10, plain rim sherd with rounded lip; 11, linear punctated round-lipped rim sherd; 12, 14, rocker-stamped body sherds; 13, dentate-stamped body sherd; 15, zoned dentate body sherd; 16, corded neck sherd; 17, sherd with wavy-line rocker-stamping; 18, dentate-stamped and slightly smoothed over body sherd; 19, brushed body sherd; 20, 21, Vinette 1 sherds.

Table 1

Metrical Data for Projectile Points

Type or form	Measurements in inches		
	Length	Breadth	Thickness
Levanna	1 1/4 in.	1 1/2 in.	1/4 in.
Levanna	1	1	3/16
Levanna	-	-	1/4
Levanna	2	1 3/8	3/l6
Levanna	1 7/8	-	3/16
Levanna	-	-	5/16
Levanna	-	2 3/8	5/16
Levanna	1 1/8	1	3/16
Levanna	-	7/8	3/16
Levanna	-	1 1/4	1/4
Levanna	-	1 1/2	5/16
Levanna	-	1 1/4	1/4
Levanna	1 1/4	1 1/8	1/4
Levanna	1	1	3/16
Levanna	1 1/4	7/8	3/16
Levanna	-	-	3/16
Jack's Reef Corner-notched	-	1	3/16
Jack's Reef Corner-notched	1 1/16	3/4	3/16
Jack's Reef Corner-notched	-	1	3/16
Pentagonal, untyped	-	1	5/16
Jack's Reef Pentagonal	1 1/2	7/8	7/32
Jack's Reef Pentagonal	3/4	9/16	3/16
Greene	-	1	3/8
Large corner-notched	2 1/2	1 1/8	5/16
Adena	-	1	1/4
Adena	-	1 3/8	5/16
Broad-stemmed	2 1/2	1	7/16
Broad-stemmed	-	1 1/8	3/8
Tapered-stem	-	1	7/16
Orient Fishtail	-	1	5/16
Crude thick triangular	1 3/8	3/4	5/16
Untyped thin triangular	1 1/2	7/8	1/4
Lamoka-like side-notched	1 3/8	9/16	1/4
Lamoka-like stemmed	1	11/16	5/16
Bare Island	2 1/4	7/8	5/16

crimped, splayed-out rounded, and everted lip forms, and other traits. Interior channeling is rarer at Knapp's than at Weinman's. Corded-stick decoration and pots ornamented with two or more techniques in combination, salient elements at the Weinman site, are rare or absent at the Knapp site (though some of the rocker-stamped body sherds may have formed the lower portions of dentate-stamped vessels). There are other differences, but these are to be expected, considering the small sample at the latter station.

Other artifacts from Knapp's which, on a comparative basis, can be placed in the Burnt Hill assemblage, include end scrapers, side scrapers, flake knives, ovate knives, the trianguloid striker, and pebble hammerstones.

Food remains were nearly absent at the Weinman site. Animal refuse bones were preserved in moderate quantity at Knapp's, and supply the first unequivocal though meager data on Burnt Hill subsistence patterns. Deer, bear and turtle were definitely eaten. There is little evidence which points to occupation in any particular season. Primary residence in the spring and summer was suggested for the Weinman site. This may have been the case at Knapp's since turtles could not have been obtained in the winter.

The incised collared pottery must pertain to a very late prehistoric, or possibly early contact period, aboriginal visitation at the site. It is conceivable that these sherds were associated with the kaolin pipe and gunflints. Alternatively, considering the intensive military activities on Lake George in colonial and Revolutionary times, it also seems plausible that the objects of European manufacture were left behind by a soldier during a brief overnight stop.

Like other small habitable loci along the mountain-rimmed shore of Lake George, the Knapp site was probably reached mainly by canoe in aboriginal times.

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1968 ANNUAL MEETING

The 1968 annual meeting and conference of The New York State Archaeological Association will be held at Rome, New York, at the Holiday Inn, on April 19-21. Program Chairman is Walter Burr, 74A Elm St., Norwich, New York, 13815. The host chapter is Chenango, headed by Theodore Whitney, New Berlin, New York. A request for papers is already in the hands of Chapter Secretaries, but those with papers to present may also write to Mr. Burr.

ON THE RELATIONSHIP BETWEEN RADIOCARBON DATES AND TRUE SAMPLE AGES*

Minze Stuiver — Yale University
Hans E. Suess — University of California

The result of a radiocarbon determination is commonly expressed as an age given in radiocarbon years. An error is usually assigned to each value as a measure of the statistical uncertainty of the measurement. Date lists published in this journal use a standard form of reporting dates and their errors (see Editorial Statements in Radiocarbon, v.3 and v.4). The conversion of a radiocarbon age, given in radiocarbon years B.P. (i.e., radiocarbon years elapsed since the origin of the sample) to a true calendar year makes necessary certain assumptions with respect to: (1) the half-life of C^{14}, (2) the production rate of C^{14} by cosmic rays, (3) the size of reservoirs into which C^{14} is distributed and the exchange rate of this distribution. Libby (1955, p. 10) has shown that as an approximation one may assume that reservoir size and production and distribution rates, and therefore the C^{14} activity in atmospheric CO_2 have been constant. However, the more accurate measurements of recent years have shown that at least one of these quantities must have varied with time. This means that a more complicated relationship exists between radio-carbon age and exact calendar age of a sample than had been assumed by Libby. This relationship cannot be determined theoretically, but can be derived empirically by determination of the radiocarbon contents of samples of known age. The following summarizes our present knowledge regarding differences between radiocarbon ages and true ages and the present status of the empirical calibration of the radiocarbon time scale.

Fluctuations of the C^{14} activity of the atmospheric CO_2 with time can be expected on various theoretical grounds. A change in CO_2 content of the atmosphere or a change in the mixing rate of the ocean could lead to a perturbation of the atmospheric C^{14} inventory.

* Reprinted by permission of the authors from Radiocarbon, Vol. 8, 1966, pp. 534-540.

It has been pointed out by Libby (1963) and Wood and Libby (1964) that these changes have to be either improbably large or of long duration in order to affect the specific C^{14} activity in the biosphere to a measurable degree. Because of the long average lifetime of C^{14} (ca. 8000 yr.), the C^{14} inventory responds to such changes extremely slowly, i.e., on a time scale of thousands of years. However, because of a delay of some 10 yr. in the CO_2 exchange between atmosphere and ocean (Revelle and Suess, 1957), and because of the slow mixing of surface water into deeper layers of the ocean (Bien, Rakestraw and Suess, 1965; Suess, 1954), the response of atmospheric C^{14} to such changes is faster than that of the whole C^{14} inventory on the Earth's surface. There are no observations that would indicate that a change of the required magnitude (of the order of 30 percent) has taken place in the CO_2 concentration in the atmosphere or in the mixing properties of the oceans. We know, however, that the production rate of C^{14} by cosmic rays undergoes large variations because of a modulation of the galactic cosmic ray flux by the sun. According to Lingenfelter (1963), this change in C^{14} production rate is approx. 30 percent during an 11-year cycle. J. A. Simpson, University of Chicago (per commun .) believes that such change can at times reach perhaps a factor of 2.

De Vries (1958) was the first who noticed discrepancies between radiocarbon and calendar ages of wood known to date from ca. A.D. 1700 and A.D. 1500. De Vries suspected a correlation with climatic events, in particular for the period often called the "little ice age." Independently, one of us (Stuiver, 1961) has pointed out that the available C^{14} data from wood of known age indicate a correlation between C^{14} inventory and solar activity. The more recent measurements by Stuiver (1965) for the 18th and 19th centuries, as well as by Suess (1965) for the second millennium A.D. confirm the correlation and show it to be the one predicted by cosmic ray observations.

Although historical records make it possible to retrace the magnitude of solar activity and sunspot numbers to the time of Christ (Schove, 1955), quantitative records of sunspot numbers date back to the 17th century only. Variations of C^{14} activity can be determined as far back as wood is available that can be precisely dated by tree-ring studies. According to C. W. Ferguson of the Arizona Tree-Ring Laboratory (pers. commun.), bristle cone pine wood more than 6000 yr old will soon be available for C^{14} measurements. So far, the oldest reliable data are for wood from Sequoia gigantea and for historically dated wood from Egyptian tombs from the second millenium B.C. The C^{14} measurements indicate that the solar-induced changes of a few percent in C^{14} activity are super-imposed upon larger changes on a longer time scale. This appears to be true in particular for the last two or three millenia B.C., when the specific C^{14} activity of the biosphere appeared to decrease steadily by ca. 0.4 percent per century (Suess, 1960; Damon and others, 1966).

The cause for the long-term variation of the C^{14} level is not known. The variation is certainly partially the result of a change in the cosmic ray production rate of radiocarbon, but climatic conditions that affect ocean mixing or atmospheric CO_2 may contribute to its magnitude. The change in C^{14} production rate and in climate may well have a common cause in the activity of the sun (Suess, 1966). The cosmic-ray flux, and hence the production rate of C^{14}, is a function not only of the solar activity but also of the magnetic dipole moment of the Earth (Elsasser and other, 1963; Kigoshi and Hasegawa, 1966). There are indications that this dipole moment has changed over the past 6000 yr., but the extrapolation of single measurements to total earth dipole moments make quantitative correlations unreliable.

In any case it is presently impossible to determine on theoretical ground what the relationship is between a radiocarbon date and the true age of a sample. However, the work of tree-ring laboratories promises to make available precisely dated samples many thousand years old so that it will be possible to establish an empirical correction table relating radiocarbon ages to the true ages of the sample. Establishment of such an empirical correlation table will require an enormous amount of work involving at least six precision measurements per century as far back as tree-ring dated wood is available. So far, sufficient measurements have been made only for the second millennium A.D., and for the prior time approximate corrections can be but suggested. In general, radio-carbon dates since

A.D. 1000 are too young; one of the larger deviations is around A.D. 1700 when radiocarbon ages erroneously suggest 19th century material. Radiocarbon dates from the first millennium A.D. are generally 50 to 100 yr. too old. However, there may be a fine structure in this trend. Samples from the 7th century A.D., for example, may not require such a correction. For the period before 250 B.C. radiocarbon ages are too young again, the correction being roughly proportional to the calendar year B.C.

Conditions during glacial times may have been considerably different. An evaluation of all the factors indicates a possibility that the C^{14} inventory differed from the present by as much as 20 to 30 percent. This would introduce an error of 2000 to 2500 yr. for samples from glacial times (Suess, 1960, 1966). Such an error for many Pleistocene samples will not greatly affect conclusions based upon C^{14} measurements.

Radiocarbon data given in the literature are calculated with the so-called conventional Libby half-life of 5568 yr. The average of the most recent measurements gives the more accurate value of 5730 ± 30 yr. (Mann and others, 1961; Olsson and others, 1962, 1963). An increase of 2.9 percent for all the C^{14} ages quoted in the literature would, therefore, give a better approximation to the true age than the values currently listed. The difference, however, is negligible and unimportant compared with the above-mentioned corrections necessary for converting radiocarbon years into calendar years. This is one reason that it was decided at the Pullman Radiocarbon Conference, June 1965, that the conventional Libby half-life of 5568 yr. should be retained for calculating radiocarbon dates.

The possibility of establishing correction tables for the conversion of conventional radiocarbon dates to true age depends on whether or not the variations in the C^{14} activity of the atmosphere and biosphere are world-wide phenomena. A comparison of samples from different geographical areas indicates that this is indeed the case, although there are indications of small variations with geographical latitude. Vogel (1965), who compared samples from North America, Europe, and the southern hemisphere, lists differences of the order of 5 per mil (corresponding to a 40 yr. radiocarbon "age" difference). In North America the differences seem to be less than 5 per mil (Stuiver, 1965). We can therefore consider variations in atmospheric C^{14} to be world-wide phenomena.

The data obtained so far from samples of known age permit calibration of the radiocarbon time scale for the last 1000 yr. Table 1, which gives the conversion of true ages to radiocarbon ages and vice versa, is based on measurements at La Jolla (Suess, 1965) and, for the period A.D. 1700-1800, on measurements of the Yale Radiocarbon Laboratory (Stuiver, 1965).

The laboratory standard in general use for the determination of radiocarbon ages is oxalic acid, supplied by the Bureau of Standards. Ninety-five percent of the activity of the oxalic acid corresponds by international agreement with the natural C^{14} activity of wood grown in A.D. 1950, after correction for isotopic fractionation and for industrial (fossil) CO_2 in the atmosphere. The original La Jolla radiocarbon data were derived by comparison with wood from a fir tree grown in Oregon between 1870 and 1880, while the Yale measurements were made with oxalic acid as the standard. The La Jolla results have been converted to the oxalic acid standard by comparing the results of 16 tree-ring measurements of the 18th and 19th centuries with similar tree-ring measurements at Yale. The resulting correction to the La Jolla measurements amounts to only 3.6 per mil in C^{14} activity, corresponding to 30 radiocarbon yr. The error introduced by the change of reference standard is small and probably does not exceed 20 yr. The statistical variations in the actual measurements are largely removed by the smoothing, necessary to graduate the data, but they leave a residual uncertainty in the calibrated data of ca. ± 30 yr. However, the existence of short-term oscillations may introduce an additional uncertainty of the same order of magnitude.

Although for each calendar year there is only one radiocarbon age, the reverse is not true. This is illustrated in Fig. 1; in some instances a series of true ages exists for one radiocarbon age. This is especially true for the last 500 yr. The figure representing the

TABLE 1

Radiocarbon ages and true ages for the last 2000 yr. The radiocarbon ages are based on a half life of 5568 yr; the standard year of reference is A.D. 1950. For each calendar year only one radiocarbon age exists, whereas a radiocarbon age may correspond to more than one true age.

Calendar Year	True Age	Radiocarbon Age	Calendar Year	True Age	Radiocarbon Age
A. D. 1800	150	130	A. D. 1320	630	610
1780	170	150	1300	650	650
1760	190	100	1280	670	690
1740	210	130	1260	690	710
1720	230	100	1240	710	710
1700	250	80	1220	730	730
1680	270	120	1200	750	920
1660	290	170	1180	770	910
1640	310	280	1160	790	890
1620	330	330	1140	810	880
1600	350	340	1120	830	900
1580	370	320	1100	850	920
1560	390	270	1080	870	930
1540	410	250	1060	890	950
1520	430	280	1040	910	97C
1500	450	330	1020	930	990
1480	470	370	1000	950	1000
1460	490	420	250 B.C. to 1000; radiocarbon ages are generally ca. 50 to 100 yr. older than true ages, but deviations from his rule are possible.		
1440	510	470			
1420	530	490			
1400	550	550			
1380	570	580			
1360	590	600			
1340	610	610			

relation between radiocarbon ages and true ages is a slight modification of the figure published by Suess (1965, p. 5950); the main difference is inclusion of the correction for the La Jolla reference standard.

Work is now in progress to extend the calibration of the radiocarbon time scale back to the time before Christ, as far as dendro-chronologically dated wood samples are available. The analyses of tree-rings and of historically dated Egyptian samples carried out so far indicate a decreasing C^{14} activity for the time from ca. 4000 B.C. to ca. 200 B.C. Therefore, the discrepancy between true ages and radiocarbon ages for this period is rapidly increasing with increasing age. A radiocarbon age of 4000 yr. for example, corresponds to a true age more than 500 yr. greater. As a crude approximation the true age T can be estimated from the radiocarbon age R by using the equation

$$T = 1.4\,R - 1100. \qquad \text{[1.4 R-900 might be even closer. M. S.]}$$

Superimposed upon the trend of this type, however, are fluctuations of the type observed during the past 1000 yr., as shown in Fig. 1. It therefore appears premature to attempt corrections of radiocarbon ages for B.C. times as long as the accurate calibration data have not been determined.

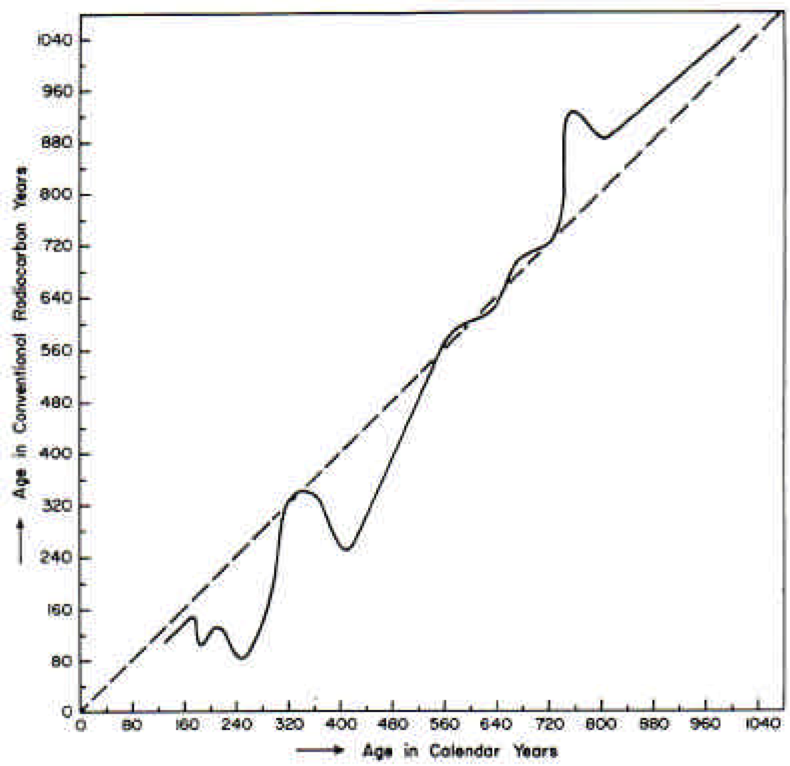

FIg. 1. The relation between radiocarbon ages and true ages for the last millenium.

The ultimate refinement of the radiocarbon dating method by applying empirical corrections still leaves well-known possibilities of errors through admixture of older carbon in lacustrine materials or through contamination of the sample with foreign carbon such as that of humic acid, roots, and other substances present in soils. Other errors may arise from effects of the local C^{14} environment in dense forests and near the ground, due to bacterial decomposition of soil components (Keeling, 1961). Also, uptake of carbonate ions through the roots of the growing plants can lead to small differences of the order of a few per mil of C^{14} (equivalent to age differences of the order of 10 yr.), although the uptake of carbon by the roots of trees has been found to be negligible. (References omitted for reasons of space).

TWO RECENT EXCAVATIONS

Paul L. Weinman Auringer-Seelye Chapter
Thomas P. Weinman Auringer-Seelye Chapter

1. THE BALDWIN ROCKSHELTER

The Baldwin Rockshelter (Cox 26-4) was discovered on the property of Mr. Vernon Baldwin, approximately one mile southwest of Flint Mine Hill in Coxsackie, New York, and was excavated in the spring of 1967 by the present writers with the assistance of Dr. Robert E. Funk and Edward Cummings of the New York State Museum and Science Service. Eroded from a poorly cemented outcrop of Normanskill shale, the shelter faces northwest and lies nearly 70 ft. above the surrounding flats. At the commencement of excavations the livable area was 14 ft. long at the mouth and almost 8 ft. deep from front to back. The overhang was 8 to 10 ft. high at the mouth and 4 ft. high at the back. This, along with its proximity to the extensively utilized flint quarries nearby, suggested that the site would produce heavy evidence of occupation.

To our disappointment, this was hardly the case. It was soon found that the surface deposits disguised a large projection of bedrock at the rear of the shelter which cut the occupied area in half. As a result, only six 4 ft. by 4 ft. squares could be excavated to any depth. Two soil strata were found. Stratum I was a brown-black humus soil, interspersed with numerous rocks, which was 5 in. - 10 in. thick at either end, but dipped sharply towards the middle and front, reaching a maximum thickness of 32 in. The reason for this great difference lies in the fact that the protruding bedrock at the rear of the shelter was semicircular in shape, diverting percolating water and soil wash to the center and front. The eroding action of this water wore a small gully, which was later filled during aboriginal occupations. Stratum II was a yellow-brown sandy soil, also containing many small rocks, which was excavated to a depth of 30 in. at the sides and 5 in. in the front-center.

Whether or not the strata separated cultural levels could not be determined, since a11 diagnostic artifacts were found in stratum I, in the middle section of the site. These were: a Levanna point at 11 in., a Meadowood at 15 in., an untyped, thin, corner-notched point at 30 in. Other artifacts occurring in stratum I were: a quartzite chopper, 3 point fragments and a double-pitted anvilstone. In close proximity to the Levanna point was feature 1, a 12 in. x 12 in. x 8 in. hearth. Feature 2 at 22 in. was a cache of 8 flint cores and the double pitted anvilstone. Four other cores, as well as 1294 flint chips, were also found in this stratum. Animal remains consisted of a few fresh water clam shells and deer bones. Artifacts recovered from stratum II were a hammer stone, ovate knife, point blank and side scraper. In addition, 5 cores and 1078 flint chips were found. Animal remains consisted of a few fresh water clam shells, deer bones, a turkey bone and a portion of a box turtle carapace.

The great quantity of flint chips (2372) and cores (17), all of local flint, suggests that this was merely a chipping station to which cores were brought from local flint sources and worked very efficiently in producing points and other tools. Of the 6 point fragments, all show fire-spalling. Two are of Kalkberg flint, which is obtainable at a short distance. This indicates that the points may not have been broken in manufacture at Baldwin and were, instead, part of the equipment brought to the area and used in hunting local game. The firespalling could have occurred during the roasting of meat. Because of the size of the site, low yield of artifacts, absence of pottery and nature of the occupation, the writers think that the Baldwin shelter was utilized over a considerable time period, but intermittently and for very short periods, by no more than 1 or 2 individuals at a time.

Although the effort expended in excavating this site may seem wasted in view of the amount of material recovered, we point to suggestions of local aboriginal movements and workmanship that can be drawn from such a study.

2. THE WEINMAN SITE EXTENSION

The Weinman site (Glf 17-1) at Assembly Point, Lake George, New York has been discussed in a summary site report (Funk, Weinman and Weinman 1965), and as a major part of a report that defined the Burnt Hill Phase of the Middle Woodland Stage (Funk, Weinman and Weinman 1966). Following the initial publication, an area adjacent to the Weinman property was uncovered (permission granted by Mr. John Cary) and, in part, included in the second publication. These recent excavations, which will be designated under the name Cary, were conducted by the present writers with help from Dr. Robert Funk of the New York State Museum and Science Service. Dr. Funk also helped in the interpretation of the data. Since this is merely a brief addendum, we will limit ourselves to presenting the findings in Stratum II not noted previously.

Fourteen 5 ft. x 5 ft. squares were excavated at Cary, where stratum II was found to vary from 5 in. to 12 in. in thickness. Most artifacts were found in the areas where stratum II was thickest. For the sake of avoiding excessive description of the stratigraphy, we will confine ourselves to dividing stratum II into upper, middle and lower zones. The upper zone (just below the contact of strata I and II) contained 1 Bare Island, 1 Lamoka, 1 Sylvan Side-Notched and 2 untyped, expanded-stem projectile points. In addition there were: a whetstone, 2 large end scrapers, a quarry blank, an anvilstone, an ovate knife, a flake knife and several worked flint spalls. As in the Weinman excavations, this horizon has been referred to the late Archaic Sylvan Lake complex (Funk, 1966; Funk, Weinman and Weinman 1965), dated at c. 2200 B.C. in the lower Hudson Valley. The Lamoka point was found in a basin-shaped cooking pit, 67 in. x 24 in. in oral dimensions and 16 in. deep, filled with cracked stones which appeared to originate in this zone. Carbon 14 dating of a large charcoal sample by Isotopes, Inc., produced a date of 590 B.C. ± 100 years (I-2400), which seems much too recent for the Sylvan Lake complex and falls within the range of dated Early Woodland manifestations such as the Meadowood Phase (Ritchie 1965, pp. 178-200). There were few artifacts in stratum I at Weinman which could be attributed to Early Woodland occupation. However, there is little doubt that the feature originated in post-Archaic times, with the Lamoka point accidentally incorporated in the fill.

The middle zone of stratum II at Cary contained 2 Vosburg and 1 Brewerton eared-notched points, a large end scraper, a flake knife and a side scraper. Another Vosburg point and an Otter Creek point were found in this zone in a thin (4 in. thick) roasting feature which was 4 ft. x 2 ft. in diameter. A Brewerton eared-notched point and another Otter Creek point were also discovered in a large pit which originated in stratum I.

The lower zone of stratum II contained 4 Otter Creek points, a stemmed, polished slate spear point, a chipped slate ulo blank, and a combination anvil-pestle. As noted above, 2 Otter Creek points were found in features that originated in upper levels.

The results of the Cary investigations match those on the Weinman property in terms of the basic Archaic sequence. Here again materials of the Vergennes Phase of the Laurentian Tradition precede a Vosburg component, a relationship originally suggested by Ritchie (1965, pp. 84-87). Otter Creek points have also been found in stratified context beneath Vosburg diagnostics at Lotus Point (Ritchie 1958, pp. 25-34), Fish Club Cave (Funk and Johnson 1964), Knox (Weinman 1965). Otter Creek-like points occurred in pre-Vosburg levels at the Sylvan Lake shelter (Funk 1966). The stemmed, ground slate spear point, which is characteristic of Vergennes as defined from the Donovan and KI sites in Vermont (Ritchie 1965, pp. 84-87), is the first of its kind to be found in stratified context beneath Vosburg artifacts.

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THE SAWMILL ROAD OSSUARY, CLARENCE, NEW YORK

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Small Niagara Frontier Iroquois ossuaries were at one time quite numerous in and around the Clarence area in Western New York. Since 1850 A.D., an unknown number of them have been destroyed by sand and gravel company operations. White (1966: 17) has listed 6 recorded sites which have produced multiple secondary burials. Several ossuaries on Hiller Road were plowed out by machinery in 1957. The contents of three were partly salvaged by Alfred K. Guthe and Marian E. White of the Rochester Museum of Arts and Sciences, and the bone is now part of that institution's collections where it has been studied by Sublett. An ossuary was destroyed by children at the nearby Nursery Site. White excavated a second one at that location in 1961 and both have since been studied. (Sublett: Ms.). The Giess Ossuary was excavated and reburied by the Ondiara Chapter of the Buffalo and Erie County Historical Society in 1961 (McCarthy and Newman 1961). Finally, the latest ossuary to be discovered in the region, located on Sawmill Road in the village of Clarence, was largely removed by power machinery and the remainder salvaged by members of the Ondiara Chapter in July, 1964. This paper is a very cursory report on the material from that site.

I. SKELETAL MATERIAL

The bone, together with the surrounding soil which had been dislodged by the power machinery, was loaded on a truck and taken to the home of Corbett Sundown on the Tonawanda Seneca Reservation near Akron, New York. Chief Sundown kindly permitted Sublett to come there and look at the material one afternoon and evening shortly before the skeletons were reburied on the Reservation. The Sundown family, Richard McCarthy, Harrison Newman, Henry Kucinski, and Marie Striegel were present, and Newman and Kucinski helped sort the bones for analysis after they were sifted from the dirt.

It was said that the bones lay in random placement throughout the ossuary. Therefore, the first thing to determine was the number of individuals represented in this mass secondary re-interment. Certain diagnostic skeletal components were chosen for two reasons: it was possible that such small bones as patellae, tali, carpals, etc. had not been recovered at the time the primary burials were exhumed and, therefore, would not be valid indicators of total population size; these skeletal elements would furnish sex determination, morphological and genetic variation information as well as indicate the demographic situation. The bones which were most intensively examined were:

Temporal Bones. From these the size and form of the mastoid process, the shape of the external auditory meatus, and any tympanic plate anomalies might be evaluated.

Large Innominate Fragments. These would help in making adult sexing decisions. The appearance of the face of the symphysis pubis would be of aid for adult ageing purposes.

Distal End of Humeri. Here the presence or absence of septal apertures was noted.

Proximal Portions of Femora. The maximum diameter of the femoral head was taken for sexing purposes. The presence or absence of intertrochanteric spurs, neck extensions, third trochanters, and the Fossa of Allen was noted. The orientation of the fovea capitis was also recorded.

Midline Portions of Mandibulae. The type of chin form was examined.

DEMOGRAPHY

Several factors operated against a really conclusive total population count. We were told that "a lens of bone measuring about four inches thick by two feet long" had been left in the pit wall. Although it is impossible to estimate accurately the number of individuals this could represent, if the original skeletons were greatly scattered at random, this would not affect the total population count. It has been brought to our attention since this article was begun that, subsequent to Sublett's study, the lens of bone in the pit wall was removed and added to the material which was eventually reburied. It was reported that the lens "contained material representing 10 individuals". It is probable that, because of the aforementioned random placement of the bones, a maximum of two individuals might be added to the total demography count. Because of the circumstances under which this study was undertaken, the exact population size can never be precisely reconstructed. Although the bones had originally been well preserved, they now were very fragmented. In fact, only 3 adult long bones were complete enough to permit osteometric measurement for stature determination, and there were no intact crania. Finally, there was some difficulty encountered by the assistants in recognizing immature bones lacking their epiphyses.

The final count was as follows:

Bone	Right	Left
Temporal	27	31
Distal end of humeri	22	22
Proximal end of femora	32	32
Mandibulae	inconclusive	
Innominata	Inconclusive	

The close correlation between left temporal bones and left proximal ends of femora makes it possible to estimate that at least 32 individuals had been simultaneously buried in the ossuary. The only deletions which could conceivably raise the number of burials were temporal bones and femora left in the wall or very small infant components which were overlooked.

OSTEOMETRY

Stature Determination: Below are the measurements of the 3 adult long bones and the stature determinations derived from them according to the Trotter-Gleser (1958) formulae for Mongoloids.

Right Tibia	41.1 cm.	179.67 cm. or 73.98 inches
Right Tibia	38.8 cm.	174.18 cm. or 68.57 inches
Right Humerus	31.1 cm.	166.54 cm. or 65.57 inches

Maximum Diameter of Heads of Femur: A total of 41 adult femoral heads were measured to obtain their maximum diameter. Since it was impossible to separate right and left sides of the same individual, bilateral measurements were undoubtedly taken on several of the people. This makes it impossible to give an accurate assessment of the sex ratio in this population. It is possible, however, to estimate the minimum number of males and females which were studied. If 4.4 cm. is taken as the division point between the sexes and all measurements falling below this arbitrary point are classed as females and those above as males, then the total number of female and male femora can be determined. Once this distinction was made, the femora of each sex were examined separately and sorted again by size to extrapolate the minimum number individuals represented. These are shown in Table I. Thus, there were at least 12 males represented and 9 females. This works out to a sex ratio of 577b males to 43% females, and tentatively indicates that there was male predominance in this population.

TABLE I

FEMORAL HEAD MEASUREMENTS AND INDIVIDUALS REPRESENTED

Measurement in Centimeters	Number Female	Number Male	Uncertain Sex
3.5	1		
3.6	1		
3.8	1		
4.0	3		
4.2	2		
4.3	6		
4.4			8
4.5		9	
4.6		3	
4.7		5	
4.8		1	
4.9		1	
Total Femora	14	19	8
Minimum Individuals	9	12	4

OTHER SKELETAL OBSERVATIONS

Because the majority of this approximately 4 hour study was taken up with sorting the bones rather than actual analysis, many fewer observations were made than had originally been hoped. It was possible to get accurate incidence figures on only 3 skeletal anomalies and 1 aging phenomenon.

Genetic Variations (Anomalies).-

Septal Apertures. Perforations linking the olecranon and coronoid fossae of the humeri were noted in 10 cases. Although 5 occurred on the right and 5 on the left sides, it was not possible to determine the degree of bilateral expression. The total incidence was 10 out of 44 or 22.7%.

"Third" Trochanters. So-called "third" trochanters were incipient on 6 femurs and quite well developed on 6 others. There was an accentuated ridge on another 17 of the femora. The total incidence, based on 64 observations, was as follows: 6 incipient third trochanters, 9.38%; 6 large third trochanters, 9.38%; 17 ridge development, 26.56%.

Dehiscences of the Tympanic Plate. A total of 10 dehiscences of the tympanic plate was observed in individuals older than 6 years. They did not appear to be bilateral, although 5 were on the right side and 5 were on the left. There were 10 cases out of 58 observations for a relative frequency of 17.24%.

DEVELOPMENTAL STAGE OF THE FOSSA OF ALLEN

This depression on the anterior portion of the neck of the femur, which occurred as either an ulcerated area or a fully developed Fossa, was present in 20 out of 41 studiable specimens with the following incidences: 4 ulcer, 9.76%; 16 Fossa, 39.02%.

MISCELLANEOUS

Very little can be said about the rest of the material in terms of morphological or genetic variations. Two fairly intact frontal bones had typical V shaped Iroquoian brow-ridges. There were some extra bone growths in the intertrochanteric region of the femur, on the patella, and particularly in the lamina region of thoracic vertebra. Several cases of spina bifida of the sacrum were noted, as were a few sternal apertures. In some cases the articular area of the head of the femur encroached on the neck. There were two congenitally fused cervical vertebrae.

PALEOPATHOLOGY

One radius had a callus remaining from an old fracture. The only other type of pathology noted was caused by osteoarthritis. Some eburnation was present on the distal end of a humerus and on the proximal end of a tibia. In the latter, this condition had eroded the lateral condyle so deeply that the inner cancellous bone was exposed. There were many cases of both osteoarthritis and osteophytosis in the vertebra, some resulting in the pathological fusion of 2 or more elements.

DENTAL PATHOLOGY

This was common and often acute. Some mandibles were edentulous, probably because of extensive pre-mortem caries activity. Others had varying degrees of carious lesions and apical abscess formations. Attrition only occasionally resulted in dentine exposure (Stage 3), and was generally more severe in the anterior region of the dental arcade.

II. CULTURAL MATERIAL

A handful of artifacts were recovered from sifting the load of earth and bone. Information on these was generously supplied by Richard McCarthy. Their context is unknown beyond the fact that they came from a limited area in or around the ossuary.

Pottery: Sherds were most numerous and, on the basis of surface treatment, represent a minimum of 3 and a maximum of 8 vessels. Only one rim was recovered and a sketch of this shown in Figure 1. The vessel from which this rim came had been used for cooking since there was a thick encrustation of burned material on the inner surface. The rim itself was presumably collared, although the base was missing. There were 7 neatly incised horizontal lines on the remaining portion. Above these was a row of finely incised oblique lines which were made with a thin, sharply pointed tool. The appearance of the line was that of a scratch or cut incision. Sometimes the incision consisted of a double line which seemed to have been a single stroke divided into 2 by unyielding pieces of temper in the vessel. If this is the correct interpretation, then the tool used had a flexible point which became double under certain conditions. A single horizontal incised line encircled the lip.

Two additional sherds were decorated. One appears to have been the bottom of a neck decoration presumably extending down from the collar. It is likely that several rows of closely spaced punctations encircled the neck below the collar and that this fragment showed the bottom 2 rows. The neck was smooth. The punctations were closely spaced and oval in shape. Their faintness suggests that the vessel clay was quite hard when the punctations were applied. The general appearance of the paste of this neck indicated that it may have come from the same vessel as the rim just described

The second came from the ill-defined shoulder of a vessel. The shoulder, just above the junction with the body, had finely cut or scratched incisions obliquely from left to right. The surface on which they were made was smoothed, whereas the body surface just below

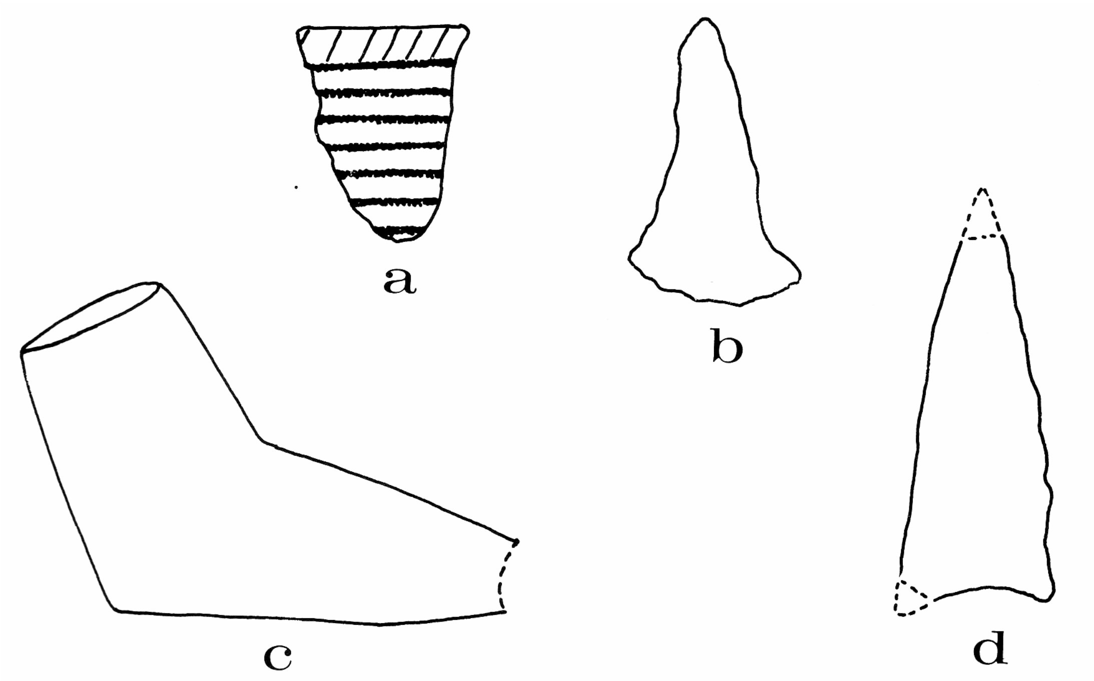

Figure 1. ARTIFACTS FROM THE SAWMILL ROAD SITE, ACTUAL SIZE.
a. rimsherd, b. drill, c. pipe, d. arrowpoint.

had been treated with a grooved paddle.

Body sherds were treated with a grooved paddle, a cordmarked paddle, a check stamp, or smoothed.

A few general comments can be made about these sherds. The pottery is Niagara Frontier Iroquois of the Intermediate Period. It is highly similar to pottery from the Henry Long and Nursery Sites in the same general vicinity. It is on the basis of similarity to these sites that the Sawmill Road material is assigned to this culture and time period.

Pipe: A single complete pipe was one of the most informative recoveries. This was undecorated and the surface had been smoothed and rubbed to produce a sheen. The colors were light brown, 7.5YR 6/4 to brown, 7.5YR 5/2 on the Munsell color scale. The sharp angle at the front of the pipe was characteristic of certain pipes of the Early Period of Iroquois development in the Niagara Frontier, as well as of the Owasco culture.

Projectile Points: A single specimen was recovered and a sketch is shown in Figure 1. This was thin (maximum thickness, 5.75 mm.) and carefully flaked from Onondaga flint. Its overall length was 56.2 mm. and its width was 21.8 mm.

Drill: An expanded base drill, also of Onondage flint, was found and is illustrated. Its dimensions were 38.6 mm. long, 23.3 mm. wide and 7.1 mm. thick.

Bone Artifacts: Two fragments of box turtle carapace were drilled with a single hole each. These may have been part of a turtle rattle. One bone awl, round in cross section, showed a recent break but was intact at the symmetrical tip. A single canine tooth had been cut to form notches on the lingual and buccal surfaces of the root, probably to allow suspension.

Shell: Four shells of Marginella were recovered. These showed no signs of working but their importation would suggest some importance or intended use. They occur commonly in the Atlantic Ocean.

III. SUMMARY AND CONCLUSIONS

A brief study of the skeletal material from a Niagara Frontier Iroquois ossuary near Clarence, New York, permitted a few tentative conclusions to be drawn. It originally contained a minimum of 32 individuals. There seems to have been proportionally more adult males than females represented. Both skeletal and dental pathology was present. The incidence of a few skeletal anomalies was noted, and can someday be compared with other local populations in an attempt to find out more about Western New York Iroquoian groups.

The described samples of artifacts is consistent with those found on Iroquois sites, although certain of them might occur on sites of earlier cultures as well. The absence of any artifacts diagnostic of pre-Iroquoian cultures makes it highly probable that these are products of a single Iroquois group who placed the bones of their deceased in the ossuary. The artifacts may have been with these bones when they were re-interred, in which case they were remnants of objects originally included with the primary burials, either as grave goods or part of the personal outfit of the deceased. They are probably not grave goods, because such were unusual with prehistoric burials. On the other hand, these objects may have been in the soil above or outside the ossuary and therefore not directly related to the burial ceremony. In either case, the typology of both the artifacts and the burial practices indicates that these belong together as products of an Iroquois group of the Intermediate Period of Iroquois development, c. 1300-1400 A.D.

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Book Reviews and Notices

AN EARLY HISTORIC NIAGARA FRONTIER IROQUOIS CEMETERY IN ERIF COUNTY, NEW YORK: ARCHAEOLOGY AND PHYSICAL ANTHROPOLOGY OF THE KLFIS SITE. Marian E. White, with appendices by William S. Cornwell, Audrey J. Sublett, Barrie R. D. Gillings, Donald J. Beck and Joyce Sirianni. Researches and Transactions of the New York State Archaeological Association, Vol. XVI, No. 1, 67 pp + XXIII plates. 2.25; Rochester, 1967.

The Kleis site, excavated in 1958, was "the first in the Niagara Frontier Region to uncover individual burials of identifiable time period and culture using modern field techniques". It falls within territory occupied by ethnically Iroquoisian peoples who may have been tribally Eries, Wenros or Neutrals, the distinction being, at the moment, of more interest to the historian than the archaeologist whose first objective has to be to identify cultural affiliations and levels. Eleven and possibly all of the 12 features excavated, in the remains of a site salvaged during subdivision development, were separate grave burials with grave goods.

Although the resemblance may not be recognizable, the Kleis site report is an essay in "total archaeology", like Sir Leonard Woolley's famous account of the burial of a king in "Excavations at Ur," the obfuscating difference being the enormous disparity between the interment of the king of a prosperous civilized city-state of the mid-East, then a peak cultural region, and that of American aborigines just beginning to acquire European trade goods but not otherwise culturally disturbed. White has used the archaeology of the burials to infer community behavior at interment ceremonies and to carry these inferences as far as they will go toward insight into the society of the living, which was not only Woolley's method, but that of all good archaeologists, whose intent is, really, ethnographic.

The advantage that modern archaeologists have over those of two generations ago are the auxiliary disciplines that are now prepared to add their information to an expanding "total archaeology." In the Kleis site report the extra consists of the detailed descriptions of osteological anomalies and the appendix on dental pathology. It was noted, for instance, that the persons buried had five times the cavities of normal aboriginal populations, and it is suspected that the population of the community had an exorbitant fondness for sugar (maybe sugar candy?); but three individuals were relatively free of cavities, and it is deduced that they were newcomers.

Genuinely total archaeology can, of course, never be achieved, certainly not with the fragmentary materials most Americanists have to deal with. Yet more disciplines can be drawn into the work; it is not even beyond possibility that psychologists have something to contribute. What inspires this thought is Elisabeth Tooker's brief note on the contents of the medicine bundle from Feature II, containing three types of objects given as dream tokens. Tooker points out that "The Northern Iroquoisians believe that the soul has desires which, if unfulfilled, can cause illness and other ill fortune". This is a Freudian view long before Freud.

The Kleis site report is archaeologically faultless, which may be its one fault. The material data is meticulously described and compiled and the deductions and conclusions are arrived at with the arithmetical precision of adding up a column of figures. So far, so good, but beyond that is what those who are not Niagara Frontier Iroquois specialists would like to know, need to know, about these non-League Iroquoisians, buffer populations between the League and the Hurons. Without this the archaeology is not as "total" as it might have been.

The Researches and Transactions series has included some of the key reports in American archaeology, and it covers the full range of archaeological development in the Northeast. The Kleis site report is wholly worthy of the company it keeps.

L.A.B.

THE PALEO-INDIAN OCCUPATION OF THE HOLCOMBE BEACH, James F. Fitting, Jerry DeVisscher and Edward J. Wahla. Anthropological Papers, No. 27, Museum of Anthropology, University of Michigan. 147 pp + XII plates 2.50 Ann Arbor 1966.

The Holcombe Beach of the title of this report on four fluted point producing sites is a sand ridge that was a sand spit at the shoreline of an early stage of glacial Lake Algonquin, when its level stood at 605 ft. above present sea level. This geologic position accords with the accepted chronological position of the wide-spread fluted point horizon and fitting places the four sites, which he considers to be nearly contemporaneous, possibly different camps of the same band, at 9000 B.C. One feature, a basin-shaped pit, yielded industrial debris and bone, including some of the Barren Ground caribou, the herd animal that almost certainly was the staple of this principally hunting economy.

The bulk of Fitting's report on the original Holcombe site, and his comparative study of the materials of three related sites, the DeVisscher, Paleo IIW, and Paleo W-A reported by DeVisscher and Wahla, is devoted to an exhaustive study of lithic technology, chipped flint being the only cultural material found, except for fire-cracked stones and five features which appear to have been burned stumps. Two stages of "preforms", which term Fitting prefers to "blanks", were found, the primary stage being, surprisingly enough, heavily edge-ground. Fitting thinks this grinding was in preparation of a striking platform preliminary to refinement into the second preform stage by "soft hammer", that is, a baton of wood or bone.

The evidence of material and the debitage is that flint, selected in small nodules or blocks, was brought from sources of Bayport chert, about 100 miles away, in the primary preform stage to the sites and there usually heat-treated before final pressure retouch. The exceptions to this procedure are (1) that the better flints were not heat-treated and (2) that material of local provenience, pebbles obtained from the washout of till, was sometimes used out of necessity, since it is a poor grade of the regional Bayport chert.

The scrapers, perforators and gravers are the familiar Paleo-hunter forms, but there seems to be an absence of the unifacial snub-nosed scraper often found on Paleo sites. One new form has been recognized, a bi-polar core, similar to the European piece esquille, believed to have been a wedge for splitting bone; these cores have also been recognized at the Paleo-hunter Debert site in Nova Scotia. The only non-flint-chert artifacts were three broken sections of bifacially worked slate, probably hide-working tools.

Flints obtained from sources far distant from the loci where they are found as artifacts (i. e. Coxsackie flint on the Bull Brook, Mass., site) are the rule on Paleo-hunter stations. In Fitting's view the material was obtained not in the course of band nomadism but by special missions undertaken by individuals who made the trip from the band habitation as a duty of high responsibility and, probably, honor. He does not believe that the Holcombe Beach people were unrestricted nomads but synchronized their movements, within a limited territory with the North-South movements of the caribou herds, as the Plains Indians lived in rhythm with the buffalo's seasonal migrations.

The Holcombe Beach sites are the first Paleo-hunter manifestation east of the Mississippi to provide clues to the life ways of the eastern fluted point makers. Fitting has made the most of the data collected there and his report is therefore indispensable to those who have or have had a Paleo-hunter site on their hands. Moreover, if the reader skips the obtrusive statistical treatments of debitage minutiae, which should have been relegated to an appendix, he has a very pleasant and informative hour of perusal awaiting him.

L.A.B.

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