

THE BULLETIN

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G. H. van Scheyndel fec.

TABAGIE, 1628

THE NEW YORK STATE ARCHEOLOGICAL ASSOCIATION

BULLETIN ON THE BULLETIN

I still can't quite believe that I am writing this, but it is so inescapably true that I can't duck it. Unless the mails favor us during the next couple of months with some publishable manuscripts there will be no *Bulletin* in March. What you see in this, the November issue, No. 71 in a series that goes back to July, 1954, without breakdown or hiatus, totally exhausts *The Bulletin's* manuscript inventory. *The Bulletin* is right back where I started, with No. 19, in July, 1960, when I had to write the entire issue, except for 12 pages, myself, in an attempt (that eventually succeeded) in keeping our publication viable until contributions could turn it into a real archaeological journal.

The crisis came upon me without warning. For the past five years or so contributions have been submitted in satisfactory numbers, sufficient to keep the inventory about two issues ahead of publication. This year exactly three contributions have been received; this issue is comprised mostly of them. The rhythm of contributions has been that most of them show up between April and September. When nothing dropped through my mail slot during this period this year I knew we were in trouble.

It is easy to see, glancing over my shoulder, how we came to this pass. Twelve of the 15 authors who appeared in the Ritchie festschrift *Current Perspectives in Northeastern Archeology* have been *Bulletin* contributors. This is far from saying the pieces contributed to the festschrift (which Dr. Ritchie deserved if anybody ever did) would have been submitted to *The Bulletin*; they probably would not have been. But they represent the writing time and the auctorial ideas of their writers who have thus been out of production for a year or so, as far as *The Bulletin* might profit from that production. While I know little or nothing about the plans for the festschrift for the late, beloved Marian White (a tribute that is an obligation) it must similarly draw off writing time and talent which might have sought outlet in pieces for *The Bulletin*.

For the past decade or more the Chenango Chapter's *Bulletin* has absorbed a good deal of report material, most of it of NYSAA *Bulletin* quality. And now comes Beauchamp Chapter with an excellent new periodical so far unnamed. That it bills itself as Vol. 1, No. 1 seems meant to inform us that it has ambitions of continuity. And the Yager Museum conference on The Upper Susquehanna is publishing the papers of that conference in a separate volume.

Most of those who have contributed most regularly to *The Bulletin*, as can be verified by leafing through the back issues, have been publishing elsewhere. Funk has had a busy two years, what with editing the Ritchie festschrift, getting out his own monumental *Recent Contributions*

FRONT COVER: The engraving on the cover was brought to the attention of McCashion by James Corsaro, Manuscripts and Special Collections section of the New York State Library in Albany. He located it in the three volume series by A. Bredius et al., entitled *Amsterdam in the 17th Century*. The engraving, strangely titled TABAGIE, 1628, (the Dutch term for smoking-room is Rookamer) is signed, on the lower right, G. H. van Scheyndel, fec. and erroneously ascribed to Gillis (Aegidius) van Schendel of Haarlem. G. H. van Scheyndel was either a contemporary engraver or George Heinrich van Scheyndel of Rotterdam, a well-known engraver working there as early as 1621 and 1635.

The original engraving, was found unsigned, however, in the Amsterdam University Library on page 69 of the book *Bacchus-Wonderwercken, 1628*, by the minor Amsterdam poet, historian and bookseller Dirck Pietersz Pers (Emden 1580-1 Amsterdam 1662). This volume, according to Joseph T. Rankin, Curator of the Arents Tobacco Collections of the New York Public Library, is a long winded (102 pages) moralistic poem on drunkenness which included use of tobacco, as the term then for smoking was "drinking tobacco." Pers proudly displays his learning by quoting the ancients on the abuse of wine but when it comes to "drinking tobacco" all he can say is that the ancients couldn't complain of it since it wasn't known to them.

The engraving indicates that smoking, as early as 1628, was already in certain cities a fixed part of Dutch culture and everybody was having a go at it.

Courtesy New York State Manuscripts and Special Collections and Niemeyer Nederlands Tobaco Logisch Museum.

to *Hudson Valley Prehistory* and doing a piece for the symposium *Amerinds and Their Paleo-environments in Northeastern North America*, and publishing (with Bruce Rippeteau) *Adaptation Continuity and Change in Upper Susquehanna Prehistory*. Kraft has contributed heavily to the festschrift, to *Paleoenvironments* and to *Archaeology of Eastern North America*. I have been guilty of using two long pieces of mine on New York work in *AENA* and of participating in the *Paleoenvironments* symposium. Ritchie has retired and Kaeser has stopped writing for personal reasons. Only the Weinmans, and now John McCashion, keep plugging away in a chosen line of research and publication in *The Bulletin*.

Yes, this is the story. But it is not the whole story. Where is the younger generation, those who have not yet broken into print or who have not followed up on their initial work? I suspect that all too many have immersed themselves in cultural research surveys, which seldom yield anything of archaeological note, and content themselves with only this use of their archaeological training.

But we, or at least I, espy a fault in that training or in the disposition that results from it. The younger generation does not seem interested in writing papers. Over the years of NYSAA annual meetings at least 50 "papers" have been delivered that one would expect to have been put in shape for *Bulletin* publication. They simply haven't been, because the deliverers never wrote them in the first place. These "papers" are slide lectures, magic lantern shows with commentary and no effort was ever made to compose them into written record. Bending over a cold typewriter that can be heated up only by rapid digital manipulation has become something to be avoided. This is the age of the projector no less than TV.

Despite the forgoing *there will be* a March issue. The March issue completes the annual volume and *The Bulletin*, if it is to end, should not end on an ugly fraction of $23 \frac{2}{3}$ years of publication. Between this notice and the July, 1978, number the membership will have had time to pull itself together. If nothing has happened by the April annual meeting the membership will have to admit that *The Bulletin* has outlived its purpose and turn to some other form of publication. To go back to the house organ or glorified news letter that it was in 1960 is unthinkable.

L.A.B.

Part 2

THE CLAY TOBACCO PIPES OF NEW YORK STATE UNDER THE SIDEWALKS OF NEW YORK: ARCHAEOLOGICAL INVESTIGATIONS NEAR THE U.S. CUSTOMS HOUSE ON MANHATTAN ISLAND, NEW YORK

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Theodore Robinson

Van Epps-Hartley Chapter
Metropolitan Chapter

Introduction

This is the second in a series of articles dealing with and emphasizing the importance of white clay tobacco pipes recovered from sites within New York State. Because of their relative abundance and datable attributes, those pipes recovered, reported and illustrated from dated complexes should, in time, provide relatively reliable aging for sites where found which are now out of their proper sequence or for those sites which have not as yet been pinned down in time. Development of trade and distribution patterns as well as social implications will be expatiated upon as more data and clay tobacco pipe specimens are unearthed.

Caughnawaga (1667-1693) Review

The first article (McCashion, 1975) analyzed the white clay tobacco pipes recovered from the well dated Mohawk-Caughnawaga Indian "Castle" near Fonda, New York. Styles and attributes were described and illustrated and historical data were applied. A preliminary dating and

distribution chart was presented for other New York State sites from which clay pipes have been recovered in some numbers and statistical formulae (Binford, Omwake, Heighton-Deagan) were applied to the samples recovered from Caughnawaga. But none of these could provide an acceptable date, theoretically, a median date of 1680, for the occupation of the site.

The reason the Binford formula was inapplicable was not because it failed to date the pipes (it did) but because that date was not the site date. Was this because Dutch stem bore diameters were smaller than English for this period? Probably not. Both Friederich (refer to Plate III) and Omwake (Walker, 1971, p. 88) have suggested that there was no appreciable difference in diameters. The real reason may be, then, the uneven distribution of types of pipes throughout the time span on the site. An indicator of this possibility is hinted at in the historical record: the largest number of clay tobacco pipes probably reached the site the year prior to its abandonment (1693). (McCashion, 1975, p. 6). Another factor, though probably not as important by comparison with the material recovered from the interior of the stockade, was the unexcavated area outside the stockade. On October 13, 1976, a survey of this area by the author, Monte Bennett and Father Ronald Schultz, director of Mohawk-Caughnawaga, yielded a musket ball and several clay pipe stems. It is risky, therefore, to rely upon one date statistically obtained as a reliable indicator of real historical time.

Further, Edward Bird, tobacco pipemaker, coming from Surrey, England in 1628 to Amsterdam, Holland and dying there in 1665, was introduced as the putative maker of all the New York EB pipes, belly bowls of which were suggested as being larger export versions of domestic Sloterdike or Amsterdam styles in vogue at the time. (McCashion, EB Pipes-Their Place in History, n.d.). Thus questionable identification of pipe specimens can play hob with statistics and other inferences.

Initial Investigations at the U.S. Customs House

It was a fortunate day for historical archaeology when Ted Robinson of the Metropolitan chapter of NYSAA, emerging from the Bowling Green subway station, on Sept. 23, 1972 noticed a contractor's red and white barricade to the right of the main front steps of the U.S. Customs House, south end of Bowling Green Park, Manhattan Island, New York City. Remembering those historians (Hall, Phelp-Stokes, Wilson) who had stated that the Customs House was located on the original site of Fort Amsterdam, Mr. Robinson took a look into the excavation which measured 5 ft. 4 in. deep, 33 in. wide, and 4 ft. 10 in. long. Strewn through the disturbed soil were bones of oxen, sheep and pig as well as the remains of a drum fish, sometimes caught in the surf by local fishermen. But it was the south wall of the excavation that appeared most interesting. There had been exposed in it an apparently undisturbed pit or occupational layer 41 in. below the sidewalk surface. The majority of the artifacts observed in that layer seemed to fall within a period not much earlier than 1665 nor later than 1685.

The Artifact Inventory

Mr. Robinson noted that the south wall contained heavily encrusted fragmentary metal objects most of which were too corroded for positive identification. But distinguishable among these were hand-wrought rosette head nails in use in America from the 1600's through the 1820's (Nelson, 1963, p. 1), one intrusive 5 in. nail with crude machine-made head cut from the common side and probably dating after 1820 (Nelson, 1963, p. 1), and one fragment of a rattail handled knife similar to "G" described by Hagerty (Hagerty, 1963, p. 98) and illustrated on page 101 of the same article. The width of the blade proved to be 7/8 in. thus putting it into the medium blade range according to Hagerty's classification. As to the date, Hagerty states:

"Type G continued on a low frequency plateau through the entire sequence (17th Century Oneida Iroquois) until a 62% frequency was reached at the Shepherdson Site (Sullivan-Moot OND 3-4) placed by dated objects in the last quarter of the 17th Century." (Hagerty, 1963, p. 101).

Since this was written, Peter Pratt has revised the OND 34 date to 1660-1677. (Pratt, pers. comm. 11/29/72), after the application of the Binford clay pipe formula by Bennett and

Cole who found the pipe production date was 1654. 515. (Bennett-Cole, 1973, p. 18 and 22). (There is a danger in relying on one date as we shall see further in this report). The provenience of the knife was compatible with this age. It was in direct association with a clay pipe stem whose bore diameter measured 7/64th in. a size common in the mid 17th century.

Glassware recovered by Robinson consisted of 6 untypable weathered green bottle sherds ranging in thickness from 3 mm to 8 mm, and one heavily encrusted neck fragment, possibly from a small 17th century apothecary flask.

The ceramic inventory consisted of 4 weathered light redware body sherds from a medium to large coarse earthenware vessel. One sherd had a thick crazed interior brown glaze while the other 3 had apparently lost their glaze through weathering. One small rim sherd, 6 mm thick, from a small bowl was also recovered. Made of a redware paste fired to a medium hardness, it held a clear glaze which appeared reddish-brown after application.

Of the small group of ceramics, the most interesting sherds were typical period delftware with pale buff body 5 mm thick and tin-glazed on both sides; and perhaps, sherds of 1 or 2 common Dutch dishes. The thick tin-glazing on 2 of the sherds, while white, exhibited a purplish cast; the third sherd, also white glazed, exhibited an interior and exterior bluish cast with the interior over-painted in blue decorative lines which resembled a large eyelash with thirteen hairs each fanning outwards from a single blue line. The ceramic inventory, therefore, such as it is, synchronizes with a twenty year period of deposit for the observed occupational layer.

Up to this point, the artifact inventory had little that was positive to offer chronologically, and a written report would not have been deemed necessary for this site were it not for the 90 clay tobacco pipe fragments, including 5 practically whole bowls and 80 measurable specimens.

Dating archaeological sites by measuring the bore of the pipe stem by inserting the hafting end of a steel drill bit measured in 64ths of an inch was an innovation of J. C. Harrington. He observed, as Calver had in 1931, that early pipes had relatively large draw holes through the stems, while the holes in the later specimens were much smaller (Harrington, 1954, p. 348). From this observation he drew up a percentage chart divided into five time periods based on data of English pipes predominantly from the Jamestown, Virginia, collection.

Using Harrington's *original* data, Lewis Binford took each pipe assigned to a period and recorded the estimated median date for its production; the sum of all the median dates for pipes making up a period sample was then calculated. This result was divided by "n", the number of pipes in the sample (Binford 1971, p. 232). This date together with the mean bore diameter was then used to calculate the regression formula $Y (1931. 85) - 38.26 X$, Y being the date at which the bore diameter would theoretically reach zero by this formula, 38. 26 being the slope of the line (number of years between each 1/64th inch decrease), and X being the mean bore diameter for the sample to be dated. (Binford 1962, pps. 19-21). The calculated result is a single number, theoretically the median date for the historic occurrence of the *material* under examination. (Walker 1971, p. 88).

When the formula is used, close analysis must be undertaken, first, to sort out the inevitable intrusive pipe stems that manage to invade the archaeological context and, second, to correct any distortions in the hole size that usually occur in Dutch-made pipes (McCashion, 1975, p. 16). When samples are available, analytic comparison of bowl types with those from other fairly well dated complexes must be undertaken. In New York State, unfortunately, we have hardly begun to scratch the surface of analysis of historic artifacts. Wherefore, any report, however primary or brief, if sincerely done, is much more useful than none at all. For this reason and because there has been little published on 17th Century site material from New York City, this report, it is hoped, makes its contribution.

All the clay tobacco pipe attributes of the custom house collection were recorded in the manner employed in the previous article (McCashion 1975: 1-2). One attribute not observed at Caughnawaga, it was noted, was a distortion in 3 stem bores called piling. Some factor in the holing-by-wire process caused the clay to "pile" in certain areas of the stem bore, causing a 1/64th reduction in the stem channel. There were 4 cases where the bore diameter was reduced by 1/64th of an inch on stems where rouletting occurred. (Seven specimens at Caughnawaga were previously reported erroneously as having a 1 mm reduction in the bore and this should be corrected to 1/64th inch reduction in stems where rouletting occurred). Probably because of the small sample from the Custom House site, no fingerprints, biting, whittling, blunting or staining were observed on the 90 specimens. These attributes were all recorded at Caughnawaga.

Description of Marks and Bowl Styles on Plate I

1A: Only one large belly bowl with impressed plain HG heelmark, by an unknown Dutch maker or owner, was observed. The 2 x 2 mm letters are apparently surrounded by a plain raised ring on a mark 4 x 5 mm in area of a slightly distorted oval heel, the diameters of which are 7 and 8 mm. On the left side of the heel of the pipe, 3.5 mm above the bottom, can be found the characteristic raised dot of the Dutch pipemaker, the "dot" possibly indicating a form of quality control. The interior of the bowl lip shows knurling or folding inwards and the exterior rim has an uneven 1 mm wide milled or rouletted decorative line. Maximum thickness of the stem at stem-bowl junction is 11.5 mm. The stem bore measures 8/64th of an inch.

The pipe on which this mark is impressed appears to be among the earliest of its *type* to reach New York State. None were reported from Caughnawaga (1667-1693) but unpublished reports indicate their contemporaneity with that site.

Generally, plain HG marks occur on both belly-bowl and funnel elbow-angled types with beaded or plain raised rings encircling the letter marks. To date, statewide provenience of all HG marks, plain, surmounted by three-point crown or surmounted by five-point crown, ranks second in total provenience to those pipes impressed with EB marks. While the mark has yet to be recorded in England, the plain HG mark, similar to 1A, has been found in Leiden, Holland, a Dutch city located between Amsterdam and Gouda (Duco, pers. comm. 3/9/76, illustration from his collection #3741). Duco's illustrated belly-bowl, though smaller, with impressed heelmark, approaches identity with certain styles found in New York State with impressed EB heelmarks on them.

2B: One medium sized 17th century belly-bowl with impressed bell heelmark, by an unknown Dutch pipemaker or owner, was recovered. Encircled by a beaded ring, the bell itself is 5 mm in length on a 5 x 6 mm mark on a slightly distorted oval heel which measured 7 x 9 mm. The interior of the delicately made bowl lip shows knurling while the exterior rim has a fine milled or rouletted encircling decorative line less than 1 mm in width. Maximum thickness of the stem at stem-bowl junction is 10.0 mm. The stem bore measures 7/64th of an inch.

In New York State, the bell heelmark occurs only on finely made, thin-walked pipes which vary little in size. All stem bore diameters are 7/64th of an inch. The mark ranges from 5 x 5 mm to 6 x 6 mm on a heel varying in size from 7 x 8 mm to 7 x 9 mm if mould distortion occurs. Minimum thickness of stem at stem-bowl junction is 10.0 mm; maximum is 10.5 mm. Friederich had illustrated the mark for Holland (Friederich 1975, p. 100, no. 83). He dates its peak production as 1645, too early for the custom house site, although it is known that this mark had a long time span in Holland. This longevity does not appear to be the case here. In New York State, 2B has been found on Caughnawaga (1667-1693), Gandagaro (1667-1693), Bloody Hill II Onondaga (1675-1685) (Bradley, 1976) and South Beach, Staten Island (c. 1675-1700) (Anderson, 1974).

3C: One medium-sized, superbly made, belly bowl with a most unusual heelmark encircled by a beaded ring was observed. About the pipe and the mark, Duco states:

"The pipe maker's mark is the Wapen van Zeeland (Arms of the District of Sealand), a southern part of Holland. The mark represents a lion rising from the waves of the sea which is the symbol for the struggle against the sea. Arms expression is 'I Struggle and Survive' Luctor et Emergo. The pipe is of Gouda origin from the period 1670-1680 (Duco, pers. comm. 5/19/76).

A variant of this mark is illustrated as number 39, page 99 of Friederich's work. He dates the mark at 1632, but the bowl style indicates a later date. The mark is 7 x 7 mm on a heel 8 x 9 mm in diameter. The interior of the bowl rim is not knurled and the milled or rouletted decorative line around the exterior of the lip is precisely even, finely executed and less than 1 mm in width. The bowl and the stem show high polish and stroke



PLATE I

burnishing. This burnishing procedure is adequately described by Walker. (Walker, 1971 p. 13). Maximum thickness of the stem at stem-bowl junction is 11.5 mm. Stem bore measures 6/64th inch. As yet no other specimens from New York State have been recorded.

4D: Only two large 17th century belly-bowls of this particular style were recorded. Both impressed with the EB heelmark, they are almost identical with one recovered at Mohawk Caughnawaga (1667-1693) and Mohawk Gandagaro (1667-1693) (Swart, pers. comm. 3/19/72). The EB letters are 3 mm long by 2 mm wide on a mark which is 7 x 7 mm on an oval heel whose diameter measures 8.5 and 9.0 mm. The letters are encircled by a beaded ring. The interior lip is knurled; the unillustrated one is not. Exterior rims of both have the milled or rouletted encircling decorative line, less than 1 mm in width. Bowls are well polished but not stroke burnished. On the right side of the protruding heel of the unillustrated specimen is the characteristic "dot" of the Dutch pipemaker. This feature was noted on the Caughnawaga specimens. The Custom House specimen evinces an interior layer of gray clay which runs throughout the bowl and stem; this is true for an identical bowl recovered at Caughnawaga, but not for the Gandagaro bowl. Maximum thickness of the stem at stem-bowl junction is 11.0 mm. All stem bore diameters measure 6/64th + in.

5E: Two fragmentary funnel elbow angled clay tobacco pipes were recovered. Both are impressed with the EB mark at the stem-bowl junction. The mark on 5E, however, is reversed. A similar feature is recorded at CNJ 49 (Tionontoguen) by Swart. It corresponds exactly with one specimen recovered at Caughnawaga; as a matter of fact the minor attributes such as position of the hole in the stem, gray clay interior, peculiarity of the impressed letter E, position of the mark, and the major attribute of an 8/64th inch bore diameter all match. To date, reversals are found only on 17th century EB marked pipes, both funnel and belly-bowl. This suggests the work of apprentices, who were unskilled, bored, or tired from having to rush manufactures to meet the sudden sailing dates the Dutch were known for deciding on from time to time.

On both specimens the letters are 2.5 mm in length by 2 mm in width, though each pipemaker's stamp is different. The EB letters on 5E are surrounded by a seemingly plain raised ring on a mark 6 x 7 mm. The EB letters on the unillustrated specimen are surrounded by a beaded ring on a 5 x 6 mm mark.

Maximum thickness of the stem at stem-bowl junction on 5E is 12.00 mm; 11.0 mm on the other. Stem bore diameter measures 8/64ths of an inch; the other measures 6/64th+ inch. 5E contains an interior layer of gray clay in both stem and bowl; the other does not.

F: This impressed EB heelmark occurred only once on a fragment of a smaller variety of belly-bowl. Encircled by a beaded ring, the EB letters are 2 x 2 mm on a mark 6 x 6 mm on a heel 7 x 7 mm. Maximum thickness of stem at stem-bowl junction is 11.0 mm. Stem bore diameter measures 6/64th + inch. Exterior white and interior blue clay composition are identical to the 5E elbow angled funnel types, and both bear resemblance to those from Caughnawaga. There is a probability that these pipes may have been fabricated together in Holland, shipped together, arriving together and presented together as a mixed variety to be traded or sold wholesale or retail.

6: Only one large white clay tobacco pipe bowl was observed from our context. Rather crudely executed, it has an uneven 1 mm milling or rouletting around the exterior lip while the interior lip shows knurling. The stained interior upper half of the bowl indicates smoking. Severe, crude trim marks are clearly visible on both front and rear of the bowl. Maximum thickness of stem at stem-bowl junction is 12.00 mm and the stem bore diameter measures 6/64th + inch. Each side of the bowl contains a cluster of raised dots in a rather irregular triangular pattern and each cluster is attached to the figure of a knotted bow, stem or tree trunk. The heel is unmarked, a rarity in predominantly Dutch specimens of this period in New York State. The provenience of the pipe may be either Dutch or English. A variety of dotted bowl sidemarks in relief appear on many different Dutch bowl styles throughout almost the entire period of Dutch pipemaking and they are described as variants on the Tudor rose theme, grapes or orange trees.

In England this moulded decoration is known as the Mulberry tree and the pipes on which they occur are known as Mulberry pipes. According to Oswald, they are distributed

mostly over the Midlands, East Anglia and along the South Coast (Oswald 1975, p. 90) and, depending upon the bowl style, could date anywhere from 1650-1700. Oswald assigns no maker to any of the specimens but does state that there is a coastal distribution and an affinity in pattern with Dutch bowls (Oswald 1975, p. 96). Except for a difference in heel design, a very similar bowl style with the same moulded decoration is illustrated from a collection of pipes in Dorchester, Dorset County, England (Watkins, 1967, p. 220, illustration #1). Watkins describes her specimen as "Pipe with a pattern of raised dots in a triangular shape with a primitive stem, known as a Mulberry pipe, from a group originating at Ipswich, and found all over the Midlands, 1650-1670. (Watkins 1967, p. 219)." However, when the source was checked for verification (JBAA, Vol. 23, p. 50) we could not find the specimen and can only assume a source printing error and that Watkins was quoting Oswald.

Another bowl style with similar "Mulberry" design is illustrated by Atkinson (Atkinson 1965, p. 251, fig. 5) who states, "I have also included in Figure 5 an example of the seventeenth century type with "mulberry" decoration. This one dates from c. 1670 and was found in Battersea Park (London)." (Atkinson 1965, p. 252). An almost identical bowl was recovered by Anderson from Pit III of the South Beach, Staten Island, excavation and was dated by him between 1650-1670 (Anderson, pers. comm. 1974).

7: Possibly originating in Amsterdam, the diamond fleur-de-lis is one of the most popular of Dutch pipemaker *stein* marks. But it rarely occurs as a *heel* mark found in Holland, England and in New York State. Bradley reports having found one on the Onondaga Indian site known as Indian Castle which he dates at 1655-1663 (Bradley 1976, p. 26) (Bradley, pers. comm. 2/18/75). As a *stem* mark it occurs in relative abundance on both 17th century domestic and contact Indian sites throughout the State. At Caughnawaga it occurred 15 times as a single stamp on steins with bores of 7/64ths in. At the Custom House site it occurred 3 times as a single stamp 9 x 5 mm, twice on stems measuring 6/64th + in., and once on a stem whose bore measured 7/64th in. In close proximity to the stem marks could be seen a milled or rouletted line once around the stem. An interesting attribute noted at both Customs House and Caughnawaga was the hardness of the stems with bore measure of 7/64th in. and impressed fleur-de-lis. All stems sounded a good "ring" when lightly tapped with the steel drill. They were also hard to scratch with a penknife, whereas the stems with bore of 6/64th + in. were rather easy to scratch. Commenting on the subject of hardness, Oswald states, "As a *rough* test it is usually possible to scratch the surfaces of Dutch pipes of the seventeenth Century with a penknife without much effort.

It is apparently more difficult to do the same with English." (Oswald 1975, p. 115). In New York, about 20% of both English and Dutch pipes were found hard to scratch and 80% were not. In New York, therefore, hardness is no criterion for distinguishing English pipes from Dutch.

8: This particular illustrated method of rouletting or milling occurred only once at the Customs House; it occurred *equally rarely* at Caughnawaga, where 6 samples were studied, 5 with 6/64th in. bores and 1 with 6/64th + in. bore. Observable specimens indicate the treatment was applied between the trimming and smoothing or the smoothing and polishing, if the latter method was employed. Once-around-milling occurs on the 3 stems stamped with the fleur-de-lis as described in (7:).

9: Alternate runs of dots and roulettes are recorded 4 times at this site, impressed on stems with bore measure of 6/64th + in., and on 1 stem with bore of 7/64th in. Of the 50 specimens recorded from Caughnawaga, 6 were as #8, and 44 had alternate runs of dots and roulettes. The bore diameters are interesting: 2 at 5/64th, 10 at 6/64th, 20 at 6/64 +, 9 at 7/64, 3 at 7/64 + in. Combinations of (8:) and (9:) exist together on the same pipes in one variation or another and are almost always found in relatively productive, Dutch-influenced contexts throughout New York State.

History of the Fort

Remembering those historians who claimed the Customs House was constructed over the site of Fort Amsterdam (1626-1790), Robinson located a modern (1916) map superimposed over

a 17th century map of the Dutch grants (Plate II-Courtesy New York Public Library) which appeared to support the historical data. He pinpointed the excavation (Plate II, marked CH-X) just outside the fort near an old well and close to the north road leading to the fort. Since the excavation is in close proximity to the fort, it becomes advisable to include a brief history for two reasons: one, the historical data, if available and applicable must never be divorced from the archaeology; two, in the event of a large scale excavation, a handy reference as to the changes in the fort is available.

In late 1626, shortly after the purchase of Manhattan Island from the Indians, Fort Amsterdam was born. Located on the south tip of the Island, or Manhattan "toe", it was nothing more than a block-house surrounded by red cedar palisades (O'Callaghan, 1848, Vol. I, p. 104). It served as a protection for lives and property, as well as for the better accommodation of the Dutch West India Company's servants who, at that particular time, were engaged in skinning the Indians while the latter were skinning the beaver.

The fort had a painful beginning. Wouter van Twiller, the rather self-indulgent Director, 7 years later, in 1633, issued orders for a thorough reconstruction of the principal fort at Nieuw Amsterdam and he also proposed that a guardhouse and barrack be built within. (O'Callaghan, 1848, Vol. I, p. 135)

In 1635, two years later, work was completed with the (estimated) dimensions now about 300 ft. long by about 250 ft. wide. (O'Callaghan 1848, Vol. I, p. 171). Unfortunately, the following year, the main house within the fort, having a "reed covered roof" caught fire and was completely consumed. From then on, Fort Amsterdam might as well be known as the "Fort that was forever in disrepair." Apparently nothing was done after the fire for, in 1638, when Willem Kieft, the third Director, arrived, he found the fort in "an utter state of decay; open at every side permitting everywhere free egress and ingress, except at the stone point." (O'Callaghan 1848, Vol. I p. 182). There is more than a little truth in this statement for, on July 28, 1639, "nine soldiers mutinied and refused to work at the fort." (Phelp-Stokes 1928, Vol. IV, p. 90). But it appears that nothing much was done in the way of repair during Kieft's administration. Lubbertus van Dinclage, who replaced Kieft in 1644, complained bitterly that "Fort Amsterdam was in such ruinous condition that men strode over the walls instead of going through the gate," and he hopefully suggested to the West Indian Company that "it ought to be repaired with stone." The reply from Holland was one of typical Dutch penuriousness: "Repair it with good clay and firm sod and use the soldiers to do it at the smallest possible expense." (O'Callaghan 1848, Vol. I, p. 349). The advice of the company was apparently not taken; in 1647 an excise was ordered on liquor sold to raise money for repairs to the fort. (PhelpsStokes 1928, Vol. IV, p. 110).

By 1649, Fort Amsterdam was still nothing more than a "mole hill or ruin." It contained "not one gun on a single frame, nor gun carriages, nor sound platforms and the complaint arose that it should be repaired and constructed with five bastions and made a first class fort. (Brodhead 1856, Vol. I, p. 303). The answer from Amsterdam was the same penny-pinching reply in 1650 as it had been in 1644. The fort, which belonged to the company, was not properly repaired, should have been, and was not. By 1652, matters were no better. (Brodhead 1856, Vol. I, p. 345). The stone walls were finally completed in 1680-1 (Phelps-Stokes 1928, Vol. IV, p. 180). As the fort grew, so grew New Amsterdam-all around the fort. In fact, Stuyvesant complained that it was for the most part crowded all about with buildings and was better situated as a citadel than as a fort for defense against an open enemy. In short, said Stuyvesant, "the fort is situated in an untenable place where it was located on *the first discovery of New Netherlands*" (Brodhead 1858, Vol. II, p. 440).

It was Stuyvesant who ended up on the defense, as Fort Amsterdam surrendered to the English on August 27, 1664, without firing a shot. This was duly noted by the West India Company in reply to his defense, when he appeared in Amsterdam. They caustically pointed out that "Fort Amsterdam should not have been so weakly constructed as to require its surrender to the enemy without firing a shot." (Brodhead 1854, Vol. IV, p. 499). On August 30, 1664, the English occupied the fort and re-named it Fort James.

Under the English, a well was dug for the fort in 1666 (Phelps-Stokes, 1928, Vol. IV, p. 262). Stuyvesant had reported during his administration that the fort was without well or cistern (Brodhead 1858, Vol. II, p. 441. But there was a well out side the fort though not directly as -

sociated with it and later maps (see: Maps under references) show both a well outside and, probably a cistern inside the fort. One of the wells outside the fort was situated near the road leading to the north entrance of the fort and probably very close to the 1972 excavation.

In 1670 (which is the median date for the pipe samples), the fort was described as an "earthen fort with the outermost bastion toward the river and on it a windmill and a very high staff on which a flag is hoisted whenever any vessels are seen in Godyn's Bay. . . . The Church rises with a double roof between which a square tower looms aloft. . . . On one side is the prison, on the other side of the Church is the Government House. . . . Without the walls are the houses built by the Amsterdammers." (Phelp-Stokes 1928, Vol. IV, p. 276).

When the fortunes of war briefly changed in 1673 and the Dutch recaptured the fort, renaming it Fort Willem Hendrick, they capitalized on Stuyvesant's "defense." They immediately tore down all the surrounding houses which were an obstruction to the line of fire. But just in time, to hand the Fort back to the English in October of 1673 by the terms of the peace treaty.

In 1678, Governor Andros describes Fort James as, "situated upon a point of New Yorke Towne between Hudson's River and the Sound; it is a square with stone walls, four bastions almost regular with 46 guns mounted and stores for service accordingly." (Brodhead 1853, Vol. III, p. 262). Mr. Lewin's report of 1680 went a bit further. He was mystified as to why so much money was spent on Fort James. The kitchen and shed had been torn down and replaced several times since 1678. Also, the Dutch roof tiles on the great house were removed and replaced by shingles. Stairs had been altered. Workers, servants and negroes were employed and paid two shillings per diem. But pay was in rum and goods, while the Crown was charged in beaver and sterling. And, in 1678, when Governor Andros was in England, Capt. Brockholes was obliged to plank the platforms and put new stockades around the fort-which, of course, were also charged to the Crown. (Brodhead 1853, Vol. III, p. 307).

Thomas Dongan arrived in 1683 to take over as governor and the fort, he found, was "somewhat in disrepair". By 1686, he reported that the fort had 39 guns, most of which were dismounted. The fort, then had 4 bastions on 2 acres built formerly against the Indians and was made of dry stone and earth with sods as a breastwork. The face of the north bastion was repaired with lime and mortar and the rest of the Fort primed and rough cast with lime. But batteries were not yet renewed and the breastwork was crumbling. A new roof replaced the flat roof of the officer's quarters and another was built over the arch of the main gate. (Brodhead 1853, Vol. III, p. 390-1). Instead of palisades, pales were planted round the fort. In 1688, a spur was erected before the north gate (Phelps-Stokes 1928, Vol. IV, p. 344). In 1689, during the Leisler Affair, it was observed that the fort was out of repair and most of the great guns not fit for service. (Brodhead 1853, Vol. III, p. 589).

Even the French took a shot at describing the fort. In 1692, they observed, "The fort is situate on a triangular point of land, and on the banks of two rivers one called the South and the other the North River. It has four bastions, and is faced with stone and terraced on three sides; on the North, South and East. Some barracks and gates are on the West Side; the ditch is a miserable affair, and is almost filled up in the East and North. There is a very fine armory which is in good order. There are twenty seven iron cannon around the Fort and four small brass pieces at its gate. It is surrounded by houses on all sides except to the South. It is not enclosed either by walls or palisadoes. The Dutch Church is in the fort and the garrison consists of sixty men." (Brodhead 1855, Vol. IX, p. 548).

Writing from London, December 24, 1698, Benjamin Fletcher, then ex-Governor of New York, defended himself against charges concerning the Fort by stating, "For at New Yorke, I made up all the soddeworke anew, the two bastions towards the sea I flagged with free stone, the curtaine between those two bastions I built up new from the ground, the well made new, and a very large cistern for receiving water, half the soldiers barracks pulled down and rebuilt, new carriages for thirty six guns, a paint house upon column for securing the field pieces and their carriages from the weather, the chapel new built and all finished to pews. As to the Governor's House, it was all new shingled by me, two rooms wainscoted, an addition thereto built from the ground with brick and shingled and secured from the weather, tho' not finished within, a new pump made without the Fort Gate and 1050 tons of lime paid for and lodged in the new house for pointing and refitting the fort." (Brodhead 1854, Vol. N, pps. 449-50).

A critical view of what had just been accomplished was noted by the Earl of Bellomont writing to the Lords of Trade on May 3, 1699, "Tis wonderful to me how Colonel Fletcher could pretend to apply the greatest part . . . to the repairs of this forte and the Governor's house, when I found everything out of repair when I superseded him. The palisadoes of this Fort are quite decayed and a third part of them destroyed or wanting: one of the bastions cracked through, which will fall if not speedily rebuilt; the parapet gone to decay. The roof of the House is out of repair, so that it rains in, and the lowest floor is decayed and rotten" (Brodhead 1854, Vol. IV, p. 513).

At the turn of the 18th century the now-in-charge Lord Cornbury on September 24, 1702 sang the same old tune. He noted, "The Fort at New York I found in a miserable condition. The parapet which is of sod-work is fallen down in many places. Not one platform is good; the guns mostly dismantled and many of their carriages are rotten. Some of the guns are so honeycombed that they are not fit to be fired. The magazine of the Fort is a building of brick made by my Lord Bellomont over the gate going into the Fort which cost 800 pounds built under Colonel Romer's direction. It should be removed and built elsewhere for fear of explosion which should surely destroy the fort and the houses built around it" (Brodhead 1854, Vol. IV, p. 967-8).

Two years later, in 1704, some progress was being made, as the Report to the Lords of Trade states, "At New Yorke the walls for the Forte are faulty in many places, many of the guns are remounted with new carriages and others repaired. The magazine for the powder lately built is large and secure but the Store Room for the Armes is ready to fall and all sorts of stores are wanting. There are two hundred men in the garrison. " (Brodhead 1854, Vol. IV, p. 1128).

On October 14, 1726, the Assembly passed an act for discharging a debt to the late agents for this Colony at the Court of Great Britian for furnishing and completing the buildings in his Majesty's Fort George, for borrowing certain sums for these purposes and for laying a tax to make good such parts thereof. (Brodhead 1855, Vol. V, p. 782). Three years later, however, in 1729, another act was initiated for raising 200 pounds for repairing the Barracks in the Fort at New York; was very much wanted as they were in a ruinous condition. (Brodhead 1855, Vol. V, p. 874). In 1731, the report on the stores within the fort was even worse. (Brodhead 1855, Vol. V, p. 929).

Seeds of rebellion, sewed during the Leisler Affair, were beginning to flower in New York City and great concern for the Fort was voiced. Governor Clinton, anxious about the State of the Province, remarked, "In making repairs to the Fort, which not only defends this town, but likewise the principal battery at the entrance of the Harbour, they refuse repairing the side next to the town, and even left the guns dismantled on that side: There can be no reason assigned for this, but a malicious insinuation that the Town may be in danger from a Governor whose Residence is in the Fort: Yet as the Town is open the Fort may be more easily attacked from the Town than from any other way." (Brodhead 1855, Vol. VI, p. 462). In 1746, March 31st, it was suggested that a collection be taken to clean out the filth and rubbish left by the soldiers now bound for Cape Breton, (Phelps-Stokes 1928, Vol. IV, p. 596).

Ten years later, a hint that the Fort might be reaching its end is in the record of a kitchen being built in Fort George by Charles Jaudine for 500 pounds (Phelps-Stokes 1928, Vol. N, p. 677). Governor Hardy, writing to the Lords of Trade on October 27th of the same year, stated, "Fort George has gone through great repairs and is now completed . . . two sides and three bastions command the Rivers leading to the City, and should properly have heavy cannon mounted, for the Defense of the Harbour. " (Brodhead 1856, Vol. VII, p. 164). However, on a very cold December 15, 1757, a fire consumed the West Range of Barracks with all the stores within and had the wind been blowing from the Northeast, it would have threatened the Governor's House in which Lord Loudon was living at the time. (Brodhead 1856, Vol. VII, pps. 341-2).

From then on, the Fort appears to go down hill. From New York, September 23rd, 1765, Lt. Governor Colden remarked that, "if riots occurred because of the Stamp Act Controversy, His Majesty's Fort in its present state would not be tenable as the guns were honeycombed, carriages rotten and no powder in the fort. " (Brodhead 1856, Vol. VII, p. 759-60). On November 1, 1765, the Stamp Act riot broke out in New York City, and the engineers rapidly "put the Fort into the best state of defense and offense" (Brodhead 1856, Vol. VII, p. 792).

The Fort remained in fair condition with Governors resident until about the 29th of December 1773 when the Government House in Fort George accidentally took fire. So rapid was its progress

that in two hours it was entirely consumed. (Brodhead 1957, Vol. VIII, p. 407). With the American Revolution at hand, and a measure of seditious activity always going on in the City, a curious letter is recorded. Written by Lt. Governor Colden to the Earl of Dartmouth, May 3, 1775, it states, "there are only 100 troop quartered unprotected in the City barracks as Fort George had been dismantled by Lord Dunmore who converted the Fort Barracks into stables about 1770-1". (Brodhead 1857, Vol. VIII, p. 572). However, the artillery, counted on September 28, 1775 at both Fort George and the Battery, amounted to 88 serviceable and 21 unserviceable pieces. (Brodhead 1857, Vol. VIII, p. 572).

As the Revolution approached, General Lee, writing to General Washington on February 14, 1776, proposed to pull down the fort on the town side to prevent its being converted to a citadel by the British, and this was done (Phelps-Stokes 1928, Vol. IV, p. 915). On November 27, 1776, Governor Tryon submitted a plan of Fort George with the Works on the Lower Battery and stated that, "The Fort with proper buildings might contain the King's Arsenal and Armoury and when all the buildings and barracks now standing are Demolished, a proper esplanade might be marked out for the Soldiery, and a handsome range of barracks constructed for as many men as might be thought proper for a standing Garrison. " (Brodhead 1857, Vol. VIII, p. 691-2).

The cessation of hostilities marking the end of the Revolution rang the death knell for Fort George. From then on nothing much happened there and on June 18th 1790, during leveling of the "old fort" a number of old Dutch pipes were found, "somewhat different from those in use in the present day" (1790). Also uncovered were two lead coffins and human skeletons. (Phelps-Stokes 1928, Vol. V, pps. 1268-9).

On this site was erected Government House, used by Governors Clinton and Jay and later doing service as a custom's house and boarding house until destroyed by fire in 1815 (New York City Guide, 1939, p. 66). The land was then sold and private residences were constructed on it; the environs around the customs house became known as "steamship row". The present Customs House was finished in 1907, and it stands today, over Fort Amsterdam under the sidewalks of New York.

The Friederich HBO Formula

F. H. W. Friederich, late of Haarlem, Holland, as early as 1964, began experimenting with statistical methods for dating white clay tobacco pipes. The bases for his statistics were

FRIEDERICH HBO FORMULA
(after Friederich, 1975)

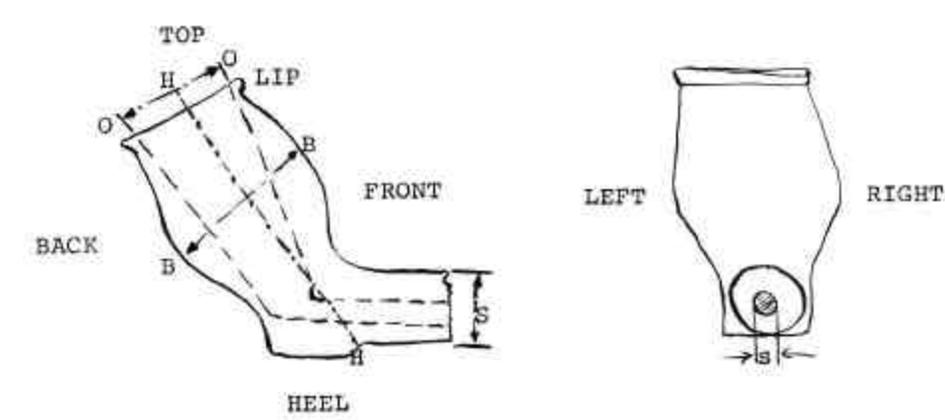


PLATE III

derived from his study of some 10,000 pipe bowls, some from Western Holland, most from the Haarlem area. Included in these data were measurements taken from Dutch paintings in which clay tobacco pipes appeared drawn or painted to scale, a study of the rise and fall of the price of tobacco (which also influenced the size of the pipe bowl) and a large amount of information on English pipes. Few, if any, data derived from America. After years of experimenting and data collecting, three bowl measurements proved satisfactory to him in achieving relatively reliable dating. Plate III indicates the initial measurements in millimeters taken, H, B, and O.

Friederich states: "A metal sliding gauge with two points and two jaws is to be used when measuring for HBO. Measure H on both sides of the pipe from behind the heel to the top of the bowl. Measure both sides because there is a tendency for tobacco pipes to be lopsided in bowl profile due to the manufacturing process. (Plate III, right profile). Using the jaws, B is found

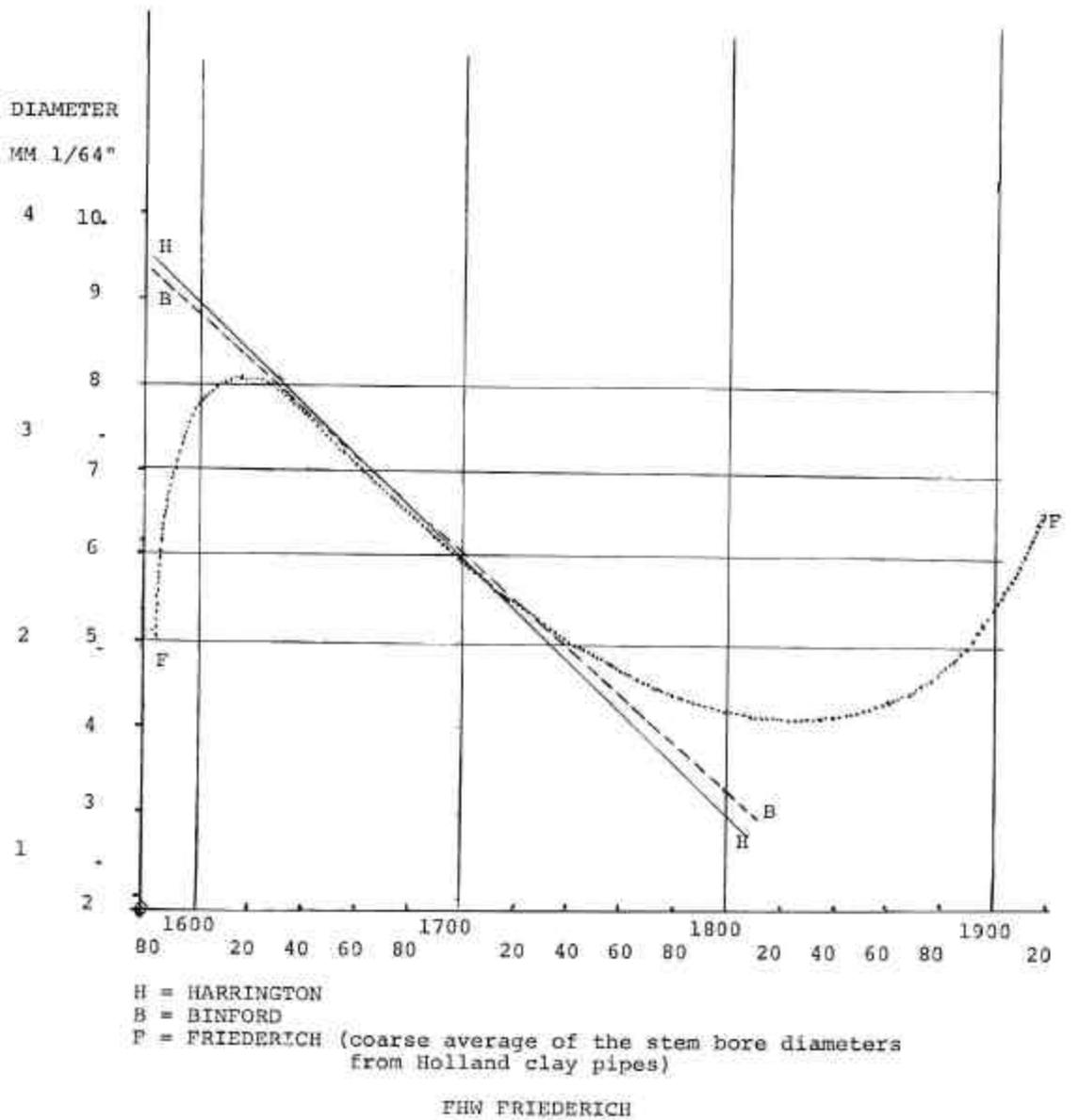


PLATE IV

by measuring once the widest expansion of the bowl. Using the points of the sliding gauge, O is found by measuring the greatest diameter of the bowl opening, first from the left to right and then front to back and taking the average of the two measurements. "

Multiply H x B x O and plot the graph on page 77 of Friederich's work (Friederich 1975, page 77, plate IV). (Cross-check using the bowl styles on page 76, plate III). Other bowl styles appear in the entire section of plates 1 through 48 in this work.

One error which must be corrected refers to plate one on page 75. (Friederich, 1975, page 75, plate I). In a letter dated 9/19/73, he corrected the "F" curve of the bore diameter graph which, he stated, was based on out-of-date notations, and he enclosed the revised version. (Plate IV).

The graph is of particular interest to us in America. A copy was sent to Gordon de Angelo who replied (De Angelo, pers. comm. 10/20/73) with some preliminary observations: "With bore diameters of 5/65, 6/64, 7/64 and 8/64th in. crossing the curve twice or more, one formula perhaps is no longer adequate. Now it is not necessary to separate Dutch pipes from English pipes between c. 1635 and c. 1715, unless to take in a slightly earlier date for Dutch pipes. With Dutch pipes whose bores measure 5/64, 6/64, 7/64, 8/64 in. crossing the curve at two or three points it is necessary to: A. separate Dutch from English on basis of form, marks, decoration, context etc. ; B. separate Dutch pipes on above basis into date brackets and derive a formula, for example: 1. Pre-1620 (Formula #1), 2. ca. 1620-1715 (Formula #2), 3. ca. 1715-1830 (Formula #3), 4. Post-1830 (Formula #4). "

De Angelo concluded by suggesting that if one could carry out steps A and B above, he knew enough about pipes not to need the formula.

Observations on the HBO formula

The question now arises as to whether or not the HBO formula could be applied successfully to 17th century clay tobacco pipe bowls recovered from New York State sites. With the possible exception of pipes recovered from Fort Orange (1624-1675), where it is hoped that this method will be tested independently since the pipes are domestic Dutch, the formula fails. The reasons are patently obvious. (1) Friederich died before enough information could be sent to him for programming. (2) It appears that Dutch export pipes for the "trade" had larger bowls than those for home consumption. This difference would add 5 or 10 years, at least, when applied to samples from American sites which range in date from about 1658 to 1700. For example, our samples from the Customs House gave a Binford date of 1670 plus or minus. The Friederich HBO dates for the measurable samples using both English and Dutch lines of a comparable period and plotting them on graph 4, page 77 (Friederich, 1975) gave the following results:

1A.	HG	H - 45	Line 7 = 1725	Line 2 = Dutch pipes (1595-1740)
		B - 21.5	Line 6 = 1735	
		O - 17	Line 3 = 1745	
		<u>16,448</u>	Line 4 = 1750	
2B.	Bell	H - 37	Line 2 = 1650	
		B - 18.5	Line 8 = 1652	
		O - 14.5	Line 4 = 1712	
		<u>9,925</u>		
3C.	Sealand Arms	H - 40	Line 2 = 1660	
		B - 18	Line 8 = 1660	
		O - 15	Line 3 = 1710	
		<u>10,800</u>	Line 4 = 1720	
4D.	EB belly		Line 8 = 1685	
		H - 45	Line 6 = 1700	
		B - 20	Line 7 = 1725	
		O - 16.5	Line 3 = 1735	
		<u>14,850</u>	Line 4 = 1745	

6.	Mulberry or Orange Tree		
	H - 47	Line 7 =	1730
	B - 23	Line 3 -	1750
	<u>O- 16,</u>	Line 6 =	1755
	17,296	Line 4 =	1760

By comparison with Caughnawaga, which has basically the same bowl styles, the same results would occur, either too high or two low, and therefore this formula is not applicable for the period of about 1658 to about 1700 in New York State. It will be of great interest to observe Dutch post-medieval excavations in years to come and the application of the HBO formula to pipes recovered from their *domestic* contexts.

At the other end of the spectrum, what happens when pipes with apparently smaller bowls are found in a context which, according to the formula, should contain larger? An article by Robert Stenuit (Stenuit 1974, p. 236) on the underwater excavation of the *Lastdrager*, a Dutch East Indiaman, lost off the island of Yell, Shetland, in 1653, had an interesting chart on page 236 which gave some measurements of pipebowls recovered according to Friederich's formula but not credited to him. It is curious to note that there was no final application of the formula to date the pipes. We used Line 2, termed by Friederich "early Dutch pipes", and applied it. (Friederich 1975, page 77, plate IV):

1	38.5	34	34	35	37	37	33	34	37
2	20	18	18	18.5	18	17.5	18	19	19
3	12	11.5	10.5	12	12	12	12	12	11
HBO	9240	7038	6426	7770	7992	7770	7128	7752	7733
Date	1642	1628	1621	1633	1635	1633	1624	1634	1632
Sunk	1653								

Avg. 20.5 years Average date of the pipes 1631.3

Were the date of the sinking not known, an average date of 1631.3 years would have to be statistically assigned to the wreck based on the pipes alone. The coin recovered with the latest date was 1650 (Stenuit, 1974, p. 237). This is one case in point to illustrate the inherent danger of relying on one statistical date as opposed to evaluating the other artifacts in the context. While the HBO dates for the pipes may be correct, it is not even close for the context. It may again be stated that "pipes date pipes, they do not date sites. "

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References

- Atkinson, D. R.
 1965 Makers' Marks on Clay Tobacco Pipes Found in London. (Part II). *Archaeological News Letter* (London), Vol. 7, No. 11 (January-February).
- Bennett, M. and Cole, R.
 1973 The Moot Site (Sullivans) OND 3-4. *Bulletin of the Chenango Chapter of the New York State Archaeological Association*. Vol. 14, No. 1 (June).

- Binford, L. R.
1962 A New Method of Calculating Dates from Kaolin Clay Pipe Stem Samples. *Southeastern Archaeological Newsletter*. Vol. 9, No. 1 (June).
1972 The Binford Pipe Stem Formula: A Return from the Grave. *The Conference on Historic Sites Archaeology Papers* 1971. (June).
- Bradley, J.
1976 A Preliminary Report on the Historic Onondaga Sequence. *Bulletin of the William M. Beauchamp Chapter of the New York State Archaeological Association*, Vol. 1, No. 1 (Spring).
- Brodhead, Jr. R.
1954- *Documents Relative to the Colonial History of the State of New York*. (Procured 1857 in Holland, England and France and edited by E. B. O'Callaghan, M. D.) Albany: Weed, Parsons and Co., printers.
- Calver, W. L.
1931 Historical Clay Pipes. *New York Historical Society Quarterly Bulletin*, Vol. XV, No. 3 (October).
- Federal Writers' Project
1939 *New York City Guide*. Works Progress Administration in New York City. In New York Public Library, Random House.
- Friederich, F. H. W.
1975 Pijpelogie. (Voor, Versiering en Datering van de Hollandse Kleipijp). *A.W.N. Monograph No. 2*, Voorburg, Holland.
- Hagerty, G.
1963 The Iron Trade-Knife in Oneida Territory. *Pennsylvania Archaeologist*, Vol. 33, Nos. 1-2 (July) Gettysburg, Pennsylvania.
- Hall, E. H.
1909 Historical Sketch of Fort George, New York. *Order of the Founders and Patriots of America*. Publication No. 26. In the New York Public Library.
- Harrington, J. C.
1954 Dating Stem Fragments of Seventeenth and Eighteenth Century Clay Tobacco Pipes. *Quarterly Bulletin of the Archeological Society of Virginia*, Vol. 9, No. 1 (September).
- Mail and Express
1901 Fort George, New York, an Ancient Fort Unearthed (Fort Amsterdam) New York Public Library I:GC P. V. 7, No. 14, April 13, 1901.
- McCashion, J. H.
1975 The Clay Tobacco Pipes of New York State. (Part One Caughnawaga 1667-1693). *Bulletin of the New York State Archaeological Association*, No. 65, (November), Ann Arbor, Michigan.
- Nelson, L. H.
1963 Nail Chronology as an Aid to Dating Old Buildings. *History News* (Madison, Wisconsin), Vol. 19, No. 2, (December).
- O'Callaghan, E. B.
1848 *History of New Netherlands or New York Under the Dutch*. D. Appleton and Co., New York.
- Oswald, A.
1975 Clay Pipes for the Archaeologist. *British Archaeological Reports number 14*, Oxford, England.

- Phelps-Stokes, I. N.
 1928 *The Iconography of Manhattan Island. (1498-1909), 7 vols.*, Robert H. Dodd, New York.
- Stenuit, R.
 1974 Early Relics of the VOC Trade from Shetland. The wreck of the Flute *Lastdrager* lost off Yell, 1653. *International Journal of Nautical Archaeology and Underwater Exploration, Vol. 3, No. 2.*
- Walker, I. C.
 1967 The Manufacture of Dutch Clay Tobacco Pipes. *Journal of the Council for Northeast Historical Archaeology, Vol. 1, No. 1 (Spring).*
 1971 An Archaeological Study of Clay Pipes from the King's Bastion Fortress of Louisbourg. *Canadian Historic Sites: Occasional Papers in Archaeology and History, No. 2*, National Historic Sites Service, National and Historic Parks
 Branch, Department of Indian Affairs and Northern Development, Ottawa, Ontario, Canada.
- Watkins, E.
 1967 Clay Tobacco Pipes Found in Dorset. *Dorset National History and Archaeological Society Proceedings, Vol. 88, (April).*
- Wilson, J. G.
 1892 *The Memorial History of the City of New York. (From It's First Settlement to the Year 1892).* New York History Company, 132 Nassau St., New York.

Maps

Catalogue of Manuscript Plans and Views in the British Museum.

- 1864 Crown Series is Vol. 1, Refer to Vol. III, London.
 CXXL35 A description of the town of Mannados or New Amsterdam as it was in 1661; being a colored plan of New York drawn in 1664, after its capture by Sir Robert Holmes from the Dutch.
 A map "of the island of Manhadoes, " and part of Long Island; drawn about 1665: with a Plan of New York.
 A plan of New York; drawn in 1695 by John Miller.
 A plan of the Fort in New York; drawn in 1695 by John Miller.
 A military plan of New York, Brooklyn and part of Staten Island, drawn about 1781.

Catalogue of Manuscript Plans and Views in the Public Records Office London, England.

- 2689 New York 1756
 Draft of the New Battery erected in New York and of the Fort there (Fort George). By John Dies. C. O. 700, New York no. 12.
- 2690 New York 1765
 The City of New York. W. Cockburn, fecit. MPI 68.
- 2691 New York 1766
 A Plan of the City of New York and Its Environs. by John Montessor. C. O. 700, New York no. 31.
- 2692 New York 1776
 Plan of Fort George and the Lower Battery in the City of New York. By C. J. Sauthier.

Collection of Maps in the New York Library.

- New Amsterdam in 1660. Redraft of the Castello Plan by Adams and Stokes probably based on the Dutch Grants.
- 304 The Fort in New York. No date.
- A Plan of the City of New York from an Actual Survey. by William Bradford. Probably 1727-1731.

- Map of the Dutch Grants superimposed over a 1916 Map of Manhattan showing the location of the Fort and partially reproduced in Plate II.
- Downtown Letter.
 1973 Published Quarterly by the Office of Public Information-of Pace University,
 1976 Pace Plaza, New York City, New York 10038. Folding booklet contains much information and maps dated 1796, 1798, and 1976.

Personal Communications

- Bradley, J.
 1975 Letter and information dated 2/8/75.
- De Angelo, G. C.
 1973 Letter and graph dated 10/20/73.
- Duco, D.
 1976. Letter and information dated 5/19/76.
- Friederich, F. H. W.
 1972-3 Information and personal communications dated 8/29/72, 9/11/72, 9/19/73 with graphs and permission to use his material.
- Municipal Archives of Amsterdam
 1977 Letters 177. 68 dated 2/2/77; 177.285 dated 3/16/77; 1 77.482 dated 4/6/77.
- New York Public Library (Arents Collections).
 1976 Letter dated 6/15/76.
- Niemeyer Nederlands Tabacologisch Museum
 1977 Letters and generous gifts 2/8/77.
- Pratt, P.
 1972 Letter dated 11/29/72 with revised Oneida date sequence.
- Rijksmuseum, (Printroom) Amsterdam
 1977 Letter dated 1/1/77.
- Staten Island Historical Society
 1974 Letters and Manuscripts from Robert J. Anderson, Staff Archaeologist, dated 2/4/74.
- Swart, J.
 1972 Personal Communications of 3/19/72.

BITTERSWEET SITES I, II, III (Cox. 41, 42, 44) Components of the Susquehanna Tradition

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The Bittersweet Sites I, II, III were excavated in 1975-76 along an oval uplift of Normanskill shale in Greene County, New York. These 3 culturally related sites are 4 mi. west of the Hudson River and 2 mi. north of Greens Lake.

Aboriginal encampments from Paleo-hunter to Late Woodland times are numerous within this Cocksackie quadrangle because of the great abundance and quality of flint found in exposures of Normanskill, Eastern Onondaga, and Kalkberg formations. The fine environment for deer

and nut trees within the lowlands, and the proximity to the Hudson as a food and travel resource were also conducive to nomadic groups.

The three Bittersweet sites were excavated from the western edge of a tongue-shaped rise, approximately 10 yd. above and 20 yd. from Murderers Creek. The occupations were distinctly separate despite being within no more than a 50 yd. line.

With generous permission of the property owner, Lloyd Zimmerman, and excavation help from Mark Weinman, Mark Emery, Naomi Reich, and Gladys Weinman, we found remains at all sites that are associated with both Late Archaic Snook Kill and Transitional Frost Island phases of the Susquehanna Tradition (Ritchie, 1969). These were identified by the occurrence of Snook Kill and Susquehanna Broad projectile points (Ritchie, 1971) and characteristic knife styles.

Bittersweet I

Aboriginal remains at Bittersweet I were found in a north-south oval which revealed 3 distinct soil strata in its center and northern periphery within the 25 five-foot squares excavated. Stratum I was a dark brown, slightly clayey soil which was between 1 and 5 in. thick. Stratum II, a similar but lighter brown soil, was 1 to 6 in. thick and contained many horizontally placed Normanskill shale fragments. Stratum III was a greyish-brown sandy clay cluttered with irregularly positioned shale pieces. Only a few flint scraps were collected from this early post-glacial soil. Despite the easily detected juncture between Stratum I and II, we cannot use the layers as a separating factor for the 2 predominate point types since they appeared in both strata. Of the 4 Snook Kill points, 2 were from Stratum I and 2 from Stratum II. Half of the 6 Susquehanna Broad points appeared in Stratum I; the remaining 3 were in Stratum II where this layer was only 1 in. thick. In Stratum I we also found a bifurcated-base point base.

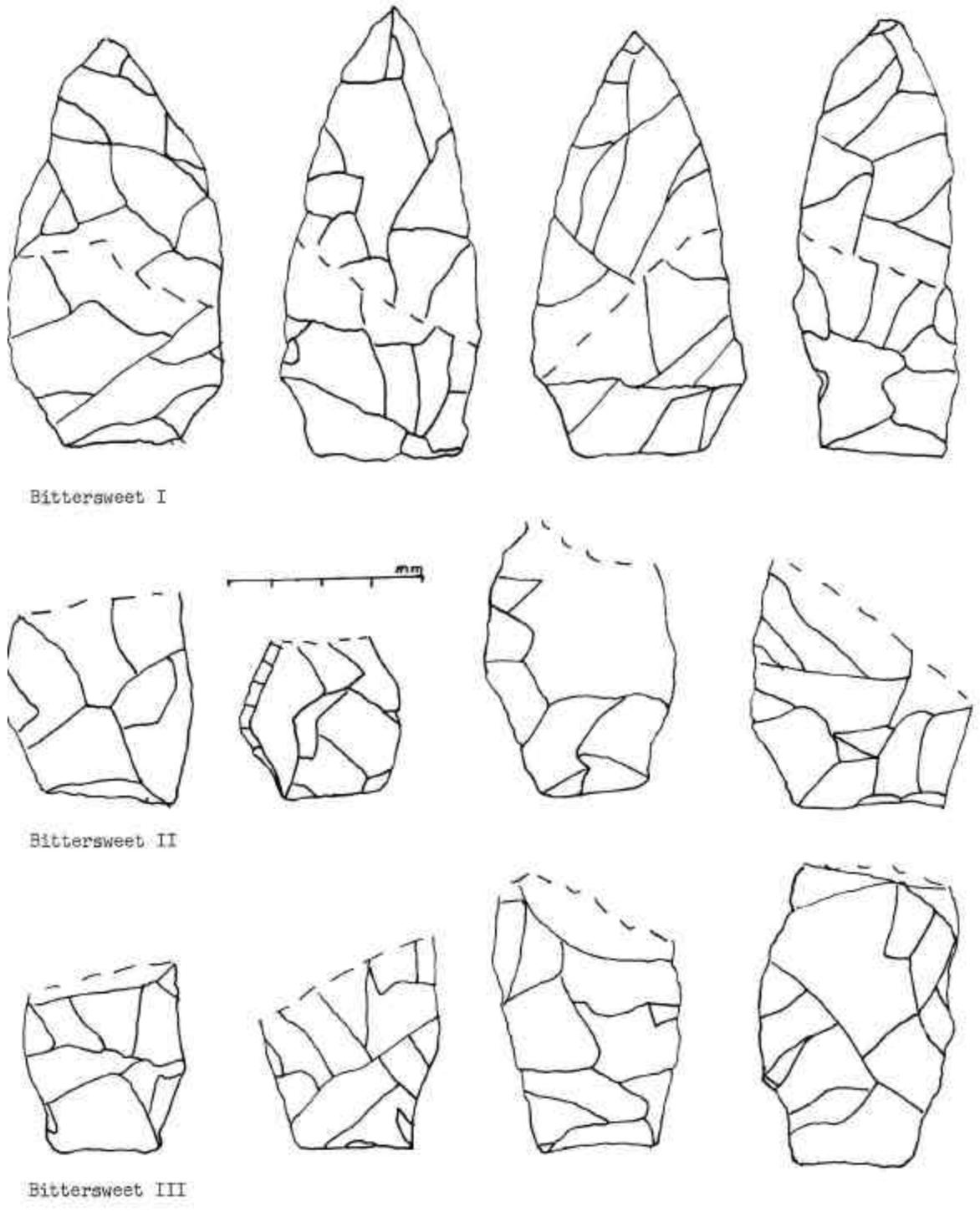
Bittersweet I yielded a larger number and variety of knives, as well as rejects in their manufacture. The finished knives and fragments exhibit 3 major designs typical of area Snook Kill and Frost Island phase sites. These forms are Corner-Removed, Lobate-Stemmed, and Asymmetrical. Other variants found were rectangular and pentagaloid. As with the point types, there appears to be no vertical uniformity to assign knife forms to either soil strata or phase diagnostics.

Corner-Removed knives Only 2 of the 17 knives which we designated as Corner-Removed are whole, though we were able to piece together 6 others that may have broken in use or manufacture. All are generally straight-based with the blade carefully chipped to form an inward, down-sloping angle from straight to slightly-excurvate edges. In all instances, 1 side is prepared to extend further up the knife than the other side. For this, we can think of no reason except perhaps to expose 1 edge further from the handle (if any) to facilitate cutting.

The Corner-Removed knives are thin, averaging 8 mm long; the complete examples average 81 mm. 15 broken samples have a mean of 33 mm at their broadest surface. 2 show slight edge wear. Either the other knives were unfinished when broken, prepared at the site for later use, or were employed very lightly. 3 additional specimens seem to be Corner-Removed varieties, but are too fragmentary to be included.

Lobate-Stemmed knives There are 15 Lobate-Stemmed knives (3 complete and 3 that fit together) and 7 others which appear to have been discarded while being manufactured. To varying degrees all those have short, broad, rounded bases that might be called stem-like. They have some suggestion of the stemmed Snook Kill point form. In most instances, the lobate-stem is slightly off center below the straight to excurvate blade and rounded tip. The complete specimens average 81 mm in length (60 mm and 116 mm at the extremes); the thickness of 15 examples is 8 mm to 13 mm (10.5 mm avg.); the breadth where they are widest (just before tapering into the stem) averages 44 mm (27 mm to 72 mm). Only 2 specimens show edge wear.

10 knives can be classed as rectangular to slightly excurvate based. The 5 complete examples of these have ovate to triangular blades with well to poorly formed tips. These average 59 mm in length. Their mean is 9.5 mm in thickness, and 37 mm in width at the base-the widest area. None exhibit use.



CORNER-REMOVED KNIVES

Figure 1

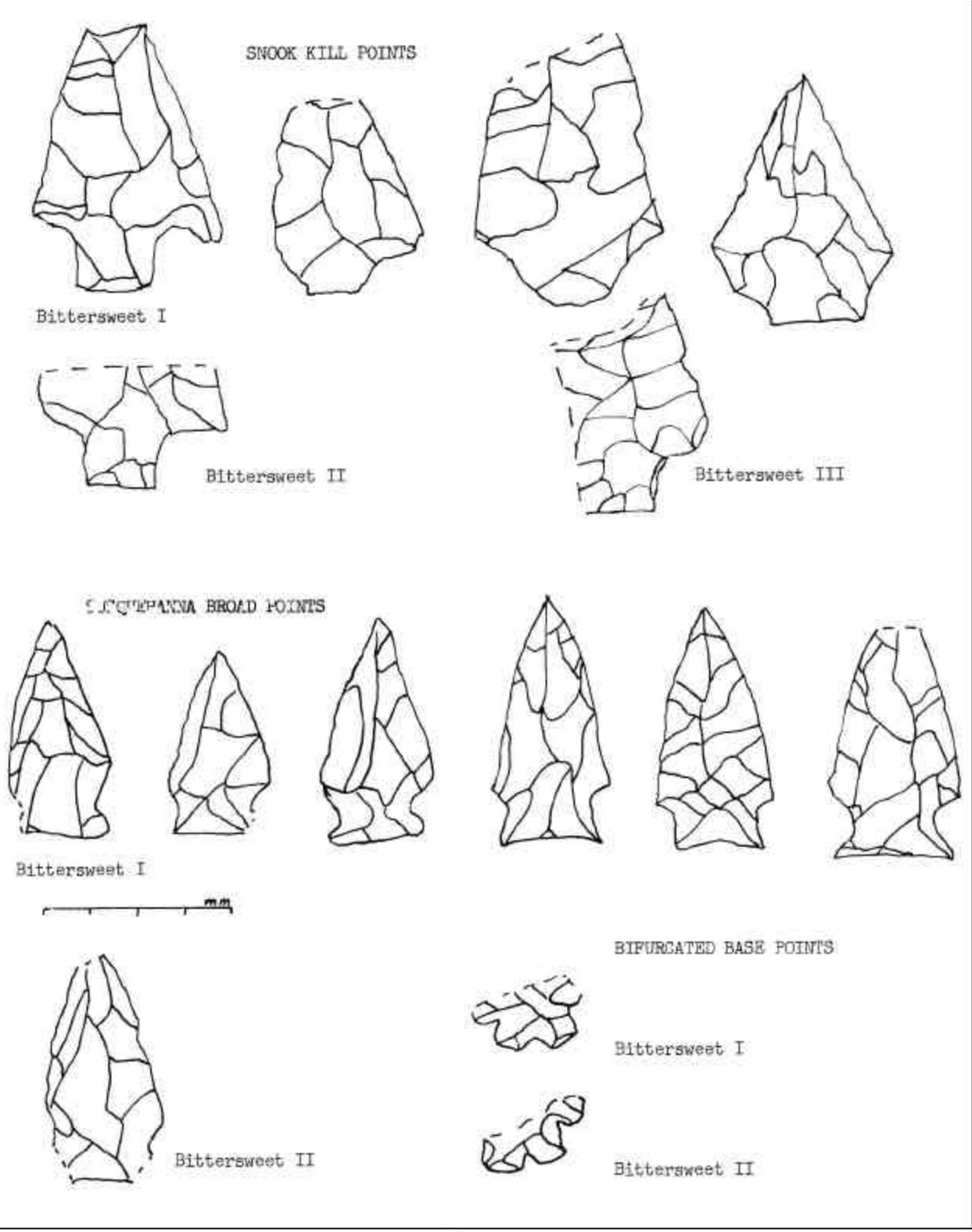


Figure 2

An unusual variety of knife is shown by 5 complete, distinctly pentagonal, examples averaging 67 mm in length, 51 mm at the widest position (almost halfway up from the base, and 14.5 mm in average thickness. None are worn.

30 midsections and tips were found throughout the occupied levels, but are too incomplete to determine what form they were part of, or in the process of becoming. Cores and knife/point preforms numbered 50. Although any of the flakes or discarded blades could have been used as flake knives, there seems to be only 1 piece that we could definitely assign to that category.

There are 23 objects which show chipping from a single side to form scraper-like tools. These are worked on only a single edge while 2 specimens are chipped along 2 convergent edges. One flake is chipped at a rounded end to form a scraper, 2 additional pieces were worked from a thin piece of flint to produce an incurvate scraping edge, as for a beamer. All of these flakes have evidence of some wear on the prepared edge or edges. All but 1 quartzite sample were made from local Normanskill flint.

In Stratum I we found a single chopper-like tool 109 mm long, 76 mm wide near its rounded battering edge, and 33 mm thick. Some wear is visible.

Other items are: 1, a possible bannerstone wing of siltstone; 2, a crescentic, Eastern Onondaga flint piece 41 mm long, 15 mm wide, and 7 mm thick; this is chipped along the entire perimeter, one side from the upper plane and the opposing side from the lower plane. 3, a trianguloid shale fragment (52 mm long, 66 mm wide, and 11 mm thick) well worn and scratched on a surface and along the incurvate end; it may have been an abrading tool. 4, a beautiful, large quartz crystal (52 mm long, 42 mm wide) evidencing some chipping or rubbing use at its apex.

22 quartzite hammerstones ranging from cobble to pebble size fill out the stone tool inventory. There were no bones, shells, postmolds, or features found. Five-cracked rocks occurred throughout, averaging nearly 4 per square. Only a few flecks of charcoal survived.

Bittersweet II

Bittersweet II is 50 yds. south of and slightly higher than Bittersweet I. The initial stratum was a dark brown sandy clay between 4 and 8 in. in thickness and profusely intermixed with shale from splinter to foot-long pieces. Stratum II (which had cultural debris only near the junction with the upper level) was a grey-brown sandy clay 1 to 4 in. in thickness. Stratum III was similar to that at Bittersweet I.

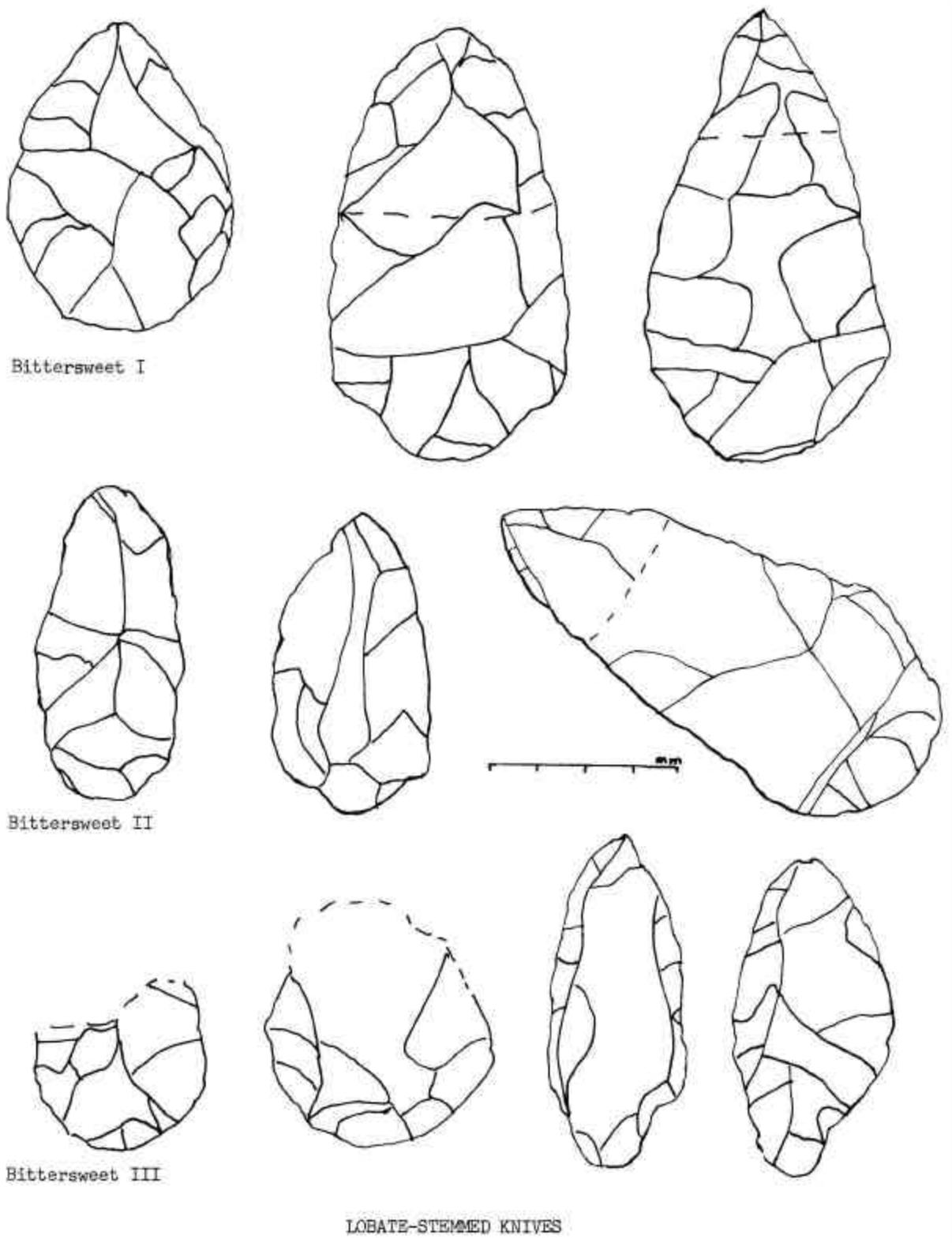
Nineteen 5 feet squares were excavated. These indicated a 10 ft. wide by 40 ft. long occupational scatter along the rim overlooking Murderers Creek. The artifacts were above, within, and below the numerous shale fragments, causing us to wonder how and why people stayed there. It certainly did not seem as if the living area could have been very comfortable.

Only 2 identifiable projectile points were typed from the 122 artifacts. These are a Snook Kill variety 6 in. into Stratum I, and a Susquehanna Broad type 4 in. deep at the junction of Strata I and II. The 8 finely worked tips collected could have belonged with either point type or to certain knife forms.

Corner-Removed All 12 examples are fragmentary. The single specimen that is complete from tip to base is 54 mm long. 11 average 36.7 mm in width. Thickness average is 8 mm. A single fragment exhibits slight use.

Lobate-Stemmed Three complete samples of this knife type measure 99 mm, 64 mm, and 57 mm in length; 44 mm, 29 mm, and 32 mm in width, 15 mm, 15 mm, and 11 mm in thickness. Two have been worn slightly along an edge.

Asymmetric 7 of the 13 asymmetric knives are whole and average 68 mm in length. Eleven samples have a mean width of 41 mm; while the entire group averages 13 mm in thickness. Four show edge wear. Aside from a single flake knife, there appears to be no other typeable knife. However, we have catalogued 49 specimens of possible knife preforms, their fragments, and rejectage. A sidescraper (69 mm long, 44 mm wide, 20 mm thick); a unique, possible sidescraper (132 mm long, 42 mm wide, 122 mm thick) showing heavy wear on one side; and a massive endscraper (99 mm long, 42 mm wide, 24 mm thick) fill out the flint artifact catalog.



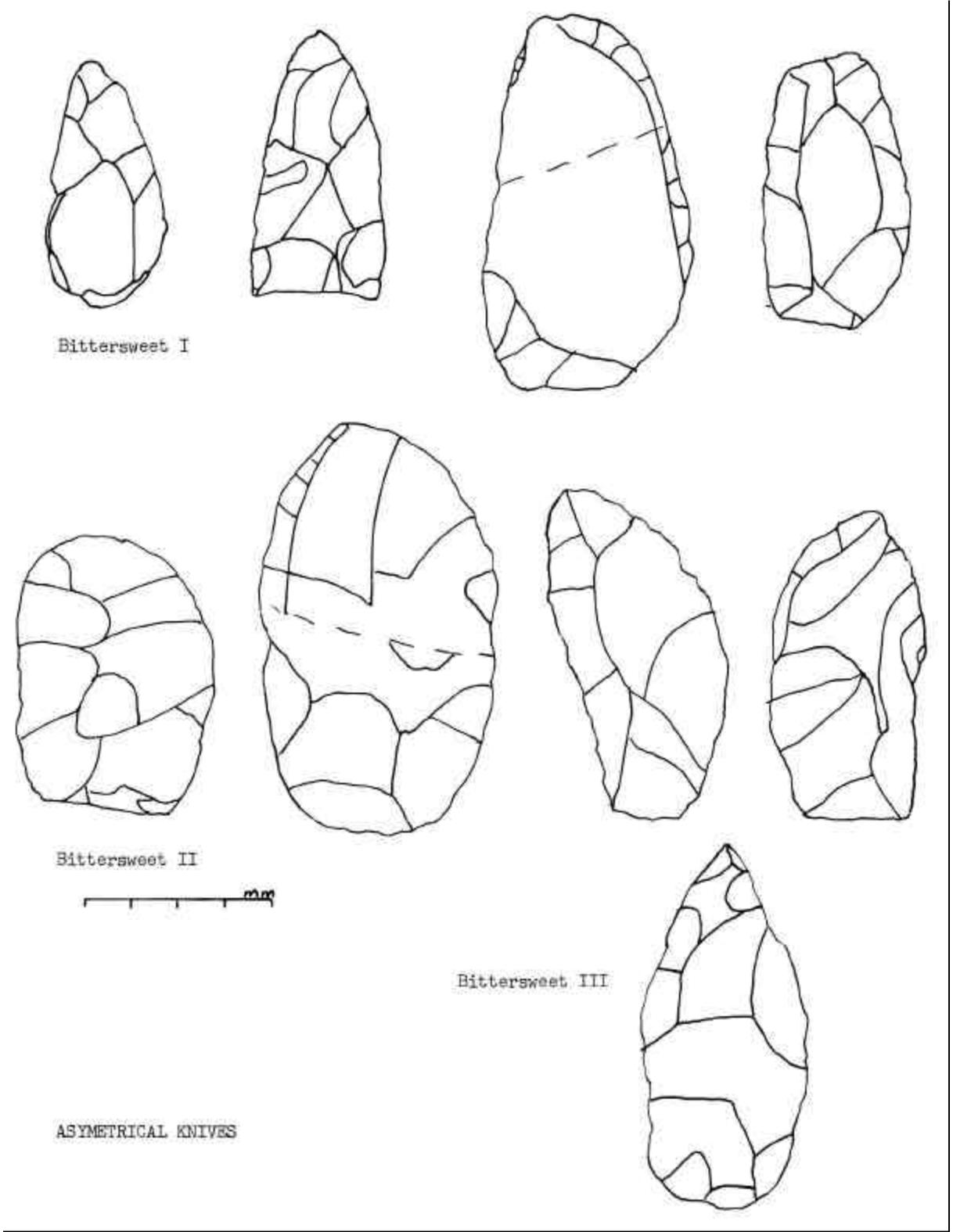
Bittersweet I

Bittersweet II

Bittersweet III

LOBATE-STEMMED KNIVES

Figure 3



Bittersweet I

Bittersweet II

Bittersweet III

ASYMETRICAL KNIVES

Figure 4

All but 3 knife fragments of Eastern Onondaga flint are of Normanskill flint from either Flint Mine Hill quarry, Scott Farm quarry, or other small nearby outcrops. The Scott Farm quarry, less than a 1/4 mi. away, contains a brilliant green variety of flint that is used today as a semiprecious gem. The Snook Kill and Frost Island phase people seemed to have had little regard for this feature since only a few green chips were excavated from the 3 sites.

An interesting non-siliceous artifact is a notched ax of coarse Normanskill grit. Although the tip is broken off, the object may have been 140 mm long, is 78 mm wide at the shoulders, 44 mm wide in the well-fashioned side notches, 75 mm wide at the base, and 20 mm thick.

As evidence that Bittersweet I was a busy workshop station, we collected 23 quartzite and 2 conglomerate hammerstones, more than 20% of the total artifact inventory.

No features, bone, or charcoal were apparent. A relatively small sample of fire-cracked rocks (less than 2 per square) were randomly scattered along the occupied area.

Bittersweet III

The third area of Snook Kill and probable Frost Island phase description was between Bittersweet I and II-somewhat closer to the first. The lack of flint found testing between the 3 sites seems to indicate that they were entirely distinct physically.

We excavated 15 five-foot squares, finding the occupation centered around a 3 1/2 to 4 feet rectanguloid fire feature that contained numerous grit and quartzite rocks. 26 of these were fire-cracked. The 48 artifacts we collected encircled the feature within a 10-12 feet radius. No charcoal, postmolds or bones were noticed.

Almost all the aboriginal debris was found in the dark brown sandy clay encountered at 8-10 in. This contained only a few scraps of flint near the overlaying level.

2 projectile points were found. 1 was a broken, fire-spalled base of a small, thin bifurcated base point. Very similar to the fragment from Bittersweet I, this is likewise of unknown provenience. The second projectile point seems to be a Snook Kill type that was broken in use or manufacture. Both points are of Normanskill flint.

The knives are similar in form to those from the first 2 sites.

Corner-Removed All 7 typed examples are broken, though 1 is complete enough to give 74 mm length measurement. 6 samples have a mean width of 37 mm, and thickness of 6 mm. All are finely fashioned. The seventh corner-removed knife had been large, perhaps 140 mm long, before the tip was broken. It remains 56 mm wide and 20 mm thick. An edge shows wear.

Lobate-Stemmed Three of the 5 samples of lobate-stemmed knives are whole and average 72 mm in length. Their mean width is 37 mm, with a thickness of 11 mm. None seem to be worn. *Asymmetric* The lone asymmetric knife is 74 mm long, 34 mm wide, and 14 mm thick. Some cutting wear is noticeable.

4 knife pieces and 17 preforms are present, as well as a crude endscraper, and a large sidescraper (61 mm long, 48 mm wide, and 8 mm thick).

All above artifacts are of local Normanskill flint. A single orange jasper flake was collected, but its source is unknown. Two notable artifacts are quartz crystals that show some wear. The first is small (21 mm long) and milky in color. The second is slight battered, but still retains evidence of wear at both ends. It is 50 mm by 40 mm in size. 6 quartzite hammerstones were also found.

Conclusions

The Bittersweet I, II, and III sites have points and knife forms that are related to both the Snook Kill and the Frost Island Phase. In New York these are considered diagnostics of the Susquehanna Tradition that connects the Late Archaic and Transitional Stages. Characteristic Snook Kill and Susquehanna Broad points were found at the first 2 components. A Susquehanna Broad point was not found to match the single Snook Kill at Bittersweet III. Three knife forms, corner-notched, lobate-stemmed and Asymmetric, appeared at all 3 stations. These knives are unique to the Susquehanna Tradition.

As of this writing, Dr. Robert E. Funk (Archeologist of New York State) is initiating his fifth season of excavations in the Upper Susquehanna Valley near Oneonta. In recent publication

(Funk, 1974), he supports Ritchie's proposal that the Frost Island Phase followed the Snook Kill. Ritchie's date at the type Snook Kill Site in the Upper Hudson Valley near Ft. Edward sets this phase at 1470 BC. Funk at Kuhr #1 had a radiocarbon date of 1670 BC for a Snook Kill manifestation. (These and the following dates are uncalibrated).

The Frost Island Phase was dated at 1250 BC at the O'Neill Site along the Seneca River in Cayuga County, New York (Ritchie & Funk, 1975). At Kuhr #1, Funk has published dates associated with Susquehanna Broad points at 1550 BC, 1595 BC, and 1535 BC. Culturally related sites -Camelot #1, Fortin #1, Camelot #2-yielded respective dates of 1475 BC, 1330 BC, and 1290 BC.

Stratigraphic evidence that Frost Island followed Snook Kill has been minimal. The lone exception is at Camelot #1, locus 2, where Snook Kill occurred metrically below Frost Island material. However, the radiocarbon dates with related plus or minus brackets that have been assembled are so close and overlapping that many more dates must be taken before the sequence can be more certain. At present there appears to be little chronological and stratigraphic evidence that the Snook Kill point did precede the Susquehanna Broad point in time.

Funk (1974) has written that Snook Kill projectile points may have evolved from Genesee points of the Battenkill Phase and that Susquehanna Broad forms rose from Perkiomen types and later may have evolved to Orient fishtail points. Seriographic study of these dual transformations seem to be true. However, the seemingly logical tendency to place the Snook Kill and Susquehanna Broad forms in some evolutionary relationship in physical outline and manufacturing techniques does not appear as demonstrable. The rather briskly chipped, cruder Snook Kill stemmed points are not very similar to the finely chipped, more delicate Susquehanna Broad side-notched points. The well-smoothed bases and notches of the Susquehanna Broad points are in direct contrast to the unground bases, stems, and undershoulders of the Snook Kill.

A further contrast in cultural diagnostics is the presence of soapstone and Vinette I ceramic vessels of the Frost Island Phase and their absence in the Snook Kill assemblages. In addition, study by Ritchie and Funk (1973) suggests that soapstone pots did not appear in New York until the later part of the Frost Island Phase, and were gradually replaced by Vinette I ceramics that were carried into the Orient Fishtail Phase along with soapstone vessels.

Diagnostic knife types that appear in both Snook Kill Phase and Frost Island Phase are the corner-removed, lobate-stemmed, and asymmetric. In this instance, there is again some suggestion of change from the postulated earlier to later site artifacts. The Snook Kill level of occupation at the Cedar Terrace Site (Weinman and Weinman, nd) less than half a mile from the Bittersweet sites, and at the type Snook Kill site near Ft. Edward, exhibit no evidence of corner-removed knives, whereas lobate-stemmed and asymmetric knives are present. At the suspected younger end of the proposed sequence, Frost Island assemblages at O'Neill, Camelot #1-#2, and Fortin #1, there are no Lobate-Stemmed knives. Corner-removed and asymmetric knives are both in evidence at these sites. From this small sample, we discern a possible change in knife style attributes in which the lobate-stemmed is present at certain Snook Kill sites, but not at certain Frost Island sites. The reverse appears the case with the Corner-Removed knives.. Although this may be shown to hold true with additional excavations, we cannot suggest at present that one form is older than the other. When, or if, a clearer chronology is established, these knife forms may be shown as diagnostics for either phase or suggest their time relationship within a phase.

Less than a 4 mi. north of the Bittersweet sites, are the excavations at Dead Sheep I and II sites (Weinman and Weinman, 1969, 1973). We stated that these seemed to be separate components of distinct Snook Kill and Frost Island complexes that overlapped slightly in occupied area. However, after excavation of Bittersweet I, II and III sites, which have evidence of both phases, we are faced with possible alternatives of what group occupied each station, and why and when.

The proximity of flint outcrops, a great number of flint cores, debris, discarded or broken tools, and a total of 73 hammerstones would definitely place the 5 stations in the category of flint workshop areas. Almost 20% of the artifacts assembled are hammerstones. Only about 10% are points, and many of these may have been broken in manufacture. Certainly some hunting was carried on at the time of occupancy, but the paucity of points, fire features, charcoal,

and limited evidence of knife use, give little support for the assumption that these stations were utilized primarily for habitation. The absence of soapstone and pottery hint that these people: (1) had not acquired these traits yet or, (2) did not carry the vessels the several miles from the Hudson River or, (3) had little need for pots at a workshop or, (4) were very careful not to break their vessels.

A millingstone from Dead Sheep II might indicate fall nutgrinding activity, but no other tools or food remains survived to give support to speculation on when the sites were occupied.

The excavations of these 5 Susquehanna sites near the Scott Farm flint quarry lead us to propose these possibilities concerning the Snook Kill and Frost Island phases:

1. They were basically small, inland flint workshops
2. As such, they were probably not occupied in the winter
3. The areas were revisited by the same groups, or different groups sharing 2 distinct artifact types
4. Or the brief stays were made at separate times
5. Or the sites were shared by separate Snook Kill and Frost Island Phase groups at the same time with some different and some similar points and tools.

Pennsylvania archaeology in respect to these questions has not been considered by the present authors because we do not feel sufficiently informed on recent work. Obviously, since the roots of the Susquehanna Tradition lie in Pennsylvania, much of the data relative to its emergence and development will be found there. Funk's continuing work in the Upper Susquehanna Valley, along with information compiled by Pennsylvania archeologists (and excavations in periphery regions such as the Hudson Valley and Genesee Valley) will lead to conclusions as to the when, how, and why of the Susquehanna Tradition.

References

- Ritchie, William A.
 1958 *An Introduction to Hudson Valley Prehistory*. N. Y. State Mus. Sci. Serv. Bull. 367.
 1971 *A Typology and Nomenclature for New York Projectile Points*. N. Y. State Mus. Sci. Serv. Bull. 384.
- Ritchie, William A., and Funk, R. E.
 1973 *Aboriginal Settlement Patterns in the Northeast*. N. Y. State Mus. Sci. Serv. Mem. 20.
- Funk, Robert E.
 1976 *Recent Contributions to Hudson Valley Prehistory*. N.Y. State Mus. Sci. Serv. Mem. 22.
- Funk, Robert E., and Rippeteau, B. E. and Houck, R. M.
 1974 Recent Research in the Upper Susquehanna Valley, New York State. *Penn. Arch.* 43:1-31.
- Weinman, Paul L., and Weinman, T. P.
 1969 A Snook Kill Workshop. *Penn. Arch.* 39:23-28.
 1973 The Dead Sheep II Site. *N. Y. State Arch. Assoc. Bull.* 58:22-23.
 ms. The Cedar Terrace Site. *subm. N. Y. State Arch. Assoc. Bull.*

ARROWHEAD CASINO:
A MIDDLE TO LATE ARCHAIC SITE AT SARATOGA LAKE, N.Y.

James P. Walsh

Auringer-Seelye Chapter

Introduction

The Arrowhead Casino Site is a stratified, multi-component station located at Saratoga Lake New York, in the county and township of Saratoga. U. S. G. S. Quaker Sprints Quadrangle, N 43°2'30" - W 73°44'40". The site is situated on the southeastern edge of a large glacial kame terrace, at the junction of Kayaderosseras Creek and Saratoga Lake. Perched on the top edge of the steep-sided terrace on the 250' contour line, some 60 feet above the present lake level, it affords an imposing view of the lake.

The site was discovered in the fall of 1971 with the aid of Mr. Alfred J. Farone, Jr., the owner of the property on which the site is located. When the area was then tested by the writer, material was found occurring within a half acre area, the greatest concentration being near the edge of the terrace. Excavation began in April of 1972, with 90 five-foot squares excavated to a depth of 36 inches to date (1976).

The site takes its name from the Arrowhead Inn, a famous night club and gaming establishment of a bygone era that stood near the site until it was destroyed by fire in 1969. Mr. Farone's help and permission to excavate is gratefully acknowledged.



Map 1. The Arrowhead Casino site, Saratoga Lake, New York.

Many persons helped during the four years of excavating, and I am greatly indebted to three members of Auringer-Seelye Chapter for their diligent efforts: Jill McMahon for her tireless excavating, Beverly Roach for her excellent cataloging, and Richard F. LaBrake for his valuable assistance in the lithic identification.

Stratigraphy

The physical profile was divided into three zones, differentiated primarily by color and texture of soil.

The A zone consisted of a dark brown, sandy loam mixed with decaying vegetal matter, and ranging in thickness from 2 to 9 in.

The B zone was composed of a lighter brown sand, from 10 to 15 in. in thickness, and contained large amounts of fire-cracked stone and flint debitage. This was the major zone of artifact occurrence.

The C zone was composed of a yellow, compact, finely sorted, glacially deposited sand.

Soil tests at various locations on the grid gave an average reading of pH 5.5 - 6.0. This slightly acid condition, coupled with the time element, readily accounts for the almost total absence of bone in the sample. From the 90 squares excavated, 57 small fragments were recovered; the only identifiable specimen being a deer phalangeal. The rest were from thick bones, most likely that of deer.

Although cultural stratigraphy was not observable in the physical profile, it has been amply demonstrated metrically (see Table 1). The vertical distribution of traits fits well within prior conceptions of the Archaic sequence for the Upper Hudson Valley (Funk 1965a, Ritchie 1965).

Features

Sixteen features were excavated at the site, all probable hearths (see Map 1). The features occurred at depths of from 12 to 19 in. , and for the most part were lenses of stained and fire-reddened soil, roughly oval in outline, basin shaped, and containing cracked stone, charcoal granules, and an occasional calcined bone fragment. The features varied in horizontal dimensions from 18 to 60 in. , and in depth at center from 2 to 16 in.

Features 1-3 each contained the additional aspect of a laid-up pile of stones, possibly roasting platforms (Ritchie, 1965:125). An Otter Creek point (Ritchie, 1961) was found at a depth of 17in. in Feature 1. The tip evidenced modification as a scraper (Plate 2, fig. 7). Two mullers were found in Feature 10, the smaller of the two on top, with the grinding surfaces together.

Charcoal was not present in sufficient quantity for dating in any of the features.

Artifacts

A total of 474 items was collected on the site; 431 of flaked silicates, 32 "rough" stone artifacts, 10 slate artifacts and 1 copper artifact. The artifacts include: 4 pestles; 15 hammerstones (7 pitted); 3 mullers; 2 adz blades; 2 ulo fragments; 2 gouges; 3 bannerstone fragments; 1 copper awl; 11 knives; 55 scrapers; 5 drills; 36 preforms, 47 tips, 14 blade fragments and 10 untyped projectile points. Typed projectile points include: 19 Lamoka, 3 bifurcated base, 21 Orient Fishtail, 131 Normanskill, 10 Vosburg, 40 stemmed Bare Island (?), 8 Otter Creek, 14 Beekman Triangle, and 17 Brewerton (Ritchie 1961).

Lithic s

Of the various silicates utilized by the aboriginal transients at Arrowhead Casino, the most popular by far was the flint of the Normanskill (Coxsackie) formation. Out of the sample of 431 flaked artifacts, 350 are of Normanskill or Deepkill flint. Other materials used were: Eastern Onondaga flint 45; Fort Ann flint 12; Helderberg flint 5; quartzite 13; jasper 1; and 5 of unknown origin.

A large sample of flint debitage was collected (approx. 80 lbs.). An estimated 95% of this flint wastage was assignable to the Normanskill and Deepkill flints.

The "rough" stone tools were composed of quartzite cobbles, sandstone, siltstone, schist and graywacke. Steatite was present in the form of 7 sherds (Plate 4, fig. 3, 4, 6, 7) as was slate, both gray-green and red, the red doubtless originating in the Indian River formation.

Tool Clusters

During the course of the 1975 excavation, two patterns of tool density began to emerge (see map 1). In one, a high percentage of knives and projectile point tips, and in the other, a marked density of scrapers. In the spring of 1976, 35 new squares (not shown on the map) were excavated to the south and west of these areas to see if the pattern continued. This speculation proved correct, and what appear to be two well defined work activity areas have been isolated. The first area (knives and tips) is interpreted as a butchering area, and is stratigraphically assignable to the River phase occupation (Ritchie 1965). Within the area in question, a sample of

TABLE 1. Vertical Distribution of Projectile Points.

	QUINCY H. FINCHES	BALE ISLAND	BERMAN TRG	BIFURCATED BAR	EBENEZER EGGS/TRI	BERNEKON S/W	LADOKA	NORMANSKILL	DEEPT FISHKILL	OTTES CREEK	VOSBURG
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
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30											
TOTALS	13	10	3	7	13	18	89	15	7	16	

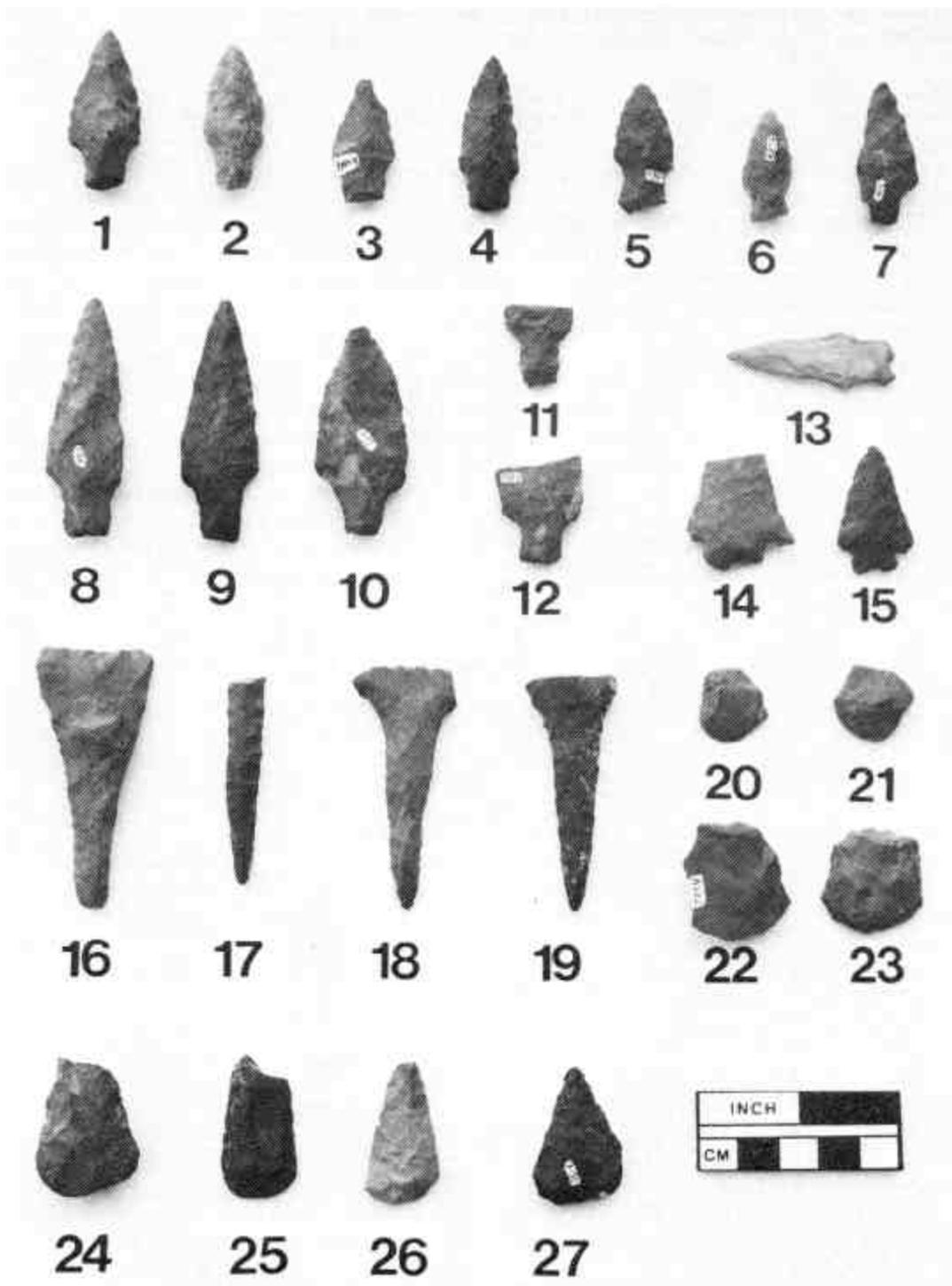


PLATE 1: 1-7, Lamoka points; 8-12, stemmed points; 13-15, bifurcated base points; 16-19, drills; 20-27, scrapers. Materials: 1, 3-5, 7-12, 14-19, 22, 24, Normanskill or Deepkill flint; 2, 6, quartzite; 13, arkose; 20, 21, 23, 26, Eastern Onondaga flint; 25, 27, Fort Ann flint.

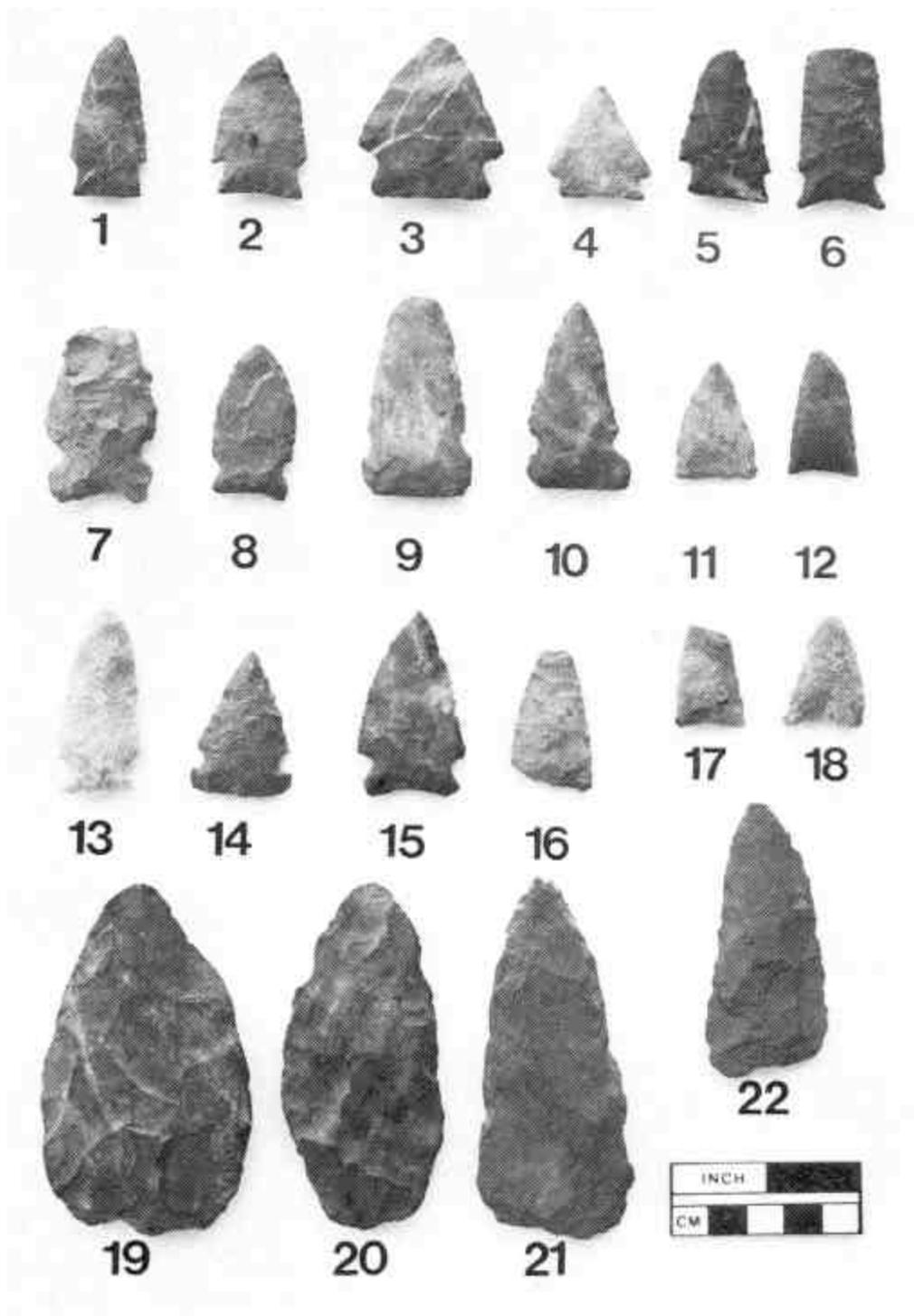


PLATE 2: 1-6, Vosburg points; 7-10, Otter Creek points; 11, 12, Brewerton Eared Triangle points; 13-15, Brewerton Side-Notched points; 16-18, Beekman Triangle points; 19-22, knives. Materials: 1, 3-6, 8-12, 15, 19, 20, Normanskill or Deepkill flint; 2, 7, 14, 16-18, Eastern Onondaga flint; 21, 22, red slate.

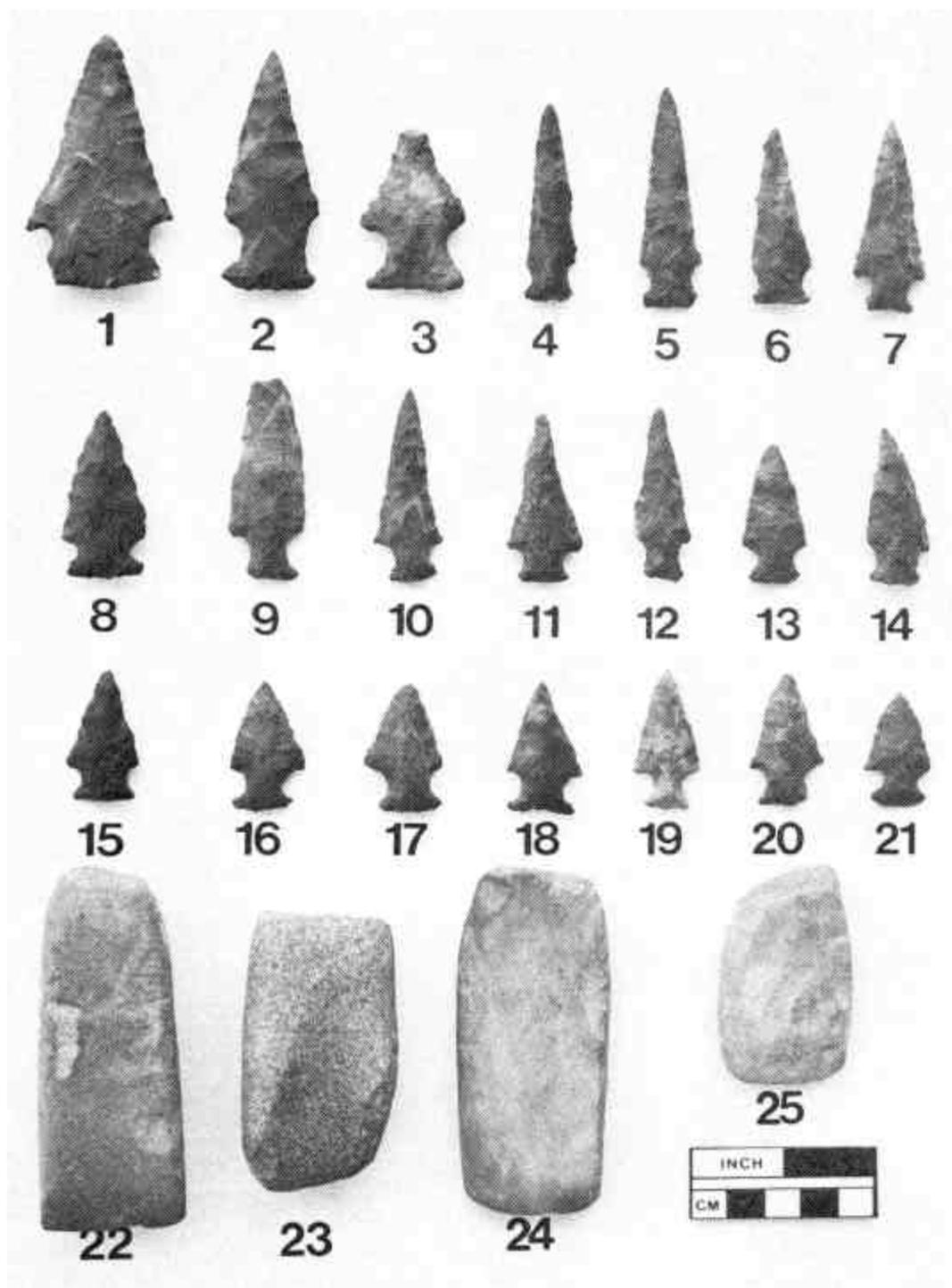


PLATE 3: 1-21, Normanskill points; 22, 23, gouges; 24, 25, adz blades. Materials: 1-21, Normanskill or Deepkill flint; 22, sandstone; 23, chlorite schist; 24, 25, gray-green slate.

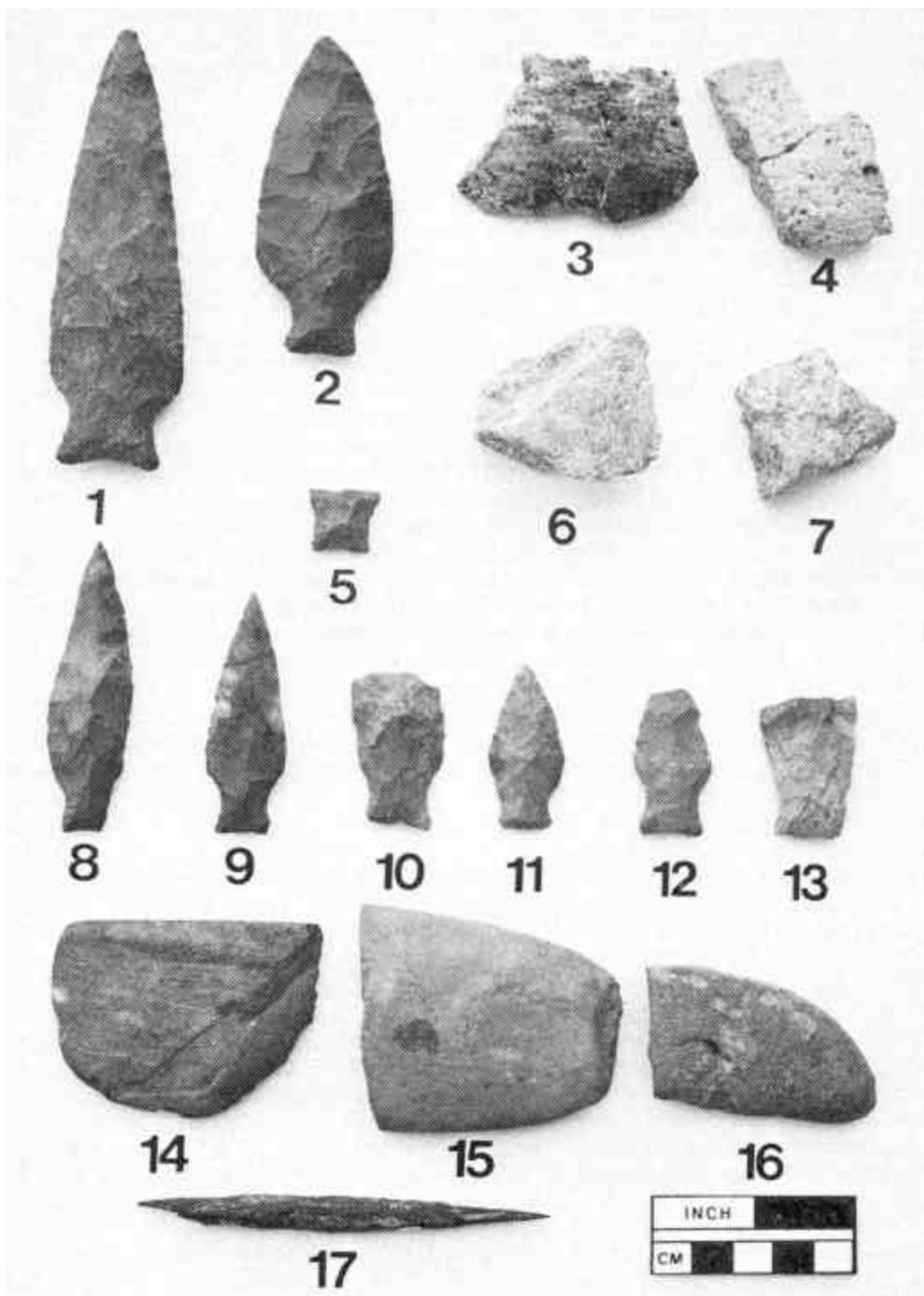


PLATE 4: 1, 2, 5, 8-13, Orient Fishtail points; 3, 4, 6, 7, steatite bowl shards; 14, ulo fragment, 15, 16, bannerstone fragments; 17, bi-pointed awl. Materials: 1, Oriskany(?) flint; 2, yellow jasper; 3, 4, 6, 7, amphibole talc; 5, 8, 11, 13, Eastern Onondaga flint; 9, 10, 12, Normanskill or Deepkill flint; 14, slate; 15, 16, sandstone, 17, copper.

41 knives and tips was collected. Of that sample, 33 items were between 11 and 16 in. from the surface, well within the vertical position of River phase traits (see Table 1).

The second area (scrapers) is thought to be a hide-working area. A sample of 29 scrapers, many exhibiting polish on the working edge, was collected within this area. A scarcity of other artifact forms was noted. The depth range on the sample was from 4 to 10 in., perhaps demonstrating late River or Orient phase affinities.

Discussion

Evidence points to the Arrowhead Casino site as being a seasonally occupied hunting station, with intermittent occupations dating roughly within the time span of 3,000-1,000 B. C. A fall occupation is indicated by the pestles and mullers found, suggesting the collection of nuts and other seeds. Hunting was no doubt the main activity; out of 474 artifacts collected, 433 relate to hunting, being projectile points, scrapers, and knives.

Although Saratoga Lake has long been noted for its excellent fishing, there was a total lack of fishing gear of any sort from the site. This absence is not so surprising, however, as there are many locations nearby more ideally situated for that enterprise.

The earliest cultural manifestation on the site was the Laurentian, indicated by such point types as Otter Creek, Vosburg, Brewerton, and Beekman Triangle (Ritchie 1961). Classic Laurentian traits such as the 2 ulo fragments, 3 bannerstone fragments, 1 slate adz blade, 2 gouges, and the copper awl were found between 17 and 27 inches from the surface.

The River phase people utilized the site to the greatest extent, to judge from the number and position of traits found (131 Normanskill points, 4 pestles, pitted hammerstones, etc.). In discussing trait variations among the River phase assemblages from the Bent, River, Pickle Hill and Fred Young sites, Weinman and Weinman have stated that: "Distances between sites are not so great that the traits would be so drastically affected by regional variation. Except for the 70 miles between Fred Young and Pickle Hill, no site is more than 45 miles from any of the others. Bent and River are only 16 miles apart. Temporal differences, previously considered, or perhaps seasonal economic requirements, may be alternative explanations" (Weinman and Weinman 1968:5-6). The River phase occupation at the Arrowhead Casino site fills the hiatus between the Fred Young and Pickle Hill sites. The evidence at hand strongly suggests seasonal requirements as the answer to trait percentage variation among these stations.

With the coming of the Orient phase people, a slight shift in on-site settlement is seen. The earlier culture traits tended to be concentrated about Features 1-11 and 16, while the Orient phase traits were found in the Feature 12-15 area (see Map).

Ritchie has stated that: ". . . it is possible that already by c. 974 B.C. the supply of large game on Long Island was running low, and the inexhaustible reserves of shellfish were largely depended upon for maintaining a population of no great size" (Ritchie 1965:165). If that was the case, perhaps similar conditions existed in the lower Hudson Valley at that time. It would then be logical to assume that groups of Orient phase hunters ventured into the upper Hudson and its tributaries in search of large mammals for skins. A clamshell tuxedo would be rather uncomfortable winter garb. I would further speculate that little meat was prepared for transport, the space in the canoes being used for the valuable cargo of skins. The proposed hide-working area (see Map 1) would seem to lend weight to this hypothesis.

References

Byers, Douglas S.

1959 "The Eastern Archaic: Some Problems and Hypotheses. " *American Antiquity*, Vol. 24, No. 3, pp. 233-56. Sait Lake City.

Funk, Robert E.

1965a "The Archaic of the Hudson Valley: New Evidence and New Interpretations. " *Pennsylvania Archaeologist*, Vol. 35, Nos. 3-4, pp. 139-160. Milton.

- 1965b "The Sylvan Lake Rock Shelter (Clo 2) and Its Contribution to Knowledge of the Archaic Stage in Eastern New York: A Brief Report." *The Bulletin*, New York State Archeological Association, No. 33. Ossining.
- Ritchie, William A.
- 1958 "An Introduction to Hudson Valley Prehistory." New York State Museum and Science Service, Bulletin No. 367. Albany.
- 1961 "A Typology and Nomenclature For New York Projectile Points." New York State Museum and Science Service, Bulletin No. 384. Albany.
- 1965 "The Archaeology of New York State." Natural History Press, Garden City, New York.
- Ritchie, William A., and Robert E. Funk
- 1973 "Aboriginal Settlement Patterns in the Northeast." New York State Museum and Science Service, Memoir 20. Albany.
- Weinman, Paul L., Thomas P. Weinman and Robert E. Funk
- 1967 "The Pickle Hill Site, Warren County, New York." *The Bulletin*, New York State Archeological Association, No. 36. Rochester.
- Weinman, Paul L., and Thomas P. Weinman
- 1968 "The Fred Young Site - A River Phase Component." *The Bulletin*, New York State Archeological Association, No. 43. Rochester.
- Wray, Charles F.
- 1948 "Varieties and Sources of Flint Found in New York State." *Pennsylvania Archaeologist*, Vol. 18, Nos. 1-2, pp. 25-45. Milton.

A FISHERMAN'S VIEW

Robert Davison

Inc. Long Island Chapter

Less than 55 miles from the heart of New York City in an easterly direction, lies the Nissequoque River, an unspoiled waterway emptying into Long Island Sound. Flowing cool and clear in a northerly direction, the Nissequoque originates from tributary streams spring fed from a central Long Island source. This primitive area, once a private hunting and fishing preserve known as the Wyandanch Club is now a New York State Park under the jurisdiction of the Long Island State Park Commission. A natural habitat, the streams are stocked each year with rainbow, brook and brown trout. In addition, the mouth of the Nissequoque offers some of the finest saltwater fishing along the Eastern seaboard.

Of significance to the archeologist, is the fact that this is an area where a large body of fresh water meets salt. Indeed, this land was once the domain of the Nassaquake Indians, one of the thirteen tribes of "Paumanok" (Long Island), (Bailey 1959:7). The term "Nassaquake" applied to the tribe of Indians as well as the land that they occupied and this term translates to mean "the clay or muddy country" (Langhans 1961:18). This name is also locally spelled Nissequoque or Nesaquake. Bounded on the west by Kings Park and on the east by Rassapeaque Point, this tract provided a varied environment of mixed hardwoods, open meadows and salt marsh.

It is a land that must have been prized by its inhabitants. Fresh water springs abound, wild berries and forest cover lured game to the area and the tidal inlet provided a variety of seafood. There was an abundance of hard and soft shell clams, oyster, scallop, mussel, crab, striped bass, bluefish, flounder, weakfish, mackerel, eel, and cod in addition to a myriad of others. Whatever the season, some species were available every day of every month. Shell middens along the shore attest to the Amerinds dependence on a seafood diet the year around (Skinner 1932:9).

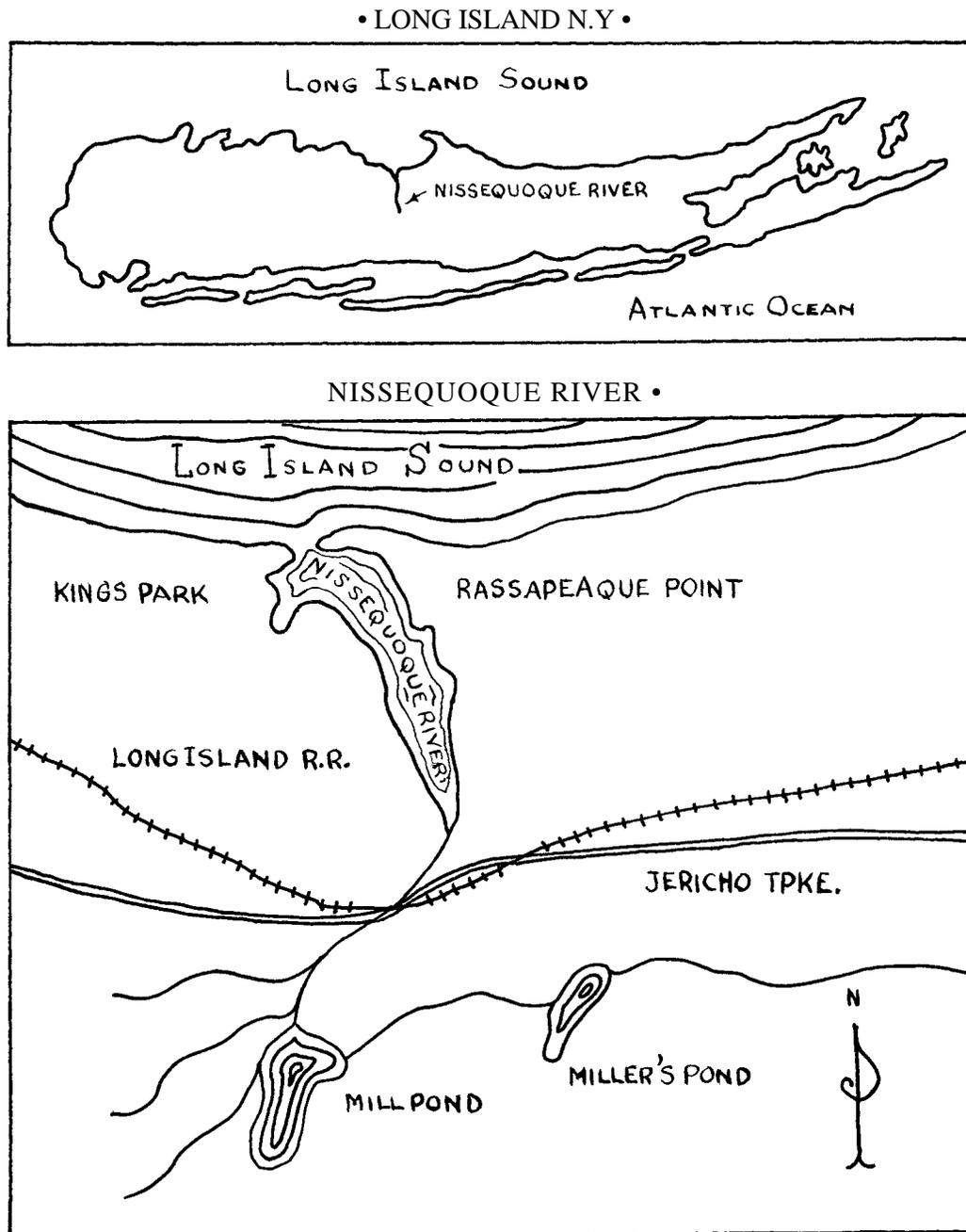


Figure 1. Nissequoque River area

I have often speculated how our modern day sports fisherman might have compared to say Oaklu, a member of this same Nassaquaque tribe in his day and age? An initial impression, strengthened by a fisherman's ego, is that Oaklu would be no match for us.

After all, we possess the distinct advantage of having the finest surfing tackle that modern technology can devise. As the result of millions invested in research and development, the varied output would have staggered Oaklu: spinning reels, fiberglass surfing rods, forged fishhooks, monofilament line, frozen bait, an endless selection of artificial lures, and fishing accessories galore. How could the Amerinds match this gear?

As the men at the end of the pole, we have the advantage of modern communication at our finger tips. We can dial weather, specialized fishing magazines enable us to study various techniques gleaned from experts, accurate tide tables are available, the latest fishing column from our local paper spell out the "hot spots". Can a savage's fishing instincts challenge these assets?

We could crown ourselves champs and end it here, but that would be rather smug and self indulgent. Some gnawing doubts might cause us to question whether we have really given Oaklu his day in court. Obviously not, since neither he nor an ancestor can be here to give testimony.

What then is left as admissible evidence? Pondering this for a while our resulting course of action should be to review recorded Amerind fishing history on Long Island and determine what, if any evidence exists to support a claim for Oaklu "Super Fisherman".

From artifacts unearthed by archeologists along the eastern shores we can assume that the earliest implement Oaklu's forebearers used for catching fish was the gorge. The gorge was merely a splinter of bone, sharpened to a point at both ends with an indentation in the middle to which a line was attached. When the gorge, tipped with bait was lowered into the water, it was gulped down lengthwise by a fish. A sharp jerk of the line would pull the gorge crosswise so that it would catch in the fish's gullet (Lewis 1971:66). This method of fishing was at best primitive and only moderately effective.

Many years later a native fisherman created the true "J" hook and still later the barb was added. The fish hook dates far back into antiquity. A stone age fishhook made from bone as long ago as 5,000 years was found in the Skipshelleren Cave, Straume, Nordhordland, in Norway, source of the largest prehistoric collection (Taylor 1975:25). Significantly, our modern day fishhooks are merely refinements of this basic design. The greatest boon to Amerind fishing had to be the advent of metal hooks as a result of trading with the colonists.

Hook and line angling with simple and compound hooks, as well as spearing with barbed harpoons either fixed or detachable are also attested to by archeological and historical data (Ritchie, Indian History of New York State, Part III:16).

The majority of Amerind fishhooks were fashioned of animal bone and others of shell (Brennan 1974:192). A rare exception was the copper hooks of the Wisconsin Indians (Miles 1963:39).

Typical examples of the bone gorge, bone fishhook, composite bone fishhook, and antler harpoon are shown in Figure 2 Fishing Artifacts-Eastern Coastal Area.

The earliest archeological records indicate that hunting, gathering and shellfish collecting appear to have been constant and the primary means of livelihood. The remains of fewer shellfish and the occurrence of numerous projectile points suggests that hunting was paramount to these pre-pottery people. Fishing implements of bone or antler were a rare occurrence. Sites of a later time period indicated fewer projectile points, and an abundance of shellfish plus the existence of bone and antler fishing implements. It becomes evident that it must have taken Oaklu's people a considerable period of time before they learned to exploit to the fullest, the limitless supply of food from the sea.

Typical Long Island archeological sites consist of thin deposits of refuse composed of marine shells, mixed with stained earth, charcoal, animal bones and artifacts. The refuse rarely exceeds 6 in. in thickness and usually covers less than an acre. Bowl-shaped pits filled with refuse are scattered over the sites. Most of the pits are approximately 3 ft. in diameter and 4 ft. deep (Smith 1950:101).

In his round, as the man behind the pole, Oaklu has the insurmountable advantage of the hunger motivation as a factor despite our advantages in modern tackle and up to date communications. Oaklu fished not for sport nor desire but because he must. His survival and that of his family and tribe depended upon it. As a child, he trained by catching fish with his bare hands. Try this method yourself sometime on a school of spearing in shallow water. You will end up at the bait shop in short order. Fishing insight was a trait of Indian heredity inbred through generations. Elders passed down the knowledge of what tides to fish, the effect of wind and current, water depth, sunlight and shadow factors, the location of school fish in relation to bait fish and a general feel for all the environmental variables. For example, the effect of a shifting bar at a favorite fishing spot might be an initial puzzlement to our sport fisherman, but Oaklu could with keen insight prejudge with accuracy the most advantageous way to fish this changed environ-

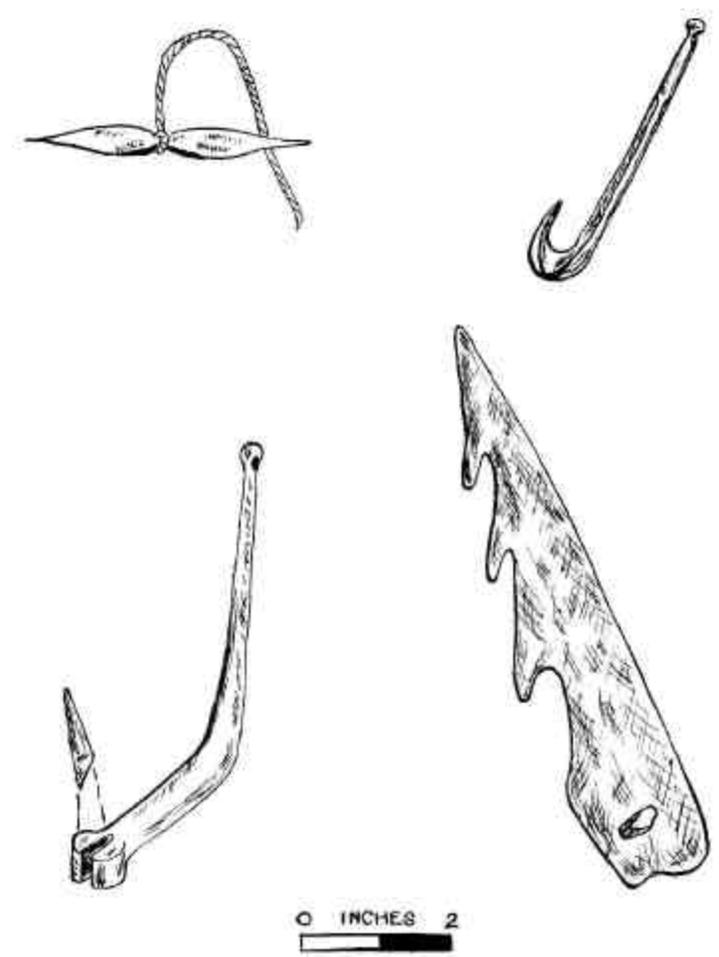


Figure 2. Fishing Artifacts - Eastern Coastal Area. 1) Bone Gorge; 2) Bone Fishhook; 3) Composite Bone Fishhook; 4) Antler Harpoon.

ment. Oaklu and his people retained a feeling of respect for the ecological balance which our generation is just beginning to recognize and reconcile.

Although we might fish numerous times a year, our competitor fished most days of his lifetime. His study of environmental changes were perpetual, while ours is only a fleeting thing. I am sure Oaklu would be alternately delighted and shocked at some of today's fishing innovations; delighted at some technical developments and shocked at the tremendous waste and pollution. He certainly wouldn't need news columns or fishing calendars to know when the spring flounder were due. How then did Oaklu know? He had his own indices, handed down to him through the ages, such as the position of the big dipper for each fishing phase, skunk cabbage buds greening in the bog, and numerous other indicators. Each natural happening is environmentally interrelated and the forecaster of a coming event. In our daily lives, we have either never been exposed to these natural happenings, nor are oblivious to them.

Convenience items have made us basically lazy which some prefer to call "being practical". We fail to ask the question-are these items really better, and by what and by whose criteria? We grab for it, because it saves us time, but a full evaluation is sometimes later than we think, i. e. DDT. We might show Oaklu our modern day night crawler "Electrical

Shocker" which drives those tender bait morsels out of the ground for easy pick-up and nary a shovel touched. Now it is Oaklu's turn, and he may show us the same trick, learned from his elders: a water slurry of ground up green walnuts, hulls and all poured over the ground. Surprisingly, same results as our sophisticated "Electrical Shocker". The crawlers will surface almost immediately as the liquid mildly burns their sensitive skin as it reaches their depth in the soil. Rinsed in clear water to remove all residue of the walnut wash, and the crawlers are ready for the hook. Now just which culture has advanced what over whom?

If the chips could really be put down between Oaklu and our modern day sports fisherman in a real "Fish Off" sponsored by a national brewing company in traditional American style what results could safely be predicted?

I must in good conscience predict that our fisherman will land the largest fish. This prediction is not based upon pride but solely upon the fact that we have by far the more efficient fishing equipment. This contest must, however, be conducted in neutral fishing grounds and not Oaklu's home waters where he perhaps knows the location of every lunger's feeding ground. Forty pound stripers do strike in a few feet of water near the shoreline.

Now, having predicted winning a battle, having put up a creditable fight, and based upon the evidence we must reluctantly concede this contest.

This conclusion is based upon factors of hunger motivation, heredity, and training which are all in Oaklu's favor. He would catch the most fish by far, in any fishing contest against us or for that matter the majority of any of our contemporaries. We must therefore, bestow upon Oaklu the title "Super Fisherman".

An old time local "Bayman" states that this discussion is academic. He claims Oaklu could have had the whole tribe down, herded the fish into the shallows, and netted the entire school before we even had a chance to get off a few casts into the surf. The discovery of an Amerind fishhook on Long Island is indeed a rare occurrence. It is encouraging to note that a local supposition that our soil is too acid for bone artifacts to survive is erroneous. Soil acidity tests taken in the adjacent areas of Stony Brook, Jamesport and Wading River have revealed a pH range of 4.3 to 8.0 (Ritchie 1959: 36, 58, 87). Free calcium carbonate can survive in the upper ranges of these results.

It is, therefore, not impossible that some sunny day during a foraging trip through the shell middens along the banks of the Sound that we will separate some shells and find safely tucked within, one of Oaklu's finely crafted bone fishhooks. Should this event not occur and we meet Oaklu at the end of the trail, and despite our different fishing motivations, techniques, and type of tackle, as fisherman we can always get down to that story of the "big one that got away".

Bibliography

- Bailey, Paul
1959 *The Thirteen Tribes of Long Island*, County Historian Suffolk County, New York.
- Brennan, Louis A.
1974 *Beginners Guide to Archeology*, Dell Publishing Co., Inc., New York.
- Langhans, Rufus B.
1961 *Place Names in The Town of Smithtown. Their Location, Origin and Meaning*, the Smithtown Library.
- Lewis, Cara L.
1971 *A Handbook of Delmarva Archeology*, Office of Archeology, Division of Archives and Cultural Affairs, Department of State, State of Delaware.
- Miles, Charles
1963 *Indian and Eskimo Artifacts of North America*, Bonanza Books, New York.
- Ritchie, William A.
n. d. *Indian History of New York State, Part III, The Algonkian Tribes*, New York State Museum and Science Service, Albany, New York.

1959 *The Stony Brook Site and Its Relation to Archaic and Transitional Cultures on Long Island*, Bulletin 372, New York State Museum and Science Service, Albany, New York.

Skinner, Alanson

1932 *The Indians of Manhattan Island and Vicinity*, Guide Leaflet #41, The American Museum of Natural History, New York.

Smith, Carlyle Shreve

1950 *The Archeology of Coastal New York*, Volume 43: Part 2 Anthropological Papers of the American Museum of Natural History, New York.

Taylor, Zack

1975 "History of the Fishhook", *Sports Afield*, March.