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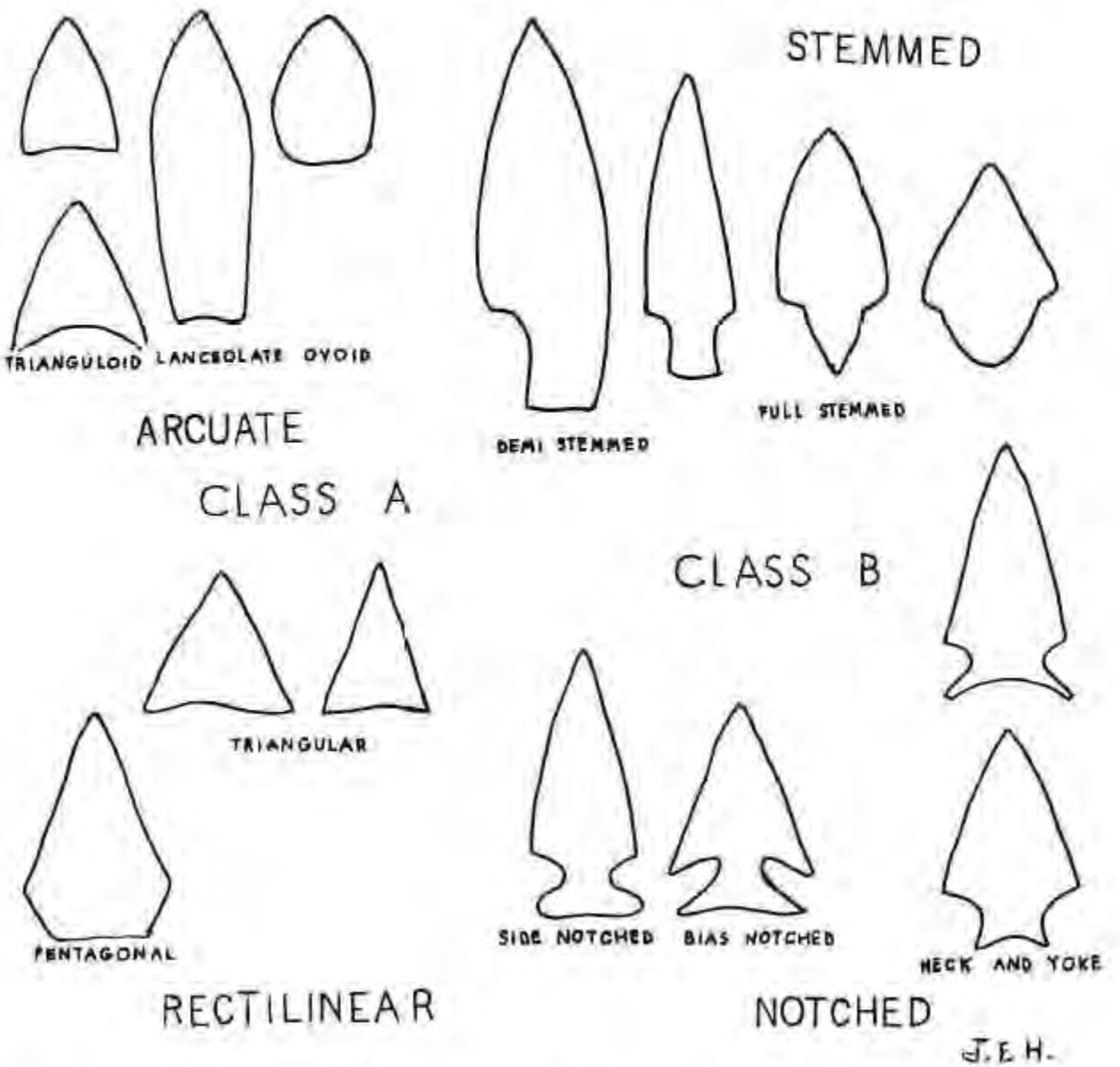

PROJECTILE POINT THEMES

THE NEW YORK STATE ARCHEOLOGICAL ASSOCIATION

THE TACONIC TRADITION AND THE COE AXIOM

Louis A. Brennan Metropolitan Chapter

THE COE AXIOM

In his recently published report (Coe 1964) on the Archaic cultures of inland North Carolina, "The Formative Cultures of the Carolina Piedmont," Joffre L. Coe drew up his statement of conclusions (p. 8) on several years work done on naturally stratified sites along the banks of Fall Line rivers as follows: "The work at these sites demonstrated two important facts: first, that stratified sites of depth and antiquity do exist in the alluvial float plains of the Piedmont; and second, that when an occupation zone can be found that represents a relatively short period of time the usual hodge-podge of projectile point types is not found - only variations of one specific theme." (Underscoring mine.)

The first of these conclusions should serve as a strong hint to those working in areas where streams have built up alluvial plains by periodic flooding that these are the places to look for sites of "depth and antiquity," but it is the second with which this paper will be concerned. What Coe makes clear that he intends by this second conclusion is that projectile points have high diagnostic cultural-chronological utility, especially during the Archaic where they are the only artifact with sufficient stylistic variability to reflect cultural-chronological change. The discovery establishes-and Coe leaves no doubt that he intends it to establish-that the craftsmen of any given community at any given time were not making a diversity or "hodge-podge" of projectile point styles, but were working to the specifications of a single design idea.

Thus, if a projectile point is defined-as may be any other artifact-as an assemblage of desired components in concrete, material form, then the Coe discovery (call it Coe's Axiom, since it has been corroborated) means that any given community of flintsmiths assembled these components according to the same technological process, following the same chipping order and strategy, within the limitations of individual skill and material. If this is true, then the flintsmiths of any given generation handed down to the next generation only that form and method of achieving it that they knew, or at least were accustomed to using. This is what constitutes a tradition by definition.

What a tradition is in projectile points in no wise differs from what it is in myth or art or pottery-making. It is a practice, a theme, a style, a method handed from generation to generation by instruction and example. Rouse (1960: 313) has used the taxonomic word "mode" for the same concept, defining it thus: "By the term mode is meant any standard concept or custom which governs the behavior of the artisans of a community, which they hand down from generation to generation and which they may spread from community to community over considerable distances." When Coe writes of "one specific theme" he is within the meaning of "tradition" and "mode."

The Coe Axiom is a discovery in the sense that Coe made it archaeologically in situ, finding in each of the separated strata of his four sites a single projectile point style or specific theme, and it is novel in the sense that it was found by him to apply to the Archaic. This consistency of projectile point types or styles, or "specific theme," has already been noted at both ends of the presently accepted chronological scale of projectile points. The Clovis fluted point is a clear case of adherence to a single design tradition on a continent-wide scale through perhaps two millenia. Equally conservative, as New York workers in the protohistoric period well know, were the Iroquois, in the monotonous reproduction of their tangless triangulars.

Generally speaking, that dogmatic catch-all, the "complex", by which were grouped together stylistically diverse and often technologically incongruous points in a cultural unit, is found mainly in the literature on the Archaic. As Coe points out in his introduction to his Piedmont report, the "complex" is a delusion. It is not a situation of diversity within

a cultural-time unit; it is a confusion of cultural-time units, brought about because a succession of cultures had occupied the same site and had left their remains in what was essentially the same soil stratum.

Coe is quite blunt not only in relating from his experience how he came upon the "one cultural-time unit - one projectile point type" discovery but also in denying the validity of "complexes," insofar as they relate to projectile points.

Before World War II, he says, and before the excavation of the Piedmont sites, he had begun a review of the enormous amount of aboriginal material already collected in the North Carolina area, with which, it was thought, some archaeological progress was being made. He writes (p.6): "When work was resumed in North Carolina in 1948, emphasis was placed on identifying and defining certain of these earlier complexes. During the following year a thorough study was made of collections from over a hundred sites in the Uwharrie area in an attempt to see whether the presence, absence, or repeated association of specific traits on those sites could identify a recurring cultural complex. It was assumed that, if a significant number of traits were found to occur together in a series of sites, then they were probably the physical remains of the activities of a particular group of people at a particular period of time. The first results of this effort appeared to be rewarding and the Guilford and Badin foci were first defined on the basis of this assumed association of traits. It was disappointing, therefore, when this small bubble of success was punctured by the irrefutable evidence that those recurring complexes of traits were in reality the remains of recurring occupations on those sites by the same sequence of people."

What burst the bubble was that, in the light of the Piedmont stratified riverbank excavations, Coe found included in his "Badin Focus," of which the pottery was dated at 1500 years ago, artifacts of the Stanly horizon (7000 yrs. old), the Kirk horizon (8000 yrs. old), and the Hardaway horizon (9000 yrs. old).

He adds the comment "many full time archaeologists, on the other hand, are still creating mythical complexes today."

Coe's Piedmont excavations do not stand as a unique example in one locale of the situation he found there. Bettye Broyles, Assistant State Archaeologist in West Virginia, who worked with Coe on the Piedmont sites, has been excavating a similar riverbank sequence at St. Albans, West Virginia, on the Kanawha River, with similar results (Broyles 1966: 11). In each of the twenty culture zones she has excavated (to a total depth of 24 ft. below former surface level) where projectile points occur, there is one type per zone. The type succession is the same and the dates are approximately the same as a Coe's Piedmont riparian sites.

We can, therefore, with considerable confidence, apply the Coe axiom to the elucidation of some of our more confused "complexes" in the Northeast and to the alignment as one tradition of those manifestations where the projectile points are obviously of similar "specific theme." This alignment has been done in a few cases, for the Perkiomen and Susquehanna Broad points for instance, but these are scarcely a beginning among the bewildering variety of sorts of points found in any locality, to say nothing of an entire region.

CLASSIFICATION OF POINT TYPES

We cannot begin classification of point themes, the determination of what is the "one specific theme" of a series of projectile points similar in form, until we have established a classification system of basic themes of point manufacture; and we must construct one that derives not from plane form geometry or other such principle or lack of principle but from the shapes in which projectile points are observed to exist.

One useful classification is based on the tool form principle. The projectile point is considered to be a tool consisting of two principal parts, the blade or acting part, and the shank, or part that connects the acting part with the shaft or handle. *(American College Dictionary:* Shank and tang have exactly the same definition). Even as animals by the

presence or absence of a backbone are classified into vertebrates and invertebrates, so projectile points can be separated into two large classes, the shanked and the shankless, by the presence or absence of a formal shank. Shankless points, obviously, must be classified by the shape of the blade, since that is all they consist of, while the shanked points are classified by the shape-technology of the shank, which is their most variable and distinctive feature.

The tool form classification of themes is as follows: (see cover illustration)

CLASS A: THE SHANKLESS (These points have no stem or appendage created by notching but consist of the blade only).

Pattern I: The Arcuates (the sides of the blade are curved).

Type 1. the lanceolates
2. the ovoids
3. The excurvate trianguloids

Pattern II: The recilinears (the blade edges are straight).

Type 4. the pentagonals
5. the triangulars

CLASS B: THE SHANKED (these points have a worked appendage extrusive from the blade body intended for attachment to the shaft).

Pattern III: The Stemmed

Type 6. the demi-stemmed (the stem is unilaterally developed).
7. the full stemmed (the stem is bilaterally developed).

Subtypes: Parallel-sided stem, contracting stem, expanding stem, and pinched stem. A pinched stem is one with indented sides, that is a notched stem as distinguished from a notched blade.

Pattern IV: The Notched Blades

Type 8. the side or straight notched (the axis of the notching, that is, the direction of penetration, is at a right angle with the altitude of the point).
9. the corner or bias notched (the axis of the notching is at an acute angle to the altitude of the point).
10. the neck and yoke (these points are either notched or stemmed, with indented bases).

This classification system is an extensible taxonomy of themes of point form, rather than of points themselves, as these themes are affected by the technology of manufacture and by custom. The point itself, as excavated or found and recorded, falls into that category below the subtype designated the style. It is the style that usually carries the theme of the tradition, though the subtype may carry it in some cases. For instance, second subtypes of type 1, the lanceolate, are recognized as traditions, the Clovis fluted lanceolate, the Plainview, the Guilford, etc; undoubtedly these will someday be broken down into varieties or will themselves be recognized as varieties. On the other hand, varieties seem to have more thematic meaning in stemmed and notched points. For instance, there are certainly two strong traditions within subtype 1 of type 7, the full-stemmed. The straight (parallel-sided) stemmed subtype is divisible into the usually narrow-bladed small points of the related Lamoka-Bare Island-Wading River series (which is what constitutes the Taconic tradition) and into Coe's straight-stemmed, broad-bladed large Savannah River style.

Most of us believe we can recognize the specific theme or tradition in a projectile point without reference to the apparatus of thematic classification, just as we can recognize a domestic cat without reference to the Linnean taxonomy. This is true enough, but some system of organization must underlie knowledge if it is to have any order at all; if, in fact, it is to exist apart from the intuitions and pronouncements of personal "authority." Classification is not a mere cerebral game, like crossword puzzles, but a necessary task in holding the ground gained in the advance of knowledge. The objective of the projectile point classification presented here is not to sort out themes for filing or some other bureaucratic purpose but to identify what there is about projectile points that have cultural significance beyond the immediacies of site association; that is, what the cultural tradition is of which they are components and indices. None of the categories of the system is to be understood as constituting a tradition. The tradition exists in another context entirely.

Traditions, of course, exist in all items of human technology, social grouping, political organization, and religious practice. If they did not it would mean that each generation would have to invent its own culture in toto, a difficult situation to imagine, since any community, including a nuclear family one, will consist at anyone time of two to four generations. But no matter how conservative in behavior a lineage of people may be, changes inevitably occur and are copied and standardized, and a new "phase" of the tradition begins. In the production of a projectile point, changes in proportion, of weight, of choice of material, may came about in a number of ways, from individual fancy or discovery to movement to a new locale or exposure to new ideas. Phases of chronological significance are to be expected, therefore, and the tradition continues until changes have obliterated its "specific theme." Thus the tradition-phase concept comprehends both the "lumpers" and the "splitters" among typologists. Obviously the lumpers recognize and emphasize the tradition, the splitters the phases.

For an analogy which will explain phases it is helpful to turn to biology. There is a definition by W. W. Howells (1966:46) of what is presently understood by the word "species" which, with appropriate deletions for the fact that artifacts are inanimate, can help us realize what is meant by tradition and phases. Howells writes: "By today's definition a species typically consists of a series of local or regional populations that may exhibit minor differences of form or color but that otherwise share a common genetic structure and pool of genes and are thus able to breed across population lines."

For "populations" substitute "collections," for "color," substitute "material," delete "genetic" before "structure" and the qualification about genes and interbreeding that follow; and the analogy between an artifact tradition and its phases and a biological species and its subspecies becomes clear. Yet it is even closer than that for, while artifacts do not have genes and cannot breed, their makers do and correlation between the artifact tradition and the genealogy of its makers is what a cultural tradition is, by the definition we have given it.

Hence, changes there will be, and what must be recognized in the evolutions of a tradition through multiple phases is that (1) there will certainly be some specimens intermediate between two succeeding phases which might be assigned to either: (2) specimens of two phases may be made at the same time, as some craftsmen continue the old form while others are changing it in response to some new idea or preference; and (3) some workmen may hybridize the two forms.

In the Taconic tradition of stemmed points, for instance, the stems of the early phase were thick and plug-like, with a knobby or stud-head appearance, as though they were intended to be dowelled or socketed into the hollowed-out end of a shaft, probably a reed. In later phases the stem has a thinned base, for inserting into the split end of a shaft, which is the more common method of jointure. However, there will often occur a point with the blade shape and attributes of a later phase, and a stem that belongs in the early phase, as though the maker liked the new blade shape but preferred the older method of jointure. The fact may be, of course, that the dowelling method was the only feasible one when reeds

were used as shaft material, and when we find the dowel or tendon stem what we find is the use of reed shafts rather than any stylistic features.

Intermediate, hybrid and, possibly, specialized forms are not the only reasons why there will be many points in a site collection of significant number that may be assigned with more confidence to the tradition than to a phase. A projectile point is a utilitarian artifact, an assemblage of wanted characteristics; the point is wanted for penetration, the blade for wound-making, the shank for joining the point to the shaft, and a certain size-weight to insure the proper ballistic performance of the total projectile since, as Mau (1963) has shown the efficiency of the total missile depends on the weight balance of the component parts. Wherefore, when a point maker has worked out his assemblage of wanted characteristics, according to the tradition he is working in, he will have a serviceable point, but it will not always be the most stylish, the most symmetric, or the most "typical." Personal skill, the suitableness of the material, and the time available for manufacture are factors in artifact production; and a stylistic "erratic" may result from hurry or indifferent workmanship or flawed materials which will be just as useful as the shapeliest specimen.

The Taconic tradition, it would seem, rather turns to the production of erratics for another reason. Its theme is the stemmed point, and a stemmed point, according to those who have learned the art of flint knapping, is harder to shape than a notched-blade point. For the latter, once a satisfactorily thin ovoid or trianguloid blank has been roughed out, notches can be worked in at will anywhere, from any angle and to any depth with a punch-like flaking tool and a few twists of the wrist. The stemmed point requires that the stem be shaped in the blank. Many accomplished workers in notched blades will not even try to produce a stemmed point; they can produce much more exotic looking pieces by pressure flaking of blanks made out of flakes. The fact that the Taconic theme is a simple stemmed point makes it a fairly simple one to recognize.

What can be said in summary, then, is that within a projectile point tradition of any time duration there will be phases, that is, groups of points of clearly similar style that may be called "vogues," or the fashion of particular moment, and there will be intermediates, hybrids, and erratics. All this is what we would expect of a line of individually handmade items, but it makes difficult the creation of a model of the tradition. The only possible model, as implied in the definition, is evolutionary, a model of change through time. This would long since been done pragmatically for the Taconic series of points had we the kind of stratified sites worked by Coe. Since we have no prospects of finding such sites, in this area at least, to construct a model of the Taconic tradition we have had to make use of what appears to be the logic of technological and form development, added by some very slight chronological clues. For instance we do have, at our Twombly Landing site, now being excavated, a stop-date forward of 4750 years on a Taconic tradition point of our Hudson phase that would have, a few years ago, been called Lamoka. But the model is a construct that may or may not hold up as chronologically sensitive sites are excavated - if they ever are. Even so, it will serve as an order against which new finds may be tested.

THE TACONIC TRADITION

Before the Taconic tradition model is presented, however, something must be said about the collection of points it is a model of. These are the stemmed, usually small (though a medium and a large size was made, for different weapons or different uses) narrow-bladed points of which the best known examples are the Lamoka and Bare Island (Ritchie 1961) but which are found all the way from Georgia where Wauchope (1966: 141-44) lists them as "stemmed narrow blade," to Martha's Vineyard, where Ritchie (1966) calls them Wading River points, to the classic Lamoka site and thence to Michigan, where they are called Dustin points (Ritchie 1961: 29).

We have taken them from almost every site excavated or collected from in this area - some ten productive sites-and wherever the site collection is large, Taconic tradition points

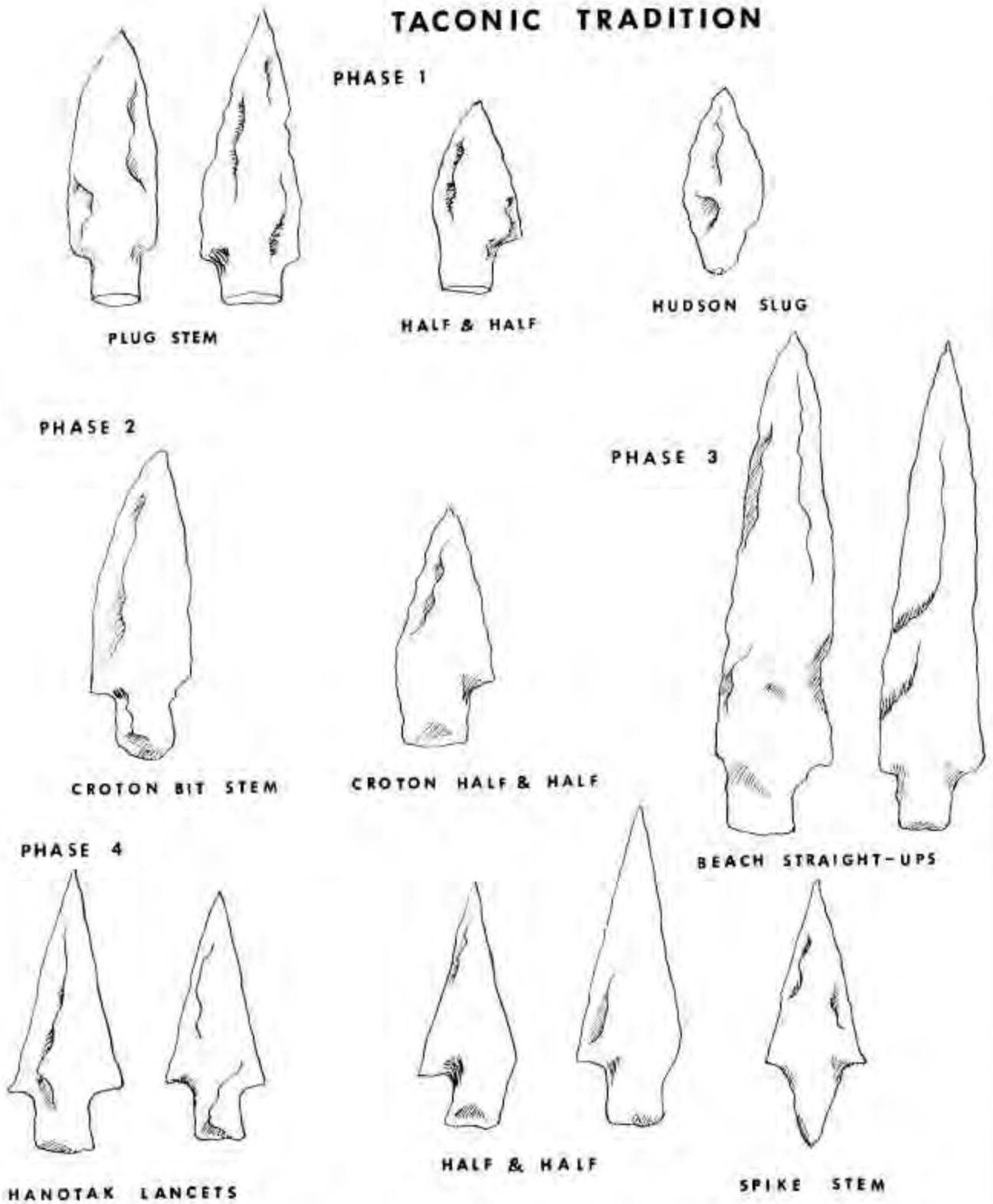

FIGURE 1 THE TACONIC TRADITION (PHASES 1 to 4)

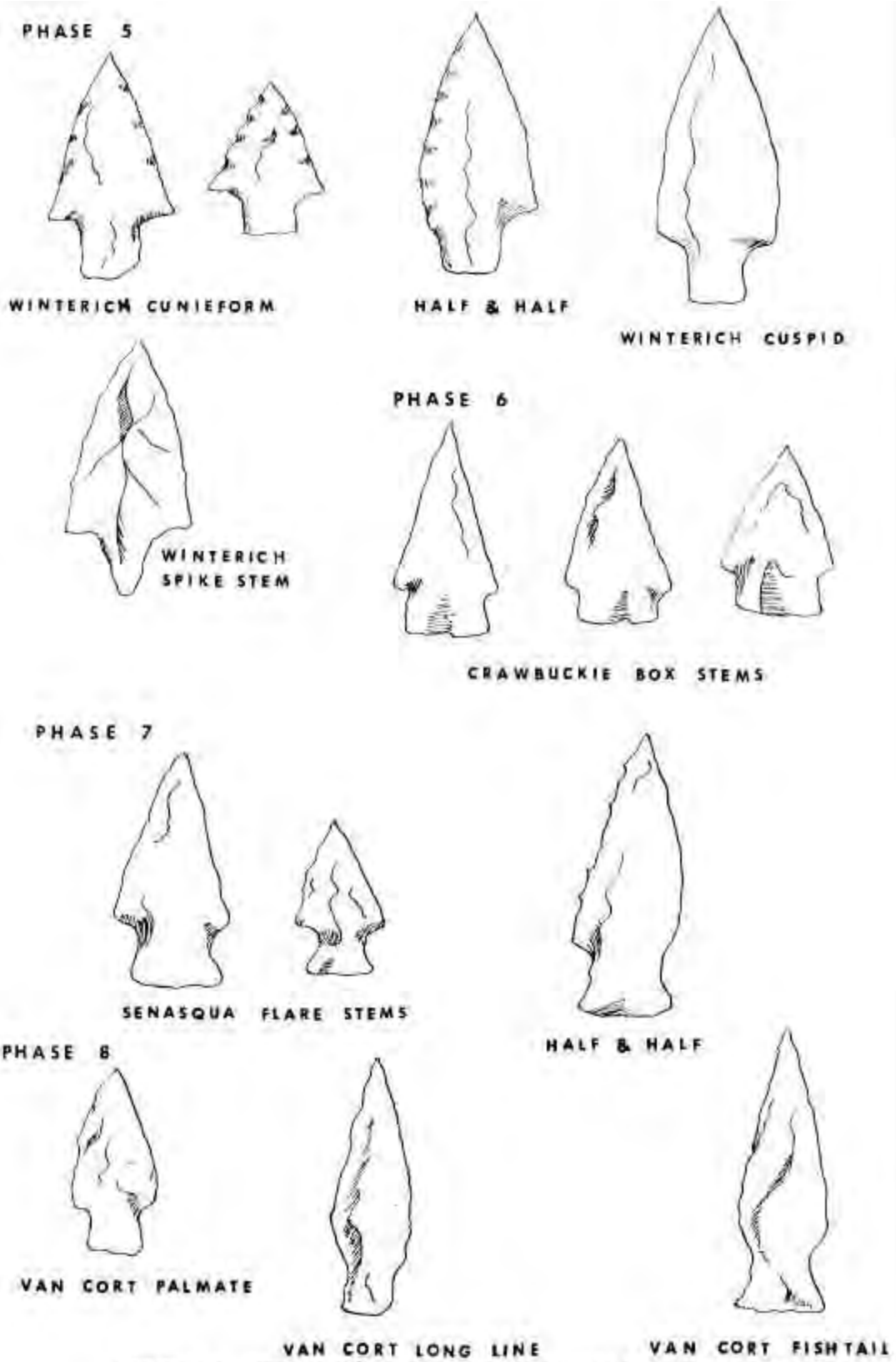

FIGURE 2. THE TACONIC TRADITION (PHASES 5 to 8)

are the largest fraction. We have thus had adequate opportunity for comparison and sufficient motivation to make something of them, since they loom as the largest archaeological problem we have to solve. We know that any Archaic site hereabouts that we excavate in the future will produce more Taconics, amongst its miscellany of point styles, whether it be a shellmidden or an inland site, than any other style. The Taconic tradition is a fact, a very large and widespread fact that has somehow been overlooked through the decades of research.

PHASE EVOLUTION

Our model begins with points having these attributes: phase one, narrow, tight-shouldered blade, lenticular in outline and cross section, with a thick knobby or indifferently squared stem with, usually, a basal flatness of the stem. See Fig. 1 and Fig 2.

In phase two all attributes are as in phase one but the stem has been thinned, though it still usually exhibits indifferent outline shaping.

In phase three the attributes are as in stage two but the blade edges are now straight and distinctly parallel.

In phase four the attributes are as in three, but the blade is now spirate, or long triangular, with sharp-cornered shoulders.

In phase five the attributes are as in four, but the blade becomes wider, almost equilateral in some specimens.

In phase six the blade is wide to medium wide but the stem is now distinctly square and almost as wide as the blade. At first blush phase six does not appear to be an important phase, but we believe it to be highly significant because it marks the end of the occurrence of knobby or stud stems. It is hypothesized that the craftsmen of the early Taconic tradition did not have good control of the technique of making squared stems that were also thinned or they did not think them worth the trouble. But, more or less suddenly, squared-off, straight-based stems became the vogue for some reason, and the easiest way to make them was to indent the stem only a little from the blade.

In phase seven the indentation becomes deeper and the result is a stem expanding toward the base, with the blade remaining a medium broad, sharp-shouldered triangular.

Phase eight does not seem to follow exactly from the preceding phase because the points are round shouldered as in the fishtail though the shank is seldom fishtail-flared. The reason for including this phase in the tradition is quite simple. All through the previous phases there occurs an asymmetric sub-variety in which one shoulder is sharply cornered and the other is rounded. Why it did not come into vogue sooner to round both shoulders or why it came into vogue when it did will probably never be ascertained, but it did come into vogue eventually, to establish a discernible variety. That it was in vogue quite early is best illustrated by the specimen pictured in Ritchie (1965), Plate 14, no. 32, Projectile points of the Lamoka phase and type.

PHASE DESCRIPTION

Phase 1: THE HUDSON PLUG STEMS: The blade is narrow, tight-shouldered, lenticular, or conical in cross-section and outline. The stem is thick and peg-like or knobby, apparently for a tendon insertion into the shaft end. The base is blunt.

Variety: The Hudson Half and Half. These are asymmetric points, with one side developed into a shoulder and the other side either more or less straight, without shoulder, or excurvate.

Locale Sub-variety: The Slug. The blade is short and blobby and the stem contracts toward the base. A locale sub variety, it is one which occurs in only a very

few specimens, but on several sites so that it seems to have been made only by a very limited number of craftsmen.

Phase 2: THE CROTON BIT STEMS. The blade is as in the plug stems but the stem is thinned down like a screw-driver bit, as though for slotting into the shaft end. The makers apparently did not know how to thin the stem and their efforts often resulted in a round-based or stud stem, which is characteristic of the first five phases of the tradition.
Variety: The Croton Half and Halfs. Asymmetrics as above. These forms are difficult to assign to a specific phase.

Phase 3: THE BEACH STRAIGHT-UPS. The blade is narrow, straight edged, and parallel-sided. The stem is the Taconic stud or squared-off.

Phase 4: THE HANOTAK LANCETS. The blade is narrow triangular, with acutely angular shoulders sometimes extruded into barbs. The stem is the Taconic stud or squared-off.
Variety: The Half and Half. The Asymmetrics, as described above.
Local Sub-variety: The Spike Stem. The blade as the lancet, with the stem contracting to a point.

Phase 5: THE WINTERICH CUNIEFORMS. The blade is broadly triangular, sometimes nearly equilateral, and relatively short. The stem is Taconic stud or squared-off.
Variety: The Half and Half. The Asymmetrics as described.
Local Sub-variety: The Cuspids. This form is isolated on features of proportion, material, and trimness of execution. It resembles a form found at Frontenac Island.

Phase 6: THE CRAWBUCKIE BOX STEMS. The blade is narrow, medium, or broadly triangular. The stem is about 80% or more of the width of the blade at the shoulder. A significant feature is that there is often a nick in the center of the base where a thinning chip or "center groove" has been removed.

Phase 7: THE SENASQUA FLARE STEMS. The blade is medium triangular. The stem expands toward the base.
Variety: The Half and Halfs. The Asymmetrics as previously described. They are indistinguishable from the Half and Halfs of Phase 8,

Phase 8: THE VAN CORT BI-ARCS. The blade is medium wide, with both shoulders rounded.
Variety 1: The Van Cort Palmates. The blade is round shouldered but distinct from the stem.
Variety 2: The Van Cort Long Lines. The blade edges curve into the stem in a continuous line.
Variety 3: The Van Cort Fishtails. The blade edge curves in a continuous line into the stem which then flares out.

Very probably the Taconic tradition, as herein set forth, should be separated into an early and a late stage, the break coming at phase 6, where the knobby stem dies out, and an apparently new method of making the stem takes over, since thereafter stems are quite broad. Also, very probably the notched stem points called Normanskill (Ritchie 1961) and found in some numbers farther up the Hudson also belong to the Taconic tradition;

they have the same size, blade shape, workmanship, and general appearance. But just where to cut off a tradition, recognizing the continuant line of the, "specific theme" as an influence but altered beyond allowable tolerance, is a question still to be settled for the Taconic tradition.

The model of the Taconic tradition presented here is both real in that the phases and varieties described do exist on several sites, and have been recognized in collections and in photographs of collections. It is inadequate in that not all points of the tradition-the intermediates, the hybrids, and the erratics-can be confidently classified. Doubtless, also, there are varieties, even phases, that we have not recognized, as well as peripheral varieties about which we are in doubt. But what is represented does exist in the concrete form of archaeological specimens. The model here given is certainly subject to revision and amendment.

DISCUSSION

Ritchie, in his definitive volume *The Archaeology of New York State* (1965) has inferred that he no longer regards the 5383 ± 250 C14 date released by Libby in 1950 as the cornerstone date for the Northeastern Archaic that it was once considered to be, and it no longer seems to date the Lamoka culture characterized by, among other traits, narrow-bladed stemmed and side-notched points found at the type site at Lamoka Lake.

This early date has become suspect because later re-testing of charcoal from the original dig, by the advanced gas diffusion method, which replaced the solid carbon method, produced ages of the order of 4500 years. This order of age was corroborated by a series of tests run on charcoal obtained by later re-excavations of the site (1958, 1962) best summarized by the Yale C14 Laboratory result of 4500 ± 80 B.P. (Y-1279).

Excavations by Funk (1966:18) at the Sylvan Lake Rockshelter in 1964-65 yielded a series of narrow-bladed, stemmed, small points, described by him as Lamoka-like and Bare Island-like, with intermediate forms, which were dated at 4160 ± 140 (Y-1536). Ritchie's work at Martha's Vineyard in 1964-65 (1966:901) produced a date on narrow-bladed, stemmed, small points, designated Wading River points by him, of 4220 ± 160 (Y-1530).

Thus the 4750 ± 160 (Y-1761), confirmed by a Geochron Laboratory date of 4725 ± 60 (Gx-0762) obtained by the author on a hearth at the Twombly Landing site, Palisades Park, New Jersey and establishing an order of age for the narrow-bladed, stemmed, small point there, is the oldest date so far obtained for this tradition or "specific theme" in the Northeast or elsewhere.

The actual projectile point dated by the Twombly hearth charcoal, which Ritchie has judged to resemble the Wading River style, was found within two feet of the hearth horizontally, and in the same stratigraphic situation. But the association is not direct. The point was found beneath an intact dump or small heap of shell that had to have been in place when the fire was kindled. The point may be a season or two older than the hearth, or a matter of decades, even centuries; it is impassible to say. But the 4750 date of the hearth is at least a stop-date forward for the earliest Taconic tradition point we know of and it can be relied on for this purpose.

Attention should be called here to a recent development in C14 dating. It has been discovered, through comparison with tree ring dates and C14 dates from about 2200 B. P. to 6000 B. P. (Stuiver and Suess, 1966). During this period of about 4000 years the rate of divergence shows annual age as greater than C14 age according to the formula: Annual age = C14 age X 1.4-1100. The divergence begins to decrease after 6000 B. P. and at 10,000 B. P. the two are approximately equivalent. Carbon 14 labs are not yet ready to release a full calibration of real and C14 ages but it is in making.

According to the formula being tentatively used in the meantime the real or annual date of the Twombly hearth would be 5550 B. P. The real date of the Croton Point shell midden (Brennan 1963:14) tested at 5863 ± 200 (Y 1315) would be 7108 B.P. The real

date of the Otter Creek phase hearth at Sylvan Lake Rockshelter (Funk, 1966; a.22) C14 tested at 6560 ± 100 B. P. (Y-1655) would be (since the discrepancy begins to decrease after 6000 B. P.) between 7500 B. P. and 8000 B. P.

This curve of divergence will go far to explain the puzzling absence of remains in the Northeast between the fluted point manifestations at Bull Brook (Byers 1959:427) with an average of several C14 dates of about 9000 B. P. and the Archaic horizon, since all C14 dates so far obtained will move back uniformly. It is curious to note that the original 5383 age of Lamoka, through coincidence or some principle not yet understood is of the proper order of true age, according to the new calibration.

As of this writing C14 ages are still in effect, certainly for comparative use. The 4750-4725 B. P. ages of the Twombly hearth and dated Taconic point neatly bracket the age of 4730 ± 80 (Y 1535) obtained by Funk at Sylvan Lake Rockshelter on a Vosburgian phase (Laurentian) hearth. Since Ritchie has a date of 4474 ± 300 (Ritchie 1965:91) on a Vosburgian phase hearth at the Bannerman site in Dutchess County and Funk has the aforementioned date of 4220 ± 160 on a narrow-bladed, stemmed point level at Sylvan Lake Rockshelter, also in Dutchess County, it would appear that the Taconic and Laurentian traditions were contemporaneous in the Hudson Valley, probably through several centuries, since the Brewerton phase of the Laurentian is given a "climax" date by Ritchie (1965:91) of about 4000 B. P. Thus the acculturation of the Lamoka focus people of the Taconic tradition of point makers and the Laurentian tradition as posited by Ritchie at the Frontenac Island site is inherently probable. Likewise inherently probable is the acculturation of the two traditions over the whole Northeast.

By the known dates the Taconic tradition is a late but fully Archaic cultural strain. Because its earliest acceptable date of record is at the Twombly site, its origin is enigmatic. Wauchope's extensive collection of "stemmed narrow blades" was obtained during an archaeological survey of Georgia in WPA days, that is the 1930's, but were only this year (1966) published in a Memoir of The Society for American Archaeology. He says that they "probably appeared in the Archaic" and apparently continued into the Woodland periods. But they do not appear in an early or even Middle Archaic sequence so far reported from the South, on Coe's excavations, at Russell Cave, or at the Stanfield-Worley Rockshelter. The implication is that they are quite late in the south, where very different printmaking traditions dominated the Archaic.

In Michigan, at the other end of an arc that would have the Twombly site near its mid-point, Lewis Binford, as reported by Ritchie (1965:78), has discovered Dustin narrow-bladed, stemmed points below Brewerton type corner-notched points, while at another site "Laurentian-like materials" occurred below Dustin points. This contradictory provenience is what we might expect of contemporaneous traditions found at different sites in the same locale and so merely duplicates the New York situation, giving no clue whatever to whence the tradition came.

One can carry speculation far afield. Meredith K. Scheutz has named "San Gabriel" a collection of points from Williamson County, Texas, (Scheutz, 1957) that in style, size, size variations, and execution, as described and illustrated, fit the Taconic tradition neatly. The trail of this theme seems to cross into Oklahoma and Missouri, but the poorly placed chronological provenience still seems to fall into the span of the late Archaic-Early Woodland. Needless to say, this is of no help to speculation.

The Taconic tradition is, then, a characteristic theme of narrow-bladed, stemmed, small (with some specimens large enough to indicate use on a different kind of weapon than the small) projectile points of the Late Archaic, stopping short at least in this area, of the soapstone horizon Transitional but probably influencing later cultural facies. The only diagnostic artifact produced by the tradition seems to have been the projectile point. Simple, tie-on, winged bannerstones may have been used, but they are not numerous and not certainly, on the culturally mixed sites where Taconic points occur, associated. The bit of a very thin well-made bevelled adze appears to belong to the Taconic points at

Twombly, but in our 15 years of finding Taconic points this is the only such occurrence. There is some evidence that the projectile point itself was the tool form for perforators, drills, reamers, knives, and scrapers and no other distinctive tool was made. The only facies of the Taconic that attained any diversity was Lamoka, but it must be pointed out that our excavations have been shellmidden sites (Twombly, Crawbuckie, Parham Ridge, etc or hunting stations (Winterich, Hanotak Rockshelter) and not full-cultured village situations like the classic Lamoka Lake site.

Of the Lamoka culture Ritchie (1965:789) says: "At the moment, the writer's guess is that the Lamoka culture . . , had its essential development in the area where its remains are found . . . . from a simpler, more generalized, and more widely disseminated and mobile hunting and fishing manifestation which probably antedated 3000 B. C." This "simpler, more generalized" culture would be the Taconic tradition point makers, but of what it consisted we know only the points for sure.

CONCLUSION

Coe's excavations in the Piedmont of North Carolina, corroborated by Broyles in West Virginia, have established the projectile point "specific theme" or tradition as a culture tracing principle. Sufficient points of one specific theme, the narrow-bladed, stemmed, small point have been excavated from a sufficient number of sites in the lower Hudson River Valley to recognize a tradition, herein named the Taconic tradition. This theme occurs throughout the Northeast region and southward along the Atlantic coast and along coastal rivers and must therefore be presumed to be an important cultural element with implication of population spread. Its known extent of occurrence gives no clue to its origins nor do the form and technology of Taconic points give any clue from what prior tradition they may have evolved. The tradition probably disappeared into acculturation. That such an ubiquitous tradition everywhere died out or petered out is hard to believe. It was probably a constituent of the early Woodland in the coastal East and elsewhere. A great deal remains to be learned about it.

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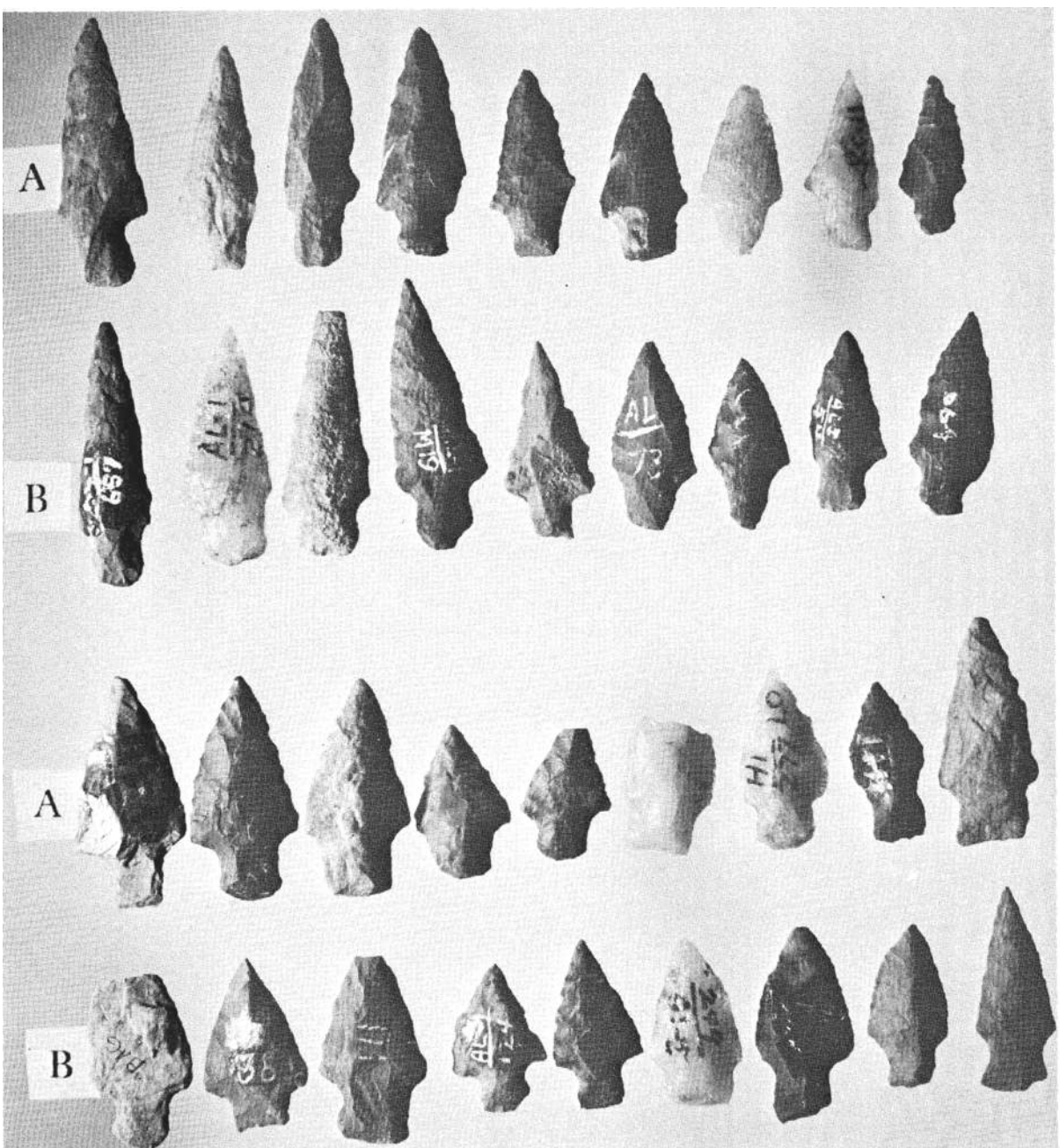

PLATE 1 THE TACONIC TRADITION: MAJOR THEMES Lines A, The Hanotak Rock-Shelter. Lines B, The Twombly Landing Site

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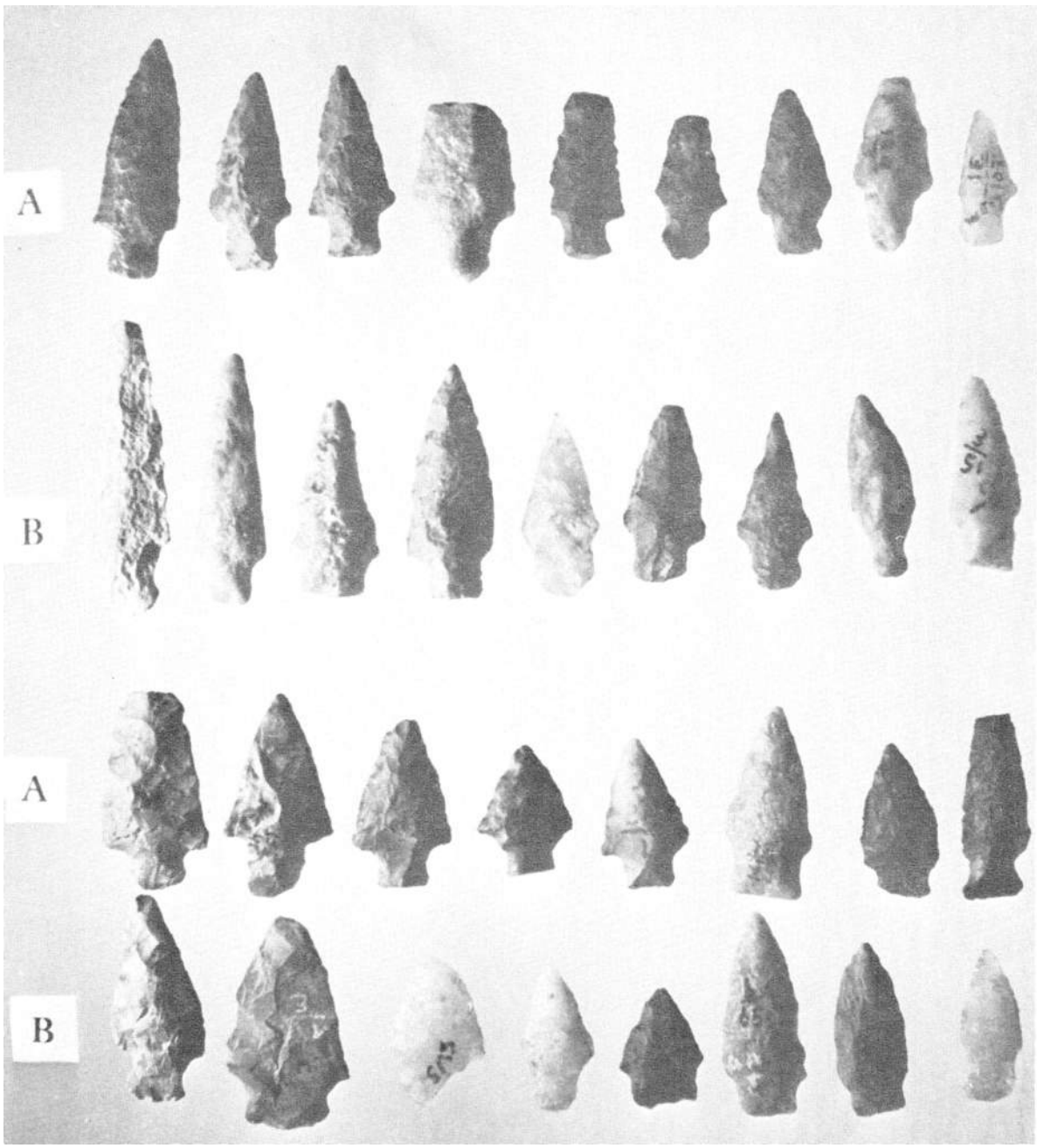


PLATE 2. THE TACONIC TRADITION: MAJOR THEMES Lines A, The Winterich Site. Lines B, The Crawbuckie Sites

EXCAVATION OF A PROBABLE LATE PREHISTORIC ONONDAGA HOUSE SITE

Robert Ricklis Lewis H. Morgan Chapter

During the summer of 1962, I conducted a test excavation on the Atwell Fort Site, situated about 15 mi. southeast of Syracuse, New York. The purpose of the test was to obtain an artifact sample of sufficient size to make possible determination of the cultural affiliation of the site and of the approximate date of occupation.

The material uncovered at this time, consisting primarily of triangular projectile points, chert scrapers and knives, bone awls, celt fragments, pipe fragments and pottery, came from three hillside refuse deposits in which a total of 18 five foot squares was dug. Under one of these deposits was found a row of large postmolds apparently representing a segment of defensive palisade. Analysis of the pottery indicated that the site was occupied during late prehistoric times, probably sometime in the 1500's. The majority of rims herds fell into the types which MacNeish considered to be primarily of Onondaga Iroquois provenience (MacNeish 1952). Thus on the basis of the pottery analysis and the location in the heart of historic Onondaga territory, I concluded that the site was a late prehistoric Onondaga settlement of around A.D. 1550 (Ricklis 1963).

During the summer of 1965, accompanied by my brother Paul, I returned to the site to attempt to determine, if possible, the type of house which existed thereon. The lack of knowledge concerning Onondaga house types prompted me to undertake the endeavor. To date, as far as I know, any large scale settlement pattern work still remains to be done on an Onondaga site.

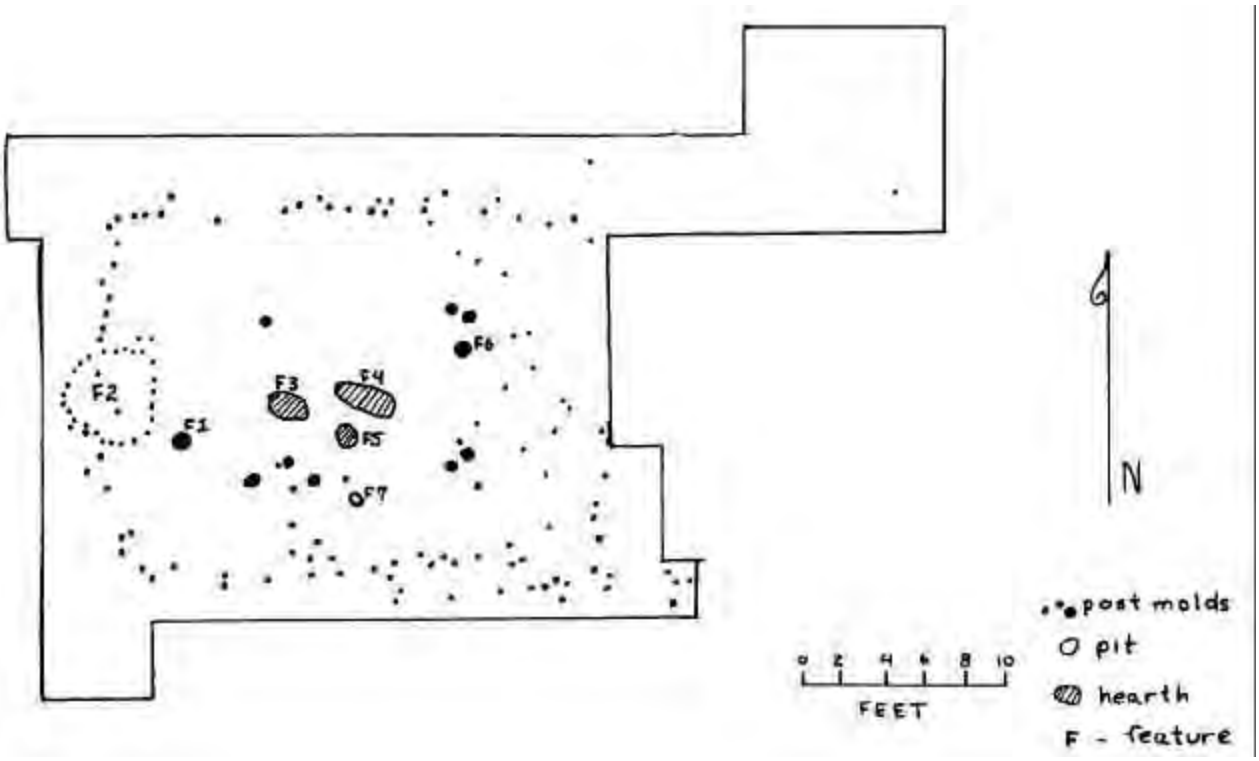
The Atwell Fort occupies a very high, jutting promontory on the east side of, and overlooking, the 3/4 mi. wide Limestone Creek valley. The maximum width of the area showing evidence of occupation is approximately 300' at the east end of the site, where the adjoining land slopes upward. This width, however, rapidly diminished to about 100' at the center of the site. The length of the site is approximately 600 feet. The nearly level top of the promontory is, and has been for many years, in pasture. On the precipitous north and south slopes are located seven refuse deposits now nearly exhausted of all artifacts save a few small potsherds.

A refuse-bearing area of the hilltop was selected for excavation on the assumption that refuse would naturally accumulate within and around house sites. A grid of 10 squares was then staked out over the area. Since the 8" to 15" topsoil layer had been totally disturbed by previous plowing, it was removed fairly quickly with spades, although refuse-bearing patches were carefully sifted through a 1/4" mesh. When the yellow sandy-clay subsoil was reached in a square, it was scraped clean with trowels in order to reveal postmolds and other features.

An initial 10' square was excavated in a particularly dark-stained area of topsoil. Here potsherds, refuse bone, and broken artifacts were found in profusion, but as the subsoil revealed no postmolds or associated features such as hearths or pits, a 5' wide exploratory trench was extended westward. Although refuse became progressively less abundant and the topsoil color lightened considerably, the subsoil in this trench produced a series of 23 postmolds which extended in a rough east-west line. Further clearing bf the subsoil revealed an additional 125 post molds ranging in diameter from 2 1/2" to 12" and in depth from 4" to 16". Associated with these postmolds were three hearths and a small pit.

The molds seem to form a roughly rectangular pattern 18' by 26', with the long axis running in an east-west direction (see map). Most probably, this roughly rectangular pattern represents a former house floor, and the irregularity of the rectangle is perhaps due to occasional repair or reconstruction of the dwelling.

That the molds represent a house floor is further suggested by the features found within the rectangular pattern. In the center were found three hearths, features 3, 4, and



ATWELL FORT SITE (CZA 1-1)
Cazenovia Township, Madison Co., New York
EXCAVATION, DWELLING AREA

5, all consisting of fire-reddened patches of subsoil. Feature 4 was very slightly basin shaped a mere 2" deep from the surface of the subsoil, and contained, near its center, a small quantity of white ash and a few small potsherds.

At opposite ends of the rectangle, and slightly off center, were two unusually large postmolds, features 1 and 6 (12" in diameter and 11" deep, and 9" in diameter and 16" deep, respectively). The location of each of these molds in corresponding positions at opposite ends of the structure suggests that they served as large roof supports. It will also be seen from the illustration that both to the north and to the south of the hearths was found a series of large postmolds approximately 5" to 7" in diameter, all about 5' from either the north or the south walls of the structure. It seems likely, judging from their relatively large size, and their nearly uniform distance of about 5' from the house walls, that these molds represent supports for benches or bunks. The location of features 1 and 6 and these possible bunk supports slightly back from the long east-west axis of the structure suggests that a 6' or 8' wide central corridor in which were located the mentioned hearths, extended the 26' length of the dwelling.

A small pit, feature 7, measured 11" by 9" by 9" deep. Its fill consisted of homogeneous dark brown soil, two fragments of fire-cracked rock, a few chert flakes, and a few small potsherds.

Feature 2 consisted of a rough circle, 5' in diameter, of 29 postmolds, ranging in diameter from 2" to 3", and in depth from 2 1/2" to 8". What exactly these molds represent is questionable, but it seems likely that they may outline some sort of storage

bin. If so, it must have existed either earlier or later than the supposed house as it directly overlays what must have been the west end of the rectangular structure. Further suggesting more than one phase of construction is the presence of an irregular line of postmolds, running in a roughly east-west direction in the southeast corner of the excavated area, and apparently extending beyond the limits of the excavation. These molds may represent a portion of a structure which existed earlier or later than the supposed house, or they may represent an extension or addition to the house which extended beyond the limit of the excavated area. If the latter is the case, however, a corresponding extension of molds should be evident on the northeast corner of the structure, and such is not the case.

Thus it seems that a roughly rectangular structure with a central fire area, large roof supports, and probable bunks or benches is represented by the molds uncovered in this excavation. A possible period of rebuilding is suggested by the occurrence of an apparently unrelated bin structure of some sort, as well as a possibly related postmolds line in the southeast corner of the excavated area. It is interesting to note that the topsoil over the house floor was light brown and nearly sterile of occupational debris, while most of the surrounding topsoil was dark brown or black, containing much occupational debris.

I would hesitate to consider this small dwelling a true Iroquois longhouse, but the basic structure seems to have conformed to the longhouse pattern: a rectangular dwelling with a central bunk-bordered corridor containing hearths.

Of course no general conclusions concerning Onondaga house types can be made on the basis of this excavation alone. Although at the nearby Temperance House Fort I was also able to uncover a portion of a postmold pattern seemingly representing a rectangular structure with an 18' width and a central hearth, much more work on Onondaga settlement patterns must be done before any definite conclusions can be reached. It would be most interesting if Onondaga houses were primarily of a small, narrow variety, as represented at Atwell and probably Temperance House forts. This would be in marked contrast to those dwellings found on late prehistoric Mohawk sites such as Garoga (Ritchie 1965:318), and early Historic Seneca sites such as Factory Hollow (Guthe 1957) and Cornish (Hayes 1966), where longhouses were at least 20' wide and 50' long. The question, I think, is one worthy of future investigation.

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THE PICKLE HILL SITE, WARREN COUNTY, NEW YORK*

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

Investigations by Paul and Thomas Weinman in 1965 and 1966 on a low, sandy knoll in a swampy valley 2 1/2 miles south of Dunhams Bay, Lake George, N. Y., have produced evidence of occupation by groups of the recently defined late Archaic River phase (Ritchie 1965: 124-131). The site contributes important data on the northerly distribution of the culture, hitherto known only from the lower Mohawk-middle Hudson Valleys.

The site (plate 1) lies on a flat-topped rise, 1 1/2 acres in extent, composed of late-glacial outwash deposits, which is adjoined on the west by a large drumlin known as Pickle Hill. The occupied area covers about 1/2 acre on the northern end of the north south trending knoll, and is about 15" above, and 100 yds. from, the Pickle Hill Road which connects Bay and Ridge Roads.

A small stream, beginning along the western edge of the rise, trickles into the Dunhams Bay outlet which is 1 mile to the north. This stream, which drains through swampy ground, is almost dry during most of the summer and fall. However, a nearby spring could have supplied the Indian occupants of the site with water during nearly all periods of the year. The hummocky valley in which the site lies is adjoined on the east and west by high gneissic hills that eventually rise to the north as fault-line scarps which line the shores of Lake George.

PLATE 1. PICKLE HILL SITE, WARREN COUNTY, NEW YORK, View of low rise on which site lies, from the Pickle Hill Road. Looking south.

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The site was first discovered through surface investigations by the Weinman brothers in 1965. Because the projectile points collected at that time conformed to the Normanskill type (Ritchie 1961), it was first believed and later confirmed that Pickle Hill was a "pure" component. Permission was granted by the owner, Mr. Herbert Mattison, to excavate the site. It was hoped that evidence of houses would be found and that a sizable assemblage of artifacts would be accumulated, thus adding to knowledge of the River complex. The first of these goals proved to be a qualified failure; the second met with some success.

Since the site had long been under cultivation, the artifacts were dispersed throughout the brown, sandy plow zone which was between 10" and 12" thick. The undisturbed subsoil was yellowish brown, pebbly sand at least 5' thick which, except for features 1 and 2, was free of evidence of aboriginal occupation.

Six trenches, one 50' by 3', the others 25' by 3', were plotted and dug from a datum stake in such a way as to sample much of the site for postmolds. Unfortunately, the plow blade had apparently destroyed any molds that might have existed. However, in three airplane flights over the site Paul Weinman sighted what may be the outline of a house. This was seen as a dark rectangular outline in recently rain-moistened earth that appeared to be 14'-16' long by 10'-12' wide. In subsequent testing in this area, no postmolds could be found, nor could the darkened outline be observed while walking over the ground.

Two features were discovered from surface occurrences of fire-cracked rocks and reddened earth. Feature 1 (in sections W50N70 and W60N70) was circular, basin-shaped hearth, 44" in diameter and 12" in depth below the plow zone. Of the approximately 30 fist-sized rocks in the feature, those in the upper half below the plow zone were relatively clean of charcoal, whereas those in the lower half were encrusted with blackened earth and a small quantity of charcoal, which was saved. A single Normanskill type point, a narrow-blade fragment, and flint chips were associated.

Feature 2 (isolated in sections W90N120 and W90N130) was a circular roasting platform 70" in diameter, extending 32" below surface (20" below plow line). The feature contained about 200 fist-sized rocks, cracked by fire. A Normanskill point, a narrow point blank, flint chips, and 3 carbonized acorn cotyledons were associated. A small quantity of charcoal was carefully collected.

Most of the artifacts in the collection are projectile points. Thirteen of the points are good examples of the Normanskill type (plate 2, figs. 1-9). Six broad-bladed points with expanded stems have some attributes of the characteristic Normanskill notch, and probably fall within the extreme formal range of the type (figs. 12, 15, 19-21). Eight narrow bladed stemmed points (figs. 11, 13, 14, 16-18), 2 crude, thick broad-stemmed points, a large, indeterminate point (fig. 26), and a crude side-notched point with unfinished base (fig. 10) are also in the collection. In addition to finished points, there are 23 narrow point blanks or rejects and 10 narrow point tips or midsections. Worthy of note is 1 stemmed, crescentic knife (fig. 27).

Common at Pickle Hill are scrapers of varied, often unusual, form (9) (figs. 22-25, 28-30). Generally, these are large, flat irregular flakes trimmed to curved, steeply bevelled edges which extend along 1/4-1/2 of their perimeters. Some can be described as "end-side" scrapers; others are strictly side scrapers.

There are a number of worked pieces of flint.

Other stone artifacts in the collection include whetstones (2) (plate 2, figs. 36, 37); an anvil- hammers tone (fig. 31); a shallow-lipped gouge (fig. 33); a large quartzite spall chopping or pounding tool (fig. 35); an ovate tool of the form usually called a chopper, in actuality probably a hide scraper (fig. 32); and 1 ovate knife (fig. 34).

The predominant material used in chipped stone artifacts was blue-gray to black scoriaceous Fort Ann flint (58 items, or 58% of the total). Gray Normanskill flint (11 artifacts, 11%), a speckled black flint, one source of which is known in outcrops of Little

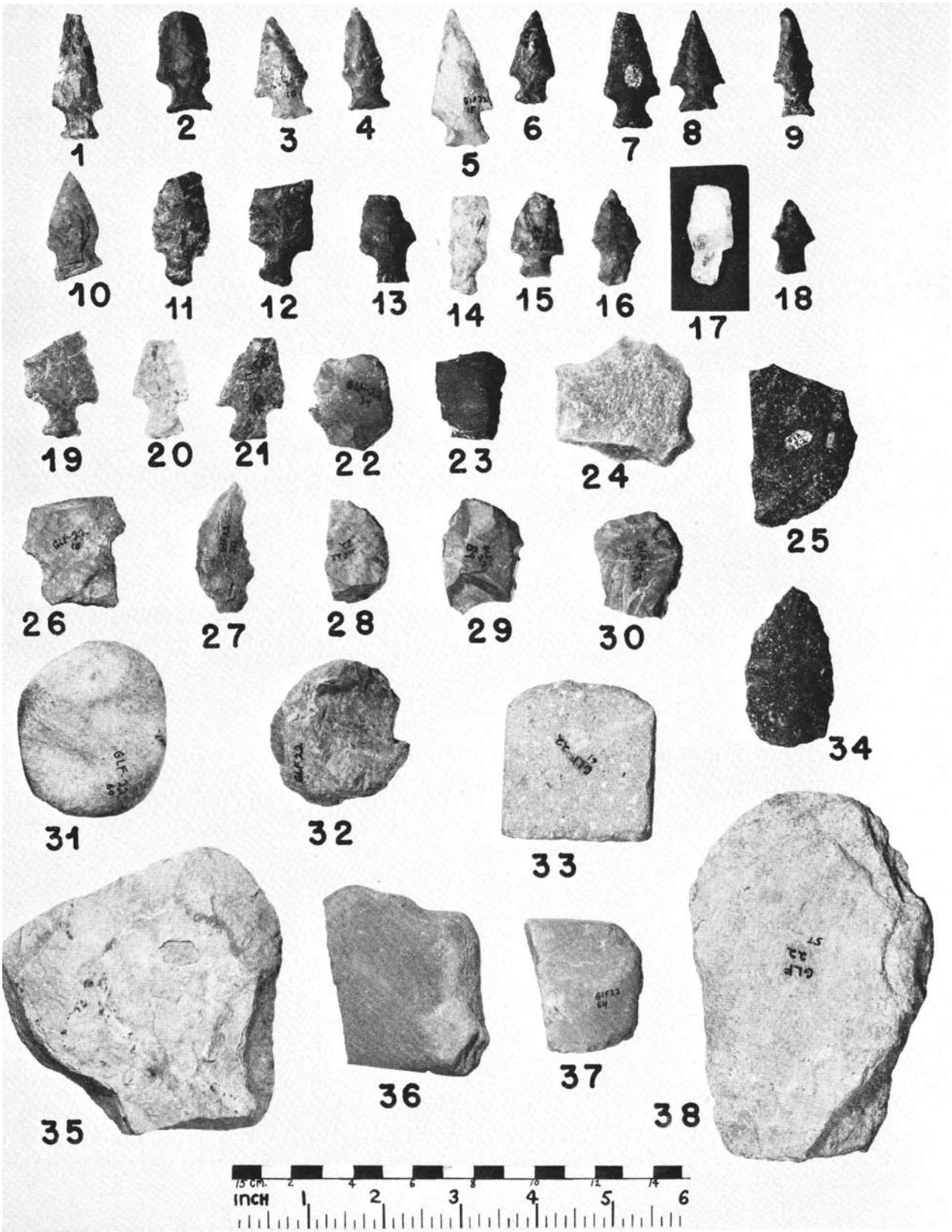

PLATE 2. PICKLE HILL SITE ARTIFACTS

Falls Dolomite on South Long Island in Lake George (9, 9 %), gray mottled Onondaga chert (4, 4%), quartz (10, 10%), black Kalkberg flint (3, 3%), quartzite (2, 2%), red slate and Deepkill flint (1 each, totaling 2%) were employed in manufacture of the remainder. With regard to rough and polished stone, the pestle and abrading stones are of graywacke; the anvil- hammerstone and chopper of quartzite; 2 pebble hammerstones of quartzite and 1 of Fort Ann flint; and the shallow-lipped gouge of porphyritic basalt. Most of these materials were available within a radius of 15 miles from the site.

No bone artifacts or animal food remains have survived in the acid soil (pH 5.75).

The site has many artifact correspondences to the River site on the Hudson River near Cohoes (Ritchie 1958: 34-53) and the Bent site near Schenectady in the Mohawk Valley (Ritchie 1965: 124-131) which are the type stations of the River phase. A very similar range in projectile point forms, the majority being of Normanskill type, is evident in the components at all three sites. The retouched flake scrapers at Pickle Hill have not been found on other sites of the River complex. The anvil-hammerstone with its fan-shaped radial scars, perhaps employed in flint-knapping, is identical with specimens from the River and Bent sites. This trait is a River phase diagnostic. Bannerstones, very common on the Mohawk and Hudson Valley components, seem to be absent at Pickle Hill. Conceivably, such items may have been picked off the site in years past; their number was probably quite small. The small, stemmed crescentic knife, not previously reported for the complex, seems to be unique in eastern New York. The other artifacts-whetstones, choppers, pestle, gouge hammerstones, and ovate knives-are present in the Bent and River site inventories. Besides the bannerstone or atlatl weight, other straits recorded at the Bent and/or River sites, but lacking at Pickle Hill, include effigy pestles, adzes or celts, and pitted stones.

Pickle Hill also seems to have shared in the postulated subsistence pattern of the River phase. The large stone features at Pickle Hill are duplicated at the Bent site. Carbonized acorn cotyledons from features at both sites may signify that acorns were roasted on such features to remove tannic acid (Ritchie 1965:128). The majority of artifacts on all River stations pertain to hunting activities. At Pickle Hill, 65% of all artifacts were whole, fragmentary, or unfinished projectile points. Scrapers, such as those found at Pickle Hill, are usually assumed to have been used in working hides, but a more likely function in view of their small size may have been woodworking (Ritchie, personal communication). Gouges and other ground stone implements may have served to chop trees, cut poles for houses, or carve dugout canoes. As previously suggested, the anvil-hammerstone may have functioned partly as a rest for chipping projectile points. Hammerstones were probably multi-purpose tools. Whetstones could have been employed in shaping ground stone woodworking tools, but their function in the culture remains problematical, as is the case with so many artifacts from archeological contexts.

Radiocarbon dates from the Bent site have placed the River component there at about 1350 B. C. and 1930 B.C. (Ritchie 1965: 126). The younger date is regarded as less acceptable. This interpretation receives considerable support from a date of 1760 B.C. ±

PLATE 2. PICKLE HILL SITE ARTIFACTS. Figs. 1-9, 12, 15, 19-21, Normanskill points; 11, 13, 14, 16-18, narrow-bladed stemmed points; 10, crude side-notched point with unfinished base; 26, indeterminate point; 27, stemmed crescentic knife; 22-25, 28-30, retouched flake scrapers; 34, ovate knife; 36, 37, whetstones; 31, anvil- hammer stone; 33, shallow-lipped gouge; 35, pounding or chopping tool; 38, ovate chopper; 23, pebble hammerstone.

Materials: 1, 6, 9, 11, 12, 14, 15, 18-21, 27, 32, Fort Ann flint; 3, 22, 28-30, Onondaga flint; 5, 8, 16, Normanskill flint; 7, 13, 25, 34, Little Falls? flint; 2, 23, Kalkberg? flint; 4, Deepkill flint; 10, 26, gray cherty slate; 17, quartz; 24, 31, 35, 38, quartizite; 36, 37, graywacke; 33, prophyritic basalt.

100 years (I-2401) based on the combined charcoal samples from features 1 and 2 at Pickle Hill. The charcoal was submitted by Robert Funk to Isotopes, Inc. in October, 1966. Thus, based on both absolute and relative (stratigraphic) chronological data, the River complex occupied a time period intermediate between the Sylvan Lake complex, dated 2210 B.C. in the lower Hudson Valley (Funk 1966a; 1966b; Funk, Weinman, and Weinman 1965) and the Snook Kill complex, dated 1470 B.C, at the type site in the upper Hudson Valley (Ritchie 1965:135).

The Pickle Hill component is the first reported River complex manifestation which is not located on a major waterway. Its small size indicates that it was a seasonal camp site, visited by small bands of people, perhaps over a relatively brief period of years. The darkened area, seen from the air, may represent the traces of a single family lodge.

All evidence points to the conclusion that Pickle Hill was occupied in fall and winter, when acorn-collecting and hunting were the main subsistence activities. Following spring thaws the River people probably moved to Lake George, the Hudson River, or other bodies of water where fish and shellfish were available.

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THE TUXEDO-RINGWOOD CANAL

Edward J. Lenik North Jersey Highlands Historical Society

In this day of tremendous mechanical earth-moving equipment, the job of digging a ditch 3 miles long, 3' deep, and 7 1/2' wide would not offer a serious challenge to any engineering firm. Imagine if you can, doing such a job without the help of any mechanical equipment-just pick, shovel, and wheelbarrow through a wild and unspoiled wilderness. It seems nearly impossible, but that was how the Tuxedo-Ringwood Canal was built two hundred years ago. This canal is approximately 3 miles long and runs from the southern end of Tuxedo Lake, Orange County, New York in a southwesterly direction to the Ringwood River.

The canal, small in size, perhaps only a ditch, was one which exerted considerable influence on the economic development of the North Jersey area. Virtually at the doorstep

of millions of people living in the metropolitan regions of New York and New Jersey, it has been completely lost in the rush of civilization.

The Tuxedo-Ringwood Canal was built around 1765 by Peter Hasenclever. Hasenclever, a German, headed a London syndicate which formed a corporation called the American Iron Company, which proposed to develop an iron empire in America. Hasenclever's accomplishments in America can be described as incredible. Within a year after coming to these shores he had brought over 535 fellow Germans. Under his direction they built forges, furnaces, dams, houses, stables, bridges, reservoirs, ponds, mills, and other buildings. He developed iron works at Ringwood, Charlotteburg, and Long Pond in New Jersey and at Haverstraw and Cortlandt in New York-truly an industrial enterprise of gigantic proportions even when measured by today's standards.

The Ringwood Ironworks was the largest and the principal works of the American Iron Company. Hasenclever in his autobiography (Hasenclever, 1773:7) tells us that at this ironworks he built the following:

1 Furnace	25 Colliers houses
4 Forges, 11 fires	1 Sawmill
1 Stamping-mill	1 Gristmill
5 Coal-houses	1 Horse stable
3 Blacksmith shops	1 Carpenter shop
17 Frame houses with bricks	4 Barracks and Barns
4 Square log houses	1 Reservoir
3 Stone houses	4 Ponds
1 Store house	2 Bridges

In the above inventory, the reader will note that Hasenclever created "1 Reservoir." This reservoir was called "Toxito Pond"; it is the present-day Tuxedo Lake. A description of this reservoir and the canal to Ringwood is given in a report submitted by four appraisers to Governor William Franklin of New Jersey in 1769. Hasenclever cites this report in his book, and a portion thereof (op, cit.: 68) reads as follows:

"These works [The Ringwood Ironworks located in present day Passaic County, N.J] formerly were liable in droughts to be in want of water, so that it has sometimes happened, that the works were obliged to stand still for several weeks at the best season of the year for working; but this defect is now entirely remedied by an immense reservoir, in which the water is collected in the rainy seasons, and let off in the dry seasons, in such proportions as is found necessary to supply the deficiency of the natural stream of the Ringwood river. This reservoir is a pond, called Toxito Pond, is about three miles long and near a mile broad, it formerly emptied itself into the Ramapogh river, but by an immense dam of 860 feet long, and from 12 to 22' high the natural outlet is stop'd up, and the water raised to such a height as to take its course with a head of 10 feet high into a long new canal which conducts it into the Ringwood river."

This document provides us with a meager description of the location and function of the canal. The facts as given in the appraisers' report are supported by a "Map of the Highlands in the State of New York" drawn by Robert Erskine in July, 1779. On this map, Erskine notes the existence of "Hasenclever's Dam" at the northern end of "Toxedo Pond." Also, a stream is shown flowing from the southern end of the lake into the Ringwood River. Although this stream is not marked as a canal it undoubtedly is the one described in the aforementioned report. Boyer (Boyer 1931: 20) calls this reservoir and canal "the first attempt in America to conserve and store water in the rainy season so as to supply industrial establishments during the dry period of mid summer."

In February, 1965 this writer decided to explore the area leading from the southern end of Tuxedo Lake, New York. A fairly recent historical account indicated that a portion of the canal was still in existence. Edward Ringwood Hewitt in *Ringwood Manor, The Home of the Hewitts* published in 1946 stated that "the water of the lake was led by a ditch

from the south end of the lake into a brook flowing into the Ringwood River. This ditch can still be seen to the east of the wagon road near the south gate of Tuxedo Park. Water flowed to the Ringwood River in this way. . . . . "This account is a correct one, as a good portion of the canal is still in existence and was readily apparent at this season of the year since there was some light snow on the ground.

The measurements of the canal indicated that it was 3' deep, its channel was 7 1/2' wide, and some 14' from bank to bank. Repeated measurements at several points along the existing canal revealed very little variation in these dimensions.

This writer made several subsequent visits to the area in search of evidence of charcoal along the banks or bottom of the canal. Hasenclever in his book had written (op, cit.:88) "I had laid a plan to float the coal wood from 8 to 10 miles distant by the lakes, rivers, and canals (underscoring mine) to the furnaces and forges, by which a great expense of cartage would have been saved and the coal wood have been much better." However, no evidence of charcoal was found along the existing portion of the canal; hence, the writer concludes that Hasenclever's plan was not accomplished-at least not at this location.

This historical survey has attempted to verify and expand written history, When history is written, many details are often considered too trivial to be included or too commonplace to mention. This survey has rediscovered some of the details and gives a clearer and fuller understanding of this historical event.

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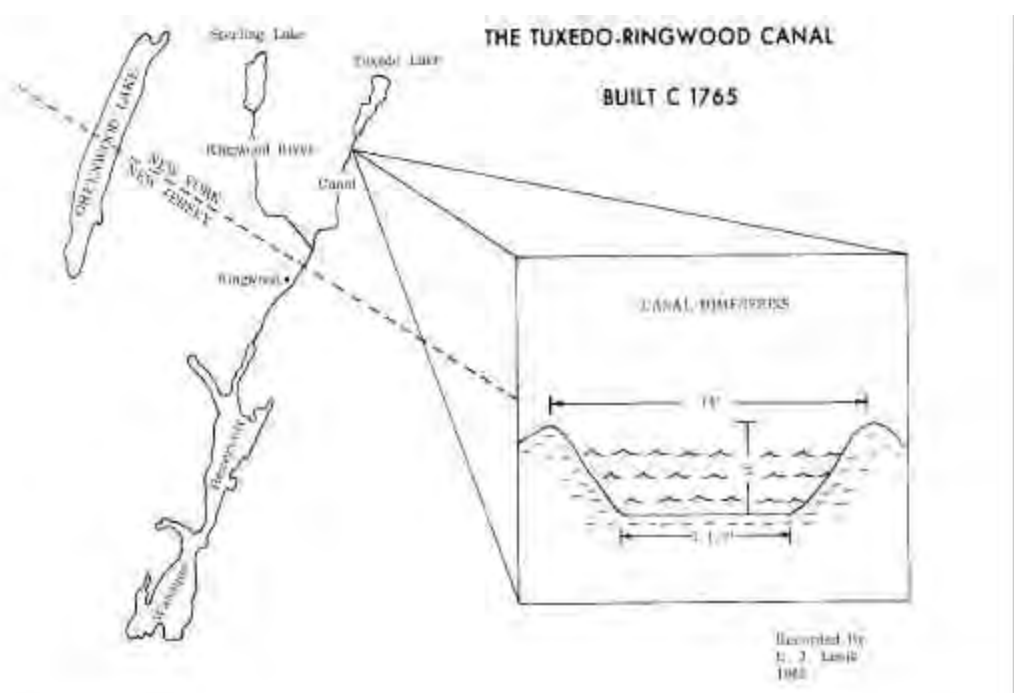

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