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HAMMERSMITH CHRONOLOGY AT SAUGUS

By William S. Fowler

PREFACE

After several years of unceasing labor, restoration of the First Iron Works in America at Saugus, Massachusetts is nearing completion. This has been an extensive project sponsored by the American Iron and Steel Institute. Its successful outcome has been made possible, largely as a result of the devoted efforts of its archaeologist, Roland W. Robbins.

During the course of operations, Mr. Robbins brought to my attention certain factual evidence which had come to light that seemed to him to have important bearing upon aboriginal research being carried on by various groups of the Massachusetts Archaeological Society. There was at the Saugus site such close relationship between historical and excavated evidence as to suggest the probable age of certain Colonial artifacts. These products are generally referred to as "contact artifacts" by prehistoric archaeologists, and are sometimes encountered among grave goods recovered from exhumed aboriginal burials of Colonial days, or from refuse pits on Indian sites. At once I recognized the importance of this information that was now available for archaeological research, and when Mr. Robbins invited me to undertake an illustrated report of it, I readily agreed to do so and submit for publication in the Society Bulletin.

I wish to acknowledge the many courtesies extended me by Mr. Robbins during my study of the evidence and inspection of the ironworks during its reconstruction. His willing assistance at the expense of valuable time taken from his regular duties is evidence of the confidence he places in the value to be derived from the data introduced in this paper.

HISTORICAL BACKGROUND

Little more than twenty years after the Pilgrims landed at Plymouth—an incredibly short period—steps were taken by certain courageous Colonists that ultimately resulted in construction of the most ambitious industrial enterprise to be undertaken during the first century of Colonial growth in New England. John Winthrop, Jr., son of the first governor, brought to the New World knowledge of iron manufacture as then practiced in Ireland, as a result of his course of training at Trinity University in Dublin. Confident of the ability of Yankee ingenuity to equal or better that of the Old World, he promoted the idea of iron manufacture in New England. His activities took him to London, where in 1641 he persuaded a group of capitalists to invest money in what was known as the "Company of Undertakers for the Iron Works in New England." From this inconspicuous start, and after an unsuccessful first attempt at Braintree, a successful iron-works was established at Saugus only a few miles north of Boston. It was called the Hammersmith works, and here was established a blast furnace and forge for the manufacture of iron extracted from bog ore that was dug up in the immediate neighborhood.

So now, a century and a half after 1500 when a charcoal blast furnace was first introduced into England by Normandy and Picardy French, New Englanders had started to produce for themselves iron, the all important metal from which so many of their household, agricultural, and military utensils were made. Some of the evidence referred to in this report has to do with a manufacturing unit of the ironworks that was privately built and operated.

In 1646, during the building of the main works at Hammersmith, a skilled blacksmith by the name of Joseph Jenks obtained the first American patent for his "engines for mills to goe with water" (water-wheels). Obtaining locally the required capital, he built a blacksmith's forge handily located in respect to the main plant; installed three water wheels, subsequently raised to a higher level due to interruption from flood tides after operating successfully for some time, and there manufactured all kinds of wrought iron products from wrought iron stock bought from Hammersmith, as produced in their larger finery forge. Thus, Jenks operated what might be called a concession on the premises of the iron-works. Hammersmith operated till about 1670-1675 turning out at times as much as a ton a day of various sorts of iron products. After this date it was completely abandoned and never again manufactured iron. During this span of about 25 years of iron production, the various objects appearing in the illustrations were either made, used, or processed...
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in some way at the foundry. As will be shown, some belong to the beginning of the period while others are associated with its close.

MANUFACTURE OF INDIAN TRADE GOODS

Among many objects recovered from the ironworks, those that seem significant for archaeological comparison as representing articles often used in barter with the Indians are brass spoons; clay pipes, brass pins, jew’s harps, iron fishhooks, and small iron axes or hatchets. With reference to the latter and in an effort to determine the market for which these hatchets were intended, it may be helpful to refer to a letter of about 1657 written by one William Curtis, an apprentice to Joseph Jenks. In the letter he is applying for a job from Winthrop, Jr. at his Connecticut ironworks, which by then was another Winthrop venture. Curtis puts it quaintly in this way: “Master John Winthrop, I remember my loving service to you hoping you are in good health as I am at this present and I will be your smith, if you please, to make all your iron ware which belongs to forge or furnace, and I know there is none that can do it so well as they that are used to it, and to make all sorts of ware that the Country has need of both for Englishmen and Indians and I hope to be profitable for you and I rest you as your loving friend.” Here it may be seen that the Indians were included among those to benefit from iron products made at the ironworks. Just what kind of articles may have been meant by “all sorts of ware” might have been gleaned from a list of objects manufactured by the foundry for the Indians, if it had not been destroyed by fire. That such a list existed is vouched for by Fred M. Terrill, an old time resident of Saugus, and one who always has taken keen interest in Indian evidence appearing about the area. In 1952, Terrill wrote to Mr. Robbins and refers to this list in these words: “I once saw a list of objects created for the Indians, by the “Foundry”, it was on a sheet of gray, thick—either paper or vellum, written in ink—old fashioned spelling, but what interested me, was a notation of 28 Hatchets, for ye Indians.” Unfortunately, he fails to recall the other objects that the list included. He goes on to say that the owner of it, Mary Cheever, told him it had been in her family for years; promised to let him have it; but died before making the transfer. Worst of all, when Terrill went to retrieve it later on, he found it burned with all Mary Cheever’s effects in a fire that destroyed the Town Farm where she had been living.

From these two references it seems most probable that the small axes, as illustrated, from the Jenks works were some of the hatchets made for “ye Indians,” to be used by them as tomahawks. As a matter of interest, the famous iron tomahawk snatched by Hannah Dustin in March 1697 from her Indian captor while he slept, and with which she killed all ten Indians who were asleep in the wigwam escaping with their scalps, is nearly identical to the Hammersmith specimen (Fig. 13, No. 4). Both are perforated in a plain head for handle insertion and are comparable in size and shape. The Dustin hatchet has been preserved by Dustin descendants, (Bulletin of the Massachusetts Archaeological Society, Vol. 12, No. 3, Fig. 14, No. 1). While other objects made for Indian trade are not established by the foregoing data, it is known from certain recorded Indian land deeds that jew’s harps were often included among such material. Therefore, it is of interest to note that a brass jew’s harp as well as two iron ones have been recovered. The brass specimen was found in the dock basin at the main plant, while the two iron jew’s harps were unearthed at the Jenks’ blacksmith forge. The iron specimens, but not the brass one are presumed to be products of the ironworks. Of other illustrated objects, small and large hand made brass pins were taken from the Jenks’ works and are presumed to have been fabricated there. These seem significant and were likely made not only for domestic consumption but for trade with the natives as well; hand made silver pins akin to these brass ones in head style were recovered from the Fort Hill Indian stockade in North Middleboro, Massachusetts, during its recent excavation by the Cohan net Chapter of the Society. In fact, all remaining kinds of objects as illustrated may likewise have served as trade goods at one time or another and may be expected to appear from time to time at Indian habitation sites. Concerning the spoons, all recovered specimens except the one of pewter are made of sheet brass. The maker’s touch, or hallmark appears in the bowl of many, indicating European manufacture. All except three or four display surface gilding, and since the frequency of gilded
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specimens is relatively high, it is thought that the process of gilding may have been carried on at the ironworks, although this is only a speculation. C. Malcolm Watkins, Division of Ethnology, Smithsonian Institute, states that these are the first gilded spoons he has seen among the hundreds of Colonial spoons he has examined.

CHRONOLOGICAL EVALUATION

Since the span of manufacturing at Hammersmith is known to have lasted only 25 to 30 years, it seems advisable to recognize but two chronological periods: one, during the first few years of operation as revealed by the Jenks' evidence, from 1646-1655; the other, toward the close of manufacturing from 1670-1676.

Those objects that belong in the earlier age are shown in Figure 13. They were recovered mostly from beneath the base sills of Joseph Jenks' water wheels—a few are from the Jenks' working area—and are presumed to represent part of the floor accumulation from the earliest operation of his forge. All other objects as shown in Figure 14 came from the fill at the dock basin site. At this place that is directly in front of the Hammersmith large forge, there is every reason to believe they were washed from the wharf into the water as a result of the breaching of a large up-stream dam in May, 1682. In the flood that resulted, surface material in the Hammersmith dock yard below the main forge must have been washed overboard. Therefore, recovered artifacts from this spot should represent remains of the period toward the close of manufacturing operations and before the flood. This final catastrophe is vividly recorded in proceedings of the Ipswich Court: the Saugus river became so filled with soil as to necessitate a carry of one mile or more for those who wished to navigate the river.

DESCRIPTION OF ARTIFACTS

AND DISCUSSION

TOMAHAWKS, (Fig. 13, No. 2-4). In this group are three iron hatchets recovered from the Jenks' works, and representing the early stage of operations at the iron works. Their heads are plain and are perforated for insertion of handle, similar to the historic Dustin tomahawk as previously mentioned. They are unadorned, and apparently were made in a shape to serve as cutting implements as well as for use as weapons. However, from historic evidence already presented it seems clear that they were intended for barter with the Indians as tomahawks. Native stone and wooden clubs were thus replaced with these more efficient iron weapons. This evidence supports my former contention in "Trade Tomahawks," (Bulletin of the Massachusetts Archaeological Society, Vol. 13, No. 3, p. 24): "All during the 17th Century metal hatchets that found their way into Indian hands probably were plainly constructed small axes for the most part." Incidentally, it is altogether possible that the Dustin tomahawk of 1697 is a Hammersmith product that found its way into Indian hands years before it turned up in such a spectacular way. Nevertheless, it is also possible it may have been a later product of other New England ironworks which by then had become established. If the latter supposition is true, then it appears likely that the plain hatchet-tomahawk was the preferred style throughout the 17th Century.

FIG. 14. Late period of manufacture. Hammersmith Ironworks, 1670-1676; 5, three times original size.
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Jew's Harps, (Fig. 14, No. 3). In this category is exhibited but one specimen that is made of brass, from the late stage of operations. However, two other partially preserved jew's harps of iron of substantially the same size were also recovered, but these came from the Jenks' blacksmith forge area. These iron specimens are presumed to have been manufactured at the plant, but it is doubtful if the brass specimen was made at Hammersmith, although its presence there indicates period relationship. Probably, jew's harps were produced partially for Indian barter, for certain land deeds of the day, already mentioned, include this commodity as a medium of exchange.

Fishhooks, (Fig. 14, No. 4). This product appears in both the large illustrated size as well as in smaller sizes. They are all made of iron with a knob at one end, while at the other appears the hook with barb. Recovered from the Jenks' and dock basin areas in the last stage of operations, such hooks were in demand throughout the 17th Century by English and Indians alike, and probably were made with both parties in mind. In 1634, William Wood included in his report the following statement: "Since the English came they (Indians) be furnished with English hookes and lines, before they made them of their owne hempe more curiously wrought, of stronger materials than ours, hooked with bone hookes: but lazinesse drives them to buy more than profit or commendations winnes them to make of their owne."

Pins, (Fig. 13, No. 1). In this group are more than 1500 hand made brass pins, large and small, all resembling the illustrated specimen, and all taken from the early stage of manufacture. Pin heads are nearly round with a slight groove extending around the middle. These pins are made from drawn bass and many of the heads were formed by wrapping a small brass piece around the end of the pin. Since they are from below the wheel pits of the Jenks' forge they are presumed to be an early product of this part of the ironworks.

Clay Elbow Pipes. Illustrated specimens display several different pipe styles that appear among a dozen or more European made elbow white clay pipes, and three of red clay, recovered from both the early and late stages of operations at the ironworks. In the former from the Jenks site appears an English made pipe (Fig. 13, No. 5). The bowl of this pipe has nearly straight parallel walls, a characteristic shape among many contemporary pipes from England; is made of white clay; stem is missing; the bowl rim is perfectly plain, without heel. Another early specimen (Fig. 13, No. 9) is of white clay with a groove extending around the bowl's rim; contour of bowl is slightly bulbous with truncated heel bearing an initialed touch—P E. A similar pipe (Fig. 13, No. 10) bears essentially the same traits with the same initialed touch—P E. However, its bowl rim is left plain; stem is missing. A fourth pipe (Fig. 13, No. 7) is of white clay; has a plain bowl slightly bulbous of relatively small diameter, thus making it appear elongated; truncated heel is without touch; stem is missing. A fifth specimen (Fig. 13, No. 6) is of white clay; bowl rim is grooved; bowl contour is gracefully bulbous with truncated heel that bears no touch; stem is missing. The last specimen of this series (Fig. 13, No. 8) is of red clay; has a bulbous bowl with rim that slips off in a bevel; its truncated heel appears without touch; stem is missing.

In the late stage of operations occur two pipe styles; illustrated specimens are from the dock basin. The first to be considered (Fig. 14, No. 1) is of white clay with a plain bowl, strikingly bulbous that terminates in a relatively small mouth; has a truncated heel without touch. The second specimen (Fig. 14, No. 2) is of white clay with bowl missing; has truncated heel with initialed touch—R T. It is probable that this touch indicates the maker as Robert Tippet of England, who is known to have made clay pipes about 1675. This reported historical date of manufacture coincides with that established by the Hammersmith data, and may suggest comparable age reliability for other objects in this late stage grouping.

Spoons, (Fig. 13). Four different spoons have been selected for illustration from eight or more specimens recovered from both the Jenks' as well as the main works area. While the latter should suggest the last stage of operations, it is probable they all belong to the early stage as will be shown further on. Of the four styles, the seal-top is the only one to be duplicated by other specimens, not illustrated. However, seal-top embellishments differ slightly, and touch marks whenever present are dissimilar, to be referred to further along.
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In the early stage from the late operations at the Jenks' works appears a flat handled brass spoon (Fig. 13, No. 12), with stem tapering toward the bowl. The end of the stem is slightly rounded; its edge has three ornamental notches, the center one being the longest one of the three. The bowl is somewhat elliptical in shape, and within it appears a touch without initials of a heart pierced by an arrow inside a diamond shaped outline. Percy E. Raymond calls this type a "Puritan" spoon, (Bulletin of the Massachusetts Archaeological Society, Vol. 11, No. 1, p. 8). This brass spoon has not been gilded or plated, but its stalk is similar to the stem of a latten spoon reported by Raymond from the Governor Josiah Winslow site in Plymouth. This evidence seems to suggest a middle 17th Century provenience for this type of spoon, which agrees with Raymond's dating.

A pewter spoon (Fig. 13, No. 11) without handle, which if present would have been no doubt of horn or wood has a fig-shaped bowl, said to be an early trait. Although it was recovered from the main works area, because of the bowl's shape and its pewter content, it belongs to the early part of the 17th Century according to Mr. Raymond.

Another style said to belong to the early 17th Century (Fig. 13, No. 13) is what is known as a seal-top, "short type." That is, its stem is terminated by a flat faced, more or less oval knob, something like a seal in shape below which is a plain ball and single annulus. The stem is slender, enlarging slightly toward the bowl that is elliptical in shape; has touch mark without initials displaying a rose (Tudor rose) enclosed by a circle. This is sometimes called the rosebud pattern and may symbolize the Tudor rose, therefore, probably of English manufacture. (The Tudor period was concluded sometime after the start of the 17th Century). This spoon is made of brass; one of those not gilded.

The fourth specimen (Fig. 13, No. 14) is made of brass; is also not gilded. Its slender stem has a rounded end that is cut off in a bevel, from which this style derives its name of slip-top. The stem tapers toward the bowl in which is a touch without initials of a single fleur-de-lis. F. G. Hilton Price of London, 1908, authority on old metal spoons, calls this touch the "Paris mark," which probably indicates French manufacture. The bowl is fig-shaped and is somewhat worn. The shape of bowl as well as the touch without initials signify probable manufacture before 1650 according to Percy E. Raymond. This justifies inclusion of this spoon in the early stage at Hammersmith.

Several more spoons, made of brass and gilded but not illustrated, were recovered from the main works, and from the Jenks' area as well. They are a later style of seal-top with a more rounded seal and more ornate ball and annulus. Two have no touch marks, while two exhibit a touch with initials within the bowl, indicating manufacture after the middle of the 17th Century. One of these consists of three spoons enclosed by a circle (Fig. 14, No. 5), above which are the initials—I C. These probably signify the maker to have been Isaac Conant, an English manufacturer. The other consists of the same three spoon touch, but with the initials—G P, maker unknown. With the exception of the brass-not-gilded "Puritan" spoon, all other recovered spoons have been dated typologically rather than as related to their area of deposition at the ironworks. This method of analysis seems appropriate for this
kind of evidence, since spoons usually last for many years and are used by several generations. Furthermore, if they were gilded at Hammersmith, it is likely that both early spoons showing wear, which were brightened and made to look like new by the process, as well as later styles, might well be represented in surface accumulations from different areas of the ironworks.

As a corollary to the Hammersmith evidence, Fig. 16 shows an iron tomahawk with spiked head carried by William Denison of Stonington, Rhode Island, during the French and Indian War of 1740-1748. Preserved by Denison descendants, it is now on display in its original haft in the museum of the Rhode Island Historical Society, Providence, Rhode Island. This historic evidence is significant for it shows that spiked headed tomahawks were in use by the middle of the 18th Century, and were carried by Colonial settlers in combat as well as by Indians. Moreover, it verifies a previous hypothesis presented by me in "Trade Tomahawks," (Bulletin of the Massachusetts Archaeological Society, Vol. 13, No. 3, p. 24): "Apparently it was not until about the middle of the 18th Century that trade hatchets began to be made with specialized features that better fitted them for tomahawks. Blades assumed smaller proportions, and at first were made with a spike at the top." It is fortunate that the Denison tomahawk, although its existence was unknown to me formerly, has now been located with important implications. In the evolutionary development of iron trade tomahawks, this evidence now convincingly establishes the position of spiked headed hatchets as being in use, and probably manufactured, toward the middle of the 18th Century.

To show how the Hammersmith evidence may be valuable in helping to date artifacts recovered from Indian camp sites or graves, illustrations of an iron tomahawk and white clay pipe are presented (Fig. 15). These specimens along with two additional iron tomahawks of a similar style, not illustrated, were found in 1952 by Milton Hall and Frederick A. Hawskley on a habitation site, Churchill Lake, Maine, situated north of Moosehead Lake. Comparison will show the tomahawk to be of the Hammersmith type, therefore, presumably a product of the 17th Century, although this type may have continued in use during the 18th Century. The pipe resembles exhibit (Fig. 14, No. 1) of the late stage at the ironworks toward the end of the same century. One variation from that of a plain tomahawk, however, is noted in the form of a small cross that is impressed into the hatchet's blade. This may suggest Canada as its source, since French Jesuits of that country are known to have provided their Huron allies with tomahawks for use against English heretical Protestants in New England. Correlation of these deductions might suggest that Indians from Huron camps on the St. Lawrence River stopped over on Churchill Lake either to or from a raid on New England settlements in the First or Second Indian Wars toward the close of the 17th Century.

Bronson Museum,
Attleboro, Mass.
July 9, 1953
THE INDIANS OF THE COCHATO RIVER VALLEY

By Kenneth M. Ayres, June Barnes, Robert Barnes, Wesley Cote,
Guy Mellgren, Douglas Prince, Edward Runge, and Janet Wilder

Presented by Guy Mellgren at the October 2, 1954 meeting of the Massachusetts Archaeological Society

In prehistoric times, in what we know as the Cochato River Valley, there lived bands of Indians who left indelible records of their cultures in the stone artifacts which are being found today by members of the South Shore Chapter of the Massachusetts Archaeological Society.

For the past three years, the chapter has concentrated on excavating several sites on the Cochato River, with additional work being done throughout the valley by individuals.

The Cochato River flows north northeast, beginning in the township of Holbrook. After winding nearly five miles through Randolph, it is joined by the Blue Hill River in South Braintree and at this point becomes the Monatiquot which empties into Fore River and thence flows to Hingham Bay.

Along the shores of the Cochato and its tributaries are many knolls and level plains which made ideal habitation sites for prehistoric man.

From evidences of sites on the upper reaches of the Cochato, it seems likely that the Cochato Indians established winter camps all along the river and its tributaries. These people probably were active here during the Early and Late Archaic Periods which have been estimated as being somewhere between the years 3000 and 1500 B.C.

The Cochato River probably became un navigable toward the close of the Late Archaic Era. This network of waterways may never have been easily traveled and presumably became unusable through natural causes.

The basis for this presumption is three-fold:

First—All the artifacts from the sites examined by the South Shore Chapter were of Archaic types.

Second—Almost no evidence of later cultures has come to light in the valley. Neither soapstone nor pottery has been found.

Third—A study of the geology of the valley shows three great subterranean ridges of bedrock running north and south. These underly glacial deposits so complex that the topography of the area is difficult to interpret. Its many swamps are due to interference with natural drainage by the bedrock ridges and erosion of glacial deposits.

We feel that after the choking of these streams and the filling of many lakes, the area ceased to be utilized by people of later cultures because of the magnetism of greater waterways—the Neponset, Charles and North rivers.

With its marshy borders grown into dark swamps, our valley no longer invited community living. From the mouth of the Fore River, north to the Charles or south to Hingham Bay, the Indians could choose summer quarters from many delightful shore or island locations.

Our map of the valley is crowded with 21 known sites, from each of which we have collected artifacts or have seen well-recorded finds. The list of prehistoric habitation sites includes eight where excavation has been done by chapter members; four which have been surface hunted and test pitted; four more surface hunted and having records of finds by others, and five which have been destroyed but have clear records of finds. (Fig. 16).

For excavation purposes, South Shore chapter first selected two sites in the valley, one known as the Lind and the other as the Mill street site.

The Lind site was and still is being stripped of topsoil for commercial use, and it was there that many chapter members, in a race against the bulldozers, gained their first archaeological experience. Thanks are due to the owner, Mr. Lind, who allowed the chapter complete freedom of action.

When the chapter started work at Mill street, it hoped to get an accurate picture of an undisturbed Indian village. (A detailed report of these findings is being prepared for future presentation.) The Mill street site has been partially removed, and through the cooperation of its owners, the Tucker family and Dr. Paul Runge, the chapter was permitted unlimited excavation.
FIG. 17

Sites in the Cochato Valley
1.—Lind Site
2.—Burns' Mortar
3.—Mill Street
X—Other Known Sites
THE INDIANS OF THE COCHATO RIVER VALLEY

Without prejudicing future conclusions, the weight of evidence now is that the Cochato Valley had its heaviest prehistoric habitation during the Early Archaic Period, with some evidence of a Late Archaic occupation.

The Mill Street site showed a much greater concentration of artifacts than the Lind, although the latter showed a greater distribution over a wider area.

(Artifact classifications used in this report are in accordance with those proposed in the Society "Bulletin" of October, 1953.)

ARCHAIC EVIDENCE

Early Archaic evidence at both Lind's and Mill street showed a predominance of projectile point type corner removed number 5, (Fig. 17), and corner notched (Fig. 17, No. 2). There was a small quantity of corner removed number 9 (Fig. 17, No. 3).

One of the outstanding characteristics of the Early Archaic phase was the tremendous quantity of oval blades ranging in length from one and one half to six inches. These are leaf shaped (Fig. 17, No. 4), and stemless (Fig. 17, No. 5).

Several semi-lunar knives (Fig. 6) were found and one reconstructed knife is nine inches long and five inches wide. All have well defined enlargement of the back.

In the same stratum with other Early Archaic type artifacts, a number of drills, plain (Fig. 17, No. 7), T-base (Fig. 17, No. 8), expanded base (Fig. 17, No. 9), and exceptional examples of cruciform (Fig. 17, No. 10) were found, as were several chipped axes, a grooved net sinker and fragments of gouges.

The majority of scrapers were steep-edged, with a small number of stemmed type (Fig. 17, No. 11).

Of ball hammerstones, a few had finger depressions. These were in heavy deposits of chips.

There were numerous fireplaces including both open-hearth and walled-hearth types, some intact and others disturbed to varying degrees.

Two paved areas were exposed at Mill street. One was triangular in shape, about 30 inches to a side, and the sides convex, paved with stones three to four inches in diameter and quite uniform. The other was also triangular about six feet long with a three foot base.

Two caches were discovered at Mill street. One contained five or six rough blades of quartzite and the other a like number of felsite.

A portion of a polished bannerstone (Fig. 17, No. 12) was unearthed from the Early Archaic zone and the beautiful brown mottled material was not indigenous.

Of what we believe are Late Archaic projectile point forms, number one eared (Fig. 17, No. 13) outnumbered corner removed number two's (Fig. 17, No. 14).

SURFACE FINDS

Throughout the area, surface finds included two grooved axes, points, knives and scrapers following the same pattern as described previously; several discoidal blades (Fig. 15), two pitted stones, four chipped axes and several pestles and gouges. Two lap anvils about two inches thick and ten to twelve inches in diameter were nearly overlooked.

Occasional finds of triangular points (Fig. 17, Nos. 16, 17) in widely scattered spots would seem to indicate that hunters passed through the area in later times.

Of more than 1200 classifiable items, about 90 percent were Early Archaic.

At Mill Street, in one place, there was a separation of Early and Late Archaic levels, with a variable sterile area between, while Late Archaic artifacts were found in other places without stratification evident.

In the Lind river field, almost all material was of the Early Archaic Period, but not far away on a knoll, a small temporary camp site disclosed artifacts of more recent people.

Eastward, across the river, a quarter mile from the Mill Street location and about 300 yards from the river, stood a mortar on the land of Robert H. Burns. To prevent its destruction through widening of a road, South Shore Chapter members moved it 100 yards, relocating it on Burns' front lawn, where the owner will continue to protect it.
THE INDIANS OF THE COCHATO RIVER VALLEY

Found in association with Late Archaic material is an unidentified object of reddish sandstone. It measures 11 inches long, 5 inches in diameter and tapers to a point at each end.

On the surface of the stripped area at Mill Street, a metal projectile point, (Fig. 17, No. 18) was found. This, along with a few other objects found mainly on the surface, did not belong to either of the Archaic periods. The point is of copper or brass, triangular in form and about an inch and a quarter long, with concave sides and a convex, recessed base, with a sixteenth inch hole in the center. The heavily verdigresed metal is about one thirty-second of an inch thick.

The chapter feels that so far only the surface of the Cochato River Valley has been scratched. As the erosion by nature and the destruction by man tend to obliterate these records left in stone, we hope that work like ours, and continued use of names like Squaw Rock, will recreate for others a picture of prehistoric Americans.

Study is continuing, and as the work goes forward, we are still of an open mind regarding our conjecture that the occupation of the valley was mainly in the Archaic periods.

* * *

REFERENCES


Dr. Henry F. Howe, “Archaeology of the Lower North River Valley”.
THE SHIP'S SHORING AT FOLLINS POND*

By Frederic J. Pohl

Geographical theory led to the conclusion that Leif Ericson and his men had entered the mouth of the Bass River on Cape Cod and had ascended the river for about six miles and had camped on the south shore of Follins Pond.† Thus to pinpoint the site in the wide expanse of our continent seemed unwarranted unless incontrovertible evidence of it could be found. Nevertheless, the Massachusetts Archaeological Society became sufficiently interested to arrange a digging project in the spring of 1952. I can never adequately thank the M.A.S. members for their willingness to investigate and for their active cooperation, and for what they accomplished in a few hours.

The day before the dig, the President of the M.A.S., Mr. Howard C. Mandell, went to the pond to inspect likely areas for the digging. He asked me what one area could be considered most promising. I knew that it was the invariable custom of the early Norse to haul up a ship on shore for the winter, and to build a shed over it for its protection. In the wilderness of North America, Leif Ericson and his men would certainly have taken such precautions with the precious ship upon which their lives depended. I therefore pointed to a gully which was the only place along the south shore of Follins Pond where they could have brought their ship ashore. Everywhere else along that shore there are boulders and a steep bank 25 to 70 feet high. But there is a gently rising beach at the shore end of the gully, and the floor of the gully rises only about 5 feet in the 160 feet of its length. The gully is about 35 feet wide, flanked by hills 25 to 35 feet high.

“Why should we dig here? What for?” Mr. Mandell asked.

“For evidence that a ship has been shored, not built here but shored.”

“How large a ship?” was the next question Mr. Mandell asked.

“About 65 feet over-all length with an 18 foot beam,” I replied.

This was a size extremely improbable on the shore of a pond only three-quarters of a mile long. Only in view of my theory did it seem sensible to imagine so large a ship in that place. A ship of such dimensions would not have been used for fishing in the pond or the river, but it was the approximate size of a Norse trading ship such as the Flateyjarbók saga said Leif Ericson had.

I had in mind a picture of an ocean-going viking ship, with level keel for most of her length, and with a curved dragon’s head on her high curved prow, and an almost equally high stern. She had one mast and a single square sail raised by a windlass. She was undecked with space amidships for cargo, and thwarts for rowers only near the ends. She was double-ended, with graceful lines. I tried to visualize Leif Ericson’s ship in the gully.

On the morning of May 10, 1952 a group of members of the M.A.S. led by the Director of Excavations, Maurice Robbins, went to the gully, where they had to cut down the trees to clear the area in which they were going to dig.

Within twenty minutes after the trees had been cleared away, the first trench they dug had exposed a vertical post 3” in diameter. It was along the median line of the gully. The top of it was 13” underground. Its bottom end was supported by a stone about a foot across, and its sides were flanked with two other stones. Obviously, it had been set in place to bear a weight. Was it a keel-bearing? Over three feet from it towards one side of the gully was a small stake that could have been a prop to keep a ship on even keel. The position of this stake suggested the likelihood that another stake would be found at the same distance away from the post on the opposite side. That other stake was found within two inches of where they looked for it.

In view of the shoring theory, a pattern was immediately apparent. If the post was a keel-bearing and the two stakes were props, then the position of all three showed that the post had not
supported the extreme end of the keel. Therefore, those who were excavating looked for another keel-bearing post in line down the middle of the gully and toward the lake. They found it eleven feet away. In the other direction, further into the gully, they found three other keel-bearing posts and three more shoring props and two prop molds (discoloration of soil where props had been). Soon also, in line with the five posts, they uncovered four keel-bearing stones. One of these was accidentally removed in the digging, leaving a mold. The keel-bearing posts varied from 3" to 5" in diameter. The posts and props were in no instance cut square at their ends. Those who planted them had not used a saw, but had rudely hacked them with a very small axe. The cleanness of one diagonal slash through a prop 2" in diameter showed that the blade of the axe was metal, not stone. Several "bites" where the blade had stopped in one of the keel-bearing posts showed that the blade was slightly curved and about 2\(\frac{1}{2}\) wide. The wood of each post and prop was sound, except for the upper five or six inches, which were spongy.

The keel-bearings, props, and prop molds indicate the dimensions of the ship that had been shored. The ship had a level keel slightly longer than the 58 feet of distance from the first keel-bearing post to the last keel-bearing stone; and for a ship with a level keel of that length, and of the shape which the shoring indicated, we should add about ten feet for overhang at bow and stern. The total over-all length was about 69 feet. The published report of the M.A.S. said "about 70 feet."

The width of a ship cannot be determined with absolute accuracy by the distance the props of a shoring are from the keel blocks. Such props slant inwards towards the ship so that their upper ends abut against her hull. The shoring props in the Follins Pond gully are set at a slight angle inward, a slant of about 1\(\frac{1}{2}\) to 2\(\frac{1}{2}\) to a vertical foot.

The third prop on the east side, which the pattern shows was at the widest portion of the ship, was 8' 6" from the center line of the keel-bearings. When it existed in its full length, its upper end about three or four feet above ground would have abutted against the ship's hull about 8' from the ship's center line, and it is a reasonable assumption that the gunwale extended at least 1' beyond that, so that we have 9 feet for half the ship's width, or a beam of 18 feet.

The chances of anyone's guessing in advance where the M.A.S. would find a ship's shoring, and approximately how large it would be, were extremely small. There are three places on the north shore of Follins Pond where a ship could have been conveniently shored, and at least nine other such places along the upper reaches of the Bass River. For more than a half-mile in from the mouth of the river, the west bank is one continuous shelf where ship shorings might have been. In pointing to the gully on the south shore of the pond, as my theory of Leif Ericson's Vinland camp site impelled me to do, I was choosing one out of more than fifty possible Bass River shoring sites. In telling the M.A.S. to look in that gully for a ship's shoring, I was choosing one out of four possibilities that had occurred to me; for I might have told them to look for metal artifacts, or for the foundation of a house sheltered from the winds, or for a kitchen midden. After the discovery, some persons felt that a ship's shoring had been so logical a thing in that gully that they lost sight of the chances stacked against anyone's guessing it. As for the dimensions of the ship that had been shored, my chances of guessing within four feet of the actual length were, modestly stated, no better than one in seven, and my chances of guessing the exact width of eighteen feet were decidedly less than one in ten. My chances of guessing all at the same time, 1 out of 50, 1 out of 4, 1 out of 7, and 1 out of 10 were only 1 in 14,000.

I had not been guessing. My prediction was based on a theory. The finding of the ship's shoring at the exact spot and so close to the size foretold is by the arithmetical law of possibilities a very strong argument in favor of its having been set up in accordance with the theory which led to it.

The next morning, Mr. Roland Wells Robbins, who had been working in another area, came for the first time to the gully, and expressed the opinion: "Not more than 150 years old—200 years at most. This is where an American ship was concealed from the British in the War of 1812, or possibly during the War of the American Revolution. If older than that, the wood would have completely rotted away."

Mr. Robbins had to admit a greater age than 90 years, because no ship of the size indicated could have been brought up the Bass River after the railroad trestle was built in the 1860's.
His opinion was quoted in the newspapers, and many readers were led to think this rendering of adverse judgment to be final. It seemed incredible to some of the men that the ship's shoring might prove to be of early Norse construction. Nails, an adze, and a rusty stove, all presumably of 19th century origin, though two nails or spikes may be much older, had been found in the gully. Though none of these iron objects was in association with the posts and props, they were something for skeptics to talk about.

The official report of the digging, written by Mr. Benjamin L. Smith and published in the Bulletin of the M.A.S. in January 1953, quoted Mr. R. W. Robbins. It did not give a diagram.

It was then that several friends advised me to make a careful study of the details of the shoring. From various sources, from the notes and memories of those who had helped in the digging, supplemented by measurements made in the gully in April 1953, and by consultations and correspondence with Mr. Smith and with Dr. Maurice Robbins, who kindly made a drawing for me from his notes, I assembled the essential data. Mr. Smith and Dr. Robbins are agreed that the diagram I have prepared gives a correct picture of the details.

The tops of the five keel-bearing posts and of the four stones in line with them were within fractions of an inch on a level, except for the fifth post, the top two inches of which had presumably rotted away. The present surface of the gully is inclined, so that while the end of the shoring nearer the lake is only 13” underground, the end farther from the lake is more than 3' under. Presumably, the surface was level at the time the shoring was made, a level of sand on top of a peat bog resting on blue clay. When the original forest in the area was first cut down, the present loam covering could have flowed into the gully in a very few years. It is possible, however, that those who were preparing to shore their ship, dug away the top soil so that the keel-bearings would be on a level. The level keel-bearings indicate that the ship had an equal draft fore and aft. A ship with a deeper draft aft is shored on inclined bearings to keep the deck level.

It is customary to beach a ship bow first. The end towards the lake, marked by the posts and props, was the stern. The pointed shape of that end is clearly established, and the bow would not have been less sharp than the stern. The pattern of posts and props and stones is undeniable evidence that the ship for which they were planted was not rounded at either end or "squared" at the stern, but was sharp at both ends. It was a double-ender.

Men with years of experience in shipyards say that the shoring uncovered in the Follins Pond gully is clear evidence that when the ship was first brought ashore, its keel rested for its entire length upon a row of stones. The stones were adequate support to keep the keel above the surface of the ground, and they were easily laid in a few minutes. On the other hand, considerable labor was involved in planting posts deep in the ground. The existence of such posts is evidence that after the ship had been shored, it was discovered that her bottom along the half of it nearer the lake, needed repair. Since the keel-bearing stones held the keel only an inch or two above ground, it was necessary, in order to make room for workmen to get at the garboards, to dig away successive sections of soil from under that half of the ship and plant the posts to sustain the keel while the repairs were being made.

A much easier way to expose the bottom of a ship so that planks near the keel could be repaired, was to careen her. But for some reason the ship shored in the gully was not careened, perhaps because the mast had been unstepped, or because the men had no effective block and tackle.

The pronouncement that the shoring was "not more than 200 years old," might have been met with a reply to the effect that wood rots away on the Cape in 50 to 75 years when it is underground but above a water table where it is alternately wet and dry. If the well-preserved posts of the Follins Pond ship shoring could be as old as 150 to 175 years, there would seem to be no reason why they could not have an age of 950 years.

For most if not all of their existing lengths, which average more than two feet, the posts and props were below the water table. Wood below a water table, or kept permanently wet by capillary action for a slight distance above the water table, may be preserved indefinitely. Wood is destroyed by bacteria which can live only in the presence of oxygen. Where oxygen is excluded by water,
whether fresh or salt water, wood is permanently preserved. For example, in the Viking Ship Museum at Oslo, Norway, there is the Oseberg ship of the early ninth century. It was found in a mound of blue clay and peat. Most of its timbers had been flattened by the subsidence of the mound, but they were so well preserved after 1100 years that it was possible to steam them back to their original shape.

When a copy of the diagram of the shoring was sent to a civil engineer, a friend of mine who has had years of experience in his father's shipyard, he consulted with his father and wrote me repeatedly in our continuing correspondence that the shoring must have been set up for a viking ship. Weeks later when we met, he lashed at me: "Your letters have completely burned me up!"

Taken aback by his severity, I faltered: "Why did they burn you up?"

"Because you don't recognize that you already have proof!"

"I see why you and your father think the ship's shoring is proof," I replied, "but lacking the special knowledge you and he have, I must consult with various authorities, and try to have wood from one of the posts tested for age."

I first procured a cross section of the largest post, said to be pine, to see whether the pattern of its rings would fit into the known pattern of pine tree rings in New England of the past 300 years. But the post had only 20 rings, and a tree must be at least 40 years old before its ring thicknesses vary enough to establish a pattern.

Having ascertained that a dendrochronological test was impossible, I sought a dating by Carbon 14 count at one of the university laboratories, and withheld from publication the present study of the shoring, pending the radioactivity test.

I supposed that a C 14 count would have scientific finality. But the result I received on March 11, 1954 was unsettling since it was couched in terms of uncertainty. I then planned to have another test made as a "control." But an article in Science, September 10, 1954, page 412, told how samples of carbon awaiting count in the Lamont Geological Laboratory of Columbia University had been contaminated by "fall outs" from atomic bomb explosions, and I was informed by the director of one of the university laboratories that his laboratory "has not trusted any results or dared publish any results since March 1, 1954."

It is now realized by the laboratories that samples of pure carbon are highly susceptible to contamination from radioactivity in the atmosphere, and that carbon from a burned specimen of wood must be kept in a vacuum from the instant of burning through the Geiger counting, during the whole process which takes five days. The laboratories are equipping themselves for this new vacuum process, or gas-counting method, which presents great mechanical difficulties, and the proposed new process may at best not be entirely reliable. When I was informed that the laboratory which will test one of my samples by the vacuum process already had a 4½-year backlog of specimens awaiting count, I thought I should have to continue to withhold this present study from publication for five more years.

A laboratory director upset my notions of scientific finality in C 14 dating by asking me what results I would accept. I had assumed that any result given me would be something I would have to accept, but it is not that simple. It is also a question of what I would be willing to accept.

I learned that I could not accept a result, say, of 950 ± 200 years, for "no biologist would dare accept so close a result. He would not be satisfied with a 2 to 1 chance of accuracy, but would want a 20 to 1 chance. This would mean ± 500 years, which on a specimen 950 years old would be from 450 to 1450 years." I said I would be glad to accept any date older than the Mayflower.

Since the public has begun to criticize the university laboratories for not continuing to publish lists of dates, I have been requested by the director of one of the laboratories to give publicity to the problem caused by atomic and hydrogen bomb explosions in the Pacific, in the Soviet Union, and in other parts of the world, which specifically means that he has advised me to publish now this present study. He has written me a letter from which I quote:

"The precision required for any date within the last 1,000 years or so depends heavily on the pre-
cision of the measurement of radiocarbon in living trees. There are slight but significant differences in the radiocarbon in modern trees compared to those 50 or 100 years old; this is partly but probably not wholly connected with the increased production of carbon dioxide by the combustion of coal and petroleum. Not only must this be taken into account, but we must find to what extent local differences in carbon dioxide content of the atmosphere affect the modern assay of radiocarbon. This kind of investigation will take some time, and it is problematical whether we should attempt a dating problem such as yours before we understand the modern assay better than we do.

“Contamination by airborne fission products should be largely eliminated during the preparation of samples by the new method. However, no one can be certain that this is the case, and I fear that this question will be something that we must always contend with. I mention this because I am afraid that you overestimate the certainty of scientific conclusions. Sometimes they are less reliable than those reached in your own less quantitative field of historical research.”

For what kind of ship does the shoring in the Follins Pond gully tell us that it was set up?

The shoring is more primitive than would be typical in the late 18th or early 19th century in New England. This will in due course be demonstrated. As for the theory that a vessel of 69 feet over-all length could have been “concealed” from the British by hauling up, Mr. Howard I. Chapelle, a distinguished marine architect and called by many the leading authority on early American sailing craft, wrote me: “Commonsense would suggest that it was far safer to sink a vessel for concealment or preservation; it is quite apparent that a vessel hauled up could be easily burned if seen by the enemy. And, as far as I am concerned, our forefathers had adequate commonsense for the solution of this problem.”

It became evident that the shoring would reveal something as to the weight of the ship which had rested upon it. It was a question of the “bearing values” of the keel supports. A “bearing value” of a support is the maximum weight it can hold without being pushed down until its top is flush with the ground. The presence of the laboriously planted posts is evidence that the keel had indeed been held clear of the ground. Therefore, the ship for which the shoring in the Follins Pond gully was made, weighed less than the total bearing values.

Bearing values are of practical importance to those who drive pilings and prepare foundations. They are in the field of definite knowledge. The bearing value of a support depends upon its dimensions, and the kind of soil in which it is embedded.

The original notes made by Dr. Maurice Robbins supplied the horizontal diameters of the keel-bearing stones and posts.

| Stone under first post | 13” x 14” |
| Stone under second post | 19” x 19” |
| Third post | 4”x4” |
| Stone under fourth post | 7” x 11” |
| Fifth post | 3” |
| Fourth stone | 7” x 9” |
| Fifth stone | c. 7” x 9” |
| Sixth stone | 13” x 10” |
| Seventh stone | c. 13” x 10” |

The seven stones have a total horizontal area of a little less than 7½ square feet. As for the two posts, Professor Donald M. Burmister, of the Department of Civil Engineering and Soil Mechanics at Columbia University, considering the kinds of soil and the lengths of all the posts, said it would be both a fair and generous assumption, as the basis for an estimate, that the total areas of the keel-bearings were 9 and a fraction square feet. For convenience we made it 10 square feet.

Professor Burmister, who is a recognized authority in his field, allows 2 to 2½ tons to the square foot for the bearing values of the keel supports. This gives the total immediate and temporary bearing values as 20 tons, and the total after “setting,” which occurred in two or three weeks or certainly under two months, as 25 tons.

The bearing values of the shoring in the Follins Pond gully tell us that without cargo, ballast, mast, oars, anchor, and gear, stripped for hauling up, the ship for which the shoring was made weighed less than 25 tons.

A ship 69 feet long and 18 feet wide, of any of the types known to have been in use in New
England waters in post-Columbian times and down to the present, would weigh from 40 to 70 short tons. Any of the types known to have been in use in New England in the late 18th or early 19th centuries (sloops, schooners, and late-type, decked chebacco boats), of the size indicated, would weigh 60 to 70 tons. Some earlier (17th century) types of open or half-decked shallops, and some ketches and some later types (18th century), such as pinkies, of the size indicated, would possibly weigh as little as 40 tons. So would a more recent faster-sailing type of New England fisherman, but her draft would bar the latter from this discussion. A large whaleboat might have been 60' long, but certainly not more than 10' in beam.

Because Americans in the mid-nineteenth century built clipper ships and later built racing yachts which outsailed British ships and made world records, there has been a smug assumption that American ships were always superior in construction. This was not so.

At first there were no trained boat builders in America. Ships of the early Colonies were makeshift vessels from European models, built with crude methods, with experience acquired by trial and error. American shipbuilders had three aims in planning vessels of ocean-going size: speed, cargo capacity, and seaworthiness. As a generality, speed calls for lightness of hull, lightness of draft, sharp bows and narrowness of beam, but large carrying capacity requires fuller lines, marked breadth of beam and rather deep, strong hulls. The demands of seaworthiness tend to tip the scales in favor of construction of somewhat greater weight than would be necessary or desirable where speed alone is the objective.

New England ships of the late 18th and early 19th centuries and of the dimensions indicated, were heavy because they were decked. The deck of an ocean-going vessel must be strong enough not only to bear a load but to withstand the crashing weight of waves that may break upon it during a storm. A deck adds more than fifty percent to the weight of a ship; for in addition to the weight of the deck beams and stanchions and heavy knees to hold the beams, and the weight of a hatchway, which requires strong bracing vertically and horizontally, the hull itself must be built with greater solidity to be rigid enough to support the knees and deck beams. A decked ship is also more heavily masted.

To get a vessel of 69' over-all and 18' beam, of any heavy American type, into position on a shoring would call for timber work, such as cross members, and possibly a "marine railway" with some crib work; in any case, timber in such quantity that the use of less suitable material like stones would be, to say the least, unlikely.

The absolute conclusion can be drawn that every known type of American ship, of the size indicated, was two or three times too heavy to have been supported on the keel-bearing posts and stones in the Follins Pond gully. This is not a matter of opinion. It is a fact based upon all the records as shown in Henry Hall's Report on the Ship-Building Industry in the United States, published by the Department of the Interior, 1884, and in the authoritative and exhaustive studies by Howard I. Chapelle, in The History of American Sailing Ships, 1935, and American Sailing Craft, 1936.

Is there any type of vessel in the history of European shipbuilding which, of the size indicated, could have been supported on the shoring in the Follins Pond gully? The answer is yes. There was one such type, and so far as is known, only one.

A vessel of the ancient Norse type, of lap-streak or clinker-built construction, of 69' over-all and 18' beam, would weigh, without her equipment, 10 to 13 tons. The 9th century Gokstad ship in the Oslo Museum, 76' over-all, 17' beam, equipped weighed, (according to Professor A. W. Brøgger's estimate in The Viking Ships) 20.2 metric tons, about 22 short tons. Stripped, it weighed less than 15 tons. Open viking ships were thus lightly built to give them wave-riding qualities. One feature of clinker-built ships was that they lacked rigidity and were actually flexible.

A vessel of the viking type of trading ship, stripped, would be easily hauled up with very simple gear by thirty men, and blocking to preserve her shape would be of the simplest kind. The stones
THE SHIP'S SHORING AT FOLLINS POND

with small thins or wedges of wood would be logical to take up the irregularities of the gully floor.

The keel-bearing posts and stones in the Follins Pond gully were set up for a ship that weighed as little as a viking ship. Since no other type of ship in all the history of shipbuilding could have been supported on the shoring, the shoring appears to be evidence of ancient Norse occupancy of the south shore of Follins Pond. It eloquently calls for further archaeological investigation.

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