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BRONSON MUSEUM

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This is the Society's museum, 5th Floor of the 8 North Main Street Building, Attleboro, Mass. — Museum hours are from 9:30 to 4:30, Mondays, Tuesdays, and Thursdays. For special arrangements to visit on other days, contact the Director, Maurice Robbins, or the Curator, William S. Fowler at the Society Office, Bronson Museum, Attleboro, Mass.

The Museum includes exhibits of artifacts and seven dioramas portraying man's prehistoric occupation of New England. The displays are arranged so as to show man's development through four culture stages, from early post glacial times.

The most recent diorama extends 15 feet across the front of the museum. It depicts an Archaic village of seven large and unique wigwams as indicated by their foundations, excavated at Assowampsett Lake by the Cohannet Chapter. Human figures to scale make the scene come alive and help create what unquestionably is an outstanding addition to our ever growing museum displays.

THE BEAR SWAMP SITE: A PRELIMINARY REPORT

ARTHUR C. STAPLES AND ROY C. ATHEARN

The authors find justification for the present report not in the spectacular nature of the finds made at this site, which actually were quite the reverse at least so far as artifacts go, but because, as it would seem, there is here an Archaic camp authenticated by an established Carbon-14 date of a charcoal sample free of interference. In only a few instances do artifacts found at the surface differ from those at the deepest levels. Furthermore a group of extremely large pits, uncovered here, with hints of their use as shelters from severe weather, appear to be new to northeastern archaeology, and so, worth bringing to the attention of those interested in the subject.

Bear Swamp in Berkley Massachusetts (site M39-72) is so named not by any caprice of the authors but because it has that designation on century-old maps of the town, although if bears were ever numerous there, they have long since departed.

The site is situated on the north edge of this swamp about a quarter mile south of the Berkley Bridge that crosses the Taunton River, and about 200yds. inland from the eastern shore of that stream. It lies diagonally across the river from the productive Sweets Knoll site; excavation of which is described in the Society Bulletin, Vol. 16,No. 4 July 1955, and is to the rear of the home of John Babbitt, the owner of the property. A short farm road leads from the house to the area where the site is located on a somewhat elevated glacial deposit of sand, gravel, and water-worn pebbles. This probably is a glacial kame, and is about an acre in size. It has been cultivated in the past, although not recently. It is approximately oval in shape with its long dimension lying northwest to southeast. Its surface is fairly level with a slight slope toward the periphery on the north, east, and south. Here it drops off abruptly to wooded, swampy land for the most part, producing a bank averaging about 10ft. high. The swamp to the east and south is more or less under water in winter and spring, but supports a stand of large trees, principally red maple, covering a considerable acreage. To the north the land is drier where pines and oaks are more in evidence.

Bear Swamp has been under excavation by the authors since October 1967 when Staples first began work there. The Babbitts, noticing the presence of stone artifacts, chips, and burned stone in the field which had been cultivated by former owners, felt that a dig here might be rewarding, and offered Arthur Staples of Dighton, who had conducted the excavation of the Sweets Knoll site in that town, the opportunity to dig on their property. In accepting the offer he invited the co-author, a fellow member of the Cohannet Chapter of the Massachusetts Archaeological Society, to work with him. Mrs. Joanne Hutchins, John Babbitt's daughter, has assisted in the work whenever she has had time to do so, and Mrs. Josephine Laugelli, chairman of the Cohannet Chapter, has also helped when her work schedule would permit. From the time when we first started work at Bear Swamp the Babbitts have continued to show great interest in our efforts giving all possible co-operation and assistance, for which the authors wish to express their deep appreciation.

METHODS OF EXCAVATION

An area on the south side of the site was chosen as the place to begin operations. A base line was established, and two-meter grids were staked out. The base line ran from northeast to southwest approximately at right angles to the long axis of the site. In all, over 100 two-meter squares were staked, and most of them have been excavated since work began. The metric system of measurement was used, as is done by the Cohannet Chapter in their work at the Wapanucket sites under the supervision of the director, Dr. Maurice Robbins. All recoveries were recorded on cards similar to those used at the Wapanucket dig, producing correspondingly satisfactory records. Dr. Robbins has shown continued interest in the Bear Swamp site, visiting it occasionally and giving much help and sound advice, which was greatly appreciated. Special thanks are due for his help in getting a Carbon-14 date from the Yale Radiocarbon Laboratory for the site's charcoal sample.

Before discussing particular site features it may be best to notice briefly the stratification of the site. There is first a dark brown loam generally 18 to 20 centimeters deep (about 9″) extending to the junction. This demarcation line usually shows a distinct separation between the loam and that which lies beneath, which is of a lighter color. In cultivated land this separation occurs at plow depth normally at 7 to 9 inches below the surface. At this site there is much evidence of modern occupation in the loam. Bits of crockery, nails, and other farming refuse are mixed indiscriminately with burned stone, chips, and occasional stone artifacts. At the south edge of the site this layer of loam increases in thickness to as much as 80cm. (32″) in some places, due probably to surface wash and plow action. At junction there is an abrupt change from the dark brown loam to a yellow or red-

dish-orange sub-soil of extremely variable thickness. This grades into light gray sand, often containing water-worn pebbles of all sizes up to cobbles as large as one's head. Sometimes this gray sand is encountered directly beneath junction excluding the yellow sub-soil altogether, and extends as deep as it has been necessary to dig. The drainage is everywhere excellent, an important condition for the aboriginal inhabitants.

SITE FEATURES

Features, which, in the authors' opinion, give the site its greatest importance are the pits, which were quite numerous (Fig. 1). Pits, of course, are common at most sites and nearly always fall into one of four categories: fire pits, refuse pits, storage pits, or graves. Of the 20 pits so far excavated at Bear Swamp, quite a few were small and seem to be fire pits because of the presence of charcoal, burned stone, etc. If any were for storage, it was not apparent. One or two contained small amounts of red ocher, but with nothing else to indicate a ceremonial use. Usually there were a few scattered artifacts within them, seemingly dropped at random. None of the smaller pits — 14 in all — require particular notice, except the red paint ceremonial burial #12; the flexed skeletal burial #20; and the square pit #19. These will be described in detail further along.

There were 6 pits, however, that were much larger, unusual enough to attract special attention. All 6 contained quite a number of artifacts but with little variation of types. Illustrated are shown a representative group of implements from the pits (Fig. 2). Artifacts from the loam, which might possibly be of later prevenience, have not been included. It should be noted that there was not one Grooved ax, Celt, or other woodworking tool. There were sandstone Oval scrapers, both small and large in size, although the former were in greater number. These were doubtless used in dressing skins. Also, present were crudely worked flat stones, used perhaps for digging the pits. Projectile points, almost without exception, were small and confined to two types: Small Triangular and Small Stem. White quartz was the material from which most of these were made. There were only a few of argillite or quartzite. Points of felsite were rare below junction. Almost all made of this stone came from the loam, a fact that may be significant. Knives and scrapers, other than sandstone Oval scrapers, were far less common than would be expected in a society that must have lived largely by hunting, with skins to be dressed for domestic use—see chart for complete listing of recovered artifacts (Fig. 3).

In nearly all the larger pits there was at least one milling stone or anvil made from a small split boulder, often with a shallow hollow on the flat side, probably the result of use. These may have served for pounding nuts or other foodstuffs, and at other times perhaps they were useful in the chipping of stone artifacts. In the pits and in the loam directly above them artifacts of all kinds were more numerous than in the areas where pits were not present, although these areas were excavated as completely and methodically as the pits themselves.

EXCAVATION OF SITE FEATURES

As mentioned above, 20 pits were excavated during the first season's work. They differed much in size and also, apparently, in the purpose for which they were intended. A discussion of them follows com-

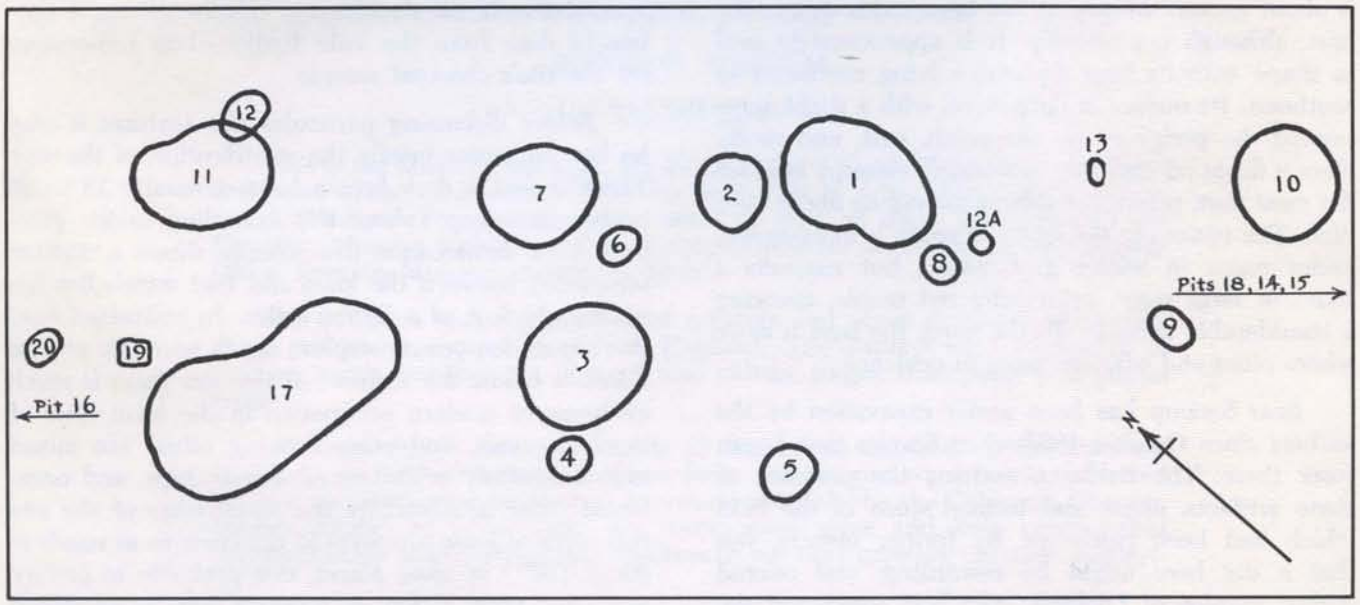


Fig. 1. EXCAVATED PITS, Bear Swamp Site. Charcoal sample from Pit #12 produced a Carbon-14 date of 4,640 ± 80 years ago.

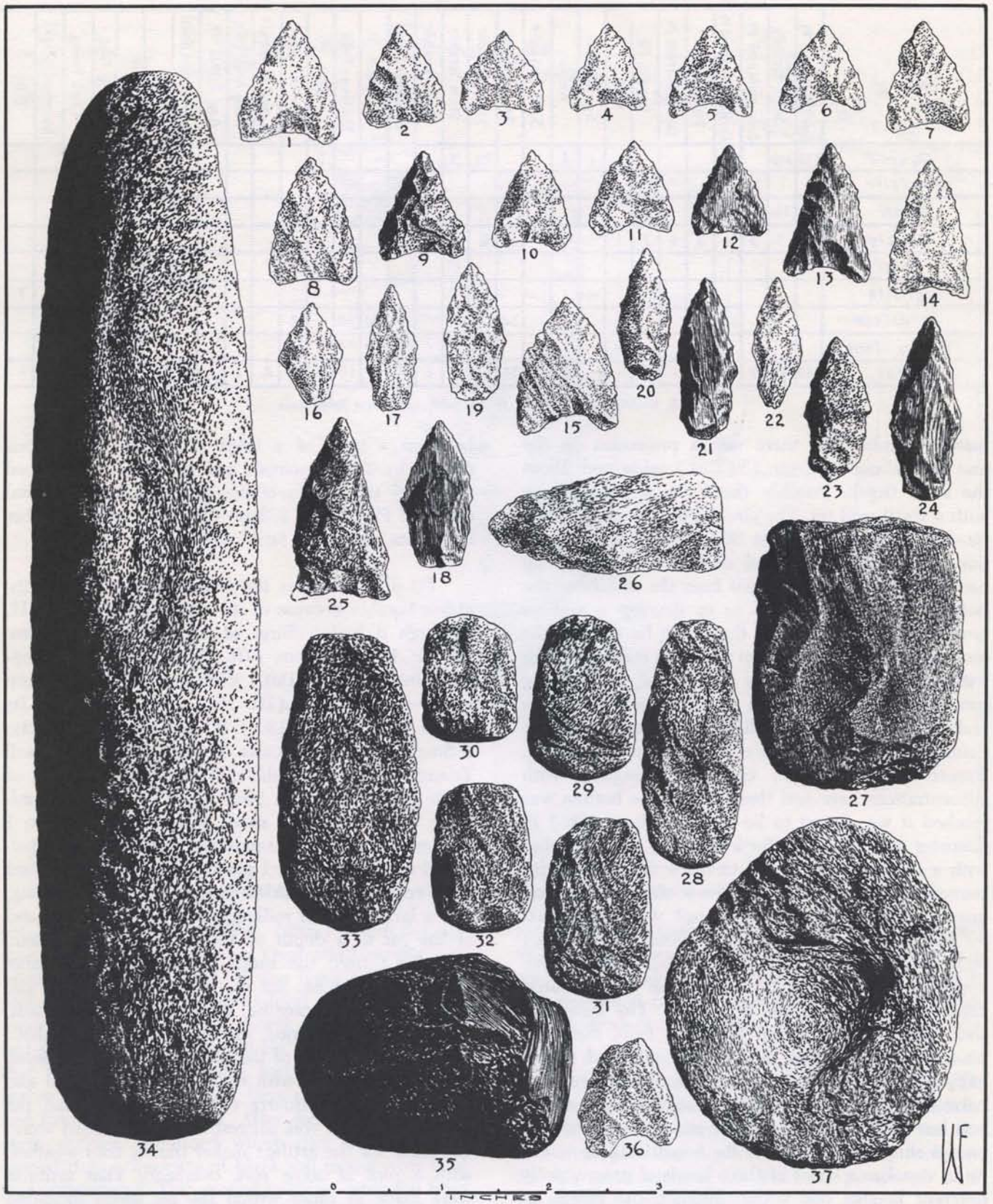


Fig. 2. REPRESENTATIVE ARTIFACTS, Bear Swamp Site. 1-14,Small Triangular#4, 15,Small Triangular#3, 16-23,Small Stem, 24,Corner-removed#3, 25, Eared#2 Projectile Points; 26,Stemless Knife; 27-33,Oval Scraper; 34,Pestle; 35,Worked Graphite; 36,Shaft Scraper; 37,Paint Cup.

mencing with the larger and more significant ones. For their relative positions reference may be made to the chart (Fig. 1).

Pit #1. Although not the largest one, this feature produced by far the greatest number of artifacts of any of the 20 pits, over 60 altogether. It was approxi-

	Small Triangular Pt.	Small Stem Pt.	Side-notched Pt.	Corner-removed Pt.	Truncated Pt.	Tapered Stem Pt.	Eared Pt.	Leaf Pt.	Spearpoint	Knife	Side Scraper	Oval Scraper	Flake Scraper	Stem Scraper	Shaft Scraper	Hammerstone	Pestle	Millingstone	Drill	Paint Cup	Worked Graphite	Wing Atlatl Wt.	Oval Atlatl Wt.	Semifinished Atlatl	Ulu	Gorget	Digging Tool	Club Prong	Notched Weight	Celt
Quartz	233	109		11					1	4	1		22	3	1				3									3		
Quartzite	4	1	2																											
Shale	4	16	2	2									1																	
Felsite	2	3	5	1	2	1	2	1					2																	
Flint	2			1																										
Argillite																						1		1	1	1				1
Sandstone												34				4	1	10		2							1		1	
Orther stone																						1	1							
Total	245	129	9	15	2	1	2	1	1	4	1	34	25	3	1	4	1	10	3	2	4	2	1	1	1	1	1	3	1	1

Fig. 3. CHART OF ARTIFACT TYPES, with associated lithic data.

mately circular, but there was a projection on the east side about a meter (39.37in.) wide and about the same depth. Possibly there was a joining here with a small oval pit. The circular outline of the main pit first became distinct at 30cm. (1ft.) below junction. The work was carried on in the usual way by carefully cutting down a shelf from the surface to the bottom of the feature, so as to develop a vertical cross-section. This showed the pit to be conical, the interior varying in color from yellow to reddish-orange with occasional black lenses of charcoal, all in strong contrast to the grayish sand that surrounded it. Chips and artifacts, chiefly small white quartz projectile points appeared from time to time at all depths. Burned stone was very common throughout with concentrations here and there. When the bottom was reached it was found to be circular, 60cm. (2ft.) in diameter and was filled for a depth of several inches with a mass of dark brown to black soil mixed with burned stone, and containing bits of charred bone and quartz chips. This circular deposit was surrounded by four concentric rings, each about 10cm. (4in.) wide alternating in gray and reddish sands. These appeared on the vertical cross-section as concentric shells around the outside of the pit. The innermost shell was quite dark and separated from the main pit by a layer of gray sand, which extended almost halfway to the surface. Another gray sand layer was between it and the outer shell of reddish sand, which was less bright and did not rise much above the bottom. A simple illustration of the condition here would be to visualize a series of three bowls of progressively different heights one within another, the tallest inside and the space between each pair occupied by a layer of sand. Similar colored layers were present in varying degrees of distinctness outside most of the other deep pit excavations. Sometimes there would be even a trace of a third. They may have been caused by the movement and deposition of colored matter by the agency of percolating water. The total depth of Pit #1 was 233cm. (7ft. 8in.) and the other large pits have kept fairly close to this figure.

Pit #11. This was the second largest of the pits, and is notable because of its association with Pit #12, although it had features of its own that seem important. It was 240cm. (7ft. 11in.) deep at its deepest point, 320cm. (11½ft.) wide near the middle, and narrowed to 215cm. (7ft. 1in.) at the west end. Its length was 395cm. (13ft.) It contained 23 artifacts: 8 Small Triangular points of white quartz; 2 Small Triangular points of shale; 3 Small Stem points of white quartz; 1 Small Stem point of shale; 4 sandstone Oval scrapers; 1 small white quartz scraper; 1 Hammerstone; 1 split sandstone pebble roughly hollowed for a Paint cup; 1 piece of graphite, which had been scraped on all sides, perhaps for paint making; and a large anvil or milling stone. Near the west end of the pit at a depth of 120cm. (4ft.) and 140cm. (4ft. 8in.) from the south side, there was a large block of sandstone, flat on two opposite faces and roughly squared; possibly an anvil or a stone seat, perhaps both combined, as chips were present about it. At the south side of the pit, and at the same level, there was a hearth with firestones and charcoal and an abundance of quartz chips between it and the seat. This layout was suggestive of a sheltered working place for the artifact maker during cold weather, with a roof of some sort, overhead. That artifacts were made at times within the pit seems indicated by the frequent presence of small concentrations of chips at various places. Toward the middle of the pit it became evident that, on the north side, there was an intersection with what seemed to be a small

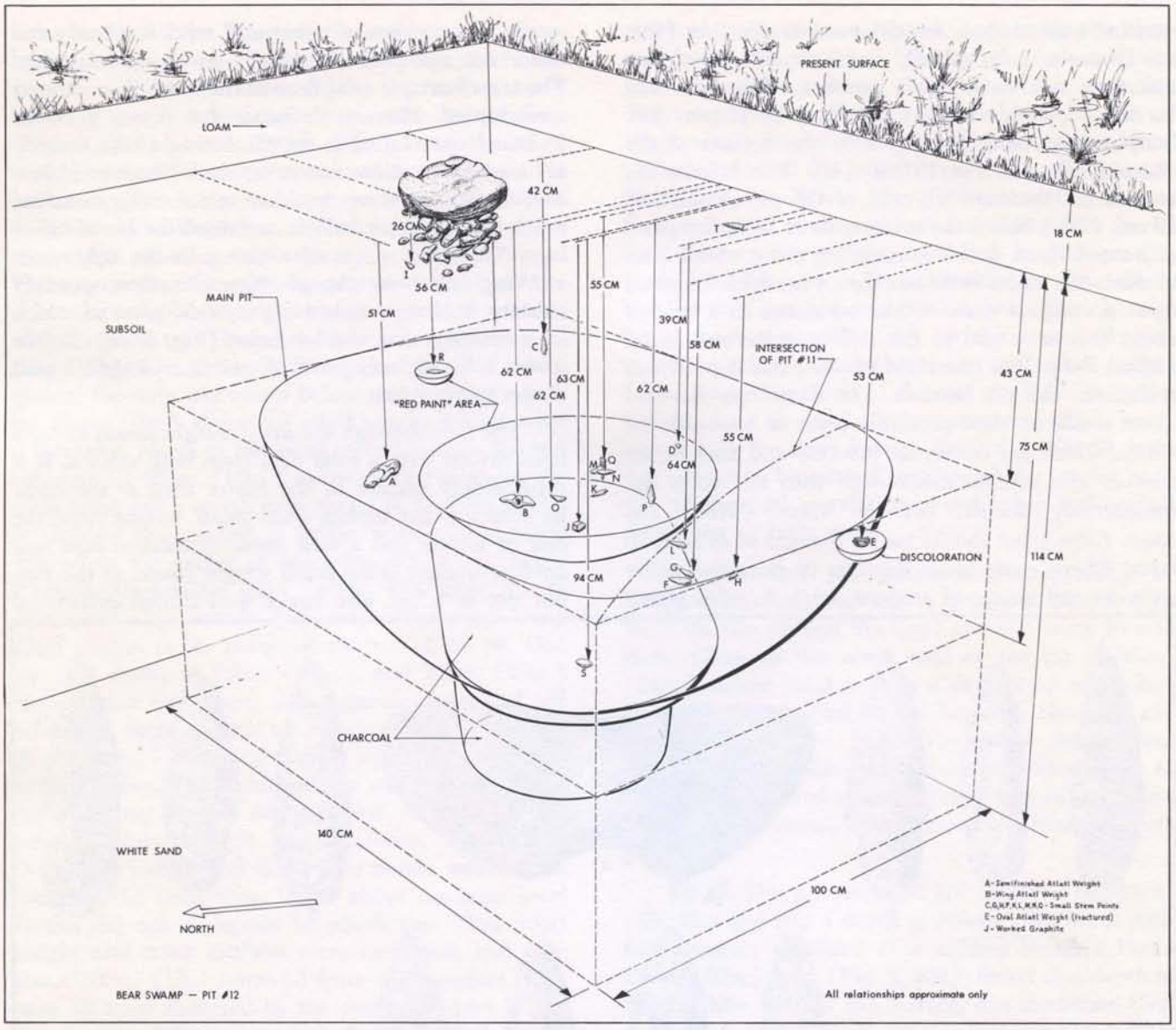


Fig. 4. DIAGRAMATIC DRAWING OF PIT #12, showing all important details: depth and relative positions of recovered artifacts, etc.

pit. Within this area at 73cm. (2lin.) below the surface, the broken half of an Oval atlatl weight was uncovered (Fig. 5, #14). It was lying in a patch of pinkish-red sand. At the same level only a few inches away were 2 Small Stem quartz points and a small leaf-shaped blade of green shale. It became apparent that this group of artifacts had been deposited together in the end of the pit, later numbered 12, which had intruded into Pit #11. After recording the 4 artifacts, digging continued where they had lain, and immediately a quantity of black soil mixed with sand was encountered. This proved to be an extension from a large mass of dense black material, evidently pure charcoal reduced to powder and closely packed into an underground recess. After digging into this, it was found that the center contained a supply of solid charcoal, and a sample of it was carefully removed for radiocarbon analysis. This sample was then placed in a covered metal box lined with metal foil and was sent to the Yale Radiocarbon Laboratory where it was processed in December 1968. This sample, No. Y-2499, produced a date of 4,640±80 years ago.

A deposit of powdered red ocher which surrounded most of the artifacts found later in Pit #12, lay directly above the mass of charcoal and practically upon it. Thus there appears reason to believe that the entire complex was deposited for the same occasion. Further excavation of Pit #12 was postponed until Pit #11 had been completed.

Pit #12. Because of the early radiocarbon date just referred to from this pit it is considered the most important unit of the series so far unearthed at Bear Swamp, and for that reason seems to merit a fairly

detailed examination, see diagramatic drawing (Fig. 4). It was a comparatively small pit with its outline indistinct until well below junction. When it could be defined, it was 140cm. (4ft. 8in.) by 110cm. (3ft. 7in.) in size, and the depth to the bottom of the charcoal deposit was 132cm. (4ft. 4 in.) from the surface. At the northerly end of the pit at junction, 18 cm. (7in.) below the surface, there lay a flat piece of burned stone, probably a milling stone, about 10in. in diameter, and a little less than 4 in. thick. It rested upon a compact mass of burned stones in a hole of about the same size as the milling stone and 39cm. (16in.) deep. It is uncertain whether this deposit was related to the pit beneath. The same may be said about a side-notched projectile point of brownish-red felsite, which lay nearby at junction and may be intrusive. The artifact assemblage with red ocher lay considerably deeper, between 68cm. (27in.) and 83cm. (33in.) but should not be thought of as an even layer. There were small deposits of pure red ocher around small groups of artifacts, while in other places were only mixtures of ocher and sand. Evidently red ocher was not plentiful enough to be used lavishly. The term burial is used here in the sense that artifacts were buried. There is no proof that it is a grave as no bones were found in the pit. It might be a secondary burial from a cremation in which bones and charcoal were ground up together to form the mass beneath the red ocher, which contained the burial offerings. The most spectacular object in the ocher was a Wing atlatl weight of greenish stone, possibly chlorite, with tiny imbedded crystals, most of which have disintegrated and left holes (Fig. 5, #4). Beside it was a Small Stem point of quartz crystal with part of the stem broken.

The hole through the atlatl weight seems to have been drilled with a solid drill from both sides as it is considerably smaller in the center than at the ends. In contrast, the broken Oval atlatl weight from the end of the pit has a well made cylindrical hole and another broken Wing atlatl weight found at the site, but not in a pit, also has a well drilled cylindrical

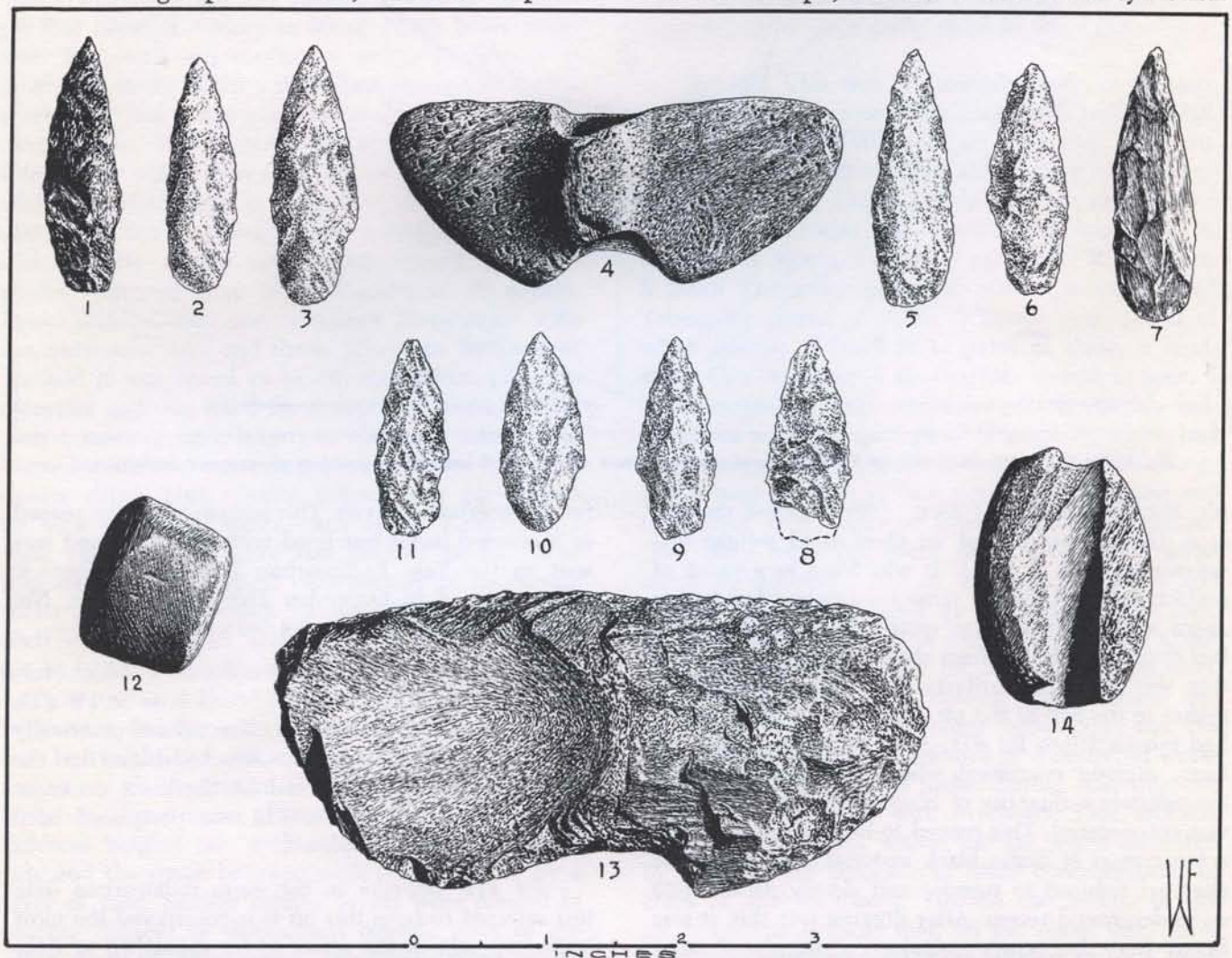


Fig. 5. PIT #12 ARTIFACTS, Bear Swamp Site. 1-3,6,Corner-removed#3, 5-7,Leaf, 8-11,Small Stem Projectile Points; 4,Wing Atlatl Weight; 12,Worked Graphite; 13,Semifinished Wing Atlatl Weight; 14,Oval Atlatl Weight (from edge of pit where it intruded Pit #11).

hole. In pit #12 the Wing atlatl weight and the close-by crystal point were buried in red ocher, and 8cm. (3in.) away at the same depth, appeared a small block of graphite with all faces worn by grinding (Fig. 5, #12). About 20cm. (8in.) from the atlatl weight were 2 stem points of white quartz and a broken quartz knife in close contact, while about 4 inches above them was a black felsite point of the same type standing vertically with its point down. There were 2 other white quartz stem points in the ocher deposit placed singly, one in a vertical position with its point up. These are included in the illustrations (Fig. 5). A Small Triangular point of white quartz, the only one found below junction in Pit #12, lay 23cm. (9in.) above the atlatl weight and possibly is intrusive. North of the atlatl weight outside the red ocher about 25cm. (10in.) removed, but at about the same level, lay a rough oval object of argillite crudely chipped and pecked to shape, with a large notch worked in the center of one edge. This is probably a semifinished Wing atlatl weight. Two more quartz stem points lay outside the group around the Wing atlatl weight, in the northeasterly part of the pit. One lay at a depth of 74cm. (29in.), and 70cm. (27in.) distant from the others, in a separate deposit of red ocher just large enough to contain it. The other was 50 cm. (20in.) away and 60cm. (24in.) deep, but was without ocher. The southwesterly end of Pit #12 that projected into Pit #11 was explored, as previouly described, when that pit was excavated. The broken Oval atlatl weight and the 3 stem points, which were found at the same time, lay at about the same level as the red ocher deposit in which the Wing atlatl weight and other artifacts were recovered, and only about 30cm. (1ft.) removed from it. Therefore, they have all been accepted by the authors as part of the same complex. However, since the Oval atlatl weight has for some time been considered as antedating the winged type, this conclusion might be questioned with the suggestion that the Oval weight, being broken in half, might be intrusive or a deposit of Pit #11. As proof of its exact provenience seems unobtainable, the reader will have to form his own opinion. As soon as the red ocher layer in Pit #12 was cleared away the top of the charcoal deposit previously mentioned appeared, from which had come the Carbon-14 sample.

This compact charcoal mass covered quite an area just beneath the red ocher, and was deposited in what appeared to be an intentionally dug hole with perpendicular sides and a flat bottom. It was not a firepit, for the sand around it showed no trace of heat. Also there was no ash or burned stone present, and a small white quartz scraper found within the charcoal had not been heated. Apparently the charcoal had been packed tightly into the hole and was solid enough to hold its shape when the sand was dug away from around it, but crumbled when an attempt was made to lift it out. The mass was 50cm. (20in.) wide and the length was considerably greater. The depth was 39cm. (16in.) It is interesting to note that a deposit of charcoal was also found in burial J of Feature 206 at Wapanucket 8 in 1967, as described by Robbins in his publication on the *Archaic Ceremonial Complex At Assawompsett.* This charcoal lay at the bottom of burial J under the worked stone slabs, red ocher, calcined bone, and artifacts. A sample taken from this charcoal deposit produced a radiocarbon date of 4,290±140 years ago, which, compared with the Bear Swamp date of 4,640±80 years ago, seems to be related because of the similar position of charcoal in relation to red ocher and artifact deposition at both sites.

Pit #3. This pit measured 275cm. (9ft.) by 230cm. (7ft. 7in.) and had a depth of 220cm. (7ft. 3in.). In the pit and the loam above it were 20 artifacts. Close to the north side of the pit at 35cm. (14in.) below junction was a deposit of red ocher, which contained small bits of hematite, charcoal, and particles of burned bone. The ocher deposit was 40cm. (16in) in diameter and 10cm. (4in.) thick. At the same depth and near the ocher was an anvilstone and a hammerstone. With them was a broken quartz point.

Pit #7. This pit measured 274cm. (9ft.) by 265cm. (8ft. 7in) and had a depth of 190cm. (6ft. 3in.). Artifact contents consisted of a milling stone, a Pestle 25cm. (10in.) long (Fig. 2, #34), found at a depth of 76cm. (30in.) below the surface, one sandstone Oval scraper, 4 Small Stem points, 9 Small Triangular points, and 1 small scraper, all of white quartz.

Pit #10. The size of this pit was 280cm. (9ft. 2in.) by 228cm. (7ft. 6in.) and had a depth of from 160cm. (5ft. 3in.) to 190cm. (6ft. 3in.) at the bottom of the deposit below the main pit. Recovered from the pit and the loam above it were 16 small artifacts and 5 large pitted milling stones with a Hammerstone associated with them. The milling stones were together at one end of the pit just below junction, they were larger than those found elsewhere at the site. It seems unlikely because of their size that they would have been used inside the pit; were probably used outside and were pushed into the pit when it was filled. The walls of the pit appeared to be burned red for a thickness of about 10cm. (4in.), while clean sand of a softer texture than that outside filled the pit. Beneath the main pit and extending about 50cm. (20in.) up on the east side, was a layer of dark burned earth. This was

separated from the main pit by a layer of gray sand varying in thickness from nil at the high point on the east side to several centimeters at the bottom.

Pit #17. So far this is the largest pit found at the site. It measured 580cm. to 610cm. (19 to 20ft. approx.) by about 323cm. (10ft. 8in.) and seemed to be somewhat curved from end to end with the convex side toward the north. Actually there appeared to have been a large circular pit at each end and another of uncertain shape between them, although it is unlikely that all were made at one time. To confuse things further there was a large, more or less centrally located hearth about a meter (39in.) in diameter and 22cm. (8½in.) deep with its top 44cm. (17in.) below the surface. Obviously, as the hearth was above the pit excavations, it could only have been made after the pit had been at least partly refilled. Over 50 artifacts of the usual types were found at various depths and one large side-notched projectile point of reddish quartzite. However this was in the loam above junction, so its connection with the pit is doubtful.

Pit #19. Unlike the other pits, all with rounded proportions, this pit was square with straight sides and a flat bottom. It was one meter (39in.) each way at the top with slightly smaller dimensions at the bottom, and was filled throughout with a mixture of loam and top-soil. Two quartz projectile points and 2 or 3 sherds of glazed crockery were found at different depths, all introduced no doubt when the hole was filled. Plainly this feature was a result of white man's work, but there was nothing at the surface to indicate its presence, and there seemed no reason for it, since as far as anyone knows, no dwelling has ever stood nearer than the present Babbitt residence, about 200yds. away at the street.

Pit #20. This was the last feature uncovered in the 1968 season. It consisted of a small oval burial pit 110cm. (3ft. 8in.) by about 60 cm. (2ft.) in size, the long diameter directed east to west. Depth to the top of the burial was 61cm. (2ft.) from the surface. A short way below junction the oval outline became distinct and was estimated to indicate a skeletal burial of the usual flexed type. The skeleton lay on its left side in a flexed position with the head toward the west. The hands had been placed at the face, but only two or three finger bones remained. All bones on the upper side of the skeleton had been gnawed by small rodents, their tooth marks being plainly visible. Most of the bones of the wrists and forearms as well as the hands were destroyed, and there was no trace of any foot bones below the ankles. The leg bones had been about half gnawed away on the upper side but were still in place, as were the ribs, skull, backbone, and pelvis. All, however, were much crushed by the weight of the earth above them. As far as could be seen there was no evidence to indicate cause of death. The bones seemed to be those of a young adult. The teeth were all present and not greatly worn, but, because of the crushed condition of the pelvis, the sex could not be determined. No artifacts were with the burial, which had been closely wrapped in what appeared to have been bark, although only a black earthy substance remained. The bones were soft, but were removed with little damage and sent to the Bronson Museum, to be forwarded to the Peabody Museum at Harvard, for study.

There were twelve other small pits, which do not seem to require separate mention. Most of them furnished a few artifacts, usually stemmed or triangular projectile points of white quartz, but were not otherwise distinguishable. All contained burned stone in greater or lesser quantities, which also was abundant everywhere above junction. There were quite a few stone hearths, usually small, at or just below junction, and doubtless many others at higher levels had been scattered by the plow. There was nowhere any trace of native clay pottery nor of soapstone bowls or other soapstone artifacts. None of the projectile points found on the site could be considered of later than Late Archaic provenience, and most of them were such as were found at all depths in the pits.

Only a very few artifacts worthy of special notice were found while excavating where no pit was present. In one of a few squares dug in the center of the site as a test, a fragment of what was probably a ground argillite Celt was found. If it is correctly typed, it is the only wood-cutting tool found on the site to date, but its damaged condition makes its identification doubtful. A piece of a Comb-back ulu appeared a little above junction, and at or slightly above junction Mrs. Laugelli found part of an atlatl weight broken through the central hole. It is the Wing type, very well made of ornamental banded slate with an even cylindrical hole. The wing is short and finished square at the end in a way that is unique as far as the authors' experience goes. Another unexpected recovery was a fragment of a black slate Gorget, found at junction.

CONCLUSION

The authors feel that, considering the small portion of the Bear Swamp site which has been excavated so far, conclusions offered now might be somewhat premature. It does seem possible to say, however, that the site must be Late Archaic with very

little to indicate occupation at a later or earlier period. The flexed burial in Pit #20 is typical of the Ceramic culture stage and probably is not more than a few hundred years old. However, so far it is an isolated feature not linked with other site recoveries. Even if a group of Woodland Indians stopped here long enough to bury one of their dead, evidently their stay was not sufficiently prolonged to leave noticeable traces of their visit.

In reference to some of the large pits, #11 and #17 in particular, evidence as has been mentioned seems to suggest that these pits may have been used as dwellings during cold weather. Perhaps they had been dug large and deep for that very purpose. It would seem that in digging them the large amount of sand thrown out would be piled around the edges of the pits thus increasing their depth. For roofs, saplings might have been laid across the tops of the pits and covered with bark or skins. This is suggested as a possibility since at Bear Swamp there is a lack of post molds or other signs of house building. This condition differs from that at the Archaic site at Wapanucket 8 on the north side of Assawompsett Pond. There, post molds occur in great numbers and, when spotted on site grids, often show the locations of circular houses, which the posts supported. At Bear Swamp, where post molds are missing, the inhabitants must have housed themselves in a different manner, at least in winter. Even if posts were sometimes used in roof building, they might have been set in the sand banked around the tops of the pits, and if so, the post molds likely would have disappeared as the banks were gradually eroded and washed back into the pits, or otherwise leveled off. Perhaps by the end of another season evidence will present itself to help cope with this and other questions concerning this site.

Fall River, Mass.
January 1969

THE WILBRAHAM STONE BOWL QUARRY

William S. Fowler

This is a long overdue report about a well-known steatite (soapstone) quarry in western Massachusetts, which has been referred to at various times in reports by different individuals. However, as far as this writer knows, no complete report has been made dealing with this site exclusive of other quarries. It is the purpose of this paper to present the history of the quarry together with evidence from excavations, much of which has never before been published. It so happens that for most of the author's life, which has been spent in the Connecticut River Valley, the Wilbraham quarry has occupied a prominent place. As a youth, he was introduced to the site by Edward Chapin, son of Dr. Walter Chapin, the discoverer of the quarry, and used to visit it often, both on hunting expeditions, as well as at times to search for stone bowl remains. A well-defined Cup-form with lug partly shaped at one end was recovered by him at that time by probing with an iron rod, and is shown in the illustrated group of this product (Fig. 13, #1).

DISCOVERY AND HISTORY OF THE SITE

Some time soon after the beginning of the 20th Century, Dr. Walter Chapin of Springfield was walking the back roads of North Wilbraham one day in search of minerals. As he passed by a farm house on the road that leads to Hampden, his eye caught site of a rather large stone bowl on the front porch of the house. As a boy, he had made a collection of arrow points, which he had picked up on the fields of Agawam, where he grew up, and so was well aware of the possible presence of aboriginal remains when he noticed the bowl. Locating the farmer, he asked where he had found it, and was told that it had been discovered in the field across the road in front of the house. Here, the land sloped down to a shallow valley

running parallel to the road, and soon Dr. Chapin had investigated all parts of the field. Ultimately, after repeated attempts to find the source of the bowl, which appeared to be a stray that had accidentally been dropped in the field, discovery of many large hollows in the ground were located with steatite flakes strewn all about. They lay in pasture land about a quarter mile up the valley from where the bowl had been found, and proved to be the remains of an aboriginal quarry. In the end, Dr. Chapin received the bowl from the farmer, and today it is in the Museum of Natural History, Springfield, Massachusetts; is known as the Chapin bowl. It will be found among the illustrations of this report (Fig 11, #3).

News of the discovery traveled fast, and soon certain individuals were making plans to excavate the site. Among one of the first was Dr. F. W. Putnam of Harvard University. He came with tent and camping equipment and spent several weeks excavating the remains. However, as far as is known, his report of recoveries was short and inconsequential; did not reveal important evidence, which was finally brought to light. The next constructive work of excavating was carried out under the direction of Dr. Chapin, together with Dr. Baldwin, who by then had become interested in the site. They hired a laborer with pick and shovel to dig trenches under their supervision.

Their first excavation was confined to digging a 3 or 4 foot trench around a steatite boulder; the only one that had not been quarried away. It was exposed about 2 feet above ground, and had the remains of a bowl-form partially pecked out on its top. As a result of this digging, quantities of broken End picks were recovered, together with a number of perfect specimens, all of large proportions. Smaller specialized tools were not reported, although several projectile points were found. However, no written report of the work was ever made, and the recoveries were stored away from view in barrels, so that more specific information of the finds is unavailable. Soon after completion of their first excavation, Drs. Chapin and Baldwin ran a trench a short distance away from the exposed boulder, up a gradual incline. Here they recovered many more relatively large End picks, and of course, broken bowl fragments, which were found in great abundance wherever the sod was overturned.

After these initial excavations were completed, several interested individuals spent a day now and then digging as they thought best in search for further quarry artifacts. One of them told the writer that he had located a crevice in the rocks at one place in which he found a number of large stone flakes. They were reported to have had steatite dust still on their blades, presumably from the bowls they had been scraping. However, no systematic effort to uncover the secrets of the quarry was made until 1943, when members of the Connecticut Valley Chapter of the Massachusetts Archaeological Society, under the direction of the author, commenced an excavation that was pursued without interruptions through three seasons of work, terminating in 1945. The results of this investigation are amply demonstrated by the accompanying illustrations, showing a wide diversification in the tools and products from the quarry.

SITE GEOLOGY AND EXCAVATIONS

Unlike any other stone bowl quarry known to the writer, this site did not consist of outcrops of steatite,

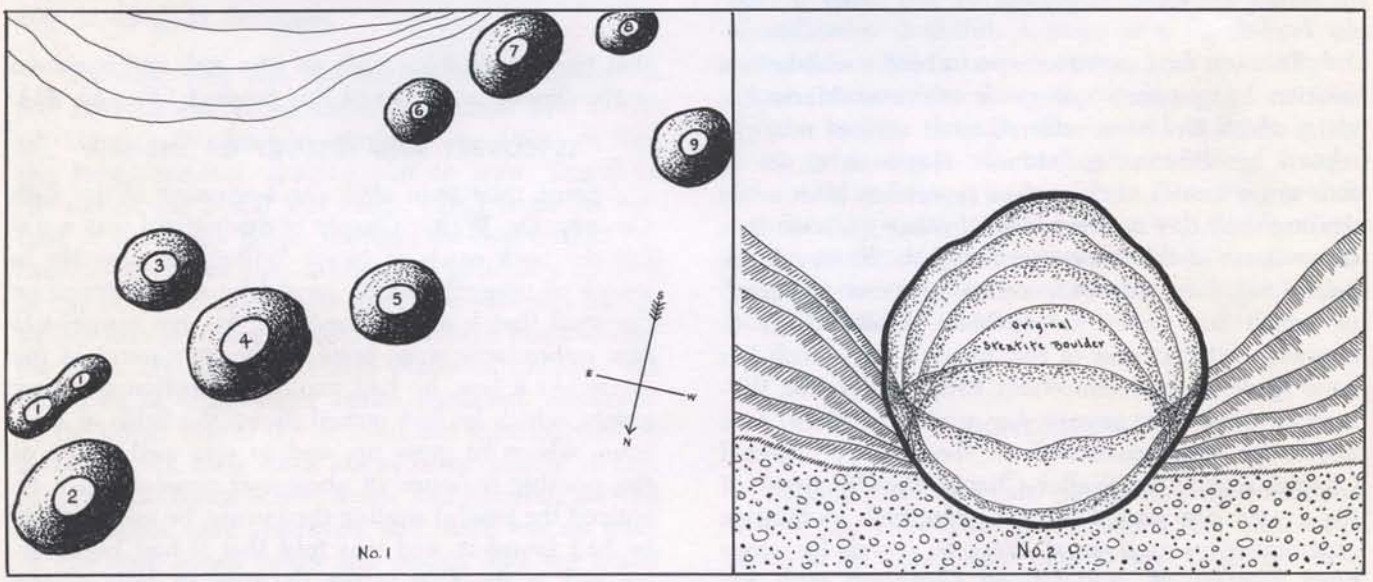
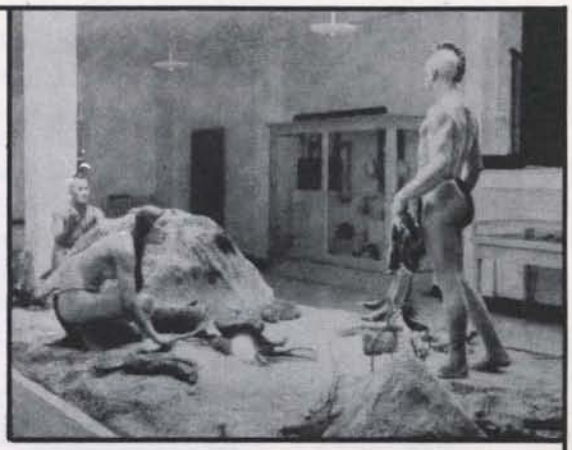
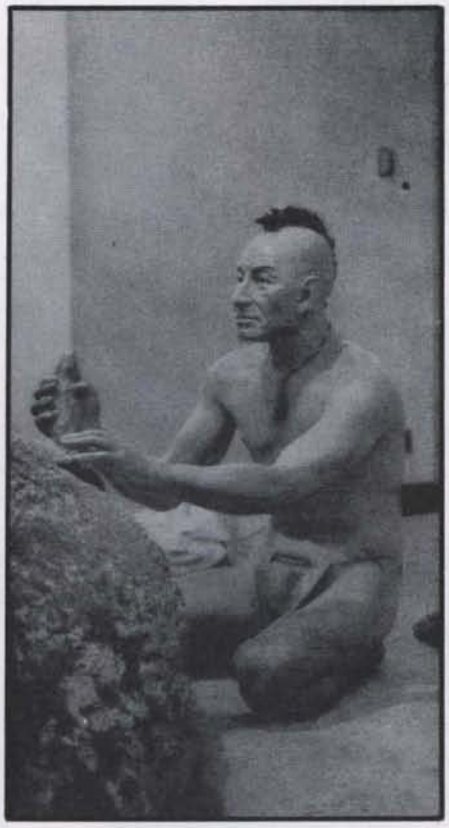


Fig. 6. MAN-MADE CRATERS, Wilbraham Quarry. 1,Relative position of craters; 2,Sketch showing formation of craters by gradual pecking away of steatite boulders.

Steatite boulder with semifinished bowl-form at the Wilbraham quarry before removal to the Springfield Museum of Science

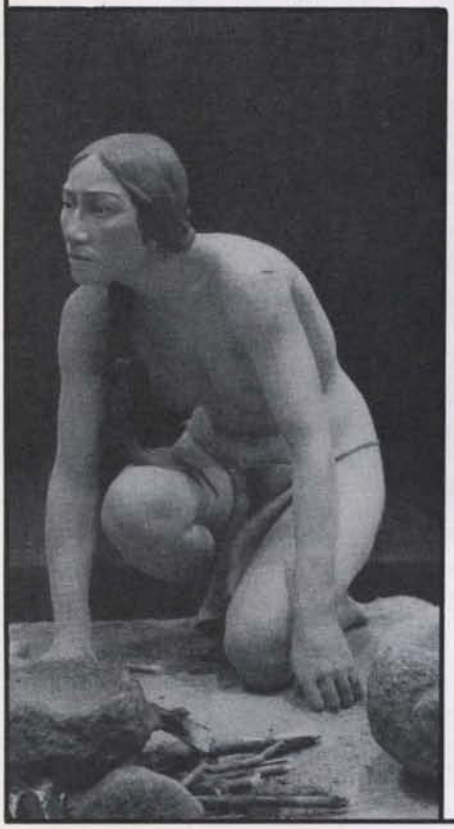


The quarry set as it appears in the Spring-field Museum of Science ~ ~



The Bowl-Maker

A woman preparing a meal



The Hunter

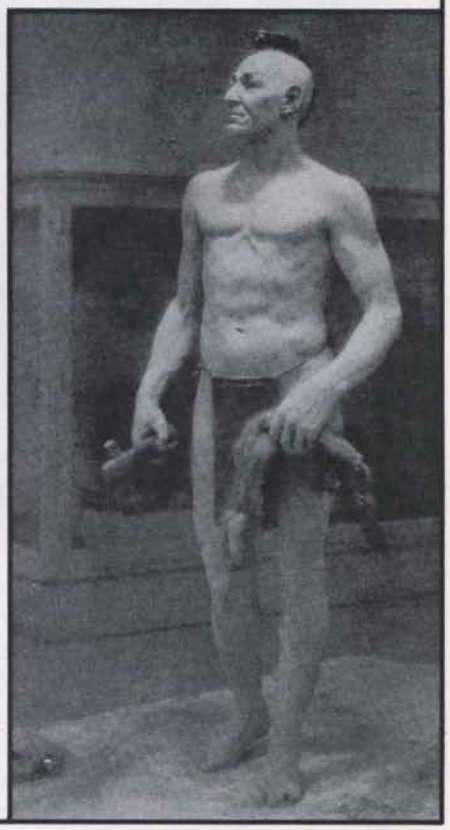


Fig. 7. STONE BOWL-MAKING SET. Illustrations, courtesy The Springfield Museum of Science. Figures were modeled life size, using exhumed aboriginal skeletons from the area for body proportions — by Frank D. Korkosz, Director of the museum.

and chlorite — a companion stone with talc content — both of which occur at other sites in ledge formations. Rather, it was composed originally of more than 9 large steatite boulders — but none of chlorite. They rested relatively close together in a shallow valley through which ran a spring-fed brook, a convenient source of water for the quarriers. The probability is that these boulders resulted from huge chunks of steatite weighing tons, which were broken off by the advancing glacier during the Ice Age from outcrops in mountains to the north. They were pushed very slowly before the advancing glacier, their sharp edges being worn off and rounded as they finally came to rest in the Wilbraham hills between Hampden and North Wilbraham. Here they were discovered by the Late Archaics in their search for bowl-making stone, and were gradually pecked away (Fig. 6, #1). The exposed boulder previously referred to, with bowl-form showing, does not appear in the layout. It lay just to the south of Crater #9, and sometime later was blasted loose from its base, transported by stone-boat to the road and thence by truck to the Museum of Natural History in Springfield. There it rests for all to see, the center of a quarry set. Three life-size figures in natural color and dress depict a working group at the quarry. A quarrier crouches, while he pecks out the bowl-form exposed on the boulder, and close by a woman prepares a meal over an open fire. At one side a hunter is shown returning with game for the meal, while stone bowls, finished and partly completed, lie around on the ground (Fig. 7).

The work of pecking away the boulders by the quarriers gradually built up banks of waste around each, and in the end left sizeable man-made craters in the ground from which the steatite boulders had been removed (Fig. 6, #2). To judge from the depths and peripheries of the larger craters, when the writer first saw them in pasture land, a tremendous amount of steatite must have been removed in order to create anything so enormous. For example, to stand at the bottom of Crater #4 was to place the surrounding banks of its periphery somewhat above one's head; the distance from one side to the other is estimated to have had a diameter of at least 30 or 40 feet. Today, with the encroachment of forestation, leaves have filled up the craters to a considerable extent, so that their proportions are not as impressive as in former days. Then too, over the millenniums, which separate the present from the closing of the quarry, humus has formed over crater remains to a depth of 8 to 12″, which must be discounted in order to obtain a true concept of crater proportions.

Excavations made by the Connecticut Valley Chapter consisted, first of a 2 to 3 foot trench that was dug down the east side of Crater #4. It was carried to the center of the crater and then was extended up the south-west side — no remains of the boulder were found, which apparently had been completely pecked away. Next, excavation was undertaken on the east side of Crater #2, which was thoroughly explored. Here appeared the remains of the boulder, which was of poor quality. It showed peck marks in some places with indications of the start of bowl-forms. This was buried deep in the tailings. During the final seasons the south side of Crater #2 was excavated, and a trench was run from here across to Crater #1. Here the final work of digging took place. The north pit of this crater was completely dug out, with excavating extending into its southern pit. No remains here of steatite boulders were to be seen.

BOWL-MAKING TOOLS

Contrary to former investigations, work of the Chapter uncovered an array of implements showing much diversity in their sizes, forms, and probable functions in pecking out products of the industry. After three previous years spent excavating the Westfield steatite quarry, the work at Wilbraham took on added significance. Here were found the same types of small tools — except for two types, Shaver and Chisel-scraper — which had been located and typed at Westfield. Also, present were similar kinds of large tools, showing some sort of contact between the work at both quarries, although they were separated by 30 or 40 miles and the Connecticut River. At Wilbraham, many of the larger picks were made of basalt, probably derived from some one of the volcanic formations in the valley of the Connecticut. A few were made of quartz, from which the smaller tools were more frequently worked. Quartzite is another stone that was sometimes used, doubtless obtained from cobbles in the area.

Illustrations of well-defined tool types from the quarry have been made, and will be described somewhat in detail (Fig. 8).

End Pick (Exhibits #1-9). This implement was the tool most frequently used for all kinds of work, whether for removing steatite from the outside or inside of bowls, or for pecking away the boulder in cutting out the bowl-form in the beginning. In the latter case, picks were usually relatively large, often with side-notched scars. These indicate that they were hafted from the side like an ax — two exhibits show suggested method of hafting (Exhibits #1-4,9). Other

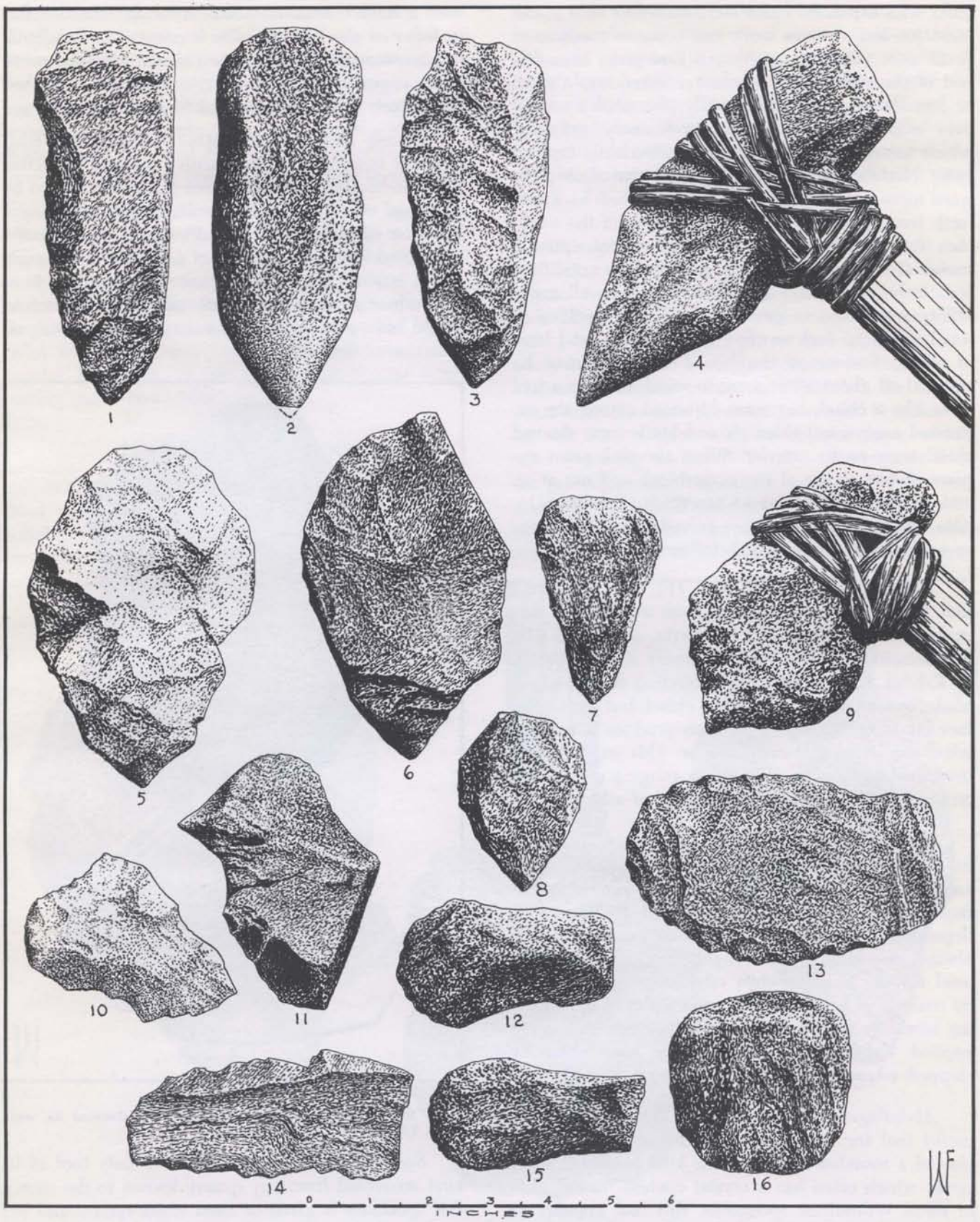


Fig. 8. BOWL-MAKING TOOLS, Wilbraham Quarry. 1-4,9,End Picks, made for hafting, and suggested method of hafting; 5-8,End Picks, made for hand use; 10,Hand Gouge; 11,Corner Pick and Hand Gouge; 12,15, Abraders; 13,16,Abrading-Scrapers; 14,Quarry Knife.

picks with expanded bases were doubtless held in the hand for less arduous work and occur in medium to small sizes (Exhibits #5-8). All End picks have one end of the stone block percussion flaked into a more or less sharp point. Occasionally, this shows an all-over smoothed surface from preliminary grinding, which has reduced the bit to a symmetrically tapered point (Exhibits #2,4). It is believed that such picks were more highly prized, and were carried back and forth from quarry to camp in possession of the workmen until they became broken. They are infrequently found at the quarry, usually in a broken condition. Relatively small picks (Exhibits #7, 8) in all probability were used in performing delicate pecking of small products, such as cups and spoons — and later of pipes. Sometimes the bit of the pick may be squared off about ½" or more in width to form a tool more like a chisel, but none appeared among the excavated recoveries, although one kettle-form showed chisel scars on its exterior. When the pick point appears at one corner of the stone block and not at an end, the tool is known as a Cornerpick (Exhibit #11). Also, this particular specimen served as a Hand gouge as well, description of which follows.

Hand Gouge (Exhibit #10, 11). This is a small tool for hand use. It is made from a relatively flat-surfaced hard stone, often of quartz, as Exhibit #10, but occasionally of other hard stones such as basalt, as Exhibit #11. Its bit has a projecting convex-edged blade, reminding one of a scoop chisel, but with a flat face. It is unifacially chipped to produce a beveled edge, similar to that of a scraper. This implement is presumed to have been used for gouging out the interior of small products such as cups of all kinds.

Abrading-Scraper (Exhibits #13,16). A most useful tool and one found in all quarries thoroughly excavated by the writer, it consists of a rather thick flat-faced stone of hard or coarse material. Its size varies depending upon the size bowl to be finished. Nearly always, one edge is left roughly worked, sometimes used for the handle, while other edges are chipped by removal of large flakes. It was employed in hollowing bowls by sawing and scraping motions alternately applied. Exhibit #16 shows extreme wear along its chipped edges; is probably a worn-out discard.

Abradingstone (Exhibits #12,15). Usually, this useful tool for smoothing pecked-over surfaces consists of a rounded lump of some kind of coarse, hard stone, which often has a crystal content. In the case of these Wilbraham specimens, this tool appears to have other useful traits, which have been intentionally hand worked. One enlarged end of an elongated bar of coarse granitic stone has been roughly chipped, with a thick convex rounded bit for the abrader. Remainder of the bar serves as a convenient handle. It is interesting to note these two almost identical specimens appearing as if this style was an established one, which might be expected to repeat itself.

Quarry Knife (Exhibit #14). Occasionally, fragments of steatite will appear with a sawed mark across them, indicating that they were being cut in two by some tool used as a saw. Undoubtedly, this implement was that which might be classified as a Quarry knife. Illustrated specimen is made of a thin spall of basalt, which has one thin longitudinal edge chipped, so as to produce a jagged saw-tooth effect. This, it seems, would have supplied the necessary bite in sawing off a section of steatite.

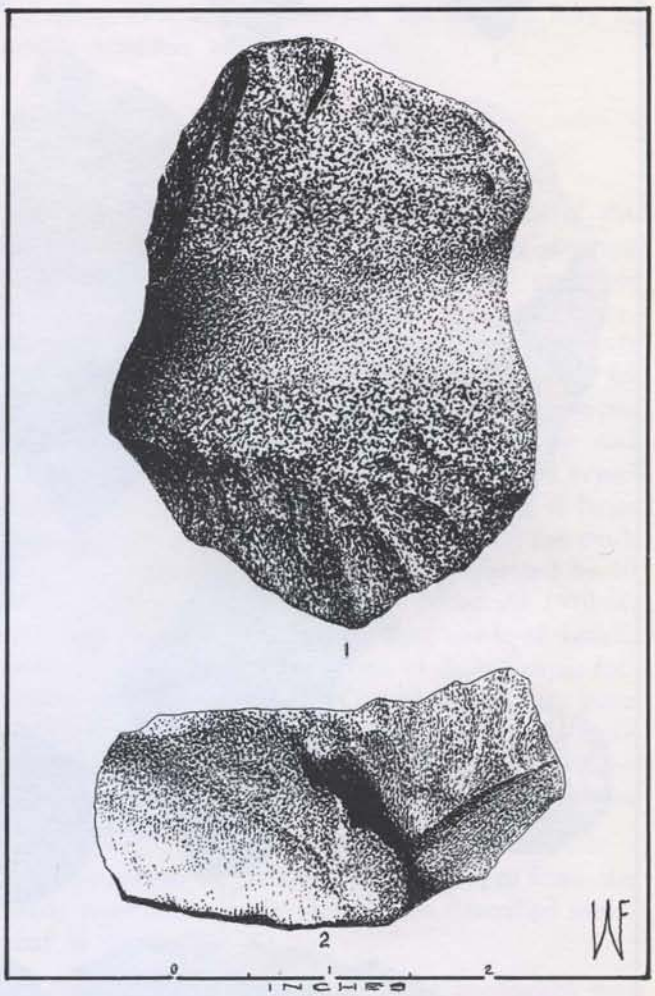


Fig. 9. SPECIAL TOOLS, Wilbraham Quarry. 1.Full Grooved Ax, worn down; 2,Scoop Chisel, of white quartz.

Scoop Chisel (Fig. 9, #2). The only tool of its kind recovered from any quarry known to the writer, this specimen is made of hard white quartz and has a relatively long blade of nearly 2", which is slightly concave longitudinally like its modern counterpart. Its bit end has been deliberately chipped with a prom-

inent convex contour with a smooth concave face. Chips have been struck off from the edge on the reverse side, and do not show in the illustration. Undoutedly, this represents an independent invention of one man. He may have conceived it after coming across a spall of nearly the desired shape with a fortuitous concavity. Just how it would have been used in working steatite is open to considerable speculation.

Full Grooved Ax (Fig. 9, #1). This specimen was recovered from the excavated trench in Crater #4, and demonstrates two facts: 1), that the Grooved ax, typologically, belongs to the Late Archaic industrial era of stone bowl making, and 2) that sometimes the bit of a worn-out specimen was reworked into a point and in this way made to serve in place of a regular End pick, in the removal of steatite when cutting out a bowl-form.

TAILING REMOVAL TOOLS

Beside quarry tools used in the production of bowl products, there was the need for other tools suitably designed for removal of quarry waste. This consisted of steatite chips and dust produced from quarrying operations, which had become packed from trampling. It was work of secondary importance, although necessary in order to permit quarrying at lower levels, when surface stock had become exhausted. By extrapolation, this work is believed to have been done by the women, who accomplished it with suitable tailing-breakers and spades, and so had a stake, however menial, in the production of stone bowls (Fig. 10).

Triangular Tailing-Breaker (Exhibits #1,2). At Wilbraham, as well as at Westfield, tailing-breakers appear in a triangular shape; do not include the spiked form as found at other quarries. The Triangular tailing-breaker was a hafted tool and appears in relatively large sizes in a weight sufficient for the work of loosening trampled waste. As illustrated, the longest point of its triangular form is thinned and becomes the bit. Its base is thick with an oblique slope, which, when receiving the handle's end — illustrations show the probable method of hafting — tips the blade away at an obtuse angle. Basal corners are invariably lopped off, when found necessary, to obtain symmetry — note right-hand corner of Exhibit #2, and left-hand corner

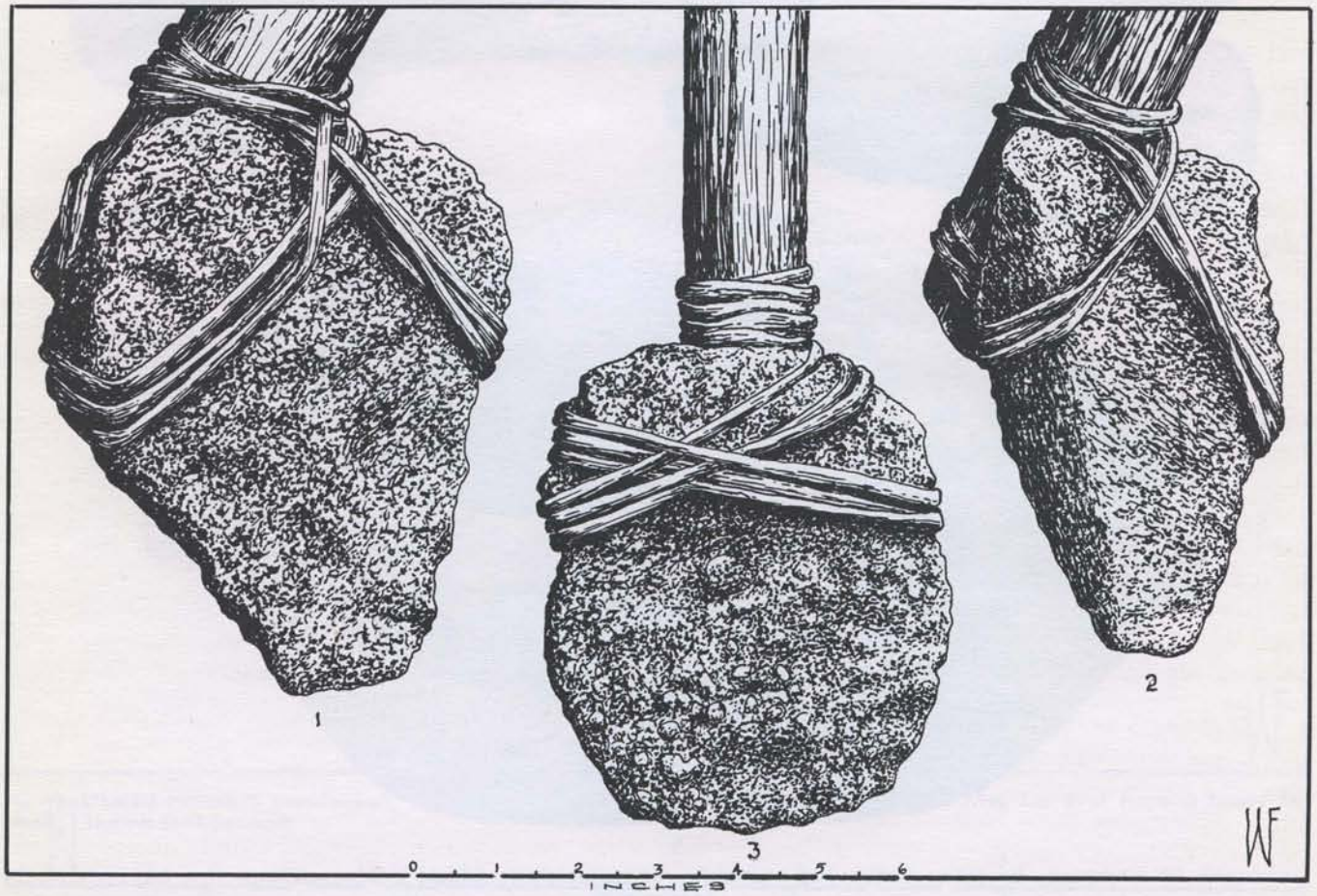


Fig. 10. TAILING REMOVAL TOOLS (showing suggested method of hafting), Wilbraham Quarry. 1,2,Triangular Tailing-breakers; 3,Spade, side-notched for hafting.

of #1. This tool is made of semi-hard stones; illustrated specimens are of granitic material.

Quarry Spade (Exhibit #3). This tool, also, is of granitic stone; is oval in shape with a flat face, a thickened base, and a thinned bit at the other end made by percussion flaking. In this case, side-notching at the base indicates that the implement was hafted — probably as suggested by the illustration. When this tool appears without side-notching it is thought to have been held in the hand, and is called a Hand spade. Presumably, it was used to shovel loosened tailings into containers, such as baskets, which were used to convey waste to quarry dumps. At Wilbraham these were located around and nearby the steatite boulders being quarried.

QUARRY BOWL PRODUCTS

As at other quarries, Wilbraham stone cutters fashioned many different kinds of bowls in various

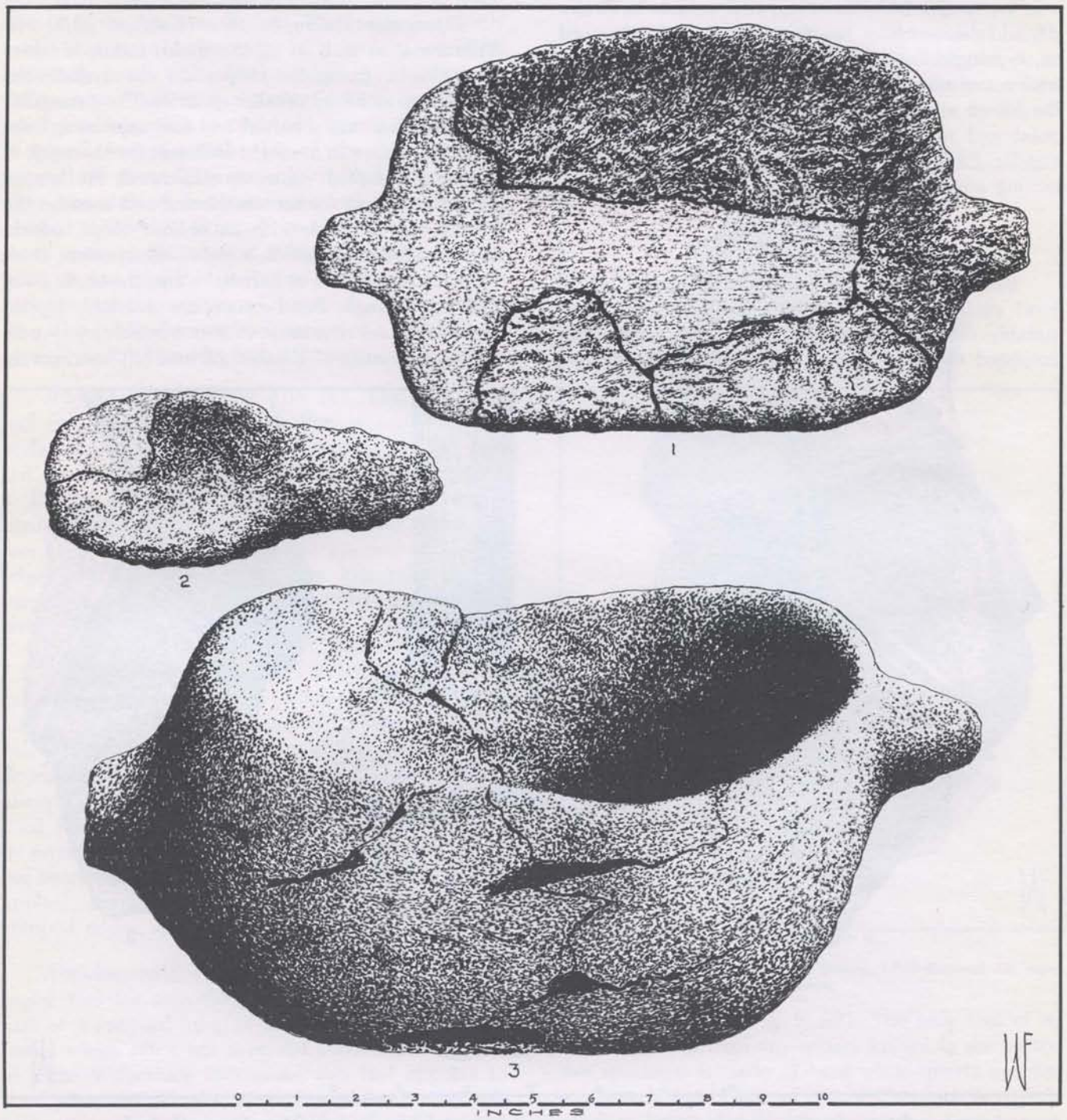


Fig. 11. STEATITE PRODUCTS, Wilbraham Quarry. 1,Platter (semifinished, in 4 fragments — restored); 2,Spoon (semifinished — restored); 3,Chapin Bowl — finished.

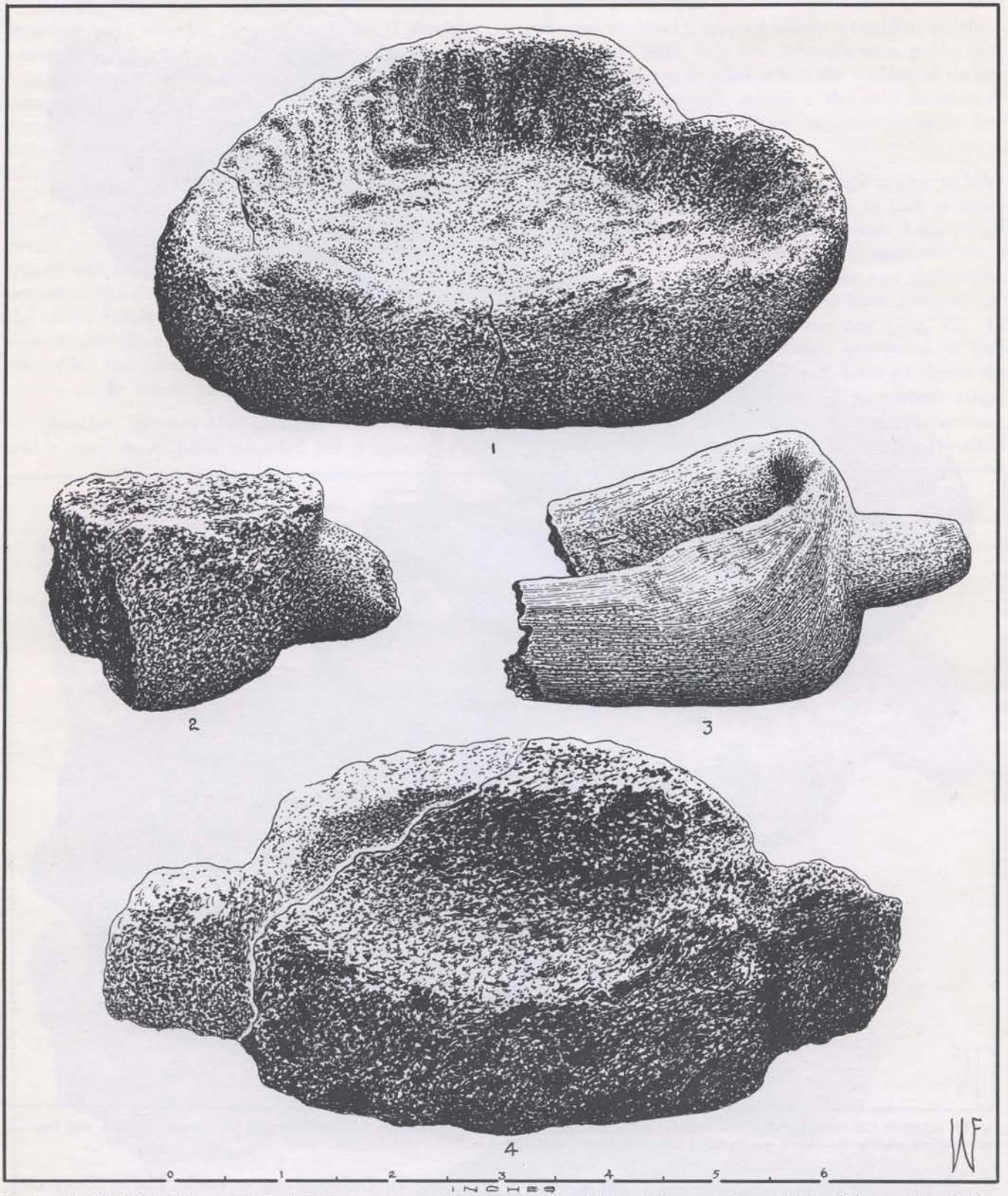


Fig. 12. STEATITE PRODUCTS (semi-finished), Wilbraham Quarry. 1,Deep Dish; 2,Lug End Bowl fragment; 3,Lug End Bowl fragment (nearly finished); 4,Shallow Bowl (restored).

sizes from the soft steatite, which at this quarry has a light to heavy iron content. This may not have caused trouble when quarrying took place from virgin steatite, but after years of exposure to corroding agents the iron content has rusted, causing some weakening of the stone.

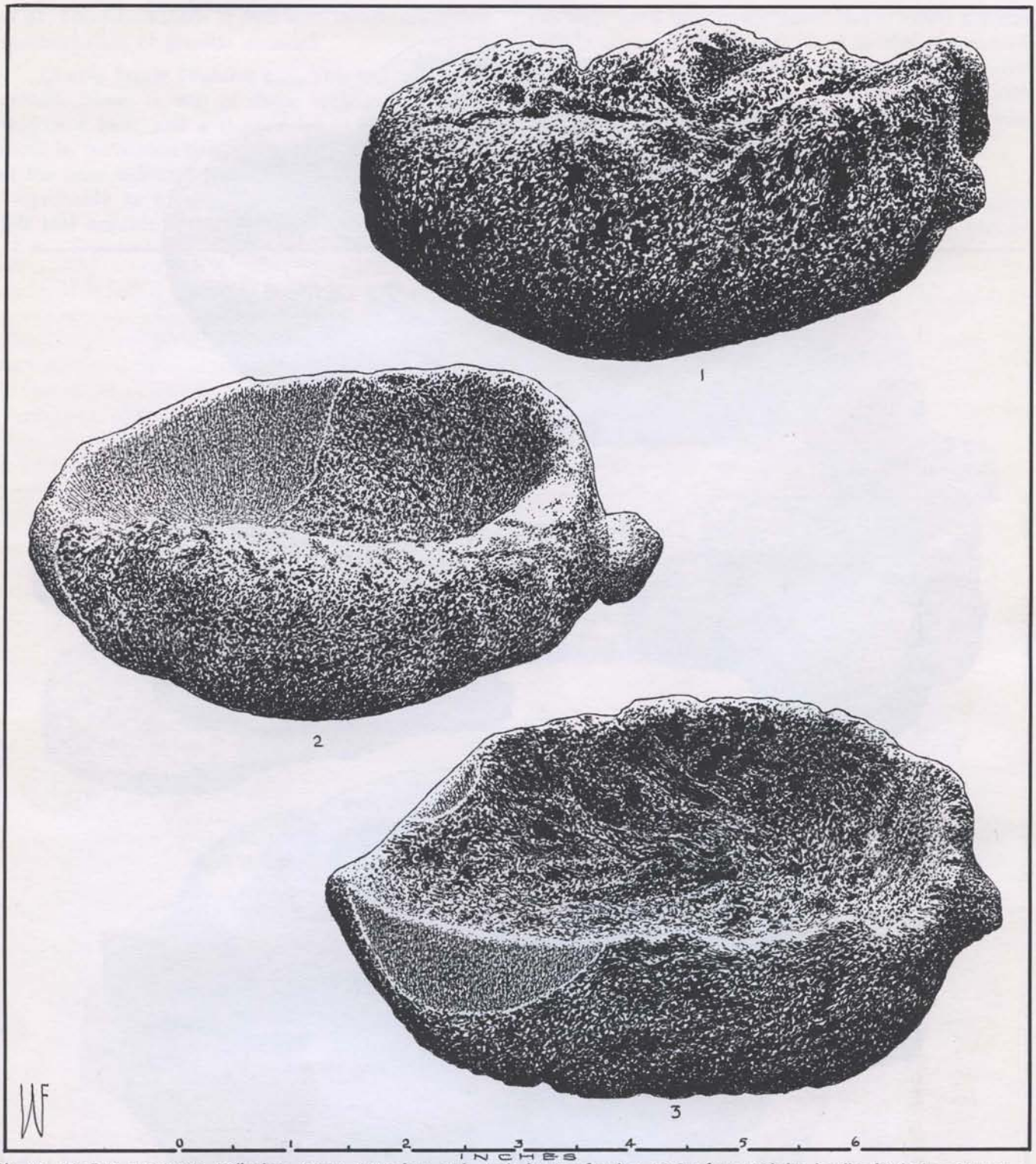


Fig. 13. STEATITE CUP-FORMS, Wilbraham Quarry. 1,Cup-form with single lug just forming; 2,3,Cup-forms with lug handles finished, and interiors and exteriors nearing completion — fractured segments have been shaded in.

Most of the bowls were made with lugs at both ends, as shown by the Chapin Bowl (Fig. 11, #3). However, some were made in a shape resembling a deep dish without lugs (Fig. 12, #1). As shown in the three groups of bowl products (Figs. 11,12,13), there was much diversification. Manufactured goods include the Drinking cup or Ladle, Platter, Deep dish, Spoon, and Kettle — the illustrated Platter was recovered in 4 contiguous pieces; its restoration followed. A complete description of these vessels and others may be had in the Society Bulletin, Vol. 27, Nos. 3 and 4. *Ceremonial and Domestic Products.*

In addition to this information, several more interesting facts may be gleaned from the Wilbraham recoveries. Contrary to previous postulations, which held that finishing of bowls took place not at the quarry, but at home sites of the workmen, one recovery here seems to dispute this in part. One end of a shallow bowl with lug was recovered, which is beautifully finished to a smooth surface outside, and partially on the inside as well (Fig. 12, #3). Its unusually long lug is neatly trimmed and finished expertly. Just how much finishing was attempted at the quarry will never be known, for only a few fractured remnants like this remain, and they tell only part of the story. However, it is evident that at least some vessels were finished before transportation to home sites. Also, the presence of small finishing tools at the quarry amply attests to this.

Another recovery that deserves attention is that which must have been intended for a spoon (Fig. 11, #2). Small, and with a long projecting handle at one end, its bowl fractured before it could be finished. Here again, with only one recovery as a guide, it is impossible to say to what extent the making of spoons was carried. However, as this is the only recovery of its kind, so far as is known, it seems unlikely that spoons were much in demand.

On the other hand, Drinking cups appear to have been in great demand, second only to that of stone bowls with lugs. The evidence reveals cups in all stages of development, which is understandable when consideration is given to the obvious fact that everyone in the family doubtless had to have a cup to use in eating the liquid foods of the day (Fig. 13). In this illustrated group are shown cup-forms in two different stages of development. Exhibit #1 shows the cup-form emerging from its rough cup-blank stage, with handle lug just beginning to show at one end. In Exhibits #2 and 3 the lug handle has been worked

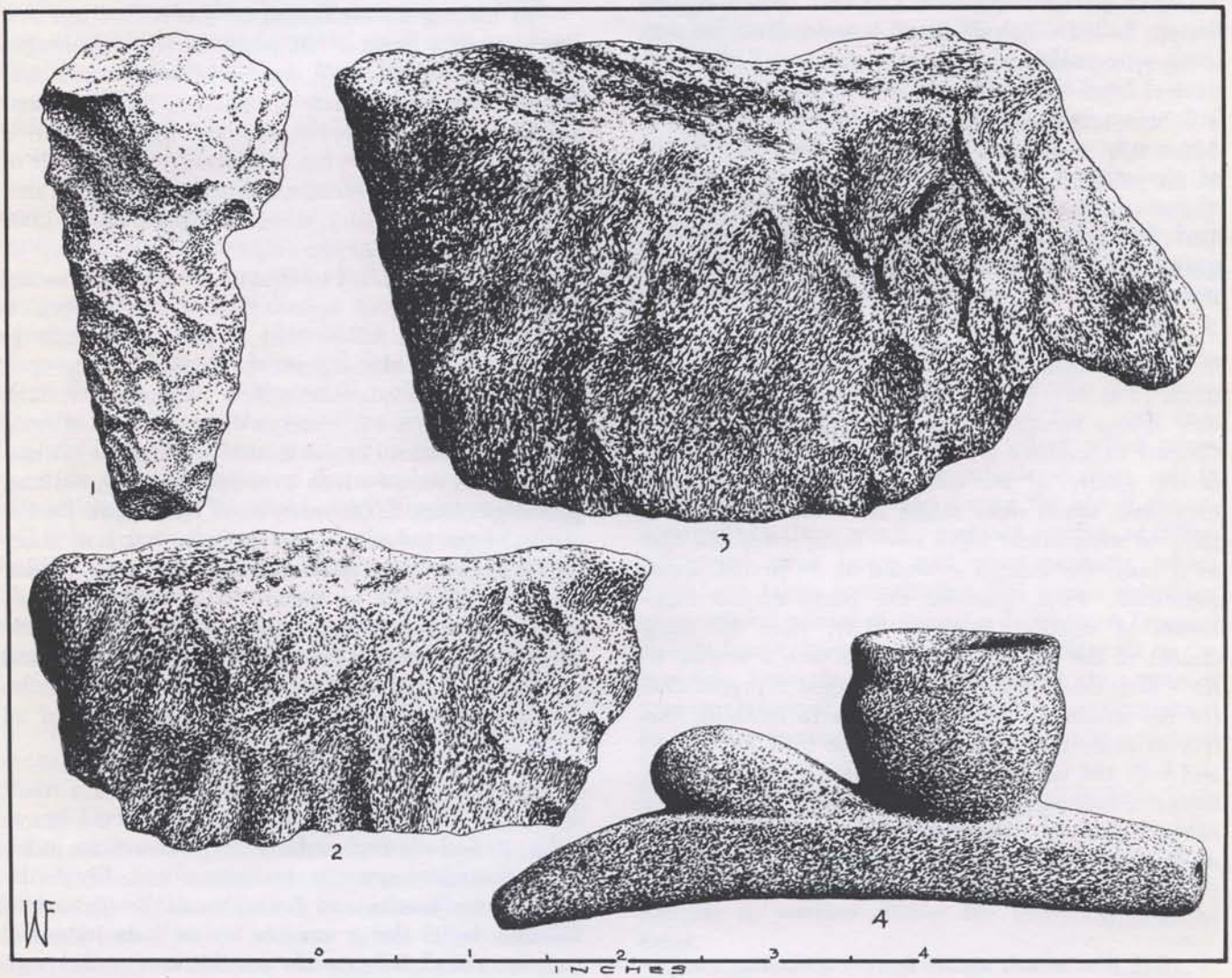


Fig. 14. PIPE-MAKING EVIDENCE, Wilbraham Quarry. 1,Pipe Bowl Reamer (quartz); 2,3,Pipe Blank (steatite); 4,Platform Pipe, shaped with stone tools from Blank 3.

more completely, so that it is brought conspicuously into view. Also, in this stage exteriors are observed to take on a more finished look. Interiors have been pecked out and nearly completed, while handles appear to be finished. These cup interiors have been hollowed by pecking — unfortunately for the makers' sake — to the breaking point. In fact, End picks used for the jobs had been kept in use too long, in an effort to reduce cup walls to thin proportions. As a result, the drinking section of Exhibit #3's rim broke away as shown, while a part of Exhibit #2's bowl fractured, which caused these cup-forms to be discarded as waste. Evidently, their makers were not enough skilled in the art to anticipate the correct moment to change from pecking to scraping; were too anxious to accomplish quick results with End picks.

PIPE-MAKING EVIDENCE

With publication of the Oaklawn quarry report, Society Bulletin, Vol. 29, No. 1, it seems probable that stone pipe-making did not take place until the final days of bowl-making. As a result, most quarries show little or no evidence to indicate the making of pipes. Apparently, in Rhode Island at Oaklawn the industry of pipe-making kept that quarry alive for hundreds of years after the making of stone bowls had terminated. It seems to have been the preferred center of operations with recovery there of literally hundreds of pipe-forms in both perfect and broken condition.

At Wilbraham there were a few recoveries that indicate the making of pipes, but there were no pipe-forms (Fig. 14). While this industry is represented by only sparse remains, it should be remembered that Chapter excavations were limited to a very small part of the quarry. If the entire area could have been excavated, much more might have come to light to show to what extent pipes were being made. Be that as it may, the limited evidence as illustrated seems significant. First, consider the partly-shaped Pipe-blanks of steatite (Exhibits #2,3). Here are thick chunks of the stone pecked out in such a way as to leave little doubt that they were shaped in preparation for the making of pipes. In order to establish this fact as more than fancy, the writer took Exhibit #3 and with the use of stone tools succeeded in making from it a Platform effigy pipe (Exhibit #4). While this in itself does not prove that a pipe was to have been made from it, nevertheless, it demonstrates that it was possible, and supports the belief that it is a probability.

But that which seems more convincing was recovery of a Pipe-bowl reamer (Exhibit #1). Here is a tool that has occurred in enough places, and also in enough numbers at Oakland quarry, where the pipe industry flourished, to indicate beyond much doubt that it was used for reaming out pipe bowls. The Wilbraham specimen is ideally suited for this work, since it is made of hard white quartz, with well worked edges, and has a bit that tapers to a truncated end, all, typical traits of this tool. The only explanation for the absence, here, of pipe-forms such as those found at Oaklawn is either from the Chapter's failure to excavate the site more completely, or, as commented before, because pipe making was only just being introduced at the close of quarrying. For some reason, which cannot be discovered at this late date, Wilbraham, evidently was not selected as the right quarry to be reopened for the manufacture of pipes, possibly because the best steatite had already been worked away.

CONCLUSION

In making an evaluation of the Wilbraham evidence after a lapse of 20 years, certain advantages are apparent. First of all, the recent radiocarbon date at the Horne Hill quarry in Millbury has furnished a valuable guide, as to the age, and by extrapolation the duration of quarrying at that site. As a result of this date of 2,800 years ago, it now seems evident that the start of the industry, there, took place about 1,000 years earlier, or 3,800 years ago, Society Bulletin, Vol. 27, No. 2 and extended to about A.D. 300, terminating with the coming of ceramics. And furthermore, it probably should follow that if this is the case at Horne Hill, the chances are that a similar time span existed for other quarries in New England. Certainly, when consideration is given to the many tons of stone probably contained in the steatite boulders at Wilbraham, all but one of which were pecked away, the long period of about 2,000 years, as at Horne Hill for the extent of the industry seems realistic. Just how many tons of steatite were pecked loose and made into bowl products will never be known. But to visit the quarry and ponder the size and contents of its man-made craters causes one to marvel at man's industry and persistence, by which this immense amount of steatite was gradually worked away and fashioned into all kinds of eating vessels.

Another advantage that has accrued, as a result of the 20 year delay, comes from additional knowledge gained through subsequent excavations in six more aboriginal quarries in Connecticut, Rhode Island, Massachusetts, and Pennsylvania. Besides establishing a belief that a more or less uniform industrial pattern existed, it has made possible a more thorough appraisal and comparison of evidence from all these quarries. This has refined former theories, such as

that of tailing removal operations. It is now apparent that the Triangular tailing-breaker was an independent invention at the Wilbraham and Westfield quarries of western Massachusetts, and had only just diffused to the Oaklawn quarry, when bowl operations there were coming to a close.

It is now known that the Spiked tailing-breaker was in use at New England quarries except those in western Massachusetts, which appears to be one of the differences noted between them. Also, the Christiana quarry in Pennsylvania had the Spiked tailing-breaker, but W. H. Holmes in 1893 reported no stone tools for tailing removal in Virginia and the Potomac River Valley quarries, although he says they must have existed, perhaps of wood.

A further benefit derived from the delay is the opportunity it affords for a fuller understanding of the manufacture and use at the quarries of small finishing tools. At the close of excavating at Wilbraham, 9 highly diversified types of small tools had been identified divided between here and the Westfield quarry. However, at the time, it was not known how widespread their adoption might have been, although it was apparent that they did not exist to the south since W. H. Holmes makes no mention of them. But here in New England quarries their presence is unescapable, and amazingly enough their respective type shapes retain unusual similarity. This should suggest that each kind had a specialized function, which was the same at all quarries. However, failure of one type to appear here, and another there, could mean that as most of the small tools were used in finishing, which usually was done at home camps, they doubtless have been removed in part from some quarries. An enumeration of the complete assemblage of small tools from Westfield and Wilbraham quarries will help impress the reader with the apparent diversification of manufacturing functions they represent. The list includes, End pick (1-2″ long), Chisel-scraper, Scoop chisel, Abrading-scraper, Shaver, Hand gouge, Bowl Reamer, Abradingstone, and Quarry knife.

The writer found the Abrading-scraper, Hand gouge, and Quarry knife among recoveries from the Christiana quarry of Pennsylvania, but has received no reports of such small specialized tools appearing futher south in Virginia quarries and beyond. Because of this, it seems to him that the more highly diversified tooling of New England, as signified by the array of small tool types in addition to the larger conventional ones, common to all quarries, indicates the precedence of stone bowl quarrying in the New England area. Advent of the industry here, would have allowed more time for creative development of tooling, which suggests that the art of making small tools may have been moving southward only toward the close of quarrying operations.

Based upon this hypothesis, which does not seem too presumptuous, New England may have been the culture center in stone bowl times, from which industrial ideas diffused to other areas wherever steatite outcrops occurred. With spread of the industry throughout the Appalachians, the stone bowl artisans of New England perhaps were more responsible for diffusion of other Late Archaic traits than might be supposed.

Taking into consideration excavated evidence from all quarries, there is every reason to believe that this industrial effort was a major factor in molding the customs of that day. For example, it must have played a significant role in changing the eating habits, which formerly were concerned chiefly with consumption of solid foods. Now, with the introduction of permanent cooking vessels, liquid foods became possible and were added to the diet. This one improvement in dietary diversification might have set in motion a whole new chain of events. As a result, this could have altered certain significant mores having to do with improvement of social contacts between family groups. Whatever was the final outcome, from the evidence it seems probable that stone bowl-making enjoyed a peaceful existence devoid of warfare, with the quarries open on a free basis to all alike. For, it is difficult to imagine how the great amount of creative thought that went into this enterprise could have flourished under the threat of attack from one's enemies. There was first the tooling effort, which probably continued throughout hundreds of years, and in fact doubtless never ceased during the life of the industry. Then there was the constant creation of different styled stone bowls and other products, which must have taken concentration that comes only from untrammeled release of inventive faculties. A Pronged club of basalt, found in the waste of Crater #2 on the east side, formerly was thought to indicate a state of warfare. However, this type of club is now presumed to indicate hunting activities instead, as it appeared in impressive numbers on the hunting site at Twin Rivers. More specifically, it is believed to have been used to dispatch wounded animals brought to bay. It seems to have been replaced by the Hatchet club, which was used both as a hunting tool as well as a weapon in warfare during the following Ceramic times.

As a matter of fact, the quarries have given up no evidence to indicate that a state of warfare existed.

Therefore, it seems safe to assume that the Late Archaic, except for the first 1,000 years, was an industrial age, in which the workmen were peace-loving individuals, and there was no group infighting to cause disruption of quarry activities. In short, it was a creative, productive age, throughout which cultural advance probably took place, that in the end placed the stone bowl artisans on a higher level of living than they had ever known before.

Bronson Museum
December 15, 1966

AN UNUSUAL INDIAN HARPOON FROM TRURO

Ross Moffett

On August 11, 1967, Mr. Warren T. Wilson, of Saugus, Massachusetts, while clamming on the flats opposite his summer cottage on Beach Point, in the extreme north part of Truro, Cape Cod, found an Indian bone harpoon of large size. According to Mr. Wilson, who has kindly given me information and allowed me to photograph his find, the scene of his discovery is about three-fourths mile off-shore and due west of the point where the boundary between Truro and Provincetown intersects the westerly shore of Cape Cod. On that day the tide was uncommonly low and he had gone out farther than usual. The harpoon was under 18″ of water, with approximately 6″ of the point end showing through the sand. When he picked up the object it was black and appeared similar to fire charred wood. After drying for three days it had bleached to the natural color of old bone.

This harpoon, as may be seen from the accompanying illustration (Fig. 15), is of the barbed kind with line hole near its base, in contradistinction to the toggle variety with line hole in its center and operating on the principal of the toggle. The length is 15 3/8″, the maximum width is 1 7/8", and the greatest thickness is 11/16″. In its third dimension the implement is slightly curved, the view shown here being of the concave side. The side not shown, the side that was uppermost as the object lay on the bottom, exhibits some weathering or surface checking, and adhering to this face are two limy patches of interlaced, marine worm casings. There is little evidence of wear from the artifact having been rolled in sand by wave or by tide. Since the bone of which the harpoon is made would have been too large to have come from any land animal then on Cape Cod, the material doubtless is from a blackfish or other member of the whale family.

In view of the time that must have elapsed since this implement was fashioned, its bone material is in

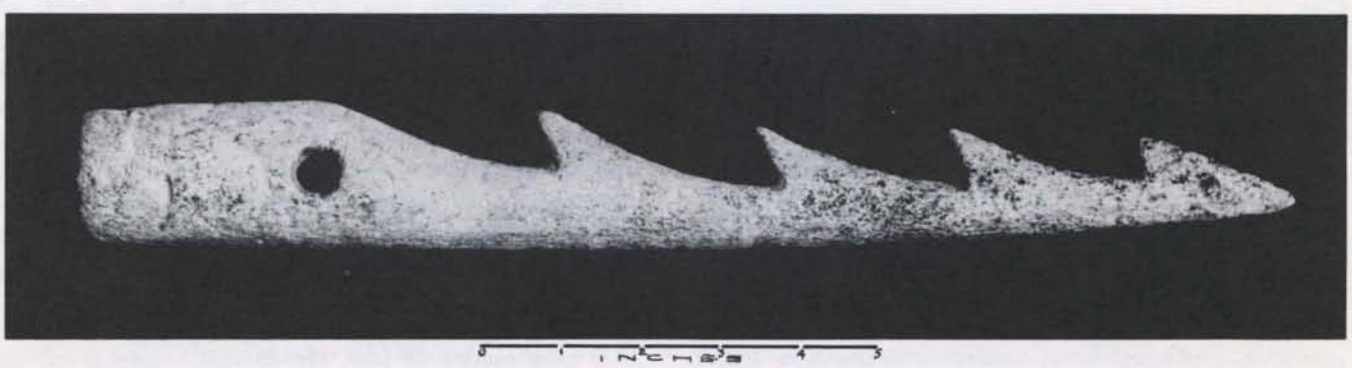


Fig. 15. BONE HARPOON (15″ long), Truro, Cape Cod.

rather firm condition. While this is probably in part due to the object having been continuously under water, the state of preservation seems to indicate also that the harpoon is not of extreme age. It appears to date from a late prehistoric or a very early historic day.

We cannot know how this Indian object came to be on the Truro flats. Was it dropped from a canoe? Did a canoe capsize? Why was such a special implement not retrieved from shallow water? Perhaps as plausible a conjecture as any is that a line to the harpoon broke, allowing the weapon to be carried away by a wounded creature, which may have been a large fish or a sea mammal.

When we attempt comparisons involving the implement before us, we find a dearth of published information about harpoons from this coastal section. Some barbed points reported as "harpoons" do not have line holes nor other provisions for attaching a cord, and these were probably intended for arrowpoints, spearpoints, leister prongs, etc. (de Laguna, 1947, pp. 119-122). True barbed harpoons with line holes are sparsely recorded from Massachusetts, Connecticut, Long Island, and New Jersey. The two examples I find from the last-named state are from the Abbott Farm site, on the Delaware River (Cross, 1956, Pl. 29), but all others are from coastal shell heaps. The largest harpoon mentioned from the above areas has a length of 8½". As we turn northward, however, we discover a more plentiful supply of harpoons, for the Robert S. Peabody Foundation (letter from Frederick Johnson) has many specimens from Maine, including examples that, although incomplete, are similar in size to the newly found implement from Truro.

Charles C. Willoughby (1936, Fig. 121, and p. 216) shows one of the harpoons from Connecticut and comments that it is "unsually large". He goes on to describe the method of using such harpoons for taking sea-bass, bluefish, and sturgeon. Interestingly enough, since size is here of some importance, the length of the implement illustrated by Willoughby is only 7½".

In passing I may give the dimensions of a few barbed harpoons from outside of this coastal section. A choice example with line hole is from Ontario and has a length of 9 5/16" (Ritchie, 1965, Pl. 79, No. 2). This is a six-barbed point and of more slender proportions than is common on the Atlantic Coast. Still further from Cape Cod, some barbed harpoons from Eskimo sites in Alaska (de Laguna, 1947, Pl. 2, No. 8) have lengths of up to 15", and in this respect they are rivals of the specimen from Truro.

With detachable barbed harpoons, to enlarge our field somewhat, we are dealing with implements whose origin lies fairly remote in prehistory, since such tools were in use as far back as the Magdalenian stage of the Upper Paleolithic of western Europe (Osborn, 1919, Fig. 193). And one may find a two-barbed, line hole harpoon described from the Mesolithic, Star Carr site in northern England (Clark, 1956). Barbed harpoons are prominent in the Neolithic of the Lake Baikal region in Siberia (Michael, 1958, Fig. 26), and they are reported from Japan, The Kuril Islands, and from the coast of northeast Asia.

In the Western Hemisphere barbed harpoons are common to the Arctic, to the Pacific Coast from southern California into Alaska, to the Atlantic Coast northward from Delaware Bay, and to a region extending from interior New York westward to include Ontario and the portion of the United States that borders on the Great Lakes. In the territory that encloses the three westernmost of the Great Lakes, however, the harpoon is sometimes of native copper. In eastern United States the most southerly located of the groups I find credited with the barbed harpoon (Morgan, 1952) are the Intrusive Mound and the Fort Ancient manifestations of Ohio.

In addition, a meager scattering of barbed harpoons is on record from elsewhere in the United States. Two examples, which are said to be rather old, were found in North Dakota. From the prarie region of south central Minnesota are two harpoons credited to the Oneota Aspect (Wilford, 1945), and the Oneota may have been responsible for a single harpoon that was found with the Nebraska culture. In this there seems a slight indication that the range of this implement was extended in protohistoric times by groups having common Upper Mississippi characteristics. In this connection one may point out the occurrence of the harpoon at a Fort Ancient site on the Ohio River.

Notwithstanding the probably late vintage of the present implement, the barbed harpoon was in the Northeast as early as 4,000 years ago, according to carbon-14 dates for New York Archaic sites having this artifact (Ritchie, 1965, Fig. 1). At roughly the same time the harpoon was in the Archaic of Maine, and perhaps in that of southern New England, where little early bone and antler has been preserved. With this age one is hard put to find a likely source for the older harpoons of this region. They evidently did not come from the Shell Mound Complex or other manifestations of the southern Archaic, which in their bone and antler work were without barbed points (Webb, 1946, pp. 232-234). And the known locations in the Northwest, Indian and Eskimo, that have yielded

harpoons are not as old as 4,000 years (Giddings, 1961, Fig. 2). Perhaps the barbed harpoon reached the Archaic of our Northeast from the old world through migrants now known through only their surviving stone industry.

To return to our point of departure in Truro, I think we may say, in summary, that the distinction of the harpoon here featured lies in its size. It is exceptionally large for southern New England. Almost certainly this implement points to a special use for large marine game. Apparently this Indian object has a long and far-traveled ancestry.

Provincetown, Mass.
November 10, 1967

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PARALLEL STEM POINT COMPARISON

William S. Fowler

As reported in Society Bulletin, Vol. 29, #3&4, p. 56, *A Case For An Early Archaic In New England,* a new type of projectile point for the Northeast seems to have been identified. It has been named, Parallel Stem, because a parallel stem condition with a tendancy to ear at times appears as one of its obvious traits. However, the fact that this parallel-sided condition is produced as a result of retouching is perhaps the most trustworthy characteristic to be observed. Other traits to be noted are: a thinned base that produces a slight to prominent concavity with a tendency to flute on one or both faces; a relatively narrow and elongated form with usually a prominent steeple-shaped tip; and generally a slight grinding of one or both lateral stem sides (Fig. 16, #1, 2). For the sake of clarification, the length of the retouched sides of both illustrated specimens has been indicated. Another important trait that identifies this point is that all specimens, so far recognized, are made of either felsite or hard fine-grained quartzite. Not one is made of the softer stone, argillite, which was frequently used for points in the Late Archaic.

The purpose of this report is to show by comparison that the Parallel Stem point does not belong in the category of Truncated points, as is held by some. For this comparison, 3 Truncated specimens are illustrated (Fig. 16, #3, 4, 5), of which 2 are of felsite and one, Exhibit #5, is of argillite.

Traits of this formerly classified Truncated type are: a relatively broad base that tends to be straight, or truncated, as a result of thinning, with lateral sides that are slightly off the parallel, tending toward a taper more apparent in the case of Exhibit #4. This kind of point is always broad and frequently long as well, which produces a wide-based spear projectile.

Its lateral stem sides are not retouched; are formed by secondary chipping only; and are not ground. Furthermore, its base is never concave, and any tendency toward fluted faces is absent. With these two traits missing, which are important characteristics of the Parallel Stem type, the Truncated point seems quite definitely to belong in a separate category.

When the Society classification of projectile points was published in Bulletin, Vol. 25, #1, research had not progressed as far as it has today. Consequently, errors of judgment at that time might be expected in the light of present-day discoveries, so that what then appeared as a type, today may appear as only a variation of another type, with traits not too dissimilar. This now seems to be the case in respect to the former Truncated type.

Careful scrutiny of the shorter illustrated specimens, Exhibits #3, 5 reveals them to have lateral stem sides that taper only a trifle — a taper that is more discernible in the other longer point Exhibit #4. With this fact established, it would appear logical to consider these specimens and all others in this Tuncated class to belong more properly in the category of Tapered-Stem points. They would then be classed as a variation of the Tapered-Stem, rather than as a separate type by themselves.

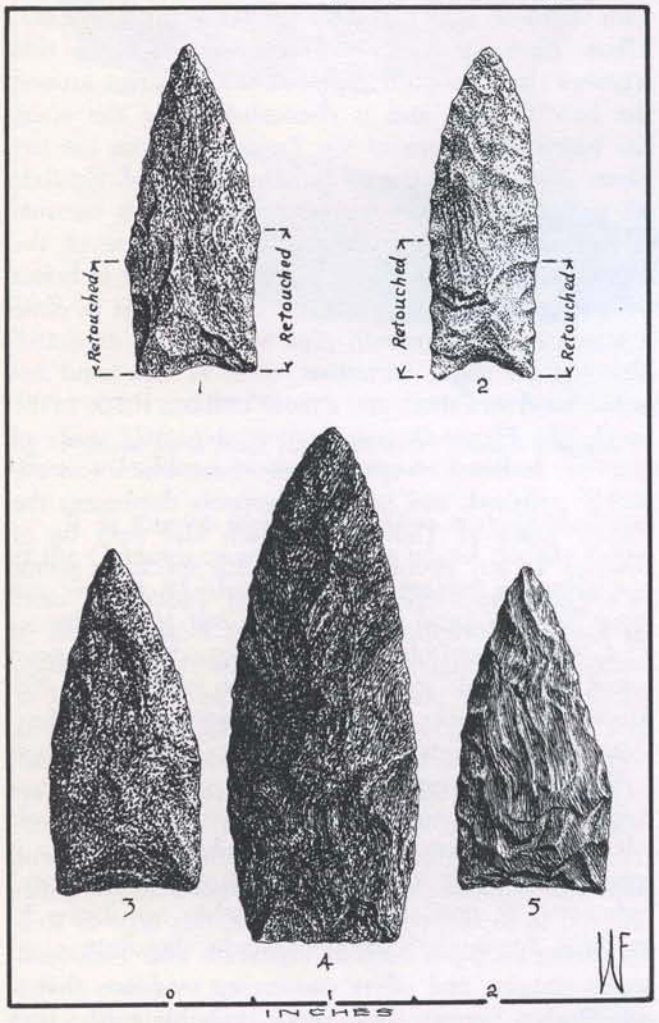

Fig. 16. PROJECTILE POINT COMPARISON. 1,2,Parallel Stem; 3,4,5, Truncated — now suggested to be classed as Tapered Stem.

Border-line variations of this kind are sometimes difficult to recognize until a new discovery, such as the Parallel Stem point, is brought into focus. But now with Exhibit #5 of argillite, a stone which is of frequent occurrence among Tapered Stem points of the Late Archaic, and with the knowledge that Parallel Stem points occur at the low Early Archaic level and below, all thought of placing these two kinds of points together in the same type class should be abandoned.

For the purpose of justifying a consolidation into one type class of two shapes of points, such as the Tapered Stem and the Truncated, that have but slight dissimilarities, it should be said that something besides point shapes should be taken into consideration. That is, the stratigraphic source of such points should be the same, suggesting that they belong to the same culture period, as well as other relationships that could be mentioned. This process of reasoning was followed, when the last Society projectile point classification was established in 1963. As a result, consolidations were made at that time of what seemed to be variations only of a type in the case of certain Corner-removed and Side-notched points, as well as for several other point classes. Consequently, in the future when developing a revised point classification for the Society, it would seem advisable to eliminate the Truncated type and include this kind of point in the Tapered-Stem category as a variation. The Parallel Stem type then would be added as a new class of points having probable similar culture status, with some trait similarities, to the present Corner-removed #2 point. Reference to the Society classification will reveal that this last-mentioned type has parallel-sided stem similarity to the Parallel Stem type except that the retouched recessing of its sides tends to be more pronounced, and the over-all shape is broader and relatively shorter. However, it is culturally related, since it has occurred stratigraphically at the low Early Archaic level or below at Heard Pond, Titicut, and Oak Island. At the latter site it was associated with the Parallel Stem point at the same low level, Society Bulletin, Vol. 29, #3&4.

Bronson Museum
September 1968

A STONE PIPE FROM PLYMOUTH

William S. Fowler

During the early part of 1967, Rodney W. Roach, a Society member, brought into the museum a stone Elbow pipe he had just found on a plowed field in Plymouth, Massachusetts. It had been damaged to some extent by the plow, but not as much as is usually the case. Part of the bowl and the stem end were missing, but about two thirds of the pipe was present and in remarkably good condition. Asked if restoration of it was possible, the writer said it could be done, and agreed to undertake the job. He was especially interested in restoring the pipe to its original condition, because of the attractive shape of its stem, which, instead of being rounded as usual, had a flattened bulbous form at the bowl end, with two opposing edges on either side. These tapered toward the mouth end of the stem, and were decorated with 5 or more notches on both sides (Fig. 17, #1).

There was something about this pipe that brought to the writer's mind remembrance of similar shaped pipes he had once seen several years earlier. They were part of an extensive aboriginal stone artifact display in the trading post museum at Tadoussac on the St. Lawrence, where the Saguenay empties into the larger river. At the time of the writer's visit, he was impressed with the unusual appearance, principally of three Elbow pipes, which had the same flattened bulbous stems at the large end next to the bowl. After obtaining permission to open the cases, he was allowed the privilege of removing the pipes, and from outline drawings made a three dimensional pencil sketch of each. These drawings were now hastily taken out of the file and compared with the Plymouth specimen. Surprisingly enough, the resemblance was so close as to excite one's imagination in speculating that they may have had a common source with the Plymouth pipe.

Exhibited with the three Tadoussac Elbow pipes were two Platform pipes, which were sketched at the same time, and appear herein with the Elbow specimens in pen and ink illustrations (Fig. 17).

The Tadoussac pipes are probably made of steatite and chlorite, but it was difficult to identify the stone used in each case by visual observation — the scratch method was obviously barred. However, Exhibit #2, a Platform pipe, similar to those from New England, was of a lighter shade and is probably made of steatite. All the other specimens had deeper tones bordering on black and are presumed to be of chlorite, although steatite sometimes takes on a dark tone resembling chlorite under certain conditions. There are no known deposits of these two stones in Canada, while the nearest aboriginal stone bowl quarries, where steatite and chlorite outcrop, appear in Massachusetts, Rhode Island, and Connecticut. Therefore, it was thought at once that the Tadoussac pipes may have had their source in New England.

A letter received from the Canada Steamship Lines Limited, owners of the Tadoussac Hotel and trading post museum, says that the pipes, "were excavated from Indian graves at Tadoussac, and other areas in Montreal and Quebec." This suggests that they belonged at one time to aborigines of the St. Lawrence region, but beyond this, apparently nothing is known about their origin.

Now appears the Plymouth specimen, Exhibit #1, with characteristics markedly similar to the Tadoussac Elbow pipes. The only difference seems to be that whereas the Plymouth pipe has a low flange around the bowl's edge, and is decorated along the stem, the bowls and stems of the Tadoussac pipes are left plain. Also, the flattened bulbous stems of Exhibits #3 and #5 are more exaggerated, with this unusual styling extending into the bowl in the case of the former — two views of it attempt to show it to better advantage. On the other hand, Exhibit #6 is as close a match to the Plymouth pipe as could be expected, allowing for slight variations, such as less bend between bowl and stem, and a more bulbous shape to the bowl. The Plymouth pipe is quite definitely made of chlorite. It has a deep lustrous bluish-black tone, is highly polished, and in these respects duplicates the Elbow pipes at Tadoussac, which also may be of chlorite. In any event, the Plymouth specimen seems to suggest the source for those at Tadoussac, since no known aboriginal pipe making existed north of central New England. Another observation perhaps should be made concerning this pipe study. That is, that of all the stone pipes this writer has witnessed, both excavated in the field, observed in museum collections, or viewed in printed reproductions of existing specimens, never before has he seen the attractive type of Elbow pipe stem with the pronounced flattened bulbous-shaped characteristics of the pipes referred to in this paper. Therefore, this type of stem appearing on pipes both at Plymouth and Tadoussac seems unique, and offers convincing evidence that a relationship betwen these pipes probably exists; that their source doubtless lies in central or southern New England.

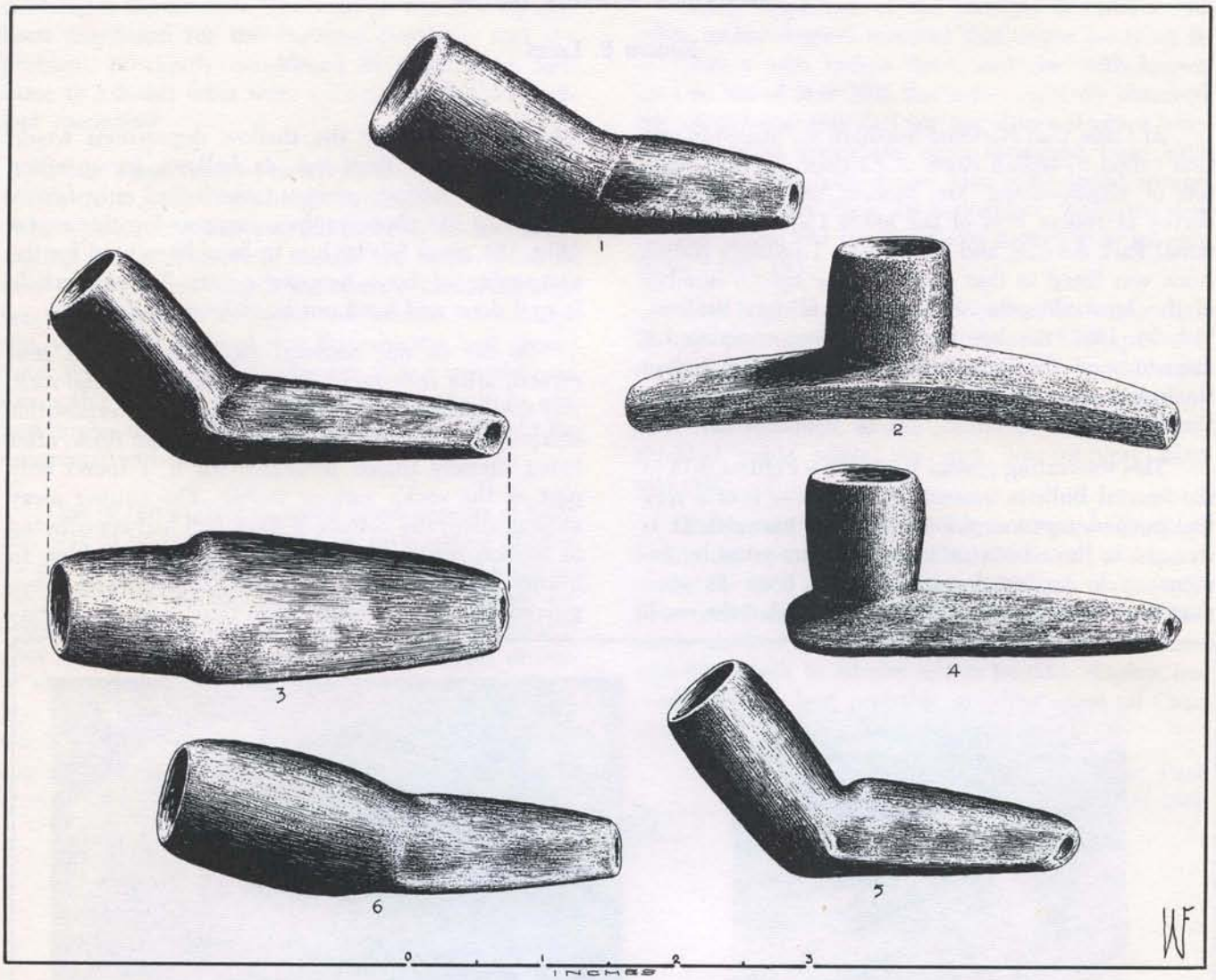

Fig. 17. STONE PIPES FROM THE NORTHEAST. 1,Surface Recovery, Plymouth, Mass. (restored); 2-6,Burial Recoveries from areas near Montreal, Quebec, and Tadoussac, (Trading Post Museum, Tadoussac).

It is known from recent pipe making evidence at the Oaklawn quarry in Rhode Island, Society Bulletin, Vol. 29, #1, that stone pipe making probably was introduced at the end of stone bowl making, some time before the quarries closed down, or about A.D. 100. From then on, elaboration of stone pipe forms probably developed, which might place the Plymouth flattened bulbous-stemmed Elbow style in the succeeding age of Stage 2 pottery making. It appears that the bowl of this pipe was first reamed out, after which a narrower-bitted stone drill was used to extend the bowl's hollowing into the head of the stem, remains of which are clearly visible. The stem is perforated by a uniformly shaped smooth hole about 3/16″ in diameter without noticeable taper — probably drilled by abrasion, using a parallel-sided stick and sand. Shaping of the pipe then took place by scraping and rubbing. Finally, to thin the bowl's walls an implement — probably of stone — was worked up and down inside the bowl with vertical strokes, which left striations that are still visible. This pipe and all those from Tadoussac, doubtless represent the work of skillful artisans, as do many other well-made stone pipes of various shapes from central and southern New England sites.

Bronson Museum,
April 22, 1967

MOVING INDIAN ROCK

Edison P. Lohr

At Cape Cod National Seashore my attention was first called to Indian Rock at Eastham by Ross Moffett of Provincetown. Mr. Moffett had completed a survey of Indian sites of the lower Cape for the National Park Service, and Hemenway Landing's Indian Rock was listed in that study. In the special number of the Massachusetts Achaeological Society Bulletin, Vol. 14, 1952, the late Howard Torrey completed a fine study on the Indian Rocks of Cape Cod. Indian Rock was most prominent among the glacial erratics that were studied.

This interesting glacial boulder — Figures 9-14 in the Special Bulletin account by Torrey — is of a very fine-grained metamorphic or granitic material. It is thought to have been utilized for many years by Indians as a combined adz, ax, and bone harpoon sharpener. Briefly, Torrey's opinion was that the small size and position of the shallow depressions would have precluded their use as hollows for grinding maize. The narrow grooves, which can only faintly be seen in the photographs accompanying this report (Fig. 18), were felt by him to have been used for the sharpening of bone harpoon points. Torrey's article is well done and need not be elaborated on here.

So far as the National Park Service was concerned, after they had become interested in the rock, was the problem of how to display and interpret this sharpening stone. When I first saw Indian Rock, after being literally forced to search for it, I found only part of the rock's surface visible. The cutting away of peat along the bottom of Skiff Hill had contributed to erosion, which had nearly buried the boulder. In historic times the stone's surface had been well above ground level, but recent high tides had completely

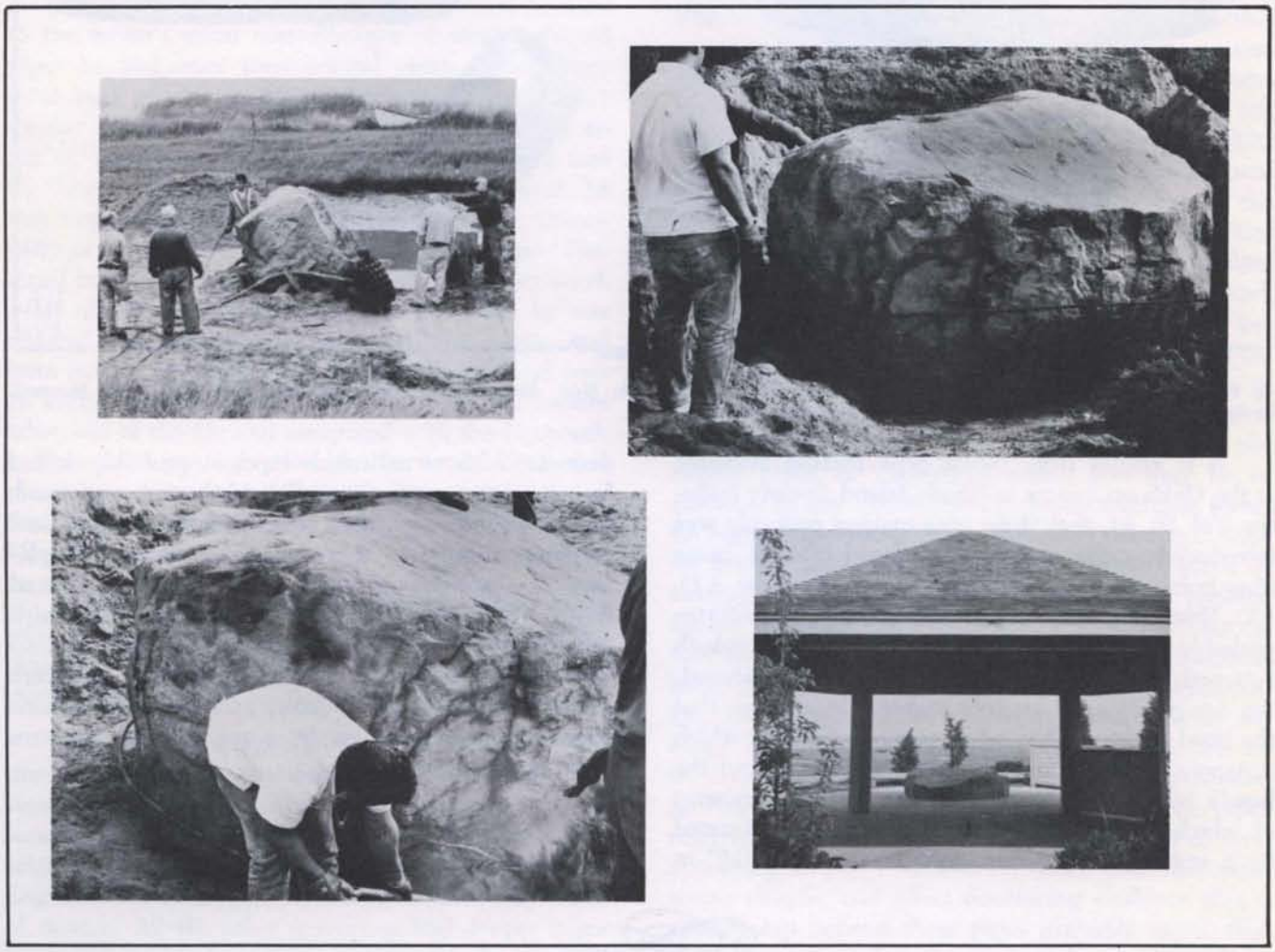

Fig. 18. INDIAN ROCK, Cape Cod National Seashore Park. Views of its removal to Skiff Hill, and as it looks today in place beside the shelter, Eastham.

submerged the boulder. The land on which it lay had been purchased for the National Seashore, and the problem, previously considered for some time, now came to a head: what were we to do with this excellent specimen?

If the stone were to be left on the edge of Nauset Marsh in its buried condition, it would be in danger of being lost altogether and of absolutely no use to the visiting public. Therefore, means had to be found to raise it onto a firm foundation of some kind. Although we were reluctant to move the boulder to another site, we finally decided that this was the best procedure. We knew we might damage it, but we told ourselves this was not to be thought of — the main objective was to remove it to a new site that should be congruous with its old location.

One of the earliest planned developments of Skiff Hill was to be the building of an Interpretive Shelter — already under way — and we decided to utilize the services of the building contractor. He would be asked to move the boulder to this shelter site, which, after all, was only one hundred feet southwest, directly above the Nauset Marsh site where Indian Rock lay. Such a move would place the Rock where it would be safe, while its presence at the shelter would augment the significance of interpretive signs to be erected there.

Being cognizant of the possible disturbance of other archaeological material that might be lying in association with Indian Rock, and also with known sites on top of Skiff Hill, the writer carefully observed the excavating and moving operations. Only a very few scattered specimens were recovered from Skiff Hill, and no artifacts of any kind were found around or under Indian Rock. In September, 1965, we dug out the grand old specimen and moved it to its new home (Fig. 18).

The huge boulder turned out to be larger than Torrey or ourselves had estimated. The specimen measured 9 x 6 x 5 feet, and weighed about 20 tons — moving it was no small feat. However, no damage to it was sustained, as the contractor used a rubber-shielded cable while the rock was of very hard material.

Today, old Indian Rock lies in its permanent bed beside the new shelter on Skiff Hill, for all to see and study. By 1967 an aluminum interpretive plaque will be erected, and it will explain the probable use formerly made of it by the departed aborigines. Visitors will find much to admire in this boulder display, undoubtedly the best probable grinding stone on Cape Cod.

Cape Cod National Seashore Park
Eastham, Mass. — August, 1966

POTTERY RESTORATION DESCRIBED

William S. Fowler

After restoring many pots to their original shapes, much has been learned concerning the preferable way to assemble potsherds, and reconstruct those areas that are missing. To start with, it is necessary to have recovered enough contiguous sherds of any given pot, to describe its rim and body contours. This does not mean, however, that remains of the entire rim and body must be present. Only enough is required, so that the balance may be projected from existing portions and filled in, to produce the whole vessel without resorting to conjecture. Usually, partial remains of a broken pot are to be found in a refuse pit; almost never are they deposited over the floor of an excavated level. Beside recovery of rim and body sherds, it is desirable to find the base. For, to know how the pot's bottom was shaped is important for a genuine restoration. However, often this is not possible, since it is frequently burned out and missing. In this event, enough contiguous body sherds should be present to reveal the vessel's contour down to, or approaching the base. Projections from this contour may then reveal the probable base form that is absent, and so permit a reasonable reconstruction of it, depending upon to which development stage the pot belongs.

When potsherds are first encountered, while excavating, they are soft and moist, and should be handled with great care. They may be placed without cleaning into a box for removal from the site. Plastic spraying while damp causes a white film to form, and is recommended only when normal handling is impossible. Generally, if sherds are so deteriorated as not to permit removal without spraying, they are hardly worth trying to save for a restoration. After removal of sherds from the soil, they must be kept out of the direct rays of the sun, taken home, and allowed to dry gradually under normal heat. When bone dry, a soft brush may be used to remove particles of dirt still adhering to them. If the cleaned sherds now appear to be brittle with a tendency to crumble, lay them on a newspaper and spray with clear plastic *Krylon* on both sides and edges. Do not over-spray, as too much will produce an undesirable gloss. If sherds are small, there should be at least a hundred, preferably more, for a medium sized pot. If fewer than this are present, restoration is undesirable unless assemblage includes large sherds.

The next step is to cement together all contiguous sherds, and allow them to form into as many independent sections as may happen. Use a plastic glue, such as *Duco Cement,* which is soluble in acetone. In an approach to this initial act of cementing, place rim and design sherds in one tray, and body sherds by themselves in another tray. If rim and design sherds are numerous, an effort should first be made to join as many of them as possible in one contiguous group. This will enable an estimation of the pot's diameter at its mouth, but only if each sherd is closely joined to the next one, so that the correct curvature of the pot is maintained. Sometimes, a few particles of dirt will be found still adhering to the edges of some sherds. In this event, they should be removed by brushing with acetone in order to permit a tight fit of contiguous sherds.

Right here, before cementing takes place, a shallow box of sand is essential to provide the means of holding two sherds together, while the cement is drying. Such sherds may be pushed lightly into the sand on edge, or in other positions as circumstances dictate, so that they may be held immovable until the cement sets.

If success in joining rim sherds has enabled formation of the entire rim, well and good. On the other hand, if a section is missing, fill this in so as to secure both unattached ends of the cemented sherds. This is done through the use of wire window screening, cut to the desired shape and length with a pair of wire-cutting shears, after the strip has first been bent to conform to the correct rim curvature. The ends of this strip of screening are now attached to the exposed ends of the joined rimsherds by means of *Castone* dental cement, or its equivalent, used sparingly, but only after the cemented sherds have been inverted. At the end of several hours, as may be required to insure extra strength, the Castone should be thoroughly set. Then, a thin layer of Castone may be spread with a spatula over the outside of the screening. When this becomes sufficiently set in about ten minutes, the entire circumference of the pot's rim will form a ridged base from which to work. The amount of water to be mixed with the Castone powder — in a glass mug, preferably — will only be discovered by trial and error. A soft liquid consistency is preferable for some operations, while a stiffer one is more suitable for others — drying time varies for each.

At this point, the joined rim made rigid as described is ready for body building operations, with the rim edge facing down. From here on, restoration of the pot continues in an inverted position. Those body sections already assembled are fitted gradually into place, as one edge at a time is found to be contiguous with this or that edge exposed on the rim. Often, small sherds, which have appeared useless up to this point, are discovered to be links that serve to complete a contiguous assembly. If a sizable portion of the pot's body is present, the problem probably will arise as to how to bring the remaining contiguous edges together. For, it is almost impossible to succeed in attaining the correct body curvature by eye, as sherds are cemented together, one by one. Usually, in such a case, one is faced with failure of body walls to close, leaving a gap of up to an inch in extreme cases. To correct this error, it is necessary to brush with acetone all cemented edges of sherds seen to have an incorrect curvature, and continually repeat this application for five or ten minutes until the cement begins to loosen, but not completely to dissolve. At this moment, if acetone is applied simultaneously to all edges where needed, the pot's body may be warped into shape by pressure brought to bear evenly from heavy twine, previously wound around the pot and made taut by a tourniquet, very gently applied. In such a case, it is important to remember never to try to force the gap to close by hand or tourniquet pressure without first using acetone, as pottery walls have little flexibility, and will in that event shatter and bring ruin to the work so far accomplished. Illustrations show two stages of development and the finished pot (Fig. 19).

Often, it is necessary to fill in small areas where

sherds are missing as the work proceeds. This is done to strengthen some section of the pot, or to enable attachment of a group of previously joined sherds. This is accomplished with pieces of screening bent and cut to the correct size and contour, fastened first with cement, then with Castone. Positioning of such pieces should place their edges as nearly as possible at the center of thickness of the existing pottery walls. When thoroughly set, spread a layer of Castone over the outside of the screening, not the inside, enough to come flush with the outside pottery walls. Before completely dry, impress into the pliable Castone sur-

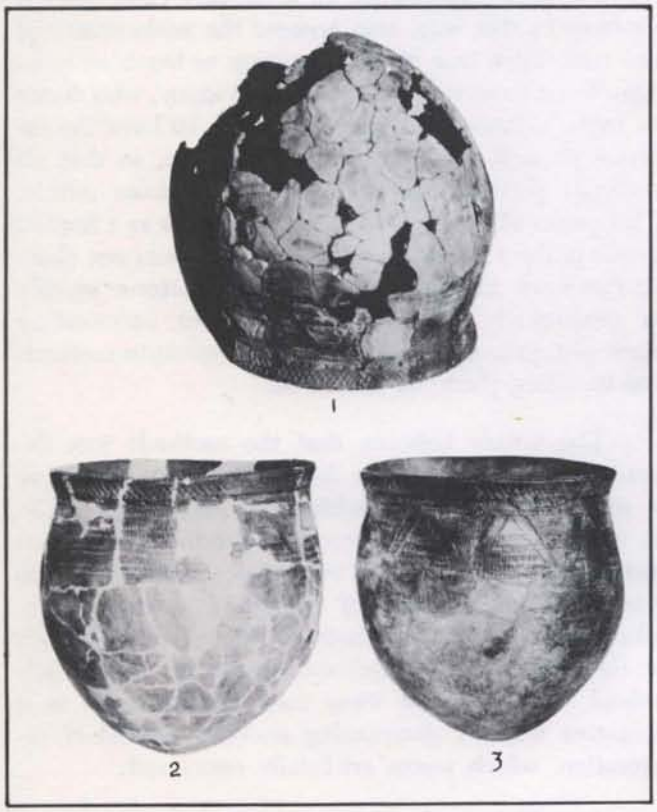

Fig. 19. STAGE 3 POT IN PROCESS OF RESTORATION. 1,Pot in inverted position showing assembly of contiguous sherds; 2,Pot fully assembled showing Castone fill-ins of missing areas; 3,Restored pot with Castone areas painted.

face characteristics to match the surrounding areas. This may be done with various coarse bristle brushes, serrated knives, or other suitable tools. Also, keep a damp rag on hand to remove Castone from pottery surfaces, smeared inadvertently while screening was being covered. Previous plastic spraying of sherds will help prevent deep absorption of such smears, and enable more complete cleaning of pottery. Leave until later the covering with Castone of inside areas of exposed screening. This will permit alterations to be made more easily in the course of restoration, if found necessary, in order to correct some glaring error.

Many times, a sherd or group of sherds including all or a portion of the pot's base is present, but without being contiguous to nearby body sherds. In this event, a temporary support for the base should be constructed with convenient objects at hand, in the center of the inverted pot. It should be positioned in such a way as to bring the base in line with the restored body walls. Then, with a bit of screening cut to connect the body with one edge of the base section, Castone is used sparingly in spots to secure it in place. This is followed by similar attachments to the remaining edges. In this manner, the central support holds the base rigid, while the Castone dries. Modeling clay is a valuable aid in holding some sherds in place as the work progresses, while plastic cement or Castone is setting. Just a pinch here or there is usually enough to hold a sherd from moving. Also, small metal spring hair clips are most useful, and may be utilized to good advantage. Miscellaneous sherds, not found to be contiguous, may be fitted in whereever possible, after all contiguous sherds have been cemented together. Selecting suitable places and determining methods for attaching them must be decided as the situation demands in each case.

As sometimes happens, rim and design sherds are in the minority with base and body sherds forming a large part of the recovery. Faced with this situation, it is best to concentrate first on restoring the lower portions of the pot and let the rim remain until the last. In this case, it becomes necessary to project and build the body upward until it meets that portion of the rim for which sherds exist. This work, unlike the first method described, is conducted with the pot in an upright position, held firmly in the sand box. Finally, the rim is reconstructed to match the body curvature.

To continue with the first method as outlined, after the exterior of the pot's body is restored, the pot is set upright in the sand box, so that the missing portion of the rim may be reconstructed. This work requires an exact eye and steady hand using the spatula to form the various intricacies of the rim and neck. After exterior surfaces are built up with Castone and the design motif is worked in to match existing embellishments, Castone filling of interior openings commences. A start is made from the rim's edge and continues down the inside until all exposed screening is covered. For openings toward the base, a small metal ladle serves as a useful tool with which to spread the Castone. Also, sharply angled spatulas may be purchased, which are helpful in reaching awkward spots.

After the pot has been restored this far, it is

ready to have the light cream colored patches of Castone painted to match as closely as possible existing pottery surfaces. Only by so doing may the pot be fully restored to its former state, both as to shape as well as to body color. For, it is impossible to completely evaluate a restoration until Castone-filled areas are color matched to ceramic sections, so as to make a harmonious visual unit for study.

To accomplish this result a combination of techniques, using oil paints, may be employed, such as an undercoat of a lighter shade retouched by lightly smeared brush strokes, then stippled with a stencil brush in light or dark tones as may be required. The eye must determine which paints to use in mixing these shades to match ceramic-fired surface effects, which occur in innumerable variations over the surface of any pot. But before paint is applied, rub exposed clay surfaces with a soft rag continuously dipped in acetone. This will remove excess amounts of plastic coating from former spraying, and will reduce any excessive gloss. Then rub the entire pot with a wet rag to clean all surfaces. Next, mix a small amount of *Rex Wall* animal size in warm water to a light consistency, and brush over the entire pot inside and out. When this is thoroughly dry, the pot is ready for painting. Sizing will prevent the oil paint from soaking into exposed clay surfaces, which otherwise would cause unwanted streaks. Coloring should be carefully confined to Castone-filled areas, and should not overlap onto clay surfaces. If by chance it should, quickly rub it off with a dry rag dabbed in pure gum spirits of turpentine.

All ceramic tints may be obtained through mixture of the proper combinations with the following oil colors: raw sienna, burnt sienna, Japan Coach black, and dull ceiling white. Use only pure gum spirits of turpentine; *Nu Brite* has been found to give the best results without a gloss. Dull ceiling white is used in most mixtures to produce opaque shades and to bring forth dull and fast-drying results. When all reconstructed areas are finally colored, so that the pot appears unified as to coloration, restoration is considered complete except for one last act that is optional. To make colored areas match ceramic ones in finish, it is desirable to brush them with a thin weak coat of animal size, but not so as to produce a gloss. This will seal the paint and prevent it from rubbing off during subsequent handling.

In the matter of coloring, some have held that it is preferable to paint restored areas in a lighter or darker tone than that of the pottery itself. It is thought that only by so doing will one be able to ascertain those parts of the pot which are artificial. However, experience has shown that this objective, no matter how desirable it may appear, is not always attained through such color contrasts. For instance, when an examination is made of such a color-treated restoration in a display case, it is often difficult to determine at a distance, which of the spots, light or dark, are genuine and which artificial. Each viewer will have a different opinion, which tends to confound the purpose of the restoration. Therefore, it seems to many much better for the observer to have the advantage of studying the full outlines and surface characteristics of a pot that has been uniformly colored, uninterrupted by an artificially color-spotted surface. In this way, one accepts the authenticity of the restoration free of any suspicion or troubled emotion. Even then, it may seem best to many, who desire to make a more thorough inspection, to have the interior painted areas tinted an off shade, so that all artificial portions may be clearly seen from within. This paper of instructions is intended only as a limited guide in the restoration of pottery, and does not claim to cover all situations. Actually, the restorer usually is confronted with varying conditions surrounding each restoration, and must devise impromptu methods for handling them, as they arise.

The writer believes that the methods just described will produce the best results, in producing a restoration closely matching the original pot. For, it would seem that a restoration produced by visual determination and control of the pot's contours, by the careful fitting together of potsherds, should accomplish similar results to those of the eye-guided work of the potter, who labored without the aid of a potter's wheel. This point of view may be expressed in a negative way by denouncing another method of restoration, which seems artificially conceived.

A mold is made of some suitable material in an imaginary shape, which is believed to represent style and size of the pot being restored. The sherds are then placed around the mold and cemented together in positions that seem to suit them best. This method has been used in the past, especially when the sherds are so small that joining them contiguously is next to impossible. In such an event, this method is a makeshift and is not recommended; should not be considered as an authentic way to restore a pot. To this writer, this method appears as an unsound expedient, and should not be used even under circumstances when nearly all of the pot is known to be present in small unmanageable sherds.

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