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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.
ABORIGINAL DUGOUT DISCOVERED AT WEYMOUTH

CHESTER B. KEVITT

Editor's Note: As confirmation that the Weymouth dugout probably is a product of aboriginal times, reference is here made to a water color painted by John White in 1586, one of his many water colors, the first authentic pictorial records in the New World (Sir Walter Raleigh’s first colony of Virginia). Reproduced for the first time in The New World, by Stefan Lorant, p. 189 it depicts Indians fishing from a dugout, which has a rounded end at both bow and stern, similar in all respects to the Weymouth dugout. While Virginia is somewhat removed from New England, nevertheless, there is reason to believe that the distance was not such as to deny contacts of some sort, which could have created similarities in dugout styling along the eastern seaboard.

Weymouth, or Wessagusset to use its Indian name, lies some seventeen miles southeast of Boston on Massachusetts Bay. Founded in 1622 by Thomas Weston, a London merchant and speculator, Weymouth is the second oldest settlement in the Commonwealth of Massachusetts.

The townspeople will long remember 1965 as the year its reservoir, the “Great Pond” went dry, a victim of the severe drought that plagued the northeast during the early 1960s. For more than eighty years, Great Pond has been the chief source of water for the Town. Located in the sparsely settled southern end of Weymouth, the natural beauty of the Pond and surrounding area has remained unspoiled since the early days of the settlement.

Geologically, Great Pond was formed some 12,000 years ago by the receding “Wisconsin” ice glacier that once covered New England. The Pond is roughly rectangular in shape, measuring slightly more than a mile in length and about a half a mile wide. A gently sloping shore descends to a saucer like bottom that is carpeted with granite boulders and debris left by the receding glacier. The Pond is fairly shallow with a maximum depth of about 20 feet. Along the shore and clinging to the stones and boulders may be seen a brownish black porous substance known as limonite or bog iron. In colonial days the Town leased the digging rights of bog iron at the rate of 60 cents a ton. The ore was sold to the early foundries and forges in eastern Massachusetts. The principal source of Great Pond’s water comes from the large swamp areas bordering along the southern and western side that drain into two streams, one at the extreme southeastern and the other at the northwestern end of the Pond. The Pond drains into Mill River that wends its way to Whitman’s Pond — where the herring spawn each spring — and thence to the sea. Early records of the Town indicate that Mill River was once navigable for small boats.

Late in October 1965, the Weymouth Historical Commission was advised by Howard Crocker of South Weymouth that he had possession of an old boat found in Great Pond that he felt should be turned over to the Historical Commission. It seems that a group of boys exploring near the southern tip of the Pond were attracted by what appeared to be a water-soaked thick plank embedded in the mire some distance from the old shore line. The boys tried to pry the object out, but it was too firmly embedded to be budged. With Crocker’s help, the mud was dug away and soon the outline of a boat began to take shape. Finally their efforts were rewarded and the boat was carefully removed from its muddy bed. Crocker and the boys did not realize it, but they had made a rare discovery. Revealed to their sight, intact and in remarkable condition was an aboriginal dugout (Fig. 1).

Fig. 1. WEYMOUTH DUGOUT. Note rounding of both ends, with the draught at the left hand end appearing slightly less. Aboriginal stone artifacts found about Great Pond give credence to the dugout’s source as being aboriginal.
Although we know that dugout canoes were extensively used by the Indians of eastern Massachusetts, few have ever been found. In fact, they are one of the rarest aboriginal items to be found in North America, chiefly because they were made of wood and wood cannot long survive exposure and dampness. The dugout discovered in Great Pond survived because it was buried in a protective coat of mud for centuries. In 1524, John Verarzanus, the Florentine explorer, tells about these dugouts used by the Indians of Narranganset Bay. Also, Samuel Champlain in his explorations along the Massachusetts coast in 1607, observed the Indians building dugout canoes. In his journal he says: "The canoes of those who live there are made of a single piece and are very liable to turn over if one is not skillful in managing them. We had not before seen any of this kind, which are made in the following manner. After cutting down, at the cost of much labor and time, the largest and tallest tree they can find, by means of stone hatchets — for they have no others except some few which they received from the savages on the La Cadie, who obtained them in exchange for furs—they removed the bark and rounded off the tree except on one side where they apply fire gradually along its entire length; and sometimes they put hot pebbles on top. When the fire is too fierce, they extinguish it with a little water, not entirely but so that the edge of the boat may not be burnt. Being hollowed out as much as they wish, they scrape it all over with stones which they use instead of knives. These stones resemble our musket flints."

The Historical Commission’s immediate problem was to keep the vessel from drying out which would have been disastrous, causing the wood to check and possibly to collapse. The dugout was carefully removed from its original site and sunk in a small lagoon near the Pond’s filter plant. Next, a call was put through to the Peabody Museum of Archeology and Ethnology at Harvard. Dr. William R. Bullard of the Museum was surprised and delighted by the news of the discovery. He immediately arranged to have it inspected by Dr. James Deetz, Associate Anthropologist at Harvard and the University of California. Dr. Deetz was on Sabbatical leave from the University of California to teach at Harvard and to direct the restoration work at Plimoth Plantations in Plymouth, Massachusetts. Within a few days, Dr. Deetz was at the Pond and his first reaction on seeing the dugout was to exclaim, "You have actually found one, no doubt about it." A thorough examination of the dugout disclosed that it had probably been made with stone rather than metal tools, strongly indicating aboriginal craftsmanship. Measurements of the dugout appear in an appropriate drawing by Joseph C. McCarten (Fig. 2). Further evidence of native workmanship was the blunt shaped bow and stern. In the early part of the 18th century, a few dugout canoes

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**Fig. 2. Diagramatic Drawing of Weymouth Dugout.** Enough dimensions are given to indicate general proportions. However, because of the limitations of this kind of drawing, edges appear sharp, which actually are irregularly rounded on the dugout. Thickness of canoe walls varies throughout, suggesting hand work with crude stone tools.
were made by white settlers who copied the aboriginal design. However, they made one significant change, the bow was usually pointed or narrow, shaped after the European style. Definite confirmation of the dugout’s aboriginal origin was established later when its age was determined by radiocarbon analysis.

Storage of the dugout in the lagoon provided an excellent but only temporary means of protecting the vessel from drying out. The immediate danger now was that Great Pond would go completely dry, thereby shutting down the pumps. If this happened with winter closing in, the danger of a freeze and ice damage to the vessel was very great. The first step was to design a water storage tank. Fortunately, this was no problem since one of the members of the Commission, Charles E. Adams, Jr., is an engineer and his talents were put to work. In a short time the design was completed and turned over to the Weymouth Vocational High School, who had agreed to construct it.

In the meantime the dugout was hauled from the water and a 30 gram sample of wood was taken from the hull and sent to the Geochron Laboratory in Cambridge, Massachusetts, for a radio-active carbon determination test; a sample was also sent to the U.S. Department of Agriculture’s Forest Products Laboratory in Madison, Wisconsin, for identification of the wood.

While waiting for the storage tank to be finished, the Commission’s attention turned to the problem of finding or devising a method that would permanently preserve the dugout and also locate suitable quarters to carry on this work. In considering possible methods of preserving old wood, Arsen Charles of Harvard’s Peabody Museum pointed out that the Forest Products Laboratory, to whom a specimen of the dugout had recently been sent for identification, had done considerable research and experimental work in the field of stabilizing and preserving green and decayed wood. The Commission was also in touch with William Baker, Marine Engineer and designer of the Mayflower II now on exhibit in Plymouth Harbor. He had visited and was familiar with the method employed by the Swedish government to preserve the wooden warship WASA that capsized and sank in Stockholm Harbor shortly after it was launched in 1650. Discovered in 1956, the ship was found to be in remarkably good condition. The warship was raised in 1962, towed to a dry dock, and is presently being treated by a method devised by the Swedish government. As it turned out, both the Swedish government and the Forest Products Laboratory were using a similar method of preserving old or archeological wood, utilizing “polyethylene glycol” as the preserving agent. Essentially, this process consists of immersing the wood in a solution of “PEG” for varying periods or until it is determined that the adsorption process is complete. The principal of the “PEG” process is the filling of the wood fibres by the wax-like “PEG”. When air-dried, the former green or water-soaked wood retains its original shape, there is little danger of collapse, and shrinkage is held to a minimum. When the process is completed, the wood is found to be somewhat darker, and has a slightly waxy feel to the touch.

On December 13th, the Great Pond went dry and the pumps in the filter plant were shut down. The Historical Commission was advised by the Water Department to remove the dugout immediately, as the lagoon was expected to freeze over. The following evening, four members of the Commission, braving a 15° temperature, raised the dugout from the bottom of the lagoon, carefully loaded it in a station wagon, and took it to the home of the Commission’s Chairman where it was buried under a blanket of snow and wet leaves.

While waiting for the storage and treatment tank to be completed, the Commission continued its search for a suitable place to carry out the work of preservation. Fortunately, the new Tufts Library of Weymouth had recently been completed, and through the good offices of Mrs. Eleanor Cooney, Town Librarian, the Library Trustees made available a sizeable area in the spacious basement of the new building.

Early in January, results of the Carbon-14 tests were received from the Geochron Laboratories Inc. in Cambridge, Massachusetts (Sample No. GX0541.) Educated guesses placed it no earlier than the 18th century; however, the carbon test established the median age of the wood as 445 years plus or minus 100 years. In statistical language, the report says that the chances are two out of three that the tree from which the dugout was made, was cut down not earlier than the year 1405 nor later than 1505 with 1505 as the median year. “A recent study by Minze Suiver of Yale and Hans E. Suess of the University of California,” on the “relationship between radiocarbon dates and true sample ages,” suggests that the Weymouth dugout may be older than the standard Carbon-14 test indicated. According to the study, the true calendar date of the dugout may be as early as A.D. 1450.

On the heels of the Carbon 14 test, the Historical Commission was informed by the Forest Products Laboratory that the dugout was made of eastern white...
pine. This was somewhat surprising since its dimensions indicated that it was made from a tree of at least 10 feet in circumference, and white pine trees just did not grow that large, or so it was assumed. A little research revealed how wrong this assumption was. Donald Peatrie, in his excellent book, "A Natural History of Trees of Eastern and Central North America," points out that prior to 1650, white pine forests covered most all of New England westward to the area of Lake Michigan, including the southern tier of Canada. Stands of these trees included huge giants in size, branches often starting more than 80 feet above the forest floor, and records exist showing that many of these white pines grew to heights of 200 feet and more. To the early settlers, the vast forests must have seemed inexhaustible. Spurred by the demand for ship masts in England, as well as for building material in the colonies, these forests soon fell victim to the axe, since conservation was unheard of then. By 1650, the giant pines were all but extinct, and the white pine of today is only a stunted copy of its noble ancestor. Some idea of their former size can be seen in the "Bowdoin" pines near the campus of Bowdoin College in Maine.

Late in January, the Vocational School completed the storage tank, and it was moved to the basement of the Library. Here, the seams were caulked and the tank lined with polyethylene sheeting. The dugout was removed from its bed of leaves and snow, encased in a wooden cradle for safe handling, and taken to the Library where it was washed down and immersed in the tank. With the dugout safely under water, attention was again directed to its permanent preservation.

The method finally settled on was essentially the "polyethylene glycol" or "PEG" treatment used by the Swedish government and the Forests Product Laboratory. The latter had used it successfully on an 18th century water-logged French Bateau discovered in Lake George. Briefly, the method called for the immersion of the dugout in a 50 percent solution of "PEG." Through the generous cooperation of the Union Carbon Carbide Company, 1500 pounds of "PEG" in cake form, was obtained. Melting this down took some time due to the lack of proper equipment. However, with the makeshift aid of borrowed hot water, heating coils, and infinite patience, some 1400 pounds of "PEG" was finally melted. The adsorption rate of the "PEG" was measured by the change in the specific gravity of the solution from daily hydrometer readings. By the 24th day, the specific gravity of the solution had stabilized, indicating that maximum adsorption had been achieved. Then the dugout was removed from the tank and allowed to air dry. In a few days, the surface moisture had evaporated, and except for being somewhat darker, its appearance was little changed. The notable difference was in the texture of the wood. The treated dugout was now firm and solid. However, prior to the "PEG" treatment, an experiment was made. A small sliver from the dugout was allowed to dry naturally. The dried specimen was almost weightless, and extremely brittle by comparison.

The number one enemy of "PEG" is high humidity. When relative humidity is near 85°, the "PEG" begins to liquify and leach out of the wood. The Historical Commission was made painfully aware of this danger during the summer of 1967. The dugout had at that time been air exposed for more than a year and was in excellent condition. The Commission was engaged in developing an exhibit room in the basement of the Library, and this project was well underway. As many will recall, July and August, were marked by prolonged periods of high humidity. The accompanying dampness in the exhibit area caused the "PEG" to start oozing out of the dugout. A plastic tent was hastily rigged over the vessel and pans of calcium chloride placed inside. This stop-gap measure checked the bleeding and soon after, a dehumidifier was obtained for permanent humidity control.

How successful was the preservation treatment? Only time can tell, but the Commission feels it was very good. In support of this contention is the fact that the dugout has now been air exposed for nearly two years, and there is no sign of checking, or other evidence of physical deterioration. The texture of the wood is the same today as it was shortly after the treatment ended. With reasonable care and attention, particularly with respect to high humidity, The Historical Commission has no reason to be pessimistic about its future physical condition.

Weymouth, Mass.
May 14, 1968

APPENDIX

1. Weymouth Exhibit Room. History and archaeology are not doorsteps to which people are likely to beat a path except on rare occasions when an event or discovery captures the public imagination and in-
ABORIGINAL DUGOUT RECOVERED AT WEYMOUTH

Interest. Such was the case at the discovery of King Tut's Tomb and with the finding of the Dead Sea Scrolls.

Discovery of the dugout generated a wave of local interest, not only among youngsters, where anything Indian is exciting, but among their parents and elders as well. The Historical Commission was besieged with requests to see it, and bombarded with questions about it.

Mention has been made that space in the new Library was made available to carry out the work of preservation. Early in 1967, the Trustees of the Library went a step further and allocated this space to the Commission as a display area. Here was an ideal spot to develop a Town exhibit room where in addition to the dugout, artifacts and documents depicting the social and economic history of Weymouth and the area could be displayed.

Charles Adams, the engineering member of the Commission, designed the free-standing seven foot partitions necessary to enclose the area. These partitions were single paneled with 4 x 8' panels of homosote on the interior and plywood panels on the exterior. The interior homosote panels were ideal for mural work, or as an area for display cabinets, picture and poster displays, etc. Later, Mr. Adams designed a 16 x 7 x 7' glass paneled case to house and display the dugout. Both partitions and display case were built by the Weymouth Vocational High School. While these projects were under way, the Weymouth High School Art Department began the preparation of a series of mural paintings that would tell the story of the dugout from the selection of the tree in the forest through the various working stages to completion. The students, who participated in this project, visited the Bronson Museum in Attleboro. Here, William S. Fowler, Curator, gave them the benefit of his rich experience in the field of aboriginal culture. Habits, customs, tools, housing were explained. The students made many preliminary sketches of the Museum's aboriginal artifacts later to be incorporated into the finished murals.

Late in June, the five panel murals were completed and moved to the Exhibit Room where they were sequentially mounted on the partitions. The professional quality of the murals must be seen to be appreciated — the most common remarks and the best compliments paid by people after seeing the students' work is: "I don't believe it."

2. Keel Piece. Near the excavation site was found a number of small pieces of wood that had apparently broken off from the dugout. In addition, a curved block of wood about two feet long was found nearby with nail holes and a rusted but identifiable nail head in its side. In appearance and shape, it resembled a "keel piece." Its discovery raised a number of questions with respect to its connection with the dugout, and whether it was of the same species of wood and style of workmanship found in the dugout. A sample was sent to the Forest Products Laboratory for identification, and back came the answer, "eastern hemlock." Dr. Deetz identified the nail as similar to the ones used in the early 17th century. In addition, the "piece" definitely showed the marks of metal tools and the style was more European than aboriginal. All of this evidence strongly indicated that the dugout had had a long life, and probably had passed through a number of hands subsequent to its original aboriginal source. Somewhere along the line, the keel piece may have been attached to protect the bow from damage when run up on the stony shores of Great Pond.

3. Discoverers of the Dugout. The following boys from South Weymouth found the dugout and with the assistance of Howard Crocker of South Weymouth, removed it from the Pond and turned it over to the Historical Commission: Donald and Jeffrey Campbell, Daniel Doyle, Paul Garvey, and Richard MacDonald.
STONE BOWL-MAKING AT THE WESTFIELD QUARRY

WILLIAM S. FOWLER

Opportunity to review and study aboriginal methods of stone bowl making has been provided Bulletin readers over the past number of years through accounts of several quarry excavations. At Ragged Mountain in Connecticut, where a rock shelter furnished both an abode as well as a quarry-workshop for the quarriers, domestic and industrial tools lay side by side, affording for the first time a chance to discover their relationships. Reports have been made of other quarry workings in Massachusetts at Dolly Bond, Horne Hill; in Rhode Island at Oaklawn; and in eastern Pennsylvania at the Christiana quarry. An early superficial description of work at the Westfield quarry was made in the Society Bulletin, Vol. 4, No. 3, but with inadequate illustrations. Since then much has been learned through work in the field to provide a better understanding of tool and bowl types, as found at the quarries.

Steatite (soapstone), from which most bowl products were made, outcrops in various places in western Massachusetts, but apparently aboriginal work was confined to those deposits convenient to Connecticut Valley camp sites. Those occurring in the Berkshire Hills at Dalton, Middlefield, and Blandford have been worked in colonial times by resident country folk — the one in Blandford was in operation toward the close of the 19th Century — but there have been no reports from any of them of aboriginal bowl remains.

This paper provides, for the first time, a composite review with illustrations of research work accomplished at the Westfield quarry over a period of three years, commencing in 1940. It brings together accounts of discoveries at the quarry proper and at an adjoining quartz tool quarry-workshop, where at least seven types of small stone bowl industrial tools were first identified. Several members of the Connecticut Valley Chapter of the Society, at various times, assisted the writer in excavating the steatite quarry as well as the tool quarry, of which a preliminary account was reported at the time in American Antiquity. However, such earlier recounting of recovered evidence has proved superficial, in view of quarry evidence since found at other sites. Consequently, it is hoped that this may be accepted as a final account, refined by more advanced knowledge not available for the earlier reports.

THE SITE

After becoming aware of the existence of a worked steatite outcrop in the vicinity of Westfield, as mentioned in an earlier geologic survey of the region, an old-time resident of the area guided the writer to the site. It lies in the Little River Valley to the west of Westfield high up on a heavily wooded ridge that rises above the meadows below. Here among enormous jagged rock outcrops tilted at fantastic angles is a 3 to 8 foot wide steatite vein jutting about a foot or more above ground. Directly on its further side lies an extensive deeply excavated cavern of a late 19th Century stone quarry, now completely filled with water. Its quarry operations were terminated some years ago, when they were moved to a lower and more accessible site. Here was quarried building stone, which was commonly called Westfield marble. It consisted of a hard light greenish-gray serpentine rock with dark green mottling, and it proved to be the same material from which in aboriginal times many of the quarry tools were made. It is possible that in those days there existed additional veins of steatite, which may have been destroyed by operations of the marble quarry; recovery of quarry tools and litter about the exposed vein, although fairly numerous, offered no clue. At the time of excavation one rather large undamaged incomplete bowl-form and two demolished smaller ones were exposed on the steatite outcrop. These furnished evidence of how the work of quarrying was carried on (Fig. 3). Today, eye-witness reports tell of apparent vandalism that has destroyed all vestige of these bowl-forms.

Excavation of an area of about 200 square feet beside the steatite outcrop, and careful digging within a crevice and about it among several large outcrops of granitic stone produced quantities of tools and unfinished steatite products. Among these were the usual fragments of semifinished bowls, dishes, platters, and cups, including numerous broken lugs from the ends of bowls. But that which adds much to the value of this report was a discovery made nearby. It consisted of a tool quarry-workshop, which presumably must have functioned as an integral part of the stone bowl industrial complex. Had this tool quarry never been found, a review of tools found at the steatite quarry would have been less impressive, since the number of tool types there was limited. But with several new and diversified types recovered from the tool quarry a better understanding of the bowl-making industry has been made possible.
Before manufacture of anything can take place, a period of tooling is required, and, as is now, this was as true millenniums ago when stone bowl making was the leading industry of the day. So it seems natural to first study and find out as much as possible about the tools of the stone bowl industry. At Westfield fortune presented a rare opportunity to carry on such research not only in a workshop where industrial tools had been made, but at an on-the-spot connected quarry, which provided the required stone material.

It happened by chance, as so often is the case, after days of work had absorbed all available hours excavating at the main steatite quarry. A casual walk a short distance of not more than a stone's-throw from there led through upended crags to a huge flat-faced granitic boulder. Pure white quartz crystalline outcrops here and there on its prominent face attracted attention and seemed to warrant investigation. Upon lifting a heavy carpet of moss at its base a surprising mass of sparkling white quartz flakes was exposed. At first it seemed as though they might have been caused by frost erosion, but upon further inspection small chunks of quartz were noticed, which appeared to have worked edges. After recovering a number of these variously shaped quartz blocks, followed by much study, they were found to have functional tool shapes and one by one were slowly fitted into different classes of bowl-making tools. These have now been named and have prompted a successful search for them at other quarry sites.

With this important tool discovery, further work at the nearby steatite quarry was postponed, and the next year and a half was spent digging out the tailings of what proved to be a quartz quarry-workshop of an extensive tool industry that was producing implements for stone bowl making. To provide a better idea of what the site looked like, an illustration has been made of the quartz embedded boulder (Fig. 4). Here, work was commenced troweling out a thick deposit of quartz waste from 1 to 2 feet in depth, which extended approximately 15 feet along the boulder's base, and at some places stretched out as much as 8 or 10 feet in front of it. Altogether, about 500 tools were recovered from these tailings, some broken, including a few large quarry picks badly worn from...
hard usage. It seems probable that the worn-out picks may have been employed to peck out blocks of quartz by removing the softer granitic stone from about them. These picks were made of a quartzfeldspar material taken from a nearby deposit, which also supplied stock for large Hammerstones used in shaping the tools; pure white quartz was used for all smaller Hammerstones.

Cache 1. As excavation progressed at the left-hand side at the foot of the boulder, 7 quartz tools, all perfect, were found lying together in a rather deep crevice. Evidently, this had been formed by removal of a quartz vein at this spot, and was then utilized for tool storage. In this cache was one large well-made End pick and one or two smaller ones, which were quickly identified. The remaining tools were not immediately recognizable, but were finally classified, as recorded in the section describing tool types.

Cache 2. About 6 feet removed from Cache 1 to the right at the foot of the boulder appeared another storage crevice that had resulted from the quarrying. In this one appeared 14 tiny quartz End picks measuring from 1 to 1½" in length, all well shaped with one end sharply pointed. A few will be found illustrated along with other tool types. Among the picks were 3 or 4 very small quartz Hammerstones of no more than ½ to ¾" in diameter and roughly formed. Because of their close association with the picks it seems probable that they had been used in making them, for which larger Hammerstones would doubtless have been ruinous.

Cache 3. After excavating extensively in front of the boulder, a relatively large block of quartz was noticed at its foot. It lay roughly midway between the 2 caches. At first it was passed by, since it fitted so close to the boulder that it was taken to be a part of it. However, in due time it was pried loose with a trowel and was found to be more or less cubical in shape, apparently a large quarried blank weighing about 10 to 15 lbs. Beneath it was found a veritable storehouse of quartz tools, which had been secreted in an expansive hollowed-out crevice, and sealed in
Fig. 5. WHITE QUARTZ TOOLS, Quartz Tool Quarry-Workshop, Westfield. 1,2, Shaver; 3-6, Chisel-scraper; 7,8, Hand Gouge; 9, Bowl Reamer; 10-13, Abrading-scraper; 14, Pipe Bowl Reamer; 15, Plain Drill; 16-28, End Pick (17,19-21,23,26,27, from Cache 2 of 14 small picks).
by this heavy quartz block cover. As one tool followed another from the pit and 50 tools had been accounted for, it seemed impossible that still more were stored below. And yet, by careful prying with a trowel, tools continued to be dislodged from their tight quarters, where evidently they had been carefully arranged so as to utilize all available space. At last with the bottom of the pit reached, 90 relatively small quartz tools had been recovered, representing 7 different types, including one slender Plain drill, which is displayed among the quarry tool illustrations.

QUARTZ QUARRY-TOOLS — Fig. 5

Following tool types will be described briefly and may be found in the page of illustrations. They represent different kinds of tools recovered from the tool quarry tailings and the 3 caches, and demonstrate an apparent extensive use of small tools for stone bowl making at the Westfield quarry.

Abradingstone (not illustrated). This tool, of which there are 2 from this site, is a small block of quartz, large enough to fit conveniently into the hand. It has one convex thick side roughly chipped, which did the abrading with a rocker action, in hollowing the interior of bowls.

Chisel-Scraper (Exhibits #3-6). In this category are 12 small tools measuring 1 to \( \frac{3}{4} \)" in length, each with a beveled chisel-like bit at one end. The opposite shank end has reworked edges to provide a convenient handle. Probably its function was to scrape small bowl interiors in the process of extending the depth of hollowing.

Shaver. (Exhibits #1,2). Of this ingenious implement there are 7 specimens. Doubtless, it served to scrape and thin the side walls of the smaller bowls. It has one straight edge that is retouched and thinned to sharp proportions, with one or both corners rounded to fit the interior curve at the base of the bowl's walls. Its size varies from 1 to \( \frac{3}{4} \)" in length.

End Pick (Exhibits #16-28). Of all the tools, this one was used the most, to judge from its high frequency at all quarries. Here at Westfield's tool works appeared about 200 specimens in small and large sizes from 1 to 7" in length. They are all made with one end pointed, while sharp edges on the opposite end have been dulled by hammering to provide a suitable handle for hand use. Occasionally the worked point is at one corner and is then called a Corner pick. Exhibits #17,19-21,23,26,27 represent a selection from the 14 small picks of Cache 2.

Hand Gouge (Exhibits #7,8). The 13 recovered specimens of this tool represent a most useful implement for gouging out the interiors of cups and other small bowls. It is made with an extended rounded bit something like a modern scoop chisel, and is unifaced with a beveled edge. The rest of the stone block is usually unworked but large enough to provide a suitable hand grip.

Abrading-Scraper (Exhibits #10-13). This group consists of 6 tools, with shapes that are sometimes somewhat triangular, and at other times are more or less oval. The size varies from \( \frac{1}{2} \) to \( \frac{3}{4} \)" in length. One edge is slightly convex and is roughly flaked, while toward the base of the blade there is often side notching, probably to accommodate leather thongs wound around the blade to form a handle. It was probably used with a sawing-scraping motion in the hollowing of bowl interiors.

Bowl Reamer (Exhibit #9). The only tool of its kind, this single specimen appeared on top of the quartz waste. This seems to suggest that it was a late invention with no chance of becoming an established tool trait before the quarry closed down. Evidently, it may have been intended as a tool for reaming out interiors of small vessels, such as paint cups and drinking cups. One end of a small rectangular quartz block has been chipped to produce a bevel on one side halfway to the apex of a convex-shaped cutting edge, while on the other side a reverse bevel extends to the opposite edge. Probably this is the closest match to a modern steel reamer that is possible from stone. Depression caused from oscillating this tool in steatite is illustrated, representing an actual experiment (Fig. 7,#3).

Pipe Bowl Reamer (Exhibit #14). This tool, one of 6 recoveries, has similar traits to other reamers found elsewhere, identified as tools for reaming out stone pipe bowls. These tools seem to indicate that pipe making had been undertaken at the quarry. This tool has a relatively wide bit, and in all but one specimen which had parallel sides, tapers to a cutting edge of \( \frac{3}{8} \)" to 1" in width. These tools have a thickness of up to \( \frac{3}{8} \)" and lengths of from 1½ to 2½".

Drill (Exhibit #15). This is the only recovery of a drill at the quarry. It represents a Plain drill with narrow proportions, and came from Cache 3. Since it occurred in association with Pipe Bowl reamers, it seems probable that its intended use was to assist in pipe-reaming operations.

STEATITE QUARRY TOOLS — Fig. 6

Now to return to the main quarry workings, where the steatite vein was exposed to view, certain
tool types were encountered, but in no case did they differ from those found at the quartz tool quarry-workshop, except in the kind of stone used in their manufacture. Representative specimens are illustrated.
Fig. 7. WORKED PRODUCTS, Westfield Quarry. 1. Cup-form, showing partly worked handle; 2. Exhibit #1 subsequently worked into its probable cup shape with stone tools by the author; 3. Steatite fragment with experimental depression reamed out with Bowl Reamer (Fig. 5, #9), from quartz tool quarry; 4. Granitic Plate with pecked-out hollowing, from quartz tool quarry; 5. Flat Plate of limestone schist.
to make possible a more intimate study.

With exception of only a few of white quartz — evidently obtained from the quartz tool workshop — the rest are made of variagated serpentine; a few are of basalt. The latter must have been made at home camp sites in the valley, where basalt was readily obtainable and brought to the quarry, since basalt is not indigenous there. Evidently, only those of serpentine or quartz were made at the quarry from local stone deposits. As shown in the case of 2 large quarry picks (Exhibits #8,9), this stone occasionally has crystalline impurities consisting of garnets and sometimes of quartz; rarely of both.

End picks were in great supply in medium to large sizes. Occasionally, a small one would appear to suggest the working of small bowls at the site. Besides the End pick, other recoveries include Abrading-stone, steatite Polishingstone, Abrading-scraper, Hand gouge, and Hammerstone. Also, tailing-removal tools were present. They consist of the Triangular tailing-breaker, and the Hand spade. A specimen of the former made of a slab of quartzite schist is illustrated, showing how it may have been hafted (Exhibit #7). The Spiked tailing-breaker was not present, and is presumed to have been nonexistent.

**INDUSTRIAL PRODUCTS — Figs. 7, 8**

**Bowl-Making.** One of the most absorbing subjects to study at any industrial site is that of the manufactured products. Unlike pyramid and temple structures of Yucatan, which are generally described with no mention of what tools were used to produce such man-made monuments, here in a stone bowl quarry, as at all others, it is possible and most important to describe not only the manufactured products, but the tools with which they were made. It seems to this writer that a study of the tools is of prime importance, and for that reason they have received first mention in this report. Now that the tooling of the industry has been dealt with, a review of what was made at the quarry can be undertaken. Here at Westfield, evidence, although minimal as a result of probable destruction of a large part of the workings by the later-day marble quarry intrusion, reveals the making of large and small bowls, as well as platters, plates, and drinking cups. This last mentioned product seems to have been in great demand, since 24 cup-forms were recovered. Of these, a few appeared more as cup-blanks, but the rest were shaped with one end narrowed, evidently for a handle, while the opposite end was left broad to accommodate the cup’s bowl. One of these forms actually had its projecting handle pecked into shape (Fig. 7,#1). Accompanying illustration shows this cup-form worked into its probable intended drinking cup shape, as completed by the writer using only stone tools (Fig. 7,#2). Cup-forms measure from about 6 to 8" in length, and not one appeared with the suggestion of just a short lug for a handle as found on cup-forms at the Wilbraham quarry. Instead, all apparently were designed so as to provide for a projecting stylistic handle. Two specimens are illustrated with a superimposed shaded sketch to show how a cup could have been fashioned from them (Fig. 8,#1,3).

Besides the one large bowl-form partially completed on the steatite outcrop, several large blocks of steatite were recovered, which confirmed the belief that some large bowls were being made. Also, numerous lugs accidentally broken off from big bowls were frequently encountered, which supported this contention. Other recoveries included broken remains for the most part of stone plates and platters. However, 2 perfect plates appeared, which are illustrated (Fig. 7,#4,5). Exhibit #5 has one end narrowed for a handle. It is made of limestone schist, an apparent outcrop with serpentine at the site, and is believed to be representative of manufactured plates in general. However, some plates seem to have been slightly hollowed, as shown by a perfect specimen made of granitic stone that was found lying back of the large boulder at the quartz tool quarry. (Exhibit #4).

**Pipe-Making.** As has been noted, the making of stone bowls and various allied products appears to represent the principal operations at the quarry. However, sparse evidence exists to indicate that stone pipes were also fabricated from steatite. First, as previously reported, 6 Pipe bowl reamers is considered worthy of note, since this kind of reamer has been thought to indicate pipe-making wherever found. Tests made with these reamers prove that holes may be quickly reamed in steatite with the tool held firmly in the fingers and twisted back and forth. The fact that all but one has a tapered bit is also convincing evidence to suggest that the hole reamed would have sloping sides like those found in most pipe bowls. But this tool is not the only pipe-making evidence at the site. A few relatively small blocks of steatite were recovered from about the steatite vein, and are thought to be pipe blanks from which pipes were to have been made. One of them shows preliminary pecking that suggests the beginning of a pipe (Fig. 8,#4). While this evidence may seem slight, it should be remembered that there is good reason to believe that the aboriginal workings were originally
that bowl-making throughout the Appalachians wherever other quarry, so far reported in this extensive moun-
tainous region, has there occurred a tool-making activity may have an important bearing upon the natural contour of the blocks of steatite from which they were usually made.

However, that which appears to warrant further interpretation is the presence of small tool manufacturing at the quartz quarry-workshop. It remains now to show the importance of this tool industry as related to other quarry workings, and to the spread of bowl-making throughout the Appalachians wherever steatite outcrops occur. It is safe to say that at no other quarry, so far reported in this extensive moun
tainous region, has there occurred a tool-making operation of the size and with the complexity of small specialized tools as that found at Westfield. What does this mean? While a definite conclusion is no more possible in this case than in that of other archaeological discoveries, this concentrated tool-making activity may have an important bearing upon a more comprehensive study of the stone bowl industry as a whole.

It seems apparent that the quartz quarry tool makers at Westfield were more than ordinary workmen who frequented the steatite quarry and tried their skill at making bowl products. To have been able to make small quartz tools, as found at the quarry-workshop, its workmen must have required unusual skill of a specialized nature. For the several implement types were closely adhered to considering the difficult working qualities of quartz, which has a tendency to shatter rather than yield conchoidal flakes. Doubtless, the small types of tools as found at the workshop must have required a long time in evolving, through persistent effort to make more efficient industrial implements. At Westfield good fortune led to discovery of the actual tool-works where they were made, which has been the only one of its kind reported, so far as is known. That there were others is quite obvious, since in subsequent excava-
tions at other stone bowl quarries in New England similar small tools have been encountered, suggesting the existence of a universal knowledge of such tools within this region. While relatively few of these tools were actually in use at steatite quarries compared to larger ones, their presence there is noticeable. Evidently, they were required for the final finishing of bowls. This work is thought to have been done at home sites for the most part, although some of it must have taken place at the quarries to explain the presence there of small tools. Had it not been for study of such tools made possible by discovery of the tool quarry-workshop, it is probable that some of them, at least, might have been overlooked elsewhere. However, now that their existence has been proven, it is important to look further afield and find out what related conclusions may be reached.

While the writer has presented an interpretation of this evidence in previous quarry reports, it seems advisable to repeat the reasoning here, since the basis for it has been Westfield’s small tool recoveries. First, let it be said that at all New England stone bowl quarries fully excavated appear large and medium sized tools similar to those reported in quarries to the south. End picks, a few with chisel bits, are present in great quantities, the same as reported by W. H. Holmes in 1894 from his excavations of Chesapeake-Potomac quarries, and as found to be present by the writer at the Christiana quarry in eastern Pennsylvania. However, Holmes is silent when it comes to small tools like those found in New England. Also, at the Christiana quarry only three Westfield small tool types were well defined but in relatively minimal amounts. Now, since evolution of the small tools must have consumed a span of years beyond that required for the larger tools, it seems safe to conclude that stone bowls were probably made in New England some time before they were made in regions to the south. The scant evidence of small tools at the Pennsylvania quarry, as noted, suggests that the spread southward of the manufacture and use of New England’s small tools had only just commenced, and failed to reach further south — according to Holme’s report — before the quarries closed and stone bowl-making was terminated. Consequently, it appears apparent that the industry had its inception in New England, from whence ideas diffused southward throughout the Appalachians, conveying the shapes of tools and bowl products to be followed. Doubtless this accounts for the universality of styling common to the entire area, although modified slightly in some sections due to the inevitable presence of independent invention.
Fig. 8. SEMIFINISHED STEATITE PRODUCTS, Westfield Quarry. 1,3,5, Cup-forms with superimposed shading to illustrate probable cups to be made; 2, Cup-form, evidently shaped to provide a crooked handle; 4, Pipe Blank.
Although this reasoning may seem justifiable, it suggests a different conclusion from that offered by W. A. Ritchie in his recent *Archaeology of New York State*. He says, because Pennsylvania-made stone bowls of the Susquehanna region are found to have rough surfaces without and usually within as well, while those from New England are finished smooth both sides, that this suggests the center of the industry to have been in Pennsylvania. However, it would seem to this writer that the opposite would be the case, based upon the above premise, since the smoothing of bowls represents a refinement, which comes usually from a longer period of manufacturing activity. In other words, it suggests that more attention was paid to the bowl’s appearance in New England as a result of a longer span of bowl making, with a resultant advanced desire for greater perfection. However, to assume that bowls from one region are all rough and those from another area smooth is a questionable premise in the first place. For, only minimal samples of bowls from either Pennsylvania or New England are available, which do not necessarily represent all bowls that were made. Also, the premise is not accurate, since there are certain New England bowls known to the writer, which have rough surfaces besides others that are scraped smooth, and the same may be true in Pennsylvania. Furthermore, it appears that the distinction made here between rough and smooth bowls is not valid, since there is no proof that rough surfaced bowls are finished vessels ready for use — may be only semifinished ones — while on the other hand smooth surfaced ones most assuredly are finished usable bowls.

As far as determining what actual uses were made of the tool-works, only a guess is possible. Apparently skilled artisans labored here not only to provide specialized small tools for the bowl makers at the nearby steatite quarry, but also to supply such tools for workers at home camp sites, where most final finishing of bowl products probably took place.

Beyond this, the three caches containing well over 100 tools represent an extensive storehouse. The fact that the contents were not carelessly dumped into convenient crevices but carefully fitted into available storage spaces seems to suggest that this was a well established industry, in which an extensive tool supply was kept in readiness for an expected demand during the extended industrial age of the Late Archaic.

While bowl containers of various descriptions were the chief products at the Westfield quarry, evidence as presented suggests that manufacture of stone pipes was attempted. However, the sparse remains of pipe-making supports a former belief derived from similar minimal evidence at Wilbraham and Dolly Bond that this was an industrial innovation during the closing days of bowl-making. Evidently, with termination of the bowl industry the Westfield quarry was not again reopened for the making of pipes, although the reverse was the case at Oaklawn in Rhode Island. The riddle of such disparity has not as yet been solved. Just why the manufacture of such a popular product as stone pipes would have been confined to Oaklawn alone is difficult to understand. To judge from the number of stone pipes continually being recovered from camp sites and burial remains in the area, other quarries not yet discovered may hold the answer. Be this at is may, it now seems well established because of the sparsity of pipe-making evidence at Westfield and elsewhere, except at Oaklawn, that this industry was a late comer during the declining days of stone bowl making. With arrival of the Ceramic era, the production of clay pots closed down the quarries, and apparently pipe-making survived at but a few of the old quarry works, only one of which — that at Oaklawn — has as yet been discovered.

Bronson Museum,
November 13, 1967
BOOK REVIEW


Seldom is a scientific subject described so that it may be easily understood by all readers. However, in this book about the search leading up to, and culminating in discovery of the origin of corn, the authors have skillfully presented a scientifically complex subject in a most fascinating and dramatic way.

Corn — maize, as it is more correctly referred to — is one of the most versatile of all grains. Since modern living the world over is so dependent upon it, there arises a universal desire to know in what part of the world it originated. Speculations throughout the years have placed its origin first in one country and then in another, as nations vied for the honor of claiming this distinction. But now with the publication of this book, all may read the story about maize, which finally and quite convincingly places its origin in Mexico.

This is a narrative, not only of archaeological research, but of botanical study made simple, in which the reader is led step by step from the insignificant wild state of maize in its grass-like form, to the sophisticated horticultural product of today — all as a result of actual archaeological recoveries extending over many years of persistent research. Beautiful hand illustrations accompany the text as marginal displays appearing on almost every page, and serve to make the written descriptions more understandable. As a source of important information about one of man's chief accomplishments, in producing food for his survival, this latest book about the origin and development of maize is highly recommended.