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THE EDITOR'S PAGE.....

We present in this number the first installment of an article entitled “Aboriginal New England Pottery” by the late William J. Howes of Holyoke, Massachusetts. Mr. Howes was a charter member of the Society and served as a Vice President and Trustee; he prepared this paper prior to his death in 19... Since that time considerable additional information concerning New England pottery has been made available; this fact should be given consideration by the reader of this paper. The thesis of Mr. Howes' paper is basic and the value of his studies, together with his excellent illustrations, has not been dimmed by the passing of time. In our opinion such a work should not remain unpublished and thus be unavailable to students of the subject. Further installments from Mr. Howes' paper will appear in later Bulletins.

There remains in the Editor's file two papers by William S. Fowler, “Agricultural Tools and Techniques of the Northeast” and “Hammersmith Chronology at Saugus”. These will appear in later Bulletins. Also a most interesting article by Gerald Dunn is at hand which will appear as soon as it can be properly illustrated.

Let me again call to your attention that this publication is intended to provide a means for publishing YOUR work. Many of the members of our Society must have data available that should be shared with us and that would make a valuable contribution to the science of Archaeology. Don't continue to "hide your light beneath a bushel".
ABORIGINAL NEW ENGLAND POTTERY

By William J. Howes

Foreword

Throughout New England an abundance of pottery has been found, a large portion of which is in fragments. Most of the material is permanently located in Museums but some may be found in private collections. A search through these well known collections for the material, and local historical records for information regarding the occupation of the areas is sufficient to give us an adequate amount of data to formulate a groundwork for the sequence of its development.

While trained archaeologists have been working in distant lands, the material from local territory seems to have been neglected; a study of the available material is left to the novice to present his findings for what they are worth.

Through local finds in the Connecticut Valley the author’s interest in the subject was created, which resulted in an article that was read before local groups. Later through the stimulus of the late Warren King Moorehead many of the collections throughout the New England territory were visited and the data obtained has greatly contributed to the fund of information that is herewith presented and described. The source of the finds vary greatly with the localities where the material was found. That from Maine and along the Atlantic coast seems to have come largely from shell heaps. In the Connecticut valley they are surface finds, saving a few recovered from burial sites.

Most of the fragments from the different sites are of late production. From each locality, however, there has been found a sufficient amount of early ware to obtain a progressive sequence of pottery development which ranges from the primitive to the latest of types.

The pot form and its decoration in some instances do not conform to type. The decoration being such that the ware is placed at a date later than the pot form itself might indicate. This, no doubt, was due to the rapid and radical transition in method and type of decoration which was brought about through their late foreign contacts, particularly in the Connecticut Valley area. This foreign influence took place in a short period of time, all of which is fully explained in the text.

While certain pieces are included to illustrate the different features described in their order in the text, others of equal value are included under each specific area showing the range of types as well as giving the characteristic features common to each location.

Grateful acknowledgement is made to the late Warren King Moorehead and to Dr. A. V. Kidder whose letters inspired the broadening of the scope of a local study to that of one covering the whole of New England. The author is under obligations to the Peabody Museums of Phillips Academy, Harvard, and Yale Universities, to the late George H. Perkins and the University of Vermont, Amherst College; the Springfield and Holyoke Museums; the private collections of Mr. Norris Bull, Mr. Walter Rodiman, and Miss Celia Guida, all of whom most graciously made all of their material available; and to Dr. J. O. Brew of Peabody Museum of Harvard University for his helpful suggestions with relation to the Guida Farm article, and to Mrs. Harriet Heywood for reviewing the proofs of a large portion of this work.

Introduction

Among all the artifacts of aboriginal man none so clearly portray to succeeding generations as wide a knowledge of the life and customs of a vanished civilization as do the fragments of earthenware pottery. They are the only artifacts that give a coordinate and comprehensive life record of the race that produced them. While this primitive ware was of fragile material and subject to considerable breakage, yet the information obtained from an examination of the fractured sections have given us a greater knowledge of its construction than if made of a more durable material. It reveals the type of aggregate used for tempering, the texture of the ware, whether it was coarse or fine, porous or compact, as well as showing the varying thickness of the walls and how they were constructed; all details that could not be obtained from an unbroken pot.

When the ware was formed and still plastic, the design used in its decoration was incised and moulded or sculptured upon its surface. With curing and firing this ware was made substantial and practically imperishable. Through its widespread dis-
tribution the range of the group’s influence was defined. The whole sequences of its development through its different stages are easily recognized, and the effects of foreign contacts are shown in the radical change of both its form and ornamentation. No other artifact of primitive people can be as definitely associated with any period of time, or show such a continuity of development as that of pottery. Other details that include the imprints of cordage, basketry, fabrics, etc., all indicate the development and progress in these arts made by the civilization that produced them.

Aboriginal New England pottery is found in almost every habitable district occupied by the Indian throughout this territory. These districts were located mostly along the Atlantic coast line save two or three inland, which bordered streams or large bodies of water, where transportation and subsistence were found equal to the locations along the coast. Large areas that included mountainous sections of Northern Vermont, the upper portion of New Hampshire, and Maine, as well as most of the territory between the Connecticut and Hudson Rivers were covered with dense forests and were reserved for hunting and trapping.

The inhabitants were of a sedentary type and devoted to domestic pursuits. They cultivated large areas of soft friable earth for raising their crops, gathered fish and shell fish in great abundance, and from the adjacent forests secured plenty of game for food and fur bearing animals for their skins for wearing apparel.

All pottery fragments are found upon or near the surface of the inland portion of New England territory, and nearer the coast they are more often found in the shell heaps refuse. Inland they are generally picked up on windswept sand dune camp sites, or where they have been exposed to view from time to time in cultivating the fields by turning of the soil by the plow. A few are uncovered at burial sites.

From the fragments found, it is doubtful if their earthenware products ever developed beyond domestic utensils and pipes, for all pieces found indicate their use for cooking, storage of food supplies, and for holding liquids. Figurines, beads, pendants, or other ornaments of personal adornment are seldom if ever found within this territory, and it is quite probable that none were ever produced here. In the number of burial places that have been found, very few of the graves indicate that pottery was among the artifacts buried with the body. It would seem, therefore, that it was not the general practice of the Indian of this territory to provide food in all cases for the departed upon his journey to the “Happy Hunting Ground.”

New England has produced many varieties of a few types of pottery. In assembling all the characteristic features and arranging them in classified type groupings, it has been found that there were only two cultural groups producing pottery within this territory. These were the Algonkians and the Iroquoian-Mohawk groups.

The Algonkians appear to have been the most ancient of the two groups, and their ware predominated throughout the territory save in the Champlain Valley district of northern Vermont where a portion of the Iroquoian-Mohawk group was located, and also in the Connecticut Valley where this group, by conquest, attained a dominating influence over the later production of Algonkian ware.

The Connecticut Valley district, the home of the “River Indians”, seems to have been the center of influence for merging of the two types of ware. It was the nearest and most accessible inhabited territory for invasion by the Mohawks from the Winnoski River district of the State of Vermont. With the intervening mountain barriers between northwestern Vermont and the Maine coast on the east, that territory seems to have almost entirely escaped such contacts as those made into southern New England, and the Algonkian ware of the Maine coast territory maintained its natural development, save slight traces which might have filtered through from the south, or from the St. Lawrence Valley district, until pottery produced by them became extinct.

With the Connecticut River district of Western Massachusetts as a center, the influence spread south and east, even to Massachusetts Bay district and possibly northward, for the “Great Falls” of the Connecticut River, now the location of the Holyoke
dam, was one of the main focal points of the southern New England Indian during the fishing season when pottery was made. The members of many distant tribes were here also, availing themselves of the opportunity at this time to replenish their supply of utensils. It has been recorded by Daniel Gookin that the proper pottery clay was “very scarce and dear”, and it was known that a superior type of material for making of pottery was found here in abundance.

Until their contacts with the Mohawk invaders, Algonkian ware seems to have retained its simplicity and consistent type of form and decoration, with little variation throughout its whole development. This was but a short time before its production ceased, which was near the close of the Algonkian Indian’s occupation of southern New England territory. The contacts and influence of the invaders’ ware seems to have made a radical change in the ware produced thereafter by this Algonkian group. Its characteristic identity that had been maintained through the long early period finally succumbed to the influence of the finer type of production of the Mohawk group’s ware, and a gradual emergence of the types was a result.

The whole range of the ware, from its very early production through to its extinction, is clearly revealed by the material that has been found. The natives seem to have lacked the artistic sense, or to have shown progress to any appreciable extent in the development of decoration. Until their contacts with the Mohawk Indian, who was considered by many, the acknowledged master in the art of pottery making in the northeastern section of the country, there was no marked change in its form or decoration. Its characteristic identity that had been maintained through the long early period finally succumbed to the influence of the finer type of production of the Mohawk group’s ware, and a gradual emergence of the types was a result.

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The Winooski River district of Vermont was Iroquoian-Mohawk territory. The tribes inhabiting this section were secluded and protected from invaders by mountain barriers on three sides. There were low level fields of fine soil for agriculture, forests for hunting, and Lake Champlain for fishing and transportation. These facilities furnished them with ample provisions for subsistence without outside interference. They were not subject to raids and constant warfare such as occurred many times in southern New England territory. In Southern New England, tribal possessions were in such close proximity that encroachments, disputes and petty grievances were many times magnified into national strife and lifelong enmity. With such environment as this Mohawk group enjoyed, pursuits could be developed without interruption, and within this quiet area there has been found pottery ware that was probably the highest type of Iroquoian pottery ever developed. The diversity of form and the refinement of decoration are its outstanding features.

The Maine coast pottery is true to type and as nearly uninfluenced by foreign contacts as that of any section of New England. Pottery taken from the many shell heaps along the Maine coast give us probably the largest number of early related types of Algonkian ware that can be found anywhere in New England territory. The deeply indented coast line with its bays that were filled with an abundance of shell fish, provided them at all seasons with a staple food supply. As the supply was gathered, the shells accumulated in great heaps along the shore. Of necessity they must have required a very long period of accumulation, for even scientists who have examined them in detail give us no adequate estimate of the time required in their collection. They covered many acres of ground to a height of twenty or more feet in certain locations. The ex-
tent of their accumulation is of such magnitude that they could not have been for local consumption only, and it is quite probable that these fishing places were available to and were used by the Indian from distant territory as well as those who lived there.

From the time of their deposit to the present there has been a gradual wearing down of these heaps and among the things exposed were many pottery fragments. These stimulated a search for more evidence of human occupation, to obtain a greater knowledge of the life and customs of the people of that time. By working over a portion of the shell heaps and exposing to view a whole camp site with its kitchen middens, many fragments of pottery of an early date have been found. Camp sites have been found at different levels, each one below having been covered as the accumulation of the shell heap mounted in height. As they have been uncovered they tell a related story, and the greater the depth at which the camp site was found, the more remote the period of its occupation.

Upon these shell heaps the Indian and his family would erect their temporary camps and live while they caught, cured, dried and smoked their supply of sea food. From the number of artifacts found upon these sites, which included their household and fishing equipment as well as broken pottery utensils, it would seem that they discarded every thing they could dispense with to increase to capacity the food supply for their return trip.

From the pottery fragments found, and other recorded data, it would seem that the same family group had occupied the territory throughout the whole accumulation of the shell heaps. There have been found, however, certain pottery fragments showing characteristic features not closely allied with the general run of coast territory ware. These with additional explorations and finds, may put them in a classification with other group's work, since the pottery form, type of decoration, texture and material of the ware does not compare with that common in the local territory.

With the covering of the earlier camp sites by the gradual accumulation of shells, the distribution and breakage of the pottery fragments was reduced to a minimum. They are above the average in size, for they have remained in their original location of discard, without movement, differing in this respect from those that are found on the surface where cultivation of the soil and action of the frost divided them into smaller pieces. Enough fragments of each pot have been found together to give, when assembled, an adequate idea as to the size, form, and decoration of the ware. When assembled most of them have revealed pots of a size for cooking over a fire. In curing, the continued heat caused a change in their color and density. This change seems to have penetrated deeply into the thickness of the ware. On some of the pieces the whole thickness of the ware was changed. It is quite probable that the earthenware pot was the Indian's only cooking utensil, for steatite pots that were once commonly used throughout portions of Southern New England, were seldom if ever known to them. At certain locations on the Southern New England coast excavations have uncovered disintegrated fragments which were in a pulverized state. Two possible reasons for this condition and a solution of problem are herewith offered. One was that the shell tempering, under heat, had calcined, and action of the elements expanded and made the material friable so that it crumbled on exposure to the air. The other might have been in the quality of some of the elements in the mixture itself, as fragments are almost black, a condition not usually found in the usual run of fat clays.

Origin and Development of Pottery Making

Pottery in its broadest sense includes all objects made of clay that have been moulded and decorated while the clay was in a plastic state, and then hardened by air drying or firing. It has been found in connection with discoveries of other primitive implements among almost all American civilizations of antiquity save those of a quite early culture. As it was a development from a more remote type of utensil it cannot be considered an early art.

In primitive times all nomad tribes in their wandering from place to place sought out subsistence from nature's storehouse. With the abundance at hand, theirs for the taking, their cravings and needs were readily satisfied. At this time flesh was eaten raw or cooked on a stick over the fire. Water was cupped in the hand from the streams or drawn in receptacles of leaves, bark, shells, or other material gathered at the time of demand and discarded after use. At a later period, when they had established themselves and had developed
domestic pursuits, basketry, and in some cases fabrics, were prepared to hold water. This was done by daubing a clay coating over the interior surface of the receptacle.

At about this time cooking of food by boiling became a practice. Probably the most primitive receptacle used for this purpose was that made by digging a hole in the ground which was lined with a skin, grass, or fabric and daubed with clay as has been recorded by several authors. This was soon followed by basketry receptacles lined with clay and used for the same purpose.

The general practice for cooking was accomplished by the immersion of heated stones, the so-called pot boilers, in the receptacle that was filled with all the ingredients of the meal. This insertion of stones and their removal was continued until the meal was sufficiently cooked.

While this custom of cooking was a survival of the period before the introduction of true pottery, it was continued more or less as a general practice until after the coming of the white settlers. The evidence are the finding of such stones and their fragments around their camp sites. These stones give every indication of having been exposed to intense heat, and then having been immediately plunged into cold water, with the resultant cracking action. Some of the fragments that were shells of a uniform thickness, had broken away from around the stone to the depth that the chilling action had disturbed its molecular substance, leaving the body of the stone intact.

An accident, no doubt, was the beginning of true pottery development. It may have occurred in either of two ways. At some period of time the deep receptacle that was used for cooking was probably set too near the fire, and the inflammable portion consumed, leaving only the hardened clay lining. Its durability, however, may have been discovered when, through some shock, this lining separated from its shallow roasting basket shell as it was used for parching corn, etc., as has been suggested by Cushing in his monograph contained in the report of the Bureau of Ethnology.* With the discovery that this clay lining was substantial in itself, receptacles that were formed on a basketry base made their appearance, and pottery in its crudest form became an established practice.

Many difficulties and failures were encountered in the early process of pottery making. The proper preparation of the clay and its treatment while in a plastic state were sources of continued annoyance until a satisfactory mixture was developed. The contraction of the thin walls while drying resulted many times in a cracked or warped pot, and the porous nature of the material which readily absorbed liquids became a detriment. These two features were the greatest obstacles that were met with. The squaw, whose sphere it was to make all utensils required for domestic pursuits, overcame all these hinderances. By the introduction of the necessary tempering material, to prevent warping and contraction, and the use of a waterproofing powder, the mixture was perfected.

This primitive ware has many characteristics that make it unique among all arts, for no set of implements or utensils of aboriginal man give the range of information that is to be found in their pottery. While plastic it was worked, moulded, and decorated with all the individual markings of the group that produced it. When finished, all these characteristics of material, structure, form, and decoration were imperishably fixed in the finished product, thereby preserving to us the whole story of its development.

Aboriginal New England pottery is almost wholly found in fragments, called potsherds. These potsherds not only clearly reveal the process of manufacture, but they also show the distinguishing

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* From *North Americans of Yesterday*, Frederick S. Dellenbaugh—Page 90.
marks that classify the different family and tribal group's type of workmanship. By their distribution throughout the country, as identified by their decorative markings and form of the pots, the location occupied by many of the separate groups and the extent of influence, or domination of territory, is clearly defined. Furthermore, while other artifacts are similar throughout their existence, and more or less common to all periods, pottery with all its characteristic forms and decorations, can be read like a book. It indicates quite clearly early and late production, and from them we are enabled to get a more comprehensive knowledge as to the period of time the pot was made, who made it, and the family group's influence upon other group's territory in this surrounding country.

Workshop sites are identified by the numerous potsherds with different markings, the tempering material fragments, and the implements used in moulding and finishing the ware. On only a few of the many different camp sites that are found in this same locality are there indications of pottery making.

Air dried, sun dried, and slightly fired pottery was in a well developed state among the Indians when the first settlers arrived in New England territory. There is only a small amount of aboriginal New England pottery in existence where the pot was found complete. Such pots as have been found have been uncovered at a considerable depth below the surface, beyond the action of the frost, where they were sometimes, though rarely, placed in connection with one of their burials. These occurrences seem to have been where the burial was that of some one of prominence in the tribe, such as chief ruler or the medicine man, whose articles of personal adornment and the artifacts he used were buried with him.

As New England Indian pottery was made largely for domestic utensils and tobacco pipes, the existing fragments are generally found in connection with their camp and workshop sites. Late cultivation of the soil where some of the camp sites were located, has distributed the material over a considerable area, and broken the fragments up into quite small pieces. Most workshop sites seem to have been located on high ground in the Connecticut Valley section of Massachusetts, where the fine erosion lake bed soil appears to have been disturbed by the swirling winds only, which left the material in place, but covering and uncovering some of it from time to time.

**CLAY AND ITS TEMPERING MATERIAL**

It is said by early writers of Connecticut Valley history that all Indian trails lead to the “Great Falls” of the Connecticut River. It was to this point and other falls up the river that the Indians would come in great numbers during the fishing season to gather in their supply of fish. While here they encamped upon the high ground on both sides of the river. In the beds of the small streams adjoining, where the squaw went for water, there was found to be an outcropping of clay underlying the fine sandy soil strata that covered the territory. From this clay the squaw would fashion the yearly supply of pottery utensils which they took with them to their settlements at the end of the fishing season. Upon some of these sites, which were their workshops for pottery making, many potsherds and implements they used in forming their pottery have been found. From these fragments which had many surface imprints, we have been enabled to obtain a fairly accurate idea as to some of their other arts, and the skill of the Indian workmanship in such industries. These imprints indicate a high state of proficiency in the art of basketry making; also in making of their twines, and the weaving of textiles.

There were but few sections where such pure quality of clay were laid down to the depths found in certain locations of the Connecticut Valley. From actual estimates, it has been determined by scientists, that the beds of clay were at least fifty-five centuries in being deposited. It was only within this mountainous and broad valley section of New England, where conditions were ideal for conserving this fine quality material in such quantities, that the clay is found in such abundance. The glaciers, as they moved forward, wore off the crystalline hills so that a portion of them was ground down to minute particles, which ultimately gushed forth at the base of the melting ice cap in muddy streams. These streams were held back by great ice dams spanning the valley and formed the Springfield, Hadley, and Montague lakes of the Post Glacial Period.
The buoyancy of the pure clay particles, held in suspension, carried them far out into the still waters of the lake where they were precipitated to the bottom, forming deep beds of the finest quality clay. A later advance of the ice cap covered these beds with fine erosion sand. Nearer the shore line a mixture of clay and sand were laid down from year to year, producing a different type of clay and sand stratification. This clay mixture condition applies in general throughout Southern New England, save in some small pockets, for the terrain of this territory did not permit of the large storage basin as found in the Connecticut Valley. With the breaking of the ice dams below, these lakes dropped in several stages, forming broad terraces adjoining the river as the lakes were lowered, until the river was established in approximately its present channel. Upon these fine sandy high terraces the Indian erected his camps and followed his agricultural pursuits.

While there was an abundance of clay at hand, it was only available to the Indian in a few places, for it was overlaid with deep banks of sand, top soil and vegetation. Its outcroppings were found where the freshets and small streams had washed their way down through sand layers to the clay which formed the beds of the streams. It was from this source that the Indian squaw secured her supply of material for the pottery she made.

This fine quality Connecticut Valley material may be classified as a fat clay. Clays from different localities vary materially from this grade. Lean clays are those having an abundance of silica and are stiff and hard to mould. Fat clays are plastic in the moist state but shrink considerably when drying. During the drying process, fat clays are subject to cracking as contraction in the material takes place.

This type of clay when mixed with crushed and powdered granular particles, which at the present time are called the tempering medium grits or aggregate, was considered the best material for pottery making. In its preparation the clay was allowed to dry and the lumps, after being pulverized, were tempered by mixing into the mass a certain proportion of aggregate. This was done to overcome the tendency of the fat clays to crack from contraction while drying, but to still retain their pliability for working into shape when wet to the proper consistency. After it was thoroughly kneaded together, the mass formed a paste and was ready for use.

Throughout New England such aboriginal pottery as has been found indicates an almost universal use of tempering material. In the Connecticut Valley, where this superior quality of clay was accessible, clearly defined sites with their accompanying workshop litter have been found. The potsherds, fragments from many different kinds of pots made thereon, permit of a close study of the tempering material introduced into the mixture used. They also show clearly how each type of mixture produced a different quality of ware.

Crushed rock, mostly of a crystalline nature was used extensively for tempering purposes. In the Connecticut Valley a large portion of the tempering material was crushed from white feldspar, though an occasional piece shows the use of red. Mixed with these there is usually found a small scattering of mica and quartz particles, presumably crushed from granite having large veins of pure feldspar.

Along the Atlantic Coast line some of the material was made from crushed shells. While shell tempering was used satisfactorily under a mild heat, yet, if the heat were intensified the shell tempering had a tendency to calcine and disintegrate, thus making the ware erupt and crumble under moisture, which would probably account for its being found in such small particles within this area. Many of these fragments range from a dark grey to a brownish black. Possibly this may be due to certain foreign elements which are natural component parts of the clay found in this territory. Recently fiber tempering has been found on fragments from a site near Andover, and crushed basalt particles are found in fragments from a burial site at Westfield in Massachusetts. All this material was of varying sizes and was used in a wide range of proportions. Each pot seems to have been treated with a mixture differing widely from another. Some batches were mixed with coarse particles of a size that almost penetrated the heavy thickness of the ware. In this type some of the particles of stone were exposed on the interior walls due, no doubt, to the scraping this surface while finishing the vessel. On the exterior the particles were seldom exposed, as the surface smoothed down with more care for its finished appearance. With such temper-
ing material in the mixture these slightly fired pieces show short hair cracking of the ware on the inner walls surface, but not enough to impair their durability or usefulness. In other pieces the coarse and fine grade material was introduced in such quantities as to overload the whole mass, forming a coarse grained mixture, and making a very porous and brittle ware.

Pulverized graphite was often added to the mixture both as a tempering and waterproofing material in the Connecticut Valley section of Massachusetts. Where this was introduced it was seldom, if ever, that other tempering material was used, and all the potsherds found present a compact, dense texture, durable for use. The waterproofing quality was in its powdered or dust form that was added, which made the mixture dense and compact. The more pure quality of the material was also used as a slip by rubbing lumps of the graphite over the walls to make them more impervious to moisture. By polishing the surfaces were brought to a bright luster finish.

As the graphite came from the nearby Sturbridge mine its use was probably limited to local territory. From data at hand there was very little of it available for use by the Indians outside the Connecticut Valley section. It would seem that it was used only within this territory for tempering and waterproofing purposes. Holmes in his exhaustive work on Aboriginal Pottery of the Eastern United States makes no mention of the use of graphite for any purpose in connection with pottery making. It is quite probable that its use never reached beyond this locality.

There is no indication in New England territory that there was a sifting of the material to exclude the coarser particles, and using the dust, except for pipe making, for all pieces seem to indicate that all grades were retained, and the squaw considered these coarser particles of no hinderance in producing a satisfactory ware.

There is no evidence that the New England Indian had a knowledge of the potter's wheel. The actual knowledge of pottery construction in this territory is purely conjectural, for no records, seemingly were ever written of its process. As their workshop sites were near their source of clay supply, and quite remote from the early settlers' plantations, no observations were probably ever made of their pottery construction. The coming of the white settlers brought a type of utensil that the Indians recognized as superior to their own. These pieces they acquired by trade exchange and soon after there was a sudden drop in the production of their own ware. Within a short period of time aboriginal pottery ceased to be made. In Gookin's time—1650-1670—, "there were few of them in use". The white man's ware had taken its place because they were more lasting than those of clay, which were subject to be broken, and the clay or earth they were made of "was very scarce and dear".

**CONSTRUCTION**

In pottery making, at least three successive stages of construction were necessary for development of the pot aside from its curing and firing, which were required for its durability. These were (1) forming the base, (2) building the body walls, and (3) finishing by moulding the neck and rim, and their decoration. Occasionally where there was work applied in relief, which evidently was done in a later operation of their pottery making, another stage was required. This was essentially so in starting and moulding the lower portion of the pot, and again in finishing the top and applying relief decoration. When the pot was to be made of some height, or where there was to be a contraction for the neck and rim, the upper portions were generally shaped and finished by hand. Each layer of clay, as it was applied, was backed up on the inside with a stone that could be grasped in the hand for support and reinforcing the plastic walls during the moulding and finishing process. Occasionally a skin or a fabric was used in the hand in place of a stone for this purpose. In these operations the finishing was done from the outside, and the imprints found on the fragments indicate only structural impressions. The only exception to this was the upper interior rim margin wall decoration, which was a characteristic applied decoration of the Algonkian Indian, generally of an earlier period.

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*W. H. Holmes, 20th Annual Report, 1898-99, Bureau of American Ethnology, Smithsonian Reports, Published 1903*

*Recent information regarding the use of graphite in other sections of New England tends to suggest that this use in the manufacture of pottery was not confined to the Connecticut Valley area.*
Rolled clay strip
start of coiling

Coiled construction
in its finished state.

1. Before pressing together
2. After pressing together

COILING PROCESS OF CONSTRUCTION

Pot construction on
a basket used as a
form.

Process of modeling
upper portion of pot
with stone modeling
tools.

Coiled construction
obliterated by plaster-
ing clay over surface

Method of reinforcing
while modeling
the walls of the pot.

PRIMITIVE POTTERY CONSTRUCTION

FIG. 11
Two distinct types of construction were used. One was that of plastering a mass of clay over a form and pressing and moulding it into shape. The other was a process of coiling. A thin rolled out strip of clay was wound from a center, around itself to the end, and then as each succeeding strip was applied it was pressed against the one below, welding both together in a solid mass.

Among the Southwestern tribes the coiling was left as a decorative feature on the exterior. The thin rolled out strips of clay were cut of a uniform length. These were coiled around so as to leave the ends of each strip overlapping the last one applied, forming a series of diagonal and spiral raised ridges from the base to the rim, which conformed to the form of the pot. These bands were sometimes varied by pinching the strips up into ripples at intervals along the length of the band. Sometimes these rippled strips were alternated with plain ones forming bands of different widths over the whole exterior. The decorative coiling work formed the highest type of constructive decoration that was done by the aboriginal people of this continent.

By the plastering method, the base required some type of form for its support during construction. Shallow baskets, gourds, and bowls of wood were probably used for this purpose. These could be rotated at will when turning the work was required. They were also used for a support to set the partially constructed pot aside temporarily for air drying. By this process a lump of clay was taken in the palm of the hand, and by pressure and a rotation of the first of the other hand against the mass; it was quickly reduced to a thin sheet, or pancake, of considerable larger size than that of the original lump. This pancake of clay was then pressed into the form, and with the thumb and fingers the edge was turned up all around, then laid aside for curing or drying sufficiently to continue building the walls. It is quite possible that in starting the work a coiled strip was set in the base of the form as was done in the Southwest.

In using a shallow form, building of the body wall was a succession of processes, as the form gave no support, and little building could be done at one time without alternate periods of air drying. The weight of the material, in its moist state, would have sagged the outline and it would have fallen out of place if done in one operation.

At least two types of wall construction were used, and it is quite probable that a combination of both plastering and coiling processes might be found in the same pot, for it was only a step from one operation to the other. The natural result of manipulating a lump of clay in the hand would be to lengthen it into a rounded form which could easily be used for either method of building. More rolling would reduce it to a long thin rope like strip one-quarter to three-eighths of an inch in diameter. These strips were applied to the top edge of the pot wall in the following manner. The end of the strip was held in one hand while the other followed around the circumference of the completed work, welding the new strip to the work below. If the work accomplished was too dry, a little moistening by dipping the fingers into water and rubbing them over the dried edge would give it the proper pliability for fusing or welding the new strip to that formerly applied. Potsherds that have been found showing the coiled process, indicate that the upper portion of the strip remained convex in form, while the underside changed its outline and became concave. With the difference in plasticity between the rope strip and the contact edge of the pot that had hardened somewhat by air drying, it is readily seen that under pressure of the application to weld the two portions together, the underside of the rope strip would yield in outline and become concave. In the Connecticut Valley many of these strips seem to have been applied directly upon the finished portion below instead of overlapping from the outside as was done in the Southwest. The application of the clay and wiping it over the coiling to make a smooth surface is indicated on some of the potsherds that have been found. Where fragments show the use of coiling, and have fractures at these points, the contacts were not sufficiently welded together when they were applied. This, no doubt, was caused by a lack of the proper amount of moisture in both contact edges to produce a fusion of the parts. The lower portion being air dried to a greater degree than the plastic newly applied material, the contact edges would not unite as one piece. Also, the handling with greasy or perspiring hands would prevent a perfect welding at these points. Many potsherds throughout this locality have been found.
Pot sherds of coiled construction showing cord or basketry weave imprinted on the surface of the pot while it was in a plastic state.

Coarse Potsherd imprint of fine basketry weave Fine

BASKETRY WEAVE AND IMPRINTS MADE ON POTTERY

Rim and neck of pot finished with a chip Coiled construction with fabric imprint on surface

POT SHERDS SHOWING SURFACE MARKINGS

FIG. 12
Stone used to reinforce inside of pot while moulding and finishing the outside.

Small modelling tool broken for use.

Modeling implement for outside surface work.

Graphite fragment to pulverize and mix with clay for waterproofing.

Graphite fragments 1 and 2 used as a slip finish on both exterior and interior of the pot to give a luster finish.
where the fracture was along the line of the original application of the strip, and clearly show this coiling process.

There are indications that forms of many different types were used for backing and reinforcing the walls during construction. What these forms were is beyond our knowledge at the present time. They probably were of some material easily acquired and readily put together for use without expending too much time in their making, for there were many varied size vessels to be made, and no one mould would be flexible enough to answer the purpose for all.

These forms might have been a wood receptacle, or one made by forming a pit in the ground and plastering it with clay, as recorded of their use in some portions of the country, or even a built up form of sand and stone which was plastered on the inside with clay. Probably shallow basketry forms were more universally used than any other type. All would be practical and problematical types. When the ware was to be made in such a form as a pit in the ground, the walls were lined with a thin strong medium that would aid in its withdrawal from the form intact without warping out of shape. It was essential that it should be removed when in a more or less plastic state to permit the finishing and decoration of the exterior walls before they had attained a hardened and rigid form. This lining might have a skin, a fabric, net, or other material that would keep the ware separated from the form. It is possible that even grass was used for this purpose in early periods for such types of imprints have been found upon some potsherds.

In early work baskets were used to some extent for forms as indicated by the imprints upon occasional groups of potsherds found on different sites. Chase in his article on the Wampanoag Indians of Massachusetts, from the Smithsonian Report of 1883 says,

"There were three sort of vessels found on Cape Cod."

"First those made of soapstone; second, and most abundant, pottery made of clay mixed with pounded shells and baked after the proper shape had been given by moulding the clay in a basket. The basket was burned away, leaving the outer surface much better baked and, in consequence, far redder than the dark clay within. The outer surface bore the imprint of the wickerwork of the basket, and the inner surface, the marks of some tool used in applying and shaping the clay with which the basket was lined."

This type of form was well adapted for early Algonkian pots where the walls were cylindrical to the top but with little curvature. This practice probably did not continue very long as it necessitated the destruction of the basket by fire, and the loss of a good receptacle required for other purposes. With the use of such forms for reinforcing the walls throughout their height, the plastering of a series of lumps of clay, one after another around the pot, could be done continuously until the whole pot was completed. Certain potsherds inspected show that the force of application, as the material was pressed against the form, met with resistance, and curved the mass of clay upward from the outer wall to the inside of the pot.

In all work where there was to be a neck and rim, these portions were slowly and patiently built up without forms. The necessity for this is apparent in the varied types of rims and necks shown in the different pieces, for there are no two alike either in undercut or curvature of the neck, flare of rim, or in the decorative treatment that ornamented them. These undercuts, curvatures, and flares were all done by manipulation of the plastic material with the thumb and fingers as it was applied. It was then finished by modeling tools that were worked over and around the surface while the inside wall was being reinforced by a stone implement held in the hand as a backing.

Many of these tools or modeling implements were of stone, most of which were natural water worn pebbles, selected for their adaptability to the requirements of the individual type of work to be produced. A few were broken off the end for ease of handling. One in the author's collection is a quartzite pebble of small size that was broken off on three sides to be used between the thumb and fingers. It had a small well rounded surface for modeling a small curvature at the neck of a pot. The nature of the material is such that it is remarkable to note so much shaping without fracture to the implement itself. No doubt implements of wood, shell, and bone were used to some extent for this purpose, but owing to their perishable nature they have disintegrated to dust and all traces of them have been lost to us.

Along the Atlantic seaboard the wide range of shells that were accessible, were largely used by the Indian tribes bordering the coast. The use to which
these implements were put were varied. Some were used to scrape and finish the walls to a smooth surface, others to mould and iron out the deep undercut necks, while larger ones were used for trueing up the outline of the body walls and base. The edge of small scallop shells were used for making indentation markings upon the exterior surface of the potsherd such as has been found in the Cape Cod district. One such has markings resembling what might have been done by a roulette wheel. By the use of a small scallop shell, and using a progressive back and forth rocking motion, identical markings were accomplished. With deep undercuts and wide flared rims the work was done in successive stages. By this method sufficient hardening by air drying was required to give rigidity to the undercut portions before starting the rim. This prevented a sagging or collapse of the work that had been accomplished before the weight of the overhung material was added.

In work where there were to be portions raised above the surface, the projecting pieces were formed separately. They were then applied to the location designated, that had been scored or punctated, and pressed into these depressions which had been made ready just before the application, so that there would be a perfect fusion of the two units as one. Raised or relief ware is rarely found in New England territory.
LOCALLY AVAILABLE STONES:
FIRST CHOICE FOR ARTIFACT MANUFACTURE

By Charles F. Walcott, M.D.

If the thesis of this paper is correct, that our New England Indians tended to use locally available types of stone for their chipped implements, it should be possible, from correlation of data on material collected from many sites, to locate prehistoric sources of supply or quarries, and to map the usual trade routes or annual movements of the aboriginal inhabitants of our area. Occurrence of a significant amount of Kineo felsite at a site would indicate contact with Maine, since this material does not occur in quantity in Massachusetts. If the only source of jasper like stone is Saugus, Mass., a high incidence of this stone in a locality would imply close contact, trade or migration with the early inhabitants of Saugus.

The first step would seem to be to classify our implements according to stone types and locality where found, and, secondly, to obtain specimens of the typical stones from known sources of supply or quarries. An exhibit of source material, labelled according to locality, could be set up here in the Bronson Museum and used by our members for reference and further research. In this way we may find other stone types as easily distinguished and as distinctive as Kineo felsite. Saugus jasper, Marblehead felsite, Hingham felsite, are possible examples. The only way to tell is to correlate our material in one central depot, and this Museum would seem to me to be the logical place to do it, and our membership would seem the group best fitted to do the job.

As a pilot study the author has classified his own collection according to several easily identified types of stone, using Fowler's method. Though the small number of implements makes the statistics of doubtful value, the results seem interesting enough to justify a preliminary report. It is hoped that our local Chapters may be able to provide enough material to give significant and reliable data on many widely separated localities throughout our area. By publishing this material in the Bulletin we may all learn a great deal about the origin of the implements in our collections and the stone preferences, trade routes and the migrations of our Indians.

Some rough and simple method of classification is essential when working with our collections, and it seems to me the one used by Fowler in his article on Stone Importation in Prehistoric Massachusetts in our Bulletin for January, 1950, is a very practical one. He mentions quartz, quartzite, shale, felsite and flint as generalized terms denoting stone preferences having the greatest frequency in varying degrees throughout Massachusetts.

We are all familiar with milky or white quartz, a very hard white stone with a somewhat granular texture like coarse lump sugar. It does not usually chip smoothly as does flint or a good variety of felsite. Less common is the crystalline, clear glassy form. Quartz occurs in veins, outcrops, and cobbles. The latter are not abundant at Marblehead, but on some Cape Cod beaches, as at Sandy Neck, near Barnstable, they are very plentiful.

Quartzite is a sandstone the grains of which have been compacted by heat and pressure into a hard material which breaks across the individual grains of which it is composed. It often occurs as cobblestones in stream beds deposited there in till as a result of glacial action.

Felsite is fine grained stone which has been in a molten state and has solidified slowly enough to allow a microscopic crystalline structure to form, too fine to detect with the naked eye. However, it often contains scattered visible crystals called phenocrysts, white or black or shiny, and is then called a felsite porphyry. Sometimes it has a marbled appearance due to wavey bands of various colors as if it had been remelted, partially mixed and hardened again. By microscopic study, felsite can be further defined according to the composition of its crystalline structure, but for our purposes this seems unnecessary. By inspection we can identify Mount Kineo felsite, the largest source of which is at Moosehead Lake in Maine. When fresh, this is a greenish color sprinkled with dots and squares of gray crystals. After weathering it becomes pale gray, almost white. Implements and chips of this material are abundant not only around Moosehead Lake, but also along the Kennebec and Penobscot rivers and along the coast of Maine, and glacial boulders are found well South of the lake itself. Implements of this material are only occasionally found in Massachusetts.
Shale and Slate, sometimes referred to as Argillite, are derived from sedimentary muds which have been subjected to heat and pressure and have become solidified. Some forms have a tendency to break into slabs like roofing slate, while others are more compact, contain more silica, and are harder and break with a conchoidal fracture. Most of the material I have found has been of the softer, slaty form. Chipped implements from this material are usually rough and ineffective looking, though of course some beautiful polished points were made of it.

Flint, as defined by Fowler, is a fine grained, hard stone, with a smooth texture which chips with a conchoidal fracture, and is sometimes called chert. Jasper is a form of flint, usually red in color, and often has whitish bands. Chalcedony is another form usually white in color. Willoughby describes a deposit of Jasper and Chalcedony at Saugus, Mass. Flint is scarce in the regions with which I am familiar. Some European flint is found, either as gun flints or as nodules or implements made from these. Nodule flint was apparently brought to this country as ship ballast to some extent in Colonial times.

At Marblehead, Mass., where I am familiar with sites on Peahe’s Point and up the shore of Salem Harbor to Forest River at the head of the Harbor, the chips found are almost exclusively of locally occurring forms of felsite, while quartz is unusual. This is borne out by the incidence shown in my collection of artifacts. It should be checked by other larger collections from this locality. In this region large deposits of suitable felsite are close at hand, but quartz is not plentiful as raw material.

At Spy Pond, Arlington, Mass., I was impressed by the relatively high incidence of quartz chips and also of shale or slate. One large field on the southern side of the pond had some sizeable areas covered with shale chips. The statistics from implements recovered here bears out the increase in quartz and shale. There were local ledges of slaty stone known as Cambridge slate, used extensively as building stone for cellar foundations, and I believe this accounts for the higher percentage of this stone used. Rounded smooth felsite typical beach cobble stones were found in these fields. This site communicated with Boston Harbor by way of Mystic River, easily navigable by canoe, but slate could be picked up on the spot. It is easy to believe that under certain conditions travel would be difficult or inconvenient, and that then the locally available yet less desirable slate would be used. Where the quartz comes from I do not know, but it seems to me that in this region whenever felsite is scarce, quartz takes its place.

Along the Sudbury Valley, at Concord, Wayland and Sudbury, the proportion of quartz chips seems higher than at Arlington, and my statistics bear this out. Here I feel on somewhat shakier ground as I have so few implements. It would be a simple matter to check on this, however, as Concord has an extensive collection as has Ben Smith and others of our members. It is interesting to note that the Concord River connects with the Merrimack which enters the sea at Newburyport, a sandy coast. The nearest ledges on the sea coast would be Cape Ann, where Annisquam was a good Indian site. What sources of supply there may be at Concord I do not know, but I doubt if there are large ledges of good felsite.

We think of quartz as being most abundant on Cape Cod and south as shown by Fowler’s figures for the Attleboro region. I was interested, therefore, to note at Silver Lake, Chesham, New Hampshire, near Keene, that the chippings are all quartz. The shores near the site, at Sandy Beach at the end of the lake, are covered with quartz cobblestones, doubtless the source of supply. On a sandy point on Lake Winnisquam, near Laconia, New Hampshire, quartz chips greatly predominated, though here there was some felsite also.

<table>
<thead>
<tr>
<th></th>
<th>Marblehead</th>
<th>Arlington</th>
<th>Concord, Sudbury, Wayland</th>
<th>Canton</th>
<th>North Haven, Maine</th>
<th>Attleboro (Fowler)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felsite</td>
<td>55 % 93 %</td>
<td>33 % 57 %</td>
<td>23 % 34 % 30 % 83 %</td>
<td>107 % 91 %</td>
<td>14 %</td>
<td></td>
</tr>
<tr>
<td>Quartz</td>
<td>3 % 5 %</td>
<td>33 % 50 %</td>
<td>5 % 13 % 1 % 2 %</td>
<td>2 % 1 % 0 % 0 %</td>
<td>70 %</td>
<td></td>
</tr>
<tr>
<td>Shale</td>
<td>1 % 15 %</td>
<td>5 % 7 %</td>
<td>1 % 2 % 0 % 0 %</td>
<td>0 % 0 % 3 % 2 %</td>
<td>10 %</td>
<td></td>
</tr>
<tr>
<td>Quartzite</td>
<td>0 % 4 %</td>
<td>4 % 6 %</td>
<td>1 % 1 % 5 % 4 %</td>
<td>2 % 1 % 3 % 4 %</td>
<td>4 %</td>
<td></td>
</tr>
<tr>
<td>Flint—(Jasper)</td>
<td>1 % 2 %</td>
<td>1 % 3 %</td>
<td>1 % 1 % 5 % 4 %</td>
<td>2 % 1 % 3 % 4 %</td>
<td>1 %</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>60 % 100 %</td>
<td>66 % 98 %</td>
<td>66 % 98 % 36 % 98 %</td>
<td>117 % 98 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There is an Indian site at Ponkapoag Pond, Canton, near great Blue Hill, Massachusetts. The plateau is now used as a summer camp and is bordered by the swamp at the northwestern end of the pond. It is interesting that at this inland site, away from the seacoast approximately as far as Spy Pond, Arlington, the incidence of felsite is high and there is practically no slate. I suspect that, the Blue Hills being igneous granitic rocks, there is probably a good source of felsite available near this site. Also, I do not know of any slate deposits here. The only distinctive stone at this site is a brownish felsite.

In Maine, at North Haven Island, in Penobscot Bay, though felsite is the preferred stone as at Marblehead, the occurring varieties are sometimes different enough to be easily distinguished. Mount Kineo felsite accounted for about a third of the implements found. Another distinctive stone is a very handsome variegated black and brown rock giving a sort of tortoise shell pattern. Neither quartz nor jasper are common, though both occur.

My figures are obviously derived from a most inadequate number of artifacts from the various sites, and I would not consider them worth mentioning were it not that the incidence of the various stones as chippings roughly parallels these figures. As we all know chippings occur in abundance on good sites.

At Marblehead, Mass., we have at least two sources of felsite with which I am familiar.

Castle Rock, on the south or bay side of Marblehead Neck, is a mass of dark black porphyritic felsite as large as a house, rising directly from the ocean. The surface has weathered to a dull gray color and it is seamed with cracks and fissures. Where fresh surfaces are exposed by fractures due to frost action or the weather, the underlying material is seen to be a black or bluish-black fine grained material, speckled with white dots of included crystals. In saddles and pockets of the rock are beds of chips, and in some levels on the seaward face areas of turf are being washed away by the surf in storms. Here may be found roughly blocked out, fresh colored turtle backs or spalls, accompanied by some beach stones pecked and chipped by use as hammer stones. Areas of the rock are of a pale gray felsite with large included black
fragments, and, most interesting, are several areas, included in the main body of the rock, two or three feet in diameter, of a fine grained greenish stone. The only implements of this material I have were found in Maine! There are also areas where the gray and black rocks have intermingled and mixed producing a marbled, wavey patterned rock. Chip­pings of all these rocks are the most common on the Marblehead sites with which I am familiar, with the exception of the green material which is in relatively very small supply here.

Cat, Children's or Lowell's Island, as it is vari­ously called, lies off the mouth of Marblehead Harbor. There are three cobblestone beaches which afford good landing places at either end of the island. Otherwise the shores are composed of vari­ous forms of felsite bluffs and ledges, some almost white, others dark gray, and at the southern end some of a quite vivid red. Indian chippings are found in all eroded banks around the shores, the most prolific area being at the Southern end at the head of the beach. I have never found anything other than rough blanks at this site. Recently on top of a ledge of the red felsite, in a dirt filled cavity, were noted smooth rounded gray beach stones, far away from the shore. On inspection these all showed evidence of use as hammer stones and lay in a litter of rough chipped spalls and fragments of red felsite.

These felsites, the black, the red and the gray, commonly occur as separate ledges, but there are areas where they are adjacent to one another, and I suspect their mixing in a molten state accounts for the wavey, mottled and marbled appearing stones at this site. Another feature of these stones is that at times the red felsite in particular is some­times in some places so fine grained and waxey­looking and free from included crystals as to sug­gest jasper rather than felsite.

The pebble and cobble stone beaches on Cat Island as well as those on Marblehead Neck are largely composed of smooth, rounded felsite cobble stones. Similar stones are common finds on Indian sites along Salem Harbor and as far distant as Spy Pond, Arlington.

A little practice, however, convinces the novice that it is far easier to start to block out an implement from a sharp edged spall fragment from a ledge than to try to knock good flakes off a rounded compact grained felsite cobble. Indeed it has been said that the California Indian, "Ishi", became very reluctant to start his arrow heads from cobblestones of obsidian, due to the danger to his eyes from flying splinters of rock, much preferring sheet glass as a starting material.

A small collection of chipped stone implements has been classified according to Fowler's method. As a result a pattern of stone use emerges which shows a tendency to use felsite when readily available, but other stones, quartz or shale, in increasing degree when locally available.

There seems to be a center of felsite use at Marblehead and another at Canton, Mass. Shale is most prevalent at Arlington, and quartz is more abundant than felsite in the Sudbury valley. Marblehead and possibly Canton have good local sources of felsite, while Arlington is near a plentiful source of shale.

At North Haven Island on the Coast of Maine, felsite is the stone of choice, and in some cases is easily distinguished from the felsites of Marble­head.

Quartz may be used almost exclusively as far north and inland as near Keene, New Hampshire, when a plentiful supply of the material is available.

The statistics used in this paper are based on inadequate figures, but can easily be either verified or disproved by checking available larger collections.

It is hoped that this paper will serve as a stimulus to further work along this line by our members, aided by reference material in the Bron­son Museum from known quarry sites.