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A PRELIMINARY REPORT ON THE CONCORD RIVER SITE
AT BILLERICA, MASSACHUSETTS
M-11SE9

By WALTER A. VOSSBERG AND J. ALFRED MANSFIELD

Four miles upstream on the Concord River from its confluence with the Merrimack River there is a sharp bend in the river involving an area of perhaps a square mile. Within the confines of this area evidence of aboriginal culture has been found for many years. Large artifact collections have been made by numerous individuals, and the site was given an official Mass. Archaeological Society number in 1939 (M-11SE9). At least seven different site names appear, including "Call Farms" and "Talbot Mills".

Rev. Henry Hazen, in his History of Billerica, Mass. (1883) makes the following comments: "The Sawshin territory was a favorite resort of the red men. The Pawtucket tribe occupied the vicinity of the mouth of the Concord River, on both sides of it, as their headquarters ... Wamesit, or Weymesit, was originally the name of the eastern angle between the Concord and Merrimack Rivers, around Fort Hill and the modern 'Belvidere' of Lowell ... the mouth of Bacon Brook which bounded this Indian plantation southerly." We thus have the southerly limit to the historical site of Wamesit defined as being Bacon Brook.

Bacon Brook lies within the present southern limit of Lowell. M-11SE9 is two and a quarter miles further upstream, and therefore cannot be considered a continuation of Wamesit. However, we do have, by inference at least, an historical reference to this particular site which for clarity we shall call the "Call Farms" site. The Rev. Hazen also remarks, "But the Indian occupation of Billerica was not confined to Wamesit. The frequency with which their arrow points and other articles are found shows how numerous they once were. Graves and the site of a wigwam are still shown north of Jaquith Brook, near Concord River." Benjamin S. Smith of Concord, who is an authority on the prehistory of the Concord Valley, states that part of M-11SE9 was once land belonging to a Mr. Jaquith, and was known as the Jaquith Farm. It seems highly probable that the brook of the same name was also within the site.

The Rev. Hazen also describes at some length the part Wamesit played as a meeting ground for the principal tribes whose geographical limits of authority were fixed by the natural boundaries of the Concord and Merrimack Rivers. North of the Merrimack was the territory of the Pennacooks (the Pawtuckets were a sub-tribe of the Pennacooks). The Concord River was the eastern boundary of the Nipmucs and the western boundary of the Massachusetts tribe. It is quite likely that an area within two miles of Wamesit was an alternate meeting place for these tribes.

Most of the land included within the site is a high sand plain on either side of Call Road (which runs parallel with the river). The whole area has been dug over for years with great quantities of lithic material and some burial material reported. Willoughby mentions a cache of 112 blades from Billerica (perhaps this site). The slope to the sand plain from the river starts very near the river at the downstream end of the site. However, near the upstream limit the slope begins perhaps 200 yards from the river. The lower land between the slope and the river is heavily wooded and strewn with high glacial boulders, some weighing several tons.

The Charles C. Willoughby Chapter tested several areas in this low land and discovered one, generally overlooked by others, about 100 feet from the river and near the upstream limit of the site. The elevation is less than 10 feet above the river. A ravine runs through one end of the site and was perhaps a water supply. The river at this point is narrow and littered with boulders. Despite the dam a half-mile downstream, this is a fast-water spot in an otherwise sluggish stream.

One large trench and several smaller ones were laid out and excavated this year by six or seven members of the C. C. W. Chapter. Rarely were more than two members digging at the same time, and often only one was digging. Between fighting mosquitoes and poison ivy, quite a few fine implements were found along with fragments of many unusual pieces.
A PRELIMINARY REPORT ON THE CONCORD RIVER SITE
AT BILLERICA, MASSACHUSETTS

In the area excavated this year a profile shows two to four inches of humus, four inches of black loam, two inches of yellow and black mixed, twelve inches of yellow loam with some gravel, and below this a lighter yellow sand. Artifacts were fairly evenly distributed down to the yellow loam with only a maul, one broken knife and a possible ulu fragment being found in the yellow loam.

A count of lithic material has not been completed, but there appears to be a preponderance of quartz and porphyritic felsite, with the felsite more common above the yellow loam and the quartz more abundant in the yellow loam. No particularly unique lithic materials were found except an appearance of more than the usual amount of flint, both yellow-brown and red. A sample of the former was thought by members familiar with the Bull Brook site to be similar to the material from Bull Brook.

An unusual positive diagnostic trait is the occurrence of large quantities of clay potsherds. Very few sites along the Concord River, and particularly in Concord itself, have produced any clay pottery. There are more than fifty pots represented, with many rim pieces, despite the small area excavated. The pottery is grit tempered and usually exhibits traces of the coil process of manufacture. Thickness of rim pieces averages about three-sixteens of an inch, with little variation. Other sherds are as much as half an inch thick. Surface treatment is generally “paddled,” with finger impressions on many pieces. Decoration of all types except sculpturing appears. Three sections, each about six inches square, pieced together, represent the largest portions of a single bowl uncovered. This pottery is typical of that found, although somewhat less eroded. The decoration is probably from a scallop shell edge of the type referred to as rocker stamped. The vessel was about 11 inches in diameter at the rim with a slightly constricted neck. No bottom sherds were found, but the bottom was probably semi-pointed with an over-all depth of 12 to 14 inches. The pottery seems to be of forms ranging from early intermediate to late prehistoric. No Iroquoian-influence type sherds were found, i.e., no scalloped, polygonal or lugged rims. Two fair-sized stone bowl pieces were found. One with a lug was unearthed in a test pit a few yards from the excavation trench. The other piece was unearthed about 300 feet downstream.

Special mention should be made of the following: Figure 10, No. 1, a lugged rim piece of a soapstone vessel; No. 2, a drilled pendant; No. 3, a grooved axe; No. 4, a maul; and Figure 11, No. 1, an unusually well-chipped base of a large knife; No. 2, a semilunar knife fragment; No. 3, a finely made stemmed scraper of jasper; No. 4, an unusual arrow point; Nos. 5 and 6, two of four remarkably similar knives.

The following chart gives a listing of the artifacts found:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Crudely notched scraper</td>
</tr>
<tr>
<td></td>
<td>Hand chopper</td>
</tr>
<tr>
<td></td>
<td>1&quot; by 2&quot; Mica</td>
</tr>
<tr>
<td></td>
<td>Hammerstones</td>
</tr>
<tr>
<td></td>
<td>Quartz cores (one face flat)</td>
</tr>
<tr>
<td></td>
<td>Drill pendant</td>
</tr>
<tr>
<td></td>
<td>Maul</td>
</tr>
<tr>
<td></td>
<td>Grooved axe</td>
</tr>
<tr>
<td></td>
<td>Gorget Fragment</td>
</tr>
<tr>
<td></td>
<td>Atlat fragment</td>
</tr>
<tr>
<td></td>
<td>Soapstone sherds</td>
</tr>
<tr>
<td></td>
<td>Ulu fragment</td>
</tr>
<tr>
<td></td>
<td>Polishing stone</td>
</tr>
<tr>
<td></td>
<td>Problematics</td>
</tr>
<tr>
<td></td>
<td>Fragment serpentine polished</td>
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<table>
<thead>
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<th>Quantity</th>
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<tr>
<td></td>
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<td>Small triangle point, #1</td>
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<td></td>
<td>Small triangle points, #5</td>
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<td>Small triangle points, #6</td>
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<td>Side notched point, #4</td>
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<tr>
<td></td>
<td>Side notched points, #5</td>
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<tr>
<td></td>
<td>Side notched points, #6</td>
</tr>
<tr>
<td></td>
<td>Truncated point</td>
</tr>
<tr>
<td></td>
<td>Bifurcated point</td>
</tr>
<tr>
<td></td>
<td>Small stemmed points</td>
</tr>
<tr>
<td></td>
<td>Corner notched points</td>
</tr>
</tbody>
</table>
A PRELIMINARY REPORT ON THE CONCORD RIVER SITE AT BILLERICA, MASSACHUSETTS

FIGURE 11

No. 1

No. 2

No. 3

No. 4

No. 5 and 6
A PRELIMINARY REPORT ON THE CONCORD RIVER SITE
AT BILLERICA, MASSACHUSETTS

Scrapers

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Stemmed scraper</td>
</tr>
<tr>
<td>1</td>
<td>Side scraper</td>
</tr>
<tr>
<td>1</td>
<td>Thumbnail scraper</td>
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Knives

<table>
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</thead>
<tbody>
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<td>Stemmed knife, #6</td>
</tr>
<tr>
<td>1</td>
<td>Stemmed knife, #5</td>
</tr>
<tr>
<td>1</td>
<td>Asymmetrical knife</td>
</tr>
<tr>
<td>4</td>
<td>Knives ?</td>
</tr>
<tr>
<td>3</td>
<td>Leafed knives</td>
</tr>
<tr>
<td>6</td>
<td>Stemmed knives, #1</td>
</tr>
<tr>
<td>1</td>
<td>Straight-sided knife</td>
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</tbody>
</table>

Drills

<table>
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</thead>
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</tr>
<tr>
<td>1</td>
<td>Plain, #2</td>
</tr>
<tr>
<td>1</td>
<td>Expanded, #2</td>
</tr>
<tr>
<td>2</td>
<td>Expanded, #1</td>
</tr>
<tr>
<td>1</td>
<td>Eared, #3</td>
</tr>
<tr>
<td>1</td>
<td>Cross, #2</td>
</tr>
<tr>
<td>1</td>
<td>Crescent</td>
</tr>
<tr>
<td>1</td>
<td>&quot;T&quot;, #1</td>
</tr>
<tr>
<td>1</td>
<td>Flake, #1</td>
</tr>
</tbody>
</table>

Conclusions

Site M-11SE9 consisted of two areas. The one bordering the river was a workshop and fishing station, while the area on the more elevated sand plain was the site of the village. The lower area, because of the boulders, seems unsuited to wigwams, and the lack of post mold and house floor evidence seems to confirm this. The more elevated area was probably quite important in historical times because of its location. Artifacts found here are generally of a superior workmanship. The swapping of ideas generally occurring at a congregation area might account for the fine tools. The large quantity of chips and the extent of area of the site indicate a populous site. The depth and apparent transition of cultural material indicate a considerable temporal span of occupation. Typologically, considerable age is indicated by the appearance of soapstone pottery and ulus, if similarity is assumed with other sites for which a more definite chronology exists. Only a small section has been excavated, and testing elsewhere on the site has been encouraging. It is to be hoped that this preliminary work will be followed by more intensive field work, a more thorough analysis and a more complete typology.

Newton Center, Mass.

October, 1954.
Despite the traditional stoicism of the Indians as seen through the eyes of the early colonists, we find occasional references to their various games, many of which were boisterous in nature, and all of which seem to have been blended with sound effects.

One of their dice games, appropriately called "Hubbub," could be heard a quarter of a mile away, according to William Wood.

In any event, gaming occupied a considerable portion of their time, and there were pastimes for all ages and both sexes. Some were reserved for fixed seasons during festivals or religious rites, while others were participated in at will. Some involved a very few individuals, while others pitted tribe against tribe.

Individual games were played in much the same manner among widely separated tribes. The variations were more in the materials employed, due to environment, than in the object or method of play.

Indian games may be divided into two general classes—games of chance, and games of skill or dexterity.

The Indian chance games included dice games and guessing games. In the former, the outcome depended upon the random fall of certain implements employed like dice; in the latter, the guess or choice of the player was the deciding factor. The gaming implements were usually derived from symbolic weapons. Stick dice were often miniature arrows or bows, as were the counting sticks. The engraved and painted tubes used in the guessing game resembled arrow shafts.

The Indians would play at these chance games for long continuous periods of time, often over twenty-four hours, or until all their belongings were lost. If unmarried, they were even known to hazard their own persons, and if chance turned against them, reduce themselves to slavery. Superstitions were nourished with fetishes or lucky stones carried to insure success. During Winslow's visit to Massachusetts at Sowams in 1623 sub-chiefs and tribesmen came to visit, and "went to their manner of games for skins and knives."

Dice type games are described as existing among 130 tribes belonging to 30 linguistic stocks, and from no one tribe do they appear to have been absent. From two to four were the usual number of players. This was an ideal game for the long winter nights in the wigwam. Roger Williams describes an "arbour or play house" used in dice games where a village champion would be pitted against a worthy opponent of another village. Each was backed with high stakes by his followers amidst loud shouts of encouragement.

The implements consisted of the dice and the instruments for keeping tally. The small playing discs or dice were made of various materials including split canes, wooden blocks, bone, beaver and woodchuck teeth, walnut shells, peach and plum stones, grains of corn, shell and pottery. Their two faces were of different colors or markings—they could be black and white or other combinations of colors, and were usually eight in number. They could be either thrown by hand or tossed in a bowl or basket.

When thrown by hand they could be tossed in the air against a hide or blanket, struck ends down upon a stone lying on the ground or sometimes held in the hand, or allowed to fall freely upon the ground. If black and white turned up four and four, or five and three, there was no count; six and two counted four; seven and one, ten; and all eight of the same color, twenty. This particular scoring method was used by the Norridgewock tribe of Maine, and varied in other localities. A previously agreed winning number decided the victor. The score was kept with sticks, grains of corn, or other handy material. The Penobscot tribe used counters of cedar wood, and employed six rather than eight dice. William Wood's variation for Massachusetts, the "Hubbub" referred to previously, was played with five small bones in a small tray. One side of the discs was colored black, and the other, white.
Thumping the tray on the ground varied the colors and produced the score. All black or all white gave a double game; three and two a single game; and four and one counted nothing. The player continued while winning, but gave up the tray to the next player after a nothing count.

Card games were mentioned by Roger Williams and William Wood without any detailed account of the play. Williams described the cards as "strong rushes," and Wood used the word "puim" as a card game in which 50 or 60 sticks a foot in length were used. Both probably confused the game of cards as we know it with the Indian stick game, a guessing game having wide distribution.

The guessing games, or stick games, had at least four variations of play. Sometimes a bundle of sticks or arrow shafts was divided in the hands, the object being for the opponent to guess in which hand the odd stick or a particularly marked stick was held; or two or four sticks, one or two marked, were held in the hands, the idea being to guess which hand held the unmarked stick or sticks. Another variation was the use of four sticks, marked in pairs and hidden together, the object being to guess their relative position. Still another, often called the hidden ball or moccasin game, involved some small object—a stone, stick or bullet—which was hidden in one of four wooden tubes, in moccasins, or in the earth. The right guess would locate the object, with the resulting gain or loss of counters. Stick games involved but two persons, and the players continued until all the sticks were won by one or the other.

Games of skill or dexterity included the game of ball in several forms, archery, shooting, racing, swimming, ring and pin, snow-snake, wheel and stick, button hunting, bear baiting, and the harvest game of giveaway.

Among the games in which an implement resembling a ball was employed were the ball stick game or lacrosse, in which the ball was tossed with a racket; shinny, in which the ball was struck with a club; and double ball, a game played mostly by women, whereby two balls or billets were tied together and tossed with a stick. The balls used in these games varied in material. They were commonly covered with buckskin, but some were made of wood, of bladder netted with sinew, of cordage, bone or stone.

By far the most popular, and that having the widest distribution, was the "ball stick game," later called lacrosse. In the North it was played with one racket, and in the South with two. Important intertribal matches were held, and the competing athletes were regularly trained for this game. William Wood observed that the contestants painted their faces as in war. The game was played with a small ball of deerskin, stuffed with hair or moss, or sometimes with a wooden ball of similar size. A ball from Oldtown, Maine, four inches in diameter, covered with buckskin and filled with moose hair is in the Peabody Museum at Cambridge, Mass. The cover, a nearly circular piece of buckskin about nine inches in diameter is drawn up with a buckskin thong around the wad of moose hair; over it is placed a second piece of buckskin, five inches in diameter, which closes the opening. Horizontal goals were set up on a level plain or sandy beach free from stones and other obstacles. The distance between the two goals varied from a few hundred yards to a mile. The participants varied from 8 or 10 on a side to hundreds, and high stakes were wagered. The object of each team was to drive the ball under the opponent's goal by means of the racket, without touching it with the hands. It sometimes required two days to score a single goal, and while the men were playing, the audience sang and shouted encouragement. After the winners had scored the previously agreed number of goals, the entire assembly joined in a feast. Early observers agree that despite the high stakes and the will to win there was no quarreling or bickering, and the rivals parted on amicable terms.

The "ring and pin" game, sometimes called the "lover's game" by the Penobscots, was played throughout New England. A pin or dart of sharp pointed bone or wood about 8 inches long was joined at the middle with a foot long cord, which in turn was fastened to a conical roll of moose hair. The object was to impale the up-swinging cone with the pin. The target could also be a tightly wrapped bunch of cedar twigs, or a hole-punctured strip of moosehide. This game was analogous to the European game of cup and ball.

The lover angle developed when a man called on a maiden and the game was produced. Seated on a robe or skin, the man started the game, and continued until he missed impaling the target. Then it passed to the girl. If his company was agreeable,
she continued the game to the end; but if, on her first successful thrust, instead of continuing, she handed the implements back, it meant that his company was not acceptable.

In another form, this was played as a gambling game. In this case the target became six moose phalanx bones strung on a thong, with a little piece of leather on the end to keep them in place. Betting stakes were produced, and each player had ten throws, at the end counting up one for every bone that he caught. When all had played, the man with the highest number won. This game was also played as a child's amusement.

The sling game was played between men with slings, the idea being to throw stones as far and accurately as possible. The sling sticks were about a foot and a half in length, with a thong at one end having a loop for the thumb and a groove at the upper end near where the thong was attached. A round stone was placed in the groove, and was held down by the thong. This in turn was kept taut by the thumb through the loop until release. By this method the stones were hurled a surprising distance.

The snowsnake game, or "skid," was a favorite pastime with the Northern New England tribes within the limit of ice and snow. Highly polished darts or javelins up to ten feet in length were thrown with a motion similar to that used in skipping stones on the water. When used on the snow, a path or track was made by dragging a round log about six inches wide for a considerable distance. Sometimes a boy was seized by the feet and dragged down an incline to accomplish the same purpose. This was probably one of the reasons the boys favored playing on the ice. Sides were chosen and stakes bet upon the result. The greatest distance decided the winner of all the sticks. After choosing those he decided to keep, he threw the remainder in the air and they became the property of those quick enough to seize them. By spring the custom was to throw away the snowsnakes lest they turn into real snakes.

The wheel and stick game had universal appeal. One player rolled forward a stone disc, or wheel, while his opponent slid after it a stick curved at one end in such a way that the disc, when it fell over, rested within the crook of the stick. This was considerably harder to accomplish than in the telling, and often resulted in prolonged activity to gain the desired result.

A frequent amusement among the younger set was head rubbing. Two contestants clasped their hands behind each other's neck and rubbed foreheads together until one gave up. One refinement involved a sidewise gouging of the foe's temple. This game undoubtedly hardened the head and developed immunity to pain if not carried to extreme.

A more dangerous pastime was that of bear baiting, observed by William Wood in Eastern Massachusetts. Seeing a bear take to water, an Indian would swim after it, and following a scuffle which could easily end disastrously to the Indian, he would mount the bear's back and ride it through the water until it drowned. Very few achieved this result without being considerably mauled in the process.

Hunt the button games, with other artifacts used rather than buttons in the earlier days, were usually accompanied with songs and movements of the hands intended to confuse those occupied in finding the hidden button.

While dancing generally had a religious or ceremonial significance, there were other occasions when the purpose was purely social. Martin Pring, in 1603, had a talented youth in his company who could play the "gitterne" or zither. With the boy playing tunes in the center of a ring of twenty Indians, they delighted in dancing around in a circle until one broke the ring, whereupon he was punished by the others. Poutrincourt, in the vicinity of Gloucester, Mass., in 1606, observed Indians dancing and playing games to the accompaniment of reed flutes. DeForest, in Connecticut, describes a dancing game in which an Indian stood in the center of a large assembly. Dancing alone, he flourished a valuable article around until it was claimed by one of the bystanders. This continued until the dancer was thoroughly tired or had danced himself out of all his property. Another then took his place and followed the same procedure, and the game of give-away continued; all going away at
the end with what they had been able to beg from others. A similar game, called the harvest game because it took place at that period, was described by Roger Williams as an annual ceremony of the Narragansetts of Rhode Island.

Running races were seldom over short distances. The Indian took pride in his power of endurance, and could jog trot for miles with little apparent effort. Couriers between tribes displayed this power, and covered enormous distances in remarkable time.

Morton observed that in the spring, when the fish came up the rivers in large numbers to spawn, the Indians gathered in favorable places and spent considerable of their time in gaming and juggling, each striving to surpass the other in skill and dexterity.

Target practice was universal among the warriors and boys of the various tribes. Spears, knives and hatchets were thrown for accuracy from the hand, and gaming arrows of special design and ornamentation were shot from the bow. As in most other games, betting gave impetus to the contest.

Swimming races undoubtedly took place, although they are not specifically mentioned by the early colonists. According to Josselyn, the Indians took naturally to the water. Their natural stroke was a dog paddle rather than a spreading of the arms. Wood observed them diving and coming up in unexpected places. Roger Williams noted that they could easily swim over a mile, and could float lying as still as a log. Their children were taught to swim when very young.

Games for women included modified forms of shinny, football, and the deer-foot game. In football, the ball was kept in the air as long as possible by kicking it upward. The deer-foot game was played with a number of perforated bones from a deer’s foot. They were strung on a beaded cord having a needle at one end. The purpose was to toss the bones in such a way as to catch a particular one upon the end of the needle.

Children had a variety of amusements such as top spinning, target shooting, stilts and slings for the boys; and buckskin dolls, playing-house, forfeit plays and breath-holding contests for the girls. Culin states that the top was one of the most widely diffused of Indian children’s playthings. Its antiquity is shown through its use in prehistoric times in Peru. Spinning tops of wood, horn, stone or clay was a winter pastime, commonly played on the ice. In common with all children, the Indian youth took pride in imitating the games of their elders.

The hand wrestling game; so popular today, and reputedly of Indian origin, was not noted by early observers in this area.

Traits which reveal themselves as outstanding in the conduct of the various games played by the Indians include a love of gambling, indifference to losses, enthusiasm expressed through general noisiness, and good sportsmanship on all occasions—a worthy precedent to follow in our present day activities of like nature.
WABANAKI DANCES

By Nicholas N. Smith

Little has been written concerning the importance of dances as a social function among the Wabanaki group of Indians. Dr. Frank G. Speck contributed considerable to our knowledge of this aspect of Penobscot folk-lore but he thought that native music was about at an end in 1936. A few of the older people however have passed along the songs or fragments of them and we still find that there is occasionally an Indian Dance held at Old Town. The Indian Pageants held there have helped prolong the customary dances but some of the colorful ritual has a western origin.

The Passamaquoddies are the only eastern Indians of this group who perform their ritual dances for their own benefit and not that of the tourists. The present day Penobscons are passing through the same kind of retrogressive stage that their ancestors experienced forty or fifty years ago.

The Malecite seem to have lost more of their dance customs than either of the other tribes. After studying the music of these people I have found that all used the same Election, Wedding, Corn, Greeting, and Snake dances and songs. Records made by Dr. Speck among the Penobscons forty years ago were understood and translated by Malecites. Records that I made among the Passamaquoddies and Malecites in 1953 were understood by the Penobscons. In 1955 I recorded the inauguration of William Neptune and found that the Greeting to the Chief and the Chief's Greeting to the People were identical with similar records made by Dr. Speck at Tobique about 1910. The words had been memorized and passed down from one generation to the next.

We are not sure what type of instruments were used to accompany the dances in ancient times. Some contend that the drum is an innovation but others have told me that different kinds of drums were used in the old days. One drum described to me seems to have been of the snare type similar to that which the Naskapi use in their ceremonies. Others have described a drum made from a rotted cedar covered with hide and still others speak of a drum of this type with a little water in it. Several of these drums may have been used to produce slightly different tones. This would remind one of the Iroquois drum. However, I have never seen any of these drums in our museum collections nor have I known of them being used in a ceremony.

We know that the Indians made flutes of bone and I have also heard of wooden flutes but again I have never found a reference to the use of this instrument in the dance. All agree that the rattle is the instrument most widely used in dancing. E. Tappan Adney believed that the turtle shell rattle was the original type of instrument because of the similarity in the Indian name for that animal and the dance rattle. A fine turtle shell rattle will be found in the collections at the Peabody Museum in Salem, Mass. This rattle bears carved designs, one design being a turtle. With the advent of the whites the cow's horn became the chief source of rattle material.

The Election Dance is perhaps the most important in Wabanaki ceremonialism today. We have very few accounts of these dances and of these, most of the narrators did not seem to know just what was going on or why. Dr. Speck quotes an account of this ceremony performed at Old Town on September 19, 1816(1) which is the earliest reference that I have found. There is a great deal of difference between this early ceremony and the one which Speck recorded in 1910. An account given by Mrs. W. Wallace Brown of an Election Dance among the Passamaquoddy in 1892 gives details that neither of the above mentioned accounts present, however it is closer to Specks 1910 record(2). These early accounts give details which seem similar to those to be found in the ceremonies of the Naskapi, for example the barring of women during some parts of the performance. The old men went into a hut or wigwam alone where certain secret rites were performed including a meal. Possibly a sweat bath was originally included in the ceremony, this being a special rite for men which was forbidden to women and children. Sabattus Tomer remembers some of the Passamaquoddy performing this ritual at Peter Dana's Point and pointed out to me the spot where a sweat bath once stood. He did not remember it as a part of the Election ceremony but thought it might well have been.

Wampum is the only bit of authentic Indian ceremonial regalia now worn. Among all of the stone pendants found by archaeologists, I have never seen one that was classified as that worn by a chief or as being the symbol of the office, yet today a medal is used as the symbol of a chief among these tribes.
...The Sagamore then taking the medal nearest Atteon, addressed him and his tribe in another speech of the same length as the former, in the course of which he came to momentary pauses, when the Tarratines collectively uttered deep gutteral sounds like 'aye'. These were evident expressions of assent to have Atteon, Neptune, Francis, and others their first and second Sagamores, and two senior captains. The speaker closing his remarks, advanced and placed the suspended medal about Atteon's neck, by which act he was formally inducted into office and constituted Sagamore for life.

Just what the medal was that the visiting Malecite Chief placed about Atteon's neck is not mentioned. However, for about a hundred years an 1827 medal bearing the portrait of Andrew Jackson was used. The present medal bears the portrait of a Pope and no one seems to know what became of the medal honoring Jackson. William Neptune, who won the campaign among the Passamaquoddies in 1953, wore a medal during his election ceremony. He also wore a beaded pouch, the same which his grandfather (being a conservative Indian, he never thought further back than a grandfather) wore when he was chief and assembled the Malecite and Passamaquoddy Indians to fight for General Washington during the American Revolution. Sabatus Tomer told me that in the olden times the chiefs wore a piece of bone that had a picture of themselves painted on with plant dyes. A cord of green hide suspended it about the neck.

Because of a feud which developed between Atteon and Neptune, the election of 1816 was the last in which a chief was elected for life. The Maine legislature attempted to solve the problem but the action resulted in the creation of two factions among the Indians. "On March 16, 1839, the legislature of Maine authorized a biennial election of governor and lieutenant-governor and the Selectmen of Orono were authorized to prepare a voting list of all who were 21 years of age on the first Monday of August 1839, and every year thereafter to receive the vote, provided the tribe on the date of this August election, adopt the legislative enactment."(4)

Now the elections are held on the even numbered years and the winner is inaugurated at the beginning of the following year. The position of governor here is also much of a family affair. Mrs. Fanny Eckstrom lists seven Neptunes who become governor and William Neptune would be the eighth. She adds:

"It is evident that the Neptune family has been in almost uninterrupted succession at the head of the Passamaquoddy tribe for considerably more than two hundred years. Even in the royal line in Europe such a record would be notable."(6)

After the more serious inauguration ceremony is over, the tribe and the visitors enjoy the dances. The dance is put on by the newly elected officers to show their appreciation. We have the following account of the dances at the election of 1816:

"The spectators, at the marshal's request, now withdrew, to be spectators only about the doors and apertures: when the Tarratine females clad in their best dresses and fancifully ornamented, joined
for the first time the Indian assemblage, and the whole formed an elliptical for the dancers. In close Indian files they moved forward in successive order, with a kind of double shuffle, to their former places, animated by the music of a light beat upon a drum, in the midst of a circle, well accompanied by vocal tune. The female dancers then retired, the Indians took their seats, and the spectators were readmitted. To close the ceremonies, four chief men of the Marechites severally arose in succession and sang short songs; somewhat entertaining, which were duly responded by others from the new made officers, through which the whole assemblage uttered, at almost every breath, a low-toned emphatic guttural sound, not unlike a hic-cough—(h', the sign of assent) the singular way they expressed their plaudits and pleasures.”(7)

A good description of a Chief's Dance was given to Speck by Peter Nicol:  

“It was enacted by chosen women. One old woman carrying a walking cane led a file of dancers, all women. We are not told what other prerogatives these women enjoyed. They circled only once about the council room. This done, the chief to be inaugurated went to the leader and placed a good broadcloth blanket upon the old woman leader's shoulders, and the seven council-men placed similar gifts upon the seven women dancers. These gifts were kept by the women as presents. None of the songs were remembered, but the word burdens were in praise of the new chief. This dance has evidently not been performed since some time prior to 1870. The appearance of the matrons of the tribe in the chief's ceremony and the favor done them by the officers are reminders of the Iroquois political sentiment toward women.”(8)

It is interesting to compare this with the account left us by Mrs. W. Wallace Brown of the Passamaquoddy performance she witnesses:(9)  

“The captains also improvised songs to the meat. After this part of the ceremony, which is called ‘Weck-we-bal-ten’, meaning ‘the people’s supper to the officers’, they again arranged themselves in a circle about the room. A drum was beat with short, sharp taps, very slowly at first; each beat of the drum was accompanied by a ‘honk-honk-honk’ from those in the circle. Then the door was burst open, and six women, chosen from among the visitors, entered dancing. As they passed before the chief, he threw a shawl over the head of the first one, the captains throwing shawls over the others. They danced three times around the room, still covered, then all present joined in the dance, the women leading. This is called ‘Moeo-mayic-hapijic’ or ‘women thanking for the chief’. The shawls become the property of the women who dance, and are treasured as trophies. The old custom was to place masks over their faces. There are none of these masks in preservation, so they use shawls instead.”

The reason for only six women taking part in this dance whereas seven participated in the Penobscot ceremony we do not know and can only speculate about. Seven is an important number among the Wabanaki. It is mentioned in the stories of the old times, a man was automatically a medicine man if he was the seventh consecutive son. I know of one Malecite who had this honor and is usually referred to as “Doc”, but I have been able to find only one occasion when he administered medicine. A method to fight medeoulin is to boil seven needles. Perhaps there were only six Passamaquoddies who could fit the requirements. It is also important to note the use of masks as this is the only time I have found reference to masks among this group of Indians except as entertainment in the Trading Dance which I will mention in detail later.

Speck's term, “mowia ‘wegan” is the same as Brown’s “moeo-mayic-hapijic”. I gave this term to my collaborator, Peter I. Paul, and he translated it as “Lament Dance”. I then showed him where I found the words. Speck was told that the song was in praise of the new chief, although no one could remember the word burdens. The dance had not been performed in forty years at the time Speck received the information. I think Mrs. Brown has a better translation—“women thanking for the chief”. The dance was probably derived from the old times when a new chief was only elected when a chief died. This dance was probably a lamenting for the old chief and hoping that the new chief would be as brave, strong, and wise as the old one. With the changing times and the electing of the new chiefs every two years, the need for this dance would no longer exist. It would be especially out of place if a chief were reelected, as many of them were. Mrs. Brown’s term “weck-we-bal-ten” is used today as
meaning any kind of feast. She probably asked what the term meant and was told for that particular occasion. The Indians even use the term in referring to a picnic.

It is interesting to note the part played by the women in the election ceremony. In 1839, when the legislature authorized the preparation of a voting list by the selectmen of Orono, the women were not included. In 1921 Penobscot women were still denied the vote, as shown by the following letter—

Old Town, Maine
February 21, 1921

Percival P. Baxter
Governor of Maine
Augusta, Maine.
Dear Sir:

Now that the women of Maine have full suffrage, we, the women of the State of Maine, members of the Penobscot tribe, believe that we should have the right to vote in all tribal meetings. We are informed that the present agent of our tribe submitted the question of whether Indian women had such right to the last State administration but that Secretary Ball gave no definite answer. Local attorney advises that we always had the right to vote and that the agent cannot refuse to accept our votes at election time and sort and count same, as provided by statute.

Will you not kindly refer this matter to the attorney general’s office that our agent may be fully informed the premises.

Yours very truly,

(signed) MRS. PETER NICOLAR

From information that I received from Sabattus Tomer of Peter Dame’s Point, Passamaquoddy women have only voted in the last three elections. They were dressed in their Sunday best for the hour in which Agent Hall kept the polls open in 1952. Later, at the Inauguration Ball, an old lady had the primary role in the Greeting Dance to the new governor and lieutenant-governor. She was an elderly person and wore a patch over one eye. A large circle was formed and everyone joined hands and circled around with increasing speed. People began to smile, talk, and yell and soon everyone was enjoying the fun. The spectators seemed to get as much enjoyment from it as the participants. In the dances which followed each individual seemed to use their own step. Sometimes they selected partners and at other times they danced alone. When the elderly lady got up for the Greeting Dance, called Skaweg, all of the others went to the outskirts of the circle and listened attentively and respectfully. She paced up and down the center of the floor singing the song slowly. The song being finished the governor made his reply, after which a cheer went up from the spectators and they renewed their noisy dances which are called the Skawintawagen, or confirmation of the chief. This whole ceremony was definitely in the hands of the dance leader, Sabattus Tomer. He set the pace by the beat of his drum or the tempo of his rattle. He began the first dance by slow beats on the drum and increased the tempo as the dance progressed, singing all the while. After he had worked up sufficient spirit he handed the drum over to another Indian while he used the rattle, a cow’s horn about one hundred years old.

One of the important differences between these dances and those of the Penobscot was the use of songs the words of which were meaningful to the Indians. The Penobscot songs of today consist largely of “chant” words which were at one time only the chorus of the song. Although the words have no meaning to the Indians now they must have originally been understood by their ancestors. I have found that the Tobique Malecites used the same Greeting Song and Chief’s Reply in the 1953 ceremony as that used in 1910. If the chief could not sing, the Governor’s Reply could be sung by proxy. All the songs are memorized and a good singer would be chosen to present it. Under such circumstances the song is given a special name but as yet I have been unable to obtain it.

The Passamaquoddy dance was held on Old Christmas as they consider this the proper time for dances. The Penobscot ceremony was held on January 1st, 1953 and was an even more degenerate and abbreviated affair than that witnessed by Dr. Speck in 1910. Few of the people knew any of the dances and the leader did little singing. He used a tom-tom but no rattle. No one was dressed in the
A panic in the crowd seemed imminent, when Joe coming to me said: "William better stop, young Indian getin clasy (crazy)." Their savage nature had really begun to assert itself, and this exhibition made quite evident to our senses the influence that may be brought to operate on untutored minds.(10)

In this instance the Indians became greatly excited for no cause and one may imagine what might have happened had there been a reason for war. During the course of Indian wars many of the women lost loved ones and when captives were taken these provided an opportunity to work off some of their pent up emotions.

... this Night we arrived to an Indian village called Apoge, (Ek-paw-hak) where we found ye Schooner Montague was arrived with ye other prisoners Some Days before us, at this place ye Squaws came down to ye Edge of ye River, Dancing and Behaving themselves, in ye most British and Indecent manner yt is possible for human kind, and taking us prisoners by ye arms, one Squaw on Each Side of a prisoner, they Led us up to their vallage and placed themselves In a Large Circle Around us and Striking of us in ye face with English Scalps, yt caused ye Blood to Issue from iur mouthes and Noses, In a Very Great and plentiful Manner, and Tangled their hands in our hair, and knocked our heads together with all their Strength and Vehemence, and when they tired of this Exercise they would take us by (the) hair and some by ye ears, and Standing behind us, oblige us to keep our Necks Strong so as to bear weight hanging by our Hair and Ears. In this manner they thumped us in ye Back and Sides, with their knees and feet, and twiched our hair and Ears to such a Degree, that I am Incapable to Express it, and ye others that were Dancing Round if they saw any man falter, and did not hold up his Neck, they Dached ye Scalps In our faces, yt every man endeavored to bear them hanging by the hair in this manner, Rather than have a Double Punishment; after they finished their frolick, that Lasted about two hours and a half, we was carried to one of their Camps, where we saw Some of ye Prisoners that Came in ye montague, at this place we Incamped yt Night with hungry Belleys 40 L from ye entrance W.N.W. by our Computation."(11)
Weddings are occasions of much celebrating and good times. Special wedding dances were performed. Andrew Dane, a Penobscot, told me that there were twenty-one variations of the wedding dance. Speck gives two in his "Penobscot Man." (pp 282-283) The words are just chant words. One of Speck's recordings of a wedding dance at Tobique gives a speech by the father of the bride plus the chant words. I recorded the wedding dance sung by Gabriel Polchies, a Malecite living at Old Town, whose son, I believe was the last to have the native ceremony at one reserve. This dance song had meaningful words but also a chant chorus. The Snake and other dances were used in the ceremony as well.

A good description of the Snake Dance is given by Dr. J. Walter Fewkes. Although he never witnessed the dance, he obtained some of the songs from Peter Selmore and Noel Josephs, Passamaquoddy, and the description from Mrs. W. Wallace Brown whose husband was the Indian Agent for some time. She had seen the dance performed twice.

"The Leader or singer, whom we may call the master of ceremonies, begins the dance by moving about the room in a stooping posture, shaking his rattle made of horn, and beating the ground violently with one foot. He peers into every corner of the room, either seeking the snake or inciting the onlookers to take part, meanwhile singing the first part of the song. Then he goes to the center of the room, and, calling out one after another of the auditors, seizes their hands. The two participants dance about the room together. Then another person grasps the hand of the first, and others join until there is a continuous line of men and women, alternate members of the chain facing in opposite directions, and all grasping each other's hands. The chain then coils back and forth around the room, and at last forms a closely pressed spiral, tightly coiled together, with the leader in the middle. At first the dancers have their bodies bent over in a stooping attitude, but as the dance goes on and the excitement increases, they rise to an erect posture, especially as they coil around the leader with the horn rattles, who is concealed from sight by the dancers. They call on the spectators to follow them, with loud calls mingled with the music; these cries now become louder and more boisterous, and the coil rapidly unwinds, moving more and more quickly, until some of the dancers, being unable to keep up, slip and fall. Then the chain is broken, and all return to their seats with loud shouts, often dripping with perspiration.

In this dance all present take part; it always occurs at the end of the Passamaquoddy dances, though it may be followed by a Micmac or other foreign Indian dance."(12)

Fewkes notes that the end of the dance resembles the game, Snap the Whip and Speck makes the same remark in his "Penobscot Man." I was surprised to find the comment in Speck because the same thought occurred to me when I saw the dance in 1953. Fewkes thinks that the leader is looking for a snake but from the answers to my questions I cannot confirm this. My informants from three tribes spoke only of the motions and contortions of the dances as portraying the actions of a snake and did not speak of the leader looking for a snake as the dance opened.

Among the records Speck made among the Malecite at Tobique Point, New Brunswick, number 40 is a Snake Dance. The leader, Jack Solaman, sang one word throughout the air, al-la-degee-eh. The best translation of this word is "moves like a snake" although the word snake is not included in the Malecite term. Jack Solaman is now dead but is still remembered as a great dance leader. The only words given by Speck in his "Penobscot Man" or by Fewkes in his "Contributions to Passamaquoddy Folk-Lore" are the new and meaningless chant words.

The special Wedding Dance was performed by the newly-weds in the center of a circle; the others circling around them. Another attraction was the Wedding Feast. In more recent times the priest performs the religious ceremony and then a feast is held followed by a dance. A gun or cannon might be fired after the religious ceremony. This was the order of events at a wedding which Sabbattus Tomer attended about twenty years ago at Peter Dana's Point. Peter L. Paul described a similar ceremony which took place at the Woodstock Reserve about thirty years ago between Andrew Paul and Louise Soloman. At the feast they prepared moose, turnips, and potatoes in a stew. Peter Paul was one of those who looked after the
preparation of the feast during the religious ceremony. Paul recognized some of Speck's recordings to be some of the dances performed at this ceremony. The evening ended with square dances at about one or two o'clock.

Some dances were performed merely as a means of entertainment. One of these, the Pine Dance, was a child's pastime. The girls cut the ends of the pine boughs so as to produce a cluster of needles which represented a person. The needles were cut straight along the bottom so that they would stand up on a piece of split cedar. When several such dolls were fashioned and set up on the wood, the girls sang a song and tapped in rhythm to it on the board. There was no actual control over the little dancers which moved about at the vibration or taps on the wood. The singer sang about the antics of the dancers which moved to the right or left, perhaps embracing or circling about. Speck tells of this dance being performed by some women in "Penobscot Man" (pp. 299-300). I think that this instance was a later innovation of the child's game, or perhaps came from Micmac contacts as it is called the Micmac Dance or Nawa'dawe. This imitation of the little pine needle clusters was unknown among the Malecites of the St. John River. The words of the song do not tell what the women are doing and are meaningless to the Penobscots. There seem to be no rules for this dance, each acts as she pleases as if she were one of the little pine needle dolls. The Passamaquoddies have a Squaw Dance, which, I believe to be the same dance as the Pine Dance.

The Trading Dance was another form of entertainment. Speck says this is a gaming ceremony, obsolete now for upward of fifty years. The Malecite used it much later than fifty years ago and occasionally it is still performed by the Oromocto people. A few Passamaquoddies know how to perform the dance. A person who had something to trade would go to the house of a neighbor. He would open and close the door a few times, this would attract the occupant's attention as Indians do not knock but usually walk right in. As the visitor was costumed and the dance usually took place in the winter, it would be difficult to identify him, which added to the fun. Often there were two visitors. Sometimes they blackened their faces or wound cloth about their head. In earlier times masks were worn. A mask might be the head of a deer, dog, bear, or just a cornhusk mask. As far as I have been able to determine, this is the only time a mask was used by this Indian group. When the occupant's attention and curiosity was finally aroused, the masquerading visitor would not let him open the door but would first sing a little song. Then he would enter and dance around the room a few times. After this he would leave and return with the article he wanted to trade. If the occupant had nothing he desired to trade he would attempt to embarrass the visitor. On one occasion, when the dance was performed at the Woodstock Reserve, the visitor took an adze, such as was used to hollow out butter trays. In his song he sang "I will show you how to use it", and proceeded to make a butter tray in the wooden flooring. This was taken in good nature by all. Later the new owner of the adze took an augur to his visitor's house and to show him how to use it proceeded to bore holes in his floor and walls. The following translation of the opening song of the trader recorded by Speck at Tobique was made by Peter L. Paul:

"This is the reason I'm here, my friend.
I brought this trading article, my friend.
Return article is what I want, my friend.
Now bring something to me I need.
For this is just what you want, my friend.
Now if you like this article of mine, my friend.
Bring to me the return article, my friend.
Now if you cannot come with it, let me know.
Of course the evening is long, my friend.
Don't think you can outdo me.
There is a lot of stuff where this came from, my friend.
Don't think you can get the best of me.
So attend to this right away, my friend.
Before it gets too late, my friend.
It is hard going, the snow is getting deeper, my friend.
I think this has come to stay, my friend.
It's a bad hail storm, my friend.
Don't think I can't walk through it, I have snowshoes too, my friend.
I will snowshoe over, now it's whatever you think, my friend."
It is interesting that the item of trade was never mentioned in this nor two other songs that Speck recorded. The words to these were usually the same, only changed to fit the type of article to be exchanged or other conditions such as the snow. The participants tried to make the song as humorous as possible and yet rhyme.

When the peddlers arrived at the reserves, it was an occasion for entertainment. A dance was made up called "Pedles Ped-chos-eh." The song is still remembered by the Malecite and is occasionally sung by the Passamaquoddies. I was able to get translations from two versions of it that Speck recorded. Both translations were by Peter L. Paul of which the following is one:

The pedler has walked here, ya-he-ay
The pedler has walked here, ya-he-ay
You can tell by his face, ya-he-ay
It's a little money he wants, ya-he-ay
Let us help him out, ya-he-ay
The pedler has walked here, ya-he-ay
You can tell by his face, ya-he-ay
It's a little money he wants, ya-he-ay
Oh yo wa ni ho ya he ay,
Oh yo wa ni ho ya he ay,
Oh yo wa ni ho ya he ay,
Oh yo wa ni ho ya he ay,
(Repeat chant chorus)

On important occasions, such as the planting and harvesting of corn or hunting and fishing expeditions, dance ceremonies were used, but these have been almost wholly forgotten. Speck mentions a Hunter's Rejoicing Dance which he thought resembled that of the Montagnais. I have not been able to find any of these but did hear bits from three different hunting songs when I spent a few days at an Indian hunting camp. I have found several Malecite and Passamaquoddy Indians who remembered old men burning muskrat shoulder bones so the cracks would foretell the future places for good hunting or of taking the thigh bone, holding it over the head with one hand, and trying to get the forefinger of the other hand in the hole of the joint. If they succeeded, good hunting was indicated, of course failure meant poor luck. This also resembles ceremonies of the Naskapi and Montagnais. I have been able to obtain bits of the corn ceremony, but again a great deal is lacking.

The dance was an important part of the life of these people. It fostered community spirit and tended to keep opposing factions on good terms at the election of chiefs and their inaugurations. It was an important part of the wedding ceremonies when new families were being founded, in fact hardly was there a tribal or village function of which the dance was not a part. It also contributed greatly to their meager social activities and entertainment.

I am greatly indebted to the University of Pennsylvania for their aid in carrying out this study through the generous loan of recordings by Dr. Frank Speck. The Peabody Museum of Salem, Massachusetts also gave courteous consideration in making available a recording machine as well as the use of the Adney material in their collections. I found the Indians interested and willing to cooperate by furnishing information. It was with deep regret that I learned of the death of Governor William Neptune in April of 1953. While preparing this paper the news arrived of the death of Gabriel Polchie. Without the goodwill of these two men I could not have gathered the information upon which the paper is based. These were men, proud of their Indian heritage, and eager to teach those who showed genuine interest in the subject.

The last evening I spent with Gabe I had taken a Penobscot boy of about 15 along with me. When we had finished going over a few dances, it was quite late, and the lad said, "I didn't think that we could have so much fun right here on the island." A helpful Malecite informant, Molly Francis is very ill. Although these people are passing away, there is still much interest in the old dances.

Danforth, Maine

October 1954.
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*Note: Pote's story may also be found in MacMechan, Archibald, Red Snow on the Grand Pre, McClelland and Stewart, Toronto, 1931, pp. 106-107. The original publication edited by V. H. Paltsits is an extremely rare and valuable work.
PROPOSED METHOD OF DATING TOOL MARKS IN STONE

By Melvin V. Landon

Stone structures of unknown date often contain tool marks or quarry marks in the undressed stone. Conceivably these tool marks provide a clue to the age of the structure. Yet little or nothing has been done toward reading these clues. While considerable work has been done on the theory of weathering, I have been unable to find a single reference to dating structures of stone. The work is far from complete or conclusive, but it does open up some possibilities.

Without going into the theory of weathering, which is not necessary for the application of this method, it is perhaps well to remember that weathering is a two fold process; chemical and physical erosion. The chemical erosion consists of a complicated series of oxidations and hydrations. Air and water act independently on the constituents of the stone. This is because most stone is a mixture of several minerals. The physical erosion consists of wind erosion and the effects of freezing and thawing of surface water.

The process of weathering is a subtractive process in as much as the material is removed, destroying the original surface and hence the origin of any measurements. It is this aspect of weathering which has prevented its being used in dating structures. However, there is one matter which has been overlooked, as far as I can ascertain. In wearing away of the stone, the corners are worn away faster than the flat surfaces. It is this that provides a workable tool.

In Fig. 12 let AB and BC represent two stone surfaces meeting in a sharp right angle at B. Let W be the amount of stone weathered away. Then AB and BC are the new surfaces after weathering. But, point B is exposed on two sides and hence the weathering is twice as rapid as on AB or BC, resulting in a curved surface with radius R. This is only true if R is small, but as will be seen later, in practice R is extremely small. OB is then seen to be made up of R plus 2W. Applying the Pythagorean theorem:

\[(R+2W)^2 = 2(R+W)^2\]
\[R+2W = (R+W) 2\]
\[(2-1)R = (2- 2)W\]
\[R = W 2\]
\[W = R 2\]

\[\therefore \ W = R 2\]

Assuming that the average rate of weathering for New England has been fairly constant since colonial times, then the total amount of weathering and also the radii are in direct proportion to the time of weathering. In practice all we need to do is measure the radii of marks in a structure of known date and compare with marks in the same kind of stone in the same locality of unknown date and the problem is one of simple arithmetic.

In practice it is not as simple as this. Certain rigid conditions must be met. The history of the edges must have been the same. The stones must have been exposed continuously to the air and sun in the same manner, or must both have been buried throughout their life in the same kind of soil with approximately the same moisture content. We must be certain the original edge was sharp. Furthermore, in studying any structure, it is necessary to find a suitable control. This might perhaps be done with the aid of nearby tombstones or structures of known date.

At this point I was very fortunate in discovering an abandoned quarry on the property of Mr. Adden Major, Mammoth Road, Dracut, Massachusetts. In this quarry there were two distinct types of tool marks; one the old iron wedge type, the other the more modern plug and feather type. Even the most casual observation showed that the wedge type was much more weathered than the plug and feather type. Since this was a native (biotite) granite and quite hard, the total weathering was small, keeping R within theoretical limits.

I measured the radius of curvature of some thirty odd of these marks which seem to have had a similar history. They were all in stones that had
PROPOSED METHOD OF DATING TOOL MARKS IN STONE

been continuously exposed to air, and as far as possible in the side of the rock rather than on top, though this was not always possible. In no case was the radius of the curvature of the wedge marks less than $\frac{5}{64}$ of an inch or the drill marks over $\frac{5}{64}$ of an inch.

Much of the stone was used locally and in structures which can be dated with fair accuracy. It is known to the older inhabitants of Dracut that no quarrying was done after 1875, but that a barn was built using posts from the quarry shortly before 1875. These posts have the drill marks. When the old canal in Lowell was rebuilt about 1824, only drill marks appear in the stones. However, the original canal was built with stones split by wedging. This is shown by the presence of meager traces of wedge marks in the foundations of St. Anne's Church, Lowell (1824). It is also mentioned in histories of the period as the method of splitting stone in use as late as 1817. Thus we see that the period of quarrying with drills (plug and feathering) came in use about 1825.

It would seem then that a radius of $\frac{5}{64}$ inches represents cuts made about 1825, since no drill mark has a larger radius and no wedge marks has a radius less than this.

The foregoing discussion is based on a survey of all of the tool marks available in the quarry. Let us examine a single stone, presumably quarried at one time. In this particular stone there are thirteen holes, wedge shaped. The following statistics summarize the study of the stone.

| Number of Marks | 13 |
| Maximum Radius | $\frac{11}{64}$ inches |
| Average Radius | 8.1 |
| Median Radius | 8.0 |
| Standard Deviation | 1.8 |
| Uncertainty | 1.2 (0.67 times standard deviation) |

If then $\frac{5}{64}$ represents 125 years, then the age of this stone is $\frac{8}{5}$ times 125 or 200 years plus or minus about 25 years. This carries us back to about 1750 with perhaps the earliest date 1725 and the latest 1775.

This early date can be checked roughly by the occurrence of stones bearing the identical tool marks in the cellar hole of a house some three hundred yards from the quarry. This house was built about 1750. While this is the only house that I have as yet been able both to date and link with the quarry, there was great activity locally in house building and quarried stone was extensively used about this time.

While data in this case is perhaps meager and it may be argued that it is not conclusive, it does offer possibilities and it is to be hoped that other cases may be found in which the method may be applied and further developed by such application.

NOTE ON THE NORTH SALEM, NEW HAMPSHIRE SITE

This has been extensively examined and written up by Goodwin and others. Goodwin spins some fanciful tales about the tool marks and other features found there. I felt on examining the site that the only hope of settling the question of the origin of the site was in finding objective, internal evidence overlooked by Goodwin. The foregoing method of tool mark dating was developed for this purpose. By an ironic turn of fate so common in investigations of this sort, the method was found to be inapplicable to this site.

However, some interesting facts emerged from a study of the tool marks. The wedge shaped marks found in the "Y carvern" which Goodwin traces to Italy and South America, I found common in that area as discussed in the main part of this report.
In a stone a few feet south east of the Plaza, there are three holes drilled completely through and about 1¼ inches in diameter. One of these has 1½ inch square depression at the opening. This just fits a 1 inch or 1½ square nut (American Standard) allowing 3/16 to ¼ inches wear. The hole (1¾ inch diameter) is of a size consistent with a 1 inch bolt, allowing for wear.

I believe that these holes were anchors for a small crane very commonly used for stone loading at the time the site was used for a quarry about 1840(10).

This does not date the site, but it disposes of the tool marks as an argument for any ancient origin of the site.

North Berwick High School
North Berwick, Maine
September 1954.

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2. I am indebted to Miss Edna Cutter, Mammouth Road, Dracut, Cass, for this information.
3. On the old Mills farm, Collinsville section, Dracut, Mass.
5. Coburn, p. 156.
10. Goodwin, p. 179.