RETHINKING PALISADES IN THE NORTHEAST: EVIDENCE FROM THE EATON SITE

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Eaton is a multicomponent site located in western New York. The major component consists of an Iroquoian village dating to the mid-sixteenth century. There is a high ratio of expedient lithic tools to debitage in the area of the palisade. We explore possible explanations for this distribution and discuss the implications for the construction and maintenance of a palisade.

Le site Eaton, dans l'ouest de l'État de New York, est constitué de composantes multiples dont la principale consiste en un village iroquoien datant du milieu du XVIe siècle. Dans le secteur de la palissade, on retrouve un ratio élevé d'outillage opportuniste par rapport au débitage. Les auteurs explorent les causes de cette distribution et discutent des implications possibles dans la construction et le maintien de la palissade.

INTRODUCTION

The Eaton site (Buf 2-4) is located in West Seneca, New York, on a knoll adjacent to Cazenovia Creek (see Figure 1). In the 1960s, part of the northern portion of the site was destroyed by gravel mining operations. The eastern portion of the site was destroyed in the early 1970s by the construction of a building. The site is listed on the National Register of Historic Places and the Archaeological Conservancy now owns the major surviving portion of the site. The site was plowed from the mid-nineteenth through the mid-twentieth centuries, during which time it was surface collected by many individuals. In the 1960s and early 1970s, members of the Houghton Chapter of the New York State Archaeological Association conducted excavations on the site. Beginning in 1975, Engelbrecht directed 17 summer archaeological field schools on the site through 2000. Eight of these field schools were for Buffalo State College, three were for SUNY Buffalo, and six were joint Buffalo State–SUNY Buffalo field schools. These field schools resulted in the excavation of 257 2-m-x-2-m units. All soil from these units was passed through ¼-in mesh screens.
The major component at Eaton is an Iroquoian village dating to approximately A.D. 1550. The village was presumably occupied by ancestors of the Erie (Engelbrecht 1991). No European material has been found that can be securely associated with this occupation. Occupation of the site spans the period from late Paleoindian to the present. Smith et al. (2010) discuss the late Paleoindian component on the site, while Engelbrecht et al. (2008) discuss an artifact from the early-nineteenth-century Buffalo Creek occupation. Publications on the Iroquoian component include Engelbrecht (1994), Salisbury (2001), O’Donnell (2003), and Jenkins (2004). The pre-Iroquoian occupations are defined on the basis of 84 diagnostic projectile points. These points are widely distributed but tend to be concentrated in the southwestern portion of the excavated area. In contrast, 547 complete Iroquoian (Madison) points were found across the excavated area. Seventy percent of the non-Iroquoian points and 88% of the Iroquoian points were recovered from the plow zone.

Major portions of three longhouses were uncovered during excavations. The most complete is the southwestern longhouse, extending over 34 m along the edge of the knoll (O’Donnell 2003). Post mold evidence for five palisade rows was uncovered in eight contiguous units at the northern end of the site (Engelbrecht 2009:181, Fig. 8.1).
The Eaton Database Project

Upon Engelbrecht’s retirement in 2003, he began reorganizing material from the site to resolve errors, to assign material to more detailed artifact categories, and to create a comprehensive digital database of material. All bags of debris were reexamined for utilized flakes, tools, and tool fragments, and retouched specimens. Jack Holland of the Buffalo Museum of Science was regularly consulted during this process. Additionally, Marie-Lorraine Pipes has completed a faunal analysis for all of the field school units.

The initial sorting and classifying phase is complete and data have been transferred to a relational database using Microsoft Access. The database is linked to a GIS platform to allow spatial analyses of artifact categories. The Access tables and supporting documentation may now be viewed under “The Eaton Project” on The Digital Archaeological Record (tDAR).

The following categories have been created for the Microsoft Access tables: debris; core fragments; utilized flakes; utilized core fragments; cores; exhausted cores; stage 2, 2.5, 3, 3.5, and late stage biface preforms (an elaboration of Callahan [1979]); biface fragments (unknown stage); broken scrapers; whole scrapers; broken endscrapers; whole endscrapers; notches (spokeshave scrapers); broken knives; whole knives; drills; points; point tips; point bases; point mid-sections; multipurpose tools; tool fragments (indeterminate function); ground stone tools used in (a) grinding, (b) pounding, (c) chopping, and (d) smoothing; pottery sherds; pipes and pipe fragments; and fire-altered rock (kilograms). Counts for these categories have been entered for each level and unit. Debris, utilized flakes, core fragments, and utilized core fragments are discussed here.

Debris and Utilized Flakes from Eaton

Chert debris (debitage) includes whole and broken flakes and pieces of shatter. This category does not include larger “chunks” of chert, arbitrarily defined as specimens greater than 2.5 cm x 2 cm x 2 cm. These are curated separately and tabulated as core fragments. The total debris count from the units excavated by field schools is 335,433 pieces. This number consists of material from the pre-Iroquoian components as well as from the Iroquoian village. No estimate is available at this time of the relative proportion of debris pertaining to the pre-Iroquoian components.

Utilized flakes are the most common stone tools on most Iroquoian sites (Timmins 1997:115), yet their distribution on these sites is largely unreported. Utilized flakes are an expedient tool form in which the edge of an unmodified flake exhibits use wear. Changes to the edge of a flake can result from various deliberate human actions such as scraping, slicing, sawing, chopping, engraving, drilling, and puncturing. These actions result in either abrasion (edge rounding, polish, striation) or microfractures (scars) on the edge of the flake (Shen 2000:71). The flakes identified in this study as utilized generally exhibit microfractures.

This study does not record the presence of more than one area of use wear on a flake, nor does it attempt to determine the type of use to which a flake was put. The vast majority of utilized flakes at Eaton appear to have been used for cutting or scraping. An attempt to use high-powered microscopy to determine the type of material on which any of the utilized flakes might have been used is beyond the scope of this study. The location of use wear on a flake is not recorded except (a) in notches and (b) on flake projections. Flakes showing evidence of use wear in a notch are counted in the “notch” (spokeshave) tabulation, along with notches formed by retouch and are not counted in the utilized flake tabulations. Similarly, flakes showing use wear on natural projections are combined with flakes exhibiting retouch to form similar projections. These are tabulated under the category of “drills/awls/gravers/perforators.” The distribution of notches, gravers, and other tool forms will be considered in a later study.
We examined each piece of debris that appeared to exhibit edge wear using a 10x hand lens. Plowing, trampling, excavation, rough handling, and other postdepositional processes can modify the edge of flakes (Andrefsky 1998:75; Shen 2000:67). This argued for a conservative approach to flake microwear identification. Rather than identifying a flake as utilized on the basis of three or four contiguous microflakes, we expected all or most of the working edge of a flake to be modified. Flakes with irregular or minimal modification were regarded as exhibiting edge damage and were placed in a separate bag within the debris for that level and unit, and were counted as debris. A total of 3,085 flakes with use wear were identified. If there is a bias in this study, it is in underrepresenting cases of use wear rather than overrepresenting them.

DISTRIBUTIONS

The vast bulk of material recovered from the Eaton site was recovered from the plow zone (Level 1 and Level 2 combined). Level 1 was excavated to a depth of 15 cm and Level 2 was excavated to the base of the plow zone, generally encountered at a depth of approximately 25 cm. One concern was that flakes with edge damage from plowing or animal trampling might be mistakenly identified as utilized. However, the percentages of total debris and total utilized flakes found in the plow zone were similar, suggesting edge damage occurring to flakes from plowing or trampling was not confused with utilization. A total of 83.5% of debris (N=280,283) and 86.9% of all utilized flakes (N=2,682) was recovered from the plow zone. If damage from plowing or animal trampling were mistakenly interpreted as use wear, one would expect a higher percentage of flakes identified as “utilized” in the plow zone.

The effect of plowing on archaeological sites is debated. Some studies suggest that general spatial patterning of material typically survives repeated plowing, though the patterning may not be as clear (e.g., Trubowitz 1978; Hoffman 1982; Diez-Martin 2010). However, other studies (Odell and Cowan 1987; Navazo and Díez 2008) note the destructive influence of plowing on spatial patterning. We suggest that each plowed site is unique in terms of tillage history and material distribution, so the degree of disturbance should be assessed on a site-by-site basis, where possible. The distribution of debris and utilized flakes relative to the Iroquoian features of longhouses and palisade (totals for Levels 1–4) are presented in Figures 2 and 3 and will be considered with this issue in mind.

The average amount of debris per 2-m-x-2-m unit on the site is approximately 1,305, while the average number of utilized flakes per unit is approximately 12. Units that fall within a longhouse have slightly less debris and fewer utilized flakes than units that are outside (see Table 1).

Two possible explanations for this tendency are (1) cleaning activities removed material from inside longhouses, and (2) activities that produced both flakes and utilized flakes more often occurred outside longhouses. A striking example of the tendency for more artifacts to be located outside longhouses is observable with the distribution of potsherds (Engelbrecht 1994:7). Potsherds at Eaton are exclusively Iroquoian and therefore more clearly reflect the Iroquoian distribution pattern. An unknown quantity of chert debris and utilized flakes dates to pre-Iroquoian components, potentially muting the distribution pattern of Iroquoian debris and utilized flakes.

An area immediately to the north of the third longhouse from 48N to 60N, consisting of 10 excavation units, contains a high concentration of both debris and utilized flakes. The average debris count for these units is 1,877 and the average number of utilized flakes per unit is 28.7, the latter more than twice the average for the site. One unit, 50N 1W, yielded a total of 48 utilized flakes, the most on the site. Possible explanations for this concentration of material will be the subject of future research.
Figure 2. Distribution of debris.
Figure 3. Distribution of utilized flakes.

Table 1. Longhouse Location and Unit Averages.

<table>
<thead>
<tr>
<th></th>
<th>Inside Units</th>
<th>Partial Units</th>
<th>Outside Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debris</td>
<td>1261</td>
<td>1197</td>
<td>1367</td>
</tr>
<tr>
<td>Utilized Flakes</td>
<td>10.6</td>
<td>11.8</td>
<td>12.9</td>
</tr>
</tbody>
</table>
The average amount of debris for palisade units was only 453, much lower than the average for the site as a whole (1,305). On the other hand, the average number of utilized flakes in these same units was 13.5, more than the average for the site. Neither debris nor utilized flakes appeared to be spatially clustered within these units.

The relatively high ratio of utilized flakes to debris in the area of the palisade is illustrated by Figures 4 and 5 (based on Levels 1–4) and the ratios presented in Table 2. In general, ratios are highest in the northern portion of the site. Units with the highest ratios in the southern portion of the site are partial units (those containing a longhouse wall).

The ratio of utilized flakes to debris in the eight palisade units is derived from 108 utilized flakes and 3,627 pieces of debris. If just material recovered from the subsoil of these units is considered, the ratio is 1:16 (7 utilized flakes to 111 pieces of debris), an even higher ratio, albeit based on a much smaller sample. The ratio of utilized flakes to debris in the four units north of the palisade is 1:25 (45:1130); however, if just material recovered from below the plow zone of these units is considered, the ratio is 1:13 (2:26). While patterning in the plow zone and below the plow zone both reveal a high ratio of utilized flakes to debris compared with the rest of the site, the highest ratios are found below the plow zone.

Both the debris and the utilized flakes from the eight palisade units were subject to mass analysis (Ahler 1989). Since ¼-in mesh was used in artifact recovery, the smallest size grade was ¼ in, followed by ½ in, ¾ in, and 1 in (Table 3). While the size of the vast majority of debris recovered (83.7%) was between ¼ and ½ in, utilized flakes were generally larger, with 18.5% being too large to pass through a 1-in-x-1-in opening. Almost every flake over ½-in in size recovered from these units was utilized.

The distribution of core fragments and utilized core fragments on the site was also examined. For the site as a whole, there were, on average, 11 core fragments per unit, but for palisade units, there were only 3 on average. However, a much higher percentage of these (over ⅓) were utilized (see Table 4).

The presence of lithic material from the pre-Iroquoian occupations complicates the study of debris and utilized flake distributions resulting from the Iroquoian village. However, the palisade roughly marks the northernmost portion of the site, and we argue that, in this area, Iroquoian distribution patterns are clear. Immediately north of the palisade, the quantity of cultural material decreases significantly. Since the Iroquoian palisade would have had no bearing on the location of pre-Iroquoian occupations, the general lack of cultural material north of the palisade suggests the absence of pre-Iroquoian occupations in the palisade area. While a total of nine complete Iroquoian points were recovered from the eight palisade units, the nearest non-Iroquoian point, a Lamoka point, was found 10 m to the south. The next nearest non-Iroquoian point, a Saugeen point, was 34 m south of the palisade. The general lack of material north of the palisade and the distribution of Iroquoian and non-Iroquoian points suggests that the debris, utilized flakes, core fragments, and utilized core fragments found in the palisade units relates to the Iroquoian village occupation and not earlier components.

DISCUSSION

Why is there a high ratio of expedient tools to debitage by the palisade? Compared with other areas of the site, there is a general lack of lithic debris, including core fragments, suggesting that this was not an area where stone tools were regularly manufactured or lithic debris discarded. Since debris and utilized flakes are scattered throughout the palisade units, rather than clustered, these materials are unlikely to have originated from palisade structures, such as a watchtower. At present,
Figure 4. Utilized flake total divided by debris total for each unit.

Palisade construction is known, while possible subsequent activities remain conjecture. We therefore focus on the possible use of flakes and core fragments in the Iroquoian tool kit during (1) the preparation of materials for the palisade, and (2) its construction and maintenance.

It is commonly assumed that saplings or small tree branches were woven between palisade poles (Heidenreich 1971:140, Ritchie and Funk 1973:259). Champlain (1967 v.2: opposite 220, opposite 241) illustrates palisades around temporary Iroquois camps using branches. Branches trimmed from trees used for palisade poles could have been used for this purpose. However, it is also possible that interwoven branches were just used for fortifying temporary camps and that palisades around villages instead made use of bark sheets to prevent enemies from slipping between palisade poles.
Between June of 1623 and the fall of 1624, Gabriel Sagard described Wendat (Huron) villages enclosed by palisades:

"Others are fortified by strong wooden palisades in three rows, interlaced into one another and reinforced within by large thick pieces of bark to a height of eight or nine feet, and at the bottom there are great trunks of trees placed lengthwise, resting on strong short forks made from tree trunks. (Sagard 1968:91)."

Lafitau (1977:16) echoes Sagard’s description of palisades as “reinforced throughout by heavy, thick bark to the height of ten or twelve feet.”

Bark could have been harvested from palisade poles either where the tree grew or at the construction site. Callahan (1981:335) suggests that bark should have been harvested where the tree was felled to eliminate damaging the bark while the tree was transported. Once the branches were trimmed away, the poles could then be rolled to facilitate harvesting bark. Speck (1940:122) describes the Penobscot rolling felled birch trees to harvest bark. The felled tree was supported on logs and a slow fire set under it and warm water poured over it to facilitate bark removal. Axes, large flakes, or core fragments could have made the initial cut through the bark. Chisels of wood, bone, or antler would have been needed to help pry the bark from the tree or pole (Rogers and Hamell 1995).
Table 2. Ratios of Utilized Flakes to Debris.

<table>
<thead>
<tr>
<th>Area</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio for all units</td>
<td>1:108</td>
</tr>
<tr>
<td>Ratio for units outside the longhouse</td>
<td>1:106</td>
</tr>
<tr>
<td>Ratio for partial units</td>
<td>1:102</td>
</tr>
<tr>
<td>Ratio for units inside the longhouse</td>
<td>1:119</td>
</tr>
<tr>
<td>Activity area north of the third longhouse</td>
<td>1:65</td>
</tr>
<tr>
<td>Palisade</td>
<td>1:34</td>
</tr>
</tbody>
</table>

Table 3. Size Grade Percentages in Palisade Units.

<table>
<thead>
<tr>
<th></th>
<th>vier in</th>
<th>½ in</th>
<th>¾ in</th>
<th>1 in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilized flakes (N = 108)</td>
<td>16.6%</td>
<td>36.1%</td>
<td>28.7%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Debris (N = 3627)</td>
<td>83.7%</td>
<td>13.8%</td>
<td>1.2%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Table 4. Distribution of Core Fragments and Utilized Core Fragments.

<table>
<thead>
<tr>
<th></th>
<th>All Units</th>
<th>Palisade Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core fragments</td>
<td>2855</td>
<td>25</td>
</tr>
<tr>
<td>Utilized core fragments</td>
<td>361</td>
<td>9</td>
</tr>
<tr>
<td>Utilized/nonutilized</td>
<td>.13</td>
<td>.36</td>
</tr>
</tbody>
</table>

While sheets of bark from palisade poles could have been used, larger sheets of bark could have been obtained from the “great trunks of trees placed lengthwise” described by Sagard. Large sheets of bark for both longhouse and palisade construction could also have been obtained from mature trees that were girdled during the process of creating horticultural plots. Bark is best harvested when sap is rising and the precise time varies both by species and by microclimate (G. Hamell, 2010, personal
communication). The importance of bark to Iroquoians is reflected in a seasonal reference: “When the bark is being peeled from the trees” (Parmenter 2010).

After harvesting, the rough outer bark was removed and the bark sheets flattened and stacked for future use (Lafitau 1977:20). Speck (1940:122) states that the Penobscot used a knife to remove rough outer birch bark, but in earlier times they used a sturgeon scale as a scraper. If bark were used in the palisade at Eaton, then flakes and core fragments could have been used in cutting and scraping it. More complex stone tools would not be necessary for these tasks.

Once the bark sheets were dried and flattened, being placed lengthwise on the palisade would work against their natural tendency to curl. However, in that position, bark does not shed water the way it would if placed vertically the way a tree grows, perhaps explaining why the rough outer bark was removed (Hamell, 2010, personal communication). Awls of bone or antler could have been used to punch holes in bark so that it could be fastened to the palisade (Gates St-Pierre 2010:81). Stone awls could also have been used, and Regan (1928:232, cited in Moerman 1998:563) notes the use of oak awls among the Chippewa to punch holes in bark.

The average diameter for the 82 palisade post molds recorded at Eaton was 13.8 cm. While there is evidence that post hole diameters are greater than the diameters of the posts themselves, for the sake of argument, this number is used in the following exercise. A diameter of 13.8 cm yields a circumference of slightly less than 43 cm. If 3 m of bark were taken from an average palisade pole, it would yield a piece of bark 43 cm x 300 cm. At Eaton, over a 3-m distance, there are, on average, eight palisade post molds in a row. If eight bark sheets, 300 cm long x 43 cm high, were laid above one another lengthwise, like shingles, they would reach a height of slightly less than 344 cm or approximately 10.5 ft. This is close to Sagard’s 8- to 9-ft estimate for the height of bark on a palisade and within Lafitau’s estimate of 10–12 ft.

In reconstructions of Iroquoian villages, palisade poles are typically bark covered. Given the usefulness of bark, this seems unlikely. The same would hold true of poles used in longhouse construction. Further, it can be argued that if bark were peeled from poles, the poles would last longer, as they would not be subject to insect infestation between the wood and the bark and would be more resistant to decay (Rogers and Hamell 1995).

The historic literature is largely silent on the possible function of bark in palisades. Both Sagard and Lafitau’s references to “thick bark” imply that it served as a barrier, and Keener (1999:781) refers to bark on the interior of palisades as strengthening them. Rogers and Hamell (1995) compare flattened and dried elm bark to plywood, stating it is “quite strong.” Bark of species with a high fiber content such as hickory is the strongest; however, even these are generally not as strong as wood (Bowyer et al. 1996:163). Sagard referred to bark as being “within,” so it would not have been the first material encountered by attackers. If attackers penetrated the interior of a palisade, bark within the palisade could have limited their escape routes. Roscoe (2008) argues that in contact-era New Guinea, attackers trapped inside fortifications could then be annihilated, this possibility creating a deterrent against attack.

An additional explanation for the presence of bark is that it served as a visual barrier. A nearly universal function of defensive barriers is that they obscure vision (Keeley et al. 2007). The inability of an enemy to see inside a village would hide the position and strength of the defenders, putting the attackers at both a tactical and psychological disadvantage. If attackers breached the palisade, not being able to see the village layout beforehand would also have put them at a disadvantage. Attackers could have been confronted by additional obstacles, such as a cordon or a longhouse wall, blocking easy access to the rest of the village and creating potential traps (Wright 1974:5; Finlayson 1985:407, 1998:20; Engelbrecht 2009:182).

Reid (1975:7) argues that palisades served both as windbreaks and snow fences. The sturdiness of most palisades and the obvious effort expended in their construction argues for defense as their
primary function (Engelbrecht 2003:99; 2009:180). However, the addition of bark on the inside of a palisade could have enhanced a secondary function as a snow fence or windbreak.

In addition to cutting and scraping bark, expedient tools could have been used in procuring and cutting both fiber and bark strips used in tying palisade components together. In building traditional Pamunkey houses, Callahan (1981:197–201) found flakes were useful for a variety of tasks, including cutting bark strips and cordage. Bark sheets could have been attached to the palisade with bark fiber cordage and braced with small poles. Any superstructure, such as a watchtower or gallery, would have needed to be tied together using cordage or bark lashing. Basswood, elm, maple, willow, and a number of other trees provide useable fiber for cordage. Basswood fiber is generally said to be the strongest (Lee 1982). In Virginia, Callahan (1981:322) found walnut bark cordage to be strong after two years of weathering. Morgan (1962:366) described three-ply bark rope formerly used by the Iroquois.

Iroquoian women are generally assumed to have been responsible for cordage production. In a Seneca legend, a man who lived alone returned to his empty lodge, when, “on discovering a partially finished braid of fibers of bark, he knew that a woman had been at work” (Curtin and Hewitt 1918:362). In another legend, a woman is described as “making bark thread by rolling it on her legs” (Curtin and Hewitt 1918:408). Even if women made bark fiber cordage away from the palisade, bark fiber could have been secured from branches and poles used in the palisade.

Small branches are best for procuring fiber for cordage (Layton 2006). Flakes could have been used to make incisions in the branch to facilitate peeling off bark strips before these branches were then woven between the upright palisade poles. Chippewa women were observed using their teeth to separate the inner fiber from the outer bark of basswood bark strips (Regan 1928:232, cited in Moerman 1998:562), but, alternatively, this could have been done with flakes. Chippewa wigwam poles were tied together with basswood bark fiber, which produced a tight knot when the fiber was wet, and an even tighter one when the fiber dried and shrunk (Regan 1928:232, cited in Moerman 1998:563). Flakes could have been used to cut off splices in the cordage as well as to cut the cordage used to tie bark and other palisade components in place.

Alternatively, strips of bark could have been used to lash branches and bark in place (Kidder 1999; Rogers and Hamell 1995). Speck (1940:135) describes how Penobscot men gathered strips of inner basswood bark. They first cut through the outer bark with an axe and peeled it off. The inner bark was then separated from the tree with a knife and strips were then pulled off by hand. A knife was used to trim the bark strips to the proper width. Before metal axes and knives, sharp flakes could have been used to initially separate the inner bark from the tree so that it could be peeled off as well as to trim bark strips to the desired width.

The Wendat (Huron) used bark cordage (probably basswood) “for tying and holding the planks and poles of their lodges” (Sagard 1968:240). Sagard states that the cordage used for this construction was not boiled, but that bark strips were boiled when the fiber was used for making ropes and bags. The Chippewa boiled and then abraded inner basswood bark strips to extract fiber (Moerman 1998:563). Before use, the Penobscot boiled bark strips in water containing wood ashes for half a day to make the bark more pliable (Moerman 1998:562). Experimentation reveals that basswood bark boiled with wood ash for 24 hours is soft and pliable (Lee 1982). It is possible that the practice of boiling basswood bark strips and fiber with wood ash was widespread in the Eastern Woodlands, as was the case with boiling maize kernels in a similar solution (Katz et al. 1974:772).

Expedient tools could also have been used in the manufacture of bark containers kept by the palisade to extinguish fires. In 1666, the Mohawk abandoned a village just before French invaders attacked. It was prepared for a siege and included an “abundant supply of water they had provided, in bark receptacles, for extinguishing fires” (JR 50:145). Sagard (1968:91) refers to water being stored in galleries or watchtowers near the top of the palisade. The type of container is not specified by
Sagard, but bark containers near the top of a palisade make more sense than heavier wooden or ceramic ones.

Containers used for the collection of maple sap by the Iroquois provide a possible model for the type of container that could have held water by a palisade. Morgan (1962:370) describes tubs for collecting maple sap made from a piece of bark approximately 3 ft x 2 ft. The rough outer bark was scraped away from each end of the piece to facilitate gathering and tying the ends together to form the container. Morgan notes that these tubs would last for several seasons. Smith (1870:36-37, cited in Kinietz 1965:38) observed mid-eighteenth-century Huron sap tubs in Ohio and said they held about 4 gallons.

When Champlain accompanied a Huron war party in an attack on a central New York Iroquois village in 1615, he describes the palisade system as “well supplied with gutters, placed between each pair of palisades, to throw out water, which they had also under cover inside, in order to extinguish fire” (Champlain 1967 III:131). Champlain also refers to water flowing like a brook when poured on fire set by the palisade (1967 III: 133). The material used for the gutters is not specified, but bark would seem to be the most likely. Smith (1870:36–37, cited in Kinietz 1965:38) described bark tanks for maple sap holding about 100 gallons, suggesting the feasibility of constructing large bark holding tanks for water near palisades.

Both large and smaller bark containers could have been constructed by the palisade, and this would seem particularly likely for large holding tanks. The bark used could have been derived from trees used in palisade construction. Expedient tools would have been appropriate for cutting the bark and scraping off the rough outer bark at the ends of the piece, so that a container could be formed by tying the ends together. Having an abundance of water stored near the palisade must have been critical, given the likelihood of deliberately set fires during an attack and the flammable nature of Iroquoian villages in general.

Five rows of post molds define the palisade at Eaton. Engelbrecht (2003:97) has argued that more than three rows of poles at any one time are unnecessary, so more than three rows probably indicate successive rebuilding of the palisade. If so, then the expedient tools recovered from palisade units would reflect multiple building episodes as well as routine maintenance. Large flakes or core fragments would be needed for cutting rough bark on trees, and there are large expedient tools from the palisade units that are appropriate for this task. Some flakes recovered from the palisade units may have been too small for cutting through rough bark but could have been used for cutting bark on branches, separating the bark fiber layer from adjacent growth layers so it could be pulled off, cutting cordage, and trimming bark strips for lashing.

CONCLUSION

Material from the plow zone dominates the assemblage from Eaton. Consideration of the distribution of debris totals and utilized flake totals from the site indicates a high ratio of utilized flakes to debris in the area of the palisade. When just material from below the plow zone is considered, this pattern is more pronounced though based on much smaller samples. This suggests that at Eaton, the distribution patterns of material has not been obliterated by plowing, but may have become less clear.

Non-Iroquoian points are not found at or near the palisade, making it probable that materials found in this area derive largely from the Iroquoian occupation. The quantity of material falls off dramatically as one moves north beyond the palisade. It is therefore assumed that the bulk of debris, utilized flakes, core fragments, and utilized core fragments by the palisade originated with the Iroquoian occupation, giving us a view of Iroquoian discard patterns not obscured by material from earlier components.
This paper explores the possibility that flakes and core fragments were part of the tool kit used in constructing and maintaining the palisade at Eaton. We do not claim that all utilized flakes and utilized core fragments found in palisade units were used in this manner. Rather, we attempt to explain the relative abundance of these tools in association with this feature. Determining the use of each expedient tool through edge wear analysis is beyond the scope of this study.

We suggest that the use wear on the majority of flakes and core fragments by the palisade resulted from cutting and scraping bark and/or cutting fiber cordage. At this stage of the research, it is not possible to be more specific. Support for these possibilities is circumstantial. Both Sagard (1968:91) and Lafitau (1977:16) describe the use of bark in Iroquoian palisades. Before the introduction of European nails, Iroquoian villages were constructed using cordage and bark lashing. An Iroquoian village was essentially tied together. Bark containers used in the eighteenth and nineteenth centuries for maple sap collection provide possible models for bark tubs and holding tanks for water used to extinguish fires. These bark containers could have been made with expedient tools near the palisade.

We suggest that cutting trees for palisade poles and harvesting bark and bark fiber were likely interrelated activities. The removal of bark is best done in late winter or spring when sap is rising in trees. Actual construction may have occurred later, after cordage and other materials were prepared. The best time to set palisade poles in the ground would have been when it was soft, not frozen as it is in late winter or early spring. Bark sheets for the palisade would need to be flattened and dried after harvesting. Strips of bark for lashing or for fiber extraction were possibly soaked in water or boiled with water and wood ash. The manufacture of bark cordage would also require a period of time. If Iroquoian females were involved with cordage production, as is generally assumed, and cordage was used in the palisade, then both males and females played an important role in palisade construction and maintenance.

Little attention has been paid to the possible function of bark in palisades. Sheets of bark placed within a palisade would have provided a physical obstacle for invaders attempting to enter or escape from a village and would have obscured a view of the interior. The inability of attackers to see inside a village would have provided the defenders with numerous advantages. Cross-culturally, defensive barriers almost always obscure vision of the enclosed area.

This article presents an alternative model to the standard one of Iroquoian palisade construction and use. This rethinking of the structure and function of palisades resulted from our attempt to explain the relatively high proportion of expedient tools recovered in the vicinity of the palisade at Eaton. These explanations are preliminary. A variety of both formal and expedient tools were no doubt used in palisade construction. As the Eaton database project proceeds, the distribution of other artifact categories with respect to the palisade will be examined, including that for scrapers, knives, awls, axes, and ceramic vessels. A use wear analysis of the utilized flakes and utilized core fragments found by the palisade should be undertaken. Experimental archaeology could strengthen or cast doubt on some of the suggestions presented, including the efficacy of bark in palisades for windbreaks and snow fences. Finally, it is hoped this study will stimulate an inquiry into the presence or absence of similar patterns on comparable sites.

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