# UNNOTCHED TRIANGULAR POINTS ON VILLAGE SITES

William Engelbrecht

*Unnotched triangular arrowpoints and point fragments are sometimes found in large numbers on village sites in the Midwest and East. The possible reason or reasons for this are rarely considered. These points were used for both warfare and hunting. An attack on a village with a volley of arrows provides the most obvious explanation for large numbers of points and point fragments. Alternatively, using arrowpoints that detached within their target prey would have resulted in points and point fragments being brought back to a village in meat. These possibilities are considered in explaining the large number of points from an Iroquoian village site in western New York.*

*En pueblos del medio oeste y del este de los Estados Unidos se han encontrado con frecuencia un número elevado de puntas de flechas triangulares sin muesca o fragmentos de ellas, aunque raramente se ha considerado la razón de su presencia en los yacimientos. Estas puntas se empleaban tanto para la guerra como para la caza. Una razón obvia sería un ataque contra un pueblo mediante una lluvia de flechas, lo que explicaría el número y la condición fragmentaria de muchas de las puntas. Otra posible explicación sería que estas puntas de flecha se desprenderían de la carne de la presa de caza una vez transportada al pueblo. Este ensayo analiza ambas posibilidades para explicar la presencia de las numerosas puntas encontradas en un pueblo iroqués localizado en el oeste del estado de Nueva York.*

Triangular arrowpoints are widely distributed across North America after A.D. 1000 (Christenson 1997:132; Kehoe 1966:839). Unnotched triangular points tend to replace notched triangular points (Christenson 1997:134; Jelks 1993:10), and by the Contact period notched triangular points are absent in much of eastern North America (Christenson 1997:132). Small, thin, unnotched triangular points known as Madison points and related variants occur in the Midwest and East (Justice 1987:224–227; Ritchie 1971:33–34). These are sometimes found in large numbers on village sites and are likely the triangular points that Wilson noted as occurring "in great profusion" on some sites (1899:910).

Table 1 lists some sites with large numbers of Madison points, including Hoxie Farm in Illinois with 4,797 points, Cameron (Oneida) with 1,402 points, Pompey Center (Onondaga) with 1,200 points, and Richmond Mills with 1,187 points. The numbers given should be taken as minimum ones since most of the sites listed have been only partly excavated. In most cases, an unknown number of additional points have been recovered from these sites. While the dating of most of these sites is approximate, the majority listed date to the sixteenth century.

Levanna points, the larger unnotched triangular precursor to Madison points, are not found in similarly large numbers on sites. Levanna points date between approximately A.D. 900 and A.D. 1350, a time period in the Northeast when large nucleated villages are not yet in existence (Hart and Means 2002:351). Large numbers of triangular points appear to be restricted to village sites. Occasionally male skeletons have been found with numerous Levanna points embedded in them. For example, at the McNair site south of Rochester, New York, 38 Levanna points were found in the thoracic region of a male skeleton (Ritchie 1947:73). While finds such as this are typically interpreted as "overkill" (Keeley 1996:102), they may also represent the arrow sacrifice of individuals (Engelbrecht 2003:38–42).

The reason for the presence of so many small triangular arrowpoints on some village sites has

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Table 1. Some Sites with Large Numbers of Points.

| Site | State/ Province | Affiliation | Age Range (A.D.) | Number of Points | Reference |
|---|---|---|---|---|---|
| Otstungo | New York | Mohawk | 1500–1525 | 192 | Snow 1995:132 |
| Klock | New York | Mohawk | 1540–1575 | 165 | Funk and Kuhn 2003:37 |
| Cameron | New York | Oneida | 1590–1610 | 1,402 | Pratt 1976:254 |
| Pompey Center | New York | Onondaga | 1610–1630 | 1,200 | Bradley 1987:125 |
| Richmond Mills | New York | Seneca | ca. 1540 | 1,187 | Parker 1918:18 |
| Cameron | New York | Seneca | 1575–1595 | 344 | Wray et al. 1991:297 |
| Cleveland | Ontario | Neutral | ca. 1540 | 224 | Noble 1978:158 |
| Hamilton | Ontario | Neutral | 1645–1655 | 216 | Noble 1978:158 |
| Johnston | Pennsylvania | Monongahela | 1430–1470 | 341 | Dragoo 1955:112 |
| South Park | Ohio | Whittlesey | 1550–1620 | 491 | Brose 1994:98 |
| Fort Meigs | Ohio | Upper Mississippian | ca. 1450 | 524 | Rutter 1984 |
| Hoxie Farm | Illinois | Upper Mississippian | late fourteenth/ early fifteenth centuries | 4,797 | Jackson 2003 |

not been widely discussed in the literature. Noel Justice writes: "Most prehistoric projectile points were discarded or lost during work and maintenance activities at camps and villages" (1987:5). However, it seems unlikely that hundreds of Madison points would be lost, and it is unclear why so many would be discarded. In considering the large number of Madison points on Richmond Mills (a Seneca site), Arthur C. Parker suggested deliberate discard: "The bear is pleased that the instruments of his death are not kept" (1918:36). While this fits with an Iroquoian worldview, there is little ethnohistoric support for this explanation. Phillip Neusius (1996) suggested that the 105 Madison points in the Arthur C. Parker collection from the Ripley site in southwestern New York were grave offerings. However, not all of these points were found in a mortuary context. Also, internments are not typically found within most Iroquoian villages, arguing against grave offerings as a general reason for large numbers of points on village sites.

Ethnohistoric sources suggest that arrows were sometimes shot within a Wendat (Huron) village by those living there. In 1632 Sagard noted: "The usual and daily practice of the young boys is none other than drawing the bow and shooting the arrow" (1939:132 [1632]). During the Wendat Feast of the Dead both men and women shot the bow and arrow within the village for prizes (Thwaites 1896–1901:10:289–291). In 1635 a Jesuit described a ritual in which arrows were shot within a village (Thwaites 1896–1901:10:37, 39; see Engelbrecht 2003:42). One would assume that if unbroken arrows remained attached to the arrow shaft, they would be recovered and reused. Target practice seems an unlikely explanation for the large numbers of whole points on some village sites.

The primary use of arrowpoints was in warfare and hunting. Where both notched and unnotched points were used, it has been suggested that the notched points were used in hunting while the unnotched points were used in warfare, though Christenson (1997:134) notes that this was not always the case. On village sites where there are only unnotched triangular points, these must have been used for both warfare and hunting. Of these two possibilities, warfare would initially seem to be the most likely explanation for large numbers of points on sites. If a village was attacked with arrows or warriors were preparing for an attack by stockpiling arrows, this could result in a large number of points on a site. Hunting, on the other hand, is an activity that occurs off-site.

We can infer warfare from the existence of fortified nucleated villages in the Midwest and Northeast during the Late Prehistoric and early Contact periods. Many sites with large numbers of points are fortified and are also situated on defensible terrain. In the early seventeenth century, Jesuit accounts of Iroquois attacks on Wendat (Huron) villages describe arrows falling like rain or hail (Thwaites 1896–1901:16:149, 19:223, 23:175). Carmody (2003:59) relates the predominance of projectile points on the Oneida Cameron site to external conflict.

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Points used in warfare are often designed to detach from the arrow shaft. This increases the lethality of arrows since they remain in the victim (Christenson 1997:134; Keeley 1996:52; Milner 2005:151; Theler and Boszhardt 2006:445). In reviewing the use of historic-period metal arrows on the Plains, Pyszczyk cites Catlin that arrowpoints used against the enemy were "but slightly glued" (1999:169). The Wenro of western New York were said to excel in removing an arrow from a wound (Thwaites 1896–1901:17:213), from which it can be inferred that arrowpoints of their enemies tended to detach from the shaft. It is possible that the body heat of the victim served to loosen the adhesive used on the point, as was the case with Miwok arrow foreshafts used in hunting (Barrett and Gifford 1933:217; Christenson 1997:137).

However, if arrowpoints detached within their target when hunting, they could have been brought back to the village within the meat. Arrows designed to detach in prey increase the chance that the arrow shafts would be recovered by the hunter for reuse. This would be advantageous as arrow shafts take longer to make than arrows and are bulkier to carry. Points or point fragments would then have been discarded when the meat was processed and eaten in the village.

If large numbers of points on a site reflect warfare, then one would expect large numbers of points to be found by the palisade, where they were either stockpiled or shot. If points were brought back to a village in meat and then discarded, one would expect points to be more common in refuse areas and inside longhouses where meat was consumed. This article examines the distribution of Madison points on a palisaded Iroquoian village to determine if the distribution reflects warfare or discard practices.

## The Eaton Site and Madison Points

The Eaton site (Buf 2–4–New York State Museum, A029-25-0003–New York State Division for Historic Preservation, UB 221–State University of New York [SUNY] at Buffalo) is located in western New York immediately south of the city of Buffalo in the town of West Seneca (Figure 1). The site is located on a silty loam terrace some 17 ft above the floodplain of Cazenovia Creek. The northeastern portion of the site was destroyed by gravel operations in the 1960s, and the eastern portion of the site was destroyed by the construction of a nursing home in the early 1970s. In 1954, before these portions of the site were destroyed, Marian White and Charles Gillette made a topographic map of the site, and White (1961:60) estimated the area suitable for occupation to be .89 ha (2.2 acres). The major surviving portion of the site is now owned by the Archaeological Conservancy.

Between 1975 and 2000, I directed 17 summer archaeological field schools on the site: eight for SUNY Buffalo State, three for SUNY at Buffalo, and six jointly for both institutions (one co-directed with Margaret Nelson). The site was chosen for field school excavation in 1975 in part due to a concern that the site might experience future development. A total of 257 2-$m^2$ units were excavated, representing 12 percent of the .89-ha site area (Figure 2). The site has multiple components, with occupation ranging from Late Paleoindian through the nineteenth century (Engelbrecht 1994, 2009; Engelbrecht et al. 2008; Jenkins 2004; O'Donnell 2003; Poplawski et al. 2012; Salisbury 2001; Smith et al. 2010). The major component is an Iroquoian village dating to the mid–sixteenth century.

Major portions of three longhouses were revealed during the excavations (see Figure 4). The southwestern longhouse (LH 1) is the most complete, extending more than 34 m in length. The southeastern longhouse (LH 2) appears to be longer, but the ends have not been defined. The western end of the northern longhouse (LH 3) has not been excavated, but 29 m of the eastern portion of the structure have been exposed.

Twelve meters of a five-row palisade were uncovered on the northern periphery of the site. More than three rows of poles at any one time is probably unnecessary, so the five rows at Eaton suggest successive rebuilding of the palisade (Engelbrecht 2003:97). The northern site area is characterized by a gentle slope and is the least defensible portion of the site. Evidence for a palisade along the steep western edge of the site is inconclusive.

The current model of Iroquoian settlement suggests that small Iroquoian villages coalesced to form larger villages in the late fifteenth and sixteenth centuries. These larger villages period-

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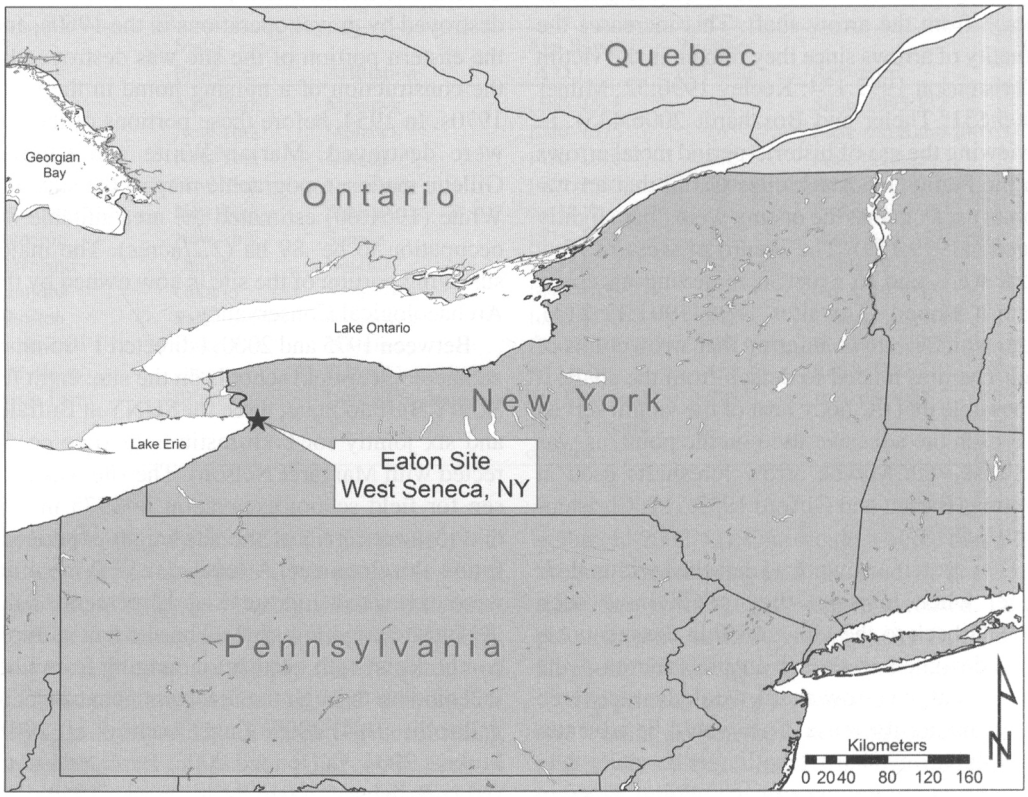



**Figure 1. Location of the Eaton site in West Seneca, New York.**

ically relocated every 10 to 30 years depending on their size and the availability of local resources. Eaton is believed to be the second in a series of village sites that represent the successive locations of a community. About 10 mi to the east, there was a second village sequence. The first village site in that sequence is Newton-Hopper, believed to be roughly contemporaneous with Eaton. Following Tuck (1971:215), the phenomenon of villages moving near one another may reflect alliances between these villages and the beginning of Iroquoian nations. The ethnic identity of the individuals at Eaton is not known. Their descendants may have formed a component of the seventeenth-century Erie Confederacy, or they may have been Wenro or a component of the Neutral Confederacy (Engelbrecht 1991). The Seneca, some 50 mi to the east, referred to the people in the Niagara Frontier region of western New York as Kahkwa (Pendergast 1994).

Upon my retirement in 2003, I began reorganizing and tabulating material from the Eaton site. The distributions of whole Madison points, Madison point fragments, and Madison point refits are listed in Microsoft Access tables uploaded to the Digital Archaeological Record under "The Eaton Site Project." Also listed in tables are the distributions of various preform stages, debris, cores and core fragments, various scraper types, ground-stone tools, ceramic sherds, and other artifacts. Geographic information system distribution maps for these artifact categories have also been uploaded. Marie-Lorraine Pipes (2009) completed a faunal analysis for all the field school units, which has also been uploaded to the Digital Archaeological Record.

A total of 516 whole Madison points were recovered during the field school excavations. See Figure 3 for an illustrative sample and Figure 4 for a distribution map. Eight of these points were surface finds on the eroding slope of the terrace on which the site is located and lack precise provenience. The other 508 points come from the 257 2-x-2-m excavation units, yielding an average of

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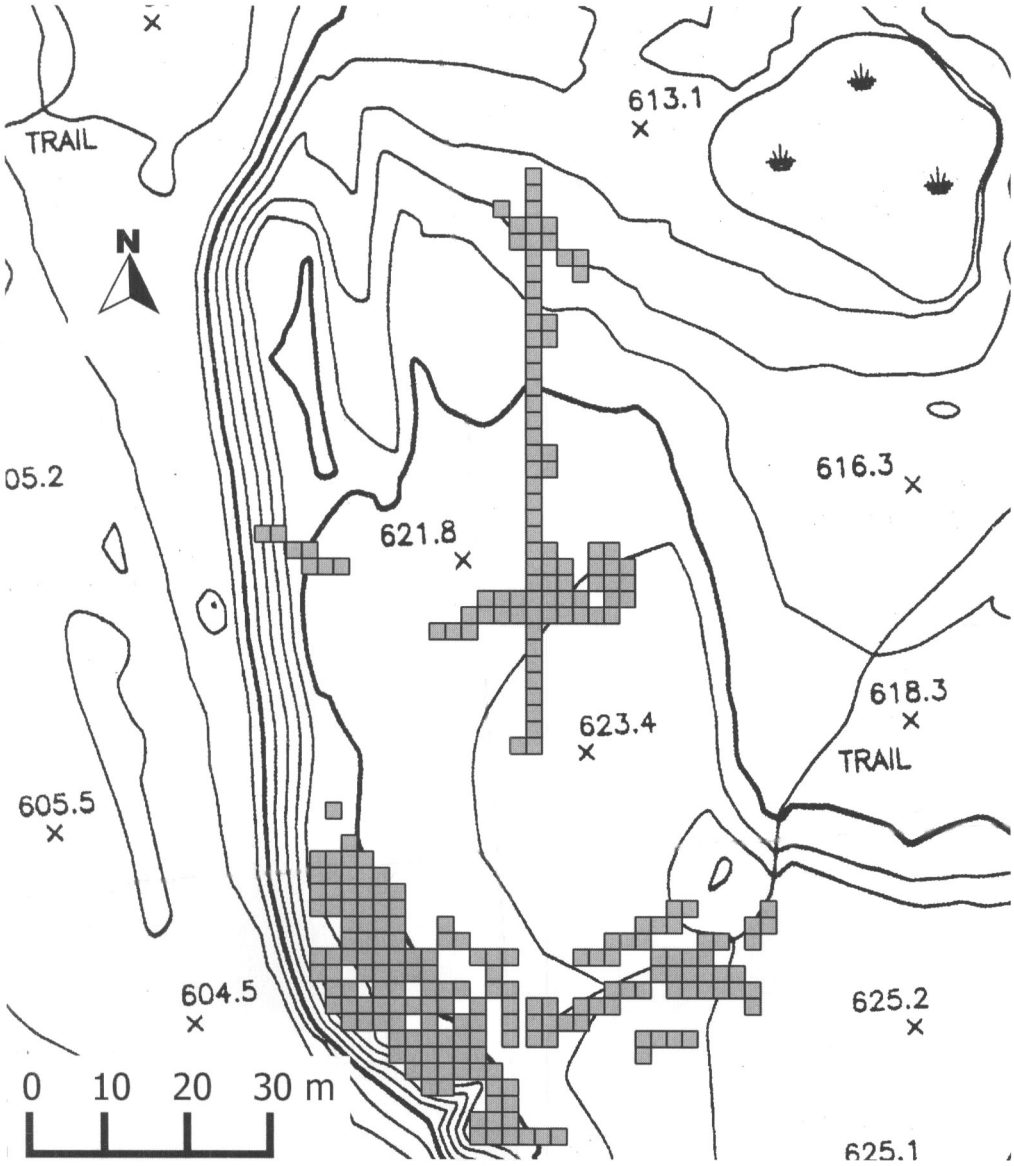



**Figure 2. Location of excavation units at the Eaton site.**

nearly two points per unit. Eighty-six percent of the Madison points were recovered from the plow zone, a percentage similar to that of other artifact categories. It is argued elsewhere that while plowing at Eaton may have rendered artifact patterning less distinct, patterning has not been obliterated (Engelbrecht 1994:6–7; Poplawski et al. 2012:83). The Madison points are assumed to be associated with the Iroquoian village component.

The ratio of length to width was calculated for each of the 516 whole points from Eaton, and the average of these ratios was 1.85. This ratio is nearly identical to the length/width point ratios of Onondaga and Mohawk sites of the same period (Kuhn 1996). Bradley (1987:41, 63), Kuhn (1996), and Tuck (1971:202–203) argue that changes in the length/width ratios of Madison points can be used to relatively order single-component Iroquoian sites. This similarity in changes of Madison point design characteristics over a wide area is illustrative of shared ideas regarding these points.

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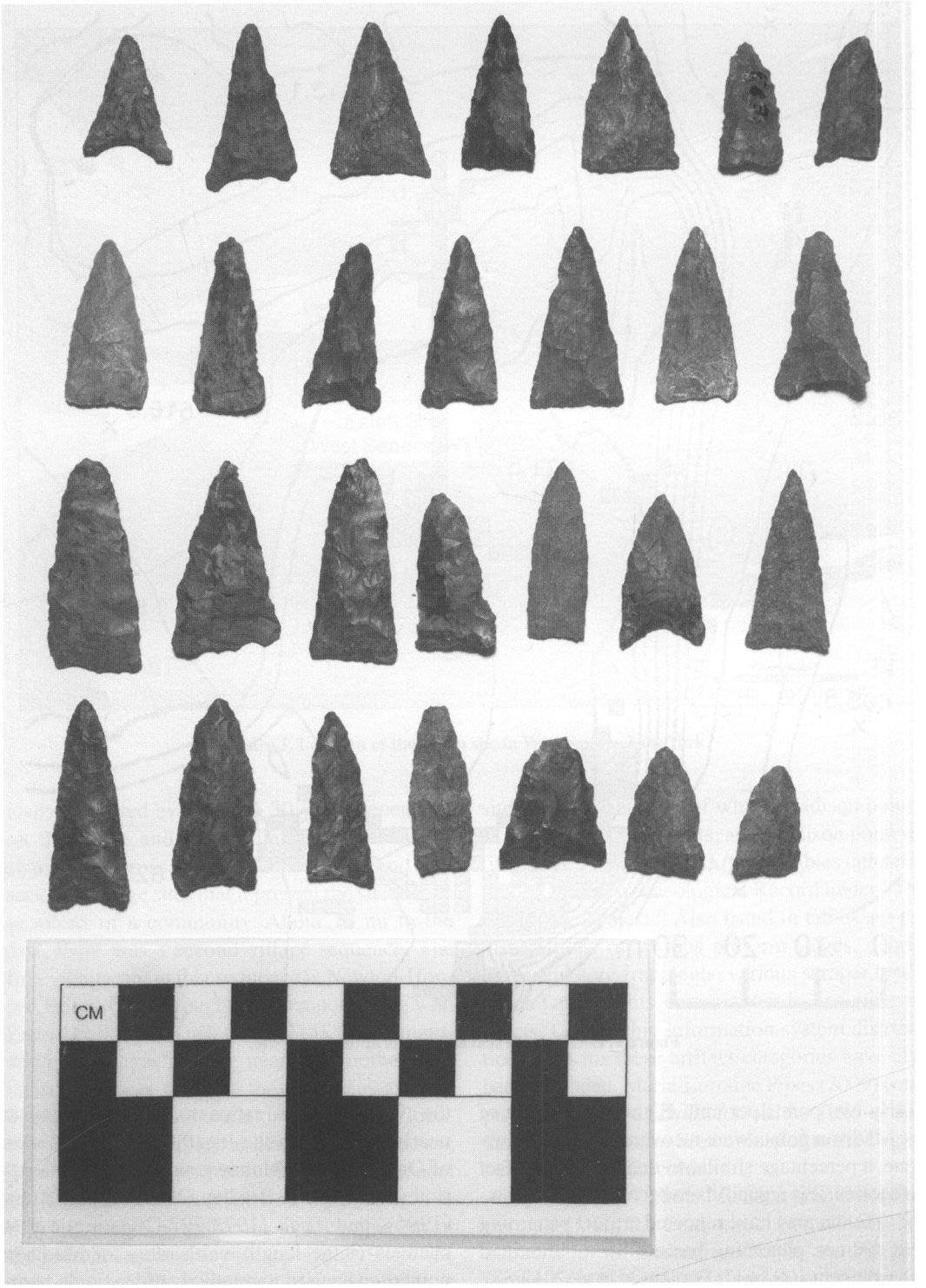



**Figure 3. Random sample of Madison points from the Eaton site.**

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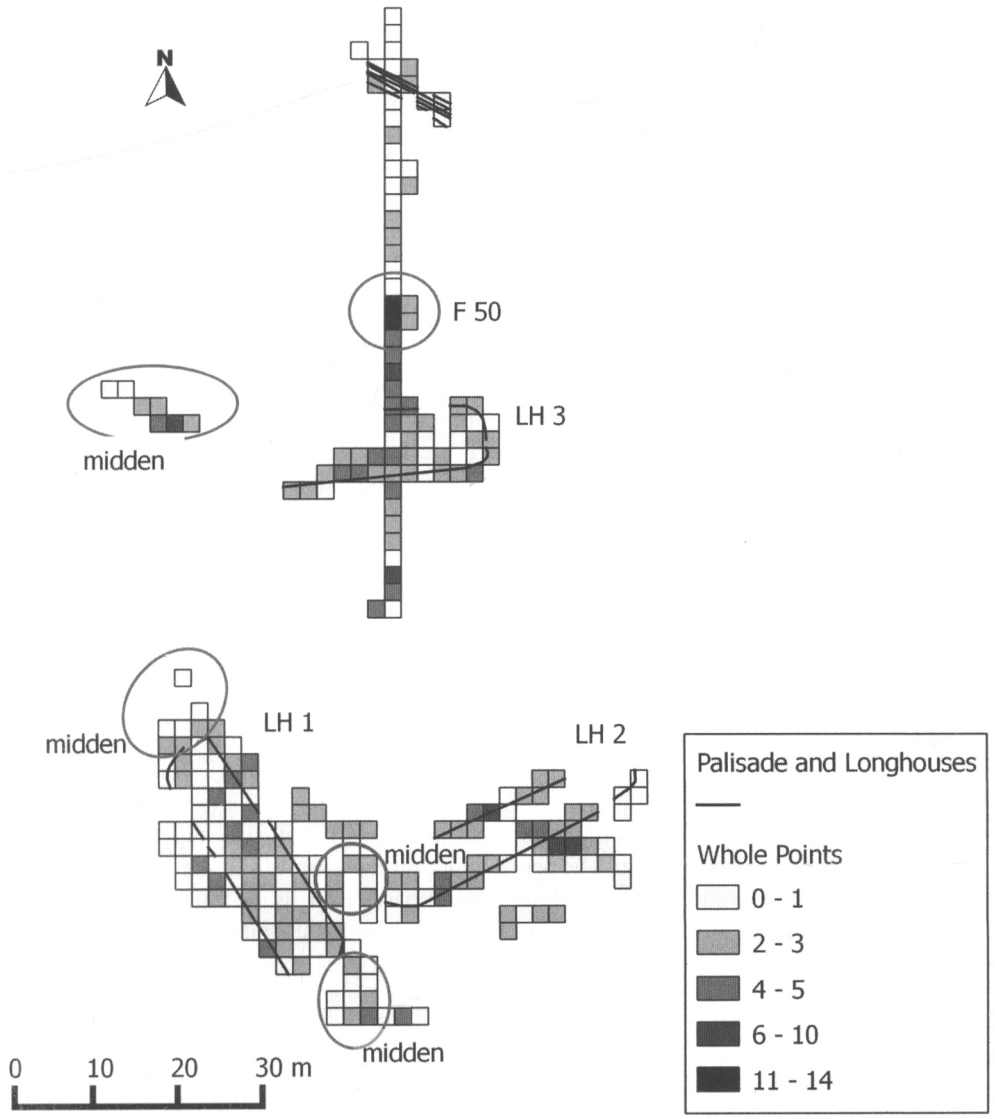



**Figure 4. Density distribution of whole points from the Eaton site relative to longhouses, middens, and the palisade.**

In addition to the whole points, 692 point tips, 129 point midsections, and 893 point bases were recovered. All these specimens are believed to be from finished Madison points. Unfinished points and point fragments with stacking or irregular edges are tabulated separately as late-stage biface preforms. A total of 114 refits among point fragments (bases, midsections, tips) were achieved, resulting in 103 complete points. The remaining 11 refits were between midsections and either bases or tips.

The overwhelming majority of whole points (92 percent) were of Onondaga chert, while 8 percent were of other locally available cherts. The source profile of the point refits is identical. There is a source of Onondaga chert slightly over a kilometer from the site, though Onondaga chert cobbles may also have been available in Cazenovia Creek, immediately adjacent to the site.

There were 1,485 point fragments that were not refit (bases, tips, midsections). If each fragment is counted as a proxy for a whole point and

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we add these to the whole points and point refits, we have 2,115 points from approximately 12 percent of the Iroquoian village of .89 ha. Assuming a comparable density of points and point fragments on the rest of the site, extrapolation would yield a total of 17,625 points.

While it can be argued that more point fragments might fit together if the site were totally excavated, thereby reducing the estimated point count, it can also be argued that many whole points have been removed by collectors over the years, making the number of whole points in the excavated portion underrepresented. Artifacts from Eaton were on exhibit during the Pan-American Exposition in Buffalo in 1901, and more than a hundred years ago an avocational archaeologist wrote that Eaton "was formerly very prolific but the ground is now much picked over" (Rayner-Herter 2001:79). Over the years I have seen numerous Madison points from Eaton in private collections. While we cannot know the total number of points and point fragments discarded at Eaton, the number must have been large.

Point tips were inspected for use wear using a 10x hand lens. Of 516 whole points, 325, or 62 percent, sustained obvious minor alteration, typically in the form of a small flake or flakes driven off the tip. Of the 104 tips present on point refits, 66, or 63 percent, exhibited similar wear. The percentages of tips showing alterations on both whole and refit points were therefore nearly identical. This suggests that both the whole points and the point refits had similar use lives. Stone points break easily, so it is unlikely that most were used more than a few times (Cheshier and Kelly 2006; Odell and Cowan 1986; Titmus and Woods 1986). Stone arrowpoints are typically easier to manufacture than dart points (Railey 2010:266), so perhaps arrowpoints were more likely to be discarded, while dart points were more often resharpened. The fact that the majority of the tips on whole points showed wear suggests that they were not being stockpiled for future use. While damage to arrowpoints from plowing is a possibility, examination suggests that impact fractures are the most likely explanation for minor tip damage.

### *Distribution*

There were 73 units excavated inside longhouses, 51 units that were partially inside, and 133 units that were designated outside. When the inside and partial units are combined, they total 124, close to the number of exterior units (133). A total of 248 whole points were found in exterior units (average = 1.9 per unit), while 272 whole points were found in inside or partial units (average = 2.2 per unit). The number of refits between fragments found in house contexts (inside or partial units) was 38, including seven refits between fragments in different longhouses. The number of refits between fragments from outside units was 41. There is no tendency for refits to occur more often between outside units than between inside/partial units, nor is there a tendency for more whole points to be found in outside units. There were also 35 refits between fragments in interior and exterior units. The majority of these were between longhouses and refuse areas. A detailed discussion of the distribution of point refits on the site is the subject of a manuscript in preparation.

The palisade ran through eight units. Only eight whole points were found in these units, half the average for all units on the site. Ten point tips (average = 1.25 per unit) and 28 point bases (average = 3.5 per unit) were recovered from these same palisade units. This compares with an average of 2.69 tips and 3.47 bases for all units on the site. While the average number of point bases in palisade units was comparable to the average for the site as a whole, the average number of whole points and point tips in palisade units was considerably less. Only four units were excavated immediately outside of the palisade. These units contained a total of three whole points, 12 point bases, and three point tips, even less than the averages for palisade units. Points and point fragments were not concentrated within palisade units or immediately outside of the palisade.

The highest concentration of points and point fragments was encountered in a refuse pit, Feature 50 (Table 2 and Figure 4), which also contained quantities of faunal material and ceramic sherds. This feature contained 51 point tips, 77 point bases, and 31 whole points. It is located midway between the northern longhouse and the palisade and was dug in a pocket of almost pure clay, suggesting that it was originally excavated for clay procurement.

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Table 2. Distribution of Points and Point Fragments in Three Exterior Areas.

| Area | Number of Units | Number of Whole Points | Number of Point Bases | Number of Point Tips |
|---|---|---|---|---|
| Feature 50 | 6 | 31 | 77 | 51 |
| Average per unit | | 5.2 | 12.8 | 8.5 |
| Beyond doors | 31 | 89 | 196 | 171 |
| Average per unit | | 2.8 | 6.3 | 5.5 |
| Palisade | 8 | 8 | 28 | 10 |
| Average per unit | | 1.0 | 3.5 | 1.3 |

On a number of Iroquoian sites, refuse was discarded immediately beyond longhouse doors (Finlayson 1985:398; Prezzano 1992:329–358, 368–369; Timmins 1997:173–174; Warrick 1984:29). This appears to have been the case at Eaton. Thirty-seven (31 percent) of the 133 outside units were designated as part of refuse areas immediately outside longhouse doors (see areas circled and labeled "midden" in Figure 4). Forty-nine percent of the whole points found outside were in these areas, as were 52 percent of the point bases and 57 percent of the point tips (Table 2). There was a definite tendency for points and point fragments found outside to be located in refuse areas just beyond a longhouse door or in Feature 50, the large refuse pit. No clustering of points that could be considered a stockpile was found anywhere on the site.

## Discussion

Boszhardt (2003:78), Cowan (1990), Kent (1984:193), and Theler and Boszhardt (2003:136) suggest that unnotched triangular arrowpoints were hafted so as to detach after penetrating the target. The point could have been inserted into a nock or split end of the shaft using adhesive, with the ligature wrapped around the arrow shaft but not the base of the point. The point would need to be attached firmly enough to the shaft to penetrate the target deeply but loose enough that the wide point base would prevent the point from being withdrawn with the shaft. No ligature around the corners of triangular unnotched points would also facilitate maximum penetration (Christenson 1997:134–135; Thompson 2003:17). Preserved hafting on small triangular Cottonwood arrowpoints in the Southwest indicates that sinew wrapped the shaft below the base of the point but typically not the base of the point itself (Justice 2002:261).

Before the introduction of the bow and arrow, composite spears consisting of a main shaft and separate foreshaft were used with the atlatl (Justice 2002:28). Evidence from the arid Southwest where wooden spear and arrow shafts are sometimes preserved indicates that the earliest arrows imitated these spears with both a foreshaft and a main shaft and that only later did self-arrows composed of a single piece of wood come into use (Justice 2002:39). Use of composite spears and arrows facilitated the rapid retooling of the main shaft if the point tip became embedded in the target and the main shaft disengaged. Foreshafts were often hafted with notched points.

If an unnotched triangular point hafted to a self-arrow were to become embedded in a target and detach from the arrow shaft, then the shaft could be retooled, just as the main shaft of a composite arrow could be retooled when the foreshaft detached. Composite and self-arrows coexisted in a number of areas into historic times (Pyszczyk 1999:164).

### *Attacks*

One hypothesis to explain the large number of arrowpoints on the Eaton site is that the whole and broken arrowpoints resulted from one or more attacks. Keener (1999:785, 787) argues that attackers of a palisaded Iroquoian village first used their range weapons (bows) before breaching the palisade and engaging in hand-to-hand fighting. When Champlain's men attacked a palisaded Iroquois village in 1615, his Huron allies shot arrows into the village. Champlain (1967:III:132 [1882]) felt this an ineffective tactic. Dye (2009:148) notes that in the Eastern Woodlands human remains with arrowpoints are found in undefended

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hamlets, but in palisaded villages injuries due to axes and war clubs are far more common than those from arrowpoints. This observation supports Champlain's assessment of the ineffective nature of an initial arrow volley, at least for inflicting casualties.

No Madison points from Eaton have been identified as "foreign." As mentioned above, for any time period Madison points exhibit a similarity over a wide region. Onondaga chert is available over a broad swath running from west to east through Ontario and New York. However, the absence of any exotic chert points on Eaton does argue against a volley of arrows shot by an enemy living far to the north or south.

If a volley of arrows were largely or solely responsible for the majority of points and point fragments at Eaton, one would expect a concentration of these around the palisade. However, this is not the case (Table 2). Only point bases were found in some frequency by the palisade. Examination of these bases suggests that some were used secondarily as expedient tools. It is argued elsewhere (Poplawski et al. 2012) that expedient tools were used on bark and cordage in the construction of the palisade.

A volley of arrows would also be expected to result in the distribution of points in exterior spaces within the village. This is not the case, as the average number of points in exterior units is 1.9, while the average is 2.2 for units in a longhouse context. If arrows shot within a village broke, one would expect most point refits to occur between "outside" units. However, refits occur in equal proportion between interior and exterior spaces (average of .3 per unit for both). Even if arrows shot into a village were picked up and reused if whole, those that broke should be represented by a greater number of refits in exterior units.

### *Hunting*

Deer dominate the faunal assemblage at Eaton (Pipes 2009), and deer are the most common mammalian remains on Iroquois village sites (Socci 1995:107). Gramly (1977) estimated that Wendat (Huron) villagers would need slightly more than 3.3 deer hides per person per year for clothing. A population density estimate of one person for every 20 $m^2$ (as per Snow and Starna 1989:143) for a .89-ha Iroquoian village suggests a population of approximately 445 people for a village like Eaton. Using Gramly's estimate, a village this size would require 1,473 deer hides every year. Birch and Williamson (2012:115) estimate that between 4.5 and 5 hides were needed per person. Using a figure of five hides, this comes out to 2,225 hides needed for 445 people.

We do not know how long the Iroquoian village at Eaton was occupied, but an occupation span of approximately 20 years for Eaton seems reasonable (Engelbrecht 2003:101–104). If so, using the above estimates, the villagers would have needed between 30,000 and 42,500 hides. While more than one point may have brought down a deer, or a single point may have been used successfully more than once, it seems likely that the number of points manufactured and used by hunters at Eaton would exceed the number of hides secured. While the estimate of hides needed is more than the estimated number of points discarded on the site (17,625), it is not expected that every point used by hunters from Eaton would be found on the site.

In hunting, preservation of the arrow shaft was advantageous. When hunting caribou, the Naskapi loosely hafted points so that the arrow shaft could be retrieved (VanStone 1985:12).

Experimental archaeology suggests that greater time and effort are expended in the manufacture of a fletched arrow shaft than in the manufacture of an arrowpoint (Cheshier and Kelly 2006:353; Keeley 1982:800; Pope 1923:54; Railey 2010:266). The process of making an arrow shaft first requires the selection of appropriate shoots for cutting and then drying. The shaft then requires straightening by means of shaving, sanding, or heat treating. Morgan (1850:72) and Rogers (1940:263) state that an Iroquois arrow was typically fletched with three half feathers, while Hough (1891:62) says that only two feathers were used. All sources agree that the feathers were attached with glue and/or sinew and were set radially and trimmed to impart spin to the shaft during flight.

Ethnohistoric accounts suggest that the length of an arrow in eastern North America was around 114 cm, or 45 inches (Kent 1984:189). A study of 132 ethnographic and archaeological specimens (most from the western United States) from

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the American Museum of Natural History suggests a shorter arrow shaft length, but on average more than 80 cm (Thomas 1978). To inflict a fatal wound, an arrow would need to penetrate approximately 15 cm into a deer's thoracic cavity (Friis-Hansen 1990:495). For a 114-cm shaft, this would leave 99 cm, or 86 percent, of the shaft outside the animal. The movement of the animal, the weight of the arrow shaft, and the likelihood of the long arrow shaft brushing against surrounding vegetation would all work to dislodge the arrow shaft before the animal fell. With a fatal arrow wound, a deer is unlikely to travel more than 45 m before dropping (Friis-Hansen 1990:494).

Iroquoians are generally classified as "sedentary villagers," but this term oversimplifies complex patterns of mobility glimpsed in the ethnohistoric record. A significant portion of Iroquoian villagers, especially men, were more mobile than sedentary (Engelbrecht 1987:19). When a Dutchman visited a Mohawk village in December 1634, he found that most of the inhabitants were away hunting (Gehring and Starna 2013:4). A Jesuit missionary to the Seneca (1669–1671) wrote: "The greater part of the people who belong to the Villages where we are settled, are at war, or out hunting, during nine months of the year" (Thwaites 1896–1901:54:117).

Ethnohistoric evidence indicates that both Iroquoian men and women transported meat from kills and hunting camps back to the village. Men commonly left the village after the harvest to hunt, not returning until around the winter solstice (Fenton 1978:300). In 1668, a Jesuit among the Oneida wrote that "the women do hardly anything else, all The winter, but go and get the flesh of the deer or of the moose that the men have killed, sometimes Fifty leagues away from the village" (Thwaites 1896–1901:51:129). James Smith, a captive, spent the latter part of the 1750s in hunting camps in the Ohio Country. There he observed both men and women carrying bear and deer meat back to camp and on one occasion men dragging deer across the snow using tumplines (Drake 1851:194, 213–214). Mary Jemison, an eighteenth-century captive who became Seneca, stated: "In the season of hunting, it was our business, in addition to our cooking, to bring home the game that was taken by the Indians, dress it, and carefully preserve the eatable meat, and prepare or dress the skins" (Seaver 1961:56 [1823]).

In January 1635, van den Bogaert observed 40–50 cut and dried quarters of venison in Mohawk longhouses (Gehring and Starna 2013:24). It may well have been women who would have encountered points and point fragments while butchering the kill or cooking, either at the hunting camp or in the village. In the village, they could have simply discarded points and point fragments or used them as expedient tools. Villagers eating meat could have encountered whole points and fragments that were missed and discarded them within longhouses.

There is a tendency for both whole points and refits to be found in refuse areas or longhouses. While 26 percent of outside units were designated as refuse areas, 36 percent of whole points found outside were recovered from these units. When one examines the refits that occurred between fragments in outside units, nine were between fragments within a refuse area, six were between fragments found in different refuse areas, 14 were between fragments found in a refuse area and another outside area, and seven were refits in which at least one fragment was immediately adjacent to a longhouse. Only five refits were not tied to either a refuse area as defined here or a longhouse.

## Conclusions

Warfare and hunting were major concerns of Mississippian and Late Woodland villagers. While rituals or target practice could be responsible for some of the points recovered from Eaton, warfare and hunting would seem the most likely explanations for the large number of points on the site. It is possible that Eaton sustained one or more arrow volleys from enemies. However, the distributional evidence suggests that the majority of points were discarded, rather than shot into the village or stockpiled by the palisade. More points are found on average in interior units, and points found outside tend to be found in refuse areas rather than by the palisade.

Deer hunting was critical for subsistence and clothing. It is likely that unnotched triangular arrowpoints used in hunting were hafted so that they tended to detach from the arrow shaft. Whole points and point fragments would then have been brought back to the village embedded in meat,

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where they ultimately became part of the archaeological record.

There is no doubt that conflict played a major role in the development of fortified nucleated settlements in much of the Northeast and Midwest. The mid-sixteenth-century Eaton site serves as an example of one of a series of nucleated, fortified village sites in western New York. By the second quarter of the seventeenth century, the geographical scale of conflict broadened to include fighting between confederacies. For example, the Five Nations Iroquois and particularly the Seneca were fighting both the Erie and the Neutral. The Wenro fled western New York to join the Wendat (Huron) in 1638 (White 1978). There is therefore a tendency to assume that there was continuous conflict from the advent of fortified nucleated settlements through the seventeenth century.

However, Birch and Williamson (2012:161) suggest that there was a period of reduced conflict in Ontario during the mid–sixteenth century, reflected in widespread contacts and trade material at the Mantle site. Mantle and the Iroquoian component at Eaton are contemporaneous. As noted earlier, Newton-Hopper is also roughly contemporaneous with Eaton, and it is the first large village in a sequence of village relocations roughly 10 mi east of Eaton. This suggests a local alliance between the villages at Eaton and Newton-Hopper and perhaps a temporary cessation of regional hostilities before the advent of more wide-ranging conflict.

The widespread adoption of unnotched triangular arrowpoints over much of North America argues for an advantage of this type over a notched counterpart. Increased transportability of the hunting tool kit (Nelson 1991:75–76) would be one advantage. Since arrow shafts took longer to make than triangular points, it is likely that retrieving the arrow shaft took priority over retrieving the point. Men who hunted away from the village for extended periods would have had an advantage if they were able to retrieve the majority of their arrow shafts. It is easier to carry a pouch containing chert arrowpoints than to carry a quiver filled with a comparable number of long arrows.

Following Bryan (1980) and Musil (1988), a change in hafting design can account for the spread of new point styles if the change improves efficiency in killing and results in greater prevention of shaft damage. A detachable arrowpoint would have resulted in greater efficiency in terms of killing enemies and greater likelihood of retrieving the arrow shaft when hunting. The "maintainability" (Bleed 1986; Nelson 1991:70–71) of the tool kit was increased since the same arrows and hafting were used for both war and hunting. This simplification made a hunter/warrior ready for either contingency.

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