INNOVATION AND IDENTITY IN SENECA IROQUOIS LITHIC DEBITAGE: ANALYSIS OF STONE TOOLS FROM THE WHITE SPRINGS AND TOWNLEY- READ SITES, CIRCA 1688-1754

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by

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ABSTRACT

This thesis is concerned with the chipped stone artifacts found at two Seneca Iroquois sites, excavated by Dr. Kurt Jordan of Cornell University. Both of these sites are located at the northern end of Seneca Lake, in the Finger Lakes region of upstate New York. The first of these sites, by historical chronology, is White Springs, occupied from 1688-1715, where the Senecas lived in longhouses behind a palisaded wall. The second site, Townley-Read, was occupied from 1715-1754, and is one of six sites which represent the dispersed community of New Ganechstage, where residents lived in smaller "short longhouses," as previously described by Jordan (2003, 2008).

Conventional wisdom has de-emphasized stone tool use by indigenous peoples following initial European contact, assuming that stone tools are rapidly replaced by functionally-equivalent metal counterparts. At both of these sites, however, the lithic assemblages indicate that there was extensive stone tool use by the Senecas well into the 18th century, despite two centuries of sustained trade with European colonists. This paper will investigate the ongoing significance of stone tool use in the lives of Seneca people.

By using multiple scales of analysis, including diahcronic, regional, and household scales, a more complete view of Seneca stone tool use is produced. Formal stone tool forms at the two sites are rare, and most likely played a secondary role to the use of expedient stone tools. Over 10,000 pieces of debitage were examined and cataloged with regard to several different variables, including morphology, dorsal flake scarring, and size, in order to provide aggregate statistics for each site and locus. Those few formal tools were also noted and analyzed, as well as the chipped stone tools (gunflints) which were introduced by Europeans. Using this methodology,

patterns have been demonstrating variation between the sites and loci, indicating ongoing change and innovation in the assemblages, as reduction patterns were altered and debitage utilization intensified at Townley-Read.

These stone tools are discussed in the end with the remainder of artifacts found at the site in order to illuminate the possible reasons for these choices, including as a result of and as a reaction to historical and political-economic developments, such as altered relationships with neighboring cultures and redesigned routes for the fur trade. Functionally equivalent tools made of material classes of European origin provide complementary contextual information, instead of an adversarial acculturative replacement. This serves to remind that stone tools were part of an extremely complex set of historical and socio-economic particulars, and were the product of informed, innovative decisions by the Seneca Iroquois.

BIOGRAPHICAL SKETCH

Matthew Krohn is the son of Joan and Raymond Krohn. He attended Vassar College in Poughkeepsie, New York from 2000 until commencement in 2004. After commencement, he returned to his native New Hampshire, and spent several years digging as a contract archaeologist around New England, working for Victoria Bunker Inc., John Milner Associates, Inc., New England Archaeology Company, and University of Massachusetts Archaeological Services. In 2009, he moved to Ithaca, NY, and married Suzanne Stockman in the summer of that year.

ACKNOWLEDGMENTS

Several people made this possible. First, I would like to thank Dr. Kurt Jordan, whose encouragement helped me through completion of the degree, and who first alerted me to the potential of the lithic assemblage from his site. For the past year, he has been unfailingly helpful in providing me with references, guidance, and wisdom. I would also like to thank Dr. Frederic Gleach, who shares my interest in lithic material. He provided expertise when my eye was unsure, and reminded me of the value of my research.

I would like to thank Mary Stazi and Rose Christofferson, my bosses at the Computing Center, in Ithaca, NY. They treated me well as I juggled a professional and an academic life.

Finally, I would like to extend infinite gratitude to my wife, Suzanne Krohn. Without her support and encouragement, I certainly would not have been able to excel as I have this year. I doubt there are greater challenges for a newlywed couple than dealing with a graduate student. She has kept me on-task, listened, and proofread even the dullest paper. She has all of my love.

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Chapter 1: Introduction

Archaeologists have unearthed a chipped stone assemblage at the Seneca Iroquois sites of White Springs and Townley-Read, in Geneva, New York, which were occupied circa 1688 to 1754. Combined, the two sites represent over sixty years of Seneca history. In spite of the commonly received scholarly wisdom that stone tools were quickly eliminated from the archaeological record after European expansion into an area occupied by indigenous peoples, the lithic assemblages at both of these sites are considerably large. This thesis will critically examine past literature in order to explain the roots of this common archaeological wisdom, particularly the seminal work on acculturation, *Objects of Change* (Rogers 1990), and then to contrast that with more recent work on chipped stone tools. This will build the basis for a more equitable treatment of the lithic material class, and of the debitage ("waste flakes" from stone tool production, use, and upkeep) from the White Springs and Townley-Read sites. Instead of using categories of "formal" and "informal", I shall present stone tools as either "formal" or "expedient". By framing stone tool use as an active choice made by the Seneca Iroquois instead of as a dying art, I believe that archaeologists will get a better view of the ongoing implementation of and innovation in stone tool technology.

Two excavations are of major concern to this paper. Neither assemblage has yielded very many formal stone tools, and both consist mostly of debitage. Both sites were inhabited by the Seneca Iroquois, the westernmost of five (and later six) nations in the Iroquois Confederacy, which also included the Mohawk, Oneida, Onondaga, Cayuga, and Tuscarora Nations (Jordan 2008, 3). The White Springs site was a nucleated village which likely contained longhouses, and is currently under investigation by Dr. Kurt Jordan of Cornell University. White Springs was occupied

from approximately 1688 to 1715, well after Europeans arrived in what is now upstate New York and Senecas became involved in the fur trade. Three seasons of excavation (with a fourth presently ongoing) have unearthed roughly 1,200 pieces of debitage from thirty-three test units. Townley-Read, also investigated by Dr. Jordan, has been identified as part of the dispersed historic community of New Ganechstage, inhabited from 1715 to 1754. Sixty-six test units, spread over two components, uncovered over 450 pieces of debitage from a Late Woodland component (termed the Ridgetop), and over 900 pieces of debitage from the New Ganechstage component. The New Ganechstage component is further subdivided into four discrete houselots, three of which were excavated, and play a crucial role in the interpretation of spatial variation at Townley-Read. Those pieces, larger than 5mm, comprise the bulk of the analysis presented within this paper, due to the use of predominantly ¼" (6mm) screen in the field. Thousands of additional smaller pieces of debitage have been recovered from flotation samples. Despite their temporal proximity, the two villages reflect the very different historical contexts in which they were occupied.

Because of this proximity, they provide ample opportunity to compare the circumstances affecting lithic assemblage formation. Prior literature has covered two concepts of increasing importance to the archaeology of indigenous cultures which interacted with foreign colonizers: colonialism and cultural entanglement. Colonialism has been developed as a term to acknowledge the the ongoing violence and oppression that is sometimes created by colonizing powers, such as Europeans in their New World. *Colonialism* is "the process by which a city- or nation-state exerts control over people – termed indigenous – and territories outside of its geographical boundaries" (Silliman 2005, 58). The contrasting, relatively peaceful interactions between an indigenous population and a colonizer is termed *cultural entanglement*, as defined by Alexander (1998) and Jordan (2008, 343). "Cultural entanglement is a process

whereby interaction with an expanding territorial state gradually results in change of indigenous patterns of production, exchange, and social relations" (Alexander 1998, 485), in which power relationships are not necessarily unbalanced or predetermined. The important change I would make to this definition is to clarify that cultural entanglement will affect not only indigenous patterns, but also the patterns of the colonizing state, and has the potential to encompass relationships among Native American groups as well. In another study on the effects of colonialism, Gosden (2004) defines a similar concept of "middle ground" colonial encounters, which are characterized by equitable power relationships, and also by cultural innovation stemming from the interactions between indigenous populations and the foreign colonizer. These interactions were not always over short distances; in the Seneca case, the major European forts were located at Oswego, Niagara, and Albany (Jordan 2008, 4-5). Only Oswego was within their regional resource-procurement area (Jordan 2008, 42).

White Springs and Townley-Read each fall into one of these categories of colonialism or cultural entanglement. The village at White Springs was founded shortly after the French invasion of the Seneca homeland in 1687 (Jordan 2008), which undoubtedly led to a troubled relationship with the French during the following times. In contrast, the period of occupation at New Ganechstage was characterized as one in which "political-economic conditions were the *most unambiguously positive* of any time during the eighteenth century" (Jordan 2008, 343, emphasis in original) between Senecas and Europeans. Due to this violent turmoil followed by a period of relative peace, I believe the ground is ripe for comparisons of Seneca activity during the period of European colonization. The early years (1688 to 1701) of occupation of village at White Springs could be characterized as a period of colonialism, with frequent military conflict with neighboring Native American groups and Europeans

(Jordan 2008, 50-56). The latter period of Seneca occupation at New Ganechstage, however, seems to be characterized by cultural innovation, fostered by these positive political-economic conditions.

In order to address this innovation, I will primarily examine the lithic record at Townley-Read. The White Springs site, though valuable as a diachronic point of comparison to Townley-Read, is less well understood at the present time, with relative drawbacks in the data set to be considered later in the paper. Lithic materials are frequently under-emphasized in the Postcolumbian record because they are supposed to be rapidly eliminated from Native American toolkits, due to the assumed functional inferiority to European metal (Cobb 2003a). Despite this assumption, we see lithic tool use continuing through the 18th century at both White Springs and Townley-Read, side-by-side with metal tools in a possibly complementary relationship. Instead of fitting stone tools into an acculturative model, where they are replaced by technologically superior European goods (e.g., Ramenofsky 1998), I hope to use them to detect cultural changes. The shift in lithic technology and lack of formal tools at White Springs and the Postcolumbian component of Townley-Read should not be construed as an indicator of cultural loss, but instead as representing both change and continuity as the same process (Silliman 2009).

Because no culture is a homogeneous entity (Schortman and Urban 1998), one would expect to find cultural innovations taking multiple forms across space. Fortunately, the Townley-Read site has a dispersed settlement pattern, divided up into houselots with short longhouses, where each house contained only two families (Jordan 2004). They are detectable in the archaeological record as surface clusters of domestic refuse, and excavations at the Townley-Read site confirmed the presence of postmolds representing a house at one of the Domestic Refuse Clusters, hereafter abbreviated as “DRCs” (Jordan 2008). This spatial separation is advantageous, and

investigation of the lithic debitage (the "detached pieces that are discarded during the reduction process" [Andrefsky 1998]) will be conducted at this level at Townley-Read. No such distinction has yet been detected at the White Springs site, and there will be less emphasis on intrasite variability there. Through this investigation, I hope to detect variation among households at Townley-Read to further illustrate multiple methods of active adaptation to cultural entanglement with Europeans. Instead of simply examining the incidence of lithic tools as opposed to European ones, this paper will examine how stone tools, as their own material technology, continue to be used in a cultural context alongside materials of European origin.

Throughout this thesis, I shall explore three separate explanations for the variation in stone tool use in the Townley-Read and White Springs assemblages. The first is the idea of "acculturation," whereby stone tools are gradually replaced by "superior" European tools. This hypothesis shall be explored (and discounted) in the following section on models of stone tool replacement. Another explanation for variation in stone tool use relates to the political and economic factors which may have influenced their use, and those factors shall be detailed in the background section (Chapter 2) of this thesis. A final, more traditional, explanation of stone tool variation is Andrefsky's contingency table concerning availability and quality of lithic material, which in turn influences the types of tools (which Andrefsky terms formal and informal) which will be produced at any given location. These final two hypotheses will be critically evaluated through examination of the lithic collections at Townley-Read and White Springs.

Stone Tool Replacement Models

The stone tool collections at White Springs and Townley-Read give us great insight into the variety of ways in which one cultural group may deal with change. Previous studies have dealt with stone tools in acculturative frameworks, an approach which has both downplayed individual decision making (Cusick 1998) and led to the implicit assumption that stone tools were rapidly phased out in favor of European ones (Cobb 2003a). There have been attempts to rectify this by creating interpretive frameworks for lithic assemblages in contact period sites across a range of different times and cultures, including other Iroquois sites (Carmody 2003; Cobb 2003b; Silliman 2003). In the case of White Springs and Townley-Read, the examination of the extensive collection of debitage (over 10,000 pieces total) provides new interpretations that are not tool-centric, and possess wide applicability.

Acculturation frameworks depict stone tool use, and the cultures that they are associated with, as being on an inevitable path to decline. Early work by Charles Wray on Seneca Iroquois sites shows these biases against stone tools and indigenous material culture clearly. Wray and Harry Schoff (1953) created a sequence of Seneca material culture, which documented the gradual replacement of stone tools which they saw. This was couched in dismal terms. They describe lithic technology as being "on the decline. Arrowpoints of flint, whole common, were being replaced by triangular brass points" (Wray and Schoff 1953, 56-57). The directly adversarial nature of Indigneous and European technologies, as they saw it, was even more obvious in 1973, when Wray wrote that the stone projectile point had "met competition from brass arrowpoints and was later replaced by firearms" (1973, 9).

Rogers' *Objects of Change* (1990) perpetuates the failures of the acculturative approach when faced with changes in stone tool technology. The objectives of the

study were to examine the contact experience of the Arikara people in the Missouri River Basin, and to assess the correlation between the archaeological record and historical accounts. The study is regional, based upon a number of rescue archaeology operations, and the data spans nearly two hundred years, from 1680-1862. Rogers chronicles the various rises and falls of Arikara material culture during that time, based upon the corresponding shifts in proportions of "indigenous" and "Euro-American" objects. Cusick points out that acculturative studies have a tendency towards trait lists (1998), and Rogers' work is no exception, though Rogers does challenge previous concepts of linear acculturation. Though it attempts to eschew models of one-way decline, the model is still flawed in the assumption that culture is a zero-sum quantity, that can be lost or gained in inverse correlation to an opposing cultural phenotype. In his study of the Arikara of the Midwest, higher amounts of Euro-American goods necessarily represent a corresponding devaluation of indigenous culture, even if those valuations are shown to fluctuate (Rogers 1990). Conversely, "a culture that is rejecting inclusion of new categories is assumed to be experiencing a high level of cultural coherence" (Rogers 1990, 218). In this way, Rogers links rejection or addition of Euro-American objects to cultural stability, or lack thereof. This type of study, by separating objects into cultural categories, also prioritizes pre-existing cultural forms, and sees any change as evidence of Native American decline (Silliman 2005). Instead, lithic material should be examined without a deterministic view of stone tools as an obsolete technology.

Underemphasis on indigenous agency (Cusick 1998) leads to the assumption that stone tools were rapidly replaced. One example which provides a counterpoint to this model of rapid value loss is a study from New England. This study examined the continuing value of stone tools in an indigenous household was made after discovering a redeposited Archaic-style point (approximately 3700-1000 B.P.) in a household

crawlspace by reservation Pequot in the 1830s (Silliman 2009). Though it did not match the dominant technology of the time, this projectile point clearly had associations with the past, which may have held value to the Pequot person who picked it up and brought it back into their house (Silliman 2009). These associations, independent of perceived technological usefulness, are sure to have influenced behavior in the past for people who accessed stone tool technology, and likely impacted the use of stone tools by past peoples.

As mentioned previously, White Springs and Townley-Read were occupied in two periods characterized by two very different sets of interactions with Europeans, but neither set involved complete replacement of Native tools. At the White Springs site, the emphasis should likely be on the effects of colonialism. Clearly, the complete sacking of the Seneca homeland falls into this definition, as the French exerted control over the Seneca, and this likely influenced the construction of White Springs. Unlike initial village layout, lithic use is not defined by a single year in history, but is continually constructed and reconstructed, during which political-economic circumstances may change. In contrast, the construction and occupation of the Townley-Read site occurred at an unusually peaceful time without external pressure on the Seneca identity. This relatively positive period cannot be examined through a lens of colonialism, which tends to manifest violence and oppression (Jordan 2008).

Lithics in the Record

Lithic analysis in the contact era is usually restricted to use as a statistical figure to measure against European tool adoption. Fitness of stone tools is measured and weighed against similar technologies that retain the same forms, but which are attributed to a European acculturative force because they are made out of metal or

glass (Ramenofsky 1998). Rogers sorts the artifacts in his analysis based on their contexts of deposition, whether those are ceremonial earthlodges, domestic earthlodges, or mortuary contexts. Objects are coded by type, and then are sorted into a series of nested functions, which reinforces the notion that utilitarian function is the primary mover of tool choice. For example, a fairly straightforward artifact is the "BSW", a bone shaft wrench, which is used for straightening, a function of weapon preparation, which is in turn in a function of tool production, and may be found within any of the earthlodge or burial contexts. More complicated classifications belong to multiple functional categories (Rogers 1990, 150). After all of these artifacts have been coded and placed within their functional categories, they are attributed to either Arikara or Euro-American origin, and in this way, each functional class can examined for shifts in the proportions of Arikara or Euro-American content (Rogers 1990). These attributions seem to be largely arbitrary as well. Rogers grants glass objects "Arikara" status once they have been remanufactured (Rogers 1990, 143) but holds back this designation from metal projectile points (144). This is a curious choice, considering the lack of evidence of Europeans hunting with copper-tipped arrows.

What is particularly frustrating about Rogers is that the framework fails internally as well – there is no mention of lithic debitage, unless it is nebulously included under the code "OWS - other worked stone" (1990, 144). While there is inclusion of a category, "WKF – worked or utilized flakes" (Rogers 1990, 142), this sublimates the variation in use that these tools may represent. While this thesis examines utilization in stone flakes without regard to specific use, it also avoids consideration of functional replacement in the same way as Rogers' monograph. Instead, this thesis examines the deliberate production of expedient tools as end products, in counterpoint to the prevailing views of utilized flakes as being byproducts of real "tool" production (see also Gero 1991, 165).

In many Late Woodland settings, the lack of formal tools is conspicuous, even before European arrival. The Plus Site, a Late Woodland Iroquois site also in the Finger Lakes, was a remote camp for non-village activities, found near the south end of Cayuga Lake in Tompkins County. No formal chipped stone tools were found at this site, but twenty-two flakes were recovered from a feature context (probably a refuse or storage pit) (Abel 2000, 195). Twenty of the twenty-two flakes had been modified or utilized for sharpening, hunting, or processing (Abel 2000). In Rogers' study, these objects, lumped together into the "WKF" category, despite their varied uses; more detailed analysis may have prompted much different comparisons of Arikara versus Euro-American tools, and a much more favorable view of the retention of Native American values.

By using a non-deterministic framework for analyzing the practice of stone tool work, we open the doors for many other types of study, especially when enriched by the contextual information available in more recent time periods, by way of preservation and documentation. For example, at the Oneida Iroquois Cameron site, occupied around 1600 CE, Michael Carmody (2003) was able to examine use-wear. The formal stone tools analyzed at the Cameron site were excavated from a pit feature near a longhouse, and the various polishes present on those tools provided a picture not of the exact uses, but of the variability in activity that those tools represented. Further analysis may be able to tell us the specific kinds of activities that these tools were used for, and can indicate the ways in which indigenous groups may have used them in comparison to tools of European origin. Others, such as Silliman (2003), are able to examine the political and labor implications of stone tools. His examination of a California Rancho from the 19th century revealed that European influence on stone tool technology was far from total. Indigenous groups had power over procurement of lithic material and production, and lithic sourcing demonstrated how far away some of

the obsidian had been carried. Lithic procurement represents a time investment, and can indicate how indigenous trade routes were maintained in colonial contexts.

In order to disentangle lithic practices from colonialist interpretations, I will examine these practices in isolation from other material categories, and then place them into the colonial context. By examining methods of production and expedient tool use, I will de-emphasize formalized tools. At the Townley-Read site, there are no formal tools in the Postcolumbian component, and only a single formal projectile point has been recovered from White Springs, which could lead to the assumption that stone tools no longer held value, and that their disappearance signifies a decline in indigenous culture. In fact, stone tools continued to be produced, as evidenced by high frequency and density of lithic debitage, which is a testament to the enduring value of stone to the Seneca people at White Springs and New Ganechstage. Nor were the lack of formal stone tools at these sites a sudden change by any measure, as excavations as the Ridgetop exposed very few formal tools, and there was a noted lack of formal stone tools at other sites across the Late Woodland period, even before European incursions (e.g, Abel 2000), indicating that there is already significant variation in stone tool use over time. By broadening the examination of stone tool use at both of these sites, and the ways in which expedient tools were used, we will be able to discuss the ways in which stone tool use was still very much practiced – indeed, during the Townley-Read occupation, expedient stone tools will be shown to have increased in proportion to the use of other indigenous and non-indigenous technologies.

Another goal of the study is to remove the emphasis from pre-existing cultural forms (Silliman 2005). One of the fundamentals of anthropology and archaeology is that *cultures change*, whether this is a short- or long-term process. Any study that conflates formal material stasis with traditional continuity thus operates upon the

forgone conclusion that a culture is stagnating. The Townley-Read site presents an excellent example of cultural continuity, concurrent with a number of changes within a Native American framework. The shift to a dispersed settlement pattern (Jordan 2004), for example, is not a change to a European model, and European officials actually took active steps to encourage Senecas to stay together in fortified settlements (Jordan 2008, 84). In similar ways, Senecas may have changed their subsistence patterns to reflect their continued resistance to European lifeways. Especially in this situation, where there was little military threat to Senecas, and where there was likely to be increased innovation, one cannot take this material change as an indicator of acculturation.

In this thesis, metal tools are considered as a supplementary, contextually informed material class, but what is important to note is that they will not be used to generate indexes of acculturation (e.g., Rogers 1990). Indeed, I will deliberately start from the assumption that any goods that are found on the site have been incorporated into a Native American worldview, whether they are generally assumed to have a European origin or not. In the case of the Eastern Pequot, Silliman notes that "When used on the reservation and in Native American community life, *these items became Eastern Pequot objects"* (2009, 225, emphasis in original). Just as we cannot assume that metal tools were equated by indigenous peoples with Europeans or European influence, it cannot be assumed that a stone item, such as a gunflint, would be immediately incorporated into the indigenous toolkit just because it is made out of made out of stone.

This does not make European-sourced goods immediately equivalent to the stone tools that are in use at the site – these items likely retained a differential value for the Seneca who used them, at least in certain contexts. Even in the event that they were fully integrated into the Native American toolkit and identity, there is still a

practical difference in issues of procurement and upkeep. This is evident in the historical record. The Senecas seem to have had control of their own smithy, requiring only the those with the technical knowledge to operate it, and played the English and French off of each other in order to obtain trained smiths (Jordan 2008, 104). In the absence of evidence to the contrary I will assume that metal tools were integrated fully into the Native American identity, but will still examine them for the purpose of identifying different strategies of adapting to the colonial milieu.

Comparable Sites

Though the White Springs and Townley-Read sites are somewhat unique in the makeup of their lithic assemblages, and in the case of Townley-Read, in the structural composition as a dispersed village, there are other comparable sites from the region. I will touch upon two such sites here, the Gannagaro site, in Victor, New York, and the Jackson-Everson site in the Mohawk Valley. The first site is useful in understanding what lithic studies have been restricted to in the past, and in determining what lithic use may have looked like during the period preceding the occupation of White Springs. The second site gives an idea of how lithic studies elsewhere in the region have been conducted.

Gannagaro is located about halfway between Rochester and Canandaigua Lake, well within the Seneca Homeland, and was investigated by Robert L. Dean (1984, 1) in 1983 and 1984. The site was one of the four principal Seneca villages occupied immediately prior to the French attacks by Marquis de Denonville in 1687 (Dean 1984, 4), making it one of the villages occupied immediately before White Springs. Test units and test trenches were dug at the site, and soil was screened through 1/4” screen (Dean 1984, 12). In contrast to earlier excavations, the authors

were concerned with settlement patterns, and concentrated their excavations around the longhouse structure they found (Dean 1984, 75). This does produce an easier comparison to the later data, which this paper is concerned with.

The amount of lithic material recovered from the site was comparable to either Townley-Read or White Springs, though seemingly over a much greater area; 1061 chert flakes, as well as 204 other chert artifacts, were recovered from four 5' by 40' trenches, and five 5' by 5' test units (Dean 1984, 31-33). As a percentage, many more formalized tools were found here than at either the White Springs or Townley-Read sites; two scrapers, a biface, and four projectile points were excavated. Twenty utilized flakes were recorded across the entire site , which is about a 1.9 percent utilization rate (Dean 1984, 31-33). No attempt is made to explain these lithics, and they are merely tallied and described. Also notable is the separation of gunflints as a separate material class. Thirty-four gunflints were found at the site (a much higher number of flints than at either White Springs or Townley-Read, with four and two gunflints, respectively) (Dean 1984, 46). They are simply tallied. None of the lithic material is given any consideration in the discussion or conclusions.

The Jackson-Everson excavations, of the same year, occurred in the Mohawk Valley in eastern New York. Unlike other studies referenced in this paper, this site was occupied by the Mohawk, on the opposite end of the Iroquois confederacy. Unlike the Seneca assemblages, the presence of lithic assemblages on this site is considered unusual. “Given the late date of the site (A.D. 1666-1680), the presence of these materials warranted special attention” (Cushman 1986, 67). While this site is roughly contemporaneous with the Seneca Iroquois site of Gannagaro, the presence of a total of 52 lithic artifacts was considered highly unusual and noteworthy, and lithic use is characterized as having been “superceded” by materials of European origin. Most of

the chert used came from, unsurprisingly, the eastern end of New York (Cushman 1986, 67).

Of the 52 lithic artifacts, eight were recognized as formal tool types, with five scrapers, two gunflints, and one projectile point. We should be aware that this number may be highly affected by recovery methods, and by the expectation by the excavators that lithic stone tools would not be found. One of the gunflints was made of local material, and the other identified as likely from European material (Cushman 1986, 72). Here, North American and European flints are considered as two parts of the same material class. In contrast, a total of eighteen utilized flakes were found, along with 26 pieces of non-utilized debitage (Cushman 1986, 70). This is a remarkably higher amount of utilization than any of the loci at the Seneca sites, with a roughly 40 percent utilization rate. As we shall see, at Townley-Read and White Springs, there appears to have been much more lithic reduction happening on-site. Where reduction activities may have been performed for the tools excavated at the Jackson-Everson site is not addressed in the report, though the emphasis on local chert procurement is noted (Cushman 1986, 73).

Excavations

Site excavation methods at Townley-Read and White Springs have a great effect upon the material analysis of the collections. It should be noted that the author did not participate in these excavations. To this end, I shall attempt a short description of the method used at of each site. Townley-Read was the first of the two to be excavated, from 1996-2000. Conducted by Dr. Jordan with advisement from Peter Jemison of the Seneca Nation, the goal of the excavation was to focus on domestic areas of the site, and specifically the 18th century component. Physically, the site is

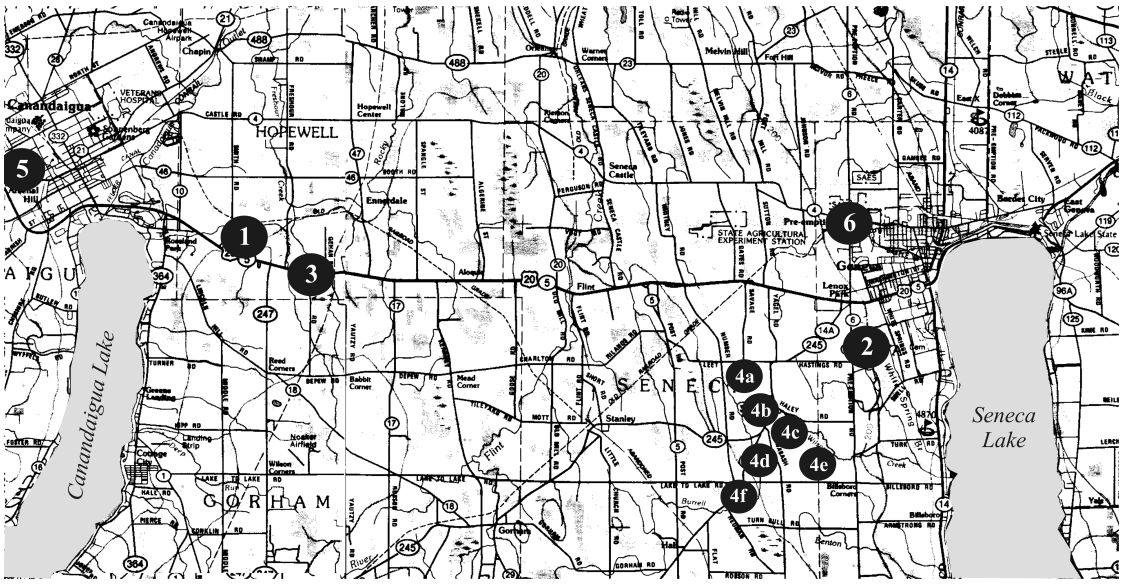

Figure 1: Seneca sites occupied during 1688-1779, from Jordan (2008, 94). 4a-4f represent the New Ganechstage Site Complex with Townley-Read represented by 4b. White Springs is represented by 2. Snyder McClure, also mentioned in this text, is located at 1.

located in plowed fields southwest of Geneva, New York. Burrell Creek runs along several edges of these fields, allowing any residents in the past easy access to water (Jordan 2008). Limited amounts of field chert show up in the soil, providing some on-site access to lithic resources, though the actual Onondaga cherts outcrops occur at the north end of Seneca Lake (Wray 1948), closer to the White Springs site and downtown Geneva. The two components of the Townley-Read site are separated both spatially and temporally, with the Late Woodland Ridgetop component in the western end of the site on a rise, and the 18th century component representing a neighborhood of New Ganechstage site complex in the lower, eastern portion of the
site. The site complex (see Figure 1) covers a wider area than just the Townley-Read site, including five other small sites nearby (Jordan 2008).

The Townley-Read site has a rich material record, but the lithic material contains fewer than ten finished tools, and only five bifacial tools or fragments. In comparison, excavations at the Rancho Petaluma, another post-Columbian Native

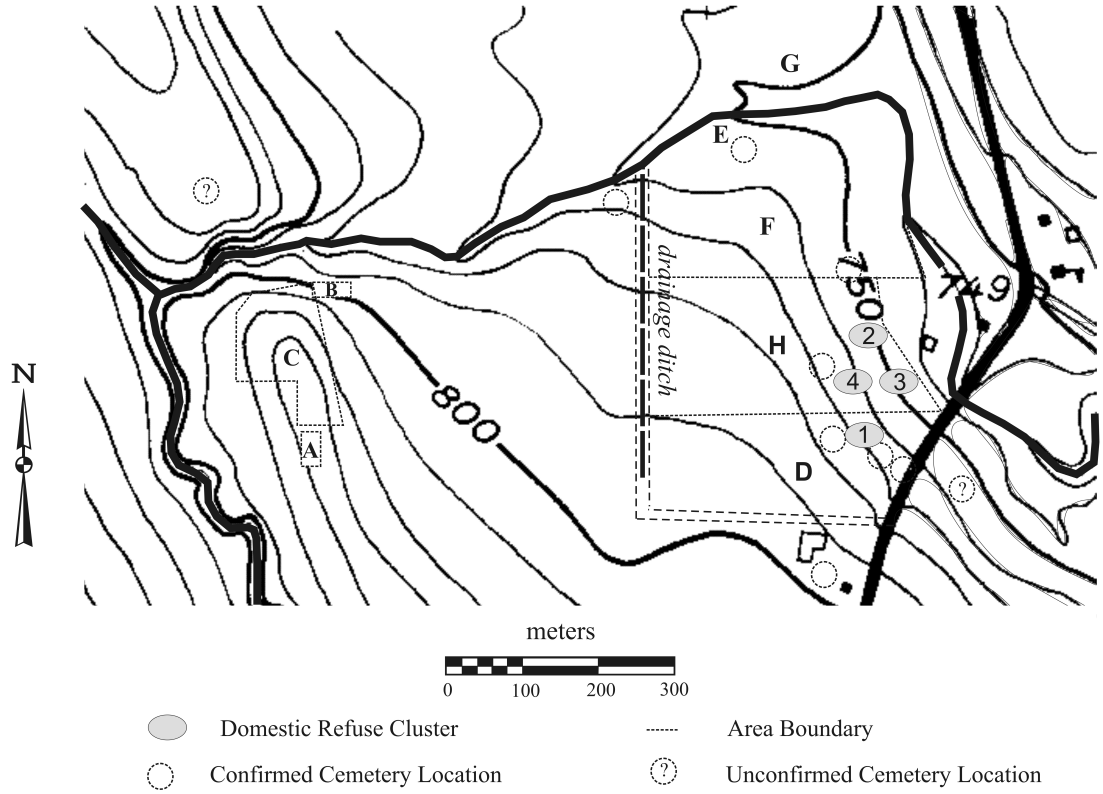

Figure 2: Townley-Read Excavation Map. Areas A, B, and C represent the Late Woodland Ridgetop component. Areas D-H represent the 18th century component. From Jordan (2008, 122)

American site, recovered 68 formal tools (Silliman 2008), and at the Oneida Iroquois Cameron site, 119 tools were recovered (Carmody 2003). In contrast to this, there are 931 pieces of debitage larger than 5mm, and when smaller materials from the full flotation samples are tabulated, the total increases to a whopping 10,396 pieces. To focus on the few formalized tools would be to ignore both expedient tools, and the wealth of information about the production process.

Not all of the material which was surveyed was collected and brought back to the lab, in accordance with the wishes of the Seneca nation (Jordan 2008). Therefore, the sample which is under analysis represents a partial excavation of the site (as with all archaeological collections), centered on the houselots which were discovered in the course of survey and excavation. Four such Domestic Refuse Clusters were identified,

and three were partially excavated. Flotation samples were taken somewhat irregularly, and are not included in most locus statistics, though they provide valuable supplementary information about the content of the sites.

Some materials from the Townley-Read site are also housed at the Rochester Museum and Science Center, brought there by a number of collectors, including artifacts from extensive excavations by Charles Wray (Jordan 2008, 115). Most of this material is from mortuary contexts, or the context is otherwise undefined. As well, there is no lithic debitage in this collection. Unfortunately, because of the lack of comparable contexts from Dr. Jordan's excavations at either White Springs or Townley-Read, as well as the lack of debitage from these collections, they make a poor sample to compare against, and though their existence is acknowledged, the catalog will not be included in the analysis of the lithic material from these sites.

White Springs is under investigation currently, and has been since the summer of 2007. The portion being excavated lies at the juncture of two properties, one of which is a vineyard. Surface collection has been conducted in the exposed rows between the posts of the vineyard, and though few lithic artifacts have been found in each survey section, there is still detectable, concentrated variation. Due to the wishes of the property owner, excavation has avoided the vineyard, and concentrated on the narrow strip of land that is not being cultivated, between the vineyard and the adjacent property. The test units are aligned along a roughly five meter by sixty meter strip, and give access to a good cross-section of the site, with many features for exploration. To date, 1,200 pieces of debitage have been found there, as well as a single arrowhead and four gunflints. Both the White Springs and Townley-Read excavations yielded many other Seneca-era artifacts, including materials of glass, metal, and bone.

By examining the lithic practices of the Seneca Iroquois at these two sites, I hope to flesh out an oft-overlooked and misunderstood portion of the archaeological

record. Though a popular material for analysis at Precolumbian sites, the lithic record is frequently relegated to secondary status after European immigration to North America, and it deserves to be further investigated. This paper will demonstrate how chipped stone tools represent a vector for ongoing cultural expression as part of the Seneca Iroquois identity.

Chapter Two: Background

The two sites which provide the lithic assemblage presented in this paper are each the product of specific historical and political-economic conditions. These conditions affected the ways in which the residents lived their lives, the ways in which the villages were constructed, and geographical concerns for procurement and production of chipped stone tools. Individual households provided settings for these activities, as well as a convenient spatial distinction for investigation and analysis.

White Springs, 1688-1715

The White Springs site has roots in processes of both colonialism and resistance. The documentary record shows that in the early 1680s, the Seneca were engaged with the French on their borders in both trade and warfare. This included both the sieges of French forts and retaliation by the French against the Seneca. Finally, in the summer of 1687, the French brought two thousand troops against the Seneca under the command of the Marquis de Denonville, and all four of the Seneca villages were burned, either by the French, or by the Senecas themselves during evacuation. They spent the winter with their Eastern neighbors, the Cayuga, before moving back to their homeland in 1688 to found two new villages, now known to archaeologists as the western Snyder-McClure and eastern White Springs sites (Jordan 2008, 172-173).

This period must have had an effect upon the composition and population of those villages. Jordan (2008, 52) notes that these villages must have been founded without the usual period of several years' preparation, as was customary during previous village relocations. At the same time, both villages were located somewhat to the east of the old Seneca territory. Regionally, the period from 1688-1700 was under

constant threat of warfare, as King William's War brought the French and English into conflict with each other, threatening to involve the Senecas, and with frequent French-sponsored attacks upon Iroquois territory across the confederacy (Jordan 2008).

The turn of the century marked an improvement in Seneca relationships with European groups, and Jordan (2008, 57) marks the years from 1701-1713 as a "Period of Uncertainty." The peace process was initiated by the Treaty of Ryswick in 1697, though some conflict continued with other indigenous groups (Jordan 2008, 53). The Senecas were engaged in frequent conflicts with their Indian neighbors to the west, such as the Miamis and the Ottawas, and it seems that Senecas were frequently encouraged to do so by the French, who they were on better terms with than during the prior century. The specter of war between their English and French neighbors still loomed over the Senecas, and both European groups tried to curry their favor. French interest in the Seneca remained high, and the French sent missionaries and smiths up until 1709 (Jordan 2008, 57-63). This improvement in relations likely influenced the eventual dispersed settlement of Townley-Read.

Townley-Read, 1715-1754

The archaeological record at the Townley-Read site reflects not just Seneca material culture, but also choices that were made in a unique set of circumstances. This abridged history of the site focuses on subsistence, tool procurement, and household construction, and considers political history as a factor shaping these variables. Townley-Read is part of the New Ganechstage site complex. The most likely settlement date is 1715, shortly after the signing of the Treaty of Utrecht, which ended Queen Anne's War. This period, which Jordan (2008) characterizes as the "middleman" period, has signs of being relatively peaceful for Seneca nation. They

are described as having a geographic middleman position, which afforded them certain social and economic benefits, but should not imply their assimilation into a European economic model.

During this period we can already see the Senecas using their position to play the vying European powers off of one another. Unlike the early years of occupation at White Springs, the people of New Ganechstage were no longer in direct conflict with the French. The French and British both attempted to woo the Senecas in order to gain permission to build forts and trading outposts in their territory, and the Senecas were able to make their own demands in return (Jordan 2008). Most importantly to this study, they requested, and received, smiths to work in their villages. Jordan points out that French and British smiths were frequently present in the Seneca homeland (2008, 66). We can see that there was Native agency involved in procuring these smiths, and that they had access to the means of producing metal tools, though they may not have been working the metal themselves. This has significant implications for the continued use of stone tools at the site, as a Darwinian model predicated upon functional replacement of tools (e.g., Ramenofsky 1998) cannot account for the continued use of "inferior" technology in the presence of such convenience.

This period also seems to have encouraged Senecas to change their village structure to a much more dispersed model. Instead of closely nucleated communities, the site complex was organized into small "neighborhoods," with a likely majority of two family short longhouses. Likely encouraged by relative peace, these house sites were not chosen for defensibility, but for agricultural appropriateness, and contributed to the site's extended occupation span (Jordan 2004). This spatial dispersal proves convenient to the lithic analysis, as short longhouses are visible in the archaeological record, and their boundaries define a household-based analytical structure. Though the analysis will not be as straightforward as if there were only one family in each

household, it is certainly simpler than the extensive multi-family longhouse community structure seen in other Seneca communities, including, most likely, White Springs, although further investigations must still be conducted to confirm the house forms at White Springs.

The middleman period was followed by what Jordan terms "the Oswego Era," beginning in 1724 with British attempts to position their forts closer to the sources of furs (2008, 71). As the construction of the trading house at Oswego represented a huge advantage for the British, the French began to court the Senecas even more heavily, though they seem to have gone ahead with construction at Fort Niagara before obtaining permission from the Seneca nation (Jordan 2008). The Senecas still played an active role in the fur trade, and this would likely have had an effect on their own seasonal strategies. Though Iroquois involvement in the capitalist system is seen by others as having had a universally destabilizing effect on the Iroquois (Wolf 1982), the lithic record may shed some light on the diverse reactions to colonialism that Senecas had even within a single village.

Even with these new developments, the European powers still wanted additional posts in the area, leading the French agent Joncaire to establish another short-lived post between the two Seneca villages, complete with a smithy (Jordan 2008). Though not located within a Seneca village, this means that smithy access would have been within a local trip, one "that did not need overnight stays but required some daylight hours for tasks to be completed at the destination" (Jordan 2008, 41). If Huntoon and Townley-Read were indeed the two Seneca villages Joncaire resided between, this would have placed him easily within local travel of New Ganechstage, and one can assume that smithy access would still have been convenient for Senecas. Through at least 1744, there were recorded instances of French involvement in Seneca villages, with the Joncaire family and the "Laforge"

smith family both frequenting the region. There was political tension at this point, as the Senecas seem to have been on better terms with the French, but the British were still eager to be in their good graces, and sent frequent delegations (Jordan 2008).

This period brought an increased amount of trade between Senecas and both Indians from the west and Europeans from the east. Though Seneca populations were caught between two frequently violent colonial powers, they clearly established an effective system of coping with them, as opposed to the more drastic assimilation of the Mohawk to the east (Jordan 2009). Instead, the lithic record, in combination with other contextual information, reveals several different ways in which Senecas adapted to the incursions of Europeans into their homelands.

Community Structure and Households

Seneca community underwent several changes from 1688 to 1754. The most obvious are the changes in both household and community structure. There is not yet conclusive archaeological evidence that White Springs followed the prior patterns, but historical records suggest that White Springs was comprised of a nucleated village and of longhouses. Longhouses were multi-family structures, constructed of posts and bark. The archaeological evidence points to a variety of activities happening within the household. Corn-processing activities and hearths were both common in Iroquoian households. Organic tools are noted at many sites for use in sewing and weaving, as well as other utilitarian tasks (Engelbrecht 2003). The creation and use of stone tools is of most importance to this study, and has been noted as happening inside of the longhouse (Engelbrecht 2003, 82). It is also assumed that they were in palisaded communities, with agricultural fields and work areas radiating outwards from the villages. This served to keep the communities nucleated and more defensible. In the

wake of the 1687 attacks by the French and the resultant burnt villages, it is likely that these nucleated communities were valued for security in the troubled times of White Springs (Jordan 2008, 176). This settlement pattern makes it difficult to examine the household level at White Springs, but does afford us a better context for a sitewide assemblage.

At Townley-Read, there was a shift from true longhouse use to another form, the short longhouse. The structure recovered at Townley-Read appears very similar to a single segment of a true longhouse, with the traditional features of a hearth and sleeping compartments. It is not without precedent in the archaeological record, though metal tools were used in its construction (Jordan 2003). A benefit to excavators at Townley-Read is that they have remains that can be attributed to single households. Jordan also notes that there is a high amount of unorganized space within the short longhouses at Townley-Read (2003, 56). It is likely that this unorganized space could have been used for experimentation. This unorganized space would have allowed for greater flexibility in activities within the short longhouse. Additionally, Jordan determines that short longhouses are not special purpose dwellings, as had been suggested by other authors (Jordan 2003, 57). Though the middleman period only lasted for an estimated eleven years, the establishment of this settlement pattern at Townley-Read had implications for the long-term occupation of the site, as these short longhouses appear to be the standard for the site (Jordan 2008). This represented a less defensible site plan, most likely indicative of an increasing sense of security within the Seneca nation (Jordan 2003).

Methodology

I assessed the debitage from White Springs and Townley-Read with an eye towards hidden details which may be illuminated by aggregate analysis. Several analytical parameters were taken from Andrefsky's (1998) guidelines for debitage analysis – morphology, size, weight, and amount of dorsal cortex. Material, utilization, and provenience were also noted. The goal of this data collection was to determine broad patterns in production methods, not to pinpoint the exact production process. A sample of the data collection spreadsheet is included in Illustration 1.

	A	B	C	D	E	F	G	H	I	
1	Context#	Cat#	Quantity	Material	% Cortex	Morphology	Wear?	Size	Weight (g)	Notes
595	616	1	2	Onon	0	ffrag	No	3.35-5mm	0.09	
596	616	1	20	Onon	0	ffrag	No	2-3.35mm	0.25	
597	616	1	17	Onon	0	ffrag	No	1-2mm	0.06	
598	617	1	1	Onon	1	ffrag	No	5-10mm	0.05	
599	617	1	2	Onon	0	ffrag	No	5-10mm	0.15	
600	617	1	6	Onon	0	ffrag	No	2-3.35mm	0.09	
601	617	1	14	Onon	0	ffrag	No	1-2mm	0.04	
602	617	1	1	Onon	0	ffrag	No	<1mm	0.00	
603	621	1	1	Onon	0	ffrag	No	10-15mm	0.16	
604	621	1	1	Onon	0	shatter	No	5-10mm	0.12	
605	621	1	3	Onon	0	ffrag	No	5-10mm	0.23	
606	621	1	1	Onon	1	ffrag	No	5-10mm	0.04	
607	621	1	1	Onon	0	ffrag	No	3.35-5mm	0.05	
608	621	1	10	Onon	0	ffrag	No	2-3.35mm	0.14	
609	621	1	7	Onon	0	ffrag	No	1-2mm	0.05	
610	621	1	1	Onon	0	ffrag	No	<1mm	0.00	
611	623	1	1	Onon	0	ffrag	No	5-10mm	0.09	
612	623	2	1	Onon	0	prox	No	10-15mm	0.29	
613	623	2	3	Onon	0	ffrag	No	2-3.35mm	0.08	
614	623	2	1	Onon	0	prox	No	2-3.35mm	0.04	
615	623	2	3	Onon	0	ffrag	No	1-2mm	0.00	
616	624	2	1	Onon	0	ffrag	No	5-10mm	0.04	
617	624	2	2	Onon	0	ffrag	No	2-3.35mm	0.02	
618	624	2	3	Onon	0	ffrag	No	1-2mm	0.00	
619	631	1	1	Onon	0	ffrag	No	5-10mm	0.04	
620	632	1	1	Onon	0	ffrag	No	2-3.35mm	0.00	
621	632	1	1	Onon	0	ffrag	No	1-2mm	0.00	
622	639	2	1	Onon	0	shatter	No	10-15mm	0.56	
623	639	2	2	Onon	0	ffrag	No	5-10mm	0.09	
624	639	2	2	Onon	0	ffrag	No	2-3.35mm	0.04	
625	642	6	8	Onon	0	ffrag	No	2-3.35mm	0.09	
626	642	6	13	Onon	0	ffrag	No	1-2mm	0.05	

Illustration 1: Screenshot of data collection form

The morphology was determined according to a simple free-standing typology, matching neither Andrefsky's (1998) or Sullivan and Rozen's (1985) entirely (as in Andrefsky 1998). Andrefsky suggests morphological division into flakes, proximal flakes, flake shatter, and angular shatter categories (1998, 74), while Sullivan and Rosen suggest a freestanding typology divided into debris, flake fragments, broken flakes, and complete flakes (Andrefsky 1998, 123). The majority of the material analyzed was Onondaga chert, which has its own properties as a raw material that affect morphology. Wray characterized Onondaga chert as breaking "with an excellent conchoidal fracture" (1948, 41), but the assemblage and chunks of field chert present in the plow zone at these Seneca sites display much more variation in quality. The proximal end in one flake may possess a clear striking platform, compression rings, or bulb of percussion, while failing to display the other two characteristics, and so one must assume that there are, perhaps, proximal ends which contain none of these characteristics. The chert may also break along tabular ends or internal shears in the material, making it difficult to tell whether an abrupt termination is the completion of a flake or encountering a flaw in the material. It is similarly difficult to distinguish between "flake shatter" and "angular shatter." Because of the difficulty of distinguishing within flake and shatter classes reliably with this material, I prefer to use only the categories of "flake" and "shatter" for the remainder of the paper, in order to preserve replicability. Finally, due to the difficulty of examining such physically small samples, no morphological distinctions were made for those pieces less than 5mm in size, although I made an initial attempt to do so.

The size and weight measurements are more straightforward, but still limited somewhat. The size category was limited by the screen size most commonly used in excavation, ¼" (approximately 6mm) screen, though ⅛" screen was also frequently used. This formed the first meaningful division, that debitage greater than 5mm, and

that less than 5mm, the latter of which was obtained through ⅛" (approximately 3mm) screening or flotation methods (approximately 1mm). Debitage larger than 5mm was arbitrarily divided into 5mm increments, and measured with calipers according to their largest dimension. Debitage smaller than 5mm was sifted through geological screens of 3.35mm, 2mm, and 1mm mesh. Any debitage smaller than 1mm was assumed to be insignificant or the product of agitation during the excavation, screening, and flotation processes. Weight was taken in bulk after samples had been sorted for all other distinguishing characteristics.

Finally, the presence of cortex on the dorsal surface of the flakes was recorded in an ordinal system. As absolute percentages are difficult to record at best, and impossible to replicate at worst, the degree of cortex was lumped into four values, 0, 1, 2, or 3, representing 0%, ≤50%, >50%, and 100%, respectively (Andrefsky 1998). Due to the variable nature of the flaws in the Onondaga chert, this was not always a straightforward measurement. Flaws are generally planar, and may be slightly rough, but would not necessarily have been seen before the raw material was worked. For this study, I have restricted the definition of cortex to those surfaces affected by *chemical* weathering only, identifiable by the patina and textural differences caused by such weathering.

Scales of Analysis

Three scales of analysis will be used for interpreting these collections, two spatial (regional and household) and one temporal. Jordan (2008) documents regional influences on Seneca culture, and gives an excellent background against which to frame the general findings. Any individual group within this neighborhood of New Ganechstage or in the village at White Springs would likely have multiple identities,

as a member of the Seneca nation, the village, and the household, which would all affect into their daily practice. To discount this larger setting would be to ignore one of the motivators of their behavior, though one cannot say with certainly whether or not it was a primary motivator. Other factors outside of identity may also explain variation or similarity in behavior, such as availability of goods. Regional influences will also be considered in explaining the consistencies between the assemblages, and may indicate a regional identity formed by lithic use, in contrast to influences by Europeans or other neighboring indigenous groups.

The second scale is the temporal one, which here shall be represented by the three components from the two sites, the Late Woodland Ridgetop at Townley-Read, the 1688-1715 occupation of White Springs, and the 1715-1754 occupation at Townley-Read. Though Jordan (2008) provides extensive background on the historical events leading up to the occupation of the White Springs and Townley-Read sites, there is no lithic data to compare against from those time periods before 1688. The data on the early eighteenth century are essential to our understanding, however. Senecas were not actively threatened by European power during the occupation of New Ganechstage, and Europeans were unable to direct interactions with Seneca people there (Jordan 2008, 354). We are able to see Seneca practices as products of their own choices and labor during this time period, which, as we shall see, greatly affected the choices they made during stone tool production.

The third scale is the household level at Townley-Read. More fine-grained than the other scales, it enables us to get as close to individual action as we can. We are still constrained by the unknown size and duration of each household – the estimated occupation of the site was forty years, during which many people could have lived in these domestic areas. Four areas were identified at the site with high concentrations of faunal material and European-made items, the "Domestic Refuse Clusters," (Jordan

2008, 128-130). Three of these were excavated, and though only two extensively so. Only DRCs 1 and 3 were initially chosen for statistical analysis, but failed to account for a great deal of the variation across the site, and so DRC 2 was eventually included as well. Only DRC 1 has a definitive "short longhouse" structure (Jordan 2003). DRC 3 is referred to as a midden location by Jordan (2008, 150). For the purposes of this paper, I shall consider each Domestic Refuse Cluster as a discrete activity area, and treat them as social units. Even if they do not represent a single household, each still represents choices made by adjacent occupants. As a group, this 18th century component will be considered and referred to as the East Fields.

For White Springs, there is, at present, a lack of spatial compartmentalization. Unlike Townley-Read, it is not divided up into separate Domestic Refuse Clusters, but spatial patterning is still accessible through the variety of features which have been recorded on the site. The test units are in a line, giving a good cross-section of the site, with a distinct rise and fall pattern in lithic density observed. These "hotspots" represent dense activity areas, which may be refuse or processing areas. The site will be treated as a single component, comparable to the Townley-Read East Fields.

The Late Woodland component in the west fields, referred to as the Ridgetop by the excavators, is included in analyses for a combination of regional analysis and geographic comparison. Though it does not contain a dwelling, it is a discrete area on the western end of the site which helps to give a more complete picture of the excavations that took place. However, the majority of artifacts found date from a Precolumbian time period with few Euro-American artifacts (Jordan 2008, 126). The Ridgetop is considered as an important analogy to Seneca-period finds at the site, based upon both spatial proximity as well as presence of the same lithic raw materials.

The Ridgetop is *not* intended as a baseline for comparison to assess change vs. continuity in Seneca culture. The concept of a prehistoric baseline has been critiqued

as ineffective in archaeological interpretation, as it presents an inescapable assumption that the mere presence of European goods on a site indicates cultural disjunction (Silliman 2009). Additionally, there may have been many unseen innovations in the three hundred years between the Ridgetop occupation and that at White Springs. Using the Ridgetop only as an analogy does trade away the diachronic framework which is one of the strengths of archaeology, but will avoid the pitfalls associated with the use of a Precolumbian, temporally distant and culturally "pure" baseline.

The White Springs site provides variation for multiple axes of scalarity. The spatial scale is doubly varied. Instead of a spatially dispersed settlement, as at Townley-Read, we can examine a long-term, nucleated site occupation. This has implications for the nature of the assemblage – already at White Springs, with less area excavated, the lithic sample is much larger. As the ways in which people lived together changed, their domestic habits may well have also changed, providing an avenue for lithic tool use innovation. At the regional level, the White Springs site is about three and a half kilometers away from Townley-Read (Jordan 2008, 97), and represents a shift in the local sphere of influence. Most importantly, White Springs provides with it a variation on temporal scale – with different processes related to European colonization, warfare, and trade, both as influenced by Europeans and by neighboring indigenous groups. Where Townley-Read existed during the profitable (for the Seneca) middleman period, White Springs was founded during what Jordan calls a period of uncertainty (2008, 57). If lithic assemblages are indeed influenced by historical and political-economic processes, then there should be some apparent difference in the ways in which stone tools were produced and used at White Springs and New Ganechstage.

Analytical Issues

At both sites, a large amount of the flakes came from plowzone-related contexts (plowzone, redeposited plowzone, etc.). This included 528 pieces of debitage at Townley-Read (45 of which had signs of wear) and 1156 pieces of debitage at White Springs (13 of which had wear). In neither of these samples are pieces of debitage within the plowzone disproportionately identified as having wear, but it is a real concern in these samples that some of the chert could be plow-damaged. At the macroscopic level, some of this could mimic the same attributes used to determine whether or not a flake was retouched or utilized. Of particular importance were the two types of plow damage termed "Common Linear Retouch" and "Tangential Retouch." Both of these types can be distinguished from the original flintknapping event or events, fortunately. Both types of plow retouch more frequently produce irregularities, resulting in a "sinuous" edge (Mallouf 1982, 88-89). For this reason, I re-examined each item which came from the plow zone and were marked as having wear, and I did not find any signs of either of these types of plow damage. While it is possible that there are other plow-damaged artifacts in this sample, broken into smaller pieces without signs of plow retouch, the majority of those larger specimens appear to have been spared the plow's blade.

Another type of difficulty presented for the analyses here is the type of coverage. At Townley-Read, in deference to the wishes of the Seneca with whom Dr. Jordan communicated, no artifacts were collected during the initial stages of site exploration, instead only mapped and noted. This was part of a deliberate attempt to avoid burials (Jordan 2008). As well, the excavator's concern was largely with households and house forms (Jordan 2003). At White Springs, the situation is more complex, as property rights comes into play, on two neighboring parcels. The space

available for excavation to date has been limited to a smaller strip between the vineyard proper and the adjacent manor property. This limits the spatial distribution of subsurface investigations. Where larger contour maps of the distribution of lithic debitage might be desired, there has not been consistent enough coverage.

Chapter 3: Results

After all flakes were looked at individually, cataloged, and examined for wear, they were grouped by a number of different characteristics, including by site, locus, decortication, and morphology. Patterns in morphological distribution were detected across the sites, as well as changing patterns within Townley-Read. Frequency varied by intrasite location as well. Finally, this chapter will examine a small number of individual lithic artifacts from each site, including four gunflints from White Springs and two gunflints from Townley-Read.

Aggregate Debitage

The results of the lithic investigations at White Springs and Townley-Read have been clustered in several ways. First, the White Springs assemblage was analyzed as a unit, due to the spatial distribution of test units. Townley-Read site-wide statistics are provided as well, but these are only to give a general idea of what may be expected

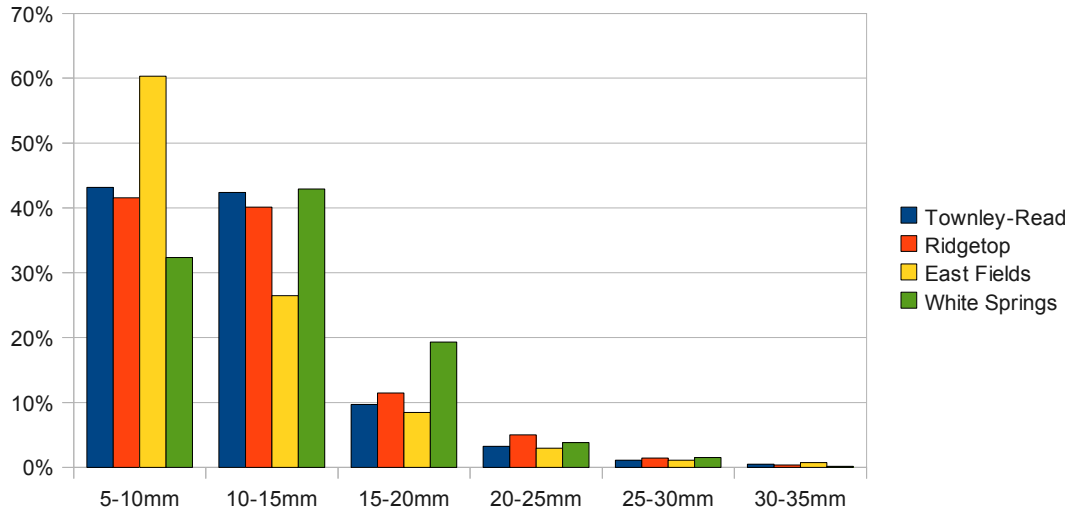

Figure 3: Proportions of debitage size by site

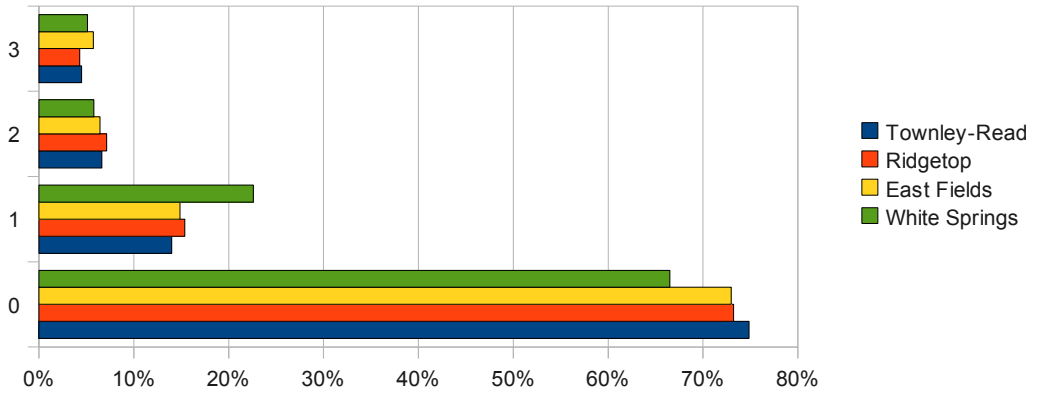

Figure 4: Amount of dorsal cortex remaining on each flake, by site. 0 represents 0% cortex, 1 represents ≤50% cortex, 2 represents >50% cortex, and 3 represent 100% cortex.

due to its geographic location, with the Ridgetop and East Fields so close to one another. Townley-Read is divided into the separate chronological components, the Late Woodland Ridgetop and the 18th century East Fields components, with the East Fields further subdivided by domestic refuse cluster, which may represent houselots.

Notable differences exist between the assemblages (Figure 3); the peak flake size at White Springs is in the 10-15mm range, while Townley-Read peaks at 5-10mm, indicating some kind of difference in flintknapping technique. While both sites show that most flakes have already been completely decorticated (Figure 4), White Springs does seem to have a larger proportion that have at least some cortex on them.

The location of New York State's flint-bearing escarpment should be taken into account when attempting to explain differences between the assemblages at White Springs and Townley-Read. The escarpment runs east-west within the locality of both sites (Illustration 2), making it only a day trip, but when the source is more than a stone's throw away, a knapper is more likely to do the primary decortication at the procurement site, so that the load is lighter to carry home. White Springs is about 3.5 kilometers closer to the escarpment, which may influence the amount of reduction

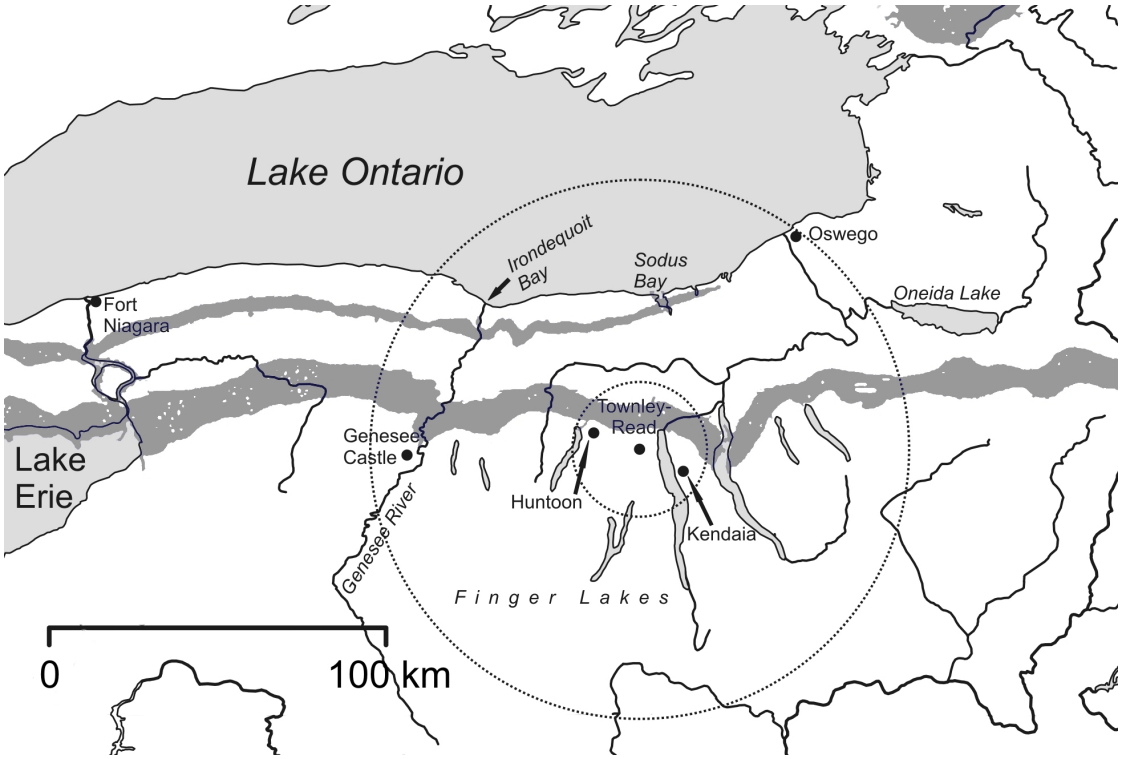

Illustration 2: A map of local and regional scales of the Townley-Read site, indicated by dashed circles at 20km and 80km radii. Light blue areas show flint escarpments of New York state. Local and regional scales adapted from Jordan (Wray and Schoff 1953, 56-57) and escarpment location from Wray (1948).

happening on-site – with White Springs showing a higher overall flake size and a lower amount of completely decorticated flakes than at any of the loci at Townley-Read (Figure 3).

Each site has a large amount of shatter from the tool production process (Table 2), an attribute typically associated with material quality. White Springs has a much higher incidence of shatter than any of the loci at Townley-Read, including the Late Woodland Ridgetop component, suggesting that something may have been consistently affecting material quality at the Townley-Read site across time. Geographic distance from the procurement site is constant between the two components at Townley-Read, and may be what affected the quality of the material used. White Springs, being closer to the escarpment, should have provided easier

Table 1: Flake and Shatter distribution across site loci for samples greater than 5mm in maximum length

Locus	Flakes	%	Shatter	%	Total
Townley-Read	557	60.14	365	39.59	922
East Fields	272	60.04	181	39.96	453
DRC 1	87	71.31	35	28.69	122
DRC 2	48	60.00	32	40.00	80
DRC 3	137	54.58	114	45.42	251
Ridgetop	279	60.26	184	39.74	463
White Springs	606	49.15	627	50.85	1233
All Components	1163	53.97	992	46.03	2155

access to materials, and more time at procurement sites to sort for better flintknapping material. Despite this, White Springs has a higher incidence of shatter, suggesting that something else may have been happening. Perhaps the knappers at Townley-Read had a different procurement site, more local, that is currently unknown to archaeologists, or perhaps the knappers at White Springs simply did not place as high a value upon good stone.

The other remarkable difference between White Springs and Townley-Read is the number of utilized flakes found at each site. At White Springs, the number of

Table 2: Number and percentage of utilized pieces of debitage. Percentages based upon total number of flakes per locus with maximum length greater than 5mm.

Locus	Pieces of Utilized Debitage	%
Townley-Read	58	6.28
East Fields	23	5.08
DRC 1	2	1.64
DRC 2	15	18.75
DRC 3	6	2.36
Ridgetop	32	6.90
White Springs	15	1.22

utilized flakes is a stunningly low 1.22 percent - only fifteen flakes out of the 1,233 recovered pieces of debitage (Table 2). Compare this, for a moment, to the Townley-Read data, where the overall 18th century component shows approximately five percent use of debitage. Despite the large amount of flintknapping going on at White Springs and the apparent lack of formalized tools, there are very few utilized flakes. Clearly, the ends to which stone tools are being put were very different between White Springs and Townley-Read.

White Springs Debitage

The number of pieces of debitage at White Springs is notable at the start. To date, only about half as many 1x1 m excavation units have been dug at White Springs as at Townley-Read, but about one-third more flakes present at the 5mm grade and larger have been recovered. This indicates, already, a much higher density of flakes, in terms of excavated material. This likely reflects at least partially the change in settlement pattern, with occupation being much denser at White Springs than at Townley-Read, where the houses are dispersed and each individual house is smaller. With these 1233 pieces of debitage, the distribution is also heavily weighted towards the center of the line of test units, with the majority being centered in or around Units 6, 9, and 17, which contain Feature 3, tentatively interpreted as a midden (Illustration 3).

The only projectile point found thus far at White Springs is from the plowzone above Feature 3, broken off at the tip, and may be of the Madison variety. There are also relatively few used stone tools from Feature 3, with only one piece of debitage showing expedient wear. This is somewhat to be expected of a feature labeled as a midden; only those pieces which were no longer of use are present, as well as a

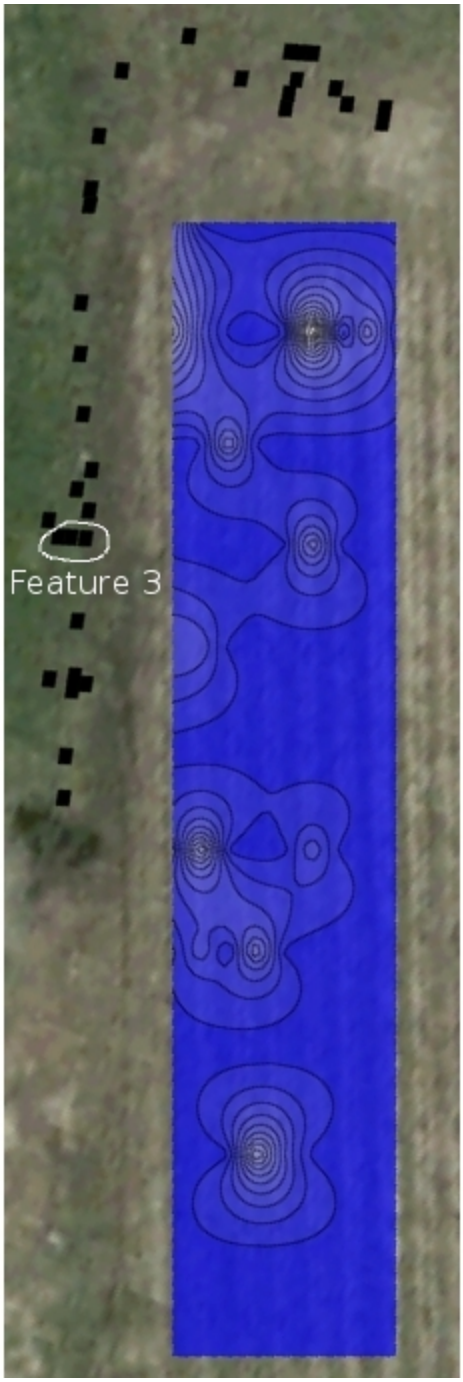

Illustration 3: Test Unit locations and surface lithic density contours at White Springs.

discarded point. This is also the area where two of the four gunflints present at the site ended up, with one of them broken in half, found in the feature fill of TU 9, consistent with the designation as a refuse pit.

Also notable at White Springs is that every Test Unit has at least some lithic debitage in it; this is likely due to the high occupation density, though one must be careful not to engage in circular reasoning. With only one exception (out of redeposited plowzone), all of the utilized debitage comes from Feature 3 or points south.

Flotation samples were taken from several features at the site, and are still being processed at the time of this writing. Of these, samples have been analyzed from pit features (Features 2 and 3) and from a possible post (Feature 4). The sample from Feature 3 was from TU 9, and contained only 636 pieces of debitage which were less than 5mm, mostly at the 1-2mm range (n=391). By contrast, the sample from Feature 4 had 143 flakes (120 at 1-2mm), and the two samples from Feature 2, the other pit feature, had 990 and 715 pieces of debitage, again, mostly from the 1-2mm range (n=699 and 226, respectively). This seems to show that a lot of very small flakes, possibly related to resharpening activities, were being produced at those locations. The tools being resharpened may have been either formal or expedient – resharpening either would result in the same small pressure flakes. These numbers are, additionally, in sharp contrast to the amount of flakes in a flotation sample from DRC 3 at Townley-Read, to be discussed later.

Townley-Read Debitage

Because the excavations were not conducted with an eye towards eventual aggregate analysis of debitage, flotation samples were not taken as regularly at

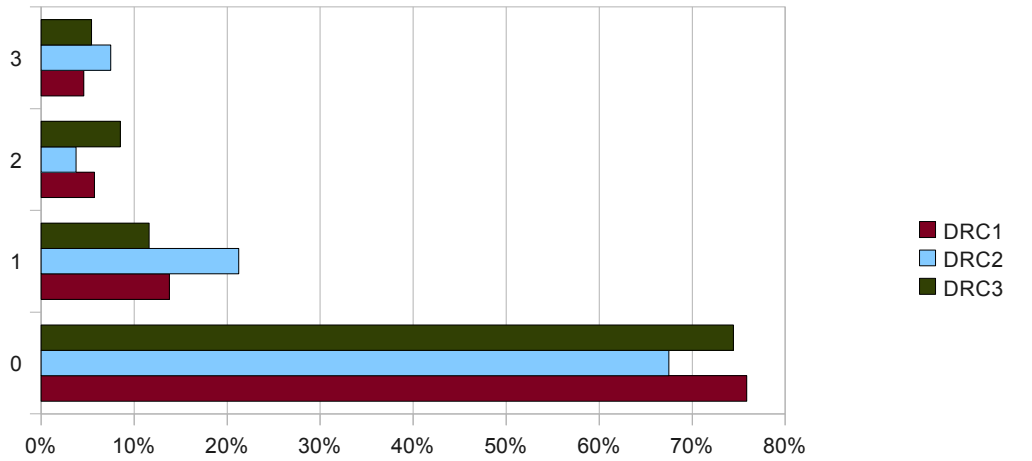

Figure 5: Degree of decortication on the dorsal surfaces of flakes larger than 5mm at each Townley-Read locus.

Townley-Read as I would have hoped, and so most of the data presented necessarily ignore the debitage smaller than 5mm, in order to standardize the sample. After examining each flake carefully, and tabulating them, the first results gave the appearance of uniformity across Townley-Read. There is a decisive norm for almost every metric, be that the flake size, amount of decortication, material type, or amount of shatter. This becomes far more interesting when compared to the White Springs sample, which has its own patterns in flake size, morphology, and utilization.

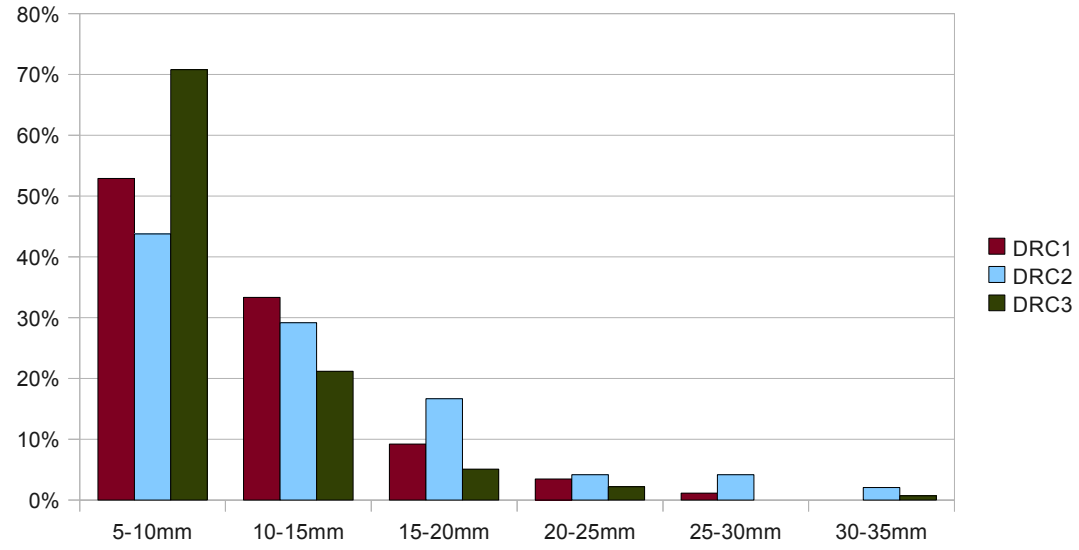

Figure 6: Debitage Size at each Townley-Read locus.

While an average can be extrapolated from the patterns that occur across all loci in the East Fields at Townley-Read, every locus also deviates from the average in important ways. The amount of primary stone tool production, also called lithic reduction, is indicated by the amount of cortex on each flake, and the size of the flakes. An earlier flake in the sequence is likely to be larger and contain more cortex. Because the debitage at the site has a relatively low amount of cortex (seventy-five percent of flakes show no signs of cortex) and a small flake size (ninety-nine percent of flakes are smaller than 20mm at maximum width), we can assume that most primary lithic reduction took place elsewhere, perhaps at quarry locations, or at another, unexcavated portion of the site. The material is relatively uniform, with only a few flakes (n=12) that are not of Onondaga chert, and the assemblage shows a very consistent percentage of shatter, or material that did not flake off, but broke off. The Ridgetop is a useful comparison here. The amount of shatter is consistent with the Ridgetop, which may indicate the simple difficulty in working the material. Another explanation may be that the procurement site was farther afield, and that primary decortication happened at that site, in order to reduce the load carried home.

Each site locus within Townley-Read does possess something of its own character. DRC 3 has a slightly higher amount of late-stage flaking going on, as is shown by the lower flake size. Once the flotation samples are considered, the number of small flakes skyrockets. While DRCs 1 and 2 show a roughly equal amount of small flaking, DRC 3 had over 3000 small flakes from a single flotation sample (context #922). As tool size gets smaller, and nearer to completion, so too do flakes get progressively smaller (Andrefsky 1998, 96). It should be noted that the DRC 3 sample comes from the middle of a trench in a unit that contains a posthole feature, and the neighboring units have few (if any) pieces of lithic debitage. This large disparity may represent household cleaning, as flakes were swept aside to the edge of the houselot.

That being said, this is still an extremely high concentration, whether or not it was representative of density of domestic activity. We can take this phenomenal number of tiny flakes at DRC 3 to indicate that this is a location where a number of tools (formal, expedient, or both) were sharpened and finished – or, conversely, where a small number of tools were being resharpened successively as they wore down. This is one of the several reasons that I shall propose for the lack of formalized tools at the Townley-Read site.

It should be noted that this is a different interpretation of DRC 3 than is presented by Jordan (2008), who asserted that this DRC is a buried plowed midden. In contrast to the density of faunal remains identified by Jordan (2008, 150) as being indicative of a midden area, the lithic material does not possess any uniformity. The plow scars at the bottom of the midden are the proof that Jordan (Jordan 2008, 152) presents that this area was plowed, an interpretation I would not disagree with. Instead, I would suggest that the uniformity of the feature results not from use as a midden, but has instead been blended by plowing. The final reason I would give for the identification of this area as a houselot are the single postmold and hearth features that were found in DRC 3; perhaps other features and postmolds were destroyed by the plowing (2008, 152). There are two implications of this point of difference. The first is that there is a midden feature excavated at White Springs (Feature 3) which no longer has an equivalent feature to compare against at Townley-Read. The second implication regards deposition of used-up stone tools; if exhausted tools are disposed of in a midden (such as the lone projectile point at White Springs), those tools would not have been found in the Townley-Read excavations, which I interpret as all residential contexts. Future research may attempt to locate such a midden, if one indeed exists at Townley-Read.

The second locus I would like to examine is DRC 1. Here, the lithic debitage matches the site average almost completely. The only deviation is in the amount of shatter produced. Here, unlike the other areas of the site, the amount of shatter over 5mm in size is about ten percent lower (Table 1), about one quarter of the shatter found at other loci. This could be due to a steadier hand in the knapping, a difference in technique, or, more possibly, better quality material. I tend to discount the former two explanations because of the close resemblance to the patterns at the Ridgetop. One would expect that if there is variation in technical skill across space, it would also vary across time, and yet this does not seem to be the case at the remainder of the site loci.

The Ridgetop shows a number of worked tools, more than anywhere else on the site. It is here, in the Precolumbian component of the site, that all four bifacial tools (two projectile points and two more ambiguous bifaces) were found, as well as a single scraper. The knapping patterns closely resemble those elsewhere on the site, indicating a similarity in production techniques. Just as it has most of the large tools found at the site (six out of ten), it also has the most expedient flake tools, some showing slight modification, others used as they were. Thirty-two flake tools were found, comprising nearly 6.9 percent of the flakes. This is extremely important as we consider the final locus in the study.

DRC 2 has the smallest amount of lithic debitage excavated within Townley-Read (Table 2), due to the limited amount of excavation that took place in that locus (Jordan 2008, 147). Though no conclusions were made concerning the nature of DRC 2 in Jordan's analysis of the site, the lithics provide a clearer picture. Here, instead of the meager two and six utilized flakes unearthed at DRCs 1 and 3, respectively, there are fifteen utilized flake tools – making up nearly a fifth of the large (>5mm) flakes excavated from the locus. The amount of early stage reduction at this DRC is also slightly larger than that at other loci – flake size is larger, and there are more

decortication flakes present. Most of the utilized flakes are larger than 20mm, and few are smaller than 10mm. This gives the impression that the families residing in DRC 2 were deliberately using stone tools as a convenient source of cutting implements. I hope that future excavations at Townley-Read can explore this area more fully, as it may indicate whether the lack of formal tools at this location was the result of indigenous preference or of sample size.

Individual Artifacts

There are several notable artifacts from each site, which I shall address presently. One set of artifacts to discuss here is gunflints. Though not part of the debitage analysis, and not of indigenous origin, these items are still made from chert, and are considered here as part of the material class under analysis. We cannot assume that simply because they were not *invented* by the Senecas that they were considered a non-Seneca piece of the toolkit. Indeed, their prevalence in comparison to stone projectile points suggests a substantial degree of incorporation into Seneca lifeways. As mentioned before, few locally-made formalized tools have been found at either site. The only bifacially worked pieces of local manufacture are illustrated here, WS142 (Illustration 4), TR68.1, TR68.5, and TR71.1 (Illustration 5).

Notable White Springs Artifacts

The White Springs point does have excellent contextual information. Excavators found the point in the plowzone of Test Unit 9, the same unit which yielded more than 300 flakes from the plowzone and feature fill combined, and contained Feature 3, the midden deposit. Identified as a Madison point, a typical Late

Illustration 4: Notable lithic artifacts from White Springs. WS142, Madison point tip. WS248, Split spall-type gunflint. WS276, WS289a, WS289b, Spall-type gunflints. Artifact numbers are preliminary and are not catalog numbers.

Woodland type, it is related to similar projectile point types found across the eastern United States (Ritchie 1971, 33-34). It is the only evidence for projectile point manufacture at White Springs. Given the extremely wide range of manufacture, geographically and culturally, it is doubtful that this type held any special meaning as demarcating Seneca culture from either their Iroquoian or non-Iroquoian neighbors. It is certainly outnumbered by the gunflints, another projectile-related technology.

At White Springs, four gunflints have been found (Illustration 4). Two were found within Feature 3; the other two were found a scant four meters north. Out of these four, three are definitely spall-type gunflints, as defined by Luedtke (1999). They have two smooth surfaces on both the ventral and dorsal sides, which Luedtke points out is what differentiates them from what some archaeologists might mistake as

scrapers. This somewhat circumstantially indicates that they are most likely of Dutch or English origin, as the French are suspected not to have ever produced spall-type gunflints (Luedtke 1999, 33). Additionally, they are all composed of a nearly identical material – it is entirely possible that they all came off of the same stone, though it is more likely that they simply shared a common source. All of the gunflints from both White Springs and Townley-Read have been compared against a fairly exhaustive list of New York State flints, compiled by Charles Wray (1948). No New York sources match the translucency of any of the six gunflints. Although several sources (Esopus, Leray, Fort Ann, and Whitehall [1948, 31]) have gray color and are spotted either white or glassy, the individual descriptions indicate graininess, coarseness, or dullness, meaning that none of which match the glossy, smooth gray chert of the White Springs gunflints. Nor do those flints match typical French gunflint descriptions (Durst 2009). Given the ongoing tensions that the residents of White Springs had with the French, it is somewhat unsurprising that they preferred to acquire their gunflints elsewhere. Shortly before submission of this thesis, however, it should be noted that two "blonde" gunflints were excavated at White Springs, which does call this hypothesis into question, though due to time constraints, these gunflints cannot be incorporated into this analysis. None of the gray gunflints display any wear that would be associated with uses unaffiliated with a firing mechanism. Their presence is certainly notable, especially in counterpoint to the absence of significant numbers of projectile points at White Springs.

Notable Townley-Read Artifacts

Several formal tools have been found at the Townley-Read site. All of them, however, come from the Late Woodland Ridgetop component. They are useful for

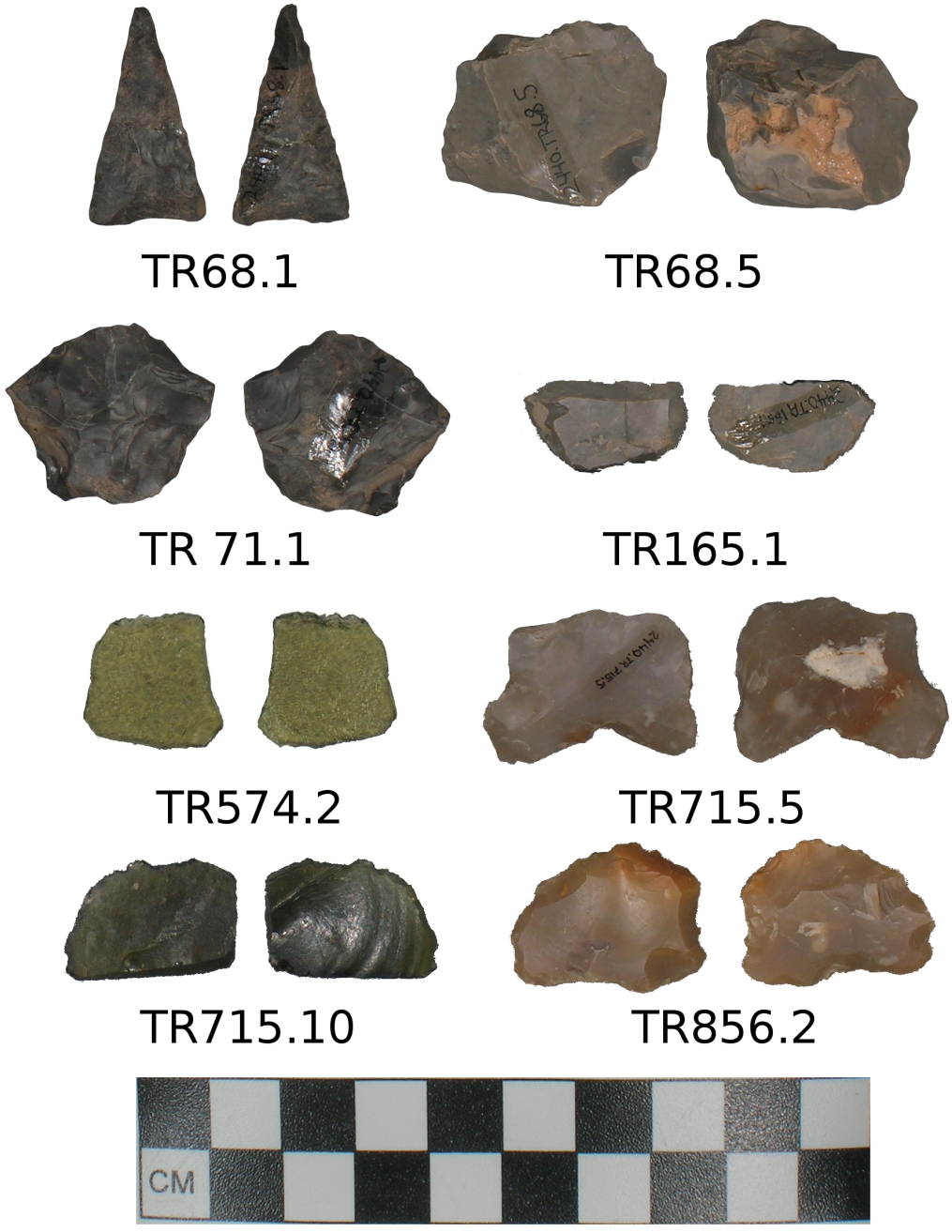

Illustration 5: Notable lithic and glass artifacts from Townley-Read. TR68.1, Madison point. TR68.5, Exhausted core. TR71.1, Biface. TR165.1, Scraper. TR574.2, TR715.10, Utilized green glass. TR 715.5, Battered “blonde” gunflint, possibly of french origin. TR856.2, “Blonde” gunflint, possibly of French origin. TR68.1, TR68.5, TR71.1, and TR165.1 are from the Ridgetop component; TR574.2, TR715.5, TR715.10, and TR856.2 are from the East Fields component.

comparison to how a group in the same location might make different use of the available material. TR68.1 and TR71.1 have been bifacially worked; the first is a complete Madison point. This demonstrates some continuity of stone tool tradition between the Ridgetop and White Springs, though the remainder of the toolkit seems to have undergone significant changes. TR 71.1, though bifacially worked, does not appear to match any kind of standardized tool form. TR68.5 is an exhausted core, of the type likely used to create expedient flakes, and has flake scars across the top.

At Townley-Read, two gunflints were recovered, both of the "blonde" color typically associated with France (Durst 2009). A single "blonde" flake (TR521.38) was also found in DRC 1. A chemical testing process known as laser ablation inductively coupled plasma-mass spectrometry (LA-ICP-MS) would be useful to confirm these associations (e.g., Durst 2009), for both the Townley-Read specimens and the White Springs specimens. The Townley-Read gunflints are much more heavily used, and do fall into the morphology expected of French blade type gunflints (Luedtke 1999), showing retouch on the ventral surface of the flint. Again, neither show definitive evidence of having been used for any other purpose, but one of them (TR715.5) shows extreme battering, which may be evidence of secondary use as a fire flint. This gunflint was found on the surface near the one definitive glass flake (TR715.10) at Townley-Read, and perhaps this location (located within Area H) requires more subsurface investigation. The undamaged gunflint (TR856.2) was found in shovel test 240, in DRC 3, along with a 17g chunk of Onondaga chert that may have been a discarded preform. This was at the far southeastern extent of the buried horizon in DRC 3 at Townley-Read (Jordan 2008, 149), an area that may also warrant further investigation in the future.

Townley-Read has two notable glass artifacts that may be tools. Glass, as a potential knapping material, was examined and recorded during the debitage analysis,

but only two pieces showed any signs of having been deliberately knapped. The first artifact, TR574.2 (Illustration 3), was found in DRC 1, a piece of flat glass, green, and somewhat patinated, likely from the Seneca occupation era. Many pieces of glass at both Townley-Read and White Springs have breakage patterns that are sharp, but do not display the regularity assumed to occur from deliberate knapping and retouch (e.g., Mallouf 1982). This is further substantiated by the fact that these items displaying sharp breakage are frequently too recently produced (after Euro-American occupation of the properties) to actually represent deliberate flintknapping. This piece, however, is regular enough that it can be assumed to be genuine wear. Only one edge of the four displays this sharpening, and it may have been used as a cutting or scraping tool.

More distinctive is the piece, TR715.10, found in Area H through surface investigation, though it is not associated with any distinct Domestic Refuse Cluster. This piece is notable because not only does it show the same consistent signs of some retouch, but actually shows signs of being deliberately produced as a flake. It is a distinct entire flake, consisting of a bulb of percussion at one end, and ripple marks across the dorsal surface – a real conchoidal flake, of the type not produced by typical accidental breakage (such as a shattered bottle). The lower edge (as positioned in Illustration 5) is from an original break and does not show signs of being retouched. Though it does not appear to have been deliberately resharpened, the edge shows wear from use as an edge tool of some sort. This demonstrates that at least some kind of incorporation was made by residents at Townley-Read of glass into their repertoire, however rare. No such artifacts have been found yet at White Springs.

A final object to be addressed is one identified by Jordan as an “olive glass shard”, TR706.4 (2008, Figure 10.3). This particular piece of glass has a very pronounced bulb of percussion, and appears to have been struck at a very steep angle. There are no signs of utilization or deliberate knapping on the piece, either. It is most

likely incidental damage from a vessel breaking, and the same pattern of breakage has been observed by this author on much more recent vessels which were definitively not worked. Unless a formalized tool is found at Townley-Read, which was created from the same material, there is nothing to suggest that this flake was deliberately crafted, and is most likely not the product of flintknapping activity.

Chapter 4: Discussion

In Chapter 2, I addressed the issue of scales of analysis, and how they alter the interpretations of the archaeological record. In the following discussion of the debitage at Townley-Read and White Springs, I have broken up the analysis into a spatial, regional view, where the larger forces are taken into consideration to make sense of the overall patterns that occur across both sites. Then, we are able to look at both sites at the site-wide levels and address lithic tool manufacture and use at White Springs and how the residents of Townley-Read altered these patterns. Finally, we are able to take an in-depth look at the ways in which stone tool use varied, indicating some spatial organization at White Springs, and the innovative ways in which different households were using stone tools at Townley-Read.

The Regional View – Consistency in 18th Century Production

The chipped stone tools at White Springs and Townley-Read appear very simple in comparison to the tools of other earlier time periods. There is an overall dearth of formalized stone tool forms, even compared to the Late Woodland component on the Townley-Read Ridgetop. It extremely tempting to attribute this to one of two tropes traditionally utilized by researchers. The first is the acculturative model of culture change, whereby the Native American tools were gradually (or suddenly) replaced by European goods, and the second is raw material quality and availability. At this time, Europeans had been in North America for more than two centuries, and the historical records show that Senecas certainly had more than a passing familiarity with metal tools, as evidenced by their demand for European metalworkers to come to their villages (Jordan 2008). One would expect to find a

number of metal tools in the record because of this, even though metal objects may not have been as easily broken and discarded, and many were returned immediately to the smiths for reworking (Silliman 2008). If an overzealous population consistently returned all broken metal objects to the smithy, there would probably be a much lower incidence of discarded scrap metal – e.g., nails, hinges, wire, and other unidentifiable objects in the Townley-Read and White Springs assemblages.

Another possibility is the quality of the lithic material. Andrefsky presents a contingency table demonstrating how lithic quality and abundance affect the kinds of tools produced by knappers (Table 3), but this scheme fails to address the circumstances at the White Springs or Townley-Read sites. He correlates lithic quality directly to how many formal tools are produced, indicating that a higher-quality chert will lead to formal tool production, while a lower-quality chert will lead to what he terms "informal" production. One would therefore expect the Ridgetop therefore to have both a high quality and abundance of chert, by the high number of formal and informal tools, while the Postcolumbian component has a poorer quality of chert, as evidenced by the many expedient tools at DRC 2, and the lack of any chipped stone tools at DRCs 1 and 3. The hole in this model is that the lithic quality appears to be more or less consistent across Townley-Read, with the exception of DRC 1, where the degree of lithic shatter is lower, and yet has the fewest stone tools of any of the loci. At White Springs, which is the closest to the Onondaga chert escarpment, and presumably has the best access to high quality material of the three site components

Table 3: Contingency table showing correlation between availability and quality of raw material. Adapted from Andrefsky (1998, 154)

	High Lithic Quality	Low Lithic Quality
High Lithic Availability	Formal and Informal Tools	Primarily Informal Tools
Low Lithic Availability	Primarily Formal Tools	Primarily Informal Tools

examined here, there is actually a higher proportion of shatter in the assemblage. It can be safely assumed that, under these circumstances, the quality of the material is actually not a factor considered by the flintknappers, whether in their choice of cobbles to work, nor in their decision not to make as many stone tools as during previous periods.

As pointed out earlier, formalized stone tool use in the Northeast was already being reduced *before* the first interactions with Europeans (Abel 2000) – so any choice not to use stone tools should not be viewed in Seneca contexts as discontinuity or neglect. The Late Woodland period has been noted elsewhere as well as having a rise in expedient tool use and "a concomitant reduction over time in formal tools" (Engelbrecht 2003, 34). Also, White Springs shows evidence of other kinds of projectile technology being discarded in the midden – the gunflints. If gunflints were being discarded at the midden, why wouldn't an old arrowhead be put into the midden as well, broken during hunting or perhaps removed from a carcass during processing of the kill? With the current evidence, we can say that the relative absence of stone arrowheads is likely proof that they were dropping out of favor with the Seneca.

Some stone tools were used for hunting, as evidenced by the gunflints at both sites. These stone tools do require occasional maintenance which could easily have been carried out by Senecas, and as evidenced by the single "blonde" flake at Townley-Read. Still, much of the stone tool use and production at White Springs and Townley-Read goes unaccounted for, in the face of so much lithic debitage. Most sources point towards alternate uses for stone tools in domestic contexts. The patterns have been suggested for other time periods, such as the New England Archaic, where flake knives and utilized flakes are considered more useful for plant and meat processing in residential areas (Jones 2008, 79). The same pattern of utilized flakes has been suggested for domestic contexts in Peru, and possibly cross-culturally, by a

feminist scholar as well (Gero 1991). The Townley-Read midden also contains many pieces of bone, further the idea that perhaps the lithic debitage and faunal remains were all dumped at the same time, in the same place. It is probable that stone tools were therefore mainly a domestic product used by the Senecas at both sites. Though there is no evidence that women at the White Springs sites were in charge of domestic labor, and therefore the lithic technology as well, we should not assume that men alone were producing these stone tools.

The Spatial Organization of White Springs

The most striking thing about the White Springs site, in contrast to its successor village, is the extremely low amount of debitage that has been utilized, in combination with a remarkably low number of chipped stone tools. With only fifteen pieces of utilized debitage, it has a lower degree of use than at any of the loci at Townley-Read. This is not too surprising, given the features and contexts which have produced the most flakes at White Springs – over half of the large (>5mm) debitage is found in the four Test Units closest to Feature 3, interpreted as a midden. If tools are being produced elsewhere, but refuse from that toolmaking is being dumped in this location, one would not expect to find anything but unused debitage in this location. Therefore, those few outlying utilized flakes that also are deposited in the midden will show up as only a small portion of the sample. The easiest conclusion to come to is that the stone tools being produced are simply not being discarded at the site. Especially if projectile point technology is the most common, one would not expect many lost arrowheads to show up in a village midden. Broken arrowheads may get resharpened as well, or converted into other tools, rendering the final artifact deposited into the archaeological record unrecognizable.

However, this does not hold up extremely well once the remaining evidence is tallied. There is a cluster of pits in the southern half of the line of test units, around 1060N, that is centered around Feature 3, the tentatively identified midden feature. The southern half of the row of Test Units contains, as mentioned previously, nearly all of the utilized flakes – the majority of them around this 1060N cluster. I do not believe that this is a bias resultant from selection of the test unit locations, as there is a similar number of test pits in the northern end of the site, with significant variation in lithic density. Both gunflints (WS248 and WS276) which were found in undisturbed contexts were found in the southern cluster, as well as the single Madison point tip.

Townley-Read Households

In the three examined households at the Townley-Read site, we can see several different mechanisms for adapting to the new situation that Senecas found themselves in. They changed their settlement pattern to conform to their current needs, switching from a nucleated village model to one with dispersed neighborhoods (Jordan 2004). The lithic record clearly demonstrates, however, that this was a time period of multiple innovations, with each household producing a new pattern of production or consumption to fit their own needs and, possibly, their own agendas. These patterns are fully illuminated by examining the other lines of evidence at the site.

DRC 1, as mentioned above, may have had access to, or preference for, slightly higher quality chert, as evidenced by the lower occurrence of lithic shatter at the locus. However, instead of leading to increased tool production, it is less evident here than elsewhere in the East Fields. This lack of chipped stone tool production correlates to a greater concentration of metal, suggesting an increased reliance on metal tools to do the same jobs. Though it is tempting to put this into an acculturative model, suggesting

that stone tools were abandoned in favor of metal ones, this fails to explain why there are more metal tools *as well as* a higher quality of chert – the acculturative model would lead one to expect a decrease in chert quality. Instead, at DRC 1, they seem to have had access to a better quality of material all around. There are 34 brass scraps, and 2 brass projectile points, the only ones found at the site. This highlights one of the flaws of acculturative theory: it tends to be deterministic (Cusick 1998), and yet we have this example of material replacement at only one of the site loci. I suggest that instead of assimilation, this represents conscious choices on the part of social actors, which can be seen by incorporating other aspects of the record.

If the occupants of DRC 1 were simply attempting to assimilate into European cultural norms, one would expect there to be higher numbers of European artifacts all around. Where Jordan breaks up artifact and ecofact counts by houselot or area (2008, 284, 312), we can see that DRC 1 has a similar percentage to DRC 3 of white-tailed deer specimens against the total Mammalian NISP, and the bottle glass comprises a much smaller percentage of total surface finds. If they had preferential access to European goods, one might expect food stores and bottle glass to reflect this, but instead, they still retain a high number of deer specimens. Senecas were using deerskins to maintain trade with Europeans and access to their goods (Jordan 2008, 343), and the high number of deer specimens is consistent with the high amount of European metal goods obtained (and discarded) by members of the houselot. These same people were not using glass to as high a degree, however, and so they were not trading for every type of European good that they could obtain, but were actively prioritizing certain types over others.

At DRC 2, the houselot with the highest percentage of utilized flakes, we see only one iron object that is not a nail. This continues the inverse correlation of chipped stone tools to metal European goods, but it is difficult to be certain, as much less

volume was excavated at DRC 2 than at other areas. Despite this lower amount of metal, it is notable that there is more red stone in this area (Jordan 2008, 305), and may be another example of trade priorities by the residents. This red stone may have been important in the cosmology of the Iroquois (Hamell 1992), and would have had to have been acquired over possibly long distances, as some sources are located at the New York-Vermont border, and other sources are located in Minnesota, Wisconsin, Ohio, South Dakota, Kansas, and perhaps even Arizona. This red stone would have likely been obtained from other Native American groups through Townley-Read involvement as a middleman in trade between Europeans and the Senecas' western neighbors (Jordan 2008, 303-304). The increased early-stage lithic reduction also suggests that more stone tool production may have been occurring at this locus. Unfortunately, it is extremely difficult to assess these variables without further excavation at the location. Because the stone tools here appear to have been used primarily for domestic tasks, it seems that the residents of DRC 2 may have been engaged in those processing tasks more intensively. This may be related to changes in their trading patterns with Europeans, as with DRC 1, where there may have been more processing of skins to trade. Future research on the specific wear patterns at DRC 2 may prove useful in proving (or disproving) this hypothesis.

The third Domestic Refuse Cluster is differentiated from the others by the unusually high number of small waste flakes present. This may be due to the number of flotation samples taken at this locus as opposed to others, and so I will not compare the tiny resharpening flakes against the number of flakes greater than 5mm. Though statistically significant, they should be taken anecdotally, as the difference could be due to sampling strategy. As mentioned before, they signify either resharpening or finishing stages of stone tool production. For this reason, we know that stone tools (whether formal or expedient) were being used at this location, but just not making it

into the archaeological record. We must not take this absence of evidence as proof that stone tools were not used here.

Instead, the residents of DRC 3 likely put an extremely high value on stone tool use. In the event that these stone tools were continually being finished here, they must have been discarded elsewhere on site. If the DRC is a buried midden, as Jordan (2008) suggests, then we should also expect to find the broken pieces of formal stone tools in this locus along with the debitage of their production. Instead there are none, suggesting that if they were broken, they were not discarded, and retained intensive value, most likely being resharpened. This is further evidence that DRC 3 is likely a houselot, instead of a midden.

If stone tools continue to be highly valued by these residents, what is the value of other tools to them? There are two exhausted cores at this location, also implying a high degree of stone tool use, as pieces are taken off of the core to form other tools. Two gunflints were also found at this location, so not only could projectile points have been produced at Townley-Read, but flintlock firearms were in use as well. Both of these are only conjecture, lacking evidence for either bow or full flintlock technology. One of the gunflints has also clearly been reused, demonstrating another purpose for these gunflints outside of the European technological milieu. There are also fifteen brass scraps here (though none of them are reworked into arrowheads) and three pieces of iron (excepting nails). This could demonstrate a lower degree of participation in European trade by these residents, yet the deer remains are in an equal proportion to those found at DRC 1 (Jordan 2008, 284). There are also the most glass fragments here, none of which have been modified at any of the loci, though two modified glass items were found in outlying areas. Again, one can see here the conscious decisions to use different materials in different ways; gunflints appear to have been good enough to

rework into indigenous forms, while glass was usually left aside and used only as a vessel.

Change Over Time

The lithic assemblages at White Springs and Townley-Read clearly refute notions of cultural erosion at the hands of prolonged European exposure. Stone tool use rises and falls between the different sites and components, as utilized flakes are used heavily in the Late Woodland at the Ridgetop, dip in popularity at the White Springs site, and then enjoy variable popularity among different houselots at the Townley-Read site. While this could be construed as simply fitting into Rogers' admittedly non-linear model of acculturation, there are far too many things happening in multiple avenues of material culture at this site to simply say that indigenous identity goes through cycles of death and rebirth. Though I sought evidence for some kind of distinctive Seneca identity and a reflection of the historical record within the lithic record from these three components, what I found seems to be much more straightforward. Patterns of lithic reduction, as shown by varied amounts of morphological attributes, seems to be more related to the distance over which Senecas accessed the raw materials, and the quality thereof.

This is not to say that Seneca identities and lithic use were not influenced by the presence of Europeans. Indeed, it would be naïve to believe that the expeditions mounted by the French in the 17th century had no impact upon the Seneca nation, as the totality of that warfare forced them out of their homeland for half of a year. Likewise, as clearly demonstrated by Jordan (2008), the latter period of occupation at the Townley-Read site was, thanks to Seneca self-determination, relatively positive, and the encroaching European presence was still a part of that equation. This is not

necessarily going to be directly reflected by the stone tool archaeology. While this initially appears to be a null hypothesis, it actually has much greater meaning. In spite of everything else that changed at these sites, the lithic practices remained similar, showing a remarkable tenacity. Perhaps this is because chipped stone was part of a domestic activity, more easily controlled, less highly visible.

With luck, future further excavations, perhaps at smaller Iroquois remote camps (a 17th or 18th century version of the Plus Site), or the Seneca remote satellite communities in their Ohio, Ontario, Pennsylvania, and Quebec territories (Jordan 2010), will shed further light on this topic. One such remote village from the mid-17th century is Bead Hill. Located in Ontario on the north shore of Lake Ontario, it was occupied from about 1665-1687 CE (Poulton 1991). Both gunflints and stone tools were much more visible at this village, with eight gunflints (three of North American chert, five of European chert), seven projectile points, and nineteen other formal tools (Poulton 1991). Though the incidence of utilized flakes at this site is comparable to White Springs, with 26 utilized flakes and 2552 pieces of debitage (Poulton 1991, 25), formal tools clearly played a more important role. The time period is not synchronous with either White Springs or Townley-Read, dating from just before the Denonville expedition. Perhaps the reduction in stone tools at White Springs and Townley-Read is more indicative of change than comparison with Late Woodland examples would lead me to believe; alternatively, the Bead Hill site may represent an intensification of stone tool use in relation to its distance from the Seneca homeland, or some other function of political-economic circumstance. If farther removed from European trading partners, they may have chosen to use fewer metal tools. As well, with European smiths being supplied at later time periods, metal tool wear and breakage may have represented a larger inconvenience than at the later White Springs and

Townley-Read sites. Flintlocks were clearly being used, but unlike White Springs and Townley-Read, Native chert sources were used for some of the gunflints.

Across the Townley-Read site, lithic practices were kept alive and healthy instead of being replaced by European stone tools. Instead, there was active adaptation and change in the ways in which lithic manufacture and use was conducted. What Gosden predicts will occur in middle ground situations (2004) (which I here equate to Alexander's concept of cultural entanglement [1998]) is demonstrated. This was a period of heightened cultural experimentation and innovation. The key here is that they used economic and productive methods that were neither European nor pre-existing. In many ways, it echoed the transitions in house forms and settlement patterns during this time period – in neither case was an entirely European cultural pattern adopted, but neither was it represented in previous sites. The short longhouse and dispersed settlement pattern indicate creativity among Senecas. There seems to have been experimentation in all aspects of life: production, trade, and construction.

At the present time, it is difficult to determine what may have prompted experimentation in stone tool use and production. Senecas were making active choices about their stone tool use, but in none of the above examples do they experiment with glass, a very high quality material for flintknapping. There are two possibly worked glass flakes at the site, but neither of them occur within a Domestic Refuse Cluster. As they do not occur in a household, it is possible that they were used out of convenience, but never used indoors for any more routine work, such as food preparation. Senecas clearly made a distinction as to the "fitness" of certain materials over others, whatever the functional aspects of those materials may have been. This echoes the absence of certain types of stone tools from the archaeological record at Rancho Petaluma, where the Native American rancho workers made decisions about which tools to bring home with them (Silliman 2008). There is a social distinction (or perhaps a power

relationship) that affects which types of material culture were being adopted at Townley-Read.

It is obvious that technological examination cannot be analyzed only at the macro scale. When there are three different household adaptations to the pressures (or lack thereof) during the time period, a regional analysis, such as Rogers' (1990), fails to account for the variability that may occur in any cultural interactions. These three different strategies could be easily obscured by accumulative site comparisons, especially if those households did not all occupy the same time frame. The Seneca village at New Ganechstage existed within its own cultural situation, which may not have been true of previous, more violent periods, or other regions, such as the Mohawk Valley (Jordan 2008, 354; 2009). With so much variation within the group, cultural analogies are difficult to draw, as they frequently rely upon monolithic representations.

Also important to note is that the debitage analysis here gives us insight into the different ways people were using stone tools, and may indicate some social difference, though I hesitate to use the word inequality. It demonstrates that any society is still made up of individuals who participate in different social structures to different degrees, and interact with Europeans to fit their own needs. In DRC 1, the material was demonstrated to have its own value, due to the higher quality of the material. At DRC 2, the residents valued stone tools for their functionality, making expedient tools as necessary. Finally, at DRC 3, the tools seem to have been valued for their own forms – very few expedient tools were used, and bifacial tools disappeared from the record due to their continual upkeep and assumed reuse. Each of these represents a separate set of attitudes and conscious decisions.

Conclusion: No Better, No Worse

Though political economy has had a key role in the development of New Ganechstage (Jordan 2008), the lithic record does not seem to reflect the changing conditions directly. Lithic technology could likely react in a variety of different ways to the political landscape. Instead, lithic technology seems to display more variation based upon the context of use, detectable as spatial variation at White Springs, and the different ways in which dispersed households at Townley-Read utilized their stone tools. The other variable put forward, that of lithic source distance and quality, is also not the single key factor. At the temporal level, we can see that formalization of tool use is completely independent of lithic resource proximity, as the Ridgetop used more formalized and bifacially worked stone tools than did the occupants of Townley-Read. Likewise, the intensity of expedient tool use appears to be higher at Townley-Read than at White Springs, both of which had similar access to lithic procurement resources.

The frequently ignored lithic assemblages at these 17th and 18th century indigenous sites provide a powerful vector for understanding life in the past. Attention should be paid to the patterns in the debitage, where those sites are lacking in formal stone tools. A single projectile point may be useful from a cultural-historical perspective for obtaining an idea of the occupation period of the site, but the debitage can tell us so much more. We know that stone tool traditions, rather than dying out with the advent of metal material culture in Seneca territories, were actually alive and well, and may have been valued crafts. It also creates a sequence of lithic development where change is not immediately equated with decay. The very fact that stone tool use changed between White Springs and Townley-Read demonstrates that people – some of them knapping at both sites, given their consecutive occupations – were making

active decisions about how to practice stone tool manufacture. These active decisions refute the old acculturative models, where stone tools were discarded for supposedly "superior" metal ones, and indeed the technologies existed side-by-side from 1688 to 1754, and most likely longer.

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