Current Research in New York Archaeology: A.D. 700–1300

EDITED BY

Christina B. Rieth
and
John P. Hart

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PREFACE

This volume is based on a symposium that we organized for the New York State Archaeological Association's 94th annual meeting in Ellenville, New York, on April 24, 2010. Our intention for the symposium was to highlight the wide range of current archaeological research in New York during the period of time we have referred to as the early Late Prehistoric period (A.D. 700–1300). As anyone following New York archaeology realizes, this is an arbitrary slice of time within the dynamic history of Native Americans in the state, but one that has been quite contentious over the past few decades. This contentiousness has centered on the origins of the ethnic landscape that was recorded by early European missionaries, settlers, and explorers. Was that landscape the result of migrations and displacements, or was it part of a long-evolving, in situ pattern? Can these two alternatives really capture the dynamics of the past, or are they too simplistic in their conceptualizations? There is a wide range of ongoing scholarship on these questions. What we wanted from the symposium and ultimately this volume was to show that while these questions are important, they are far from the only topics of research being addressed by archaeologists working on the early Late Prehistoric period.

The symposium comprised nine papers, the abstracts of which follow this preface. Also included in the symposium was a discussion of the papers by James Bradley. The papers included reports on excavations at specific sites, regional settlement pattern analyses, lithic sourcing, ceramic analysis, and a summary of results from an ongoing research program involving a variety of analyses. The symposium certainly captured a wide range of research that demonstrated the dynamic state of archaeological investigations within New York. The present volume comprises updates of six of those papers, an introduction, and an eighth paper that was not presented in the symposium. As such, the volume provides a strong sense of the state of archaeological research on the early Late Prehistoric period in New York at the beginning of the 2010s.

Thanks are due to those colleagues who participated in the symposium and to those who contributed to this volume. Meeting deadlines is not always an easy proposition, but in all instances the deadlines we established for chapter authors were met, making the production of this volume not only easier, but also very quick. The many peer reviewers for the volume and its individual chapters met our deadlines and in all instances provided well considered comments, suggestions, and criticisms, which resulted in a stronger volume. Thanks are due to Jonathan Lothrop who coordinated the peer review process for the volume and Janice Morrison for copy editing. Thanks also to Maria Sparks for managing the volume's production.

John P. Hart
Christina B. Rieth
May 2011

ABSTRACTS FROM APRIL 24, 2010 SYMPOSIUM

Changing Perceptions of the Levanna Site, Cayuga County, New York (1922–2010)

Jack Rossen (Department of Anthropology, Ithaca College)

This paper discusses how perceptions and interpretations of the Levanna site have changed throughout the history of investigations at the site. The site was recorded in 1923 by Arthur C. Parker and excavated from 1932–1947 and 2007–2009. Analysis of the collections recovered over three recent field seasons is underway. Preliminary statements may be made on interpretive changes of the site, including how it is culturally assigned (Algonkian, Owasco, Cayuga), the type of domestic architecture (small circular versus proto-longhouse), whether the site was palisaded, implications for regional ceramic typologies, and the nature of the famous stone animal effigies.

Social Setting as a Possible Source of Ceramic Vessel Variation in Early Late Woodland New York State

Donald Smith (Panamerican Consultants, Buffalo, New York)

This paper explores the possibility that the social setting(s) in which pre-contact period potters intended their vessels to be used played a role in their decisions concerning the mechanical and decorative attributes of their wares. The paper focuses on the remains from the early Late Woodland Carpenter Brook site in central New York state, excavated by Ritchie in the 1940s. Ritchie argued that the site, which was located in the bank of a stream and comprised a single deposit made up nearly entirely of smashed ceramic vessels and skeletal remains from bears, was the result of ceremonial activities. This paper compares attributes of the Carpenter Brook pots, including their decorative qualities and characteristics related to their durability as cooking vessels, with those from the early Late Woodland Bates, Maxon-Derby, and Sackett village sites, which were likely deposited in more prosaic contexts. The results indicate the Carpenter Brook pots have larger (more visible) and more complex decoration than do vessels from the domestic sites. They also have qualities that would have made them relatively less durable as cooking vessels. These results are consistent with the hypothesis that the social setting(s) in which potters intended (or anticipated) their vessels to be used played roles in the decision-making processes that accompanied the manufacture of the pots.

Late Prehistoric Archaeology at the Iroquoian Southern Door: New York's Chemung Valley

Laurie E. Miroff and Tim Knapp (Public Archaeology Facility, Binghamton University)

Late Prehistoric research in New York state has often focused on water systems, primarily organized by river valley or lake basins. Basin-focused Late Prehistoric research has overlooked several important Northeastern drainages, including the Chemung. The Chemung Watershed, covering an area of approximately 2600 m^2, is an important tributary of the Susquehanna River, including nearly 10 percent of this large drainage system. Geographically, the Chemung River is an important transportation corridor and archaeological evidence suggests that this drainage also forms a cultural bridge between the Finger Lakes Region of New York and the West Branch of the Susquehanna, in central Pennsylvania. In this paper we summarize the Late Prehistoric data currently available for the Chemung Drainage and demonstrate why this overlooked valley should play a role in Late Prehistoric studies.

Watersheds and the Late Prehistoric Upper Delaware Valley: Evidence from the Deposit Airport I Site

Tim Knapp (Public Archaeology Facility, Binghamton University, State University of New York)

Dean Snow in *Archaeology of New England* argued that Native American territories were often defined by watersheds which served as "geographic containers of prehistoric communities." According to Snow, rugged upland drainage divides served as remote boundaries separating native populations, providing a necessary buffer which ensured survival and helped maintain distinct social identities. Given this, Snow advocated a "riverine model" that treats watersheds as an appropriate unit of spatial analysis. This approach was largely intended to counter what Snow saw as the spatial

overextension of culture-historical taxons built on formal analyses which often relied on a single artifact type. In proposing his "riverine model," Snow is careful to stress its status as a model that is unlikely to universally apply. In particular, Snow suggests that historical factors may lead to upstream-downstream distinctions within a given watershed. Using this framework, this paper presents investigations at the Deposit Airport 1, a multi-component late Middle and early Late Woodland site located along the West Branch of the Delaware River in Delaware County, New York. Radiocarbon, ceramic, settlement, and botanical data will be presented. These data will be compared with downstream patterns, as well as to the nearby Upper Susquehanna Valley.

Trace Element Analysis of Lithic Artifacts from the Trapp's Gap Site

Christina B. Rieth (Research and Collections Division, New York State Museum) and L. Lewis Johnson (Department of Anthropology, Vassar College)

Traditional models of Late Prehistoric (A.D. 700–1400) interaction in the middle Hudson Valley suggest strong ties with contemporaneous groups in southern New England. Recent research, in the form of trace element analysis of lithic artifacts from the Trapps Gap site in Ulster County, New York, question this assumption suggesting a more diverse and complex landscape in which groups interacted. This paper will discuss where the site occupants were getting their lithic material, how such procurement patterns may have changed over time, and what such data might reveal about regional socio-economic behavior.

A Small Back-Country Site in Coxsackie, Circa A.D. 1200

Edward V. Curtin (Curtin Archaeological Consulting Inc.)

The excavation of Concentration 23B.1, a small site in Coxsackie, provides an unusual glimpse at Late Prehistoric, short-term back-country settlement in the Hudson drainage. Occupying low ground near a small stream within the lake plain, Concentration 23B.1 contained several archaeological features, a varied lithic assemblage indicating different stages of lithic reduction, fragmentary Owasco-like ceramics, and twelfth-thirteenth century A.D. C-14 dates. Settlement pattern implications are explored in terms of the changing use of the local landscape as well as the diversity of late prehistoric settlement systems in the upper Hudson valley.

A Middle Woodland Pottery Stamp and Associated Middle-Woodland Ceramics from the Indian Hill Site, Wawarsing, N.Y.

Joseph E. Diamond (Department of Anthropology, State University of New York at New Paltz) and Susan Stewart

The site of Indian Hill was excavated by SUNY New Paltz under the direction of Leonard Eisenberg in 1976–1977. Important Late Prehistoric finds include a dentate pottery stamp, associated Middle Woodland pottery, and other Middle Woodland ceramic vessels. The ceramics from this site represent one of the few samples of Middle Woodland ceramics from the upper Rondout drainage.

The History of the Collared Rim

Hetty Jo Brumbach (Department of Anthropology, University at Albany, State University of New York)

An attribute analysis of rim and body sherds from sites in central New York reveals that the "collared" rim form, often considered distinctive of late pre-contact Iroquoian and Algonquian vessels, has a long history in this study area. The collared rim is common in many areas of the East, but its history is not well documented. Sherds from the Vinette site (dated to ca. 300 B.C.) and Cottage site (A.D. 200) suggest that the form began as a band of decorative elements placed on the rim exterior just below the lip. At a later time, vessels with thickened rim areas were manufactured, followed by an "appliqué" collar bearing distinctive decorative motifs. Still later, more elaborately modeled collars appear. This paper will illustrate the subtle shifts in manufacturing that resulted in the distinctive collared rim.

The Death of Owasco—Redux

John P. Hart (Research & Collections Division, New York State Museum, Albany)

In 2003, Hetty Jo Brumbach and I published an article in American Antiquity titled "The Death of Owasco." Based on a formal analysis of the traits used by former State Archaeologist William A. Ritchie, to define the Owasco Tradition, we determined that his definitional boundaries for the taxon are no longer valid. Furthermore, we argued that Owasco and other New York culture-historical taxa, have no useful role to play in our understanding of the past. In this presentation, I review our original analysis and subsequently produced data and suggest more useful approaches to understanding the past.

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Chapter 1

INTRODUCTION TO CURRENT RESEARCH IN NEW YORK ARCHAEOLOGY: A.D. 700–1300

Christina B. Rieth and John P. Hart

Abstract. *The early Late Prehistoric period (A.D. 700–1300) is a time in New York that traditionally has been seen by archaeologists as a period of change, from mobile hunter-gatherers to settled agricultural villagers. This traditional understanding of the past is being replaced by more dynamic understandings based on the applications of new methods, techniques, and theories. As such, archaeologists working on this slice of time in New York are in a period of transition. The works presented in this volume reflect that transition. Here we place the volume in the broader context of research on this vital period of inquiry in New York.*

Our understanding of the past is dynamic and ever evolving with continual introductions of new theories, methods, and techniques that are applied to the analyses of new and extant collections. Newly identified sites through academic and cultural resource management research help to round out our datasets and provide more evidence with which to build understandings of the past. In the course of continuing research, new paradigms are developed and older ones abandoned.

This describes the current state of early Late Prehistoric (cal. A.D. 700–1300) research in New York. Much has changed over the past decade in our understandings of this slice of time. For much of the state it had been considered traditionally as a time of transition as indigenous, ancestral northern Iroquoian hunter-gatherers adopted agriculture and settled village life or as a time of replacement as Iroquoian agriculturists migrated to the region and replaced and absorbed indigenous hunter-gatherers. We now know that the histories of the various traits used to create these pictures of the past are very different from what was thought on the basis of traditional approaches. Attempting to capture the diversity of human behaviors in the context of northern Iroquoian "origins" is impossible, as is attributing major changes in how people lived on the basis of agricultural crop adoption. As a result, archaeologists working on this span of time in New York find themselves in a period of transition and replacement. The old tried-and-true approaches to the past are being questioned. New approaches are arising with interconnecting, complementary views. These approaches challenge us to create understandings that are much more dynamic, detailed, and, perhaps, reflective of how people lived their lives. The chapters in this volume reflect that state of transition.

SUMMARY OF EARLY LATE PREHISTORIC RESEARCH

There are many ways of knowing the past. A number of these stem from archaeology, a discipline that studies the past through the materials people left behind and that preserve under prevailing environmental conditions at any given location. There are no tenets that delineate how archaeologists view the past. Rather, archaeological understandings are dependent on theoretical orientations. Today, there are many generally complementary theoretical orientations. What separates early twenty-first-century archaeology from early to mid-twentieth-century archaeology, perhaps, is a greater degree of theoretical self-consciousness. Curtin (this volume), for example, draws on resilience theory to build a new understanding of how Native Americans used the upper Hudson River valley during the early Late Prehistoric.

Parker-Ritchie-Funk Taxonomy

As described by Hart (this volume), Arthur C. Parker, William A. Ritchie, and Robert Funk and their various colleagues developed and perpetuated the most influential conceptualization of New York's past in the twentieth century. This conceptualization consisted of the extensional definition of culture-historic taxa at various levels of inclusion based on artifact traits and inferred subsistence, settlement, and other behavioral traits.

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Once a site was assigned to a particular taxonomic level within the hierarchy (phase>culture>stage), it fell into an established interpretive pattern for that hierarchy. Assignment within the culture-historic scheme was, perhaps, the most important aspect of analysis for any given site. In synthetic publications, specific sites were used to illustrate the characteristics of particular phases within this hierarchy (e.g., Ritchie 1944,1969; Ritchie and Funk 1973; Tuck 1971). Higher taxonomic order, regional interpretive narratives were then constructed into broader regional understandings of the past, often framed in the context of trait complexes. Trait-specific analyses were anchored in the taxonomic scheme, with taxa being the units of analysis and interpretation. The narratives themselves became more consciously theoretical beginning in the 1960s, but the overall pattern of site-level descriptions with regional interpretive narratives did not change substantially. There are, of course, many exceptions to this characterization, but the underlying foundation of all approaches until recently was the Parker-Ritchie-Funk culture history, regardless of theoretical orientation.

There have been several critiques and calls for abandonment of all or portions of the Parker-Ritchie-Funk scheme based on trait analyses and new suites of radiocarbon dates (e.g., Gates St Pierre 2001; Hart and Brumbach 2003, 2005; Smith 1997) that pertain to the time of investigation represented by this volume. However, the influence and persistence of the scheme is still reflected by the volume's chapters. This occurs primarily in the use of time periods derived from the original Parker-Ritchie-Funk stages (e.g., Brumbach, Smith). However, Hart (this volume) repeats his original calls with Brumbach for the abandonment of the scheme. Curtin (this volume) approaches this issue pragmatically by using Parker-Ritchie-Funk taxa when referencing older works, but otherwise avoids them. Rossen (2010), on the other hand, has suggested the exchange of Parker-Ritchie-Funk taxa for more explicitly ethnic terms. This suggests a return to early twentieth-century practice (e.g., Parker 1922) prior to the widespread adoption of the Midwest Taxonomic Method in eastern North America (Ritchie 1936), which purposely eschewed such designations (McKern 1939). Whether the Parker-Ritchie-Funk scheme will be abandoned in favor of research-problem specific taxonomies or continue to be used in whole, part, or revised will be a critical issue for the early Late Prehistoric archaeology in the coming years.

New Methods, Techniques, and Excavations

Our understandings of the past change as new methods and techniques are developed and applied in archaeological analyses. In many cases such work has resulted in interpretations that are dramatically different from those originally proposed, providing more complete understandings of the past. Examples include the analysis of ceramic attributes at several early Late Prehistoric sites in the Finger Lakes Region of New York (e.g., Brumbach this volume; Gates St Pierre 2003; Hart and Brumbach 2009; Schulenberg 2002; Smith 2005, this volume; Wonderly and Sterling 2007:19–26), lithic and faunal remains from the Tufano site (Anderson and Rieth 2004), human and animal remains from the Engelbert site (Beisaw 2007, 2010), social interactions in the St. Lawrence River Valley (Morin 2001:65–100), the chronologies of ceramic types from sites in central New York (e.g., Hart and Brumbach 2003, 2005; Miroff 2009; Schulenberg 2002; Smith, this volume).

Several archaeologists have also undertaken excavations at previously excavated sites to further verify earlier results or generate larger samples for analyses. Included among these are studies of the settlement patterns at the Apalachin Creek site near Owego, Tioga County (Carmody et. al 2007), reanalysis of the lithic artifacts at the White site in Chenango County (Card 2002), reevaluation of the age, function, and distribution of keyhole structures in south-central New York (MacDonald 2008:99–112), excavations at the Levanna site near Ithaca (Rossen 2009), excavations at the multicomponent Bay site (Bln 1–3) at Pilot Knob near Lake George (Kingsley et al. 2006:45–62), and excavations at rock shelter sites first identified by Leonard Eisenberg and Max Schrabisch, in the Shawangunk Mountains of eastern Ulster County (Rieth and Johnson, this volume; Santo and Johnson 2011).

Archaeologists have also sought to reevaluate older collections through the examination of new problems or research areas that were not pursued by the original excavator. Often these projects were suggested in the original site report as future research topics (e.g. Funk 1976:70–89, 300–302; Ritchie and Funk 1973). In other instances, the idea to reexamine a particular portion of the collection stems from similar studies being done at other nearby sites or as a result of information that was recovered but not fully analyzed when the site was excavated.

Research that falls into this category includes analysis of phytoliths recovered from encrustations on ceramic vessels in central New York (Hart et al. 2003, 2007; Hart and Matson 2009; Thompson et al. 2004), trace element composition of avocational and older CRM collections near Schoharie (Rieth 2008), lithic materials associated with the Abbott Zone complex in Bronx County (Kaeser 2004:53–60; 2006:63–69; 2008:31–46), spatial modeling of site locations in the Schoharie Valley with geographic information systems (GIS) (Primeau 2007), and soil data with GIS to predict site locations in Columbia and Saratoga counties (Sander's 2008:78–82).

Finally, early Late Prehistoric research has been enhanced recently by the study of older collections that had not been previously thoroughly analyzed. Many of these collections originated through avocational digs and non-compliance projects (e.g., Kaeser 2004; Solecki 2006). In many cases, these projects use small collections stored in local historical societies and museums that have rarely appeared in the archaeological literature.

Included among these are comparison of lithic procurement strategies of the Paul J. Higgins site and other local collections at the Trailside Museum (Higgins 2010), analysis of settlement patterns of groups living in the Shawangunk Mountains as represented by materials curated at the Daniel Smiley Research Center at Mohonk Preserve (Santo and Johnson 2011), analysis of Native American burials identified in the 1930s at College Point (Solecki 2006:70–79), and analysis of collections generated largely by James Osterhout for the Iroquois Indian Museum near Cobleskill (Rieth 2009:1–18). These analyses have not only allowed archaeologists to revisit some of New York's little-known collections but also to reconsider our understandings of the activities that were occurring during this time.

Recent CRM Contributions to the Study of Early Late Prehistoric Archaeology

Many early Late Prehistoric sites in New York have been identified as a result of cultural resource management investigations. The discovery of these sites has not only resulted in the generation of new collections but also in new information about the temporal occupation of various sites and regions as well as the relationship between artifact classes. Studies of previously underrepresented areas of the state have allowed us to gain a more complete picture of the types and ranges of settings that were occupied by early Late Prehistoric occupants of New York.

CRM investigations have contributed to the study of non-village sites and activities that occur beyond the village boundaries. Studies by Curtin (this volume), Curtin Archaeological Consulting (2006), Diamond (this volume), Dale (2008), Kastl et al. (2010), Rieth (2009), Sopko (2008), Versaggi and Hohman (2008), among others highlight the roll of resource procurement stations, short- and long-term camps, kill sites, horticultural hamlets, and other site types that were often not the subject of earlier excavations. The analysis of small lithic scatters has aided archaeologists in mapping the movement of groups across the landscape and the migration patterns of such groups in search of various resources (e.g., Higgins et al. 2007; Higgins 2010; Sopko 2009).

Following Versaggi and Hohman (2008), the study of non-village sites not only shows the diversity in the range of site types used, but also in many instances, highlights the fact that hunting and gathering continued well into the period in which domesticated plants formed a major component of the prehistoric diet. In addition, the activity areas identified at these sites suggest gender-specific tasks carried out beyond the village (Rieth 2009; Versaggi and Hohman 2008).

CRM investigations increasingly provide information on areas of New York that have not been intensively surveyed or been the focus of extended research projects. Research at the Naima site in the Town of Smithtown, Suffolk County (Mazeau 2010a), the Price Prehistoric site on Staten Island (URS Corporation 2005), the Coram Route 112 site in the Town of Brookhaven, Suffolk County (Merwin 2007:1, 7), and the House Park Watershed (Historical Perspectives 2006), have contributed information about coastal adaptations and use of aquatic and aviary resources in southeastern New York. Excavations at the Herrick Hollow sites in Delaware County (Versaggi and Hohman 2008), the Paul J. Higgins site at Bear Mountain in Westchester County (Higgins 2010), and the Catskill I and II sites near Catskill in Greene County (Rieth 2009), document the importance of upland sites within Native settlement systems and the role such sites played in lithic, floral, and faunal resource procurement. Finally, the identification of sites away from major waterways and in backcountry areas has provided better understandings of the spatial arrangement of early Late Prehistoric settlements systems and the interrelationship of these sites with more distant village sites. These investigations include those by Dale (2008) at the James Holloway and Raymond Dale sites in Schoharie County, Montague et al. (2010) at the Red House Bridge site in Cattaraugus County, Rush et al. (2008:147–149) at Fort Drum near Potsdam, and Curtin's (this volume) investigations of Concentration 23B.1 in Greene County.

CRM archaeology has also helped to refine our understanding of the spatial and temporal diversity of specific valley corridors. In the Cobleskill Valley of Schoharie County, Rieth (2009:1–19) has examined changes in the settlement patterns of prehistoric groups between cal. A.D. 700 and 1300. Although the region has traditionally been considered to be abandoned during the early Late Prehistoric, the use of multiple scales of analysis (both site and micro-region) allows important variability in local land use patterns to be discerned, which in turn allows archaeologists to reevaluate extant models of settlement in the western Schoharie Valley. Grills et al. (2010) has examined the relationship between small lithic sites and larger settlements contained in the Grasslands Prehistoric Archaeological District (Miroff et al. 2010) surrounding Canadarago Lake in Otsego County. The results of this analysis demonstrate the diverse array of activities that were

occurring around the lake and the role that the lake played in providing food and material remains to groups living nearby. In addition, the authors demonstrate how early Late Prehistoric groups occupied many of the same locations as earlier groups, suggesting that the decision to settle in specific locations was not haphazard but may have been focused around specific glacial features (Grills et al. 2010:9).

Finally, accelerator mass spectrometry and radiometric dating have helped to demonstrate discontinuities between absolute dates and previously developed regional typologies (Ritchie 1971; MacNeish 1952; Ritchie and MacNeish 1949). Quite often this discontinuity results from ceramic types being recovered from hearth and pit features that are supposed to date to different time periods. At the Papscanee Creek 3 site near Rensselaer, Sopko (2009:45–46, 58; see also Mazeau 2010b) convincingly demonstrates incongruity between cord-marked and incised pottery recovered from shallow hearth features and the AMS dates of A.D. 130 to 350. At Site L near the village of Moreau, Saratoga County, Kastl and Miroff (2008) document the recovery of rocker-stamped and incised pottery from features dating to the end of the early Late Prehistoric period. While traditional ceramic typologies suggest that these vessels were used at different times, both Sopko (2009) and Kastl and Miroff (2008:17–19) highlight the fact that these types do not fit neatly into discrete time periods as proposed by Ritchie and MacNeish (1949) but rather have a longer use life that often cross-cut much of the early Late Prehistoric period (see Hart and Brumbach 2003, 2005; Schulenberg 2002).

ORGANIZATION OF THIS VOLUME

This volume is a result of a symposium organized for the annual meeting of the New York State Archaeological Association at Ellenville in April 2010. The symposium complemented an earlier symposium we organized in 2000 as part of the New York Natural History Conference in Albany. The results of that symposium were published in the volume *Northeast Subsistence-Settlement Change: A.D. 700–1300* (Hart and Rieth 2002).

The goal of the 2010 symposium was to bring together researchers working on early Late Prehistoric (cal. A.D. 700–1300) settlement and subsistence in New York. In total, nine papers were presented followed by a presentation by Dr. James Bradley who served as the symposium discussant. The papers covered such diverse topics as changes in site location and resource procurement, the role of non-village sites in regional settlement patterns, the analysis of Late Prehistoric ceramics, and the timing of tropical domesticates in New York.

The papers in this volume are organized geographically beginning in the western part of the state working eastward. The chapters by Hart et al., Smith, Rosen, Curtin, Diamond and Stewart, and Rieth and Johnson focus on individual site analyses. The papers by Hart et al. and Smith are re-analyses of sites excavated by William A. Ritchie while the chapters by Curtin, Diamond and Stewart, and Rieth and Johnson focus on more recent excavations completed as a result of academic and cultural resource management projects. The chapters written by Hart and Brumbach are concerned with broader, regional analyses. Brumbach provides an analysis of the evolution of collared vessels drawing on collections from central and eastern New York. Hart discusses his research on the traits used by Ritchie to define the Owasco tradition in New York. In his chapter, he argues that the definitional boundaries proposed by Ritchie for the taxon are no longer valid, and a more useful approach for understanding the past is presented.

CONCLUSION

This volume reflects the continuing interest in and work on the early Late Prehistoric in New York. The chapters reflect the transitional nature of research on this arbitrary slice of time. Some of the work reflects the continuing interest in traditional areas of research such as pottery and lithics, but with the application of methods, techniques, and insights that provide new understandings of manufacture, function, and style. Other work, such as the direct dating of encrusted, carbonized cooking residues and the analysis of phytolith assemblages recovered from those residues has opened entirely new avenues of research and understandings. The chronologies and cultural sequences that were so important in the development of New York archaeology in the twentieth century are being challenged as a result of new dates on key defining attributes. The adoption of new theoretical structures are providing understandings of the past that challenge traditional ideas about why and how Native people used specific portions of the landscape. As we have reviewed in this introduction the works presented here constitute only a small sample of the extensive work being done on this slice of time. Whether based on the work of university field schools, cultural resource management projects, museum investigations, evidence freshly unearthed, or collections and archives made decades ago, the work being done is dynamic, interesting, and path setting. We look forward to continued developments in theory, method, and techniques and their application in this vital arena of archaeological research.

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Chapter 2

THE CARPENTER BROOK SITE, SOCIAL SETTING, AND EARLY LATE WOODLAND CERAMIC VESSEL VARIATION IN CENTRAL NEW YORK

Donald A. Smith

Abstract. *The chapter hypothesizes that the social setting(s) in which early Late Woodland potters in central New York intended vessels to be used is reflected in some of their pots' attributes. Characteristics of the ceramic assemblage from the Carpenter Brook site, which was probably deposited during ritual, are compared with those of pottery from three village sites: Bates, Maxon-Derby, and Sackett. On average, relative to the vessels from the villages, the Carpenter Brook pots are larger, have walls with characteristics that would have made them less durable as cooking vessels, and have larger and more complex decoration. The differences are possibly related to the different functions of pottery in ritual contexts, relative to how it was used in more prosaic social settings. The possibility that the site was related to ceramic vessel production is also discussed.*

This chapter explores the possibility that the social setting(s) in which late Middle Woodland–early Late Woodland (ca. A.D. 900–1300) potters in central New York intended their vessels to be used played a role in their decisions concerning the mechanical and decorative attributes of their wares. I focus on the assemblage from the Carpenter Brook site in Onondaga County, excavated by William Ritchie in 1946 (Figure 2.1) (Ritchie 1946). Ritchie argued that the site, which played an important role in his formulation of the "Owasco"/ early Late Woodland (A.D. 1000–1300) culture-historic sequence, was deposited during a series of ceremonial events (Ritchie 1947; Ritchie and MacNeish 1949). This paper compares several attributes of the pots from Carpenter Brook, including their diameters, wall thicknesses, and the size and complexity of their decoration with those of vessels from three early Late Woodland central New York village sites—Bates, Maxon-Derby, and Sackett—which were likely deposited in more prosaic contexts. The results indicate there are differences between the pots from Carpenter Brook and those from the villages that may reflect the differing needs of the distinct social settings (i.e. formal ritual vs. "everyday" or prosaic) in which they were used. Specifically, the distribution of vessel attributes from Carpenter Brook relative to those from the villages is consistent with the hypothesis that, in general, the potters who made the Carpenter Brook pots expended greater amounts of effort on their vessels' decoration and less effort on characteristics that would have ensured the pots had long use-lives as cooking vessels. However, other interpretations are certainly conceivable, and the possibility that Carpenter Brook was associated with ceramic production or that some of the differences between its pots and those from the villages were related to changes through time are also addressed.

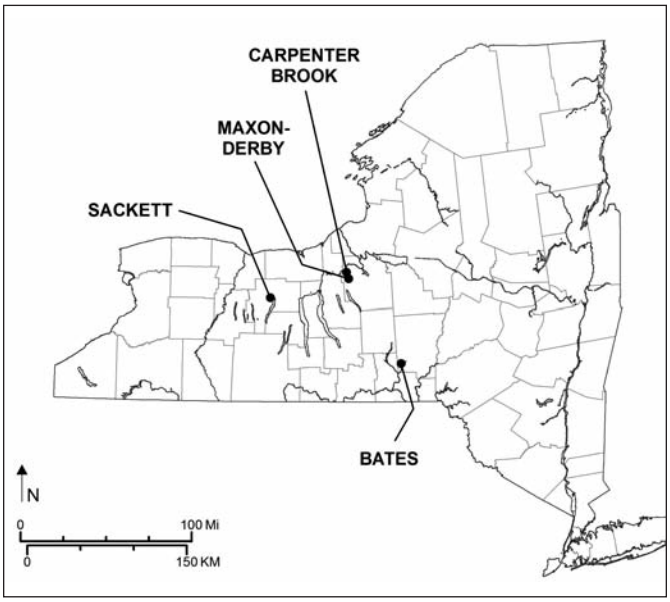

Figure 2.1. Locations of Carpenter Brook and the village sites used in this study.

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THE CARPENTER BROOK SITE

The Carpenter Brook site was located in the bank of the meandering stream with which it shares its name, several hundred feet south of its confluence with the Seneca River. It was initially discovered by avocational archaeologist Earl Mann in 1922, who subsequently informed Ritchie of the find (Mann 1922–1946; Ritchie 1947:56). It comprised a single artifact deposit measuring about 12 m by 3 m (40 ft by 8 ft) that was eroding from the east side of the stream bank roughly 60 to 100 cm below the surface of the adjacent terrain (Figure 2.2) (Ritchie 1947:56, 58). The stream bank that contained the deposit was near the base of a sandy knoll that rose just east of the brook. Ritchie (1947:56) describes three soils overlying the artifacts. The uppermost was a 46 to 53-cm-thick stratum of "fine brown culturally sterile silt ... [that] washed down from the closely adjacent knoll." The silt overlaid a layer made up of lenses of "brown silt, coarse gray or buff-colored sand, and fine calcareous sinter" that totaled 13 to 25 cm in thickness. Ritchie attributes the varying qualities of this layer to changes in depositional mechanisms: "It evidently represented wash from the knoll and stream[-]deposited sand and tufa or calcium carbonate, laid down in periods of high water." As with the overlying silt, he found no artifacts in it. Finally, below this was a 20 to 30-cm-thick "stratum of coarse sand and fine gravel," the lower 15 cm of which contained the artifact deposit. The sand/gravel layer was "so heavily interspersed with masses of tufa as to appear a veritable zone of nodular calcareous sinter, stained and streaked with limonite." Ritchie notes it likely accumulated in a submerged depositional environment. He describes the artifact deposit as:

Figure 2.2. The Carpenter Brook deposit during Ritchie's excavation (Ritchie 1947:61).

> a nearly solid mass of potsherds, lying among scattered water-worn boulders similar to those now littering the stream bed, and like them encrusted with calcareous sinter or tufa deposited from solution in the cold spring-fed water of the brook. Present among the sherds were occasional animal bones, a few mussel and other shells, and very rarely an artifact of other type, all coated in sinter varying in thickness from a mere white film of 2–3 mm to a heavy encrustation up to 2 cm. (Ritchie 1947:56–58)

The artifacts were underlaid by "the old stream bed, composed of coarse light gray or buff-colored sand and fine gravel" (Ritchie 1947:58). Ritchie (1947:58, 66) attributed the exposure of the site to erosion resulting from a decrease in the water level of Carpenter Brook caused by nineteenth-century attempts by the state to drain the nearby Montezuma Marshes.

In addition to the soils described by Ritchie, Mann (1922–1946) mentions that he observed "a layer of very fine clay" in the "creek bed." While Ritchie does not mention such a deposit, the USDA soil survey for Onondaga County indicates that two of the soil types found along Carpenter Brook (Teel silt loam and Williamson silt loam) occasionally contain lenses of clay, suggesting Mann's observation may have been accurate (Hutton and Rice 1977:100, 110; Soil Survey Staff 2011).

During his excavations, Ritchie (1947:58) tested the surrounding area with a series of test pits, and a trench measuring 1.2 m (4 ft) wide and at least 2.4 m (8 ft) long that extended east from the artifact deposit toward the base of the nearby knoll. None of this testing yielded any additional prehistoric cultural material. Mann, who visited the site occasionally until 1946, also searched nearby for signs of prehistoric occupation or use. He identified "only slight signs of an earlier occupation on the top of the adjacent knoll," but unfortunately he

makes no further observations as to the characteristics of these remains (Mann 1922–1946:4).

The artifact assemblage from the site, now in the collection at the Rochester Museum and Science Center, is dominated by pottery; Ritchie recovered hundreds of vessel fragments including 437 rim pieces from at least 125 pots (Figure 2.3) (Ritchie 1947:64; Ritchie and MacNeish 1949:118). He believed the sherds were from whole vessels that were broken in situ; Mann's notes include a similar observation (Mann 1922–1946; Ritchie 1947:64–66). In addition to the sherds recovered by Ritchie, Mann collected pieces from up to another 25 vessels during his visits and Ritchie estimates a further 50 pots were lost due to erosion of the stream bank, bringing the total number of pots from the site to about 200. (Ritchie 1947:64).

Mann's notes also include some comments concerning characteristics of the pots he collected. He remarks that vessels of all sizes were present, ranging from "a tiny bowl … to immense bowls nearly an inch thick." He observes that the amount of decoration on the pots was similarly variable; while some vessels had minimal decoration, others had "impressed designs of some intricacy, well down the sides" (Mann 1922–1946:2–3). Both Ritchie and Mann remarked that the sherds in the deposit were highly fragile, and many disintegrated when they attempted to collect them. Ritchie (1947:60) attributed their fragility to submersion in water: "an unusual feature is their friability, doubtless to be accounted for by long immersion in cold water." He goes on to note that Sagard's seventeenth-century description of Huron pottery included the observation that "they [the pots] cannot stand moisture and cold water for long, but become soft and break at the least blow given them" (Ritchie 1947:60; Sagard 1939:109). Mann (1922–1946) provides additional hypotheses for the fragility of the sherds: they were "either frail due to poor baking or the temper being drawn by the lime and moisture." He also states that "in some cases [they do] not appear to have been used."

In addition to the pottery, Ritchie found a total of 150 animal bones and bone fragments scattered among the ceramic fragments. Of these, 90 (60 percent) were from a minimum of 7 Black bears (*Ursus americanus)* and 19 (a further 13 percent) were from deer (Figure 2.4). Almost all the ursine bones (79 out of the total 90) were from either the bears' heads or feet. The remainder of the faunal assemblage included material from woodchuck, rabbit, raccoon, turkey, muskrat, dog, mink, beaver, puma, and one bone from a fish. Mann also noted the presence of bear and deer remains, as well as those from other animals he does not enumerate (Mann 1922–1946; Ritchie 1947:62).

Besides the pottery and faunal material, Ritchie found just 20 additional artifacts. Among these was a

Figure 2.3. Reconstructed rims of Carpenter Brook vessels.

Figure 2.4. Bear mandible from Carpenter Brook.

5.7-cm-long by 3.5-cm-wide fragment of a "unique effigy of the human phallus" made from potters' clay and detailed with a cord-wrapped stick (the same type of implement typically used to decorate early Late Woodland pottery) (Figure 2.5) (Ritchie 1947:63). The phallus also includes an anatomically accurate longitudinal perforation; as Ritchie describes:

> Unusual interest attaches to the fact that the true position of the urethra ... is correctly indicated by a small perforation, 1.5 mm in diameter, which can be followed by the probe almost to the extremity of the glans. However, this portion of the model was structurally too weak to carry the desired larger perforation, so the urethral passage, 5 mm in diameter, was placed above it through the center of the object. The existence of this sole anatomical flaw creates the impression that the urethra was intended to serve some functional purpose. Speculation on this point is largely precluded by the absence of the proximal portion and the lack of comparable specimens. (Ritchie 1947:63–64)

Although Ritchie does not comment on the function of this object, Parker (1922:197) reports on a similar item—a "phallus in clay"—from the Late Prehistoric Richmond Mills site in Ontario County that he interpreted as a smoking pipe. Engelbrecht (personal communication 2004) suggests the Carpenter Brook phallus was probably used for the same purpose.

The remaining artifacts Ritchie collected from the site include: a complete obtuse-angle clay smoking pipe; an Onondaga chert core; two sandstone pebbles; 3 sandstone hammerstones; 10 Onondaga chert flakes; an Onondaga chert pebble; and a possibly-polished white quartzite pebble. In his notes, Ritchie (1946) mentions that he observed "large charcoal granules and fragments," as well as some fire-cracked rocked, but he did not retain any of this material. His notes also indicate that he collected a piece of unburned wood, but it is no longer present in the Rochester collection. Mann (1922–1946:1) reports on two additional items he collected: an antler 'prong' and a "very crude adz-like implement of sandstone" he suggests may have been related to pottery production. Although he states he gave the adz-like item to Ritchie, it is not present in the Rochester Carpenter Brook collection.

Figure 2.5. Clay phallic effigy (probably smoking pipe) from Carpenter Brook.

THE AGE OF CARPENTER BROOK: CHANGING INTERPRETATIONS

Results from recent research concerning Middle and early Late Woodland (A.D. 1–1300) pottery chronology, settlement, and subsistence in the Northeast (e.g. Gates St-Pierre 2001; Hart 1999, 2000; Hart and Brumbach 2003, 2005, 2009; Hart et al. 2003; Prezzano 1988; Schulenberg 2002a) necessitate a brief discussion of the changing interpretations of Carpenter Brook's age. To accommodate methodological developments and new data, Ritchie's ideas about the age of the site changed several times in the years after he excavated there (Figure 2.6). All his estimates were based on qualities of the site's ceramic assemblage. Initially, he believed the site belonged in the Canandaigua Focus, a taxonomic entity that he speculated in his dissertation lasted from about A.D. 1200 to A.D. 1450 (Ritchie 1944:13, 28–30; 1947:64, 67). Later, he and MacNeish reconsidered the age of Carpenter Brook relative to Canandaigua, and argued that Carpenter Brook was older (Ritchie and MacNeish 1949:118). Ultimately, Ritchie believed the site was contemporaneous with the Maxon-Derby village site in the village of Jordan, for which he acquired uncalibrated radiocarbon dates of 850±100 B.P. and 850±150 B.P. (A.D. 1100±100 and A.D. 1100±150), respectively (Ritchie 1980:275; Ritchie and Funk 1973:210). He based his argument for the contemporeneity of the two sites on their proximity (they were separated only by about two km) and similarities in their ceramic assemblages. In fact, he speculated that people from Maxon-Derby "were probably intimately connected" with those who visited Carpenter Brook (Ritchie and Funk 1973:195, 210).

However, recent AMS (accelerator mass spectrometer) and radiometric dates on charcoal from Maxon-Derby obtained by Hart (2000:8-13, 17) from samples collected by Ritchie indicate that in addition to a calibrated eleventh-century occupation corresponding to Ritchie's uncalibrated A.D. 1100 date, the site also had an occupation from the cal. mid-twelfth to mid-thirteenth centuries A.D. Beyond this, Schulenberg (2002a)

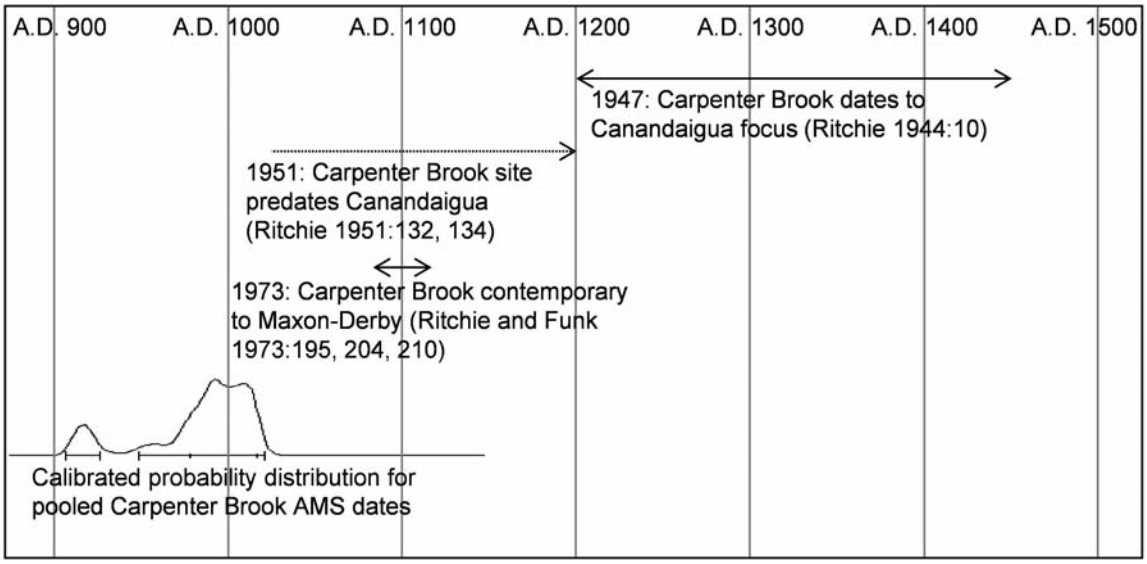

Figure 2.6. Changing interpretations of the age of Carpenter Brook.

and Hart and Brumbach (2003:743–745; 2005) have acquired AMS dates on charred cooking residue adhering to sherds of Middle and early Late Woodland pottery types that are far outside the time ranges Ritchie assigned them (see also Gates St-Pierre 2001). Beyond demonstrating that Ritchie's "Owasco" ceramic types lack the temporal sensitivity he believed they embodied, these studies have substantially revised many long-held ideas concerning regional cultural developments during the Middle and Late Woodland in New York. For example, Hart and Brumbach (2003) have shown that none of the traits that Ritchie argued appeared together around A.D. 1000, including nucleated villages, longhouses, and a system of agriculture based on maize, beans, and squash, appeared at that time. Instead, squash and maize have been found in much earlier contexts, "while beans, maize-beans-squash agriculture, longhouses and associated matrilocality, and villages are later" (Hart and Brumbach 2003:746). This research also necessitates that Ritchie's estimation of Carpenter Brook's age be reconsidered.

To address this issue, I obtained AMS dates for charred residue adhered to two sherds from Carpenter Brook, one of which has the qualities of Carpenter Brook Cord-on-Cord in the Ritchie and MacNeish (1949) typology and the other is Owasco Corded Horizontal (only about five of the sherds from the site have adhered residue). The dates are: 1010±40 B.P. (cal 2-σ range and median probability of A.D. 970 [1030] 1060 [p = .71] and A.D. 1080 to 1160 [p = .26]) (Beta-193706) for the Carpenter Brook Cord-on-Cord sherd and 1100±40 B.P. (cal. 2-σ range and median probability of A.D. 870 [920, 980] 1020 [p = .99]) (Beta-193707) for the Owasco Corded Horizontal piece. The dates are not significantly different at the 95 percent level of certainty and have a pooled mean of 1055±28 B.P. (calibrated 2-σ range and median probability of A.D. 900 to 920 [p = .12] and A.D. 940 [1000] 1020 [p = .88]). (Calibrations and calculations were completed with Calib v. 6.0.1 [Reimer et al. 2009; Stuiver and Reimer 1993, 2010].) These dates indicate Carpenter Brook is roughly 100 years older than Ritchie believed. Unlike many of the cases reported by Schulenberg and Hart and Brumbach where sites were used more than once, the Carpenter Brook dates do not indicate it was visited during a time outside its primary period of deposition (although more dates for the site may change this).

CARPENTER BROOK, ITS POTTERY, AND RITUAL

Ritchie's interpretation of Carpenter Brook was partly influenced by its atypical qualities relative to those of other large prehistoric artifact deposits. "We do not," he notes, "abandon a secure position in formulating the initial premise ... that the pottery dump is no normal refuse midden" (Ritchie 1947:67). This observation is based on two of Carpenter Brook's qualities: its distance from other sites and the unusual composition of its artifact assemblage. First, with the exception of the "slight" indications of earlier prehistoric use Mann (1922–1946) identified on the adjacent knoll, neither he nor Ritchie located any nearby evidence of additional prehistoric

use. In fact, in his Carpenter Brook monograph, Ritchie (1947:67) notes that the site was at least 500 meters from the nearest known habitation site, that at the Felix farm on the bank of the Seneca River (at the time of his monograph, Ritchie believed Carpenter Brook was deposited by people living at Felix). He implies it is unlikely that the inhabitants of Felix would have traveled so far to dispose of their refuse. In terms of the unusual characteristics of the Carpenter Brook artifact assemblage, Ritchie (1947:67) notes that typical early Late Woodland trash deposits

> invariably produce only a scattered small fraction of the potsherds recovered at Carpenter Brook and a vastly larger representation than was found here of chipped and polished stone artifacts, plus bone and antler implements (always in the majority in this culture [i.e. the Canandaigua Focus] and here totally wanting), together with a far greater quantity of refuse bone, and rejectage of industrial processes. Moreover, no other instance of extensive massed sherds is known.

On the basis of these atypical qualities, Ritchie concluded that Carpenter Brook was the result of prehistoric ritual activity, a conjecture he developed even before completing his excavations; he refers to the site in his field notes as "a ceremonial dump" (Ritchie 1946). Interestingly, Mann (1922–1946) arrived at a similar conclusion, remarking in his notes that "there seems to be some pertinent reason for this deposit ... of ceremonial origin." Neither Ritchie nor Mann indicate whether they had discussed this possibility with one another. Ritchie's hypothesis concerning the nature of the rituals during which Carpenter Brook was deposited were mostly influenced by two of its characteristics: the large volume of ceramic material and the predominance of bear remains in the faunal assemblage. His ideas were also related to Hallowell's (1926) influential study of bear ceremonialism, in which that author described a set of broadly similar ritual acts associated with bears throughout the northern hemisphere. Specifically, he noted practices in which some parts from bears that were consumed during rituals—typically their heads—were disposed of at 'special' places away from settlements. The bear remains were also sometimes left with small sacrifices of food, tobacco, or other items. Ritchie (1947:67, 71) suggests Carpenter Brook was the result of an analogous series of acts related to the ritual disposal of the remains from bears consumed during ceremony along with accompanying food offerings, "the spectacular breakage of pots being perhaps only incidental to this intrinsic purpose." He also implies that the dramatic volume of pottery could potentially and inaccurately influence the interpretation of the events during which it was deposited: "Although the fictile component forms the dominant element in our discovery it may only mask the intrinsic features vital to the actual elucidation of the site" (Ritchie 1947:72).

In the remainder of this section, as well as the attribute analyses of the Carpenter Brook pots that follow it, I focus on an elaboration of Ritchie's ideas concerning the ceremonial origins of the site that considers its ceramic vessels as more central to the acts during which it was deposited than he believed. I then discuss another interpretation of the site that explores the possibility that it was related to ceramic production.

An alternative to Ritchie's interpretation of Carpenter Brook is a scenario in which the pots from the site were not as tangential to the acts during which they were deposited as he believed. This is consistent with both ethnohistoric and archaeological data indicating Iroquoian-speaking people viewed ceramic vessels as symbolically charged items worthy of sacrifice. At the most general level, as Wonderly (2001) has noted, early historic-period Iroquois perceived strong symbolic associations between clay pots and fertility, the earth, and death and dying. While ceramic vessels in general would probably all have embodied these kinds of symbolic relationships to some degree, the associations would likely have been most intense when pots were directly involved in feasts, particularly those with ritual reenactments/reification of beliefs related to fertility, death, and dying. For example, the Huron referred to the ceremony popularly known as the "feast of the dead," during which recently deceased individuals were interred in group burials, as 'the feast of the kettle' or more succinctly, "the kettle" (Thwaites 1896–1901 10:269).[1] Kapches (1976:33–34) reports on a particularly vivid archaeological manifestation of the link between cooking vessels and death, fertility and the earth from late prehistoric village sites in southeastern Ontario, where people interred deceased infants inside clay pots. The symbolic importance of cooking vessels was regularly reified by their central roles in Iroquoian social gatherings, including formal rituals described by Sagard and the Jesuits (e.g., Sagard 1939:211–212; Thwaites 1896–1901 10:145, 179–180, 269–271, 289; 39:31; 70:149). Another indication of the symbolic prominence of pots was their role in metaphors related to general social conditions and well-being. For instance, the Jesuit de Brébeuf (Thwaites 1896–1901 10:307) notes that one Huron group used the phrase "divided kettle" to describe a disagreement among villages and he notes that, in one case, "a general Assembly of the Notables of the whole Country took place to … reunite the kettle." The Jesuits Chaumonot and Dablon report that both the Huron and Onondaga kept a "war-kettle" on the fire during times of conflict

(Thwaites 1896–1901 42:121–123, 169–171).

Archaeologically, the symbolic importance of ceramic vessels is suggested by their inclusion in Late Prehistoric and Protohistoric burials (Engelbrecht 2003:61; Tuck 1978:332; see, e.g., Ritchie 1937; Sempowski and Saunders 2001:732–808; Wintemberg 1936:117; Wray et al. 1987:175, 226). There is also some evidence for prehistoric instances of "pot killing" in the Northeast. For example, Jamieson (1999:191–192, note 3) and J. V. Wright (1999:683) have both suggested that clay pots from the southern Ontario Woodland period Pergentile and Red Horse Lake Portage sites, respectively, had been symbolically destroyed. Also, Ritchie (1944:227–228) has documented 'killed' steatite vessels accompanying Transitional Archaic period graves on eastern Long Island, each of which had a small hole knocked through its base. In light of this ethnohistoric and archaeological evidence for the symbolic importance of cooking vessels in the worldviews of Iroquoian-speaking people in the New York area, it is likely that those who visited Carpenter Brook and left items there had similar ideas about their clay pots.

Finally, from a purely pragmatic perspective, it would not have been productive for the individuals who visited Carpenter Brook to have simply smashed or left usable vessels behind if such an act had no symbolic purpose. Allen (1992:140–142) and Dunford (2001:38–59) have noted that prehistoric pottery production in the Northeast, which was most likely carried out by women, was a complex task that included gathering resources, forming vessels, and drying and firing them (also see Rice 1987:113–167). Many elements of this process were only possible in relatively dry and warm weather, so pottery production was likely limited to warmer months and was probably closely tied to the timing of other seasonal activities in which women participated, such as harvesting crops (Allen 1992:140–142; Dunford 2001:38–59). Undoubtedly, unexpectedly inclement weather, such as extended wet periods, would have contributed additional unpredictable elements to pottery production.

Thus, given the complexity and challenges of pottery production in the Northeast, as well the symbolic importance of ceramic vessels for Iroquoian-speaking people, it is unlikely that the pots from Carpenter Brook were "incidental" to the acts during which it was deposited, as Ritchie suggested. However, the possibility that the vessels from the site played a central symbolic role in ceremonies there is contingent on whether Ritchie's ideas concerning the ritual nature of the site are accurate. His arguments relating the site to ceremonial acts were largely based on its atypical qualities, including the prominence of bear remains in the faunal assemblage, the large volume of pottery juxtaposed with the near-complete absence of lithic material, and its distance from the nearest contemporaneous habitation site (Ritchie 1947). However, his contention is consistent with additional ethnohistoric evidence related to the importance of liminal watery settings similar to those at the site, and ritual acts people performed at them (see Smith 2005).

In brief, Carpenter Brook is partially fed by an adjacent spring. In Iroquoian cosmology, springs and waterfalls are portals to a dangerous underwater world. There are numerous accounts from seventeenth-century European travelers in the Northeast including Sagard, the Jesuits, and Champlain, in which they report individuals leaving material sacrifices—including smoking pipes, tobacco, copper, and arrows—at such dangerous places in the landscape to ensure safe journeys (e.g., Champlain 2000:47; Sagard 1939:171, 189; Thwaites 1896–1901 10:159, 165-167; 50:265, 267, 287). J. V. Wright (1999:683–685) argued that pottery ranging from Middle Woodland to Late Prehistoric times found underwater at the Red Horse Lake Portage site in southeastern Ontario was left during a series of similar rituals (see also P. Wright 1980). In this light, Carpenter Brook also has some qualities commensurate with those of a 'special place' in the landscape at which people would have left items as offerings. It is somewhat distant from the nearest habitation site and is near a spring, an important and dangerous setting in Iroquoian world view. Beyond this, its artifact assemblage primarily comprises symbolically charged items, notably the pottery and bear remains—although the presence of less numerous objects, such as the smoking pipe[s], phallic effigy, and dog and puma remains, are probably also significant (Engelbrecht 2003:45–46, 54–57; Hamell 1998:269–271; Ritchie and Funk 1973:360; Smith 2005:112–130).

This evidence is consistent with Ritchie's interpretation that Carpenter Brook was deposited during acts related to ritual. However, its ceramic vessels should not, as he argued, be dismissed as tangential to those acts and it is probable that they were intended as offerings as much as the items found among them. Thus, the pots from the site were used in a ritual social setting distinct from that of pots used in everyday/prosaic contexts. This interpretation permits analyses of the Carpenter Brook vessels from the perspective that some of their attributes might reflect the differing needs of the social setting in which they were used, relative to those of vessels found in more prosaic contexts.

The ethnohistoric and archaeological records contribute evidence to support the idea that the qualities of Iroquoian vessels changed with the social setting in which people used them. Most of these relate to feasting, one of the primary ways in which Iroquoian people

shared ritual experiences in the early historic period (e.g., Thwaites 1896–1901 10:177). For instance, in 1637, the Jesuit le Mercier recounted that a Huron individual reported to him that a healing ritual could not be performed because "they had no kettle large enough to make a feast" (Thwaites 1896–1901 13:233). Beyond illustrating the pragmatic need for larger pots to cook for the greater numbers of people who attended a ceremonial feast, this individual's statement indicates that several smaller vessels would not do—that is, that a large pot was symbolically necessary for conducting a feasting ritual. Elsewhere, Dunford (2001:124) has suggested that Late Woodland potters on Cape Cod produced two classes of vessels, one of which comprised "elaborately decorated" pots "for use in community-wide feasts" and the other was made up of "carefully constructed but minimally decorated… vessels for daily household use." Meanwhile, Cervone (1987:24–25) and Wonderly (2002:38) have both raised the possibility that people manufactured vessels included in burials specifically for that purpose and Cervone has suggested that they might have characteristics different from pots they used everyday.

DIAMETER AND WALL THICKNESS

As indicated by le Mercier's account, as well as the simple need for large vessels during feasting that could service more people than would a pot used for everyday cooking, a vessel's size is one attribute that correlates, to some degree, with the social setting in which its maker intended it to be used (see also Mills 1999:104). Larger pots were likely meant, at least in part, to be used for feeding larger numbers of people, such as groups that would gather during ritual feasts. This is not to say that bigger vessels were not used for everyday purposes, but that in a ritual context that involved feasting one would expect cooking vessels to be larger. Thus, in the case of Carpenter Brook, the presence of relatively sizable pots would be another line of evidence consistent with the hypothesis that the site represents the remains of items used and consumed in a ritual context.

One variable that correlates with overall vessel size for prehistoric pots in the Northeast is orifice diameter. Thus, to examine the relationship between the sizes of the pots from Carpenter Brook and those used for everyday purposes, I compared the extrapolated orifice diameters of vessels from the site with those of pots from the early Late Woodland Bates, Maxon-Derby, and Sackett habitation sites. All three of these settlements were excavated by Ritchie at various times from the 1930s to the 1950s and their collections are stored at the Rochester Museum and Science Center (part of the Sackett assemblage) and the New York State Museum (Bates, Maxon Derby, and the remainder of the Sackett material) (Ritchie 1937; 1980:281–287; Ritchie and Funk 1973:195–252). Bates is roughly 100 km southeast of Carpenter Brook and has yielded radiocarbon dates from the calibrated twelfth to thirteenth centuries A.D. (Hart 2000; Ritchie and Funk 1973:251). Although the dates from Bates are 200 to 300 years later than those from Carpenter Brook, its two earliest dates (calibrated 2 σ ranges and median probabilities of A.D. 1022 [1160] 1257 and A.D. 1019 [1161] 1276, respectively [Hart 2000:5]) are not significantly different from the later of the two dates for Carpenter Brook at the 95-percent level of confidence (Stuiver and Reimer 2010). Maxon-Derby, as mentioned above, is about 2 km south of Carpenter Brook and had multiple occupations: one during the calibrated eleventh century A.D. and another from the cal. mid-twelfth and to mid-thirteenth centuries A.D (Hart 2000). The two radiocarbon dates that represent the earlier of these occupations (calibrated 2-σ ranges and median probabilities of A.D. 904 [1021] 1161 and A.D. 988 [1025] 1160, respectively [Hart 2000:5]), are not significantly different from the later of the two Carpenter Brook AMS dates at the 95-percent level of confidence, and the earliest date from Maxon-Derby is not significantly different from the earlier of the Carpenter Brook dates at the same level of certainty (Stuiver and Reimer 2010). Finally, the Sackett site is about 75 km west of Carpenter Brook. It has yielded radiocarbon dates from the calibrated thirteenth century A.D., roughly 300 years after Carpenter Brook (Hart 2000). Although all three of the village sites are within three centuries of the dates for Carpenter Brook and some of their dates are not significantly different than those from the site, there is a possibility that temporal differences among them are reflected in the results of the ceramic analyses presented below, an issue to which I return later. Also, since radiometric dates are not available for all the vessels included in this study, the attribute data presented below is necessarily an aggregate of values for each site. That is, it is not possible with current methods to determine, for example, when during the habitation of Bates a particular vessel was manufactured or to which occupation of Maxon-Derby a given pot may be assigned (with the exception of those sherds from contexts directly dated by Ritchie and Funk [1973] or Hart [2000]). This being said, the assemblages excavated from the village sites largely comprise items people used in "everyday" (not formal ritual) contexts. Thus the ranges of attributes of ceramic vessels from village settings will, to some degree, correspond with the prosaic functions for which the pots were intended (Allen 1992:139–140; Rice 1987:293–301). Undoubtedly,

some sherds from vessels used for feasting will be present in village assemblages (e.g., Allen 1992:139–140), but the pots will likely be low in number relative to those used in everyday contexts.

Rim sherds from a total of 330 pots from the four sites were large enough to yield data for vessel diameter (Table 2.1; Figure 2.7). Of these, 114 are from Carpenter Brook and 216 are from the villages. The Carpenter Brook vessels have the largest average oral diameters, at 29.7 cm, compared with 21.1 cm for the village pots. The nonparametric Wilcoxon rank sum test indicates the distribution of diameter values for Carpenter Brook is significantly different from those of any of villages (α = .01); the same relation holds when the values for the village sites are grouped together (statistical calculations were performed with SPSS 9.0). Thus, the Carpenter Brook vessels are significantly larger (on average) than those from more prosaic contexts, a result that is consistent with the hypothesis that at least some of the pots from the Carpenter Brook site were used during feasting. Although more research is needed concerning how vessel diameters changed through time in central New York, it is unlikely the differences between the Carpenter Brook vessel diameters and those from the later village site pots reflect temporal changes. If, as suggested above, larger vessels were made to cook for larger numbers of individuals, one might also expect pot size to correlate with population density. Village sites with more than one household, among the earliest of which is Sackett, appear in central New York in the thirteenth century A.D (Hart 2000; Hart and Brumbach 2003:745–746). Thus, to some degree, populations were becoming denser during the time span represented by Carpenter Brook and the settlement sites. However, the earlier Carpenter Brook pots are larger than the pots from the later habitation sites, the opposite trend one would expect if the differences reflected increases in population density.

Table 2.1. Mean Reconstructed Vessel Orifice Diameters for Carpenter Brook and the Village Sites.

Site	*N*	Average vessel orifice diameter (cm)
Carpenter Brook	114	29.7
Bates	85	16.0
Maxon-Derby	22	21.7
Sackett	109	25.0
(Total for Villages)	216	21.1

Another attribute that may be related to the intended function of the Carpenter Brook pots is vessel wall thickness. In general, pots with relatively thin walls and consistently thick cross-section will be more durable in thermally stressful environments than will those with thicker walls or walls with inconsistent thickness (e.g. Rice 1987:227–229). In the Midwest, Braun (e.g. 1987:164) has noted a relationship between thinner-walled vessels and an increased dietary reliance on starchy seeds,

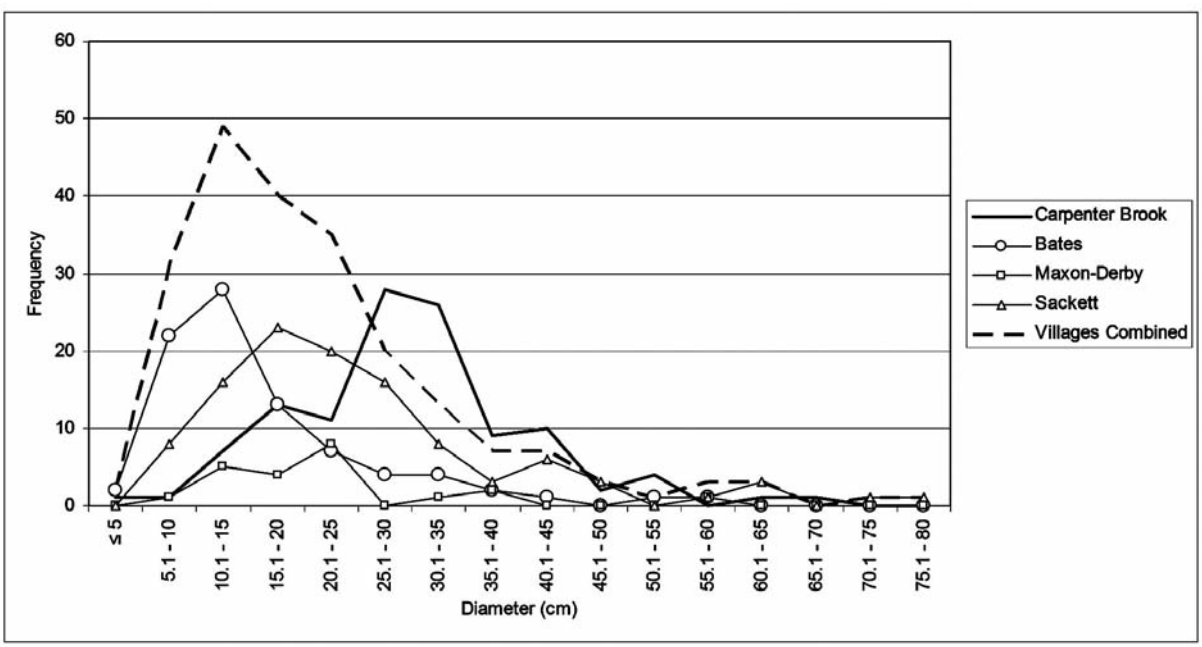

Figure 2.7. Frequency distribution of vessel orifice diameters from Carpenter Brook, Bates, Maxon-Derby, and Sackett.

which are best prepared by lengthy episodes of boiling or simmering. Brumbach and Bender (2002:235–236), Chilton (e.g., 1999:55, 58), and Schulenberg (2002b:88) have suggested a similar correlation in the Northeast (see also Luedtke 1986). While pots with thin walls of consistent cross-section are advantageous in terms of their long-term survivability when used repeatedly for cooking, they are also more time-consuming and require more skill to produce than pots with thick walls that have inconsistent thickness. Thus the qualities of the Carpenter Brook vessel walls relative to those of pots from the villages will shed some light on the degree to which the vessels were intended for long-term use for cooking.

Measurement of the thicknesses of 295 sherds from Carpenter Brook and 583 from the villages indicated that those from the site have the highest mean thickness, 7.97 mm; the average for the villages combined is 6.74 mm (Table 2.2, Figure 2.8) (for rimsherds, thickness measurements were taken at the furthest intact point from the vessel lip; for body sherds, the thickness measurement used was the average of the thickest and thinnest on the sherd). The Wilcoxon rank sum statistic indicates the Carpenter Brook distribution is significantly different from that of any of the village sites individually or when the village site data are pooled ($\alpha = .01$). However, vessel wall thickness cannot be considered in isolation since, as noted above, the pots from the brook are also significantly larger than those from any of the other sites, suggesting its relatively high wall thickness value might be a reflection of its bigger vessels.

Table 2.2. Mean Vessel Wall Thicknesses for Carpenter Brook and the Village Sites.

Site	*N*	Average vessel wall thickness (cm)
Carpenter Brook	295	7.97
Bates	184	6.2
Maxon-Derby	184	7.11
Sackett	215	6.9
(Total for Villages)	583	6.7

The nonparametric Spearman's rank correlation coefficient was employed to calculate the degree of correlation between vessel diameter and wall thickness for vessels from the four sites. Fragments from 112 pots from Carpenter Brook and 213 from the village sites (all from discrete pots) yielded data for both variables. Spearman's coefficient indicates the two variables are correlated at the 95-percent confidence level for the four sites and for the data from the villages when they are grouped together. However, when the relationships between the data are smoothed using the LOWESS non-linear modeling method (after Hart and Brumbach 2009), there are two notable differences between the distribution from Carpenter Brook and that from the village sites (LOWESS smoothing was performed using the PTS LOWESS

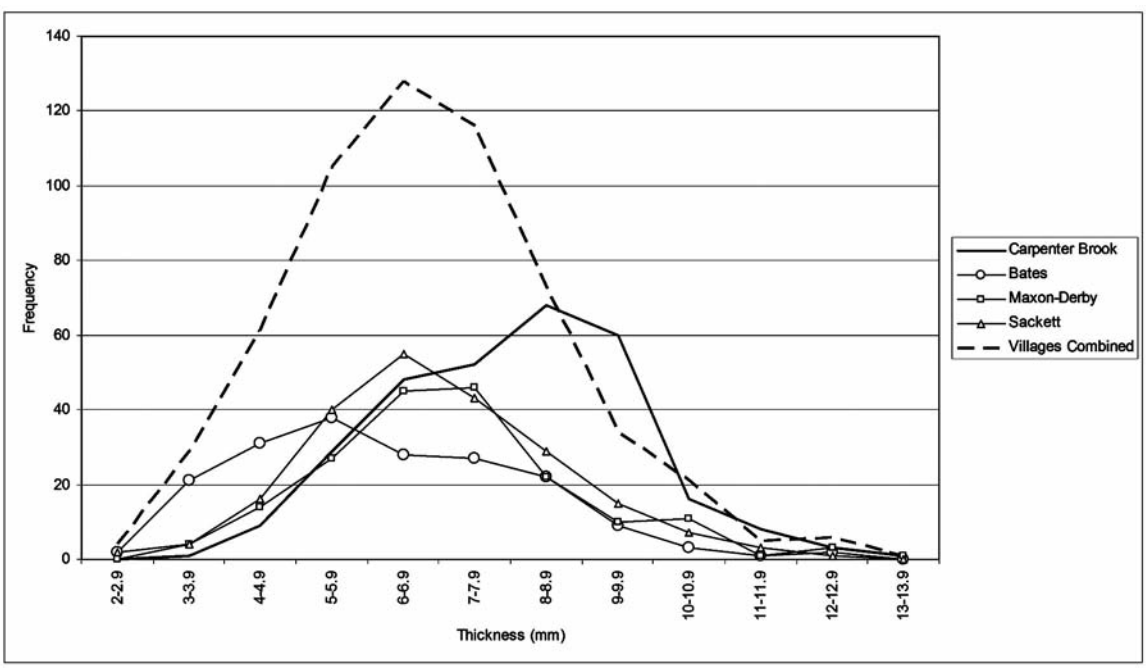

Figure 2.8. Frequency distribution of vessel wall thickness values for Carpenter Brook and the villages.

Calculator add-in for Microsoft Excel using a smoothing parameter of 1) (Figure 2.9). The trend line for the villages shows wall thickness and diameter are directly proportional for vessels smaller than about 40 cm in diameter: small pots tend to have thinner walls and larger ones have thicker walls. For pots from the villages larger than 40 cm in diameter, wall thickness remains roughly the same, on average, regardless of vessel size (Hart and Brumbach [2009:373, 375] obtained similar results for data from Woodland-period habitation sites). For pots from Carpenter Brook, however, the trend line indicates a directly proportional relationship between the two variables for vessels of any diameter. There is no value for diameter above which pots tend to be made with walls of the same thickness. The other notable difference in the two trend lines is that, for the entire range of vessel diameter, the Carpenter Brook pots tend to have thicker walls. Thus, for vessels of a given diameter, those from the Carpenter Brook site generally were made with thicker walls relative to those from the villages. Both these aspects of the distribution of data for vessel diameter versus wall thickness are consistent with the idea that the potters who made its vessels were not as concerned with making thin-walled pots as were those who produced the vessels from the villages. This perhaps also implies that they were aware their wares would be employed as sacrifices, so they expended minimal effort toward qualities that would have assured the vessels had longer use-lives, but were more difficult to produce.

It is likely that a portion of the differences in the thicknesses of the earlier Carpenter Brook pots and the later vessels from the villages is a reflection of a more general trend through time. Hart and Brumbach (2009:373–374) have shown there is a gradual decrease in vessel wall thickness throughout the Woodland period, from an average of over 11 mm at 1100 B.C. to around 7 mm after A.D. 1000—a total difference of about 4 mm over a period of 2,000 years (there may be a greater rate of decrease between A.D. 820 and 1130, but this depends on what technique is used for constructing trend lines with which to summarize the data). Thus, although this gradual trend may account for a part of the difference between the average value for the Carpenter Brook walls and those from the villages, it probably does not account for the entirety of the change which, when the villages are grouped, represents over a 1 mm decrease in thickness in a period of about 300 years. More research on how vessel wall thicknesses changed through time will undoubtedly shed more light on this issue.

Several sherds from Carpenter Brook display another quality related to wall thickness that indicates they were from vessels that would not have been durable as cooking pots and is also consistent with the hypothesis that their makers were expending minimal effort in assuring they had long use-lives. Specifically, they have gouges and depressions on their interior surfaces that were formed when their clay was still plastic—features

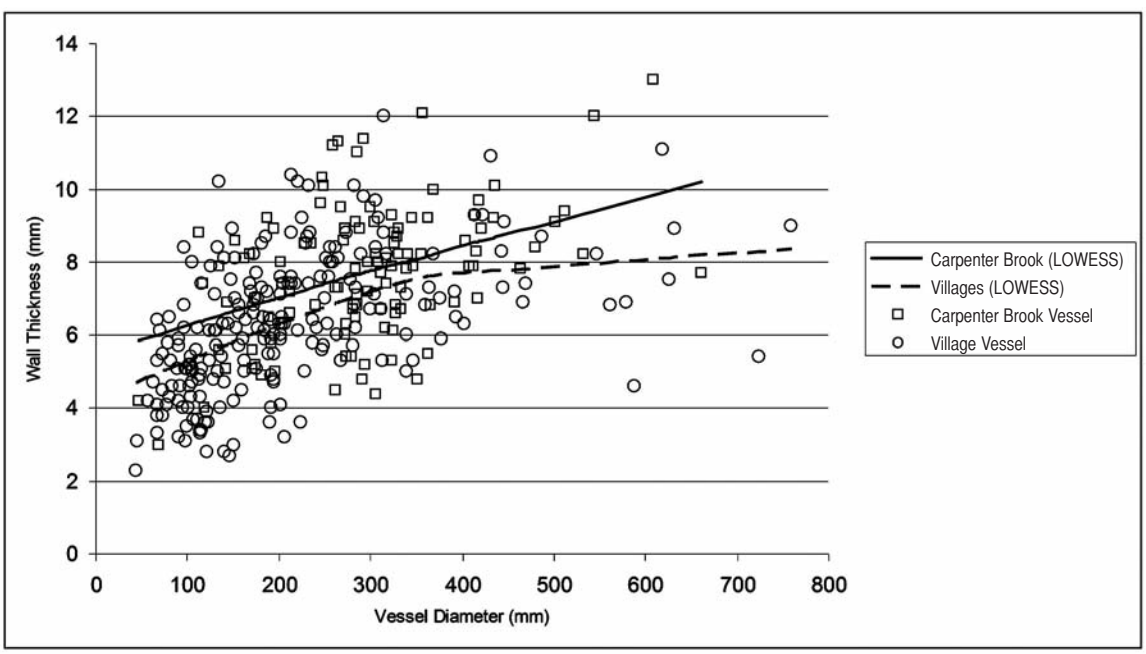

Figure 2.9. Scatterplot of vessel diameter vs. wall thickness for Carpenter Brook and the villages, also showing LOWESS smoothing.

Figure 2.10. Carpenter Brook sherds with irregular interior surfaces.

that result in varying wall thickness across relatively small portions of the pots (Figure 2.10). If these pots were used repeatedly for cooking they would likely have soon crumbled from stresses caused by differential thermal expansion. No instances of similar internal gouges and depressions were observed on any of the pots from the villages.

Finally, one Carpenter Brook sherd displays an anomalous quality that would have also made it short-lived in thermally stressful environments. The surface of the fragment is covered with a layer of clay that includes temper, but is likely unfired and that obscures the original exterior, lip surface, and interior of the portion of the vessel from which it came (Figure 2.11). Although

Figure 2.11. Carpenter Brook sherd with an additional applied layer of clay obscuring the original vessel surface. The original exterior surface of the vessel is visible in the upper right portion of this sherd.

the exterior of the added clay surface is in poor condition, it appears to be decorated. There were no other instances of this kind of vessel alteration in either the Carpenter Brook assemblage or that from the villages. The added clay might have been related to a repair, but too little of the original pot remains to permit a more definitive assessment of its possible function. Nonetheless, the added material would have decreased the durability of the vessel in cooking contexts. Not only does it increase the wall thickness of the pot from which the sherd came, but because it is made from clay with a different density than that of the underlying vessel, the pot's walls would have had variable thermal expansion characteristics. Both qualities indicate the vessel's wall would have expanded inconsistently in a thermally stressful environment and likely would have failed relatively quickly. Although one cannot read too much into a single anomalous artifact such as this fragment, its inferior characteristics for cooking are consistent with the qualities represented by many of the other sherds at the site, as well as the hypothesis that its maker(s) (or in this case, those individuals who altered it) were minimally concerned with cooking performance.

DECORATION SIZE AND COMPLEXITY

Decoration size and complexity are additional vessel attributes a potter may have altered depending on the social context in which she intended her ware to be used. Both are expressions of the amount of 'decora-

tive effort' expended on a pot (see Braun 1991:381). The hypothesis that the amount of decorative effort expended on a vessel varied with the social context in which it was to be used is based on the premise that pots used during feasting had central and highly visible roles. In Renfrew's (1994:51) terminology, they served as "attention focusing devices." Thus, larger and more complex decoration might have had the effect of enhancing the perceived relative visibility of a vessel during feasting, one of the most ubiquitous elements of Iroquoian ritual. Additionally, larger decoration would have been visible from greater distances and so increases in its size would also increase the number of individuals who could see it in crowded ritual/feasting settings (Carr 1995:189–190; see Rieth and Horton 2010:11–13). Finally, larger and more complex decoration might have been related to the greater diversity of people who attended feasts relative to those typically present in more prosaic contexts. Braun (1991:369–384) notes that the amount of decorative effort potters expended on their wares increased in southern Illinois between 200 B.C. and A.D. 200, a time when people from different kin groups started living together in composite households in increasingly diverse villages. In this context, ceramic vessels offered potters "a rich opportunity for decorative display and variation" (Braun 1991:384). Thus, although not 'signaling' (see, e.g., Wobst 1977) any kind of group affiliation, increases in the size and complexity of clay vessel decoration accompanied the intensification of inter-group communication in the Midwest. Similar (although briefer) phenomena may have accompanied ritual events in the Northeast during the Late Woodland, such as that represented by Carpenter Brook. Specifically, potters may have increased the amounts of decorative effort they expended on their wares in proportion to the diversity of individuals attending the events during which they were to be used.

Typically, decoration on early Late Woodland clay pots from New York is confined to the upper portions of vessels. It is most frequently applied with cord-wrapped sticks or other implements to the exterior of vessels' necks extending down from their rims (the pots usually do not have collars). Decorative impressions also appear on pot lips and the upper parts of interior surfaces (also extending down from the rim). The following discussion focuses on exterior decoration, which is usually composed of bands of single motifs, including vertical, horizontal, and oblique impressions, as well as more complex zoned (i.e. plats) and chevron designs. Occasionally, potters also applied bands of punctuates or notches to the interior surface of the vessel (see, e.g., Ritchie and MacNeish 1949).

One way the amount of decoration on the exterior of a pot can be measured is in terms of the distance its decorative field extends below its lip. Rim sherds from a total of 44 vessels from Carpenter Brook and 56 from the villages are intact enough so this variable—the 'height' of the vessel's exterior decoration—can be measured (Table 2.3, Figure 2.12). On average, the pots from Carpenter Brook have the greatest value for decoration height, 61.1 mm, larger than the values from any of the villages. However, the Wilcoxon rank sum test indicates that, at the 95-percent level of certainty, the distribution of values from Carpenter Brook is only significantly different from that of Sackett ($\alpha = .02$). It is different from those from Bates and Maxon-Derby at the 72-percent and 83-percent levels of certainty, respectively. The Carpenter Brook distribution is also significantly different from those of the villages when the latter are grouped together, at the 95-percent level of certainty ($\alpha = .03$). Thus, while the degree of statistical significance changes to some degree depending on how the data are grouped, the Carpenter Brook vessels do have larger decorative fields, on average, than do the pots from the villages.

This result might be linked to the fact that the pots are larger than those from the villages, suggesting there may be no proportional difference between the relative sizes of the decoration on the pots from the sites when vessel diameter is taken into account. That is, larger pots might simply have proportionally larger decoration. Spearman's rank correlation coefficient was used to determine whether the two variables were related. Sherds from just 84 vessels yielded data for both vessel diameter and height of decoration; 41 are from Carpenter Brook and 43 from the villages. The results indicate there is no statistically significant correlation between the variables (even at just a 40-percent level of confidence) for vessels from Carpenter Brook ($r_s = -.035$) or from the villages when their data are grouped together ($r_s = .079$) (the data from the villages were pooled because of the relatively small numbers of sherds from each site that yielded data for both variables). Thus, it is unlikely that the larger decoration on the Carpenter Brook pots is related to their larger average size.

Design complexity, another indicator of decorative effort, can be measured as the number of distinct impressed bands composing a vessel's decorative field. Based on the same vessels used for the 'height of decoration' analysis, the Carpenter Brook pots have the most decorative bands, on average: 3.2 per vessel (Table 2.3). The distribution of values for Carpenter Brook is only significantly different at the 95-percent level of certainty from that for Sackett (1.2 bands per vessel). The Carpenter Brook distribution is also significantly different at the 95-percent confidence level from those from the village sites when their data are grouped, but this

result is heavily influenced by the low value from Sackett. In sum, the pots from Carpenter Brook do have more complex decoration in terms of the number of bands in their decorative fields, but the value is only slightly higher than that for Bates and Maxon-Derby. For this variable, Sackett, with its very low average, is the outlier.

Finally, although the average value for the number of decorative bands—i.e. design complexity—for the Carpenter Brook pots is only slightly higher than that for the villages, there may be differences between the two groups of pots in how the complexity of decoration on vessels is related to the size of their decorative fields. Spearman's coefficient indicates there are statistically significant correlations between the two variables for all four sites and the villages when they are grouped.

Table 2.3. Mean Exterior Decoration Height and Average Number of Exterior Decorative Bands for Carpenter Brook and Village Vessels.

Site	*N*	Mean decoration height (mm)	Average number of decorative bands
Carpenter Brook	44	61.1	3.2
Bates	26	47.5	2.8
Maxon-Derby	5	31.8	2.8
Sackett	25	34.5	1.2
(Total for Villages)	56	40.3	2.1

When the data from the sites (villages grouped) are smoothed with the LOWESS method (again using a smoothing parameter of 1), there are two notable characteristics in the trend lines (Figure 2.13). First, for vessels with relatively small decorative fields extending less than about 40 mm from vessel rims, those from Carpenter Brook and the villages tend to be decorated with similar numbers of bands per unit of decoration height. However, for vessels with larger decorative fields, those from Carpenter Brook typically have more complex decoration than do pots with similarly sized decorative field from the villages.

In sum, the data support the interpretation that the potters who made the vessels recovered from Carpenter Brook expended more effort, on average, on the decorative qualities of their wares than did those who made the pots from the villages (although the degree of certainty of this assertion is certainly subject to interpretation based on how strictly one wishes to adhere to the statistical standard of utilizing a 95-percent level of confidence as a standard critical value for whether to reject null hypotheses in archaeological applications). The Carpenter Brook vessels have larger mean decorative fields than do those from the villages, and the difference is not related to the larger average size of its pots. The Carpenter Brook vessels also have more decorative bands—i.e. greater decorative complexity—than do the village pots, although the statistical significance of this result is somewhat equivocal.

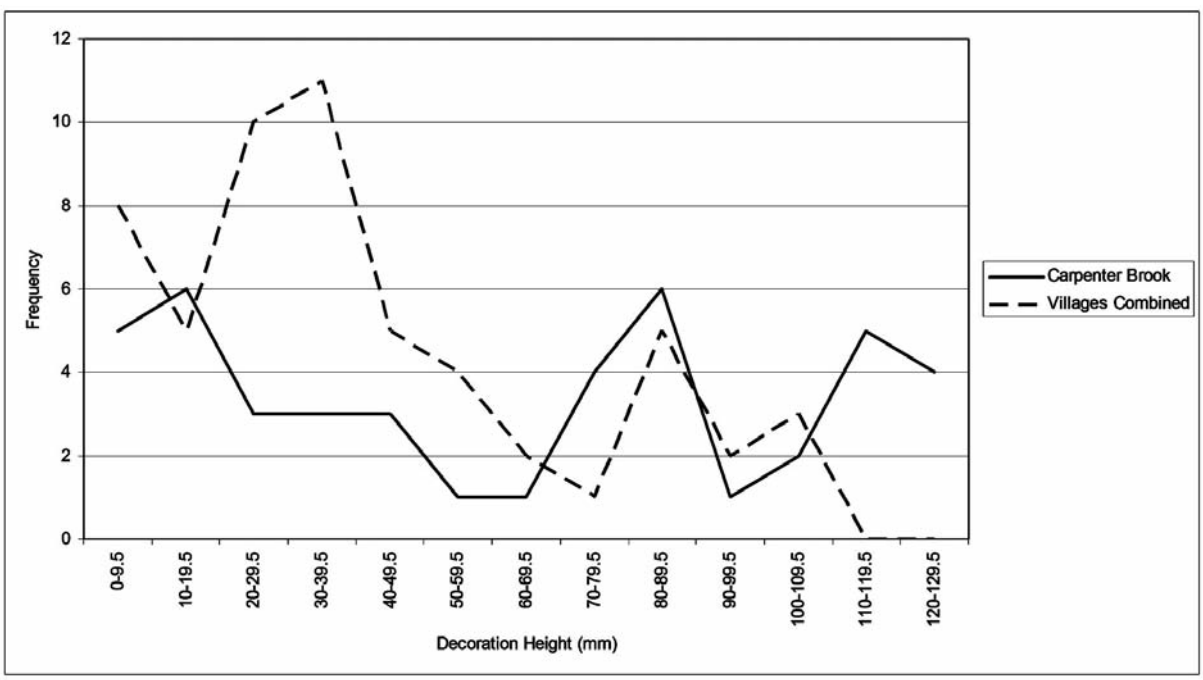

Figure 2.12. Frequency distribution of decoration height for the Carpenter Brook and village vessels.

Finally, it appears that, for vessels with large decorative fields, the Carpenter Brook pots display more complex decoration than do vessels from the villages with equally sized decorative embellishment. More research is needed to explore how these decorative variables changed temporally in order to explore whether the differences discussed here are related to changes through time from the earlier Carpenter Brook to the later habitation sites.

ALTERNATIVE INTERPRETATION: CARPENTER BROOK AS RELATED TO POTTERY PRODUCTION

One possible alternative to the hypothesis that Carpenter Brook was formed during ritual activities is that it was related to pottery production. Allen (1992:144) describes several archaeological indicators that may be present at or near loci of vessel manufacture, including: "pottery making tools, proximity to clay kilns, stashes of clay and temper, and a high number of wasters (broken during the process of manufacture)." In the Northeast, vessels were likely either fired in ovens or in open fires, which would have left archaeological "evidence in the form of areas of burned soil, possibly fire-reddened ... and associated with piles or scatters of sherds" (Allen 1992:144).

Several characteristics of Carpenter Brook correspond with elements of this description. These include the possible vessel-making tool found by Mann and the potential presence of clay near the site, which he also noted. Beyond this, the Carpenter Brook pots, which tend to have qualities that make them poor cooking vessels, may have been wasters, vessels disposed of during or immediately after production because they had manufacturing errors. This would also be in line with Mann's idea that the fragile nature of the pots was a result of them being poorly fired. Although neither Ritchie nor Mann noted the presence of burned or reddened soil, such features would have been easy to miss if buried.

However, the hypothesis that Carpenter Brook was related to pottery production cannot account for several of the site's other qualities, such as the presence of the anomalous faunal assemblage (the predominance of the bear remains) and the clay phallus, or the fact that some of the vessels from the site had been used repeatedly for cooking, as evidenced by the presence of adhered charred food residue. These qualities are more consistent with the hypothesis that the site was related to ritual activity. However, neither interpretation of the site is necessarily exclusive of the other. Although the AMS dates for the site are not statistically distinct, they suggest it may have been deposited over a period of several decades. This scenario would also be consistent

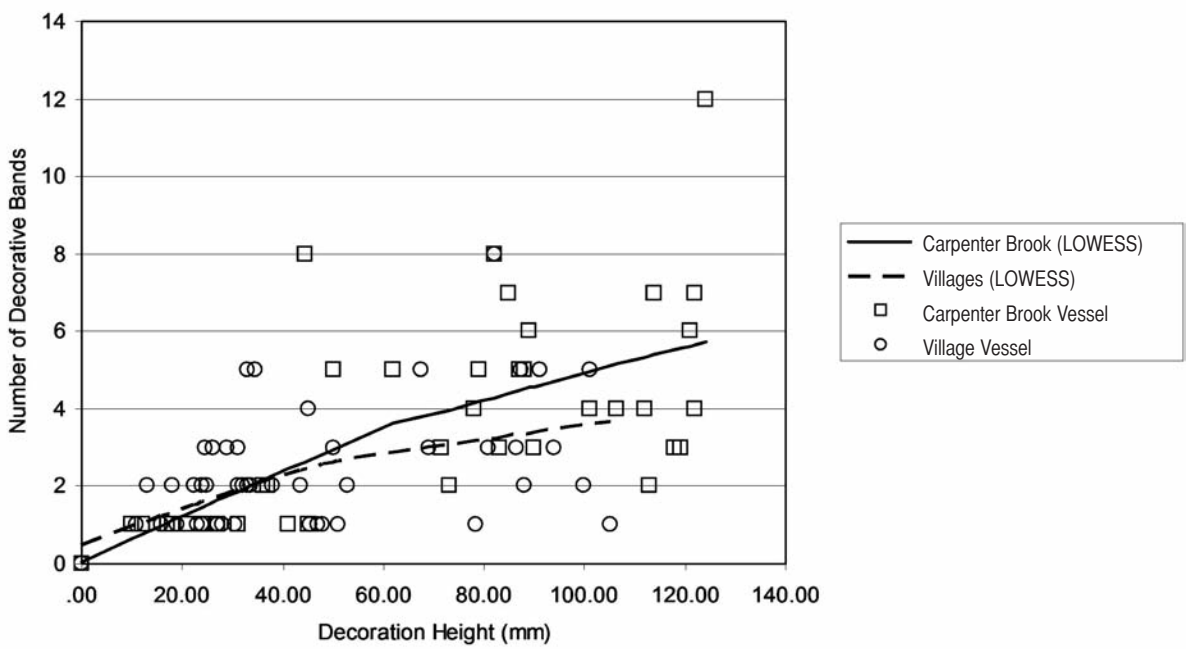

Figure 2.13. Scatterplot of size ('height') vs. complexity (number of bands) of the decoration on the Carpenter Brook and village vessels, also showing LOWESS smoothing.

with the large volume of material from the site. Thus, if Carpenter Brook was deposited over several decades, it is certainly within the realm of possibility that its uses alternated during that time and may have included those related to both pottery production and ritual practices. Beyond this, additional uses not considered here might also be feasible.

DISCUSSION AND CONCLUSION

The attributes of the Carpenter Brook pots examined in this paper—diameter, wall thickness, and the size and complexity of decoration—are consistent with the interpretation that the potters who made the vessels intended at least some of them to be used for purposes different from those from the more prosaic contexts at Bates, Maxon-Derby, and Sackett, although variables such as changes through time or the possibility that Carpenter Brook was related to pottery production may also have influenced the results. The Carpenter Brook pots on average are larger than those from the villages, suggesting more of them were intended to feed large numbers of people, such as would be present during feasting. Their walls, on average, have qualities that would have made them less durable as cooking vessels than those from the villages; i.e. they would not have endured as many heating-cooling episodes. Finally, as an assemblage, they have larger and more complex decoration than do pots from the villages (even when the larger sizes of the pots from the brook are factored into the equation). Thus, while they have inferior qualities relative to prosaically practical long-term use as cooking vessels, their decoration indicates their makers expended more effort on their embellishment than they did on pots that were used in "everyday" social contexts. Finally, as Mann noted, some of the Carpenter Brook sherds show minimal indications of use, such as adhered charred cooking residue, and their fragile nature may be attributed to a poor or minimal firing process. All of these characteristics are consistent with the hypothesis that the pots from the site were not intended for long-term use as cooking vessels.

The symbolically charged qualities of Carpenter Brook, including its setting, which is similar to those at which people were observed to make sacrifices of objects in historic times, and other elements of its artifact assemblage, such as the bear remains and smoking pipes, along with the fact that ceramic vessels themselves were items worthy of being sacrificed, all imply that the pots from the site were intended as symbolic offerings. Thus, the differences between them and vessels from more prosaic contexts might reflect the differing needs of those two social settings. The Carpenter Brook pots, if their makers intended them to be used as offerings, would not have needed the difficult-to-produce qualities that would have ensured they could withstand the thermally stressful environment of repeated use as cooking pots. It is conceivable they were made with just enough thermal durability to survive a single use. At the same time, their larger sizes would have served the greater numbers of people who would be present during a ritual event than would pots used in everyday contexts. Their larger and more complex decoration may have served as attention-focusing devices, important elements of feasts during which food-containing vessels would have been at the center of the ritual performance. The larger average sizes of the Carpenter Brook pots may also have served attention-focusing roles. These assertions are tempered by the possibility that Carpenter Brook may also be related to ceramic vessel production and some of its vessels might be wasters—pots that were recognized as of low quality during the manufacturing process.

Undoubtedly, there are numerous other potential interpretations for the disparities between the Carpenter Brook pottery and the vessels from the village sites beyond those addressed in the current study. Also, since the analyses presented here have focused on comparing the Carpenter Brook pots as an assemblage with those from the villages, the variability among its vessels has been downplayed. For example, while the pots from the brook are large on average and many have thick walls that have been minimally refined, small vessels with thin, finely made walls are also present. Also, while most of the Carpenter Brook pots show few indications of long-term use such as adhered charred cooking residue, a small number of sherds (approximately five) do have adhered residue (Mann's observation that the sherds from the site appeared to have been minimally used indicates the lack of residue is not a reflection of post-excavation cleaning). Further study focusing on the refined pots or those with charred residue would undoubtedly be productive. There are also attributes of the Carpenter Brook vessels relative to those from the villages that were not addressed in the current study, such as temper. An analysis of the qualities of the temper of the Carpenter Brook pots relative to those from the other sites might shed further light on the differing needs of the purposes for which the two groups of vessels were intended. Additionally, an analysis that includes some earlier domestic sites would elucidate how potential changes in ceramic vessel attributes through time have influenced the results presented here. Finally, a more systematic survey of the area around Carpenter Brook than that conducted by Ritchie might

provide additional evidence concerning other site uses, including its possible role in pottery production.

Although this study has focused on the clay vessels from Carpenter Brook, the remainder of its assemblage also holds potential for additional research. For example, the clay phallic effigy might represent an opportunity for studying gender roles, particularly in the context of a site with so many ceramic vessels. In early historic times, clay pipes were apparently made by men (Engelbrecht 2003:55; Kuhn 1996:32), and the physical form of the phallus from Carpenter Brook unmistakably conveys a sense of masculinity. Clay pots, meanwhile, were made by women (e.g. Allen 1992:140; Sagard 1939:109) and were associated with fertility. The proximity of two such explicit expressions of gender at a possible location of repeated ritual acts represents an additional potentially productive subject for future study. Beyond this, residue analysis of material that may be present in the perforation of the phallic effigy might more definitively address whether the item was used for a smoking pipe. Also, given the socially integrative function of ritual in general, it is even conceivable that men played a role in manufacturing the vessels from the site. This would be consistent with the presence of vessels whose more difficult-to-produce attributes were poorly executed, since men were probably fairly inexperienced in making pottery. However, testing this hypothesis with archaeological data would be very challenging.

The perspective that the differences between the Carpenter Brook pots and those from the villages are related to the distinct social settings in which the vessels' makers intended them to be used adds another vector of variability for pottery analyses in the Northeast. It also sheds some light on the roles of individuals relative to long-duration technological changes, such as the gradual decrease in vessel wall thickness through the Late Woodland noted by Hart and Brumbach (2009). The differences in the wall thicknesses of the vessels from Carpenter Brook relative to those from the village sites indicate that the potters who made them were aware of the importance of controlling such subtle variables and, in so doing, allude to the degree to which individuals played roles in the gradual changes in ceramic technology through the Woodland Period (Hart and Brumbach 2009:368–369). This is also consistent with Braun's (1983:112) observation that numerous ethnographic studies of traditional pottery manufacture from contexts around the world indicate that potters are aware of the subtlest attributes of their wares. Finally, it underscores the fact that a site of a type as singular as Carpenter Brook can contribute to broader-scale investigations of social, economic, and cultural dynamics in the Northeast, despite its uncommon characteristics.

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ENDNOTE

1 Much of the ethnohistoric evidence cited in the discussion that follows of beliefs related to Carpenter Brook are based on observations made by Champlain, Sagard and the Jesuits among the Huron in the seventeenth century. Although the Huron were an Iroquoian-speaking group and likely had many customs and beliefs similar to those of Iroquoian-speaking people who inhabited New York State in prehistoric times, there were undoubtedly many differences as well. As Allen (1992:135) has noted, "the written accounts can only be used as guides to the earlier situation ... However [they] may be considered a baseline for an understanding of Iroquoian society." These issues—particularly the degree to which practices and beliefs recorded in written historical accounts can be used for interpreting Carpenter Brook, which dates to about six centuries before the earliest interactions between native groups in the New York area and Europeans—are addressed further in Smith 2005:71–225.

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Chapter 3

ADDITIONAL EVIDENCE FOR CAL. SEVENTH-CENTURY A.D. MAIZE CONSUMPTION AT THE KIPP ISLAND SITE, NEW YORK

John P. Hart, Lisa M. Anderson, and Robert S. Feranec

Abstract. *The histories of maize in New York have changed radically over the past decade based on the recovery of phytolith assemblages from directly AMS-dated charred cooking residues adhering to the interior surfaces of pottery sherds. We now know that maize was being used as early as ca. cal 300 B.C. at the Vinette site in the Finger Lakes region. Maize phytoliths have also been found in cooking resides dating to ca. cal. A.D. 650 from the Kipp Island site. Here we present additional evidence for maize use at this time through the analysis of human teeth from a cemetery at the site that Ritchie originally dated to ca. A.D. 1000, but that now appears to date primarily to ca. cal. A.D. 650. Dental caries rates and stable carbon isotopes both indicate maize consumption at this time.*

The histories of maize (*Zea mays* ssp. *mays*) in New York and the greater Northeast have undergone considerable change over the past several years. Previously thought to have been introduced in temperate northeastern North America around A.D. 1000, we now know that the crop has much longer histories in the region. Direct dates on maize macrofossils from southern Ontario have shown that maize was in use there by at least ca. cal. A.D. 500 (Crawford et al. 1997; Crawford and Smith 2003). Stable carbon isotope analyses of human bone collagen and apatite have provided complementary data showing that maize consumption is detectable in some individuals sampled in that region by at least ca. cal. A.D. 500 (Harrison and Katzenberg 2003; Katzenberg 2006). In central New York, phytolith assemblages extracted from directly dated charred cooking residues adhering to the interiors of pottery sherds have indicated maize was being cooked in the region by at least ca. cal. 300 B.C., well before there is evidence for its use in the macrobotanical record (Hart et al. 2003; 2007; Thompson et al. 2004). Similar evidence has recently been reported from the Saginaw River basin of the lower peninsula of Michigan (Riaviele 2010).

In this chapter we provide additional evidence that maize was being consumed in central New York prior to cal. A.D. 1000. This evidence comes from the Kipp Island site, which contained both residential areas and cemeteries. One cemetery, excavated by Ritchie in 1963 was assigned by him to a component he believed dated to approximately A.D. 1000 (Ritchie 1969; Ritchie and Funk 1973). As reported here, new AMS dates indicate that the cemetery is multicomponent; the majority of it dates to approximately cal. A.D. 650. The rate of caries in the human teeth from the cemetery is consistent with maize consumption. Isotopic analysis of dentin and enamel of third molars from three individuals, two from the ca. cal A.D. 650 component, also suggest maize consumption. These results add further evidence that maize has a much longer history in the region than previously thought.

BACKGOUND AND CHRONOLOGY

Location and Excavation History

The Kipp Island site is located on a glacial drumlin island above Montezuma Marsh on the north end of Cayuga Lake, and between the Clyde and Seneca rivers in north-central New York (Figure 3.1). Ritchie (1969; Ritchie and Funk 1973) defined four components at the site based on pottery typology and three radiocarbon dates. Kipp Island 1 was defined on the basis of a small cemetery with nine burials, which Ritchie assigned to the end of his Middlesex phase of the Adena tradition ca. 650–150 B.C. Kipp Island 2 was defined by Ritchie (1973:155) as "an early Hopewellian-influenced phase of the Kipp Island culture." He included in this component a small burial mound, several features found in the habitation area, and an undetermined number of burials excavated by collectors. He assigned a radiocarbon date on charcoal from a feature of 1640±100 B.P. (Y-1378;

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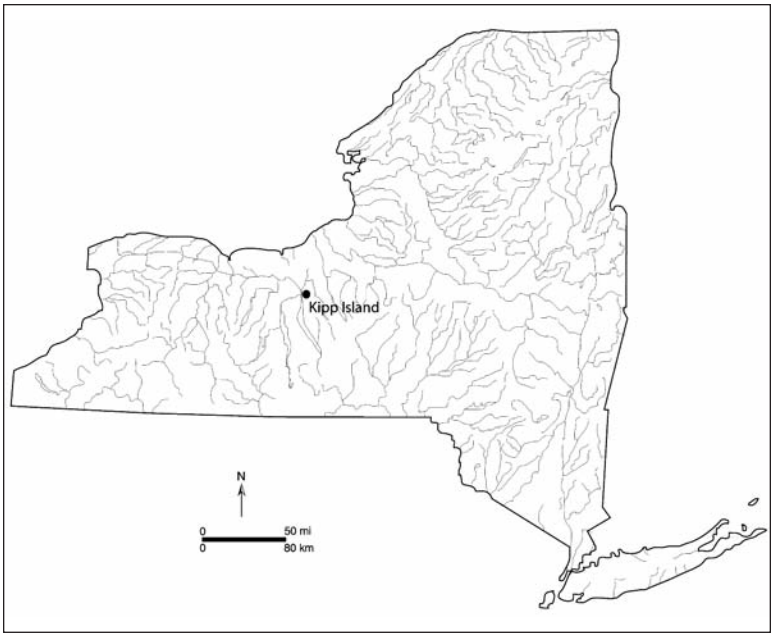

Figure 3.1. Location of the Kipp Island site.

cal. 2σ A.D. 140–614) to this component. Kipp Island 3 was considered by Ritchie (1973:155) to comprise the primary occupation of the site both in terms of the habitation area and burials excavated by collectors. This was the type component for his Kipp Island phase (Ritchie 1969; Ritchie 1973). He assigned a radiocarbon date of 1320±100 B.P. (Y-1379; cal. 2σ A.D. 545–962), obtained on wood charcoal from a feature in the habitation area, to this component. Finally, Kipp Island 4 was defined by Ritchie (1969, 1973) as belonging to his late Point Peninsula Hunter's Home phase, and comprising habitation features and a cemetery excavated in 1963. He assigned a radiocarbon date on wood charcoal from Burial 7, a cremation from the cemetery excavated in 1963, of 1005±100 B.P. (Y-3441; cal. 2σ A.D. 780–1224) to this component.

Ritchie reported that the burials he associated with Kipp Island 2 and 3 were spatially separated from those he excavated in 1963 (Ritchie 1969, 1973). He noted that:

> Prior to our excavations of 1963, on which the present account is based, the entire northern two-thirds of the island, which had contained the mound and the cemeteries of an earlier age, had been taken away for fill by the New York State Thruway. The southern remnant of the island, also much dug over by collectors, was explored by us for settlement pattern information. The new burial component of the Hunter's Home phase (Kipp Island No. 4) was discovered during the late 1962 survey for this work. (Ritchie 1973:155)

The portion of this cemetery excavated in 1963 had 29 graves containing approximately 120 individuals (Figure 3.2). Based on field assessments, Ritchie (1969:265) reported that these consisted of 21 adult males, 27 adult females, 31 adults that could not be sexed, 18 children 4–16 years of age, 8 infants, and 5 individuals that could not be aged. All of the graves were shallow, extending no more than 10 cm into the subsoil, which is described in field notes as a hardpan. A range of burial forms were identified including single flexed; single bundle; single cremation; multiple flexed; multiple bundle; multiple bundle and cremation; multiple flexed and bundle; multiple flexed, bundle, and cremation. Ritchie (1969:265–266) indicated that the predominance of interments were secondary burials. The bone was in very poor condition and only teeth and a few bone fragments were collected from some of the burials, while the rest of the skeletal material was not collected and reburied in place. Only three of the burials contained grave goods. These included three ceramic pipes and a slate pendant.

New Radiocarbon Dates

A large number of accelerator mass spectrometry (AMS) dates were obtained on charred cooking residues adhering to the interiors of pottery sherds from the habitation portion of the Kipp Island site during the 2000s (Hart and Brumbach 2005; Hart et al. 2003; Hart and Lovis 2007; Schulenberg 2002). These dates were run in two separate studies at two different AMS labs and on types assigned to both the Point Peninsula and Owasco series. They have revised the chronology of the Kipp Island 3 and 4 components, producing mean pooled ages of 1423±20 B.P. (cal. 2σ A.D. 600–655) and 1249±14 B.P. (cal. 2σ A.D. 686–805), respectively (Table 3.1). Dates on residues from sherds assigned to Point Peninsula and Owasco series types contribute to both pooled mean ages (Hart and Brumbach 2005).

These new dates raised questions about the age of the cemetery that Ritchie assigned to the Kipp Island 4 component. The radiocarbon age that Ritchie used to establish the age of the cemetery, from a cremation, post dates the radiocarbon age now assigned to the Kipp Island 4 component by two centuries. The date reported by Ritchie has a 100-year standard deviation, resulting in a 444-year cal. 2σ range (A.D. 780–1224) and making any interpretation of a specific occupation date or date range impossible. Also of potential chronological significance for the Kipp Island 4 cemetery is the range of burial forms, which, as noted by Ritchie (1969:262),

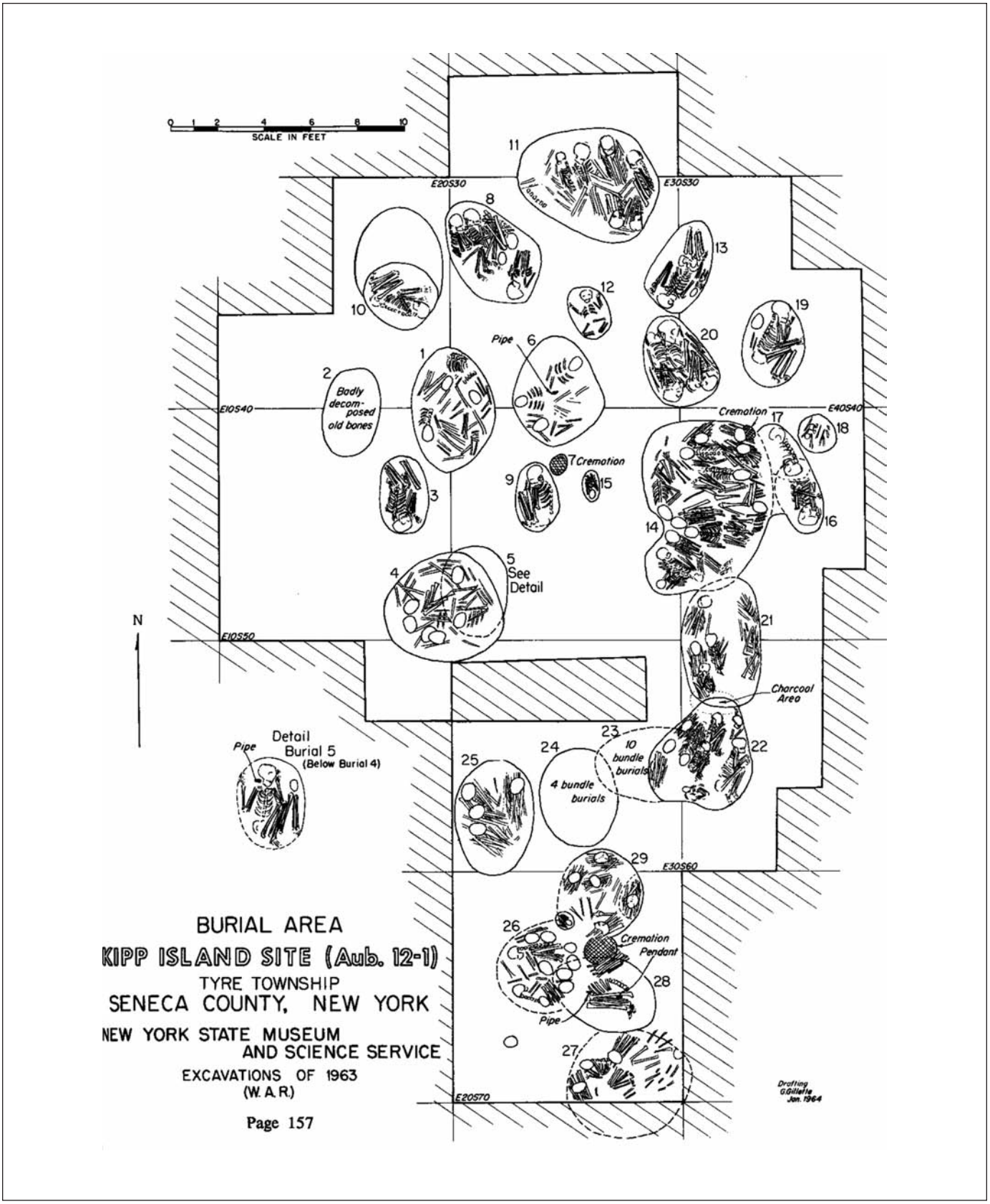

Figure 3.2. Plan map of Kipp Island 4 cemetery (Ritchie and Funk 1973:157).

Table 3.1. Radiocarbon Dates from the Kipp Island Site.

NYSM#	Lab#	Material	Source	δ13C	^{14}C Age	Cal 2σ (prob.)	Median Prob.	Source
46697	ISGS A0650[a]	collagen	Burial 26E-third molar	-21.7	5410±30	n/a		This study
46697	ISGS A0651[a]	collagen	Burial 26F-third molar	-19.7	4510±35	n/a		This study
42690	ISGS A0591[a]	charcoal	Burial 21 fill	-24	3545±35	n/a		This study
72769	ISGS A0573	charcoal	small fire pit under the feet of Burial 13	-24.8	2855±35	1126–919 B.C. (1.0)	1021 B.C.	This study
42698-30	ISGS A0747	residue	sherd	-28.1	2055±35	170 B.C. –A.D. 20 (1.0)	72 B.C.	This study
42712A-9	ISGS A0758[b]	residue	sherd	-24.6	1910±30	A.D. 21– 141 (0.95) A.D. 147–173 (0.03) A.D. 193–210 (0.02)	A.D. 94	Hart and Lovis 2007
72766	ISGS A0572[b]	charcoal	Burial 28	-25.8	1870±25	A.D. 77–220 (1.0)	A.D. 134	This study
	ISGS A1042[b]	collagen	Dog Burial, Feature 17		1855±45	A.D. 57–254 (0.995) A.D. 307–312 (0.005)	A.D. 161	This study
	Pooled mean		Kipp Island 1(?)		1881±18	AD 72–177 (0.94) AD 191–212 (0.06)	A.D. 112	
	Y-1378	charcoal	Feature 4 (Ritchie: Kipp Island 2)	n/a	1640±100	A.D. 140–154 (0.01) A.D. 167–195 (0.02) A.D. 209–614 (0.97)	A.D. 408	Ritchie 1973
42719-35	ISGS A0761[c]	Residue	sherd (Kipp Island 2?)	-25.5	1545±25	A.D. 430–573 (1.0)	A.D. 499	Hart and Lovis 2007
41119-5	ISGS A0225[d]	Residue	sherd	-26.4	1470±43	A.D. 443–450 (0.01) A.D. 462–483 (0.03) A.D. 533–656 (0.97)	A.D. 592	Hart et al. 2003
41119-2	ISGS A0226[d]	Residue	sherd	-26.5	1461±43	A.D. 469–478 (0.01) A.D. 535–659 (0.99)	A.D. 599	Hart et al. 2003
41119-8	ISGS A0227[d]	Residue	sherd	-27.0	1428±41	A.D. 559–663 (1.0)	A.D. 621	Hart et al. 2003
	GX-26450d	Residue	sherd	-25.2	1410±40	A.D. 569–671 (1.0)	A.D. 631	Schulenberg 2002
42697	ISGS A0590[d]	charcoal	Burial 26 fill	-23.5	1375±35	A.D. 600–691 (0.98) A.D. 750–762 (0.02)	A.D. 653	This study
	GX-27558[d]	Residue	sherd	-27.3	1360±40	A.D. 606–717 (0.91) A.D. 743–769 (0.09)	A.D. 663	Schulenberg 2002
46697	ISGS A0649[d]	collagen	Burial 26C-third molar	-18.9	1355±30	A.D. 622–626 (0.005) A.D. 632–710 (0.940) A.D. 747–766 (0.055)	A.D. 663	This study
	Pooled mean		Kipp Island 3		1400±14	A.D. 617–659 (1.00)	A.D. 646	
	Y-1392	charcoal	Feature 11 (Ritchie: Kipp Island 3)	n/a	1320±100	A.D. 545–899 (0.97) A.D. 918–922 (0.03)	A.D. 723	Ritchie 1973
42719-21	ISGS A0757[e]	Residue	sherd	-25.6	1315±30	A.D. 654–726 (0.73) A.D. 737–771 (0.27)	A.D. 693	This study
	GX-26448[e]	Residue	sherd	-28.2	1280±40	A.D. 658–783 (0.91) A.D. 787–824 (0.06) A.D. 841–861 (0.03)	A.D. 730	Schulenberg 2002
42729-5	ISGS A0228[e]	Residue	sherd	-26.1	1260±39	A.D. 668–831 (0.92) A.D. 836–869 (0.08)	A.D. 743	Hart et al. 2003
	GX-26451[e]	Residue	sherd	-28.2	1240±40	A.D. 680–882 (1.0)	A.D. 772	Schulenberg 2002
	GX-26453[e]	Residue	sherd	-29.2	1220±40	A.D. 685–892 (1.0)	A.D. 802	Schulenberg 2002
	GX-27559[e]	residue	sherd	-25.0	1210±40	A.D. 687–895 (0.98) A.D. 925–936 (0.02)	A.D. 814	Schulenberg 2002
	GX-26452[e]	residue	sherd	-26.8	1170±40	A.D. 727–737 (0.01) A.D. 771–975 (0.99)	A.D. 857	Schulenberg 2002
	Pooled mean		Kipp Island 4		1249±14	AD 686–780 (0.96) AD 792–805 (0.04)	A.D. 734	
	ISGS A1182	collagen	Burial 26f-second molar	n/a	1130±20	A.D. 880–981 (1.0)	A.D. 931	This study
	I-3441	charcoal	Burial 7 (Ritchie: Kipp Island 4)	n/a	1005±100	A.D. 780–791 (0.01) A.D. 806–1224 (0.99)	A.D. 1034	Ritchie 1973
72768	ISGS A0571	charcoal	hearth over Burial 21	-25.9	895±35	A.D. 1039–1215 (1.0)	A.D. 1131	Hart and Lovis 2007

[a]Contaminated sample, [b]Kipp Island 1(?) component, [c]Kipp Island 2 (?) component, [d]Kipp Island 3 component, [e]Kipp Island 4 component.

"was surprisingly diversified, considering the lateness of the period and the occurrence of only single flexed and bundle burials at the Hunter's Home site." We submitted several samples from the cemetery for AMS dating in an attempt to resolve chronological questions. The results were varied (Table 3.1), but they do allow a reassessment of the cemetery's chronology[1].

Date ISGS-A0573 was on wood charcoal recovered from a small hearth beneath Burial 13 (multiple flexed). This date indicates the cemetery post-dates 2855±35 B.P. (cal. 2σ 1126–919 B.C.). Date ISGS-A0571 was on wood charcoal from a hearth intruding into the fill of Burial 21 (multiple bundle). This date indicates that Burial 21, and probably other portions of the cemetery, pre-dates 895±35 B.P. (cal. 2σ A.D. 1039–1219).

The cremation Ritchie dated was assigned by him to Burial 29 (29E), part of a cluster of burial pits in the southern extent of the 1963 excavations (Figure 3.2): Burial 26 (multiple flexed and bundle), Burial 28 (single, flexed), and Burial 29 (multiple bundle and cremation). Burial 26 contained nine individuals (labeled 26a–26j); the pit intersected that of Burial 28. Ritchie's (1963) field map shows Burial 29E intruding into Burial 28 and the greater portion of Burial 29, indicating that it post-dated them. Although it was not possible to firmly establish in the field, Ritchie (1963) and Schambach (1963) suggested that Burial 28 was intruded by, and was thus earlier than, Burial 26. Ritchie (1963) further suggested that skull 26f belonged to Burial 28, which when archaeologically excavated after Burial 26, was missing the upper portions of the skeleton. Schambach (1963) indicated that the missing skeletal elements of Burial 28 may have been removed when Burial 26 was rapidly archaeologically excavated.

Two dates obtained from Burial 26 are consistent with the dates obtained on residues from pottery sherds associated with the Kipp Island 3 component. These are ISGS-0747 on charcoal from the fill of Burial 26 (1375±35 B.P.) and ISGS A0649 on tooth collagen from Burial 26c (1355±30 B.P.). These dates have a mean-pooled age of 1363±23 B.P. (cal 2σ A.D. 639–685), which overlaps the cal. 2σ range of the pooled mean age for the five AMS dates on residues assigned to Kipp Island 3 (1423±20, cal. 2σ A.D. 600–655). Together these seven dates have a pooled mean age of 1400±14 B.P. (cal. 2σ A.D. 617–659).

The chronological position of Burial 26f/28 was resolved with an AMS date on tooth collagen from 26f (ISGS A1182) of 1130±20 B.P. (cal. 2σ A.D. 880–991). This date and the excavators' observations indicate that the skull is later than the Burial 26 interments and probably belongs to Burial 28. A date obtained on charcoal from the fill of Burial 28 of 1870±25 (ISGS-A0572; cal. 2σ A.D. 77–220) obviously represents earlier occupations of the site as does date ISGS-A0747 on residue from a sherd within the fill of Burial 26 (2055±35 B.P.; cal. 2σ 170 B.C.–A.D. 20).

Grave Goods

Among the few artifacts identified as grave goods were three pipes and a ground slate pendant. Ritchie (1969:252) associated a number of pipe forms with his Kipp Island phase—to which he assigned the Kipp Island 3 components—platform, right-angle elbow, and obtuse-angle elbow. The plain, obtuse angle form of two pipes from the cemetery, one each from Burial 5 and Burial 6, is consistent with this assignment (Ritchie 1969:230, 252–253; Ritchie and Funk 1973:119). Burial 5 (flexed adult and bundle infant) was below Burial 4 (multiple bundle burial). Burial 6 was a multiple bundle burial. The third pipe, from Burial 28, is straight with annular punctuations. Ritchie (1969:252) identified this form with his Kipp Island phase, but he also indicated that the form extended into his subsequent Hunter's Home and Carpenter Brook phases (Ritchie 1969:257, 298). The annular punctations are suggestive of the "mammilary bosses, depicting perhaps, an ear of corn" that Ritchie (1969:296) identified as a notable exception to the undecorated pipes he believed characterized his Carpenter Brook phase. The slate pendant from Burial 28 is consistent with those Ritchie described for his Kipp Island and Hunters Home phases (Ritchie 1969:230, 249–250, 257; Ritchie and Funk 1973:119). These two artifacts are, therefore, consistent with the date obtained on burial 26f/28.

Subsistence Evidence

Ritchie's excavations at Kipp Island yielded minimal subsistence evidence. In the absence of flotation, the recovery of macrobotanical remains was serendipitous. The remains recovered included *Chenopodium* seeds and nutshell of hickory and butternut. Also recovered was bone from 30 species including mammals and fish (Ritchie 1969:242–243).

Directly-dated residue samples from two sherds from the Kipp Island 3 component were subjected to phytolith analysis (Hart et al. 2003, 2007). The grass phytolith assemblage from one of these samples was identified as maize while the second is identified as a mixed assemblage of maize and wild rice (*Zizania* sp.). Also recovered from the residues were squash (*Cucurbita* sp.) and sedge (*Cyperus* sp.) phytoliths. Analysis of fatty acids extracted from pottery fabric and encrusted residues indicated the cooking of plant and animal resources in these same pots (Reber and Hart 2008).

Summary

In sum, then, like the habitation area (Hart and Brumbach 2005), the Kipp Island cemetery assigned by Ritchie to the Kipp Island 4 component has a complex history. The new dates reported here along with those on cooking residues reported earlier are spread from 2855±35 B.P. (cal. 2σ 1126–919 B.C.) to 895±35 B.P. (cal. 2σ A.D. 1039–1215), indicating a longer history of occupation for the site than that suggested by Ritchie (1969; Ritchie and Funk 1973). The four components suggested by Ritchie can be correlated with the new radiocarbon dates record from the site, with the realization that the components were probably not single events.

Ritchie's Kipp Island 1 component may be associated with a cluster of three dates (Table 3.1) with a pooled mean age of 1881±18 B.P. (cal. 2σ A.D. 72–212). These include a date on bone collagen from a dog skeleton in Feature 17, the fill of which included dentate rocker-stamped pottery sherds. While only a single date, ISGS-A1545 may define the age of Kipp Island 2 at 1545±25 B.P. (cal. 2σ A.D. 430–573). While Ritchie's original date for this component 1640±100 B.P. (cal. 2σ A.D. 140–614) suggests an earlier age, the large standard deviation, and consequent 474-year cal. 2σ range, makes a specific interpretation impossible. The new date's cal. 2σ range falls well within that of Ritchie's original date. With the new dates from the cemetery the mean pooled age of seven dates (Table 3.1) for Kipp Island 3 is refined to 1400±14 B.P. (cal. 2σ A.D. 617–659). The seven dates on residues with a mean pooled age of 1249±14 B.P. (cal. 2σ A.D. 686–805) define the age of the Kipp Island 4 component (Table 3.1). These two pooled means 2σ ranges fall well within the 2σ range of the radiocarbon date Ritchie assigned to the Kipp Island 3 component. The radiocarbon date Ritchie assigned to the Kipp Island 4 component is later. Ritchie assumed that all burials in the cemetery belonged to the same component. This was evidently in error given the large number of dates indicating an earlier age.

The clear separation of the four components as dated here is shown in a plot of the probability distributions against the radiocarbon calibration curve (Figure 3.3). We are confident that the pooled mean ages for Kipp Island 3 and Kipp Island 4 will change little with any subsequent radiocarbon assays. The current ages tentatively identified for Kipp Island 1 and 2 will undoubtedly change with additional radiocarbon assays. However, these two components have no bearing on the chronological interpretation of the cemetery excavated by Ritchie (1969). The date on Burial 28/26f and the date on the hearth intruding into Burial 21 indicate the existence of later occupations as well. The extent of these later occupations is unknown.

Two dates suggest that the multiple interment burials date to the early cal. seventh-century A.D., or Kipp Island 3 component. Multiple burials of mostly secondary interments are consistent with regional trends for cemeteries at that time. Such cemeteries probably served to mark and identify local population territories at summer aggregation locations. Deceased members of the otherwise dispersed population would be brought to the cemetery for burial at times of aggregation, thus explaining the secondary interments (Ramsden 1990:174; Spence 1986:92; also see Ritchie 1969:266). As expressed by Ramsden (1990:174):

> band identity was marked by the presence of a permanent cemetery located strategically within the band territory, and band membership would have been marked by the right to bury deceased family members there, as well as the right to join other band members at the nearby spring/summer camp. Furthermore, participation in the rituals involved in interring family members in the band cemeteries provided feelings of group solidarity which may have been very functional in a situation of rather fluid band membership.

The recovery of maize, wild rice, and squash phytoliths from cooking residues dating to this component suggests late summer to early fall occupations—perhaps a season for aggregation of otherwise dispersed local populations. Whether the different burial pits in the Kipp Island cemetery represent contemporary subpopulations or temporally discrete burial events for the same or different local population(s) cannot be determined. Based on the Burial 26f/28 AMS date and the burial pit intersections, single interments may be later than the multiple interment burials.

TOOTH ANALYSES

The recovery of maize phytoliths from Kipp Island 3 cooking residues indicates that inhabitants cooked maize on the site. In order to assess the extent to which the population(s) represented by this occupation incorporated maize into diets, we undertook analysis of caries rates and stable isotopes of a small number of teeth collected from the interments excavated by Ritchie.

Dental Caries Analysis

Numerous bioarchaeological studies of diet and disease have linked the adoption of maize agriculture to changes in health and, in particular, changes in dental health (Cohen and Armelagos 1984; Larsen 1995; Larsen

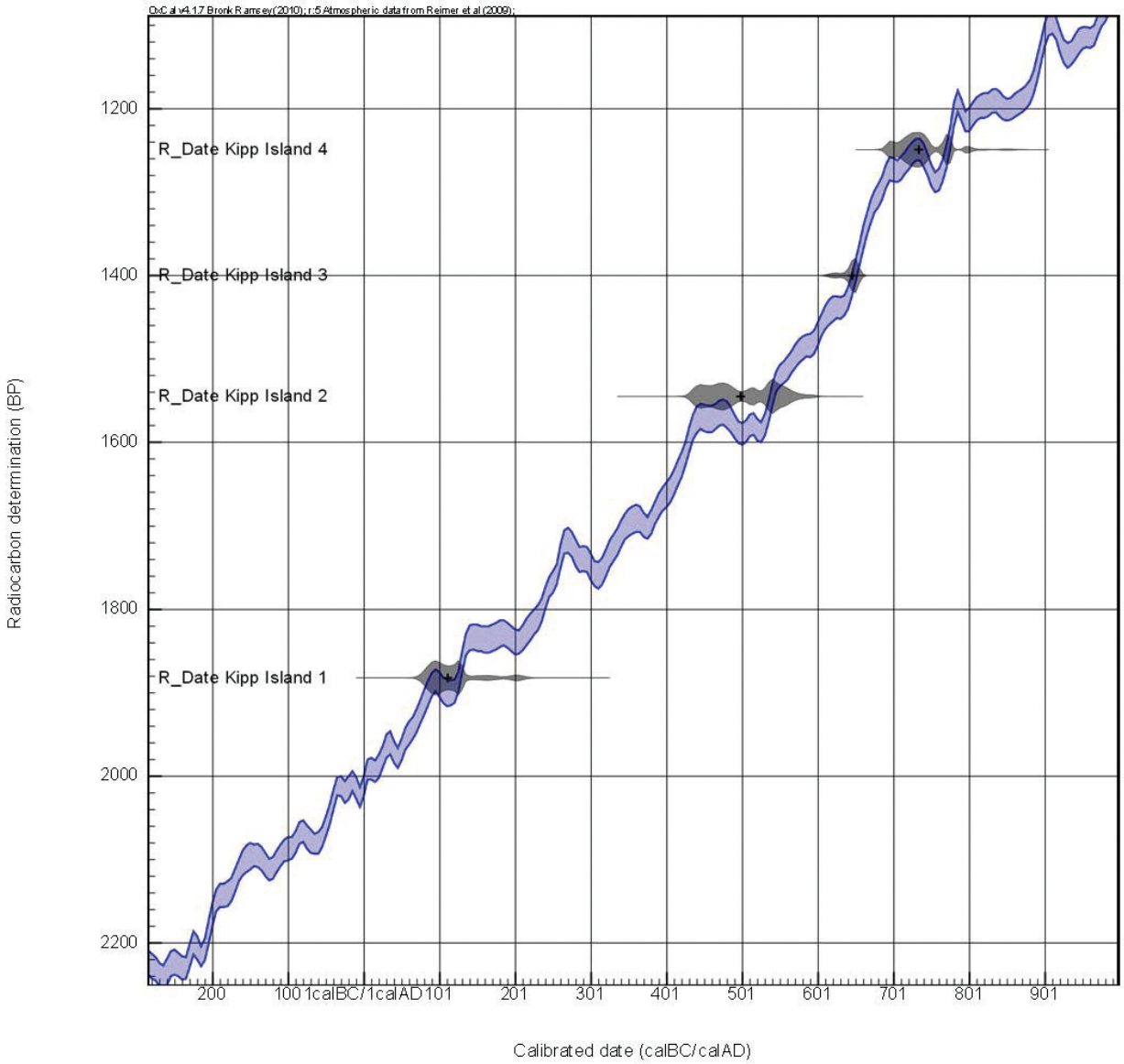

Figure 3.3. Calibrated 2σ radiocarbon probability distributions for four Kipp Island components plotted against the radiocarbon curve.

et al. 1991). Increasing reliance on maize introduced a higher carbohydrate load into the diet resulting in an increase in dental caries and related oral health problems. This trend is supported by data from the Eastern Woodlands that show a low average caries rate of less than 7 percent prior to the adoption of maize followed by a dramatic increase of 2 to 3 times among later maize agriculturists (Larsen 1997). As an indicator of carbohydrate consumption, therefore, dental caries is a useful area of study for dietary reconstruction (Buikstra and Ubelaker 1994; Larsen et al. 1991).

Dental caries is a disease process in which the minerals in dental hard tissues, such as tooth enamel, are dissolved by organic acids produced by the fermentation of dietary carbohydrates by oral bacteria (Hillson 2000:260; Larsen 1997:65). Foods high in carbohydrates promote the growth of oral bacteria which in turn trigger the development of dental caries. Simple sugars, such as the sucrose in maize, are more easily metabolized and therefore more cariogenic than more complex carbohydrates (Hillson 1979; Larsen 1997). The disease process can also be affected by differences in the consistency and texture of food. Changes in processing and cooking techniques with the adoption of maize produced softer, stickier foods that were more likely to adhere to teeth and promote decay.

In addition to changes in the frequency of dental caries, the location and severity of carious lesions are

also influenced by dietary differences. Each tooth has a unique morphology that affects its susceptibility to caries and that can be modified by other factors such as diet and dental attrition (Buikstra and Ubelaker 1994). Occlusal wear among non-agriculturalists removed food-trapping pits and fissures, reducing the potential for caries on occlusal surfaces while leaving interproximal and cervical areas still prone to caries development. As an age progressive disease, caries were rare among children and young adults. With greater amounts of sugar in the diet, caries tend to develop in the pits and fissures of tooth crowns, particularly molars, as well as in the interproximal spaces between teeth. As more areas of the tooth are affected, carious lesions increased in both number and size and they became more common in children (Hillson 1996, 2000; Larsen 1997).

While an increase in dental caries frequency is closely associated with the adoption of maize agriculture, agricultural crops are not the only source of cariogenic foods (Larsen 1995). In the Southeast, Rose et al. (1991) found an increase in dental caries prior to the evident introduction of maize that may have resulted from an increased use of naturally occurring high-carbohydrate foods such as chenopodium. In the Northeast, cariogenic foods such as starchy seeds, tubers, sap, and fleshy fruits would have been seasonally available well before the adoption of maize; however, botanical evidence for intensive use has not been identified (Milner and Katzenberg 1999). Asch Sidell (2002, 2008) has identified an increase in the density and variety of seeds with the presence of maize in the Northeast but only tentative evidence for indigenous crops. At the Kipp Island site, Ritchie (1969:241; 1973:161) reported seeds tentatively identified as *Chenopodium* as well as hickory and butternut.

To test for the presence of carbohydrates in the diet of individuals from Kipp Island, human remains were examined for evidence of dental caries. The Kipp Island skeletal sample has been heavily affected by various taphonomic processes. It consists of extremely fragmentary and incomplete remains of 75 individuals representing only a portion of the 120 individuals recorded by Ritchie (1969) in the field. Preservation and recovery biases have reduced the collection to primarily teeth with very little skeletal material present. Most teeth are loose and in some cases the roots are poorly preserved or missing. Of the 75 individuals represented in the collection, the teeth of 62 individuals are suitable for study, including 46 adults and 16 children. All of the dentitions are incomplete and the average of number of teeth per person is fewer than 10. Nearly half of the individuals have fewer than 25 percent of their teeth.

Given the condition of the collection, the types of analyses that can be performed are limited. In the absence of alveolar bone it is not possible to determine if missing teeth were naturally shed during life due to advanced decay or lost post mortem due to poor preservation or incomplete archaeological recovery techniques. Therefore it also is not possible to estimate frequencies of antemortem tooth loss or other forms of dental disease. In the absence of skeletal material, there is no control over sex and little control over age. Age can only be reliably estimated up to about 18 years using dental eruption data. Adult age was estimated in broad categories (i.e., young adult, adult, and older adult) based on the rate of dental attrition however without corroborating skeletal data to gauge the relationship between age and wear status, the accuracy of adult age is unknown. The lack of skeletal indicators of age and sex also precludes confirmation of the original demographic estimates made by Ritchie in the field.

The teeth were examined macroscopically for evidence of dental caries. Each tooth was recorded by type (i.e., incisor, canine, premolar, molar), location (arcade and side), and scored for the presence or absence of carious lesions. When caries were present, the location on the surface of the tooth (occlusal, cervical, interproximal, buccal, lingual) was recorded as well as the general size of the lesion and the degree of attrition associated with the site of the lesion. Caries frequency was calculated as the percent of carious teeth for each tooth type and all teeth combined.

A total of 537 teeth from 59 individuals in multiple burials were examined including 455 permanent teeth from 43 adults and 82 deciduous teeth from 16 children (Table 3.2.). Among adults, 58 percent experienced caries although this is based on incomplete data from missing dentition. A total of 96 adult teeth or 21.1 percent were affected by caries. As expected, younger individuals exhibited the fewest caries. The average rate of caries by tooth type is 18.57 percent for incisors, 6.9 percent for canines, 15.94 percent for premolars, and 30.32 percent for molars. Nine teeth (8 molars and 1 premolar) exhibited multiple carious lesions. Among children, 6.1% of deciduous teeth were affected, with caries occurring on five molars from three individuals under eight years of age.

The location of lesions on the teeth also varied. In the permanent dentition, 38 percent of caries occurred on occlusal surfaces. All were found on molars in 68 percent of the adults with caries. Cervical caries account for 35 percent of all caries and these were found on every type of tooth among 60 percent of adults with caries. Less common were interproximal (14 percent), buccal (7 percent), and lingual (1 percent) caries. Lastly in 7 percent of caries, the enamel crowns were too decayed to determine the site or sites of origin. Among deciduous teeth, three caries occurred on occlusal surfaces, one on

Table 3.2. Numbers of Permanent and Deciduous Teeth and Caries Examined from the Kipp Island Site.

	Permanent dentition		Deciduous dentition	
	Number of teeth	Number of caries	Number of teeth	Number of caries
Incisors	70	13	19	0
Canines	58	4	15	0
Premolars	138	22	21	0
Molars	188	57	27	5
Total	**455**	**96**	**82**	**5**

an interproximal, and one on a buccal surface.

A caries rate of 21.1 percent in the permanent dentition at Kipp Island is consistent with caries frequencies documented in Eastern Woodlands groups practicing maize agriculture including Late Prehistoric and early Historic populations in New York (Sempowski and Saunders 2001; Wray et al. 1987; 1991) and Ontario, Canada (Katzenberg et al. 1993; Larsen et al. 1991; Patterson 1984; Pfeiffer and Fairgrieve 1994). The caries rate at Kipp Island is not as high as many agricultural groups, suggesting diets less focused on maize. Interestingly, in a study of Archaic period populations in the Great Lakes region, Pfeiffer (1977) reported a slightly higher rate of caries at the Frontenac Island site in Cayuga County, New York, compared with other Archaic period sites in Wisconsin, Michigan, and Canada, where caries were generally very low or non-existent.

Caries occurred in children at Kipp Island as early as age three although at a relatively low frequency. Since caries are generally rare among children of non-agriculturists, their presence at the site suggests the incorporation of some carbohydrates in the diet. Among adults, caries appear to correlate with age although age-related trends are tenuous given the quality of the data.

The distribution of caries by tooth type falls midway between populations with and without independent evidence of maize agricultural in New York State (Table 3.3). The high frequency of caries on incisors is unusual for any group and may be due to deficient enamel deposition during crown formation, or other factors such as sampling bias, genetic differences in susceptibility, or differences in dietary, biomechanical, or masticatory behavior.

The location of carious lesions on tooth surfaces also reflects a more moderate consumption of dietary carbohydrates. A relatively high frequency of cervical lesions differs from late prehistoric Seneca populations where caries occurred most often on occlusal surfaces (Wray et al. 1987). Cervical caries have been reported as common, although not exclusive, to non-agricultural diets and diets incorporating relatively small amounts of maize (Hillson 1996; Larsen 1997). In summary, although sampling issues limit the conclusions that may be drawn from the Kipp Island dental data, the frequency of dental caries appears to indicate a diet that included starchy, carbohydrate-rich food. While the dental caries data from Kipp Island are consistent with maize consumption, it may have been to a more moderate degree than later agricultural groups in the Eastern Woodlands.

Isotope Analysis

The analysis of stable carbon isotope values for identifying components of diet, particularly in recognizing the inclusion of maize in diet, is useful because the different photosynthetic pathways used by plants (e.g., C_3, C_4) impart different $^{13}C/^{12}C$ ratios to plant tissues, and animals consuming those plant tissues, or consumers of those animals, will reflect the ratio ingested. Plants that utilize the C_4 photosynthetic pathway, such as maize, are relatively enriched in the heavy carbon isotope (^{13}C). Using standard δ notation where $\delta^{13}C_{pdb} = [(^{13}C/^{12}C_{sample}/^{13}C/^{12}C_{standard}) - 1] \times 1000$, modern C_4 plants have a mean $\delta^{13}C$ value of -13.0‰ and generally range from –9‰ to –19‰ (Ehleringer and Monson 1993; Ehleringer et al. 1991; Farquhar et al. 1989; O'Leary 1988). Studies that examined modern North American maize kernel δ^3C values show that it typically has a more positive mean value around –11.2‰ (Tieszen and Fagre 1993a). In contrast, C_3 plants, which include nearly all the native plants in northeast USA, such as most trees, shrubs, and cool-growing-season

Table 3.3. Adult Kipp Island Caries Frequency by Tooth Type Compared with Sites in New York.

	Tufano A.D. 430–625	Kipp Island A.D. 650	Menands Bridge ca A.D. 1300	Engelbert A.D. 1000–1350	Rice's Woods A.D. 1600–1620
Incisors	3.17	18.57	13.72	24.11	20.59
Canines	0	6.9	10.93	27.86	42.86
Premolars	3.16	15.94	18.26	37.54	43.24
Molars	23.37	30.32	37.6	54.38	65.79
All	11.66	21.1	21.92	36.93	43.85

grasses, use the C_3 photosynthetic pathway (Sage et al. 1999), and are relatively enriched in the light carbon isotope (^{12}C). Modern C_3 plants have a mean $\delta^{13}C$ value of –27.0‰ and typically range from –22‰ to –35‰ (Ehleringer and Monson 1993; Ehleringer et al. 1991; Farquhar et al. 1989; O'Leary 1988). It is important to note that due to fossil fuel burning since the start of the Industrial Revolution, the $\delta^{13}C$ value of atmospheric CO_2 has decreased about –1.5‰ (Friedli et al. 1986; Marino and McElroy 1991; Marino et al. 1992). Because of this change in atmospheric carbon isotope values, for archaeological sites such as Kipp Island, the mean $\delta^{13}C$ value for pre-Industrial C_3 plants is predicted to be –25.5‰, while pre-Industrial maize is predicted to be –9.7‰. This predicted value for archaeological maize is supported by the analysis of six maize kernels from archaeological sites in central New York, which provide a mean value of –9.7‰ ± 2.5‰ (Hart et al. 2002; Knapp 2002).

Animals will reflect the $\delta^{13}C$ value of food in their tissues. Modern controlled feeding experiments on rats and mice showed that collagen $\delta^{13}C$ values reflected the isotopic values of ingested protein, while the apatite mineral reflected the $\delta^{13}C$ value of the whole diet (Ambrose and Norr 1993; Tieszen and Fagre 1993b). Because of isotopic discrimination within tissues, collagen carbon isotope value is generally +5‰ from the diet, such that a $\delta^{13}C_{collagen}$ value in an animal consuming a diet of pure maize is expected to be -4.7‰ (Ambrose et al. 1997; Ambrose and Norr 1993; Tieszen and Fagre 1993b). Similarly, the apatite mineral was shown to be +9.4‰ from the diet, such that a $\delta^{13}C_{apatite}$ value in an animal consuming a diet of pure maize is expected to be –0.3‰ (Ambrose and Norr 1993; Tieszen and Fagre 1993b; Ambrose et al. 1997). Moreover, within an individual, when consumed protein has the same $\delta^{13}C$ value as the whole diet, the difference between the $\delta^{13}C_{apatite}$ and $\delta^{13}C_{collagen}$ will equal 4.4‰ (Ambrose et al. 1997; Harrison and Katzenberg 2003). Along these lines it has been shown that a $\delta^{13}C_{apatite\text{-}collagen}$ value greater than 4.4‰ suggests the consumption of a C_3 protein and a C_4 carbohydrate (i.e., maize), while a value less than 4.4‰ suggests the consumption of C_3 carbohydrates, and a protein source with more positive carbon isotope values, such as animals focused on feeding predominantly on C_4 plants or marine foods (Ambrose et al. 1997; Harrison and Katzenberg 2003). Thus, analysis of collagen $\delta^{13}C$ values, apatite $\delta^{13}C$ values, and the difference between apatite and collagen $\delta^{13}C$ values from the same individual should permit the determination of whether maize was a dietary component at Kipp Island.

For this study, collagen as well as enamel apatite from the third molars of three individuals from Burial 26 were analyzed for $\delta^{13}C$ values—one third molar each from 26c, 26e, and 26f/28 (Table 3.3). These individuals were among only a few burials where complete third molars were preserved in the collection. Based on the mineralization of human third molars, the sampled tissues (i.e., enamel apatite and dentin collagen) from these teeth should represent diets from individuals aged between about 9 and 21 years of age (Hillson 2005). Single apatite samples were taken from each of the three teeth, while two samples were taken from the dentin collagen. All samples were prepared and analyzed by Dr. R. H. Tykot (University of South Florida) following techniques outlined in Tykot (2006). To calculate the percentage of maize in the diets, we set a continuum of –25.5‰ to –9.7‰ for 100 percent C_3 plants to 100 percent maize, respectively, with collagen isotope values expected to range from –20.5 to –4.7‰ (100 percent C_3 to 100 percent C_4), and enamel apatite isotope values expected to range from –16.1‰ to –0.3‰ (100 percent C_3 to 100 percent C_4).

Based on the $\delta^{13}C$ values from both the collagen and enamel apatite, it appears clear that each of the three sampled individuals consumed maize. For samples 26c and 26e, dating to ca. cal A.D. 650, average $\delta^{13}C_{collagen}$ values imply at least a 21 percent contribution of maize to the diet, while the enamel apatite values imply a 39 percent contribution of maize. Sample 26f/28, dating a few hundred years later, appears to have consumed a higher percentage of maize. Based on the average $\delta^{13}C_{collagen}$ values, the contribution of maize to the diet in this individual is calculated to be 39 percent, while the contribution of maize based on the enamel apatite in this sample is 69 percent. The higher proportion of maize consumption in 26f/28 is not unanticipated as this individual lived nearly three centuries (ca. cal A.D. 931) after the others. Additionally, the lower percent maize contribution calculated from collagen compared to that calculated from enamel apatite was expected. Maize is only about 10 percent protein and is deficient in a number of amino acids (van der Merwe et al. 2003). Because of this, humans must consume alternate sources of protein, such as animal meat, which will contribute more to the collagen isotopically than the maize. If it is a C_3 protein source, the collagen isotope values will preferentially indicate a lower proportion of maize in the diet.

Along these lines, added support of maize inclusion in the diets of these three individuals is provided by the comparison of enamel apatite to collagen $\delta^{13}C$ values. The difference between the two tissues ($\delta^{13}C_{apatite\text{-}collagen}$) is greater than 4.4‰ for all three samples, implying the consumption of mainly C_3 proteins and maize. Scrutinizing the collagen data within the individual teeth reveals differences in $\delta^{13}C$ values up to 2.0‰ for samples 26e and 26f/28 (Table 3.4). This difference may

Table 3.4. Isotope Data from Third Molars of Three Interments at Kipp Island.

Sample	Material	USF#	$\delta^{13}C$	$\delta^{15}N$	$\delta^{18}O$
26C	Enamel apatite	8777, 8833a,b	-10.5		-7.3
26E	Enamel apatite	8778, 8834 a,b	-10.5		-7.1
26F	Enamel apatite	8779, 8835a,b	-5.2		-6.9
26C-1	Dentin collagen	9082	-17.0	10.8	
26C-2	Dentin collagen	9083	-17.4	10.5	
26E-1	Dentin collagen	9084	-17.7	10.5	
26E-2	Dentin collagen	9085	-15.7	10.6	
26F-1	Dentin collagen	9086	-15.0	11.2	
26F-2	Dentin collagen	9087	-13.8	11.2	
26C avg	Dentin collagen	9082, 9083	-17.2	10.6	
26E avg	Dentin collagen	9084, 9085	-16.7	10.5	
26F avg	Dentin collagen	9086, 9087	-14.4	11.2	

indicate seasonal dietary differences where maize is more prominent in the diet at some times of the year over others. The lack of difference in the two samples for 26c may indicate that inclusion of maize in the diet remained similar throughout the year, or that the two samples represent the same time period.

An early isotopic study that examined the presence of maize in ancient diets at sites in New York found that it became a prominent dietary component at ca. cal. A.D. 1000 (Vogel and van der Merwe 1977). Unfortunately, in that study there were no sites included that dated between A.D. 400 to cal. A.D. 1000, which appears to be a critical time period for examining when maize was being incorporated into diets in the region (Hart et al. 2003, 2007; Harrison and Katzenberg 2003; Katzenberg et al. 1995; Schwarcz et al. 1985; Vogel and van der Merwe 1977). Specific to Kipp Island, an earlier study at this site, which analyzed the stable carbon isotope values as well as the presence of particular phytoliths in cooking residues documented that maize was present by the early cal. seventh century A.D. (Hart et al. 2003, 2007). This current isotopic study extends this previous work and attempts to not only show that maize presence in diets has additional support but also to calculate how prominent maize was in Kipp Island diets over time. As provided by the data above, maize appears to be 39 percent of the whole diet by the middle of the cal. seventh century A.D., and increases in importance to 69 percent of the whole diet by the early cal. tenth century A.D. These data follow a pattern (i.e., increase in the prominence of maize in the diet) similar to that observed at sites from southern Ontario, Canada (Harrison and Katzenberg 2003). For the southern Ontario sites, the apatite mineral, indicative of whole diet, identified maize presence by ca. cal A.D. 500. Maize presence was not identified in collagen samples from southern Ontario until ca. cal A.D. 1000 (Harrison and Katzenberg 2003). Because maize was only identified in the apatite mineral (i.e., whole diet) and not collagen (i.e., protein) at the earlier sites in southern Ontario, it was suggested that maize likely started as a trade good and was only sparingly incorporated into diets. At the later southern Ontario sites, the isotopic signature of maize became apparent in the collagen as well as the apatite mineral reflecting its increasing dietary prominence. Comparatively, the stable carbon isotope data from the samples of Kipp Island collagen as well as enamel apatite clearly imply that maize was present and a prominent dietary component by at least the middle of the cal. seventh century A.D.

CONCLUSION

In his 1969 report on the Kipp Island 3 component, Ritchie (1969:241) speculated that "the subsistence economy of the Late Point Peninsula people included some use of horticultural products, since there is now reliable archaeological evidence for corn production in Hopewellian (Griffin, 1960; Prufer, 1964), one of the interacting cultures with the middle phase of the Point Peninsula." Much has happened over the intervening decades in the histories of maize in northeastern North America, and in the interpretation of the Kipp Island site chronology, including that of the cemetery excavated by Ritchie in 1963.

As reviewed in this chapter, there is now evidence for maize use by the Kipp Island 3 site inhabitants in the form of phytolith assemblages extracted from directly AMS-dated cooking residues. As demonstrated in this chapter, there is new evidence in the form of caries frequencies and stable carbon isotope values that individ-

uals interred in the cemetery, now assigned to the Kipp Island 3 component, ate maize. Ritchie's speculation, then, was prescient. It is now abundantly clear that the Kipp Island 3 component inhabitants of the site were participants in a broad, generalized regional subsistence pattern that included maize, a pattern that has very deep histories.

Of course, making a conclusive statement of maize consumption intensity across the broader region, or even in the Finger Lakes region of New York, is impossible based on isotopic evidence from two individuals or the caries data from a single cemetery. However, we expect that there was substantial variation in maize consumption across the region as has been demonstrated in other portions of northeastern North America with evidence for "early" maize consumption (e.g., Rose 2008). What we can confidently state is (1) maize had the potential to contribute substantially to individual diets during the cal seventh-century A.D. in the Finger Lakes region, and (2) this potential apparently had little or no impact on regional settlement patterns. It is not until centuries later that nucleated villages, once thought to be a hallmark of maize agriculturists in the region, appear in the archaeological record.

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ENDNOTE

1 Three of the dates are substantially older than anticipated, including ISGS-A0650 and ISGS-A0651 on tooth collagen from burials 26E and 26F, respectively. These dates can be dismissed as a result of contamination of the collagen samples. Another unacceptably early date is ISGS-A0591 on a fragment of cordage from the fill of Burial 21. This, too, is evidently the result of contamination.

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Chapter 4

TRACE ELEMENT ANALYSIS OF LITHIC ARTIFACTS FROM THE TRAPPS GAP SITE

Christina B. Rieth and L. Lewis Johnson

Abstract. *Traditional models of Late Prehistoric (A.D. 700–1300) interaction in the middle Hudson Valley suggest strong ties with contemporaneous groups in southern New England. Recent research, in the form of trace element analysis of lithic artifacts from the Trapps Gap site in Ulster County, New York, questions this assumption suggesting a more diverse and complex landscape in which groups interacted. This paper will discuss whether all of the samples were procured from the same deposit, how such procurement patterns may have changed over time, and what such data might reveal about regional behavior.*

Since the beginning of the twentieth century, archaeologists working in the Shawangunk Mountain Region of New York have considered the region to be an enigma. Artifacts recovered from sites along the mountain's ridge were often considered to be foreign in origin based on the visual color of the materials. Projectile points resembling types found in Pennsylvania, Delaware, and Virginia have been found at foraging and resource procurement stations in the region, leading archaeologists to suggest that the region was a travel corridor linking groups living in the Appalachian Highlands (see Eisenberg 1978, 1982; La Porta 1996; Schrabisch 1919a, 1919b; Sullivan and Prezzano 2001). Despite the presence of seemingly "foreign materials" recovered in the region, the Shawangunk Ridge overlooks a large flat plain of the Wallkill and Hudson Rivers. Late Prehistoric settlements dating between A.D. 700 and 1300 are found across the plain and scouting parties and family groups crossing into highland areas might also account for the deposition of such materials within cave and rockshelter sites in the region (see Diamond 1995:22-23; Eisenberg 1974:41–42; La Porta 1996:73–83).

Compounding this issue is an absence of archaeometric studies which have actually examined the materials recovered from sites in the region. Instead, most studies have relied solely on visual inspection of the materials to make determinations about the local and non-local procurement of these materials. As Calogero (1992:87–90) and others (Kuhn and Lanford 1987: 57–69; LaPorta 1996:73–83) point out, visual inspection of materials often leads to erroneous assumptions about the origin and procurement of lithic artifacts.

In an effort to shed light on this issue, researchers from the New York State Museum and the Department of Anthropology at Vassar College conducted trace element analysis on lithic artifacts from the Trapps Gap site, located in Ulster County, New York. The Trapps Gap site is a small rock shelter site located where Routes 44 and 55 cross the Trapps Gap. The use of this pass through the ridge extends back into prehistory. Excavation of the site by Vassar College in 2007 sought to test the hypothesis that the site was used in the prehistoric period by travelers resting for the night on their way across the ridge. This hypothesis led to a subsidiary hypothesis, reported in this chapter, that the lithic materials found in the site would reflect forays along the ridge and that we would find materials that originated from several different outcrops. The subsidiary hypothesis was tested through x-ray fluorescence analysis of flakes from the Trapps Gap site.

BACKGROUND

Geography and Natural Environment of the Shawangunk Ridge

The Shawangunk Ridge forms the northernmost point of the Shawangunk Mountains in Ulster, Sullivan, and Orange Counties, New York. The Shawangunk Mountains are an extension of the Appalachian Mountains running northward from Virginia where they start as North Mountain. The Appalachians also cross the Kittatinney Mountains near the Delaware

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Water Gap in New Jersey and the Blue Mountains in eastern Pennsylvania. The Shawangunk Ridge is primarily formed of Shawangunk Conglomerate, a silica based conglomerate that is resistant to weathering. Underlying the Shawangunk Conglomerate are pockets of Martinsburg Shale, which are believed to have formed more than 400–450 million years ago (Snyder and Beard 1981; Sullivan and Prezzano 2001).

The Shawangunk Ridge is bordered on the east by a large plain that extends throughout the Wallkill Valley to the Hudson River. To the west and south, other waterways including the Roundout Creek, Neversink River, and the Delaware River, wind their way across the landscape. In addition to these waterways, several small swamps and wetlands are found within and surrounding (since Rhododendron is within the ridge) the Shawangunks and provide a vast array of aquatic and avian resources. Among these is Rhododendron Swamp, believed to have formed about 15,000 years ago from a slow draining pro-glacial lake (Snyder and Beard 1991).

Eisenberg (1991:160) suggests that these waterways were present throughout prehistory and would have helped to sustain groups living both within mountain areas and on the neighboring plain. Today, more than one hundred different species occupy the ridge, including turkeys, ducks, and falcons as well as white-tailed deer, fox, (box) turtle, woodchuck, beaver, river otter, and black bear. Most of these species would have been available throughout prehistory and may have been sought by native groups (Diamond 1995:21; Eisenberg 1974, 1991:162; Funk 1976; Ritchie 1994; Ritchie and Funk 1973; Schrabisch 1919a:146).

Many chert outcrops would have surrounded the Shawangunk Ridge with many high quality cherts found to the east in the Wallkill Valley (La Porta 1996:73–83). Most of these outcrops can be identified as being within the Ontelaunee Formation. Bifaces made from Harmonyvale chert as well as points dating to the Lamoka and Orient Fishtail types fashioned from Crooked Swamp chert have been identified in many of the same collections, suggesting that nearby groups may have shared information about procurement of materials and the whereabouts of specific quarries within the valley.

History of Archaeological Investigation on the Shawangunk Ridge

The collecting of Native artifacts from the ridge has probably been going on since the first Europeans settled in the highlands. Max Schrabisch, the first professional archaeologist to work on the ridge, located most if not all of the sites he recorded through conversations with local boys and collectors (1936:1–3). Schrabisch located and described shelters on the ridge, and recent surveys have located a number of other shelters, which do not seem to be the ones he investigated (Eisenberg 1991; Kaplan and Johnson 2009). Numerous other shelters undoubtedly exist in the Shawangunks, most known only to local amateur archaeologists.

Five shelters in the Shawangunks have been investigated by modern professional archaeologists: the Rhododendron Swamp/Mohonk and Ski Minne shelters by Leonard Eisenberg and students from SUNY New Paltz (Eisenberg 1991:159–176), and the Trapps Gap, Bonticou, and Burger rockshelters by teams from Vassar College under the direction of the junior author (Sando and Johnson 2008). Vassar students have also re-recorded and reanalyzed the Ski Minne collection (Kaplan and Johnson 2009). Rhododendron Swamp and Trapps Gap were investigated by Schrabisch, but Ski Minne and Bonticou do not seem to have been; the Burger Rockshelter may be Schrabisch's Minnewaska shelter.

Judging from the projectile points found at these sites, the heaviest occupation of the ridge was in the mid- to late Archaic Period (ca. 6,000–1500 B.C.). This is true of many of the region's sites. At Rhododendron Swamp, where the occupation was on the apron rather than under the overhang and was therefore missed by Schrabisch, and at Ski Minne, the overwhelming majority of the points were Late Archaic in date. Although most of the Burger Rockshelter had been dug out by previous amateur (or professional) investigators, two Lamoka points were found by archaeologists from Vassar College in and under the stone wall in the front of the shelter, suggesting that it, too, is Late Archaic (Ritchie 1971). No diagnostic materials were found in the Bonticou shelter. Eisenberg (1991:173–174) hypothesized, following Robert Funk, that the Shawangunk Ridge was used throughout the Archaic period by hunters who followed the deer into the highlands in the late fall and winter. None of these sites contained significant amounts of pottery, suggesting a limited Late Woodland presence. At these sites, Eisenberg found 130 sherds, all of which were collected from a single pot; there were 15 sherds in the Ski Minne collection, and no sherds were recovered from the Bonticou or Burger sites.

The Trapps Gap Rockshelter is very different from these other shelters. While it did have evidence of a mid- to late Archaic occupation, it also contained a large concentration of material dating to the Late Woodland, including triangular Madison projectile points and at least 15 different vessels (Schrabisch 1936; Sando and Johnson 2008). Since large quantities of pottery are generally associated with the presence of women in Northeastern Woodlands cultures, this suggests that women, not just male hunters, may have used the

Figure 4.1. Photograph of projectile points recovered from the Trapps Gap site in Ulster County, New York.
Photograph provided by L. Lewis Johnson, Vassar College.

Trapps Gap shelter during the Late Woodland Period. As discussed below, visual examination of the lithic artifacts from the Trapps Gap site (Figure 4.1) suggest that they were made from a wide variety of materials many of which may not have been local to the area, further strengthening Sando and Johnson's (2008) belief that the occupants of the Trapps Gap site were transient groups originating from other areas.

OVERVIEW OF THE TRAPPS GAP SITE

The Vassar College fall archaeology field schools under the direction of L. Lewis Johnson excavated the Trapps Gap site in 2006, and 2007. The site is located along the east side of the ridge near a carriage trail leading to Rhododendron Swamp. It is located between two other predominant shelters: Ski Minne Rockshelter, which is located to the west, and Mohonk Shelter, which is located to the east (Figure 4.2).

All three sites are located on the edge of the Shawangunk Ridge at an approximate elevation of 300 m above sea level (Eisenberg 1991:161). The Trapps Gap site is located between the deep, narrow Rondout Valley on the west and the open Wallkill Valley to the east. This position was likely an important factor in the site's occupation and would have afforded its occupants a clear view across the Wallkill Valley with which to track animal migrations across the plain and other native groups upon approach.

The Trapps Gap site has three predominant occupations dating to the Middle Archaic (6,000–3,500 B.C.), Late Archaic (3,500–1500 B.C.), and Late Woodland (A.D. 800–Contact) periods as represented by Genesee, Brewerton, Lamoka, Snook Kill, and Madison projectile points (Ritchie 1971). Incised pottery sherds, resembling those found on Munsee sites in the Lower Hudson Valley, further suggest occupation of the site during the Late Woodland period. Seventeenth-century pipe fragments were also recovered suggesting a European presence at the site. The Late Archaic and Late Woodland period occupations are the most substantial and produced more than half of the lithic artifacts recovered from the site.

The artifact catalog from the Trapps Gap site consists largely of pieces of debitage recovered from living floor and feature contexts. Visual inspection of the materials suggests that much of it originated from quarries outside of the Shawangunk Mountains. Debitage fragments include pieces of locally available light and dark grey Onondaga chert and blue-green Normanskill chert as well as pieces of quartzite and pieces of brown, white, semi-translucent grey and red chert. Several of these artifacts showed signs of intentional use-wear and may have been refashioned for use as expedient tools.

The range of materials recovered from the Trapps Gap site resembles assemblages recovered from nearby sites such as Mohonk Rockshelter. According to Eisenberg (1991:165–170), the artifact assemblage from Mohonk Rockshelter contained a wide diversity of materials including black, light and dark grey, white, blue-green, brown, and red-colored cherts from

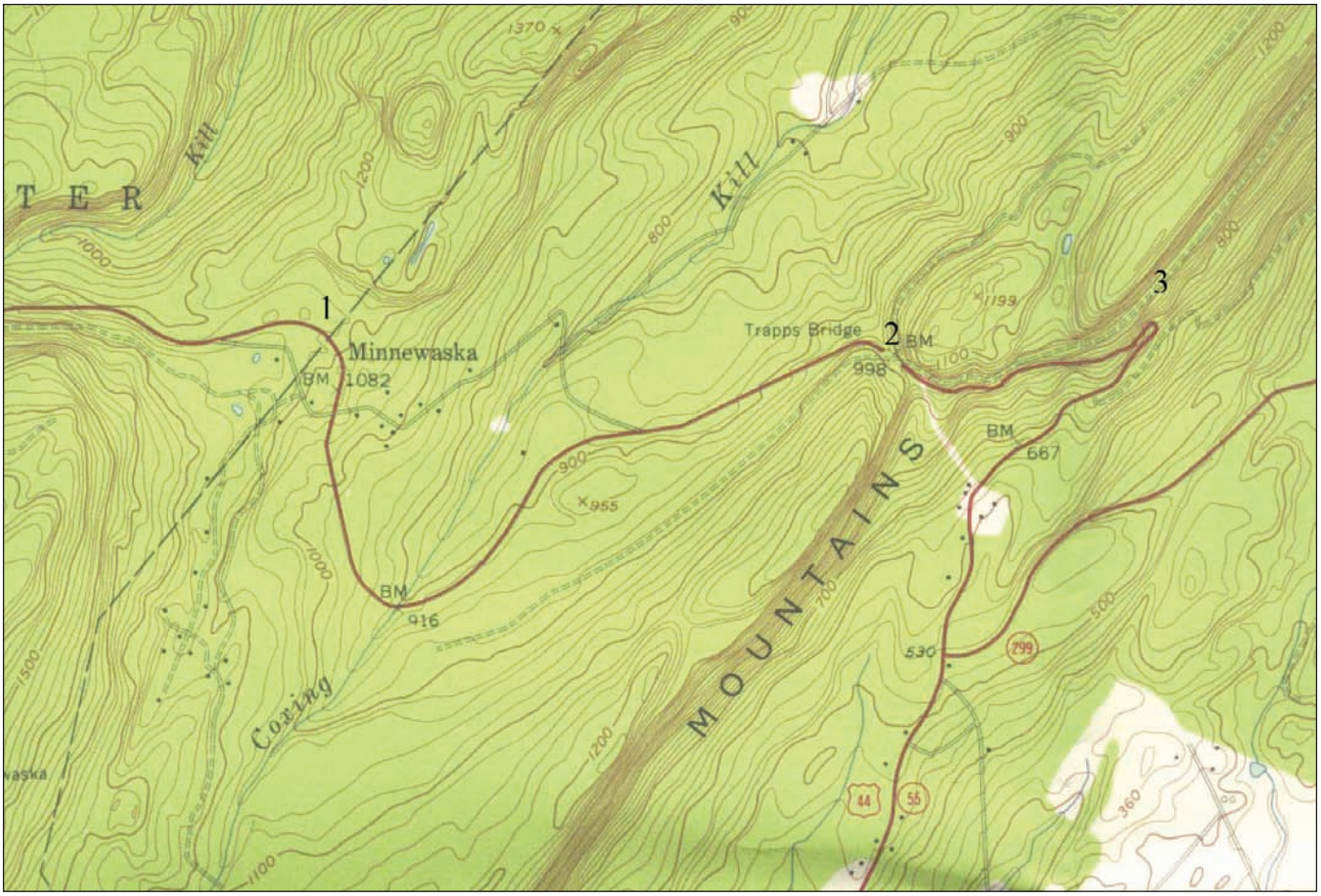

Figure 4.2. Map showing the location of the Trapps Gap site and other sites located along the Shawangunk Ridge. (Key: 1=Ski Minne site, 2=Trapps Gap site, 3=Mohonk Rockshelter site.)

deposits dating to the Archaic and Late Woodland periods. Pieces of jasper and chalcedony were also recovered. At the Ski Minne site, located to the west of Trapps Gap, artifacts recovered from the Middle Archaic, Late Archaic, and Late Woodland contexts also included cherts of various colors, including blue-grey, white, and light and dark grey (Kaplan and Johnson 2009).

The identification of lithic materials by visual inspection alone has long been practiced in Northeast archaeology. Calogero (1992:87–90), however, argues that visual inspection of materials alone often results in erroneous identifications of the origin of such materials. In a study of lithic materials from Connecticut, the vast majority of the materials were misidentified as to their origin when only visual inspection was used. The causes for the misidentification of materials included surficial weathering of materials as well as variation in how individual researchers identified materials. When other archaeometric and petrographic techniques were used, the inherent geologic features of the artifacts could be determined, linking them to a specific region or possible outcrop.

The potential identification of "non-local materials" in utilized flakes and debitage, both of which are not traditionally traded, raises interesting questions about the movement of groups across the ridge (Brennan 1979). While Brennan (1979) does not speculate about the mechanism and activities that caused groups of people to move across the Shawangunk Ridge, Eisenberg (1991) suggests that the unique environmental characteristics of the feature, combined with the range of food and utilitarian materials that might have been accessible along the feature, could partly explain such movement.

In an effort to test whether all of the materials were from the same outcrops or from many different deposits, debitage recovered from living floor and feature contexts at the Trapps Gap site was subjected to x-ray fluorescence analysis. The remainder of this paper addresses the results of this research. Possible scenarios

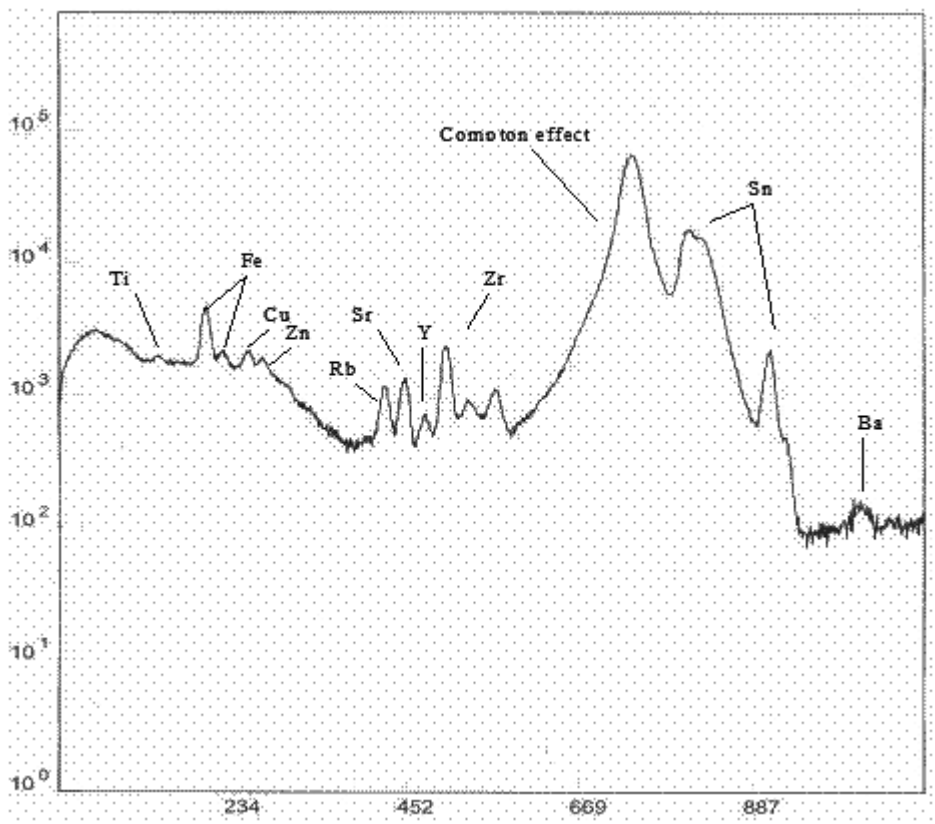

Figure 4.3. XRF spectra showing channel counts for lithic artifact (Artifact # 35) recovered from the Trapps Gap site. The horizontal (x) axis represents the channel number while the vertical (y) axis represents the counts of each element per artifact.

for the recovery of these materials and their role in understanding the settlement patterns of the region are provided.

METHODOLOGY

X-ray Fluorescence Analysis

X-ray fluorescence analysis was used to collect trace element data on lithic samples from the Trapps Gap site. Assays were performed at the University at Albany, State University of New York. The instrumentation used functions on the basis of energy dispersive spectroscopy (EDS). During the decay of atoms, X-rays are emitted and the instrument directs the emitted radiation toward a target ring composed of Tin (Sn), Iron (Fe), and Copper (Cu). When exposed to the X-rays from the secondary target, the atoms of the sample fluoresce, or get excited. These x-rays are, in turn, emitted back toward the x-ray fluorescence instrument where they are detected by a silicon-lithium (Si-Li) detector.

As shown in Figure 4.3, the x-axis in the energy spectrum is used to identify individual elements based on their particular energies, while the y-axis is used to determine the amount of energy emitted by a particular element in the sample. The peak energy positions are compared to a database of known elemental x-ray fluorescence energies; when the peak is positively correlated to a known energy or wavelength, the element in question is identified. The size of the peak is determined by the amount of x-ray radiation (in count units) received by the detector at the defined wavelength or energy. This in turn indicates the elemental concentration of the sample, where larger proportions of an element would produce proportionately larger peaks.

The techniques used to examine the artifacts from the Trapps Gap site allowed proportional data about the relationship of the elements to be collected. As discussed in Kuhn (1986), proportional data allow ratios of trace elements to be measured in terms of "the number of characteristic x-rays observed in fixed time." Following bombardment of the sample with a Cadmium 109 radioisotope for one hour, fluorescent x-rays were emitted whose energies are characteristic of the elements present in the artifact. The energy levels of

each element were recorded numerically, allowing concentrations of specific elements to be determined. Sixteen elements were measured, including rubidium (Rb), strontium (Sr), iron (Fe), lead (Pb), vanadium (V), potassium (K), zinc (Zn), nickel (Ni), barium (Ba), yttrium (Y), titanium (Ti), scandium (Sc), manganese (Mn), copper (Cu), and zirconium (Zr). Vanadium (V) and potassium (K) were removed from the final analysis due to low detection limits. Although the number and types of elements used in this study are sufficient for distinguishing between different samples, in most cases, additional samples and elements are needed to identify the precise location of a specific outcrop. Since this was beyond the scope of this project, the results are only discussed in terms of differences in the samples.

The recorded energy levels of each flake were collected and stored for analysis using the computer program AXIL (Van Espen n.d.). AXIL was applied to measure peak area counts and standard deviations for each element. Differences in peak counts were recorded in tabular and graphic formats. Based on studies by Kuhn (1985) and Kuhn and Sempowski (2001) using similar instrumentation, eight trace element ratios were selected as being the most potentially reflective of trace element variability between samples. These ratios are as follows: Iron/Strontium (Fe/Sr); Zirconium/Strontium (Zr/Sr), Rubidium/Strontium (Rb/Sr), Iron/Rubidium (Fe/Rb), Iron/Zirconium (Fe/Zr), Rubidium/Zironconium (Rb/Zr), Yttrium/Strontium (Y/Sr), and Yttrium/Rubidium (Y/Rb). Multivariate statistics, including principal components analysis, cluster analysis, and discriminant function analysis were applied to assess the degree of homogeneity between samples.

Trapps Gap Sample

Fifty-nine lithic samples from the Trapps Gap site were examined during this study. The samples were recovered from different units and were designated by the level in which they were found. When selecting samples for this study, the size and condition of the lithic artifacts were factored. Samples smaller than one centimeter were avoided because analysis would be difficult with current instrumentation. Consideration was also given to samples that were typologically identifiable as chert, that lacked surface evidence of weathering, and that had evidence of human modification.

In addition to the samples from the Trapps Gap site, eleven raw-material samples from New York chert outcrops were included to see how archaeological samples compared to archaeological chemical results (Figure 4.4,

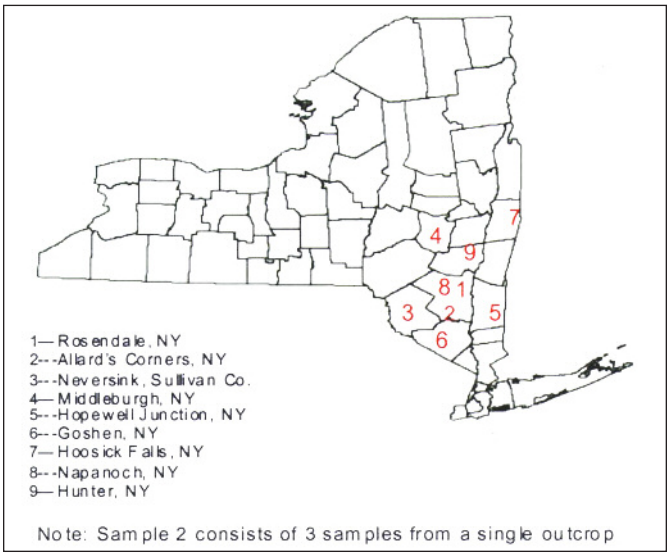

Figure 4.4. Map showing location of chert sources.

Table 4.1. Summary of Lithic Samples Collected.

Sample Number	Locational Information	Selection Criteria
Sample 1*	Rosendale, New York	Sample chosen as local (0–24 km) outcrop.
Sample 2**	Allard's Corners, New York	Sample chosen as local (0–24 km) outcrop.
Sample 3	Neversink, New York	Sample chosen as outcrop intermediate (24–80 km) distance from site.
Sample 4*	Middleburgh, New York	Sample chosen as outcrop intermediate (80–160 km) distance from site.
Sample 5*	Hopewell Junction, New York	Sample chosen as outcrop intermediate (24–80 km) distance from site.
Sample 6	Goshen, New York	Sample chosen as outcrop intermediate (24–80 km) distance from site.
Sample 7*	Hoosick Falls, New York	Sample chosen as outcrop from upper Hudson Valley. Sample from between 80–160 miles from site.
Sample 8	Napanoch, New York	Sample chosen as local (0–24 km) outcrop.
Sample 9	Hunter, New York	Sample chosen as outcrop from intermediate (24–80 km) from site.

*New York State Museum Archaeological Collection Sample; **Sample consists of two samples from a single outcrop.

Table 4.2. Grouping of Lithic Materials from the Trapps Gap Site.

Lithic Group	Number of Artifacts within Group	Number of Raw Material (Lithic) Samples	Total
Group A	30	3 (Samples 2 and 8)*	33
Group B	13	3 (Samples 1, 3, and 6)	16
Group C	7	1 (Sample 5)	8
Group D	6	1 (Sample 9)	7
Group E	3	1 (Sample 4)	4
Total	**59**	**9**	**68**

*Sample 2 had two samples.

Table 4.1). Six of these (samples 1–6) were personally collected; the remaining samples came from collections curated at the New York State Museum. Five of these eleven samples originate from collections located within a 15-mile radius of the site. Four of the remaining samples were collected from deposits located between 15 and 50 miles east and west of the site. The remaining two samples were recovered from deposits located between 50 and 100 miles from the site near Middleburgh and Hoosick Falls, New York, respectively.

Analysis and Results

Five lithic groups were identified and are here referred to as Groups A–E (Table 4.2). Principal components analysis showed that 89.9 percent of the total variance in the data set could be explained by the first four components (Table 4.3). Figure 4.5 illustrates the spatial relationship between the groups. Group A is the largest group with 30 artifacts clustering within this group (Table 4.1 and Table 4.2). This group includes cherts visually identified as belonging to different outcrops based on their light grey and dark grey color. Also in

Table 4.3. Principal Components Analysis for Samples.

Principal Component	Eigenvalue	Percent Variation	Cumulative Percentage
1	3.962	44.0	44.0
2	2.266	25.2	69.2
3	1.098	11.2	79.4
4	0.9418	9.5	89.9
5	0.4049	6.5	96.4
6	0.2155	2.4	98.4
7	0.0565	0.6	99.4
8	0.0346	0.4	99.8
9	0.0184	0.2	100.0

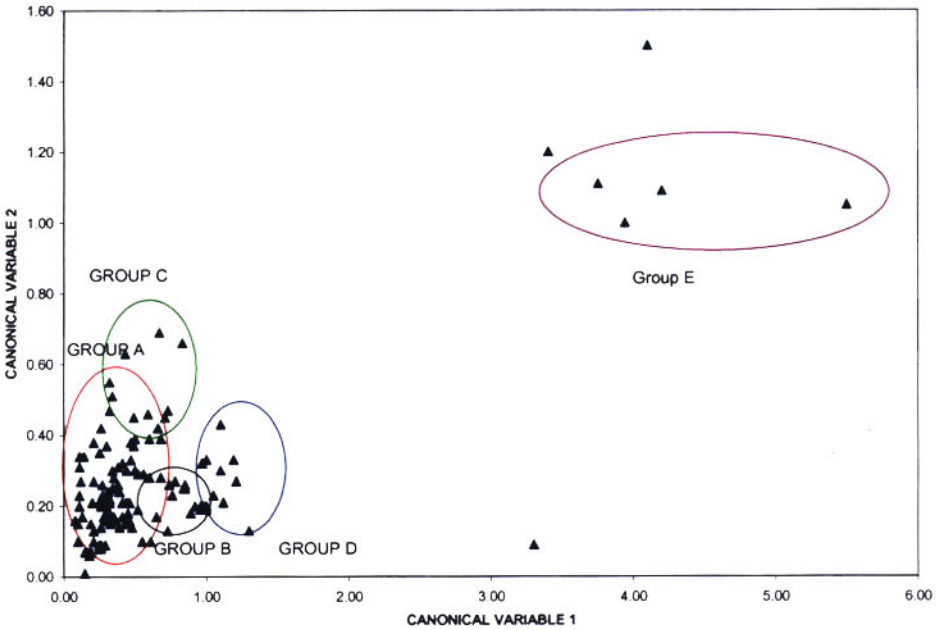

Figure 4.5. Discriminant function analysis results showing five groups identified within the Trapps Gap lithic sample.

this group is raw material sample 2, which was recovered from Allard's Corner's, New York, and raw material sample 8, which is from Napanoch, New York. The loosely clustered members of Group A (Figure 4.4) suggest that several different deposits may have been used by the occupants of the Trapps Gap site. The second half of the Late Woodland (A.D. 1000–1300) is often characterized by increased sedentism, territoriality, and warfare. If this were true, we should expect tighter clusters suggesting that the region's occupants may have continued to practice a semi-sedentary settlement pattern during this time period. Alternatively, warfare may not have been excessive, allowing prehistoric groups to move across clan and tribal territories to gather needed resources (Rieth 2002).

Group B contained 13 artifacts from the Trapps Gap site (Tables 4.1 and 4.2, Figure 4.5). In addition, the grouping also contained raw material samples 1, 3, and 6. Each of these samples was recovered from within less than 80 km (50 miles) of the site, with sample 1 recovered from within 24 km (15 miles) of the site. The grouping contained several artifacts recovered from the same test unit suggesting that many of these artifacts may have been produced from a single core or during a single knapping episode. The relatively tight clustering of data points also suggests that a limited number of different outcrops are represented by these materials.

Group C contained seven lithic artifacts and one raw material sample (Tables 4.1 and 4.2, Figure 4.5). The sample consists of raw material Sample 5 which was procured from a source located at Hopewell Junction on the east side of the Hudson River. Although the sample was recovered from a deposit located more than 50 miles away, it is still within an intermediate distance of the site and could have been procured by groups living on the Wallkill plain that is located east of the site. This group contains highly variable artifacts that visually exhibit both grey and black colored cherts. Also, these materials contain two artifacts with potlids, suggesting that heat-treatment may have been needed to enhance the knapping of the materials.

Group D contained six pieces of debitage and one raw material Sample 9, which was recovered from Hunter, New York (Table 4.1 and Table 4.2, Figure 4.5). The sample from Hunter, New York, is located within an intermediate (24–80 km) radius of the site. Unlike groups A–C, the artifacts recovered from this group consist mostly of medium and dark grey chert bifacial thinning flakes recovered from three different units spread across the living floor of the Trapps Gap site. None of these artifacts showed signs of retouch and it is unlikely that they were used as expedient tools by the site's occupants. The fairly loose clustering of the materials in this group suggests that the artifacts may have come from two or more different outcrops.

Group E consists of three different lithic samples as well as raw material sample 4, which was recovered from an outcrop near Middleburgh, New York (Table 4.1 and Table 4.2, Figure 4.5). This outcrop is located more than 80 km away from the Trapps Gap site. The scattered nature of the samples in this group suggest that they were procured from several different outcrops scattered a significant distance from the site. This is further supported by the fact that the samples do not cluster near Groups A–D, suggesting some differences in the concentrations in the elements contained within the materials.

In summary, this study suggests that the lithic artifacts from the Trapps Gap site can be grouped into five different lithic groups based on their trace element composition. These groups are identified as Groups A–E and contain variable characteristics. Several groups of artifacts clustered with raw material samples 1–9, suggesting that some of these samples may have been recovered from the eastern side of the Shawangunk Ridge in the Wallkill Valley. Since the focus of this study was not to identify where each individual lithic artifact was procured, future research is needed to test outcrops on the west side of the Shawangunks and compare how such outcrops influence the groups identified as a result of this research. The remainder of this chapter discusses what the results of the archaeometric analysis might mean in terms of interpreting the land use patterns of the Shawangunk Ridge and the adjacent Roundout and Wallkill Valleys.

DISCUSSION

The Shawangunk Ridge has attracted archaeologists since the end of the nineteenth century. Schrabisch described early explorations of the ridge in *Mountain Haunts of the Coastal Algonquian* (Schrabisch 1919a) and *Indian Rockshelters of the Shawangunk Mountains* (Schrabisch 1919b). In these publications, he described the archaeological sites of the region as being composed mostly of small rock shelters and camps, many of which are located in areas that are "quite small and uncomfortable … [with] … shelters sporadically at the foot of rock masses that become detached … an example … is furnished by a station [near] Lake Minnewaska, on Shawangunk Mountain, Ulster County, N.Y." (Schrabisch 1919a:141).

The presence of the Trapps Gap site along the ridge supports Schrabisch's (1919a) assumption that the Shawangunk Ridge was populated throughout prehistory. Few large Late Woodland settlements have been identified in the Shawangunk Mountains; instead most

large sites are located in adjacent river valleys to the west or more open areas to the east on the Wallkill floodplain. According to Schrabisch (1919a:146), "at certain seasons, neighboring tribes would join in hunting trips to the mountains, which were a kind of game preserve, held in common by a group of tribes, and where they would stalk the deer and secure other quarry, valued for food and peltry."

The trace element composition of the lithics from the Trapps Gap site suggests that the artifacts were recovered from several different deposits with at least five different groupings suggested. Many of the raw material samples clustered within these groups, suggesting that one or more local outcrops many have been exploited. The largest number of artifacts (43 percent) clustered with materials recovered from Napanoch and Allard's Corners, suggesting relations with groups to the east and west of the Shawangunk Ridge.

The presence of more than 20 ceramic vessels and several dozen expediently chipped stone tools at the site suggests that the occupants were not merely hunting parties who cached resources as they followed deer and other migratory animals across the landscape, but may have also included women (and possibly children). This is important because historically, models of upland land use have focused on the use of these areas as hunting venues for males. Few studies have focused on women's roles in the upland much less those of family groups. Recently, Versaggi (1996) and others (Rieth 2002, 2008, 2009) have suggested that women's forays into upland areas were equally important as those of men and often served for collecting plant and animal resources that would have been needed to make baskets, mats, and other household items such as specialty foods and medicines.

The recovery of expedient tools from the site is in line with gendered models of tool use among women. Gero's (1991; see also Gero and Conkey 1991) study of "genderlithics" and women's roles in stone tool production in various hunter-gatherer groups shows that while expedient tools are made and used by both genders, women appear to make and use these tools most often. Tie in the use of expedient tools to plant procurement and small game collecting/processing, and the evidence begins to mount for interpretations of this and other upland sites as locations of female foraging and gathering.

Our interpretation of the Late Woodland use of the uplands assumes that the site's occupants were logistically organized around an established residential base camp located in lowland or valley areas (Binford 1982). Evidence from the Upper Susquehanna and Schoharie Valley suggest that this assumption is appropriate for many parts of New York (Rieth 2009:1–18; Versaggi 1987). This model proposes that groups established residential base camps near areas of abundant aggregated food resources and moved their base camps to different locations across the landscape as resource availability changed. Consequently, the foraging radius, equivalent to the distance that could be traversed in less than a day, existed around the residential base. According to Versaggi (1987), within this radius, people collected, gathered, hunted and performed some processing activities as part of daily treks outside the perimeter of the camp. Those tasks that required longer-distance travel resulted in the creation of special-purpose, single- or multi-night encampments located beyond the foraging radius of the base camp.

The recovery of lithic materials from both sides of the Shawangunk Ridge support Schrabisch's (1919a) aforementioned belief that the region was a communal hunting and resource procurement area for neighboring tribes. Temporally, however, the absence of Early and Middle Woodland occupations at many of these rockshelter sites suggests that during these periods, the Shawangunks may not have been widely used for resource procurement and/or hunting. What, then, would have caused native groups to resume collecting along the Shawangunk Ridge during the Late Woodland Period?

Diamond's suggestion that groups may have fled into upland areas to seek familiar shelter or collect in safer lands might explain the presence of Late Woodland and Contact materials in this area. As Iroquoian and Algonquian groups to the north and east reorganized village settlements and as competition for fertile land for growing crops increased, groups living on the margins of these areas may have retreated to upland areas such as the Shawangunk Ridge as they looked for new places to settle and forage food and non-food based materials.

Following Snow, native perceptions of land use and ownership were very different from those of European groups, with territorial boundaries and resource exploitation zones fluctuating depending upon sociocultural alliances between groups (1994:1–6). Ashmore and Knapp (1999:2) suggest that many archaeological sites, such as isolated finds, farming stations, rockshelters, and resource procurement stations do not fit into the traditional definition of sites. Attention to these types of sites is important since they remind us how complicated studies of the past are stressing the interrelationship "among people and such traces, places, and features in space and time" (Ashmore and Knapp (1999:2).

Future research should be focused on comparing the patterns observed at the Trapps Gap site with other sites along the ridge to determine whether the lithic procure-

ment patterns identified are unique to this site or represent wide-scale patterns across the ridge. Funk argued that, "due to its geographic setting, the region [and the region surrounding Trapps Gap pass] provides an unusual opportunity to test hypotheses concerning the range of various cultural manifestations and changing land use patterns. The mountains … presented natural barriers to the movement and communication on the part of aboriginal groups" (Funk 1976:7–8). For groups to traverse these barriers and communicate with groups on opposite sides of the ridge would have been difficult at best. In addition, navigating such a corridor during inclement weather and through unfamiliar terrain would not have made the journey any easier.

Finally, this research suggests that trace element analysis provides important information about the source of raw materials that may not be gained by visual inspection alone. Variation in chert outcrops has been underemphasized in studies of raw material use in the Northeast. As Wray (1948) and others (Calogero 1992:87-90; Hammer 1976:39–62; Kuhn and Lanford 1987:57–69) have suggested, variation in the color and texture of chert recovered from lithic outcrops can in some cases be very great and obscure attempts to accurately pinpoint source areas without a more extensive analysis of trace element composition. As the above discussion demonstrates, chert debitage that visually looked different based on color often grouped within the same trace element group. In order to truly understand how the materials from the Trapps Gap site fit into larger land use patterns, trace element analysis studies of the lithic artifacts from nearby sites such as Mohonk Rockshelter and Ski Minne should be undertaken to determine if the site's occupants used many of the same outcrops. Only then can we understand the changes in the occupation of the ridge over time.

CONCLUSION

In this chapter we have summarized the results of a project conducted between researchers from the New York State Museum and Vassar College designed to examine the sources of lithic artifacts recovered from the Trapps Gap site, Ulster County, New York. The results of this research suggest that the site's occupants procured materials from a variety of outcrops, with the lithic materials from the site clustering into at least five different groups. Most of the materials recovered grouped with known deposits located within between 24 km and 80 km of the site.

At this time, it remains unclear whether these patterns represent more widespread patterns of land use across the ridge or represent phenomena unique to the Trapps Gap site. If regional land use patterns are changing during the Late Woodland Period to more fully incorporate the occupation of rockshelter sites as temporary refuge areas for groups foraging across the ridge, archaeological excavations should be able to locate these occupations and the role that such sites played in the settlement and subsistence patterns of the region's occupants. Future research should focus on detecting the frequency of such occupations across the ridge and the range of outcrops that were used by Late Woodland groups to the east and west of the ridge.

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Chapter 5

A SMALL SITE IN COXSACKIE, CIRCA A.D. 1200:
Some Ecological Issues Concerning Its Age and Location

Edward V. Curtin

Abstract. *The excavation of Concentration 23B.1, a small site in Coxsackie, provides an unusual glimpse at late prehistoric, short-term backcountry settlement in the Hudson drainage. Occupying low ground near a small stream within the lake plain, Concentration 23B.1 contained several archaeological features, a varied lithic assemblage indicating different stages of lithic reduction, fragmentary Owasco-like ceramics, and twelfth–thirteenth century A.D. radiocarbon dates. Settlement pattern implications are explored in terms of the changing use of the local landscape as well as the diversity of late prehistoric settlement systems in the upper Hudson Valley.*

When the colonist Pieter Bronck purchased a large tract named *Koixhackung* (Coxsackie) from the Mohicans in 1662, the land was described as having 252 acres (102 hectares) of land already cleared, located away from the river (Dunn 1994:284; Vedder 1985:65). In Coxsackie, the land rises up quickly more than 30 m (100 ft) above the Hudson, indicating that if Bronck's already-cleared land was located away from the river, it was on the Glacial Lake Albany plain, which has some sandy soil but is mostly clay and clayey loam (Broad 1993). This land presumably was cleared by the Indians, and unless recently cleared with steel axes, was cleared gradually with stone axes and the application of fire. Aboriginal clearing with stone axes and fire most usually occurred over a long period of time due to the labor involved (as Mann 2006:335–337 discusses in relation to aboriginal clearing in South America). Given the extent of cleared land in the Bronck Patent in 1662, the questions arise: what plausible circumstances contribute to the history of the cleared land, and how may this history and these circumstances be related to concepts of land use, settlement and subsistence during the Late Prehistoric period (A.D. 700–1500)?

Bronck's discovery of already-cleared land to buy from the Indians was not unusual in the experience of seventeenth-century Europeans. Day (1953) has synthesized a wide variety of early European observations of extensive clearing, and more recently, Dunn (1994) has detailed the locations of some of these lands in the upper Hudson region. Dunn (1994) also has indicated the seventeenth-century Dutch preference for land already cleared. The Bronck Patent is one of many examples of Dutch purchases of cleared Indian land. Most of these Dutch purchases were along floodplains and low river terraces, however, in contrast to Bronck's purchase in the interior.

Following Day's (1953) seminal article, the historians Cronon (1983) and Pyne (1997) and the geographers Denevan (1992) and Doolittle (1992) promoted views of the Native American past that see active human clearing of the forest as a primary transformative force creating the world that Eastern Woodlands Indians lived in before European contact (although forest clearing or alteration by Native Americans is not always accepted as a significant factor in pre-contact Eastern Woodlands ecology by natural scientists, such as Forman and Russell [1983:5], Pederson et al. [2005], and Russell [1983:86].

Some archaeologists or interdisciplinary teams of archaeologists and natural scientists have taken the study of anthropogenic forest alteration further by investigating its time depth, extent, and more precise character. In some areas, forest alteration and at least some limited clearing were important by the Late Archaic period (approximately 3,000–4,000 years ago), and are clearly demonstrable on a more extensive basis in many areas by the Late Prehistoric (A.D. 700–1500) (Chapman et al. 1989; Delcourt et al. 1998; Johnson 1996; Moeller 1996; Patterson and Sassaman 1988:128–130).

Some of the prime reasons offered to explain the extensive clearing practice include the creation of gardens and the expansion of forest edge area to benefit hunting and gathering. In addition, cyclically performed seasonal forest burning cleared out underbrush (facilitating movement through the woods) and increased browse for prey species such as deer, while

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preserving an open forest of large trees, particularly trees of fire-resistant species (among others, see Cronon 1983; Day 1953, Johnson 1996; Moeller 1996, Patterson and Sassaman 1988).

The perspectives of anthropogenic Native American environments (developed increasingly through the second half of the twentieth century) are widely replacing earlier notions of uninterrupted, impenetrable, and mostly uninhabitable wild forests that had shaped earlier concepts of the pre-contact, eastern North American past. However, as this view affects archaeological and other interpretations more often, it is important to eschew static reconstructions (since the ethnohistoric literature does not adequately reflect conditions of 500 years earlier), and to consider the dynamics that affected forest clearing and associated gardening, hunting and gathering on a regional basis, recognizing that these human ecological systems likely fluctuated between periods of relative stability and instability, and that fluctuations affected different habitats or larger and smaller areas differentially.

For example, much of the land clearing observed in the Hudson valley or other areas of the Northeast during the early seventeenth-century must have occurred in the several centuries prior. However, this was a period of two notably extreme climate episodes, the Medieval Warm Period (A.D. 800–1300) and the Little Ice Age (A.D. 1300–1860). Did the forest clearing, often for agricultural purposes, proceed simply despite severe climate issues such as extended droughts, excessive flooding, and unpredictably curtailed growing seasons, or did progressive forest clearing spread risk or actually facilitate subsistence productivity in the face of these environmental perturbations? Moeller (1996) points to an answer by envisioning the clearing of gardens and extension of forest edge area (enhancing species diversity and abundance for hunting and gathering) as fundamental practices increasing diversity, and thereby adding resilience to human adaptation exceeding the effect of climate change. Current evidence indicating periods of higher and lower visibility of the Hudson valley archaeological record between A.D. 700–1500 suggests that climatic perturbations may have had effects upon settlement size and land use strategies.

Addressing these issues and questions in some detail here, this chapter examines (1) fluctuations in the Late Prehistoric (A.D. 700–1500) archaeological record of the upper Hudson valley; (2) the Medieval Warm Period (A.D. 800–1300) in relation to eastern New York State; (3) recent archaeological applications of an increasingly important body of theory, Resilience Theory; (4) apparent upper Hudson regional resilience strategies; and (5) an archaeological site referred to as Concentration 23B.1. Concentration 23B.1, located 2.4 km (1.5 mi) from the Hudson River, demonstrates use of the interior portion of the Bronck Patent several hundred years before Bronck's purchase, and reflects settlement system diversity that existed in interior areas during the Medieval Warm Period.

CHRONOLOGICAL PATTERNS IN THE HUDSON VALLEY DURING THE LATE PREHISTORIC PERIOD (A.D. 700–1500)

The Late Prehistoric period is considered here as the A.D. 700–1500 time frame, a chronological interval that spans earlier definitions of the later part of the Middle Woodland period (A.D. 1–1000) and the entirety of the Late Woodland period (A.D. 1000–1500) (Funk 1976; Ritchie 1969). The alternative periodization used in the present chapter reflects apparent cultural continuity in artifact traditions and subsistence practices spanning the traditional Late Woodland temporal threshold. It also includes the entirety of the Medieval Warm Period (A.D. 800–1300). Within the present chapter, the term Late Woodland is used sometimes in reference to older data (such as Bender and Curtin 1990), or when reference to its traditional meaning was intended in earlier publications or reports.

In publishing the first archaeological overview of the Hudson valley, Ritchie (1958) looked to the existing Mohawk Valley archaeological sequence to document and internally differentiate the Hudson Valley Late Woodland period. This fundamentally meant the recognition of major Owasco and Iroquois-like chronological subdivisions, as well as the expectation that these major periods also would be divided into shorter phases. This effort, however, was hampered by a relative dearth of Owasco-like components, especially those of the Middle and Late phases (such as the Canandaigua or Snell Phase, A.D. 1100–1200, and Castle Creek Phase, A.D. 1200–1300 [Ritchie 1958:102]). Ritchie (1958:102) in fact suggested that the "little known occupants of the Hudson Valley…barred the Owasco people and their culture" from this region. At the same time, he found ceramic evidence for a later succession of cultural phases with pottery similar to the "Oak Hill, Chance, and Cayadutta prehistoric levels" (Ritchie 1958:108). Although Ritchie noted the occurrence of such evidence, he remarked upon the lack of substantial sites (similar to Iroquois village sites), attributing the sparse archaeological record to a combination of site destruction with urban development, short occupation spans, small group size, and high mobility.

Funk (1976:300–302) continued Ritchie's (1958) view of a general Owasco-like to Iroquois-like material

culture sequence, composed of phases that would replicate the Mohawk Valley sequence in terms of diagnostic ceramic types. However, Funk referred to the major chronological divisions as Late Woodland I (A.D. 1000–1300) and II (A.D. 1300–1600) in order to de-emphasize the Iroquois cultural reference for the Algonquian Hudson Valley. Funk (1976) found greater evidence of an Owasco occupation of the Hudson region than Ritchie, although still without major sites. Nonetheless, the triangular Levanna projectile point type, strongly diagnostic of the Late Woodland period, proved to be extremely common in Hudson Valley archaeological collections, indicating a relative population peak during this time (Funk 1976:312; see also Bender and Curtin 1990). Although the evidence of Late Woodland I occupation seemed sparse and scattered, Funk (1976:300–301; 310) viewed the information at hand, such as components in Albany and Ulster counties containing Owasco series ceramic types, as sufficient justification to anticipate the future discovery of Owasco village sites in the Hudson Valley. With respect to the Late Woodland II period, Funk (1976:311) took the existing evidence to indicate "unbroken development into stages similar to the Oak Hill, Chance, and Garoga horizons of the Mohawk Iroquois" (Ritchie [1958:108] had referred to the Garoga phase or horizon as the "Cayadutta level").

In the several decades since these initial formulations were published, only a few new Late Woodland sites have been studied in the upper Hudson Valley, and those that have been studied tend to indicate small, seasonal occupations, sometimes repeated intensively. Indeed, there has been a growing sense that Late Prehistoric settlements were small, seasonal, and reflected a more mobile adaptation than the larger Owasco and Iroquois villages of central New York and the Mohawk Valley (Bender and Curtin 1990).

More radiocarbon dates are now available, allowing temporal evaluations that can be viewed independently of ceramic chronology and the traditional phase systematics. Improved chronology also benefits from more widely recognized associations between Native material culture and European material culture of known age, refining sixteenth to seventeenth-century time frames and views of the emerging and unfolding Contact experience (Bradley 2007). Better chronological control allows consideration of the potential contemporaneous use of ceramic types (such as various Oak Hill, Chance, and Garoga phase types) once typically assumed to indicate different time frames (Lavin et al. 1996), as well as the clarification of such concepts as the Garoga horizon (Bradley 2007).

Currently, an innovative way of looking at this period is to use the concept of a Late Prehistoric period spanning the late Middle and Late Woodland periods, and continuing to the Contact period, an apt historic context for studying the development of horticultural systems, settlement patterns, and land-use changes in much of the Northeast (approximately A.D. 700–1600; cf. Rieth 2002a, 2002b; various references in Miroff and Knapp 2009). Among other things, this concept allows views of periods such as A.D. 700–1100 as a continuous sequence, enhancing perspectives of long-term or continuous processes, while allowing comparison to periods that may differ in significant ways, although in the past these periods (as phases of the Late Woodland) have often been viewed as parts of a continuum.

It is proposed here that, although there was no strict hiatus in human occupation of the upper Hudson region during the Late Prehistoric period, there were alternating phases of relatively high or low archaeological visibility. The earliest of these is a period of high archaeological visibility circa A.D. 700–1000 or 1100. This period includes residence along the Hudson and large tributaries at such sites as Tufano and Black Rock (Funk 1976), Winney's Rift (Bender and Brumbach 1986; Brumbach and Bender 2002), Site 211-1-1 (Cassedy and Webb 1999), apparently Welling (Funk 1976:300), and possibly Goes Farm (Brewer 2001). These sites have large artifact assemblages, riverine (often floodplain) settings, and frequently, substantial archaeological features such as pits and processing facilities.

This period is followed by a time of low archaeological visibility, A.D. 1100–1300. The backcountry site Concentration 23B.1 as reported later in this chapter was occupied during this second phase. Other small, backcountry sites nearby that seem to contain evidence of occupation during this period include the Bronck House and Zimmerman rockshelters (Funk 1976). Other roughly contemporaneous occupations include evidence of a ceramic tradition that incorporated both Middle Woodland and Late Woodland attributes dated between ca. A.D. 1150–1385 (1σ range, uncorrected thermoluminescence and radiocarbon dates) from the Winney's Rift and Mechanicville Road sites (Brumbach and Bender 2002:236; also see Hartgen Archeological Associates 1983). Other possible components of this period would include assemblages with "Canandaigua" or "Castle Creek" ceramics; however, there appear to be few if any large assemblages or sites with substantial features from this time-range documented in the upper Hudson region (the briefly reported Little Wood Creek site in Fort Edward may be an exception; see ceramics mentioned by Starbuck 2004:4). Thus, to the extent that sites of this time can be adduced from existing information, they occur in riverine as well as backcountry locations. The paucity of large or well-documented sites from this time is taken here as an indication of

either population decline, or some other aspect of low archaeological visibility, such as smaller group size, higher mobility, and dispersion into backcountry areas.

The following period of time—A.D. 1300 or 1400 to 1700—is one of relatively high archaeological visibility, as sites are more numerous and are often more substantial than earlier ones. These sites are located in riverine settings, and in some cases represent reoccupations of sites occupied during the earlier time period, A.D. 700–1100. During this period, Goldkrest and several other sites were occupied on Papscanee Island (Lavin 2004; Lavin et al. 1996; Sopko 2007; Sopko and Schmitt 2009). On the Roeliff Jansen Kill, Site 211-1-1 appears to have been occupied intensively once again (Cassedy and Webb 1999:87-89), apparently after a hiatus or period of low intensity site use. The Coffin site near Schuylerville was occupied at this time, after a very long hiatus (Funk and Lord 1972). Winney's Rift continued to be occupied, perhaps more intensively at times. The most intense episode of occupation of the Goes Farm during the Late Prehistoric occurred in this period, based upon ceramics and burial features (Brewer 2001). These sites variously contain storage and processing features, and in some cases, burials.

Almost 40 years after Funk's finding that major Late Woodland components are lacking—while Late Woodland projectile points are relatively abundant—accumulating evidence indicates that the Late Prehistoric is comprised of alternating periods of relatively high (A.D. 700–1100, A.D. 1300–1700) and relatively low (A.D. 1100–1300) archaeological visibility. Setting aside the possibility of a population decline, three aspects of this differential visibility may include: (1) variation between assemblages with different degrees of normative content or pattern; (2) differences in site size or artifact density; and (3) differential use of riverine and backcountry or upland locations. Concentration 23B.1 provides an example of all three dimensions of low archaeological visibility, since temporally diagnostic artifacts are lacking, site size is small, and the location is on clayey soil within the interior lake plain, some distance from the Hudson River. These factors make sites like Concentration 23B.1 difficult to find and recognize as Late Prehistoric components.

THE MEDIEVAL WARM PERIOD

Fagan (2008) has recently provided a broad and accessible discussion of the Medieval Warm Period. This term and the alternative, Medieval Climatic Anomaly, refer to a period of global or near-global warming from A.D. 800–1300. These terms have been used since the 1950s and 1960s when the British meteorologist Hubert Lamb introduced the notion of a "Medieval Warm Period" based upon the study of historic climate records.

The Medieval Warm Period was a largely beneficial period of warm weather and adequate rain for agriculture in Western Europe, which led to population growth, forest clearing, the proliferation of new farms, church-sponsored building, and the accumulation of wealth. The main deleterious effect in much of Europe was famine when population growth outstripped food-production. Two responses, in addition to more land clearing, included technological improvements for more effective plowing and the intensification of fishing. Warfare over neighboring food surpluses was another effect of local food shortages. Because of the growth of European population, economy, and cultural expression over this period, the Medieval Warm Period has often had the positive connotation of an ameliorating environment when used by European and American historians and archaeologists (for example, Snow 1994:21).

Much of Fagan's (2008) book, however, is about medieval warming effects in the rest of the world, where this climatic episode was often associated with deleterious droughts and significant reductions in food supplies. Fagan (2008) chronicles the severe effects of warming upon North American populations in California, the Great Basin, and the Southwest, where the extreme droughts of the late twelfth-century led to the Chacoan and other abandonments (see Judge 1989; Larson et al. 1996). Recently, Benson et al. (2009) have considered the effect of severe twelfth to thirteenth-century droughts on the Mississippian urban center of Cahokia. They relate an eleventh-century cycle of high rainfall to rapid growth and agricultural diversification and subsequent long periods of drought to abandonment of a significant upland farming complex, social and political reorganization within Cahokia itself, and progressive depopulation of the urban center leading to abandonment.

Maps of drought severity (informed by tree ring data) indicate that the Hudson Valley was somewhat or marginally affected during the twelfth to thirteenth centuries (Benson et al. 2009:477). Other data, however, indicate that medieval warming effects may have been more adverse locally than these maps suggest. Fagan (2008) cites the study by Pederson et al. (2005) indicating environmental change in the lower Hudson region related to the Medieval Warm Period. Fagan (2008:229) notes that from A.D. 800 to 1300, the lower Hudson estuary became more saline. Increasing salinity in the lower estuary primarily was the result of decreased fresh water flow from upstream areas to the north (including the Hudson's major western tributary, the Mohawk; cf. Boyle 1979). This suggests a long period of drought, including areas well upstream from the

Piermont Marsh-lower Hudson study site.

According to Pederson et al. (2005:238), the major (and perhaps most direct) evidence for a strong expression of the Medieval Warm Period in the Northeast involves "striking increases in charcoal and *Pinus* domination from ca. A.D. 800 to 1300, paralleling paleorecords southward along the Atlantic seaboard." This evidence is interpreted as an indication of significantly increased forest burning, which would result in the increased deposition of charcoal in stream and marsh sediments, and a shift of pollen frequencies toward the increased representation of fire-resistant tree genera such as *Pinus*. *Pinus* species also are early successional and tend to colonize abandoned fields and clearings that have been in transition (Asch Sidell 2008).

Pederson et al. (2005) attribute the Piermont Marsh data to the effect of natural fires greatly exacerbated by drought, although anthropogenic fire is also discussed, but viewed as less likely. However, there have long been differences of opinion about the ancient prevalence of natural wild fires versus human-set fires for land clearing or forest management (Day 1953; Denevan 1992; Patterson and Sassaman 1988). Certain vegetation changes may reflect anthropogenic change: for example, Native American gardening may account for the strong representation of *Ambrosia* (ragweed, a chronic garden invader) in the Piermont March samples pertaining to the Medieval Warm Period (data in Pederson et al. 2005). In eastern Kentucky, Delcourt et al. (1998) see an increase in *Ambrosia* pollen as consistent with other evidence of anthropogenic fire and increased gardening. In an alternative view involving the lower Hudson data on the Medieval Warm Period, Pederson et al. (2005:245) note that *Ambrosia* is expected to quickly colonize burned-over areas. Nonetheless, recognizing a long-standing controversy based upon different paradigms, it seems reasonable to continue to consider the possible human role with respect to the lower Hudson (Piermont Marsh) data on forest burning and vegetation changes. At the same time, there appears to be substantial evidence for increased forest burning in the lower Hudson region during the Medieval Warm Period, whatever the proximal cause.

Further north, above the Mohawk-Hudson confluence, a study of core samples from Collins Lake (an oxbow on the lower Mohawk) indicates a long period of increased storminess from ca. A.D. 1150 to 1590 (White and Rodbell 2010). However, it is unclear how increased storminess may have been related causally to the Medieval Warm Period—for example, whether there may have been less rainfall but more violent storms—since the indicated time frame spans the last century or two of the Medieval Warm Period and the first half of the Little Ice Age. Nonetheless, these data strongly indicate potential issues for floodplain agriculture as early as the twelfth century, due to increasingly severe floods and erosion, and perhaps for agriculture in general due to factors such as increased wind and hail damage.

Although the evidence is circumstantial, the possibility of a delay of 300 to 400 years between forest clearing and intensive seasonal occupation of the Goldkrest site on the upper Hudson may be related to floodplain dynamics during this period (since earlier instability of the floodplain seems to have significantly inhibited human use). At Goldkrest, channel migration and over-the-bank deposition eventually led to a somewhat more elevated and stable ground surface by ca. A.D. 1400 (based on discussions and data in Lavin [2004] and Schuldenrein [1997]).

It is important to consider that climate effects may vary within and between regions. For example, Mullins et al. (2011) have retrieved diverse paleoenvironmental data from Cayuga Lake in New York's Finger Lakes region that indicate an increase in local rainfall rather than drought during the Medieval Warm Period. This appears to conflict with near-continental scale, mapped information depicted by Benson et al. (2009:477). However, while noting that Benson et al. (2009:474) also record increased rainfall in the Cahokia region during the eleventh-century, providing at least a partial, potential similarity to the trend in the Cayuga Lake data, it would seem that much more information on spatial and temporal variation is needed to understand medieval climate change in the Northeast. In any event, it seems wise not to assume uniform conditions during major episodes of climate change, but to be aware of issues of environmental perturbation and instability while accumulating data.

Considering the major trend of the available information, the Medieval Warm Period had several possible adverse effects upon subsistence and settlement strategies in the Hudson Valley. These include unstable floodplain sites affected by seasonal submergence, devastating erosion, and burial under loads of sediment. Potential deleterious effects also include propensities for crop damage due to droughts, floods, high winds, and hail. When it happened, increased May-June flooding may have delayed planting, perhaps adversely. Uncontrolled wild fires may also have become a greater threat during the Medieval Warm Period (although the threat of uncontrolled fire would have been greatest in places where dead wood accumulated on the ground, especially in blow-downs associated with strong storms [Day 1953; Pyne 1997]).

RESILIENCE IN SOCIAL AND ECOLOGICAL SYSTEM INTERACTION

Recently, several archaeologists have discussed Resilience Theory and the related concept of panarchy as a basis for understanding linked changes in social and ecological systems (Delcourt and Delcourt 2004; Nelson et al. 2006; Redman 2005; Redman and Kinzig 2003; Thompson and Turck 2009; for a critique of sorts, see Jones 2005). A short definition of resilience is the "ability to recover rapidly, as from misfortune" (Webster's Dictionary 1996). Panarchy refers to the interaction of ecosystems at nested spatial and temporal scales and, in the anthropological context, to the operation of human ecosystems at different spatial and temporal scales (Delcourt and Delcourt 2004). In human ecosystems, regional processes of social and political organization, interaction, and information exchange integrate spatial scales, while the ability to remember the past (such as social memory), or even anticipate the future integrates or connects temporal scales:

> These nested hierarchies may have a stabilizing effect due to the fact that they provide the memory of the past and of the distant to allow recovery after change occurs. They may also have a destabilizing effect when dynamics across scales become "over-connected" or "brittle" allowing small scale transformations to "revolt" and explode into larger scale crises. (Redman and Kinzig 2003:1)

Resilience Theory sees change between stable and unstable system states as normal and expects ecosystems to follow cyclical patterns of growth, conservation (of resources, institutions, or practices), release (or "revolt"), and reorganization. Growth and conservation are associated with system stability; release and reorganization are associated with system transformation. During periods of instability, when conservation fails and release occurs, systems change quickly, and then reorganize to adapt (Nelson et al. 2006; Redman and Kinzig 2003; Thompson and Turck 2009).

Resilience Theory encourages thought about diversity and flexibility as important components of observed regularities, such as responsiveness to seasonal cycles of resource availability or abundance (Thompson and Turck 2009:256–257). In order to visualize resilience as a process affecting small scale societies, it is possible to imagine the failure or partial failure of agricultural subsistence strategies due to droughts or floods, leading to a subsistence-settlement system release into smaller, more mobile co-residential groups subsisting on wild resources to a significantly increased extent (see Nelson et al. 2006). This could occur on temporal scales ranging from a year to a multi-decadal drought, as occurred during the Medieval Warm Period in parts of North America. Subsistence and residential diversity and flexibility, often as they are evoked by social memory and the preservation of traditions, may condition successful subsistence and settlement strategies at local scales and in age-old habits or remembered places, technologies, and behaviors.

Resilience, seen as the potential to respond effectively, allows recovery when small scale transformations lead to large scale crises. In some dramatic cases, such as the sequences of Medieval Warm Period drought and abandonment (or irrigation problems and geographic contraction) seen in Chacoan, Mimbres, and Hohokam societies of the American Southwest, human and social ecosystems have been seen as extremely stressed and described as collapsing, but also subsequently reorganizing, often with significant change in geography, demography, cultural institutions, and sociopolitical organization (Cordell 1997:399-441; Diamond 2005; Fagan 2008; Nelson et al. 2006; Redman and Kinzig 2003). For example (and *apropos* of the thought-experiment above), Nelson et al. (2006) have examined the reorganization process in the Mimbres region of New Mexico. While drought was an external problem, the prior decline of diversity in social and ecological units was seen as a general, contributing factor leading to transformation. One way of looking at this is to view human communities in the region as too over-committed to agriculture to withstand the Medieval Warm Period droughts. Increasing commitment to agriculture and larger communities had reduced social and ecological diversity by localizing population and making food crops more central to subsistence. While large communities were in fact depopulated as a result, small communities shifting toward the use of more wild resources and smaller residential sites characterize the release and reorganization phases of the "Mimbres collapse" adaptive cycle.

In some of the archaeological literature on the Resilience Theory adaptive cycle, there is a sense that the release phase involves processes such as fragmentation into smaller co-residential groups, dispersion of population, increased mobility, and diversification of the resource base. This model has been hypothesized for hunter-gatherers shifting from collector to forager strategies (Thompson and Turck 2009:258), but may also pertain to mixed hunting and gathering and agricultural strategies, especially those transitioning toward increased hunting and gathering (Nelson et al. 2006).

Once agriculture had become a significant food source in a region such as eastern New York, environmental perturbations may have similarly favored resilience strategies leading to reorganization. Trends toward smaller site size and dispersion into the back-

Table 5.1. Dynamic Cycles of the Upper Hudson Late Woodland.

Period	Archaeological Visibility	Climatic Phase	Dominant Settlement Pattern	Typical Subsistence Strategy	Dynamic Cycles
A.D. 1300–1700	High	Little Ice Age (wetter, stormy, increasingly cool)	Larger sites, riverine orientation	Agriculture and fishing with hunting and gathering	Growth and Conservation
A.D. 1050–1300	Low	Late Medieval Warm Period (increasingly dry and stormy)	Smaller sites often dispersed into the interior	Hunting-gathering-fishing with agriculture	Release and Reorganization
A.D. 700–1050	High	Early Medieval Warm Period	Larger sites, riverine orientation	Agriculture and fishing with hunting and gathering	Growth and Conservation

country (which would equate at least in part with subsistence shifts toward increased hunting and gathering and the diversification of food resources), would also lead to lower archaeological visibility, since smaller sites located in settings not viewed as typical for the period are less likely to be found or investigated by archaeologists. Thus, it is possible to hypothetically connect the degree of archaeological visibility generalized for the upper Hudson region to the dynamic cycle proposed by Resilience Theory, and the climatic vicissitudes surrounding the Medieval Warm Period, as shown in Table 5.1.

In Table 5.1, the Medieval Warm Period is divided into earlier and later sub-periods related to perceptions of archaeological visibility and an as yet vague notion of the severity of contemporaneous climate change. In doing so, the apparent, near continent-wide, extended droughts of the twelfth and thirteenth centuries are assigned greater significance than climate change during the earlier portion of the Medieval Warm Period, although with sufficient water, warming during the ninth to eleventh centuries may have greatly favored the expansion of agriculture.

The assumptions made regarding settlement and subsistence are based on the limited data from these periods. Any interior dispersion of population is based in part on negative data, i.e., the paucity of well-documented interior sites and the assumption that this is due to low archaeological visibility. However, the record of interior occurrences of Late Woodland (or Late Prehistoric) sites based upon institutional records (Bender and Curtin 1990) is discussed further below, and seem to strengthen the case for regular use of interior, backcountry and upland settings.

Since linked social and ecological systems are considered as nested at different temporal and spatial scales, this model currently is presented as characterizing only the Late Prehistoric period in the upper Hudson region, and not necessarily as characteristic of adjoining regions, or of the Northeastern Late Prehistoric period in general. However, because global or hemispheric-scale climatic events affect very large areas, adjoining regions so affected are also likely to contain contemporaneous evidence of social-ecological stress and responses. These effects and responses may parallel those observed in the upper Hudson region or they may show regional differences. Depending upon inter-regional interactions, some systemic changes may be linked at a broad regional scale.

STRATEGIES AFFECTING RESILIENCE IN THE UPPER HUDSON REGION

The upper Hudson region as defined here includes the Hudson drainage from about the mouth of Catskill Creek in Greene County to the Town of Queensbury in Warren County, New York. In the upper Hudson region, strategies favoring Late Prehistoric human ecological resilience fall into three major categories: hunting and gathering, agricultural risk, and anthropogenic change.

Hunting and Gathering

An increase in the importance of hunting and gathering in the reorganization of subsistence and settlement has been cited in a Southwestern U.S. example (Nelson et al. 2006), and imagined as pertaining to the present situation discussed later in this chapter. While easy to imagine, is there currently any evidence for this in the upper Hudson region?

At one level, the answer is no, in the sense that floral and faunal analyses pertaining to this question have rarely been performed, and will be somewhat limited in the future by poor faunal preservation in this region. At another level, however, the answer is apparently yes, because there is artifact spatial-distributional data supporting this answer in a 1990 study of institutional site file information from the upper Hudson region (Bender and Curtin 1990). Conclusions

may be seen as preliminary, since a great deal of archaeological survey has been performed since these data were compiled. However, Bender and Curtin (1990) made considerable note of the variable quality of the data set, and interpreted it with due caution. Relying upon temporally diagnostic artifacts such as projectile point and pottery types, as well as the locations and soil associations of all recorded archaeological sites within the region at that time, this study showed several important correlations: (1) floodplain soils are highly productive for corn crops; (2) Late Archaic and Late Woodland sites follow similar trends in relation to soil capacity for corn production, except for the most productive soils, at which point Late Woodland site frequency increases dramatically in comparison to Late Archaic site frequency; and (3) Late Woodland sites are relatively concentrated on soils with the highest corn productivity (13 percent of Late Woodland sites occur on these soil types, which occupy 2 percent of the region [Bender and Curtin 1990:91]). Meanwhile, Bender and Curtin (1990:87) had found that compared to most other periods, the Late Woodland period had a relatively high frequency of sites that were occupied for the first time. This is taken as an indication that a new or unique settlement strategy was in operation, one that probably pertained to horticultural intensification involving soils with high corn production capacity.

At the same time, approximately 75 percent of sites occupied during the Late Woodland had been occupied previously. Some of these multicomponent sites are floodplain locales and others are in the backcountry. Summarizing their perspective of these intersecting dimensions of land attributes and use, Bender and Curtin (1990:91) stated that "Late Woodland settlement was semi-sedentary and still incorporated aspects of earlier hunting and gathering adaptations. This type of settlement system would require the continuation of strategic procurement locales in habitats not related to horticultural activities."

This can be considered to be a substantial mapping-on to earlier hunter-gatherer land-use patterns (although those patterns themselves are somewhat more complex than this equation implies, and does not recognize variation in Late Prehistoric land-use strategies). While this may be viewed synchronically as part of the diversity of a mixed agricultural-hunting-gathering subsistence strategy, a diachronic perspective on the changing intensity of backcountry land use is needed to more fully relate site location data to propositions of relative archaeological invisibility, or population dispersion in relation to climate change. The data do, however, indicate the plausibility of social memory of backcountry subsistence activities and site uses as a factor favoring resilient shifts toward increased hunting and gathering.

Agricultural Risk

Spreading environmental risks to crop production over space is a fundamental way of making agricultural systems more resilient. Dunn's (1994, 2000) discussions of the ownership or control of gardens (or lands available to garden) by Mohican clan leaders shows how a close relationship between social organization and land use spread this risk in the upper Hudson region. Records of land sales indicate that clans controlled land in different drainages, including lands along both sides of the Hudson and on different tributaries. This obviously could allow harvests in some places despite losses in others. Although the antiquity of this system is not known, it is a system that may have developed in extent and complexity during the Late Prehistoric period, as more land was cleared for agricultural production, and perhaps as clans became larger, stronger, and more influential over larger areas. Thus, while this system provided for a high degree of resilience during the very Late Prehistoric and Contact periods (and may have effectively aided reorganization through crisis periods of the contact experience), it is not clear how applicable it was to buffering climatic perturbations of the Medieval Warm Period.

Nonetheless, during the Contact period, some of the Mohicans' cleared lands were located away from the river, as indicated in the description of the land sale to Pieter Bronck. The large amount of land cleared, 252 acres (102 hectares), may have required a significant investment of time and labor, perhaps executed over several generations. It is highly likely that these cleared lands in the Bronck Patent were located on clayey soils that retain water during dry periods better than sandy and silty soils. The use of cornfields in locations with different soil qualities (and perhaps a different mix of wild resources in surrounding woods and forest edges) adds diversity to floodplain-dominated agricultural systems.

Anthropogenic Change

Anthropogenic change in this case refers to Native American land-use practices involving land clearing and controlled burns in the woods to enhance hunting by clearing out underbrush and increasing forage for animal prey. Fire was used in both cases, accompanied by the use of stone axes for land clearing. The antiquity of these practices and their geographic extent at any particular time in the remote past are not known, but evidence of land clearing during the Late Archaic has been reported from Tennessee and Kentucky (Chapman et al. 1989; Delcourt et al. 1998), and burning of forest understory during the Terminal Archaic has been reported from western Massachusetts (Johnson 1996). These practices are well documented as occurring in the

Hudson Valley and other parts of the Northeast during the Contact period (Cronon 1983; Day 1953; Denevan 1992; Engelbrecht 2003; Mann 2006; Patterson and Sassaman 1988; Pyne 1997). Possibly reflecting these processes, at Concentration 23B.1 (discussed below), the soil below the plow zone is infused with small bits of charcoal and melted silica spheres, while the surrounding terrain has elevated frequencies of heat-altered artifacts (Curtin 2008; McKnight 2010).

Moeller (1996) has provided an important perspective on this for the Late Woodland period. He has argued that systematic alteration of the environment by land clearing is both an ancient practice and an important aspect of Late Woodland ecology and adaptation. Increasing forest edge area, Moeller (1996:63) observes, is a significant way to increase hunting and gathering potential because of the ecological diversity created in these situations. This practice probably was going on for so long that it seems that it should be considered a traditional practice more often than a Late Woodland innovation. If this is indeed the case, then the traditional backcountry landscape that Late Prehistoric people in the upper Hudson continued to use for hunting and gathering already contained cleared, open areas and forest edges.

Forest edge is most effectively created by expanding existing openings, since clearing new patches produces little edge area at first, and thus is slower and more labor intensive (Doolittle 1992:392–393; Mann 2006:335–336). Therefore, clearing probably was accomplished progressively over time as part of traditional uses of specific landscapes. The very large clearings reported during the Contact period (as described by Dunn 1994, Engelbrecht 2003, and others) would seem to imply a significantly long period of progressive forest clearing prior to contact.

Moeller (1996:65) has also observed that the effects of land clearing and field maintenance by burning exceed "those of climatic change over the short term." That is, the anthropogenic landscape provided significant biodiversity and potential garden plots that could be tapped with some reliability when subsistence alternatives were needed. Moreover, Native American creation and expansion of patches of biodiversity can reasonably be assumed to have been an on going process prior to and during the onset of the Medieval Warm Period. The clearing and traditional uses of open areas in the forest for species diversity, enhanced hunting, and agricultural fields would have been a significant factor adding resilience to the Late Prehistoric adaptation. Making clearings in the backcountry would have created opportunities to increase social and ecological diversity by favoring the dispersion of small, mobile groups as a subsistence-settlement alternative to larger, horticulturally based settlements along the rivers.

The following discussion of a recently investigated back country site, Concentration 23B.1, provides an example of a portion of upper Hudson prehistoric land use that is relevant to considerations of small groups, mobility, possible subsistence diversity, and flexible settlement strategies during the Late Prehistoric period. Moreover, based upon radiocarbon dating, there is good reason to believe that Concentration 23B.1 was occupied during the later part of the Medieval Warm Period, when adverse climatic effects may have been most severe. This site is located within the interior portion of the Bronck Patent, and thus plausibly involved with land uses such as the extension of forest clearing during the Late Prehistoric period, or the actual use of soil or biotic resources associated with the cleared area. The surrounding area contains earlier sites reflecting a long tradition of hunting and gathering. Based upon size, location, and apparent age, this type of site is predicted by a theory of social-ecological system release and reorganization associated with prolonged episodes of climate-related stress during the Late Prehistoric period.

CONCENTRATION 23B.1

Concentration 23B.1 (Figure 5.1) is a small, Late Prehistoric site of 225 sq m. It sits in a broad, shallow swale along an unnamed drainage leading to Coxsackie Creek. The Hudson River is ca. 2.41 km (1.5 mi) directly to the east, or ca. 4.82 km (3 mi) to the northeast if the route taken follows the winding Coxsackie Creek to its mouth. In this respect, Concentration 23B.1 is oriented to upland food resources rather than riverine, and it has no access to significant floodplain (the narrow floodplain along Coxsackie Creek in this area is classified as poorly drained to very poorly drained Wayland silt loam (Broad 1993). However, the site was more directly connected to other Indian communities to the south, as it is only about 0.80 km (0.5 mi) east of a major, north-south pathway, the traditional Indian footpath following the base of the Kalkberg Ridge (Figure 5.2). In early historic times this trail linked the lands around Catskill Creek with those to the north (a portion of this trail is shown on a colonial-era map included in Dunn 1994:195).

The Lake Albany plain is relatively wide in this section of the Hudson Valley, and is bounded on the west by the Kalkberg Ridge (part of the Helderberg formation) and on the east by the trough of the Hudson River. The predominant soil type is the Kingsbury and Rhinebeck series of somewhat poorly drained silt and clay (Broad 1993). The Kingsbury-Rhinebeck series underlies and surrounds Concentration 23B.1. The site's aspect is to the north, shading it somewhat during summer and exposing it to cold winds during the winter.

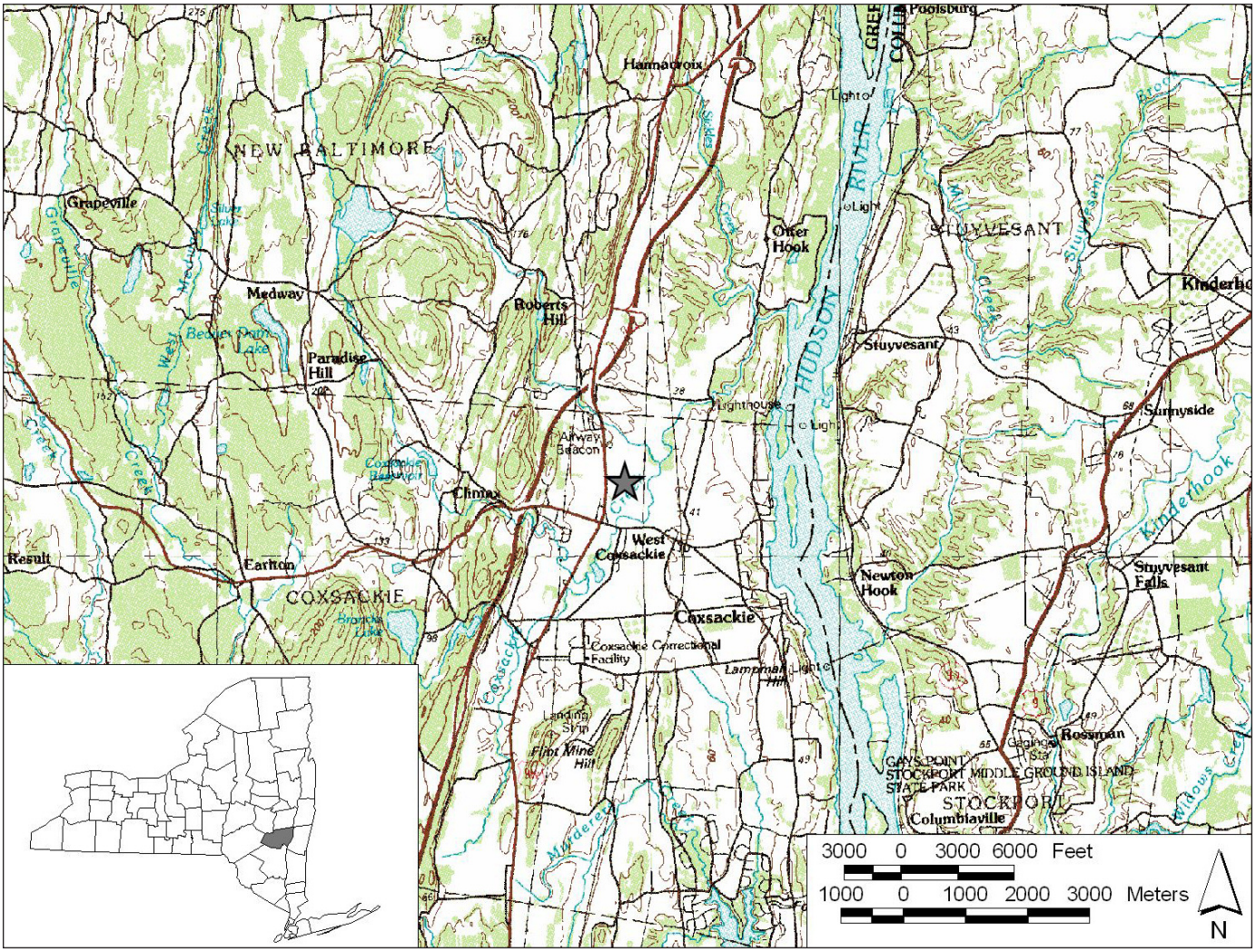


Figure 5.1. Concentration 23B.1 location in Coxsackie (Greene County highlighted in map inset).

Figure 5.2. View of the Kalkberg Ridge from the western side of the Greene Business and Technology Park study area. An Indian trail (the Catskill Path) ran north-south at the base of the ridge.

Personal experience working at this locale during the late fall and early winter indicates that exposure to wind may have made occupation of this site undesirable during the cold season.

Relatively high quality, workable stone is abundant in Coxsackie. Normanskill chert is available from tilted shale exposures that outcrop through the lake plain floor. A prominent source of Normanskill chert, Flint Mine Hill, is located about 4.82 km (3 mi) to the south of Concentration 23B.1. In addition, Helderberg cherts occur in the escarpment forming the valley wall on the west, possibly as close as 0.80 km (0.5 mi) to Concentration 23B.1. Normanskill chert is the most abundant type in local artifact assemblages, while Helderberg cherts such as Kalkberg often are strongly represented minority types. Eastern Onondaga chert also is present in local artifact assemblages, but not nearly as common as the Helderberg cherts. Exotic

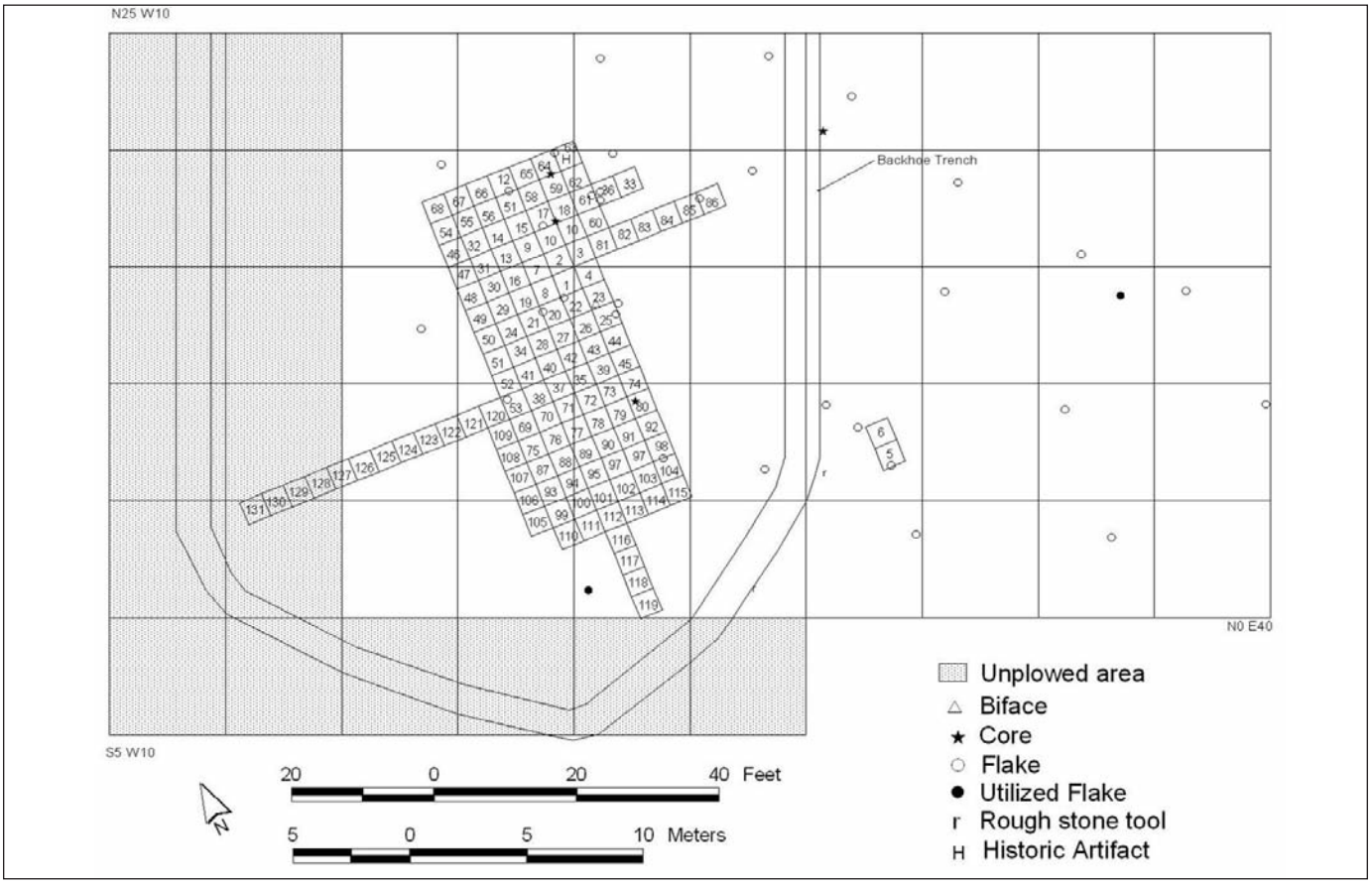


Figure 5.3. Concentration 23B.1 excavation plan.

stone types such as Pennsylvania jasper, purple-weathering argillite, western Onondaga chert, or Flint Ridge chalcedony are much less common (Cassedy 1992).

Local chert is so abundant that its procurement sometimes has been thought of as a reason that ancient Native Americans visited Coxsackie (Parker 1924). More recently, however, settlement system analyses and chronological studies have indicated at least seasonal residence in the local area on a sustained basis over a very long time (Curtin 2008; Curtin et al. 2008; Funk 2004). From this perspective, the abundant chert appears to be an important resource within an area rich in other environmental resources due to the Hudson River, local creeks and wetlands within the wide lake plain, and varied upland forest resources. The combination of resources favored sustained settlement in the local area over several thousand years.

In 2002, supported by the Greene County Industrial Development Agency (IDA), Curtin Archaeological Consulting intensively sampled Concentration 23B.1 as part of the Phase 3 data recovery project conducted for the Greene Business and Technology Park. Concentration 23B.1 was the only Late Prehistoric site identified during this work. Most of the other sites were either small Early-Middle Archaic, short-term residential sites, or had unknown periods of occupation. The surrounding landscape of some 81 hectares (200 acres) appears to have been occupied only sporadically after the Middle Archaic. Late Archaic–Early Woodland sites are few and appear to be logistical field camps. Most of the surrounding area appears to have been used for food or other resource procurement from the Late Archaic onward. Concentration 23B.1 appears to represent a reoccupation of this area after a settlement hiatus of perhaps 2000 years (Curtin 2008). During this period of settlement hiatus, continued low intensity use of the area now containing the Green Business and adjoining Kalkberg Commerce Parks is indicated by the isolated recovery of Early and Middle Woodland projectile point types such as Rossville, Fox Creek Stemmed, and Jack's Reef Corner-Notched.

The excavation of Concentration 23B.1 was conducted primarily within a large block and adjoining, short, hand-excavated trenches consisting of 129 1-x-1-m excavation units (Figures 5.3–5.5). Two 1-x-1-m units were deployed in a low artifact density area east of the

Figure 5.4. Concentration 23B.1, view of excavation block in progress, looking northwest toward Kalkberg Ridge.

Figure 5.5. Concentration 23B.1, view of excavation in progress, looking east.

excavation block, while a backhoe trench removed the topsoil in an area surrounding the excavation block in order to explore for outlying features.

Stratigraphy

The block excavation found a plow zone about 35–40 cm thick overlying either the subsoil or a thin (4–8 cm) dark brown soil deposit containing artifacts, charcoal, and melted silica spheres. This stratum was called the brown organic zone, and since patterns of plowscars seen outside of it appeared not to penetrate through it, the brown organic zone is considered part of the natural stratigraphy, rather than an older plow zone remnant. Figure 5.6 shows the extent of the brown organic soil and the total artifact density. These distributions correspond rather closely, suggesting that the dark stain is associated with more intense levels of human activity. The area of higher artifact density largely reflects the density distribution of chert debitage in the excavated sample (all strata combined).

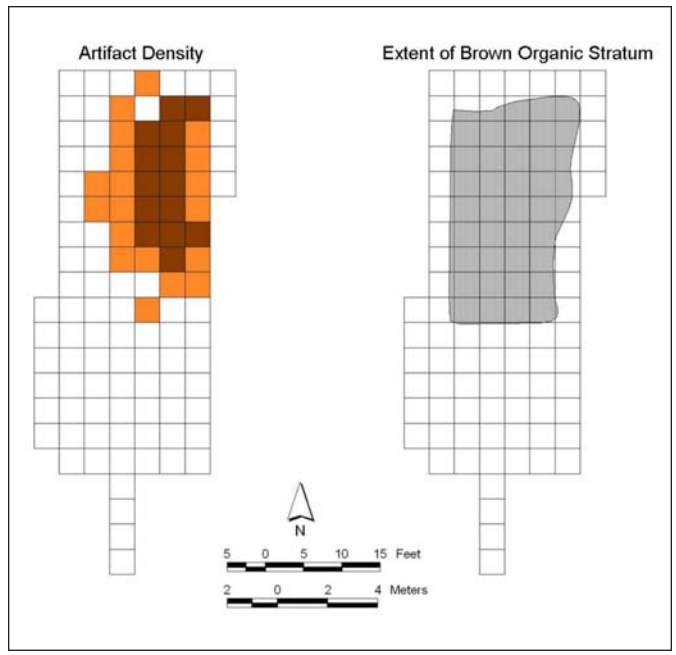


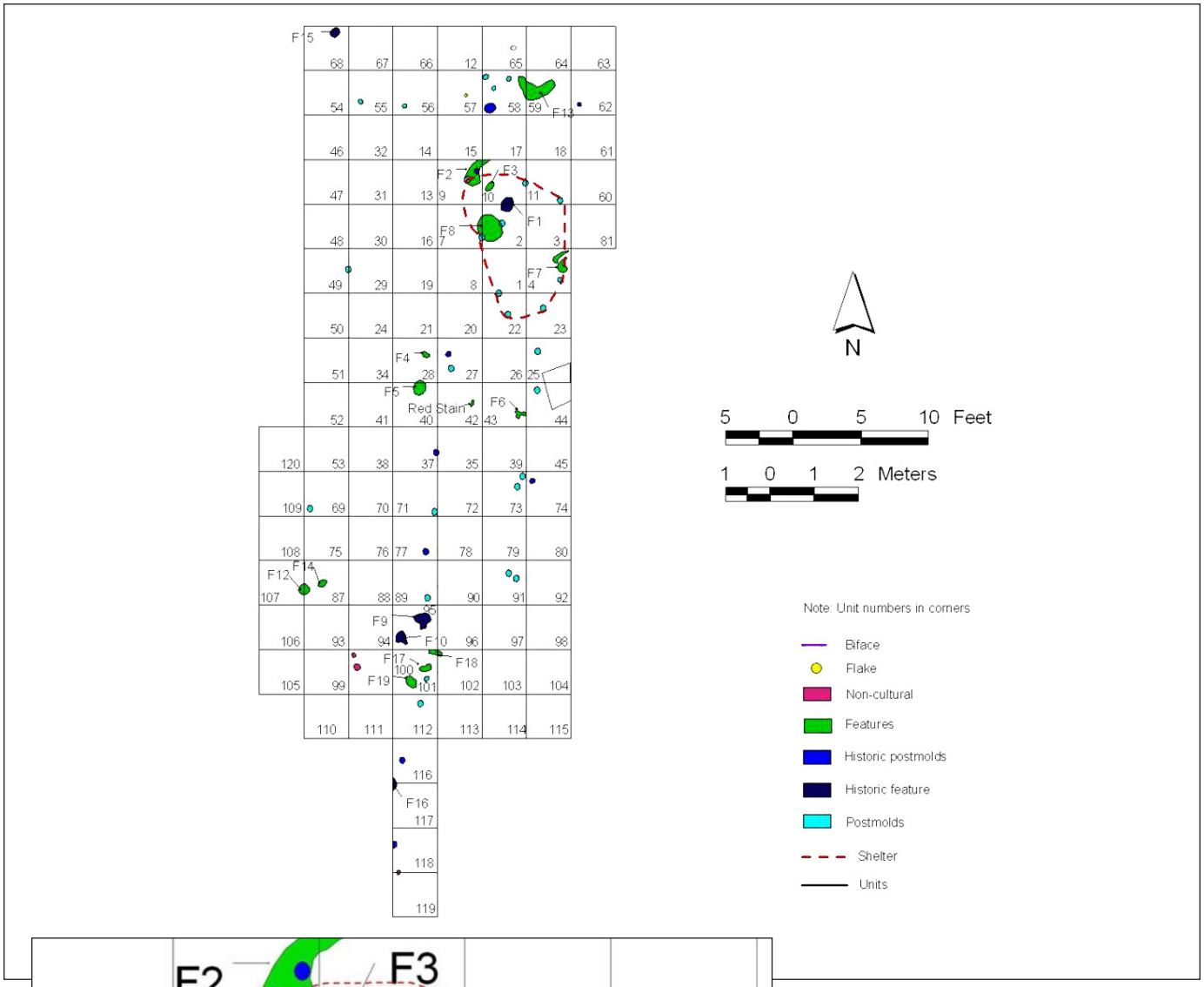
Figure 5.6. Concentration 23B.1, distributions of total artifact density and brown organic stratum. Artifact densities equal 0–41 artifacts: unshaded; 41–108 artifacts: lighter shading; >108 artifacts: darker shading.

Features

A complex pattern of historic and prehistoric features was found in the block excavation (Figure 5.7). The historic features consist of numerous post molds that contained badly corroded nails. These tended to form linear alignments, as if they marked intersecting or reconstructed fence lines. The longest line of historic post molds was exposed over a distance of 11 m (36 ft), within which the post molds were usually spaced about 2 m (6 ft) apart.

In addition to the historic post molds, several post molds were found that did not contain nails, including a group of apparent prehistoric post molds that formed an elliptical pattern 3 m long and 2 m wide. This pattern is interpreted to represent a small shelter or windbreak (Figure 5.8).

Other features included small pits, a basin-shaped hearth, charcoal stains, and patches of burned earth. Notable among these is Feature 5, a hearth or shallow pit. It has been radiocarbon dated by Beta-Analytic Inc.



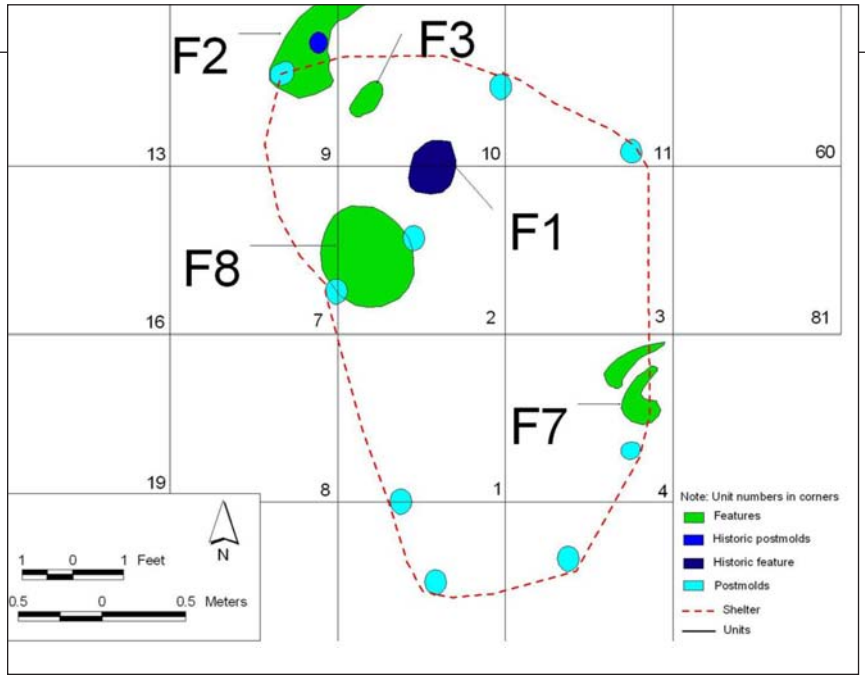


Figure 5.7. Above: Concentration 23B.1, plan view of archaeological features.

Figure 5.8. Left: Concentration 23B.1, detail of inferred shelter area.

Table 5.2. Concentration 23B.1 Radiocarbon Dates (Obtained from Feature 5).

Laboratory No.	Material	Type	^{14}C yrs B.P.	Cal 2σ range A.D. (probability)[a]
GX32367	Wood charcoal	Conventional radiocarbon	750±60	1160–1316 (.92) 1354–1389 (.08)
Beta-187077	Wood charcoal	Conventional radiocarbon	780±60	1050–1082 (.03) 1125–1136(.01) 1152–1302 (.94) 1366–1383 (.02)

[a]Calibrated using CALIB 6.0.2

and Geochron Labs to about 750–780 radiocarbon years (circa A.D. 1200), which (using the CALIB 6.0.2 program) appear to calibrate to the early to mid-thirteenth century (although multiple intercepts of the calibration curve indicate several possibilities [Table 5.2]). The original calibrated date provided by Beta-Analytic Inc. (using INTCAL98 Radiocarbon Age Calibration) was cal. A.D. 1260, with a 1σ range of cal. A.D. 1210–1280.

Feature 6 was a small pit containing highly fragmented pottery and small flecks of charcoal. Its vasiform shape and concentrations of pottery near its walls (Figure 5.9) suggest that it may have been a buried pot rather than a pit *per se* (or perhaps it was an otherwise undiscerned, larger pit containing a pot).

Feature 13 was a lithic debitage concentration measuring about 1 m by 35–40 cm, and occupying a rough crescent shape. Its contents were significantly different from the general debitage assemblage recovered from Concentration 23B.1. While the debitage assemblage from the site in general showed a relatively low percentage of large flakes (about 26 percent of flakes were larger than 1.5 cm, in a total sample of 3,101), the percentage of large flakes from Feature 13 was relatively high (about 62 percent of flakes were larger than 1.5 cm, in a total sample of 351). Thus, while most of the lithic reduction conducted at the site yielded relatively small

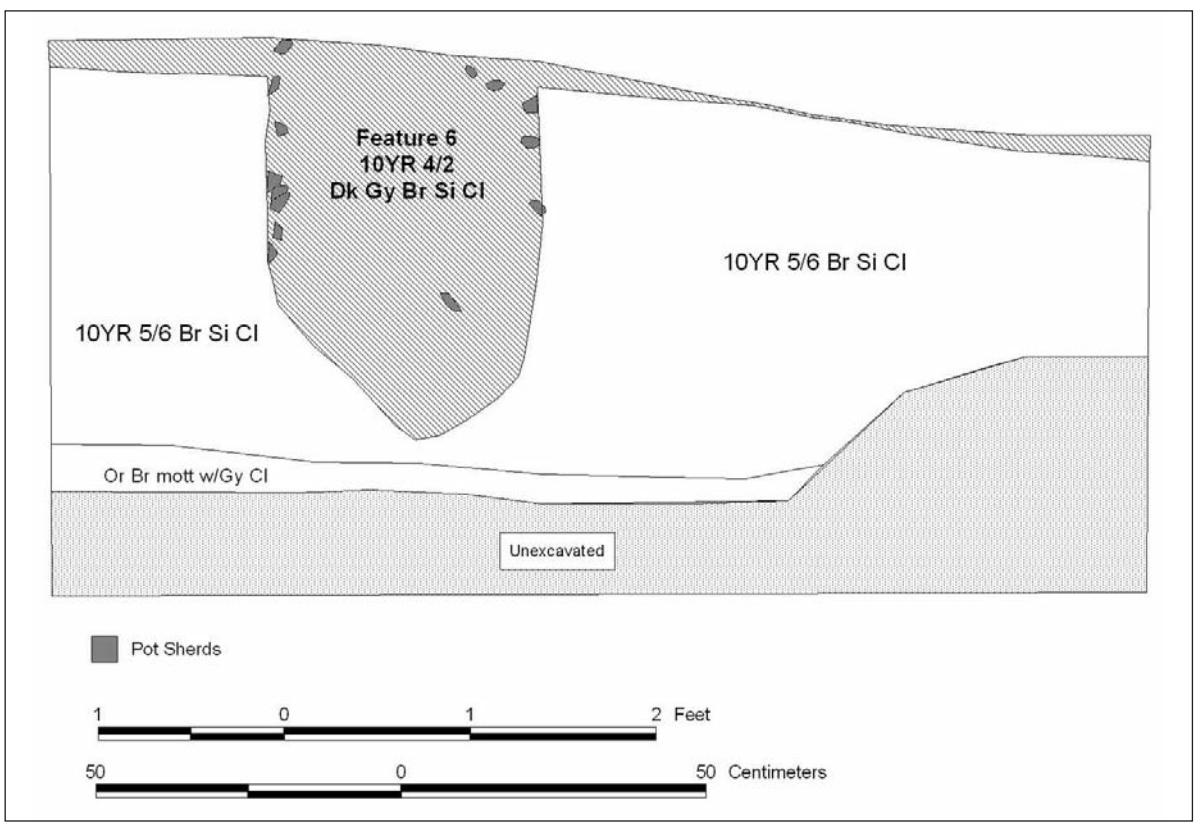


Figure 5.9. Concentration 23B.1, west profile of Feature 6.

flakes, apparently pertaining to late-stage bifaces and tools, Feature 13 is associated with a significantly earlier stage of lithic reduction yielding relatively large flakes. This inference is supported by the high number of decortication flakes in Feature 13, where 13 decortication flakes were found, compared to only 3 found in the larger assemblage outside of Feature 13.

Artifact Assemblage

A varied artifact assemblage was recovered, including pottery and various lithic tools, cores, and bifaces. The pottery assemblage is highly fragmented. One flat-lipped rim sherd was identified; no rims with other shaped lips were found. The flat lip shape and the surface treatments of the body sherds (interiors plain, exteriors plain, cord-marked or smoothed-over cord), and wall thickness (range 5.0–11.9 mm, with 75 percent between 9.0 and 10.9 mm) are consistent with pottery of the twelfth and thirteenth-centuries as observed at other Hudson Valley sites and in nearby regions (Funk 1976:31–36, 98–112; Rieth 2002a:222; see Ritchie 1969 and Ritchie and MacNeish 1949 for general discussions of Late Woodland ceramic attributes).

It has already been noted that most of the lithic debitage falls into small size grades, indicating a predominance of late-stage lithic reduction, but that Feature 13 is an exception to this trend, representing a relatively early-reduction-stage work area. In addition to abundant evidence of chert tool manufacturing and maintenance, a varied group of scrapers, choppers, hammerstones and other tools, as well as cores and bifaces was found. The diverse stone tool assemblage (Table 5.3) provides evidence that a wide range of activities was performed at the site. At the same time, it is notable that projectile points and point fragments are scarce in this assemblage, and none of the distinctive, Late Prehistoric, triangular Levanna points were found. The most distinctive point recovered is highly atypical of Late Prehistoric lithic assemblages: a stemmed point of Cresap or Adena form, made from an exotic light-colored stone (apparently Flint Ridge chalcedony) (Converse 1994; this chapter, Figure 5.10). Cresap and Adena points have been found elsewhere in the Hudson Valley, including the Zimmerman Rockshelter very near this site (Funk 1976:34–37, 108–109, 277–278). Although possibly a stray find at Concentration 23B.1, the base has been reworked into a graver tip, suggesting rather that this particular artifact has a potentially long, multi-use history, and one that perhaps involved loss or caching during the Early Woodland period, rediscovery, and transformation for a new use-life during the Late Prehistoric.

Spatial Distributions

The spatial distribution of several artifact classes provides insights into the organization of activities at Concentration 23B.1. Pottery occurs in two main clusters: one on the north side of the possible shelter and concentrated around Feature 8, an area of burned earth; and a second on the south side of the possible shelter,

Table 5.3. Concentration 23B.1 Stone Tool Assemblage.

Artifact Type	N
Point modified to graver	1
Point fragment modified to spokeshave	1
Unmodified point fragment	1
Perforator	1
Scrapers	3
Bifacial chopper	1
Bifacial chopper modified to scraper	1
Bifaces	8
Cores	9
Utilized core	1
Block flakes	5
Utilized flakes	75
Pitted stone	1
Hammerstones	5
Abradingstone and abradingstone fragment	2

Figure 5.10. Concentration 23B.1, stemmed projectile point with base reworked into graver.

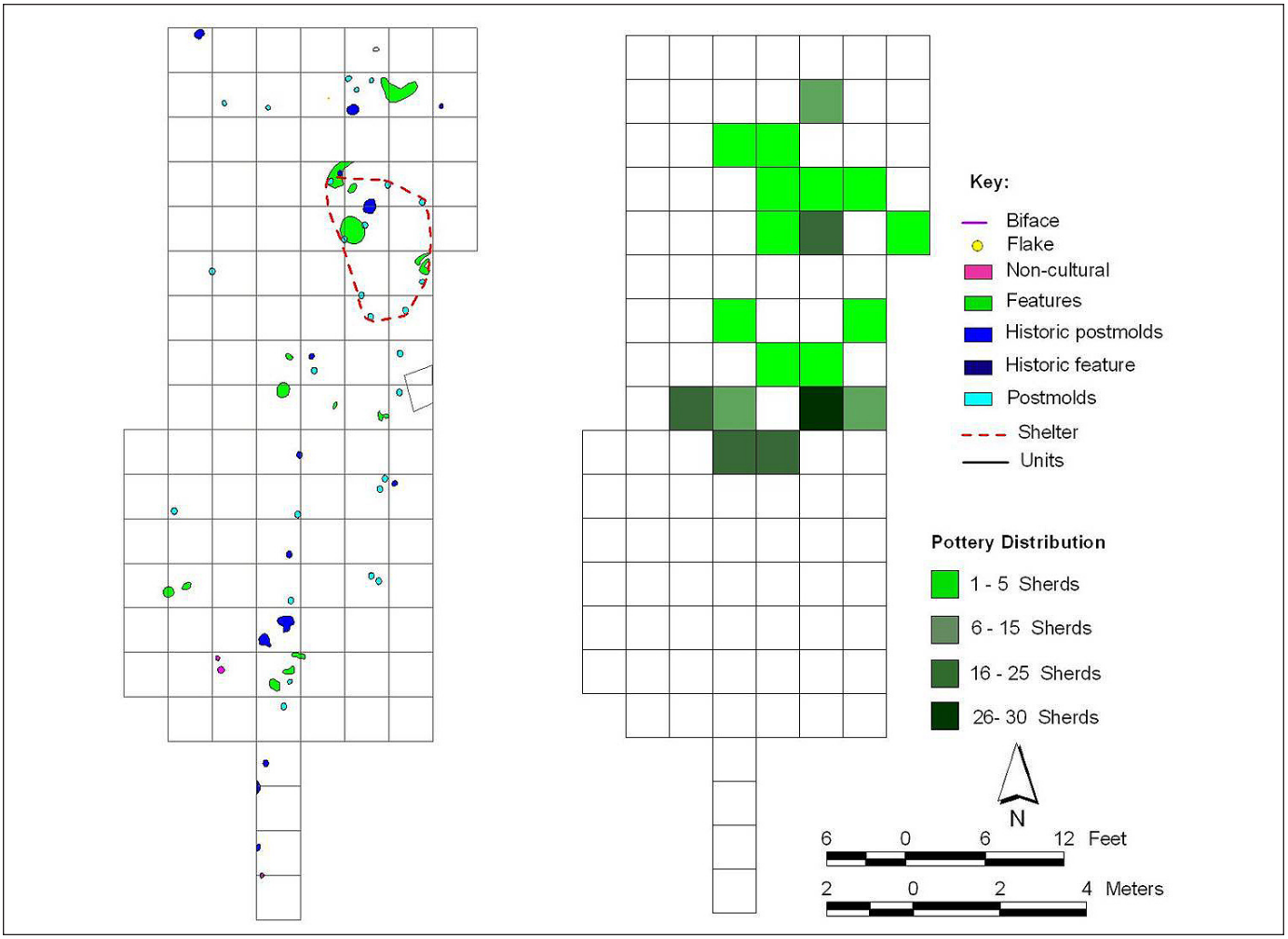


Figure 5.11. Concentration 23B.1, pottery density distribution (right), with feature distribution for comparison (left).

including a spread 3 m to the west (Figure 5.11). The radiocarbon-dated hearth Feature 5 and pottery-rich Feature 6 occur in this southern area, which also contains the majority of the pottery outside of Feature 6. Fire-cracked rock is not very common at this site, but tends to occur west and south of the possible shelter, generally in the southern area of pottery concentration (Figure 5.12). The utilized flake distribution is somewhat different than the pottery and fire cracked rock, being centered more in the area of the possible shelter, and extending north to the general vicinity of the early-stage lithic reduction area (Figure 5.13). Thus, the spatial distributions of pottery and fire-cracked rock, both associated with cooking, overlap to a considerable extent, while the distribution of utilized flakes both covers some of these areas and diverges more strongly to the north, including the early-stage lithic reduction area at Feature 13. These distributions indicate that cooking to some notable extent occurred outside and south of the inferred shelter, while the use and discard of utilized flakes appear to be more strongly centered in and immediately around the shelter.

Archaeobotanical Analysis

Analysis of flotation samples from Features 5 (1950 ml) and 6 (2000 ml) by McKnight (2008) showed abundant carbonized white oak and other deciduous wood samples but no subsistence remains. Gall and stem fragments found in Feature 5 are described as possible tinder used as fire starter (McKnight 2008:176). Uncarbonized seeds and oak flower fragments from these samples are considered relatively recent and intrusive. The brown organic stratum contained small flecks of carbonized, deciduous wood charcoal and melted silica spheres resulting from the burning of silica-rich plants, such as grasses. Recently deposited uncarbonized seeds of several native species also were

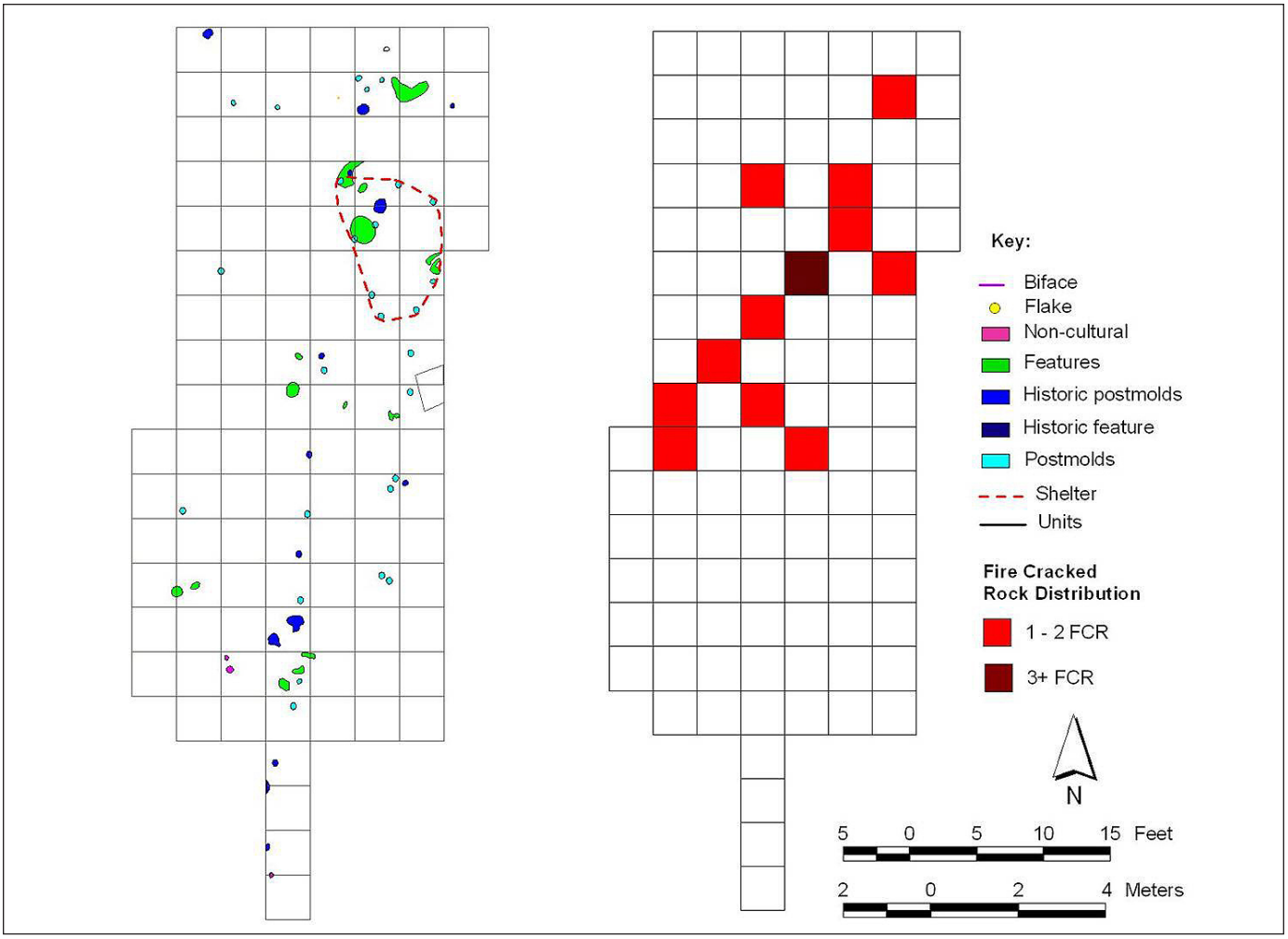


Figure 5.12. Concentration 23B.1, fire cracked rock distribution (right), with feature distribution for comparison (left).

present (McKnight 2010).

The lack of subsistence remains is perhaps not unusual because the sample sizes available were small, and in any event, the presence and preservation of cultigens or other food remains may be fortuitous in many circumstances. Considering a wide variety of Northeastern contexts, even when corn (for example) is present at an archaeological site, it often is not abundant (see discussions and data in Asch Sidell 2008; Cassedy and Webb 1999; Chilton 2002, 2008; Largy et al. 1999; Miroff 2002). That is to say, it does not necessarily follow that because corn or other subsistence remains were not found at Concentration 23B.1, corn was not grown there or people did not consume food there.

Summary

Concentration 23B.1 appears to represent an episode of reoccupation within a landscape that had been used relatively intensively during the Early and Middle Archaic periods, and sporadically afterward by logistically organized parties. Two 14C dates from the same feature processed by different labs provide a consistent radiocarbon age estimate of approximately A.D. 1200, or perhaps approximately cal. A.D. 1250. Flotation samples have identified hearth wood as white oak and other deciduous species, while the soil below the plow zone contains small pieces of wood charcoal and melted silica from burning plants, perhaps grasses. The artifact assemblage indicates a varied range of camp activities, but has no substantial evidence that the site was a specialized base for hunters. Despite the abundance of chert in Coxsackie, the debitage assemblage in general suggests the presence of a curated artifact assemblage. The use of a curated, highly transportable stone assemblage suggests that people arrived at this site after traveling from a previous occupation some distance away. At the same time, there is some situational evidence for

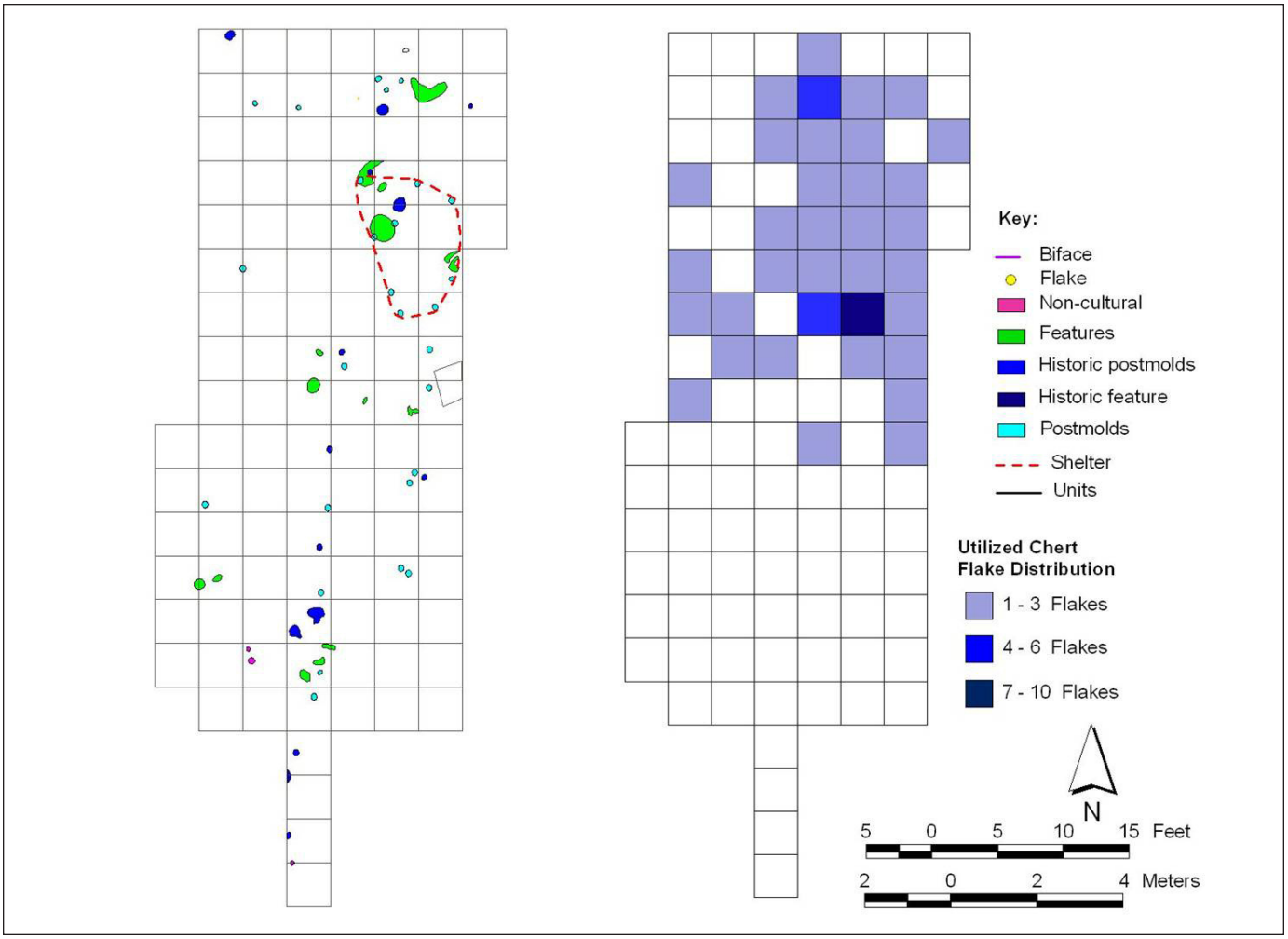


Figure 5.13. Concentration 23B.1, utilized flake distribution (right), with feature distribution for comparison (left).

early-stage lithic reduction, perhaps directed to the production of an assemblage of expedient, utilized flake tools. This site probably was occupied seasonally during late spring, summer, and/or early fall; however, its features and artifacts represent a substantial episode of short-term land use inland from the Hudson River, rather than ephemeral evidence of a random, wandering, or relatively insignificant visit.

SUMMARY AND CONCLUSION

The investigation of Concentration 23B.1 has provided a rare glimpse into life at a seasonal, inland site of the twelfth to thirteenth centuries A.D. within the Hudson drainage. This small site contained a modest, seemingly insubstantial shelter, plus cooking facilities and small storage or processing pits. A deeper, unplowed stratum immediately below the plow zone provides evidence of burning, perhaps during an early stage of site use, since it contains charcoal flecks and melted silica spheres of the sort that may be associated with burned grass. The artifact assemblage is diverse but contains very few projectile points or point fragments, suggesting that little hunting may have been conducted from this site. Different aspects of the debitage assemblage seem to indicate early-stage chert reduction oriented to the generation of expedient flake tools, plus the frequent repair and maintenance of late-stage, formally manufactured tools. The highly fragmented ceramics provide a weak temporal-cultural signature. This sort of weak signature, exacerbated by the paucity of projectile points, may be a factor contributing to low archaeological visibility during this period, particularly in backcountry settings.

A review of literature on the Late Prehistoric period in the Hudson Valley indicates that the best-understood sites occur along the Hudson or in other riverine settings such as along Fish Creek and the Roeliff Jansen Kill, and

that the beginning and end of the Late Prehistoric period are better represented in the archaeological record than the middle of this period, including the twelfth to thirteenth centuries. The general paucity of archaeological sites of the twelfth to thirteenth centuries includes large sites as well as small; thus the alternative argument that Concentration 23B.1 was a satellite camp of a larger village cannot be advanced, at least not at this time. It may well be a rather ordinary seasonal residential site of this period. Importantly, Concentration 23B.1 provides information demonstrating occupational continuity rather than hiatus during this time frame, in support of other weak indications of occupation elsewhere in the region (Funk 1976:300–302).

The present paper also reviews information on the possible effects of the Medieval Warm Period on Hudson drainage regional settlement and subsistence systems. This is an area of incipient research, yet one that has already shown marked environmental effects of the Medieval Warm Period in the lower Hudson region. Other data from the lower Mohawk area indicate an increase in storminess beginning in the twelfth century, possibly one of the most droughty times of the Medieval Warm Period based upon southwestern and midwestern U.S. evidence. More information on the issue of the possible regional occurrence of drought is desirable; nonetheless, the mapping of twelfth to thirteenth-century droughts provided by Benson et al. (2009:477) extends marginally to the Hudson valley, while Pederson et al. (2005) consider the lower Hudson (Piermont Marsh) indications of Medieval Warm Period drought to be consistent with other data from southward along the mid-Atlantic coast. On the other hand, data from central New York indicate increased rainfall in the Cayuga Lake catchment during the Medieval Warm Period (Mullins et al. 2011).

In accordance with this information, a hypothetical sequence of social-ecological system changes is proposed: A native agricultural system had become significant during the early part of the Late Prehistoric (A.D. 700–1000 or 1100). However, as time passed, this system was increasingly put at risk by a variety of possible climate change effects, including increased storminess, flooding, erosion, drought, wind, and hail. The adverse effects of climate change were perhaps most pronounced during the twelfth to thirteenth centuries, as they were throughout much of North America. This is consistent with evidence from this time frame of increased storminess in the Mohawk drainage, increased incidences of fire and erosion in the lower Hudson drainage, and increased salinity in the lower Hudson estuary.

Native people of the Hudson Valley may have responded to these problems with great resilience in terms of settlement pattern and subsistence changes. The larger or more sedentary communities noted during the early part of the Late Prehistoric period may have broken into extended family segments and become more mobile, using a wide variety of sites, and using the backcountry more intensively. Sites occupied previously by hunter-gatherer ancestors continued to be used, although efforts to farm on the floodplains were probably part of the overall strategy, and probably partially successful. In addition, however, the cultivation of clayey upland soils may have provided further diversity in the food production system, since these soils would retain water longer than sandy or silty soils during droughts. This argument is relevant to the interpretation of Concentration 23B.1 and other Late Prehistoric sites that may be found within the lake plain setting of Coxsackie. For example, although archaeologists often focus on well drained floodplain soils in referring to native corn horticulture, Figure 5.14 is a recent (2010) photograph showing modern corn growing on somewhat poorly drained clayey soil in Coxsackie. The Kingston and Rhinebeck series soil at the site pictured is the same as the soil type at Concentration 23B.1, and presumably these soils were suitable for cultivation during the Late Prehistoric period.

The adjustments just cited were probably made in the context of backcountry land use involving a long-term process of land clearing that increased forest edge and related biodiversity, and may have offered attractive open sites for gardens and small settlements. That is, the long-term effect of continued clearing of forest would have been to make hunting and gathering more productive, and to diffuse risk within the agricultural

Figure 5.14. View of corn growing on somewhat poorly drained Kingsbury and Rhinebeck series soil in Coxsackie, August 2010.

system. Clearing in the backcountry of Coxsackie would have made clayey soils available for planting. This context, or some aspect of it, is a plausible setting for the seemingly unusual archaeological site, Concentration 23B.1.

Several regions of North America, including much of California, the Southwest, and the central Mississippi Valley, saw such severe drought effects during the Medieval Warm Period that subsistence and related economic patterns were significantly disrupted, social and political organization were altered (in many cases fragmented and reorganized), and residential sites, farm complexes, and large portions of regions were abandoned. These effects in these regions have been seen as elements of societal collapse, although recent scholarship—and particularly application of Resilience Theory—is also investigating the strategies that societies have used to cope with mismatches between environmental productivity and social scale during extreme episodes of climate change.

In the Northeast, there are no indications that the effects of the Medieval Warm Period were as extreme as in the Southwest or within the Cahokia polity, in part because droughts do not appear to have been as severe in the northeast (see Benson et al. 2009:477), but also because northeastern societies, organized on a smaller scale and with significantly less administrative hierarchy, could respond more flexibly to adversity caused by extended droughts, severe floods, and violent storms. Nonetheless, this flexibility in the Northeast probably did involve higher mobility and segmentation into smaller co-residential groups. Chilton's (1999, 2002, 2008) concept of mobile farmers appears to be very compatible with these concepts of long-term, Late Prehistoric subsistence-settlement dynamics.

Over the last several years, a number of archaeologists working in New York have examined upland and backcountry sites with an eye to understanding their importance within settlement and land-use strategies (Abel 2000; Diamond 1996; Miroff 2002; Rieth 2007). In addition, Rieth (2009) has looked at a larger landscape containing early Late Prehistoric sites to see how spatial and temporal patterns shifted between residential and limited activity uses. In the upper Hudson Valley, the significant questions raised by the location, features, and artifact assemblage of Concentrations 23B.1 include how did this site fit into a land-use pattern conventionally thought to be dominated by river and floodplain-oriented residential sites? To be sure, a broad range of sites within well-defined temporal and spatial scales will need to be studied in order to determine whether shifts over time occurred between settlement patterns containing relatively large, relatively visible settlements, and patterns composed of small, less visible sites.

Concentration 23B.1 has a number and variety of archaeological features, fairly abundant pottery, a diverse stone tool assemblage, and an abundance of stone waste material, all suggestive of a seasonal residence. If this is indeed a residential site, some of the questions for future study become: How common are small Late Prehistoric residential sites in the upper Hudson region? How do they vary internally as a group? How do their locations, assemblages, and features vary over time, and with respect to the developing body of evidence on ancient climate change?

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Chapter 6

A MIDDLE WOODLAND POTTERY STAMP AND ASSOCIATED MIDDLE WOODLAND CERAMICS FROM THE INDIAN HILL SITE, WAWARSING, NEW YORK

Joseph E. Diamond and Susan O'Connell Stewart

Abstract. *The site of Indian Hill was excavated by SUNY New Paltz under the direction of Leonard Eisenberg in 1976–1977. Important Late Prehistoric (ca. 1500–1000 BP) finds include a dentate pottery stamp, associated Middle Woodland (ca. 1300 BP) pottery decorated by the stamp, and other Middle Woodland ceramic vessels. An experimental study has linked the pottery to the stamp, and pointed out the need for similar studies on other sites where "idiosyncratic" notched artifacts and dentate or rocker-stamped ceramics have been found. The ceramics from this site represent one of the few samples of Middle Woodland ceramics from the upper Rondout drainage.*

In prehistoric pottery analysis, classification and typology is dependant in large part on surface decoration. Terms used to describe decorative techniques include cord wrapping, rocker stamping, net marking, shell stamping, dentate stamping, incising, and trailing, among others. Tools used in decoration are hypothesized to be manufactured from cordage, fabric, netting, wood, stone, bone, and shell. However, attention is rarely given to the question of the design of lithic pottery tools and their use in the production and decoration of pottery. The discovery of a carved stone pottery stamp in association with decorated pottery presents a rare opportunity to reconsider artifacts in existing collections and in the field that may have in fact been used to produce and decorate ceramics. This chapter will hopefully provide an impetus to refocus efforts to locate and test, using experimental techniques, other artifacts that bear similar attributes.

SITE SETTING AND INVESTIGATION

The Rondout Drainage runs in a slight southwest to northeast direction as the Rondout Creek flows to the Hudson River from its origin near Ellenville, New York, in southern Ulster County. The Creek is bounded on its east by the Shawangunk Ridge, an escarpment of Silurian conglomerate that runs from High Falls, New York, south to northern New Jersey and the Delaware River (Fisher et al. 1970). The well-watered and easily traveled valley at the western edge of this escarpment is a natural and direct corridor from the Delaware River to the Hudson River. To the west of the Rondout is the southeastern edge of the Catskill Mountains. As the Rondout Creek flows northeast, its volume is increased by several small streams that enter at various points along both sides of the creek. The site of Indian Hill (NYSM #6645) overlooks the Rondout Creek and a small ancillary stream.

Indian Hill is a large multi-component pre-Contact site in Wawarsing, New York (Figure 6.1), that was partially excavated by the SUNY New Paltz Archaeological Field School in 1976 and 1977 under the direction of Dr. Leonard A. Eisenberg. The site itself is a relatively flat sand terrace that probably formed as a delta or glacial outwash plain (Tornes 1979:Sheet 101). The soils consist of a 5 cm humic layer overlying a 20-cm-deep yellow sand, which then overlays a 20-cm-deep stratum of red

Figure 6.1. Indian Hill excavation, 1976.

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sand. The fourth stratum, a grey sand, was only investigated in two locations as it was found to be sterile. Currently a mixed coniferous-deciduous forest covers the site.

The 1976 excavation consisted of 71 two by two meter squares (284 sq m), which, when added to the 1977 season of 29 two by two meter squares (116 sq m), brought the total excavated area to 400 square meters. Excavations in 1976 located eight features and an additional four features were found in 1977. During the 1976 and 1977 seasons, attempts to determine if the site had been plowed in the past were inconclusive. However, based on the lack of a definite plow zone and the fact that there were no artifacts with visible plow scars, the site was most likely cleared and probably used for pasture.

Occupations and visitations to the site span approximately seven thousand years. The earliest occupation at the site is represented by two projectile points from the Eva Phase (Lewis and Lewis 1961:Plates 10 and 11) at ca. 7150 BP, a relatively rare projectile point type in the northeast. This is followed by the Vergennes, Vosburg, Sylvan Lake, River Phase, Snook Kill, and Orient Phases (ca. 5500–2650 BP). There are also a number of untyped convex–based points that are reminiscent of Snyders points (ca. 2450–1450 BP), as well as lobate stemmed points such as Rossville (Ritchie 1971:46). Later occupations are represented by triangular points such as Levanna and Madison types, which are characteristic of the Late Woodland.

CERAMICS FROM THE INDIAN HILL SITE

Ceramics from the site were somewhat limited. The 1976 excavations produced 825 sherds representing five ceramic vessels from the Middle Woodland period (ca. 1950–950 BP). The 1977 excavations produced 215 similar fragments that were determined to be from the same vessels. Of the 1,040 fragments, 273 were assignable to specific vessel lots, 49 were from either of two pots, and 718 were either too small, or were not cross-mended to determine from which pot or vessel lot they originated. These five vessels constitute part of a very small sample of professionally excavated ceramics for this portion of the Rondout drainage. The entire Rondout drainage, except near Kingston, New York (Eisenberg 1989; Fisher 1982), has not been extensively sampled by professional archaeologists.

The ceramics from Indian Hill were divided by vessel lot based on several criteria that were visible under low power magnification. The attributes used were temper, Munsell color of the fired ceramic, interior and exterior surface enhancement or decoration, manufacturing technique, estimation of vessel shape, thickness and profile of lip, and crossmends. In some instances, low power magnification at 35X was used to evaluate the similarities in decorative treatment and to assign small fragments to specific lots. As mentioned above, many were not assignable, primarily due to similarities in paste, temper, and color.

After the ceramic fragments were separated into vessel lots, a typological approach was utilized to classify the pots into previously defined types. These types, which are commonly used throughout the Northeast, originated in one major publication over 60 years ago (Ritchie and MacNeish 1949). The utility of using these types is based on the fact that the recurring sets of attributes that Ritchie and MacNeish defined appear to cover a wide area from central New York into northern New Jersey (Kinsey 1972; Stewart 1998) and Connecticut (Lavin 1992, Lavin et al. 1993).

Vessel Lot #1
(Welch and O'Connell 1976:Vessel A)

This pot is represented by 57 fragments. It is decorated with vertical cord-wrapped stick impressions with an oblique cord-wrapped stick impression on the lip (Figure 6.2). The exterior surface of the sherds has been malleated with a cord-wrapped paddle. The markings occasionally overlap, and there is no dominant direction of the cord pattern. The interior of the rim is plain, the lip is slightly outflaring, and there is no decoration on the interior. The color is a 5 YR 5/4-5/6 reddish brown to yellowish red. The aplastic consists of fine to medium-sized, round white and pink quartzite pebbles that appear to be from heat-affected Shawangunk Conglomerate. This vessel is typed as Jacks Reef Corded (Ritchie and MacNeish 1949:106–107). This ceramic has been dated in other portions of New York

Figure 6.2. Vessel #1. Jacks Reef Corded.

State to 1428±41 year B.P. (cal. 2 σ range A.D. 543 [641] 668) (Hart et al. 2003) from the Kipp Island site, and 1430±40 B.P. (cal. 2 σ range A.D. 559 [620] 662) from the Felix site (Hart and Brumbach 2005).

Vessel Lot #2
(Welch and O'Connell 1976:Vessel B)

This pot is represented by 59 fragments (Figure 6.3). It was wiped vertically, then decorated with horizontal cord-cut impressions that almost totally surround the body. The same cord-cut decoration is across the lip, and then extends 2.5 cm down the inside of the rim. The lip does show a scalloped appearance that may be an incipient castellation. In some instances, two sets of cuts form rhomboids on the body. The color is a 5 YR 6/6 reddish yellow. The aplastic consists of fine-to-medium, quartzite-and-shale grit, and the breakage patterns and attributes indicate coiled construction. This vessel is typed as Wickham Corded (Ritchie and MacNeish 1949:104). Wickham Corded is one of the variations found at the Wickham site, which has recently been found to contain deposits ranging from ca. cal. A.D. 200 to A.D. 1200 (Hart and Brumbach 2005: Figure A4). A very similar vessel was reported by Funk (1989: Figure 5, No. 26) from the Ten Mile Rockshelter in Sullivan County, New York.

Figure 6.3. Vessel #2. Wickham Corded.

Figure 6.4. Vessel #3. Vinette Dentate.

Vessel Lot #3
(Welch and O'Connell 1976:Vessel E).

This pot is represented by 45 fragments (Figure 6.4). It was wiped smooth, and then decorated with oblique dentate stamp impressions that cover the exterior portion of the body near the lip as well as down the inside of the vessel. These decorations extend down the neck and shoulder of the pot and continue on the body. The oblique dentate decoration also crosses the lip, which is outflaring. The color is a 5 YR 7/3 (pink). The aplastic consists of fine-to-medium feldspar or garnet amphibolite. This vessel is typed as Vinette Dentate (Ritchie and MacNeish 1949: 100–101: see also Stewart 1998:Fig.43). A recent date for Vinette Dentate was 1990±40 BP (cal. 2σ range 1863–2009 BP) (Thompson et al. 2004).

Vessel Lot #4
(Welch and O'Connell 1976:Vessel D)

This pot is represented by 6 fragments, all of which are near the rim (Figure 6.5). It was wiped smooth, and then decorated with short linear oblique dentate stamp impressions that cover the exterior portion below the lip/ neck of the vessel. The slightly out-flaring lip has a dentate decoration that crosses the lip obliquely. The

Figure 6.5. Vessel #4. Vinette Dentate.

color is a 10 YR 7/3 (pale brown). The aplastic consists of fine mica-like flakes, and the existing portion of the rim shows the concave channel typical of coil construction. This vessel is typed as Vinette Dentate (Ritchie and MacNeish 1949: 100–101). An additional 49 fragments with dentate-stamped impressions may belong to either Vessel Lot 3 or 4. For general dating see Vessel Lot 3 on page 79.

Vessel Lot #5
(Welch and O'Connell 1976:Vessel C)

This pot is represented by 106 fragments (Figure 6.6 and Figure 6.7). It has small rhomboids with deeper holes at the corners (knots) indicating that it was decorated with a net-wrapped paddle. The slightly out-flaring rim has a cord-wrapped stick decoration proceeding over the top of a scalloped lip for 4–5 cm and then obliquely down the inside of the rim. The color is a 7.5 YR 7/2 (pinkish grey). The aplastic consists of fine quartz pebbles that might have been derived from the nearby Shawangunk Conglomerate. This vessel was constructed using the coil method and it appears to have been shaped like a hornet's nest. It is typed as Ford Net-Marked (Funk 1976: 314).

Ford Net-marked is associated with the Fox Creek Phase (ca. 1450–1600 BP) in the Hudson Valley (Funk 1976:314) as well as its extensions into southeast central New York (Funk 1993; Ritchie and Funk 1973: 123–153). It is similar in the lower Hudson Valley to North Beach Net-marked (Kaiser 1963, 1968), and in New Jersey to Abbott Zoned Net Impressed (see Stewart 1998:171–183) and Broadhead Net-marked (Kinsey 1972:455–456). It dates to ca. A.D. 350–500 (Funk 1993:157), and has been dated in Dutchess County to 1450±70 B.P. (Beta-53915) at the Brandt's Farm Rockshelter (Diamond 1995). Hart and Brumbach (2005) report a date of 1600±35BP (cal. 2σ A.D. 419–453). This ceramic type is normally associated with Fox Creek Points, although none were found at Indian Hill.

POTTERY STAMP

A diamond-shaped pottery stamp composed of slate or greywacke was found in Unit-2/R14. It measures 2.8 cm in width and 2 cm on each side with deeply carved grooves that form teeth around the outside of the stamp (Figure 6.8). It also has a linear oblique cut on both its dorsal and ventral surfaces indicating that the tool was probably hafted and used to produce dentate-stamped decoration. It may have been tied to a string and used or worn as a pendant. In an experiment, the dentate stamping tool was used to impress a square, wet clay slab of untempered potters clay, which was later fired. The firing was undertaken in the SUNY New Paltz ceramics department in a modern gas-fired oven. The impressions formed by the stamp vary in spacing, size, depth, and form. This is due to the variation in individual serrations on each of the four sides of the stamp,

Figure 6.6. Vessel #5. Ford Net-marked.

Figure 6.7. Vessel #5. Ford Net-marked.

Figure 6.8. Pottery stamp on left. Clay slab on right.

each of which produces a unique row of dentate decoration. The dentate impressions produced were found to be identical to the patterns found on Vessels 3 and 4.

One of the larger samples of Middle Woodland ceramic production in the published literature is from the Winooski site in Vermont (Petersen 1980). Here, decorative techniques similar to those found at Indian Hill suggest that similar tools were used throughout the Northeast for pottery decoration. "Although no decorative tools have been recovered at the Winooski site, such tools were presumably manufactured from wood, stone, or bone. Individual potters seem to have produced idiosyncratic examples" (Petersen 1980:19–24.).

Polished stone items with similar grooves and notches in many collections have been identified as "pendants" and similar dentate and rocker stamped motifs are thought to have been made with "notched end bone tubes" or "bone tubes and/or small square-barbed harpoons" (Ritchie and MacNeish 1949:100). In Moorehead (1917:16) he refers to "peculiar and problematical forms" and notes that there are hundreds of pendants labeled "ceremonial" whose function is unknown. Many plates Moorehead's work feature pendants that have serrated and/or notched edges.

For examples closer to Indian Hill, a perusal of the literature, particularly that of the Delaware Valley to the south would suggest that many similar artifacts have been found, but not explicitly linked to pottery decoration. At the Zimmerman site (Werner 1972:Figure 33, #25) and Camp Ministerium site (Kinsey1972:Figure 97, F) there are two similar objects composed of siltstone, and an unidentified lithic respectively. In each case, dentate or rocker-stamped pottery was found at the site. Additionally, Kinsey's illustrated examples of Owasco artifacts show an object similar to the Indian Hill pottery stamp, but it is labeled a "possible awl sharpener or pendant" (Kinsey 1961:Figure 113, I). Further afield in central New York, Beauchamp illustrated one example (1898:Figure 239) that is particularly noteworthy, since it is made of ceramic. This is a circular artifact similar to the Indian Hill tool, even down to the lines across its surface. As Beauchamp notes "its use is conjectural …" (1898:139).

It may be reasonable to assume that many so-called pendants and gorgets that are illustrated in the archaeological literature may in actuality be tools used in the making and decorating of pottery (see Peabody and Moorehead 1906: Plate XVII, XVIII). Peabody and Moorehead (1917) state that "like many other specimens in the so-called 'ceremonial' class, gorgets are of unknown use and application." In his 1977 paper on stone gorget function, Curren (1977:97–101) compares prehistoric stone gorgets with contemporary wooden ceramic tools, noting the "striking similarity" in shape and possible function. He states that "the contemporary tools are used in a variety of manners to obtain different effects in clay" noting that the notched and serrated edges of these contemporary tools are used to make various designs on the vessels. In presenting working ceramists with specimens and photographs of stone gorgets, in all cases the contemporary artists suggested use as a ceramic tool.

CONCLUSION

The five ceramic vessels from the Indian Hill site provide data to fill in the gap in our knowledge of pottery decoration and technology between the Hudson and Delaware Valleys. The data indicate a similarity of form and design that connects the two valleys and extends, at least in some cases, into central New York.

The association of Middle Woodland pottery with the stone tool used for decoration is a rare occurrence in the archaeological record. In light of the correspondence between the stone tool and dentate designs found on Indian Hill pottery, we suggest that existing collections of polished stone tools, including idiosyncratic and "ornamental" items, reworked points with similar notches, and those notched items previously classified as gorgets, be re-evaluated with a view toward possible function as pottery making or decorating tools.

Although in his comment on Curren's (1977) article, Starna (1979) argues that one must be cautious in equating form and function, the discovery of the stone tool at Indian Hill, which, in experiments replicated the exact design found in associated pottery, calls for a reconsideration of Curren's ideas. We suggest an experimental approach, where pendants and artifacts with dentate

characteristics are impressed into clay, and then compared (under magnification) with archaeologically retrieved examples of pottery from the same site, or sites from the same time period nearby. Comparisons need to take into account differences in the quality of clay, the effect that temper has on the impression, the depth of the impression, and the fact that such tools can be used for vertical stamping or rocked to form a modification of the design.

An extension of this study, with a larger sample of well-provenienced pottery from a broader area, should make it possible to define an individual potter (or her descendants using the dentate stamp) in the archaeological record. From here, it may be possible to outline the geographical boundaries of a specific individual or her family to determine seasonality and mobility patterns.

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Chapter 7

THE HISTORY OF THE COLLARED RIM IN THE FINGER LAKES, NEW YORK

Hetty Jo Brumbach

Abstract. *An attribute analysis of rim and body sherds from sites in central New York reveals that the 'collared' rim form, often considered distinctive of late pre-Contact Iroquoian and Algonquian vessels, has a long history in this study area. The collared rim is common in many areas of the East, but its history is not well documented. Sherds from the Vinette site (dated to ca. cal. 300 B.C.) and Cottage site (ca. cal. A.D. 200) suggest that the form began as a band of decorative elements placed on the rim exterior just below the lip. At a later time, vessels with thickened rim areas were manufactured, followed by an "appliqué" collar bearing distinctive decorative motifs. Still later, more elaborately modeled collars appear. This paper will illustrate the subtle shifts in manufacturing that resulted in the distinctive collared rim.*

Ceramic vessels with collared rims (Figure 7.1) are found throughout the Northeast (Kraft 1986; Lavin 2002; MacNeish 1952; McBride 1984; Puniello 1980; Ritchie 1969; Ritchie and Funk 1973; Ritchie and MacNeish 1949; Snow 1980). They were manufactured by peoples who spoke a wide variety of languages representing at least two language families: the Five Nations Iroquois of New York and related Iroquoian peoples of Pennsylvania, Ontario, and Quebec; and the Mahican, Delaware, and other speakers of Algonquian languages in eastern New York, Pennsylvania, Delaware, and southern New England. Among the New York Iroquois, collared rims and another elaborated rim form, the everted or wedge-shaped lip, account for the majority of rim forms on vessels of the Late Prehistoric period (MacNeish 1952; Ritchie 1969; Ritchie and Funk 1973; Ritchie and MacNeish 1949). Despite the widespread appearance of this trait and the frequency with which Late Woodland and Protohistoric (ca. A.D. 1000–1600) period vessels were finished with this elaboration, and the thousands, perhaps tens of thousands of illustrations of collared vessels in the literature, very little is known about the history of the collared rim.

Figure 7.1. Collared vessel with four castellations, Jefferson County, New York, ca. A.D. 1450–1500 (NYSM).

In their study of pre-Iroquoian ceramics, Ritchie and MacNeish (1949:106–107) defined two types with collared rims: Jack's Reef Dentate Collar and Jack's Reef Corded Collar. The former was described as having dentate stamped lines on appliqué collars or thickened rims; the latter type was essentially similar except that the applied decorations were made with a cord-wrapped stick (cws) or paddle. Both types were assigned to Ritchie's (1969) late Point Peninsula stage (ca. A.D. 200–600) including components of the Jack's Reef, Vinette, and Wickham sites (Ritchie and MacNeish 1949:106–107, 118). In discussing their origins, Ritchie and MacNeish state that clearly the two types are related to each other, but that "no prototype is known for either." Despite the absence of a prototype, they recognized the

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archaeological importance of this innovation: "These two types appear to inaugurate a long tradition of collared pots in the New York area" (Ritchie and MacNeish 1949:107).

My interests in the collared rim developed out of a longitudinal study of pottery from the Finger Lakes region of central New York (Hart and Brumbach 2003, 2005, 2009; Hart et al. 2003, 2007; Thompson et al. 2004). In that study, my colleagues and I recorded attributes from over four hundred vessel rimsherd lots from 26 sites; all of these collections are curated by the New York State Museum. Most of these collections were made by William Ritchie or Robert Funk, their associates, or by amateur collectors who sought out their advice (Ritchie 1944, 1969; Ritchie and Funk 1973; Funk 1993, 1998). As a study collection, this material is unique in that it represents a long and almost continuous sequence of ceramics, from some of the earliest known pottery forms, Vinette 1 and related wares, through the Contact period Iroquoian vessels (Ritchie and MacNeish 1949; MacNeish 1952). The size, range, and completeness of this sample allows for detailed study of the ways in which pottery changed over time (Hart and Brumbach 2009).

Of course, pottery itself does not "change." What does change are the methods and techniques of the people who manufactured the vessels and the needs of the people who used them (Chilton 1996; Mickelaki 2007). Our study allowed us to record a wealth of information on manufacturing techniques, vessel-forming methods, decorative elements, and related information. We also learned much about individual attributes and how they changed or were changed by the potters over time to combine and recombine, to appear, and to disappear. In the archaeological literature, regional culture histories are composed, in part, of the individual histories of ceramic types. In turn, types are composed of the individual histories of their component attributes. The longitudinal study of ceramics, and associated radiocarbon dates, has revealed much about certain attributes and when and how the attributes were combined and recombined to form the ceramic tradition of the New York Finger Lakes region.

We were also able to recover carbonized food residues from the interior surfaces of some of the vessels. These residues could be radiocarbon dated, allowing us to directly date specific vessels and gain greater knowledge of the timing of changes in pottery production. Some of these residues also produced phytoliths, microscopic plant structures that can be identified to species when the residues are sufficiently well preserved. As a result, not only could we obtain direct radiocarbon dates on vessels, but we could also identify some of the plant foods that were cooked in them. The results of the radiocarbon dating and phytolith identification have appeared elsewhere (Hart and Brumbach 2003, 2005, 2009; Hart et al. 2003, 2007; Hart and Matson 2009; Thompson et al. 2004), and will be referred to only briefly in this paper.

In the succeeding sections, I will describe the history of the collared rim profile in the Finger Lakes region of central New York as it was revealed in our study. Although I do not address the other major late prehistoric rim profile of this region, the wedge-shaped or thickened everted lip, it appears that this configuration also has a long history. The development of more elaborated rim forms is only one of a range of changes within the larger development of more complex ceramic vessels. I use the term "complex" to refer to the elaboration of vessel form, and the addition of new decorative elements. To produce more 'complex' vessels, the potters were undertaking additional steps in production, including greater attention paid to vessel form, more elaboration of vessel form, and application of new and more decorative elements. Study of the whole sequence of ceramics from this region reveals that the potters were manufacturing more complex vessels over time, and that additional steps were undertaken in ceramic production.

EARLY WOODLAND (CAL. 1150–300 B.C.) POTTERY AND STEATITE VESSELS

The earliest ceramic vessels in this study have been attributed to the type Vinette 1, characterized by exterior and interior cord-marked surfaces produced by paddling or malleating the surface of the vessel when the clay was still plastic (Ritchie and MacNeish 1949:100), although there is much variation in the attribute of surface finish, including type of cording, degree of coarseness or fineness, and orientation of twist, among others (Taché 2005). Paddling probably represents the prevailing manner of thinning the vessel wall and finishing the surface and can be combined with either coiling or modeling as a forming technique. Many vessels of the Woodland period with smoothed surfaces were likely to have been cord-marked during one part of their production but were subsequently smoothed in preparation for stamped or incised decoration. Leaving the surface cording visible or unsmoothed might represent perpetuation of the surface finish of steatite vessels, some of which retained visible tool marks (Ritchie 1969). Vinette 1 and related ceramics were relatively small vessels produced in simple shapes with straight or slightly outsloping rims, straight necks, elongated bodies and conoidal bases (Ritchie and MacNeish 1949:100). A small number of vessels had a thin fillet applied to the rim to thicken

the upper part of the vessel.

The earliest vessels of steatite were rarely decorated, although there are infrequent examples of such. Similarly, only a minority of Vinette 1 vessels were decorated beyond the surface finish. This may be due to the prevailing roughened surface finish of the early ceramics on which incised and stamped decorations are not readily visible, as well as the general lack of a tradition of painted decorations in the study region. Despite their rarity, some decorations were observed on Vinette 1 vessels in our samples. These decorations included oblique incised lines applied to the exterior surface over the cordmarking, some lip embellishment, and differing patterns of orientation of the exterior cording.

EARLY MIDDLE WOODLAND CERAMICS (CAL. 300 B.C.–A.D. 200): VINETTE 2 WARE

What Ritchie and MacNeish (1949) termed the Vinette 2 series are ceramic types largely assigned to the early part of the Middle Woodland period (cal. 300 B.C.–A.D. 200). Changes in ceramic production from Vinette 1 include: smoothing as a final form of surface treatment, although paddling with a corded object may have still been an intermediary step; the addition of incised and stamped decorative elements; and a gradual elaboration of vessel form. Rather than the simple shapes of the earliest wares, later wares are often characterized by everted rims, constricted necks, rounded shoulder areas, and increasingly rounded, semi-pointed, or even globular bases (Ritchie and MacNeish 1949:100–103).

Several vessels from one component at the Vinette site, Oswego County, dated to approximately cal. 300 B.C. (Hart and Brumbach 2005; Thompson et al. 2004) display more elaborated rims, some of which were embellished by an encircling decorative band placed just below the lip. On some vessels, the band bears distinct decorative elements, and on others the decorations are oriented differentially from that applied to the surface below the rim. These bands measured between 8 and 40 mm wide. Overall, 6 of 15 vessel lots recorded as part of our study from this component bore a distinct band of rim ornamentation. This decorative framing or setting off of the upper rim was termed Motif 1, and the band itself the "A-Zone." Over the course of the remainder of the Middle Woodland period (through cal. A.D. 950), the A-Zone gradually became more common, broader, and elaborated. During the cal. fifth-century A.D. the decorative band was combined with a gradual thickening of the rim to form the earliest appliqué collared vessels.

Figure 7.2 illustrates an example of the ceramic type Vinette Dentate (Ritchie and MacNeish 1949). The exterior surface was smoothed and then decorated with an all-over pattern combining both simple dentate and dentate rocker-stamping. The dentate stamping on the upper rim in an A-Zone band 40 mm wide is oriented at a different angle from the stamping on the vessel's neck and shoulder. This vessel was assigned to the ca. cal. 300 B.C. component based on stratigraphy and the direct AMS dating of residue from another sherd (Hart and Brumbach 2005:25).

Figure 7.2. Rim sherd (NYSM 40028-1) of the type Vinette Dentate from the Vinette site, Oswego County, dated ca. cal. 300 B.C. A decorative band just below the lip bears simple and rockered dentate stamping oriented differentially from that below the band.

A second vessel (Figure 7.3) from the Vinette site, from a later component dated to ca. cal. A.D. 40 (Hart and Brumbach 2005:25), also assigned to the type Vinette Dentate, bears a band just below the lip of right oblique dentate stamps over a smoothed surface. The neck is decorated with vertical dentate rocker-stamping. Although the rim appears to be that of a collar, the profile is a much everted lip; the different orientation in the decorations, as well as the everted lip serve to visually set off or frame the upper rim in the same way a modeled or appliqué collar would do.

A third example from Vinette also typed as Vinette Dentate and from the ca. cal. A.D. 40 component (Figure 7.4) has a decorative band of right oblique dentate stamps measuring 13 mm wide; on the neck is rocker dentate stamping oriented at a different angle and serving to set off the upper rim.

A fourth and final example from the Vinette site (Figure 7.5), also identified as Vinette Dentate and from the ca. cal. A.D. 40 component, has a short, uppermost decorative band of vertical dentate stamps 11 mm wide. This decorative band is visually enhanced by deeper punctated dentates at the lower end of the stamps.

Figure 7.3. Upper rim of a vessel with what appears to be a collar but in profile is a much everted lip. A band of right oblique dentate stamping adorns the upper rim and vertical dentate stamping is placed on the neck. Vinette site, ca. cal. A.D. 40, NYSM 40009-2.

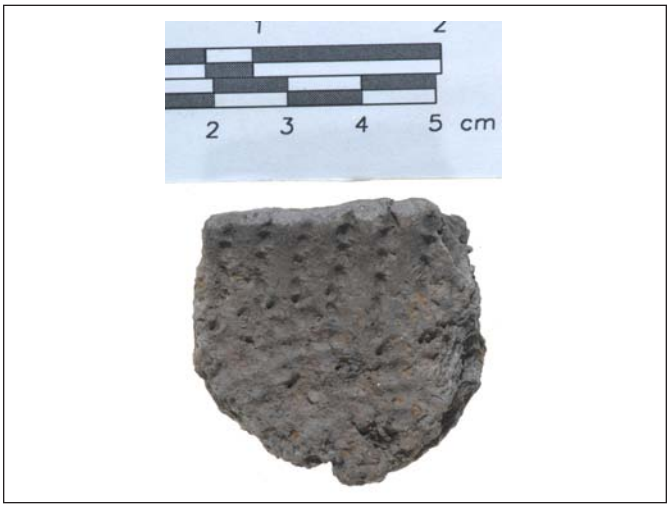

Figure 7.4. Vessel from the Vinette site, ca. cal. A.D. 40, NYSM 40147-21, assigned to the type Vinette Dentate. The exterior is smoothed. The uppermost decoration is a band of right oblique dentate stamps. Below are additional dentate stamps oriented differently to set off the upper rim.

Below this, the neck area is given emphasis with oblique lines of short dentate stamping that is similar visually to corded punctates that appear on ceramic types assigned to the late Middle Woodland, and to the oblique platted elements of ceramic types assigned to the early Late Woodland by Ritchie and MacNeish (1949).

Figure 7.5. Vessel from the Vinette site, ca. cal. A.D. 40, NYSM 40069-1, assigned to the type Vinette Dentate. The exterior surface is smoothed. Short dentate stamps form a decorative encircling band just below the rim. The band is set off or framed by deeper terminal dentate stamps or punctates. The neck bears right oblique lines of dentate stamps, a design very similar to later platted designs that give emphasis to this part of the vessel.

In our study, we identified an A-Zone on a number of vessels with these attributes. These vessels do not have thickened lips, or modeled or appliqué collars, but the upper rims are differentiated by one or more bands of decorations that set off this part of the vessel. The marking of the rim area, and the subsequent differentiation of a neck by some degree of constriction and/or distinct decoration, resulted in an increase in complexity of some vessel forms. These vessels are therefore distinguished not only by formal type, but also by the differentiation of the structural parts of the vessel. Thus, while Vinette 1 and related wares were characterized by simple shapes, the later Middle and early Late Woodland vessels were frequently characterized by distinct rims, necks, shoulders and bodies set off by surface finish, decoration, and sometimes, by vessel profile. Some of these later vessels were probably formed in two or more sections and then joined before final drying and firing, whereas the earliest vessels of the Early Woodland period appear to have been made in one piece.

The Cottage site in Broome County (Ritchie and Funk 1973) produced several vessel lots dated to ca. cal. A.D. 200 (Hart and Brumbach 2009) that bear similar arrangements of attributes. Two vessels of interest are both smoothed on the exterior surface and decorated

with dentate stamping. One of these (Figure 7.6) has an upper decorative band measuring 29 mm wide with right oblique, simple and rocker-stamped dentate impressions. Below the band, the neck bears left oblique dentate stamps. A third decorative band may be present but was too fragmentary to identify. A second vessel (Figure 7.7) bears vertical and horizontal dentate rocker stamps in a band 23 mm wide. Below this, slightly oblique to horizontal lines of simple dentate stamping decorate the slightly constricted neck and rounded shoulder. Both vessels have been assigned to the type Point Peninsula Rocker-stamped.

FIFTH CENTURY A.D. CERAMICS

By the cal. early fifth-century A.D., vessel rims exhibit all the decorative attributes of a Late Woodland collar, except for the profile. Vessels are also more complex with some changes in shape, and a second form of stamping, cord-wrapped stick (cws), now appears on many vessels. Cord-marked surface finishes re-appear during this period, although some vessels are cord-marked on only a part of the exterior.

A large portion of a refitted vessel from the Wickham site, Oswego County, further illustrates the development of rim designs (Figure 7.8). Carbonized residues recovered from the interior surface produced an AMS date of ca. cal. A.D. 400 (Hart et al. 2003), firmly placing the vessel in the cal. early fifth century A.D. The upper rim has a distinctive collar design, but the profile is not that of a collar. The surface of the rim is smoothed and just below the lip there is a band 13 mm wide of short right oblique to vertical cws stamps. Below this, on the slightly constricted neck, is a second band 34 mm wide embellished with horizontal cws stamping. The combination of short vertical to oblique elements above horizontal elements appears commonly on vessel collars of

Figure 7.6. Vessel from the Cottage site, NYSM 44469-55, assigned to the type Point Peninsula Rocker-stamped. The exterior surface is smoothed. The upper decorative band bears right oblique dentate stamps, some rockered, while on the neck is a band of left oblique dentate stamps. A third decorative band is not well preserved.

Figure 7.7. Vessel from the Cottage site, dated ca. cal. A.D. 200, NYSM 44469-28, assigned to the type Point Peninsula Rocker-stamped. The exterior surface is smoothed. The upper rim is embellished with a band of vertical and horizontal dentate rocker-stamping, while horizontal and slightly oblique lines of plain dentate stamps appear on the neck and shoulder.

Figure 7.8. Refitted partial vessel from the Wickham site, Oswego County, NYSM 40170, assigned to the type Owasco Corded Horizontal. The rim and neck are smoothed and covered with cws stamped decorations. Just below the lip is a band of short right oblique stamps, and the neck bears a wider band of horizontal cws stamping. Below the two bands, the shoulder area is corded to smoothed-over-corded and otherwise left undecorated. A direct AMS date of 1648±47 years B.P. was obtained on carbonized residues.

a later date. Additionally, because a large portion of the vessel was refitted, it also serves to illustrate another development in vessel complexity, what we informally termed 'motif 2', the application of different designs and surface finishes to different structural parts of the vessel. Below the two decorative bands, the shoulder is left undecorated but bears a different surface finish from the neck and rim and is now corded to smoothed-over cord-marked. Surprisingly, although the vessel is dated to ca. cal. A.D. 400, the potters used decorative elements and surface finish to set off different parts of the vessel, a configuration that becomes almost diagnostic of Ritchie and MacNeish's (1949) latest pre-Iroquoian types. This differentiation of structural parts of the vessel by design and surface finish stands in contrast to the early Vinette 1 and related wares, characterized by simple shapes and all-over designs.

Later fifth century A.D. vessels from the Felix site, Onondaga County, dated to ca. cal. A.D. 490 (Hart and Brumbach 2005:26–27), bear similar design elements (Figure 7.9). The exterior surface is corded and a thin fillet of clay was applied to the upper rim, forming an applied collar 25.5 mm high. Vertical to right oblique cord-wrapped stick stamping was added to increase the visual impact of the thickened rim. At the base of the 'collar' element is a horizontal band of short right oblique cord-wrapped stick impressions that creates a framing element, presaging the nicks and notches placed on the base of many Late Woodland collars. The neck and shoulder areas are embellished with horizontal cord-wrapped stick applied over a corded surface finish. The rim profile is that of a simple applied collar, however rim eversion is not very marked and the neck is not greatly constricted; it is likely that the potter's intention was only to strengthen the rim rather than to produce a new rim profile configuration.

Figure 7.9. A vessel from the Felix site, Onondaga County, dated ca. cal. A.D. 490, NYSM 40727-24, 25, with an incipient collar formed by adding a fillet or extra lute of clay to thicken the rim. Surface finish is corded. A band of right oblique cws impressions appears just below the lip. At the base of the incipient collar is a band of short cws impressions that forms a framing element. Surface finish on the neck and shoulder is also corded and then embellished with horizontal cws impressions.

EARLY APPLIQUÉ COLLARS

The two early collared types identified by Ritchie and MacNeish (1949) are Jack's Reef Dentate Collar and Jack's Reef Corded Collar. Both types were attributed to the Late Point Peninsula Tradition (Ritchie 1969; Ritchie and Funk 1973) of central New York and eastern Ontario, including components of the Jack's Reef, Vinette, and Wickham sites (Ritchie and MacNeish 1949:106–107,118). In discussing the origins of the types, Ritchie and MacNeish (1949:106–107) state that clearly the two types are related to each other, but that "no prototype is known for either." They recognize their importance, archaeologically however, and state: "These two types appear to inaugurate a long tradition of collared pots in the New York area."

The decorative band encircling the uppermost exterior of the vessel (A-Zone), is the first part of the collar configuration; thickening of the rim represents the second part. The decorative rim band appears very early in our study, seemingly as early as the development of Vinette 2 pottery. Thickening of the rim was also noted on early vessels but only as a minority attribute, and perhaps only when the potter perceived the rim was too thin to support the vessel and needed to be reinforced. A more regular combination of the two attributes does not occur until around ca. cal. A.D. 450 in our samples. Rim thickening gradually becomes more commonplace over time, and eventually, the thickening became a simple appliqué collar.

Some early vessels, such as many examples of Vinette 1 wares, may not have been used directly in the fire or may have been used only for stone-boiling. Later Middle Woodland vessels are more likely to have evidence of direct use in the fire. In our study samples, we observed more systematic thickening of rims around the period of the cal. fifth century A.D., although as already stated the practice does occur earlier. Was there a reason for this change in ceramic production at this time? Undoubtedly, there was, but the difficulty is identifying a specific explanation. Cooking practice undoubtedly played a role here: changes in food preparation may have resulted in either greater stress applied to the rim when moving the vessel, or in accessing and transferring vessel contents, or increased vessel size and

weight of contents put greater stress on the rim. Reenforcing the vessel rim by applying a fillet of clay would have been one solution to the problem.

Analysis of phytoliths preserved in some of the carbonized food residues adhering to the interior of vessel surfaces provides some information concerning the plant foods cooked in these vessels. Residues taken from a vessel from the Vinette site directly AMS-dated to ca. cal. 300 B.C. yielded maize phytoliths, while later components of the Middle Woodland sites produced phytoliths of maize, wild rice, squash, and sedge (Hart et al. 2007). Further study might provide more information on the amount of different species prepared or on changes in the way food was prepared, as well as resulting stresses placed on the vessels.

By early in the cal. seventh century A.D., design elements similar to ones that later appear on collared vessels were being used. Some potters thickened the upper rim area and then embellished it with distinct design elements; some vessels were manufactured with distinct rims, necks, and bodies. The cal. seventh century A.D. component at the Kipp Island site, Seneca County, produced several vessels of interest. Figure 7.10 illustrates a vessel with a decorative band of right oblique, cord-wrapped stick stamps on a smoothed surface; horizontal cord-wrapped stick impressions were applied to the smoothed-over cord-marked neck. The profile shows little rim eversion or thickening. Preserved carbonized residues recovered from the interior surface were used to obtain an AMS date of ca. cal. A.D. 620. Phytoliths recovered from the residue indicate the vessel was used to cook maize, wild rice, cucurbit, and sedge (Hart et al. 2003, 2007).

The cal. mid-seventh-century A.D. component at the Felix site, Onondaga County, also produced vessels with similar sets of design (e.g., Figure 7.11). One vessel bears similar design elements except in this case they are executed with a dentate stamp rather than the cord-wrapped stamp noted on vessels from Kipp Island and Felix described above. The rim profile of the Felix vessel is slightly everted and without a collar, but the decorative elements on the rim are similar to those that appear on collars. The surface was first smoothed and then decorated with a band of right oblique dentate stamps 23.5 mm wide. Below this, the exterior was also smoothed and then decorated with horizontal dentate stamps. Unfortunately, the shoulder area of the vessel is not preserved, so we cannot determine if it bore the cord-marking observed on the Wickham vessel. The vessel was assigned to the type Vinette Dentate.

Changes apparent during the cal. fifth through seventh centuries A.D. include the gradual replacement of dentate stamping by cord-wrapped stick stamping, as well as a resurgence of corded surface finishes or the use of contrasting surface finishes on different structural elements of the vessel. This change in decorative elements and techniques is interesting in itself, but whether it signals changes in the social environment, an even more interesting possibility, will not be further

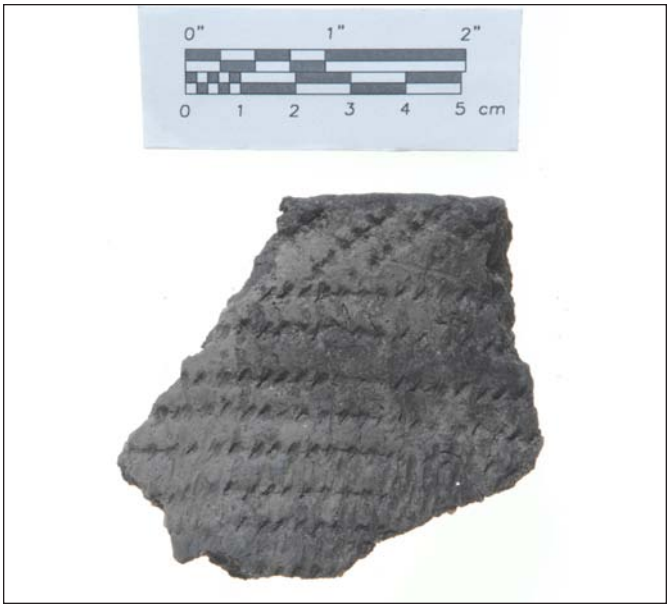

Figure 7.10. Vessel from the Kipp Island site, Seneca County, NYSM 41119-8. The rim bears a decorative band of right oblique cws stamps on a smoothed surface while horizontal cws was applied to the smoothed-over cord-marked neck. The profile shows little rim eversion or thickening.

Figure 7.11. Vessel from the Felix site, Onondaga County, dated ca. cal. A.D. 650, NYSM 40767-2. The exterior surface is smoothed and then decorated with a band of right oblique dentate stamps. The lower band is horizontal dentate stamps.

Figure 7.12. Vessel from the Hunter's Home site, Wayne County, dated ca. cal. A.D. 820, NYSM 48582-8. The surface is cord-marked. The rim has an applied collar decorated with cws impressions applied in a criss-cross pattern. Below this, the neck bears cws impressions oriented horizontally.

Figure 7.13. Vessel from the Hunter's Home site, Wayne County, dated ca. cal. A.D. 820, NYSM 48584-1. The upper rim bears a band of alternating right and left oblique cws stamps. Below the rim, the cws stamping is oriented horizontally.

addressed in this paper.

Simple, applied collars formed by thickening the rim also characterize some of the vessels (e.g., Figure 7.12) from the Hunter's Home site, Wayne County, dated to ca. cal. A.D. 820 (Hart and Brumbach 2005:31–32). The upper rim bears a decorative band with elements different from those on the lower parts of the vessel. The exterior surface is cord-marked, and cord-wrapped stick stamping was applied in a criss-cross pattern on the thickened part of the rim. Below this, the neck bears additional cord-wrapped stick impressions applied in horizontal lines. The vessel was assigned to the type Jack's Reef Corded Collar due to the presence of the collar. Without this element, the vessel could be assigned to the type Kipp Island Criss-Cross.

Criss-cross designs continue to appear on vessels during the following centuries. A vessel from the Hunter's Home site without an applied collar bears an upper decorative band of alternating and sometimes overlapping right and left cord-wrapped stick stamps (Figure 7.13). Below the decorative band, the neck and upper shoulder are differentiated by cord-wrapped stick stamping oriented into horizontal lines. The decorative elements closely resemble those observed on the preceding vessel from Hunter's Home, but the rim is not thickened. The criss-cross and alternating/overlapping oblique design elements later become a dominant design structure during the Late Woodland when they are reconfigured into alternating right and left oblique incised lines and opposed triangles on collars. This vessel was assigned to the type Owasco Corded Horizontal. Carbonized residues recovered from the interior surface produced phytoliths of wild rice, maize, and cucurbit (Hart et al. 2003, 2007).

Sites of the succeeding cal. tenth-century A.D. also produced vessels with decorated A-Zones and, to a lesser degree, thickened rims. At both Levanna, dated to ca. cal. A.D. 925 (Hart and Brumbach 2009), and at Wickham, dated to ca. cal. A.D. 930 (Hart and Brumbach 2005), the A-Zone was found to be wider and more elaborated, measuring between 11 and 38 mm wide at the former site and between 19 and 45 mm wide at the latter.

MODELED COLLARS

The earliest vessels in our sample with modeled collars similar to the predominant rim profile of the latter half of the Late Woodland, come from the component at the Felix site dated to ca. cal. A.D. 1030 (Figure 7.14). The vessel has a modeled collar 44.3 mm high above a constricted neck. The exterior surface is smoothed. The collar bears horizontal and right oblique cord-wrapped stick elements, and short right oblique cord-wrapped stick stamps reminiscent of earlier elements used to 'frame' major rim designs are placed at the base of the collar. To the upper right in the illustration is a hint of an elementary castellation, or rim peak, but the sherd is broken and the castellation may only be illusory. The vessel is assigned to the type Owasco Corded Collar (Ritchie and MacNeish 1949).

After its appearance around cal. A.D. 1000, modeled collars remain in the minority for several centuries. None of our samples from the Bates site, dated to ca. cal. A.D. 1130 (Hart 2000), or Maxon Derby dated to ca. cal.

Figure 7.14. Vessel from the Felix site, dated ca. cal. A.D. 1030, NYSM 40697-4,11. The exterior surface is smoothed; horizontal and right oblique cws stamps appear on the modeled collar; short oblique cws stamps are placed at the base of the collar.

Figure 7.15. Vessel from the Kelso site, dated ca. cal. A.D. 1400, NYSM 42581-1. The surface is smoothed and there are cws impressions on the collar and at the base of the collar. The decorations on the collar are horizontal and almost vertical under the small castellation. The base of the collar was decorated with short right oblique cws impressions.

A.D. 1176 (Hart 2000), were collared. Gradually, however, the collared rim profile does increase in frequency until by the latter half of the Late Woodland, collared rims and the everted or wedge-shaped lips dominate ceramic assemblages. The final illustration is from the Kelso site (Figure 7.15; NYSM 42581) dated ca. cal. A.D. 1400 (Hart and Lovis 2007). The surface is smoothed and the rim profile is that of an almost vertical, modeled collar. The decorative elements on the collar and on the base of the collar are cord-wrapped stick stamps. Those on the collar are horizontal, and right oblique to almost vertical, under what appears to be a low, rounded castellation. At the base of the collar are short right oblique cws stamps. The basal collar motif also has a long history, having its origins in Middle Woodland times before potters even made collars. At a later time, the short oblique stamps are replaced by short nicks and then elaborated into distinct notches, another attribute diagnostic of the latter half of the Late Woodland. All 16 vessels studied from the Kelso site are collared. Most are assigned to the type Owasco Corded Collar, the rest to the type Oak Hill Corded (Ritchie and MacNeish 1949).

After cal. A.D. 1400, sites in our study, such as Kelso, Buyea, Richmond Mills, and Factory Hollow, are dominated by rims with modeled collars. During this time, potters manufactured increasingly complex vessels with collars and everted and thickened or wedge-shaped lips, as well as other rim embellishments such as castellations, 'rim corners', and 'frills.' These elaborations accompany other emerging complexities in social and political organization, kinship, increased sedentism, and larger community size.

SUMMARY AND RELEVANCE

The longitudinal study of ceramic attributes in the Finger Lakes area has revealed much about the lengthy and intricate history of the pottery. Pottery, like many other complex craft items, is composed of different attributes, most or all of which have their own "histories." Because the attributes do not cycle synchronically, it is apparent that 'types' may not have great time depth (see Lavin 2002:165 for a succinct discussion of types and attributes). This paper has focused on only a few ceramic attributes, including a decorative band on the exterior rim below the lip (the A-Zone), a thickened rim, and short, framing elements of stamps or punctates. These elements do not appear at the same time in the archaeological record, but over time come together to form the characteristic collared rim of the late prehistoric period.

Certainly, ceramic attributes are not genes and we are not decoding the 'ceramic genome' when we carry out attribute analyses, but there is value in the endeavor. Ceramic assemblages represent one tangible part of the material record of the past and often serve as the best available proxy for more elusive records. The collared vessel was a distinguishing attribute of Iroquois pottery as well as that of neighboring peoples, and for that reason it is worth knowing more about its history. The study of the collared vessel is also one part of a larger

study of ceramic complexity in the central New York region that seeks to understand more about the lives of people during the Woodland period between the adoption of corn agriculture and the establishment of large, multi-family villages. Many of the archaeological sites from which these ceramics were recovered no longer exist. Some were destroyed in canal or road construction or by looting, and much of the direct evidence of settlement pattern, village and community organization, as well as floral and faunal remains, are no longer available. While excavations at yet undiscovered sites will help fill these voids, other lines of information can be obtained from curated collections of ceramics. Although a study of ceramic complexity is not an adequate proxy for other types of data that can inform more explicitly on sociopolitical and economic organization, it is indisputable that such study has much to contribute (Michelaki 2007; Smith 2005; Yentsch 1996).

The decisions that potters make when manufacturing complex craft items like ceramics are influenced by the prevailing material and social conditions of their lives. As Braun (1983) has pointed out, pots are tools and are manufactured to perform a function in the domestic economy, including storage and processing of food items. Changes in pottery manufacture are related to changes in other areas of food selection and the social setting of preparation and consumption. In addition to their role as a tool, pots are also craft items and domestic implements, and as such they are produced in a social setting by individuals who make decisions, conscious or otherwise, message-driven or not, about how pots are to be formed, decorated, and fired (Chilton 1996; Hart and Brumbach 2009; Michelaki 2007; Smith 2005; Yentsch 1996). As a result, pottery may inform us about individual choices and the social environment in which it is manufactured and used by Native Peoples (e.g., Dobres and Robb 2000). Pottery's role as a "social tool" suggests that changes in manufacture can inform on changes in social structure and complexity, processes that are not easily directly observed in the archaeological record.

ACKNOWLEDGMENTS

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Chapter 8

THE DEATH OF OWASCO—REDUX

John P. Hart

Abstract. *Owasco is a culture-historic taxon originally defined by Arthur C. Parker and later refined by William A. Ritchie in the first half of the twentieth century. This taxon was at the heart of a debate on northern Iroquoian origins in the 1990s and early 2000s. In a 2003 article Brumbach and I announced "The Death of Owasco" based on an analysis of the histories of the traits used to establish the boundary between Owasco culture and the earlier Point Peninsula culture. Here I review the research on these traits since that publication that indicate an even more extended and complex set of independent histories. I reiterate the need for archaeologists to move away from culture-historic taxa as units of analysis, interpretation, and summary.*

When one thinks of New York archaeology during the twentieth century, three names are likely to come to mind: Arthur C. Parker, William A. Ritchie, and Robert E. Funk. Each of these men had important impacts on the development of archaeology as a discipline in the state. Each was extensively involved in archaeological fieldwork throughout the state. Each was a prolific publisher of books and articles for both professional and popular audiences. Each worked for large portions of his career at the New York State Museum; Ritchie and Funk each served as New York State Archaeologist. So important were their collective contributions that Parker, Ritchie, and Funk established a tradition of how the past was organized and interpreted by generations of archaeologists working in New York and elsewhere. An essential component of this tradition was the culture-history scheme that originated with Parker (e.g., 1922), was revised, refined and extensively expanded by Ritchie (e.g., 1936, 1944, 1965), and was extended and refined by Funk (e.g., 1976, 1993). Ultimately, this scheme provided a means of organizing sites and site components into chronological sequences across the breadth of New York. It also served as the primary platform on which Indian occupations of the state prior to European incursions were interpreted (e.g., Ritchie and Funk 1973).

The predominance of the Parker-Ritchie culture-history scheme was such that little thought was given to its applicability in modern archaeological research in the later portions of twentieth century. Rather, the scheme was simply applied, with the placement of a site or site component into a taxonomic unit serving as a fundamental analytical goal. When placed in a taxon a site/component became part of a list of like sites/components in which the ancient inhabitants of New York conformed to specific norms of behavior. Departures from the norms were used to expand and refine taxa definitions. This was an example of extensional definition in that a taxon was defined on the basis of a list of attributes enumerated by the original definer and refined by that definer and other researchers as more sites were excavated (Dunnell 1971; Lyman and O'Brien 2002)[1]. These definitional refinements included a taxon's temporal and spatial boundaries, as well as its formal content (i.e., list of traits). Such definitions were subjective and historically contingent, dependent on available traits and the individual assessments of the enumerator and those of subsequent researchers.

As with all culture-historic schemes the Parker-Ritchie scheme was hierarchical, with higher levels in the hierarchy representing more general behaviors than the lower levels (Ritchie 1936; Ritchie 1969). The scheme was related in various graphical forms showing the progression of taxa at various levels of integration through time. This stacked box-like approach had a strong influence on how the past was interpreted with the boundary between two sequential taxa representing a shift from one state to another. That is, at a more-or-less-precise point in time, the attributes reflecting the behaviors of Indians changed. The behaviors that changed varied depending on the hierarchical

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level of the taxa. With higher-level, more-inclusive taxa (e.g., stages, cultures), the changes were fundamental aspects of subsistence, and/or settlement, and/or technology. With lower-level, less-inclusive taxa (e.g., phases), the changes may simply have reflected different manners of decorating pottery.

One important mid-level unit in this scheme was the Owasco culture. This taxon was thought to begin around A.D. 1000. It included traits that were believed to represent the onset of a sequence of occupations leading to the historic northern Iroquoians (Ritchie 1965; Ritchie and Funk 1973). These included maize-bean-squash agriculture, longhouses and assumed matrilineality and matrilocality, nucleated villages, and pottery technology and decorations. The appearance of these traits formed the boundary between the Middle Woodland stage-Point Peninsula culture and Late Woodland stage-Owasco culture. As expressed by Ritchie (1969:180), "A principal distinction setting off Late from Middle Woodland cultures is the now obvious fact of the importance of cultigens—corn, beans, and squash demonstrably—in the economy. This change accompanied, *pari passu* [hand-in-hand], a major alteration in settlement pattern, with large villages, the later ones protected by palisades, containing a sessile or semi-sedentary, augmenting population, dwelling communally in longhouses." Within the Owasco culture were three phases, each encompassing a span of 100 years (Carpenter Brook ca. A.D. 1000–1100, Canandaigua ca. A.D. 1100–1200, Castle Creek ca. A.D. 1200–1300). The phases were defined primarily on the basis of changes in pottery type percentages.

Owasco became the crux of a debate in the 1990s and early 2000s on the "origin" of northern Iroquoians in New York, southern Ontario, and Quebec. In building and refining New York's culture history Ritchie (1965, 1969) had defined a phase he called Hunter's Home that represented a 100-year transition starting at ca. A.D. 900 from the Middle Woodland stage to the Late Woodland stage, representing the end of the Point Peninsula culture. The phase was defined primarily on the co-occurrence of Owasco and Point Peninsula pottery types. To Ritchie and many contemporary and subsequent researchers, this 100-year phase represented the transition of indigenous Indian groups of the Point Peninsula culture into recognizable ancestral northern Iroquoians of the Owasco culture. This was subsumed under the so-called "in situ hypothesis" of northern Iroquoian origins.

In 1995, Snow published what became a very controversial article in which he dismissed the Hunter's Home phase. He argued that northern Iroquoian agriculturists migrated to New York from central Pennsylvania and displaced non-agricultural Algonquian populations ca. A.D. 900; this is a version of the so-called "migration hypothesis." What Snow saw in the archaeological record was a sharp break defined by discontinuities in several key traits at the onset of Owasco; there was no period of transition. As stated by Snow (1995:71), "archaeological evidence indicates that multifamily (probably matrilocal) residence, horticulture, and compact villages appeared suddenly, not gradually, in Iroquoia." Based on new evidence for maize agriculture and settlement patterns in southern Ontario (Crawford and Smith 1996), Snow (1996:794) later suggested the beginnings of Iroquoian migrations to as early as the eighth century A.D., but maintained that Owasco could not have originated from Point Peninsula, and that agriculture arrived with the Iroquoian migrants (Snow 1996:794).

Ritchie, Snow, and others saw the initiation of recognizable northern Iroquoian antecedents with the onset of Owasco; it was just a matter of what happened to establish the boundary between Owasco and Point Peninsula, and when that boundary occurred. In Ritchie's case it was the adoption of maize-bean-squash agriculture, and with it hand-in-hand changes in subsistence and settlement traits along with a change in pottery. Longhouses arose when northern Iroquoians became matrilocal after the adoption of agriculture as female labor became the dominant source of subsistence (Ritchie 1969). With Snow (1995) it was the migration of ancestral Iroquoian maize agriculturists into the territory of hunting-gathering Algonquians represented by a replacement of Point Peninsula by Owasco pottery. The Iroquoian reaction to hostility on the part of the indigenous Algonquians was to adopt matrilocal residence so that fraternal interest groups were broken and hostilities could be focused on Algonquians rather than other Iroquoians. Matrilocality gave rise to longhouses. In either case, the various traits identified as directly antecedent to historic northern Iroquoian occupations in the region arrived as a package or were adopted or developed in quick succession (see Martin 2008 for a detailed history of in situ and migration hypotheses for northern Iroquoian origins).

This initiating boundary for Owasco was critical to both hypotheses for northern Iroquoian origins in New York. By the early 2000s, my colleagues and I had been conducting research that while not directly focused on culture history had important implications for this boundary. In 2003, Hetty Jo Brumbach and I used the results of this research to examine the histories of the traits associated with the boundary. Our conclusion was that each of the traits had a history separate from the others, and that, in fact, all of the traits did not assemble together in the Finger Lakes region until ca. cal. A.D. 1300. This led us to announce "the death of Owasco"

and subsequently to question in toto the viability of the Parker-Ritchie scheme for investigation of the past (Hart and Brumbach 2005). In the remainder of this chapter, I will review the histories of these traits as we understand them now after nearly a decade of additional investigation.

POTTERY TYPES

Like culture-historic taxa, pottery types are extensionally defined. A typical definition will include a list of defining attributes that in combination are supposedly distinct to the type. The pre-Iroquoian typology for New York was established by Ritchie and MacNeish (1949). The principal objective of their effort was to better distinguish between Point Peninsula and Owasco pottery; the study was designed in order to refine the existing culture-historic taxonomy (Hart and Brumbach 2003:740–742). In other words, the types were defined with a specific goal in mind. While Ritchie (1965) later posited an overlap in Point Peninsula and Owasco types over a 100-year period, Snow (1995) argued that assemblages with types of both series were mixed, and that, in fact, Owasco types replaced Point Peninsula types as Iroquoian groups displaced Algonquian groups. If the co-occurrence of types was chronologically confirmed at any given site, then it represented captured women of one or the other ethnicity that continued to make pots reflecting their ethnicity (see Knapp 2009).

The first real test of chronological relationships between Point Peninsula and Owasco types was published by Schulenberg (2002a, 2002b) who directly dated charred cooking residues adhering to the interior surfaces of 12 sherds with accelerator mass spectrometry (AMS). These sherds, from the Hunter's Home, Kipp Island, and Levanna sites, included three assigned to Point Peninsula types and eight to Owasco types. While the three Point Peninsula types fell within Schulenberg's expected time frame for late Point Peninsula (before cal A.D. 950), five of the Owasco type sherds occurred as early as the cal. seventh century A.D. overlapping the dates of the Point Peninsula sherds. Brumbach and I subsequently AMS-dated charred cooking residues from 13 sherds assigned to late Point Peninsula or early Owasco types from the Hunter's Home, Kipp Island, and Wickham sites (Hart and Brumbach 2003: 743–745). Combined with Schulenberg's results, the 25 dates clearly indicated that Point Peninsula and Owasco types occurred together at sites with components dated as early as ca. cal. A.D. 625.

Brumbach and I continued to obtain AMS dates on cooking residues and published a more comprehensive assessment of Ritchie's (1969) Middle Woodland–Late Woodland boundary (A.D. 900–1000) two years later (Hart and Brumbach 2005). In total, we added 25 dates resulting in a total of 50 dates from 14 sites. Of these, 37 of the sherds from 15 site components were assigned to late Point Peninsula or early Owasco types. The dates conservatively demonstrated a period of overlap up to 600 years (Figure 8.1). Clearly such a lengthy period of overlap made any thought of a transition period untenable, as it did the idea of a rapid replacement of one series of types by another and thus the purported replacement of one ethnic group by another (also see Miroff 2009).

POTTERY ATTRIBUTES

Ritchie and MacNeish (1949) had posited a distinction in forming techniques between Point Peninsula and Owasco pottery. Point Peninsula pottery was formed through coiling, while Owasco was formed through modeling. We would, therefore, expect a rapid replacement of coiling by modeling under Ritchie's in situ hypothesis and a sharp break or discontinuity under Snow's migration hypothesis.

Schulenberg (2002a, 2002b) and Gates St Pierre (2001) published detailed attribute analyses of pottery from the Kipp Island and Hunter's Home sites. Both concluded that there was continuity in technology between the Point Peninsula and Owasco types. In discussing the co-occurrence of Point Peninsula and Owasco types from two components at the Kipp Island site, Gates St Pierre (2001:49) stated that "there seems to be a clear continuity in ceramic technology and types between the two groups. Point Peninsula and Owasco ceramic vessels not only have many traits in common they also frequently share these traits in very similar proportions and rank order." Schulenberg (2002b:88) concluded that "a clear line cannot be drawn between the two technologies … ."

Brumbach and I subsequently carried out an intensive study of pottery attributes to test the hypothesis of a rapid or immediate change in forming technique (Hart and Brumbach 2009) using a larger number of sites. Specifically, we examined sherds from 26 site components in the Finger Lakes region dated from 1100 B.C. to A.D. 1600. We first looked for evidence of forming technique by examining sherds for coil breaks. We found that the percentage of sherds with coil breaks formed a normal distribution over time with a peak at ca. cal. A.D. 450 and a gradual drop off to ca. cal. A.D. 1100 (Figure 8.2). There was no evidence for an immediate or quick change in forming technique. Rather the change in forming technique was a gradual process, with modeling evidently fully replacing coiling only

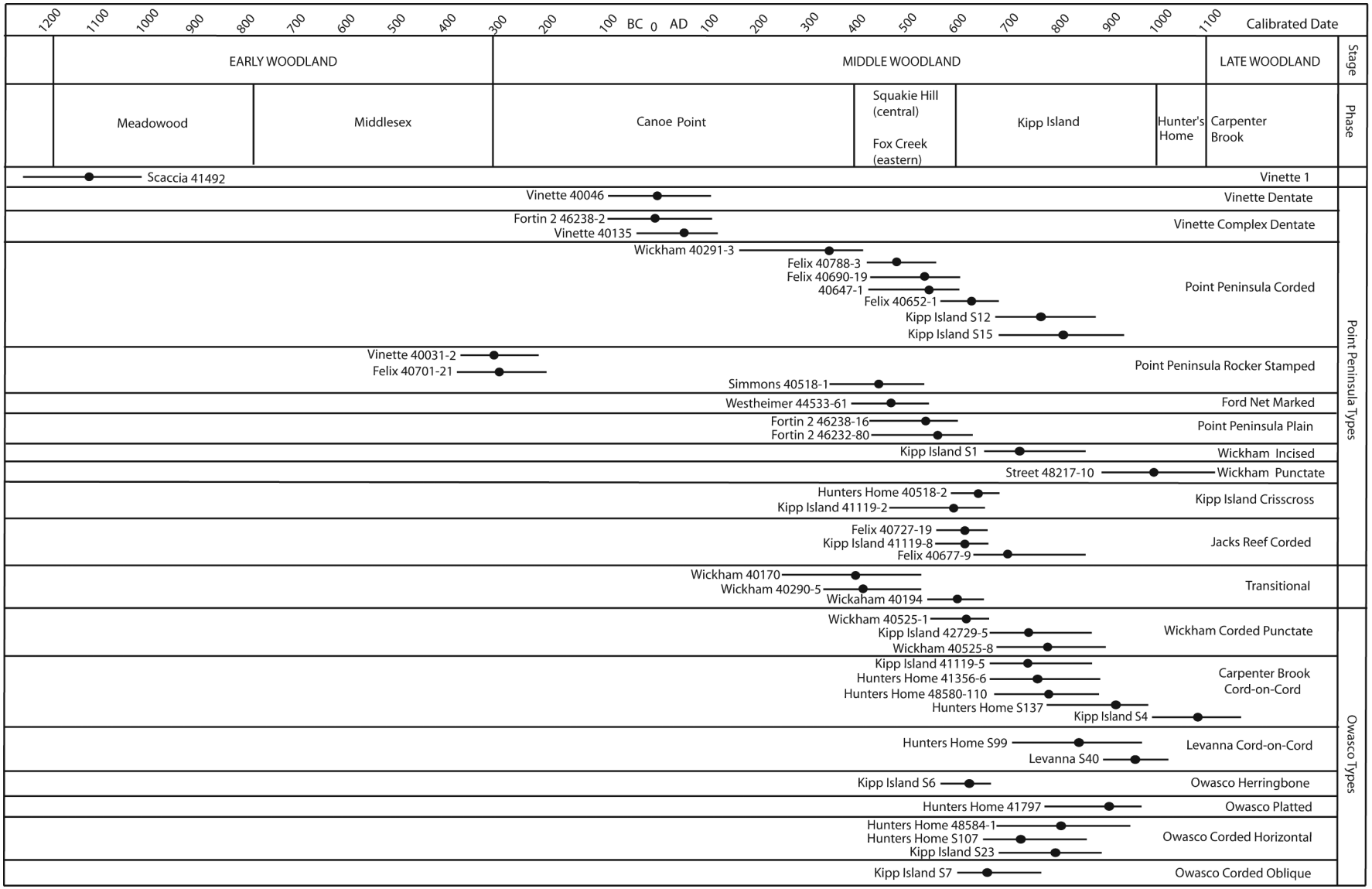

Figure 8.1. Graphical representation of individual cooking residue dates by pottery type and Ritchie's (1969) culture history phases for sites assigned to Ritchie's (1969) Early and Middle Woodland stages. Types are ordered according to Ritchie and MacNeish (1949). Bars are 2s calibrated ranges and dots are median probabilities. Sherd numbers with S prefix are those published by Schulenberg (2002a, b).

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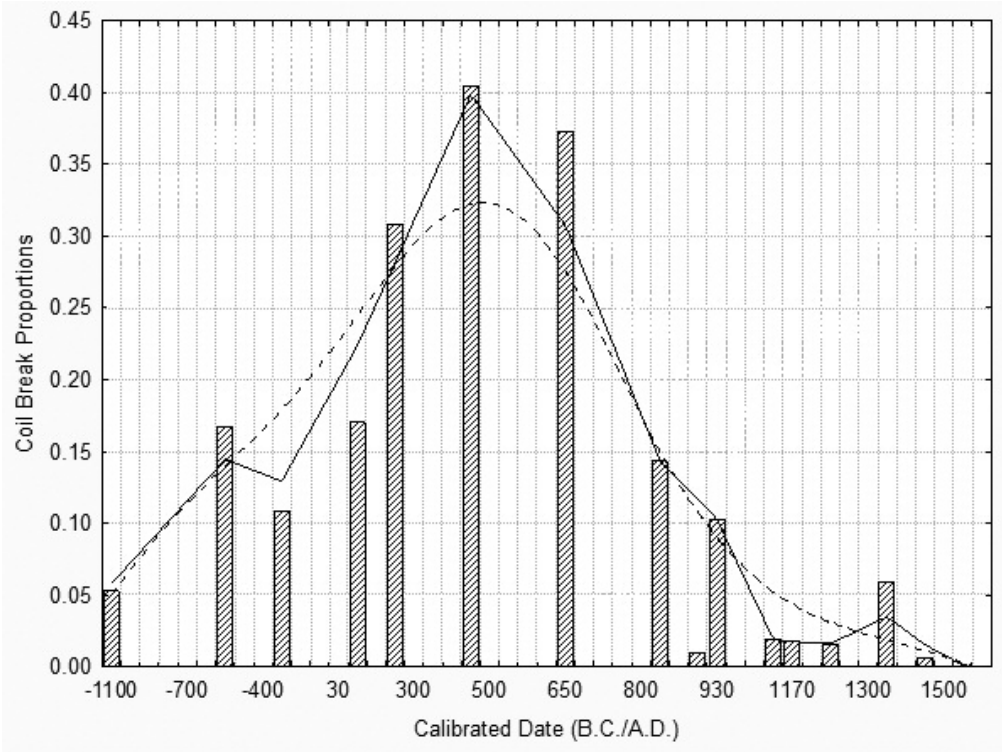

Figure 8.2. Bar graph of the proportion of sherds with coil breaks in pottery assemblages by date. The solid trend line is LOWESS smoothing and dashed is distance weighted least squares (DWLS) smoothing.

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after ca. cal. A.D. 1100. Others have noted the use of coil forming in pottery assigned to early Owasco types (e.g., Gates St Pierre 2001; Prezzano 1985; Rieth 2004).

Second, we examined pottery wall thickness. This was done under the assumption that thinner-walled pots are more efficient than thicker-walled pots for water-based cooking of grains (e.g., Braun 1983; O'Brien et al. 1994). If there was a replacement of Algonquian hunter-gatherers by agricultural Iroquoians, there should be a sharp break in vessel wall thickness—from thicker- to thinner-walled pots. Alternatively there should be a quick drop off in vessel wall thickness if there was a 100-year period of transition between hunting-gathering and agriculture. We found instead that there was a gradual decrease in vessel wall thickness beginning around cal. A.D. 450 (Figure 8.3). When adjusted for vessel girth, the decrease began as early as ca. cal. A.D. 1 and continued through ca. cal. A.D. 1600 (Figure 8.4). In other words, as with forming technique, there is nothing to indicate the shift from one state to another at a specific temporal boundary. Rather, there was a gradual process of change, perhaps related to the greater incorporation of maize into the regional cuisines (Hart and Brumbach 2009).

Third, we examined similarity of pottery decoration for each component. Under Ritchie's and Snow's hypotheses, we would expect greater similarity at nucleated village sites of agriculturists as opposed to short-term occupations of hunter-gatherers. The latter represent palimpsests of repeated occupations over years and/or generations each contributing to the archaeological record, resulting in diverse pottery assemblages. The former represent extended occupations with established pottery decoration traditions (see Hart and Brumbach 2009 for details). What we found was that there was a gradual increase in similarity beginning as early as ca. cal. A.D. 200 and continuing to ca. cal. A.D. 1600 (Figure 8.5). Here too, then, there is no sharp break or short period of transition.

In a separate research project evidence came to light for long-term pottery technology continuity. Eleanora Reber extracted fatty acids incorporated into 17 charred residues and absorbed by the pottery fabric from 12 sherds. Each of the sherds in this analysis was among those for which AMS dates had previously been obtained on charred cooking residues, spanning the period 1100 B.C. to A.D. 1450 (Reber and Hart 2008). Reber found evidence for both meat and plant cooking

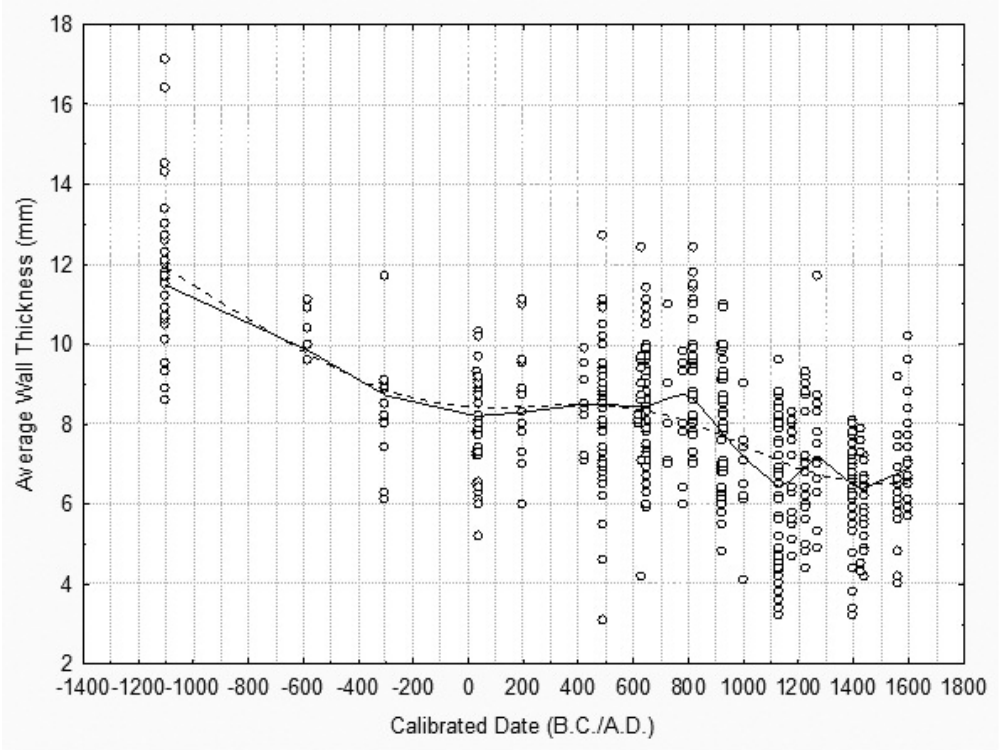

Figure 8.3. Scatter plot of average wall thickness for sherds by date. The solid line is LOWESS smoothing, and the dashed line is DWLS smoothing.

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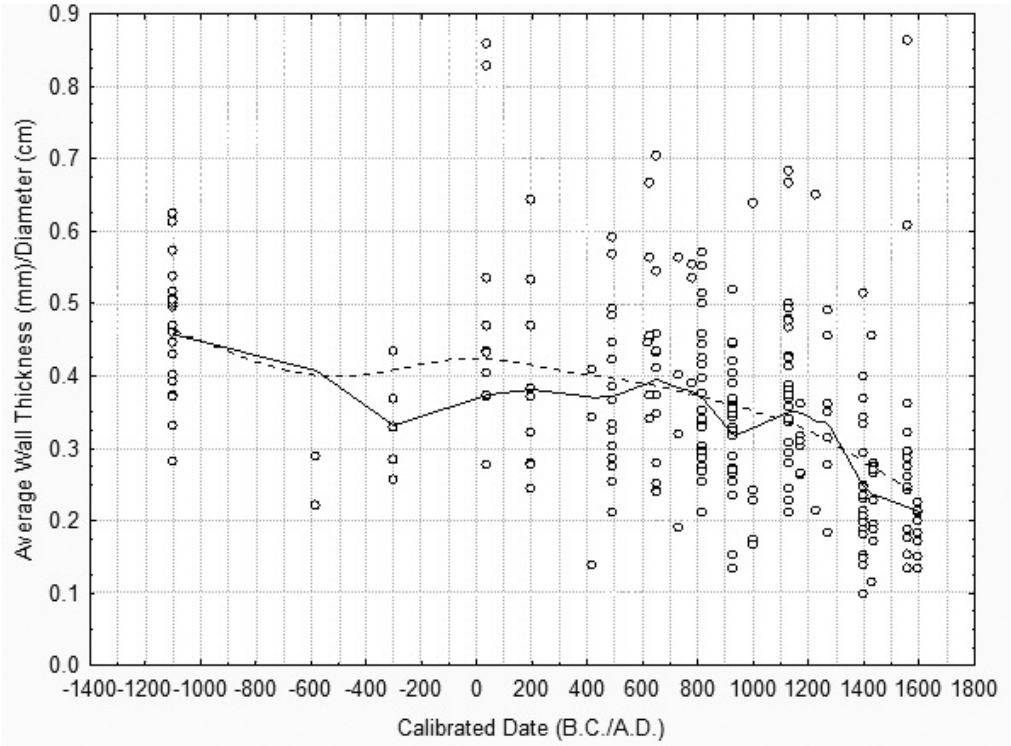

Figure 8.4. A scatter plot of average wall thickness in mm divided by diameter in cm by time. The solid line is LOWESS smoothing, and the dashed line is DWLS smoothing.

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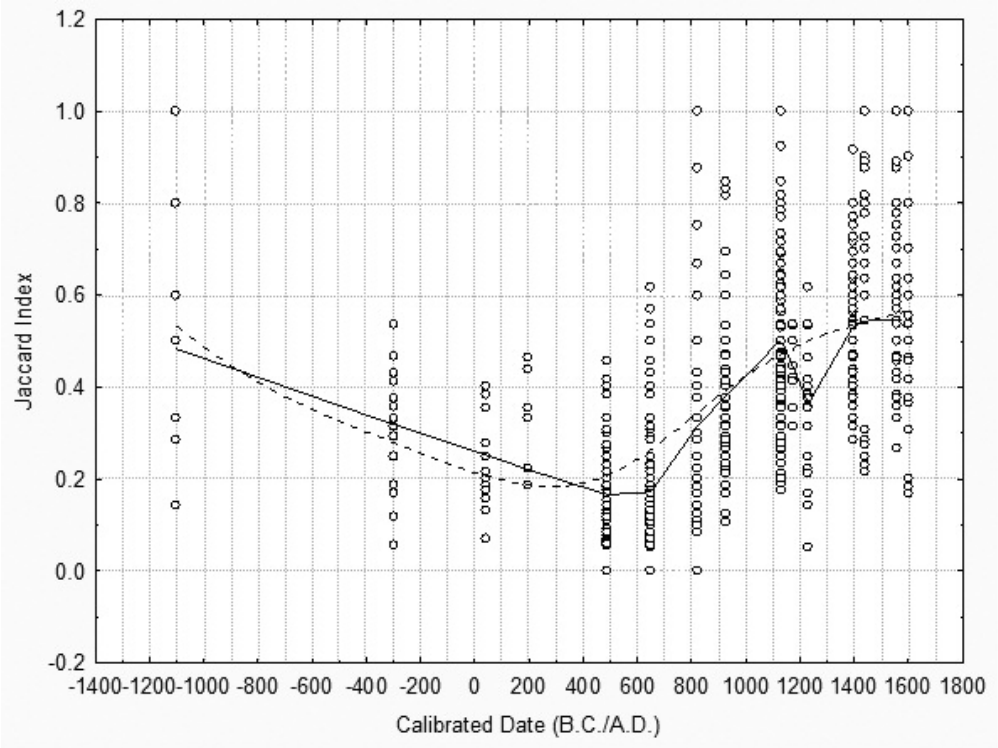

Figure 8.5. A scatter plot of Jaccard similarity values by time. The solid line is LOWESS smoothing, and the dashed line is DWLS smoothing.

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in the form of biomarker lipids (e.g., cholesterol, sitosterol, campesterol, stigmasterol). Of greatest note, however, was that 8 of the 12 absorbed residues included evidence (triterpenoids) for the use of pine resin as did 11 of 17 charred cooking residues. Interestingly, evidence of pine resin use had also been recovered by Reber from cooking residues adhering to steatite sherds from the Hunter's Home site that were directly AMS-dated to ca. cal. 1845–1524 B.C. (Hart et al. 2008).

The most likely explanation for the occurrence of pine resin in both the steatite and pottery was the desire to make the vessel interiors impermeable. Steatite vessels used in Brazil today erode and crack after repeated use if interior surfaces are not sealed (Quintaes et al. 2002). There is ethnographic (Longacre 1981), historical (Beck et al. 1989), and experimental (Schiffer et al. 1994) evidence that pine resin is useful as an interior sealing agent for pottery. These results indicate continuity in cooking vessel technology over a 3,300-year period. Unknown is whether this sealing technique was exclusive to the Finger Lakes region or was in use over a broader region. That is, the long-term record of this technology in central New York should not be used as evidence for ethnic continuity in the region. It could very well be a geographically wide spread technology that has not been recognized in adjacent regions simply because the appropriate analyses have not been done.

AGRICULTURE

A primary attribute defining Owasco was maize-bean-squash agriculture. These three crops, known sometimes as "the three sisters," were the principal crops of northern Iroquoian groups at the onset of European incursions (Engelbrecht 2003). In Ritchie's (1969) view, the advent of maize-bean-squash agriculture at the Point Peninsula-Owasco boundary resulted in major changes to subsistence and settlement systems. In Snow's (1995:71) view, maize-based agriculture arrived suddenly with Iroquoian migrants at the boundary between Point Peninsula and Owasco.

In other areas of eastern North America, much longer histories had been discovered for maize—as early as ca. cal. 45 B.C. in Illinois (e.g., Riley et al. 1994). Nearer to New York, Crawford et al. (1997) reported directly AMS-dated maize in southern Ontario at ca. cal. A.D. 500. In New York, the oldest directly AMS-dated maize

was no older than ca. cal. A.D. 985 (Cassedy and Webb 1999). (Knapp [2009] later reported a direct date on maize from the upper Delaware River valley of ca. cal. A.D. 815). As late as 2000, all evidence for maize in the Northeast came from macrobotanical remains. Working with Robert Thompson, Brumbach and I began a systematic investigation of phytolith assemblages extracted from directly dated cooking residues. Phytoliths are silica bodies that form in and around the cells of plants (Piperno 2006). By comparing assemblages of phytoliths recovered from ancient cooking residues with those recovered from modern plants, it is possible to identify the plants from which the phytoliths recovered from cooking residues originated. In the case of maize, phytoliths from the cob called rondels are used in this analysis. Thompson classified a standard 100 rondel phytoliths from each residue and from modern maize cobs and the inflorescences of various native grasses according to a taxonomy originally developed by Mulholland and Rapp (1992) and revised by Thompson (Hart et al. 2003). Statistical analysis of the resulting counts was then used to assign the rondel phytolith assemblages extracted from residues to grass species.

In 2003, our analyses indicated that maize was used in the Finger Lakes region by ca. cal. A.D. 625 (Hart et al. 2003). This was based on the analysis of six residue-extracted rondel phytolith assemblages from the Hunter's Home, Kipp Island, and Wickham sites. We continued to pursue this line of inquiry analyzing a total of 33 residues, of which 24 from 12 sites produced rondel phytolith assemblages. The results indicated maize was being used in the Finger Lakes region of New York as early as ca. cal. 300 B.C. at the Vinette site and that there was a fairly continuous record of use in the region thereafter (Hart et al. 2007; Hart and Madson 2009). As related in this volume (Hart et al.), the analysis of teeth from a cemetery at the Kipp Island site suggests substantial maize consumption by some individuals by ca. cal. A.D. 650.

While the use of cucurbits (squashes, gourds) in eastern North America has a very long history (King 1985; Smith 1992), by the late 1990s there was no evidence for cucurbit use before ca. cal. A.D. 1300 in New York (Hart and Scarry 1999). This was despite the discovery of gourd rind fragments in central Pennsylvania (Hart and Asch Sidell 1997) and Maine (Petersen and Asch Sidell 1996) directly AMS-dated to ca. cal. 4225 B.C. and ca. cal. 4545 B.C., respectively, and the recovery of squash rind fragments from central Pennsylvania directly AMS-dated to ca. cal. 645 B.C. (Hart and Asch Sidell 1997). The New York evidence for squash changed with the recovery of phytoliths from charred cooking residues. In 2003, we reported phytolith evidence for squash from each of the components for which we reported maize phytoliths, the earliest being the Kipp Island component dated to ca. cal. A.D. 625 (Hart et al. 2003). In our expanded analyses, we reported ca. cal. 1100 B.C. phytolith evidence for squash at the Scaccia site from a directly AMS-dated residue (Hart et al. 2007), placing the earliest evidence for squash in central New York in line with that for Pennsylvania, Michigan (Lovis and Monaghan 2008; Monaghan et al. 2006), and Minnesota (Perkl 1998) among other northern localities (Smith 1992).

Since the discovery of bean along with maize and squash at the Roundtop site in the 1960s to which Ritchie assigned a date of ca. A.D. 1000 (Ritchie and Funk 1973), it was accepted throughout northeastern North America that bean was present by at least that date (e.g., Riley et al. 1994; Yarnell 1976, 1986). This began to change when I obtained direct dates of ca. cal. A.D. 1350 on maize and bean remains from the same feature deposit from which the squash seeds were discovered at Roundtop (Hart 1999). Subsequent dating of 39 bean and 12 paired maize samples from 26 sites across northeastern North America indicated that bean macrobotanical remains were not evident until ca. cal. A.D. 1300 (Hart et al. 2002; Hart and Scarry 1999). Hook-shaped phytoliths are produced in bean pods (Bozarth 1990). No such phytoliths have been found in the charred cooking residues adhering to pottery sherds.

While it is certainly possible that bean was used in northeastern North America prior to ca. cal. A.D. 1300 and left thus-far unrecovered micro- or macro-botanical evidence, contrary to any speculation to that effect, currently there is no evidence of any kind for bean in such early contexts. As a result, there is no evidence at present that the maize-bean-squash triad was in use until ca. cal. A.D. 1300. Rather, each of the three crops has a history different from the others—maize and squash were in use up to two millennia prior to and beans a few hundred years after the traditional A.D. 1000 boundary. As a result, Ritchie's (1969) and Snow's (1995, 1996) formulations for agricultural history in central New York can be rejected. This further damages the concept of a boundary condition between Point Peninsula and Owasco, and thus the definition of Owasco.

LONGHOUSES AND NUCLEATED VILLAGES

As with maize-bean-squash agriculture, Ritchie's interpretation of the Roundtop site played a major role in conceptions of the history of longhouses in New York. Ritchie identified the patterns of two overlapping longhouses at the site (Ritchie and Funk 1973). One of these measured 24 m long by 7.9 m wide, while the second was initially 22.3 m long by 6.7 m wide and was later

extended to 28 m long. As with the maize, bean, and squash remains, Ritchie tied the longhouses to an occupation dating to ca. A.D. 1050.

Using charcoal obtained during the 1960s excavations at Roundtop, a careful assessment of pottery assemblages from features, and the super-positioning of features and of features and postmolds on excavation plan maps, I determined that the two longhouses dated to ca. cal. A.D. 1350 and A.D. 1600, respectively (Hart 2000). Similar analyses of other classic sites from Ritchie and Funk (1973) and a review of the literature indicated no evidence for longhouses in New York prior to the cal. twelfth century A.D. Thus, by 2003 there was no evidence for the appearance of longhouses around A.D. 1000 (Hart 2000). No new published evidence has arisen since to change this assessment.

Based on worldwide cross-cultural analyses of house size, matrilocality can be inferred from the presence of longhouses with floor space greater than 79 square meters (Divale 1977; Ember 1973; Hart 2001; see Porčić 2010). The single house plan at the White site (Whitney and Gibson 1987) approaches the threshold for a matrilocal residence. While this site was once thought to date to ca. A.D. 900 (Whitney and Gibson 1987), two recently obtained radiocarbon dates indicate a later occupation with a pooled mean median probability of ca. cal. A.D. 1100 (see Card 2002). Regardless, this floor plan does not represent a structure analogous to later longhouses.

Villages are generally defined as containing more than two households (Hart and Means 2002; Means 2007). In 2003, Brumbach and I reviewed evidence for villages in New York and determined that there was no credible evidence for such settlements before the cal. thirteenth century A.D. At that time, the earliest village with undisputed longhouses was Kelso, which based on newly obtained radiocarbon assays, was dated to as early as ca. cal. A.D. 1220 (Hart 2000). This date was on charcoal taken from a large longhouse support post and thus potentially reflected an old-wood date rather than the date of the site's occupation. A subsequent series of three dates on annual plants (two on maize, one on grass) and one on a cooking residue firmly place the site's longhouse occupation at ca. cal. A.D. 1400 (Hart and Lovis 2007).

Recent AMS dates on charred cooking residues from the Levanna site (Hart and Lovis 2007b; Schulenberg 2002b) suggest the possibility of a nucleated village as early as ca. cal. A.D. 930. The sherds from which the residues were dated were recovered by Parker (Ritchie 1928). Based on Parker's excavations, Ritchie (1928) reported 22 "lodges" at this site, although he did not present the specific evidence for these structures. On the basis of the original excavation plans, Schulenberg (2002b:158) estimated that these postulated structures measured no more than four to six meters in length and encompassed approximately 30 square meters. The occupational histories of this site, the exact nature of any structures, and the chronological status of those structures have yet to be resolved. If a component at this site representing a village does date to the early tenth century A.D., it would be evidence for one nucleated village in central New York closer to Ritchie's (1965) assessment.

ON THE RELIABILITY OF AMS DATES ON COOKING RESIDUES

Much of the new chronological information is based on direct AMS dating of charred cooking residues. Fischer and Heinemeier (2003) analyzed AMS dates on residues against dates on other materials from the same contexts at three sites from inland settings in Denmark. They concluded that because of fossil carbon in freshwater lakes it is possible for residues formed from cooking primarily fish from such bodies of water to produce radiocarbon ages 100 to 500 years too old. Lovis and I did an independent assessment of all of the dates published from these sites and found that there was only a single outlying date rather than a pattern of old apparent dates—not enough evidence upon which to build a case for a freshwater reservoir effect on residue dates (Hart and Lovis 2007a). Lovis and I subsequently analyzed 116 dates on residues from across northeastern North America against contextual dates on other materials and/or stratigraphic information and found that a maximum of 6 of these dates (5.2 percent) may be too old for their contexts (Hart and Lovis 2007b). This is an expected result for a large series of radiocarbon dates—there is no evidence that ancient carbon reservoirs in the region affect direct dates on cooking residues. There should be no doubt that the AMS dates on residues used in the various analyses of materials from central New York are accurate.

SUMMARY AND CONCLUSIONS

What is evident is that the key traits used to establish a boundary for the onset of Owasco at ca. A.D. 1000 have independent histories—they were not adopted as a package, nor did they develop hand-in-hand over a short period of time. Point Peninsula and Owasco pottery types co-occur for 200 to 600 or more years. Squash and maize have long histories in the state, with current evidence placing them at 1100 B.C. and 300 B.C., respectively. There is no credible evidence for bean,

and therefore, maize-bean-squash agriculture, until around cal. A.D. 1300. The earliest well-dated longhouses and nucleated villages do not occur until the cal. twelfth to thirteenth century A.D. The best documented early nucleated village with undisputed longhouses (Kelso) dates to ca. cal. A.D. 1400. As a result, on current evidence, what have been considered key traits for Owasco do not converge in central New York until ca. cal. A.D. 1300 to 1400. Brumbach and I announced the death of Owasco in 2003. What our subsequent research has done is bury this taxon even deeper.

So, then, what takes the place of Owasco? Do we define a new culture-historic taxon, revise the Parker-Ritchie culture-history scheme, or create an entirely new scheme? Do we even need a replacement? In concluding sections of our 2003 article Brumbach and I suggested that the persistent use of culture-historic taxa in archaeological research was a straightjacket that had channeled how archaeologists visualized the past. We argued that archaeologists needed to be aware of what culture-historic taxa represent and be cautious in their continued use (Hart and Brumbach 2003:749–750). Earlier, Smith (1997) had suggested abandoning the Middle and Late Woodland stages/periods in southern Ontario, recognizing that rather than chronological boundaries there are continua in any given region. Brumbach and I went further in our 2005 article by suggesting the complete abandonment of the Parker-Ritchie scheme in New York (Hart and Brumbach 2005:15).

One of our arguments was that units of analysis must be consistent with the theories being used to investigate the past (Dunnell 1971; Lyman and O'Brien 2002). Parker and Ritchie used the tools available at the time of their work. However, as Brumbach and I argued, the definitions of taxa in the Parker-Ritchie culture-history scheme were never theoretically justified; rather, they were simply justified on authority—that Parker and/or Ritchie recognized them (Hart and Brumbach 2003:743). In fact, one could argue that their definitions were atheoretical—they consisted simply of trait enumerations based on the number of sites excavated to date and Parker's and/or Ritchie's subjective selections. For example, Parker's original definition of what Ritchie (1936) later renamed Owasco, was based on a single site, and approximately 30 traits. Ritchie never questioned the taxon's validity—he simply accepted Parker's recognition of it and revised the definition as new sites were excavated. By 1944, Ritchie had redefined Owasco based on 30 archaeological sites and 288 traits. Why would archaeologists continue to saddle themselves with such historically contingent, subjective analytical units even to summarize large datasets?

Since the late 1950s there have been much more explicit, conscious efforts at archaeological theory building, resulting in a wide range of theoretical structures with which to investigate the past (see e.g., Bentley et al. 2009). There are an ever-growing number of increasingly sophisticated methods and techniques with which to create data from the archaeological record using new excavations as well as collections and other evidence curated for decades by museums and other institutions (see e.g., Maschner and Chippendale 2005). AMS dating technologies are becoming increasingly precise—some labs now report standard deviations of only 15 years. Because these labs require increasingly smaller amounts of organic material for dating it is becoming possible to obtain accurate dates on many more specific objects of chronological interest. As a result of the continued archaeological investigations by universities, museums, avocational archaeologists, and especially cultural resource management programs, there are now many more archaeological sites identified and excavated than were at the disposal of Parker and Ritchie. Unlike the almost exclusive focus on large, artifact-rich sites by earlier archaeologists, the continued investigation of the archaeological record in New York has included sites of varying size, content, and function (e.g., Curtin, this volume; Funk 1993; Miroff 2002; Rieth 2002; Rieth and Johnson, this volume). As a result, there are ever-increasing numbers of curated collections on which to pursue research. The massive amounts of data produced by field and laboratory projects can be easily processed and displayed by personal computers.

Given all this, the use of culture-historic taxa as units of analysis, interpretation, and summary is anachronistic. Studies that identify specific problems within specific theoretical contexts, where samples for analysis are selected that meet the specific needs of the analysis both in terms of content, geography, and chronology have great potential to increase our knowledge about the past. Comparing specific trends in artifact attributes between regions of New York and adjacent states and provinces has the potential to increase our understandings of spatial variations in human behavior. This will be especially possible by synthesizing various lines of evidence under theoretical constructs that allow the identification of contemporaneous groups and their ancestral and descendant groups. Simply asserting such relationships based on trait lists and/or geographical proximity will not suffice (e.g., Hart and Engelbrecht 2011). Culture-historic taxa served their purpose more or less satisfactorily under specific contexts that no longer exist. It is time to move on and do the studies that can make our knowledge of the past much more dynamic and interesting.

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ENDNOTES

1 Formally in an extensional definition "the necessary and sufficient conditions for membership in a unit rendered by enumeration of the members or a statistical summary of same" (Dunnell 1971:199).

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