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Building Communities: Interpreting Oneota and Mississipppian Interaction Through Paleoethnobotanical Analysis at the Morton Village Site (11F2), West-Central Illinois

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By
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ABSTRACT OF THE DISSERTATION

Building Communities: Interpreting Oneota and Mississippian Interaction Through Paleoethnobotanical Analysis at the Morton Village Site (11F2), West-Central Illinois

by

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Archaeological investigations of social interaction at the community level provide insight into the daily lives of past people and the social structures that guide these community-level interactions. This dissertation uses paleoethnobotanical analysis to examine the nature of social identity negotiation and community at the site-level scale, using data from excavations at the Morton Village site (11F2). Morton Village is a Bold Counselor Oneota and Mississippian settlement in the Central Illinois River Valley (CIRV), occupied contemporaneously by both groups in the 14th century and identified as a multiethnic or multicultural village through the presence of two distinct types of ceramic remains. This dissertation examines Morton Village as the site of a multicultural community in the CIRV, and uses paleoethnobotanical data to investigate how social identities of Mississippian and Oneota villagers were negotiated. Paleoethnobotanical perspectives on issues of community and identity have much to offer archaeological understandings of these concepts. Plant use for food, medicine, construction, ritual or ceremony, and trading reflects the beliefs, choices, and traditions of past people at both daily domestic and ceremonial or ritual levels. Food is a salient aspect of identity and choices pertaining to food and cuisine can reflect membership in a social group through patterns of planting, harvesting, preparation, consumption, and discard. This study presents an analysis of plant remains from pit features external to structures and a feasting context, and provides an in-depth analysis of one particularly important taxon, tobacco. Specifically, this study addresses plant use variability among and between Oneota and Mississippian villagers in both domestic and special contexts to aid in understanding the role of food in social interaction at Morton Village, and to generate narratives of multicultural interaction at the community level.

Results of this research indicate that Morton villagers, both Oneota and Mississippian, used similar plant taxa as part of daily and ceremonial life, but nuanced differences in plant use between groups is reported and analyzed. The data presented by this dissertation help to define Morton Village as a community in the sense that Morton Village is not a bounded, archaeological entity containing the remains of two separate material cultures, but is a dynamic social space where villagers of both Mississippian and Oneota affiliation actively negotiated their social roles and beliefs.

Introduction

The Late Pre-Contact North American Midcontinent was a site of significant social change and interaction among groups living in the region. The Mississippian component of the archaeological record in this Midcontinent is well-studied, and archaeological investigations have identified a proliferation of Oneota material culture throughout this region, beginning as early as the 11th century and continuing, in some places, to the time of European contact. Oneota development and migration in this region was complex and, in some instances, saw the establishment of multicultural Oneota and Mississippian communities and villages. Oneota is often defined primarily by ceramic style and technology, and this typological approach has laid the framework for important research examining local variability within the Oneota manifestation. Bold Counselor Oneota, a subsection of Developmental Phase Oneota material culture dating to the 14th century, provides further opportunities for creating narratives of community interaction, culture contact, and social identity negotiation.

Bold Counselor is phase of Oneota material culture restricted to the Central Illinois River Valley (CIRV) and the American Bottom, and reflects the proximity of Oneota and Mississippian villagers in the admixture of Mississippian ceramic forms into Bold Counselor ceramic manufacture (Esarey and Conrad 1998). This dissertation uses paleoethnobotanical analysis to examine the nature of social identity negotiation and community at the site-level scale, using data from excavations at the Morton Village site (11F2). Morton Village is a Bold Counselor Oneota and Mississippian settlement in the CIRV, occupied contemporaneously by both groups in the 14th century and identified as a multiethnic or multicultural village through the presence of two distinct types of ceramic remains. This dissertation examines Morton Village as the site of a multicultural community in the CIRV, and uses paleoethnobotanical data to investigate how social identities of Mississippian and Oneota villagers were negotiated. Paleoethnobotanical perspectives on issues of community and identity have much to offer archaeological understandings of these concepts. Plant use for food, medicine, construction, ritual or ceremony, and trading reflects the beliefs, choices, and traditions of past people at both daily domestic and ceremonial or ritual levels. Food is a salient aspect of identity and choices pertaining to food and cuisine can reflect membership in a social group through patterns of planting, harvesting, preparation, consumption, and discard (Hastorf 2017). This study presents an analysis of plant remains from external pit features and a feasting context, and provides an in-depth analysis of one particularly important taxon, tobacco. Specifically, this study addresses plant use variability among and between Oneota and Mississippian villagers in both domestic and special contexts to aid in understanding the role of food in social interaction at Morton Village, and to generate narratives of multicultural interaction at the community level.

Archaeological investigations into the social lives of people in the past have proliferated in recent decades, drawing on theoretical contributions from practice and structuration theories to address individual agency and interaction at varying scales (e.g. Bourdieu 1990; Giddens 1984). The term community in contemporary society has a variety of social meanings depending on the cultural context in which this term is employed, but commonly reflects shared identities, beliefs, and spaces (Isbell 2000). Archaeological explorations of communities have historically fallen short in their ability to manifest theoretical or analytical tools that reflect the nuances of community as we understand it today. Early ethnographic and archaeological work defining and examining communities employed a behaviorist conceptualization of community, describing community as a necessary condition of being human, where the community was a measureable requirement of human interaction (Isbell 2000; Yaeger and Canuto 2000). Communities in this paradigm are bounded, essentialized entities. However, recent theoretical advances in the study of communities in archaeology recognize the community as dynamic and socially constituted by individual human actors, involving complex processes of social discourse, conflict negotiation, and cultural production and reproduction. Community studies are necessarily aligned closely with examinations of ethnicity and other forms of identity, which are also actively negotiated, fluid aspects of being human that are experienced differently by different individuals (Isbell 2000). Existing along a theoretical continuum in archaeology, the community concept at one end represents the community as "a real and bounded entity, a static, natural unit of comparative science" and on the other as a "process, an imagined community constructed in competing discourse, dynamic, contingent, and contradictory", although these perspectives need not be considered mutually exclusive (Isbell 2000:425).

Early conceptualizations of community fail to address the interconnectedness of individuals on multiple nested levels through trade and exchange networks, fealty to lords or chiefs, and multi-site or regional community interaction by defining archaeological sites or villages as isomorphic with the community (Marcus 2000). Perspectives on community that attempt to define this phenomenon through the lens of active, individual social agency rightly note that communities operate on multiple levels of interaction, making them both multilocal and multivocal (Marcus 2000). Yaeger and Canuto (2000:10) favor this interactional community paradigm, advocating for archaeological approaches that focus on the "compositional heterogeneity of the community". The material remains that represent the dynamism and fluidity of communities can be difficult to interpret in terms of the social action represented by the material record, suggesting that the community concept in archaeology may be best employed as a heuristic device used to examine agency, belonging, and identity. Although many researchers have cautioned against equating an archaeological site with a bounded community entity (Isbell 2000; Marcus 2000; Yaeger and Canuto 2000), this does not mean that archaeological village sites cannot represent the remains of a community. This study asserts that Morton Village was a community in flux, participated in by both Oneota and Mississippian villagers as they negotiated life in the same village following the Oneota migration into the CIRV.

Identity and ethnicity are critically important to understanding community processes at Morton Village, all of which would have been actively negotiated and experienced differently by individuals at the site. Much like archaeologies of communities, studies of identity and ethnicity in the archaeological record gain much from employing practice-based theoretical tools, which account for the various ways in which individual actors experience, negotiate, or reject aspects of communal or ethnic identity (Jones 1997; Lucy 2005; Metcalf 2010). Ethnicity is complex topic that has been approached in a variety of ways by archaeologists, ranging from culture-historical paradigms defining ethnicity through a one-to-one correlation between specific styles of material culture and ethnic groups, to more recent post-processual approaches that understand ethnicity as expressed in highly variable ways at different scales (Lucy 2005; Metcalf 2010). Studies of ethnicity and communal identity that focus on the daily practice of individual actors within the group are a rejection of the "material culture as text" paradigm, pointing out that "social practice involving material culture is how the idea of the group becomes articulated; it is not something that can be 'read off' from the artefactual evidence" (Lucy 2005:102). There are a variety of complex, detailed discussions dealing with the nuances of identifying ethnic groups in the archaeological record (see Jones 1997, Lucy 2005; Metcalf 2010), but a common theme among these discussions is the importance of the scale of these investigations, as well as generating definitions of ethnic identity that describe this concept as socially constructed through individual recognition of belonging, rather than ascribed. Ethnic identity is thus defined, through the practice of individual actors within a group, as "that aspect of a person's self-conceptualization which results from identification with a broader group in opposition to others on the basis of perceived cultural differences and/or common descent" (Jones 1997:xiii). Ethnicity is a nebulous concept that is difficult to define, but is a relevant aspect of archaeological examinations of identity in that ethnicity makes up a part of social identity, and both concepts are negotiated in groups through daily practice and habit. This study uses insights from studies of ethnicity in archaeology as a guide to interpreting aspects of social identity as a whole at Morton Village.

Metcalf (2010:12) suggests that individuals and communities are the main actors in the construction of group identity or ethnicity, making individual, site-based examinations of the relationship between material culture and identity or ethnicity the most fruitful places to understand group affiliation of this nature. Placing an ethnic group or community within a larger historical context is also a key goal of these studies, where "the objective is to see…communities not as static 'institutions' in the manner of structural-functionalism, but as dynamic responses to changing geopolitical circumstances" (Metcalf 2010:15). This dissertation explores the Morton Village site as a community-based site of ethnic- or identity-based differentiation through various modes of cultural production and reproduction. The primary objective is not to identify, through generalizations based on ceramic attributes, the "Oneota-ness" of Bold Counselor groups at Morton Village, but to place the migration of these people into a historical context that identifies the modes by which Bold Counselor Oneota and Mississippian people produced and reproduced their identities within this shared community through daily habit and choice and ritual practices. The presence of both Mississippian- and Oneota-style ceramic remains and different patterns of house construction are not interpreted as evidence of two groups co-existing separately within the site, but rather are used to identify the presence of a migrant and host population within the community and the ways in which each group negotiated fluid, dynamic social boundaries and changing social landscapes at the community level.

A key aspect of understanding community and identity in the archaeological is building on existing archaeological classifications for material culture. Although creating typologies is often identified as an etic approach that may not produce categories that Indigenous peoples in the past would have identified with, reviewing the archaeological history and context of a material culture manifestation is a critical starting point for studies seeking to understand the complexities of identity negotiation, ethnic affiliation, and community formation in the past. While the theoretical merits of culture-historical and processual approaches to understanding and classifying material remains in the archaeological record have been debated at length, the fact remains that archaeologists must look to the material record to interpret past behaviors and the social structures they represent. The following section reviews the history and development of archaeological understandings of the Oneota manifestation and Mississippian village life in the CIRV to provide context for the discussions of migration, identity, and community formation addressed in the chapters presented in this study.

In its earliest archaeological definition, Oneota was determined to be an Upper Mississippi Valley tradition based on Classic Horizon Allamakee Trailed or Orr focus ceramic decoration (Wedel 1959:91-92) and was further divided into several core and periphery groups, with the LaCrosse region of Wisconsin and Upper Iowa and Root River regions defining the "core" Oneota area (Wedel 1959). Core Oneota areas contain cemeteries, palisaded villages, agricultural fields, and large habitation areas. As researchers continued to explore the Oneota tradition, clear evidence for regional variability and significant culture change through time became apparent, resulting in the classification of Oneota into several horizons that complicate defining Oneota by any one regional and temporal expression. Refinements to Oneota horizon chronology continue as researchers expand the body of reliable radiocarbon dates, specifically as related to defining the timing of the Emergent horizon. Hollinger (1998) and Henning (1998a) provide early to mid 10th century dates for Emergent Oneota in Eastern Wisconsin, noting that part of the problem in defining the genesis of Oneota material culture is discrepancy in regional chronologies as they relate to the Oneota manifestation as a whole; sites may return dates that suggest an Emergent phase designation, but ceramic and settlement data do not always corroborate this. Archaeologists are acutely aware of these regional discrepancies and how they complicate the horizon categorical system (Boszhardt 1998; Esarey and Conrad 1998; Henning 1998a, 1998b; Overstreet 1995, 1998), and although these classification systems are, at times, problematically etic, they remain useful constructs for organizing a complex body of archaeological data. To avoid homogenizing a distinctly heterogeneous material culture data set, archaeologists define local and regional phases and foci of Oneota ceramic, settlement, subsistence, and lithic styles that exist within larger horizon designations.

The emergence of Oneota groups in the Upper Mississippi Valley watershed is still a subject of debate among archaeologists, and multiple models exist to explain the appearance of Oneota (Benn 1989, 1995; Egan-Bruhy 2014; Gibbon 1972, 2012; Hall 1962; Henning 1970, 1998b; Overstreet 1995, 1998; Theler and Boszhardt 2000, 2006). In terms of initial Oneota development in the UMV, the Oneota designation based on Orr and Keyes' early work did not suggest a developmental relationship between Mississippian societies and Oneota groups. Others (e.g. Griffin 1960) have suggested that Oneota origins in the Upper Mississippi Valley resulted from a Cahokian "exodus", although this argument was determined untenable based on a series of dates demonstrating that Oneota settlements in fact pre-date Cahokian settlements in some cases (Benn 1989; Brown and Sasso 2001; Overstreet 1995). Recent work at Trempealeau affirms the existence of large networks of interaction between Cahokia and Oneota groups in the UMV, and may have been part of a religious network with roots at Cahokia (Pauketat et al. 2015, 2017). Benn (1989) suggested that the separate but geographically proximate development of Oneota and Mississippian peoples, coupled with shared iconographic elements such as the thunderbird and hawk, may be evidence for shared cosmological and religious beliefs in the past.

Linguistic and iconographic evidence suggest a distant and ancestral relationship between Mississippian and Oneota groups, despite a consensus that Oneota did not coalesce from a Mississippian exodus into the UMV. The linguistic relationship between Chiwere-Winnebago and Dhegiha Siouan speaking people is complex, but proto-Dhegiha and proto-Chiwere groups are estimated to have split linguistically around A.D. 1000 (Buffalohead 2004; Henning 1993; Vehik 1993). Oneota people are linguistically thought to be relatives of Chiwere-speaking Central Siouan populations, including the Missouri, Oto, and Ioway tribes (Tiffany 1997). Mississippian populations are thought to be ancestral to more southerly Dhegiha-speaking Siouan populations (Bengtson and O'Gorman 2017).

Despite numerous proposed scenarios for the emergence of Oneota in the UMV, there is little agreement on the chronology of its appearance. Archaeologists are unresolved on the issue of whether Oneota appeared, as evidenced by ceramic, lithic, subsistence, and architectural styles, prior to the shift from Late Woodland to Middle Mississippian in Wisconsin, c. A.D. 950-1050, or later (Overstreet 1995, 1998; Theler and Boszhardt 2000, 2006). The primary concern for placing Oneota origins in this transitional period is a series of troublesome radiocarbon dates, placing Emergent Oneota somewhere between A.D. 950 and 1150. Accepting earlier dates means accepting the pre-Mississippian existence of Oneota groups in Wisconsin, and accepting the later dates may suggest that Oneota derives in some way from Mississippian-influenced Late Woodland populations (Theler and Boszhardt 2000, 2006). An alternative scenario proposed by Overstreet (1998) suggests migration of earlier Oneota groups from the south into Wisconsin.

The presence of Cahokian-inspired settlements (e.g. Aztalan, Fred Edwards, Trempealeau) and material culture in the UMV during the Lohmann (AD 1050-1100) and Stirling (AD 1100-1200) phases has inspired much research questioning whether the early Oneota sites in Wisconsin resulted from an *in situ* transformation from Late Woodland groups or as a result of Cahokian influence. These site intrusions in Wisconsin likely were inspired by interactions with Cahokia people, but "one still has to look within Late Woodland societies to explain the appearance of Moingona", which is a Developmental Oneota designation and the earliest Oneota phase from Iowa (Benn and Thompson 2014:4-5). Cahokians may have exerted strong influences on Oneota/TLW groups in Wisconsin but evidence is lacking for this in other regions of Oneota development.

Several models for Oneota chronology exist, and the implications for each of these horizon chronologies are significant, as they form some of the basis for comparative studies (Table 1): Hall (1962) lists these phases as Emergent (c. A.D. 1000-1250), Developmental (A.D. 1250-1350), Classic (A.D. 1350-1650), and Historic (post A.D. 1650). Brown and Sasso (2001:211) further subdivide this, based on Boszhardt's (1989) refinement of Hall's chronology: Emergent (A.D. 1000-1150), Early Developmental (A.D. 1150-1300), Late Developmental (A.D. 1300-1400), Early Classic (A.D. 1400-1625), and Late Classic (A.D. 1625-1750). Henning

(1998a) lists an earlier date for Emergent Oneota, A.D. 950. However, Theler and Boszhardt (2000, 20006) outright reject the presence of Oneota in Eastern Wisconsin, the purported region of their development, until after A.D. 1150.

The Bold Counselor Oneota manifestation is temporally situated within the Developmental Phase of Oneota chronology, from approximately A.D. 1300-1400 (Esarey and Conrad 1998). Bold Counselor ceramics are unique among Developmental Oneota ceramic styles in the assemblages contain hybrid Mississippian/Oneota forms, likely the result of interaction and cohabitation of Oneota and Mississippian peoples at sites in the CIRV. Esarey and Conrad (1998) caution that Bold Counselor Oneota, while a distinctly Oneota ceramic culture, should not be interpreted without regard to Mississippian influence. The Morton Village site is one of five sites in the CIRV that yielded Oneota material culture (Figure 1.1), along with the Crable, Sleeth, Otter Creek, and C.W. Cooper sites, which all contain varying amounts of Oneota ceramic admixture into Mississippian material culture (Esarey and Conrad 1998). Two major excavation projects have been undertaken at Morton Village, including a salvage operation directed by the Illinois Department of Transportation and Dickson Mounds Museum in the 1980s and further excavation between 2009 and 2016 directed by Jodie O'Gorman (Michigan State University) and Michael Conner (Dickson Mounds Museum/Illinois State Museum). These excavations revealed a large habitation component without a central plaza or mound construction, which is common to Middle Mississippian villages in the region. Both Oneota and Mississippian-style house construction is evident in the presence of both wall trench (Mississippian) and single post (Oneota) structures (Conner et al. 2014; Painter and O'Gorman 2019).

The salvage excavations in the 1980s also revealed a large Oneota cemetery, Norris Farms #36, containing the remains of 265 individuals, currently known to be the largest collection of Oneota skeletal remains, many of which were exceptionally well-preserved (Milner and Smith 1990). Skeletal analysis of the remains recovered from Norris Farms #36 yielded important insights about the health of this population and the threat of violence in the CIRV region, and further analysis of demography and grave goods provides new perspectives on the social atmosphere of Morton Village as Oneota and Mississippian groups negotiated new roles and identities in this community (Bengtson and O'Gorman 2016; Milner and Smith 1990).

Following their osteological analysis, Milner and Smith (1990) reported the presence of several indications of poor diet and health, as well as evidence for violent conflict. The mortality distribution of remains from Norris Farms #36 indicates that death during the first year of life was common and approximately half of the cemetery population died by the age of 15, but those that survived into adulthood often lived past 50 years (Milner and Smith 1990:123). Orbital and cranial lesions in the form of cribra orbitalia and porotic hyperostosis were present in this population, both of which are indictors that an individual was suffering from severe anemia, suggesting unmet dietary needs. Many of the individuals examined in this study had inactive lesions as adolescents and adults, and active lesions were most common in children up to age ten (Milner and Smith 1990:126). Other skeletal lesions found on crania, long bones, and vertebrae may be evidence for this population suffering from infectious diseases, including tuberculosis or treponemal infection (Milner and Smith 1990). Dental analysis revealed high incidences of caries and linear enamel hypoplasias, which are representative of diets with high amounts of starchy sugars and childhood developmental stress, respectively.

Evidence of ante and perimortem trauma was also present in this skeletal population. Many skeletons, both adult and juvenile, showed evidence of healed or healing fractures, and 43 individuals experienced violent deaths by decapitation, scalping, or being struck by a projectile point. Other individuals experienced severe "crushing or penetrating blows" to the cranium, likely caused by a celt (Milner and Smith 1990:146), and a wide range of injuries to the upper body. Three women survived scalping and two survived being struck by projectile points (Milner and Smith 1990). The osteological analysis of the Norris Farms #36 cemetery clearly indicates a community under some amount of nutritional stress, and further demonstrates that the threat of violence in the region loomed large.

The following chapters discuss plant use at Morton Village in both domestic and special contexts, analyzing similarities and differences between Oneota and Mississippian plant use. The distinction between Oneota and Mississippian material culture and feature affiliation is not interpreted as evidence that both groups were socially distinct from each other, but rather is seen as part of important processes of social negotiations of group and community identity. Chapter 1 discusses the results of paleoethnobotanical analysis of 25 external pit features associated with Oneota, Mississippian, or mixed use based on ceramic artifacts excavated from these features. Chapter 2 analyzes the botanical remains from a feasting deposit and discusses the role of feasting in creating community solidarity and expressing identity. Chapter 3 focuses on tobacco use at Morton Village through an in-depth analysis of tobacco seed morphology intended to aid in species-level determinations of archaeological tobacco seeds. The results of these studies, coupled with other archaeological data, suggest that Morton Village was the site of significant social negotiation and change at the community level. This kind of local-level analysis is critical to definitions of Oneota that move beyond the typology and frame Oneota people as active social agents participating in community interactions with their Mississippian neighbors.

Reference	Emergent	Developmental	Classic	Historic
Hall 1962	A.D. 1000-1250	A.D. 1250-1350	A.D. 1350-1650	post A.D. 1650
Brown and Sasso 2001	A.D. 1000-1150	Early: A.D. 1150-1300 Late: A.D. 1300-1400	Early: A.D. 1400-1625 Late: A.D. 1625-1700	
Henning 1998	A.D. 950-1000	A.D. 1000-1350	A.D. 1350-1650	A.D. 1650-1725

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COMPARATIVE PALEOETHNOBOTANICAL ANALYSIS OF ONEOTA AND MISSISSIPPIAN PIT FEATURES FROM THE MORTON VILLAGE SITE (11F2), WEST-CENTRAL ILLINOIS

Introduction

Archaeological investigation of social identity is a vital component of narratives that describe past people as agents of lived, human experience, and is integral to recent efforts by archaeologists working in Eastern North America (ENA) to create historical frameworks around archaeological subjects. Studies of the Oneota tradition across the Midcontinent focus primarily on the identification and classification of material culture and Oneota origins, and the Oneota tradition has largely been defined by its distinct ceramic forms and decorations. Migration, social change, and identity during the late Precontact period (A.D. 1300-c. A.D. 1425) in the Central Illinois River Valley (CIRV) region of the North American Midcontinent are complex issues that are recently receiving more attention from archaeologists (Bengtson and O’Gorman 2016, 2017; Benn 1989; Benn and Thompson 2014; Egan-Bruhy 2014; Painter and O’Gorman 2019; VanDerwarker et al. 2013, 2016).

The Morton Village site (11F2) represents a unique, multiethnic site, home to people identified archaeologically as Bold Counselor Oneota and Mississippian, from approximately A.D. 1300-1400. Material remains at Morton Village represent active social negotiations that were required for Oneota and Mississippian people to coexist. This study examines the changing social environment at Morton Village through the lens of foodways and other plant use patterns. Foodways are salient aspects of cultural identity. Food production, storage, consumption, and disposal patterns are often the result of long-term cultural transmission of values, deeply socially embedded, and often slow to change (Egan-Bruhy 2014).

Situating Bold Counselor Oneota in a historical trajectory through comparative analysis is critical to understanding the relationships of Oneota people with larger trading networks and communities, and the social and cultural environment that existed between Oneota and Mississippian residents of Morton Village. This analysis uses paleoethnobotanical methods and theories to understand the role of food in the significant cultural entanglements at Morton Village. Plant remains from pit features external to structures (hereafter external pits), most likely storage and refuse pits, within the habitation area of the site are presented to highlight variation within in plant use between Oneota and Mississippian-associated pit features at Morton Village. This analysis employs both intra- and inter-site comparisons to build on previous research by establishing a schema for identifying how Oneota groups living at Morton Village negotiated social identity through food choices as a migrant community during a time of significant violence in the region. This study reports on the paleoethnobotanical analysis of 25 external pit features from contexts containing Oneota, Mississippian, and mixed materials. Pit features were given a cultural designation by excavators based on the ceramics recovered from them, but Morton Village is not interpreted as a village with two separate groups of occupants, but rather two groups coexisting while maintaining some traditions, and also building and participating in new ones. The multicultural social formation at Morton Village makes this site ideal for examining the role of food and traditional foodways in reflecting and shaping social identity. Significant focus is placed on the Oneota component of Morton Village to add to the much needed and growing body of scholarship seeking to understand Oneota lifeways beyond ceramic traditions.

Oneota Development and Situating Bold Counselor within the Oneota Tradition

Oneota is an Upper Mississippian material culture designation given to a diverse array of groups settled throughout the Prairie Peninsula following the Terminal Late Woodland (TLW) occupation of the same region and into the period of initial European contact (Benn 1989; Brown and Sasso 2001; Griffin 1995; Henning 1970, 1998a, 1998b; Hollinger 1995; Overstreet 1995; Wedel 1959). The Oneota designation as separate from TLW and Middle Mississippian groups is determined primarily by the style of ceramic production, specifically “shell tempered, globular ceramic vessels with rounded shoulders, curvilinear or geometric designs, and strap handles” (Staeck 1995:3), although lithic artifacts were also taken into consideration when defining Oneota (Wedel 1962). Other research also indicates house style as useful in defining Oneota phases and horizons, despite a wide range of variability in size, construction style, and form (Hollinger 1995). Oneota settlements are often found in ecotonal regions, near the confluence of upland and floodplain forests, river systems, and prairie ecosystems (Gibbon 2012). This choice in settlement area is reflected in the characterization of Oneota subsistence as “flexibly adapted” to a variety of food preferences and procurement strategies (Parker 1992:485; see also Gallagher and Arzigian 1994; Henning 1970; King 1990). Large, dispersed settlements are common and house size varies within the Oneota tradition (Hollinger 1995).

Bold Counselor is a phase of Oneota archaeological materials based almost entirely on ceramic attributes, and represents the presence of migrant groups that co-existed with local Mississippian peoples, and the nature of this variation should be considered on a site-by-site basis in the Central Illinois River Valley (CIRV) (Esarey and Conrad 1998:53). The Bold Counselor ceramic style is typical of Developmental Phase Oneota ceramic traditions and is considered distinctive based on the abundance of jars with horizontal trailing and typically without lip stamping, bowls with lip stamping, and two forms unique to Bold Counselor: Mississippian-style deep rimmed plates with Oneota-style decoration and "a broad, shallow bowl form with flared, concave flanges or handles" decorated in Oneota motifs (Esarey and Conrad 1998:40). Bold Counselor phase Oneota sites in the CIRV (C.W. Cooper, Crable, Sleeth, Otter Creek, and Morton Village), appear in the late 13th century and last through approximately A.D. 1450, clustering around a 35 km stretch of the Illinois River Valley near the confluence of the Spoon and Illinois Rivers (Esarey and Conrad 1998; VanDerwarker et al. 2013, VanDerwarker and Wilson 2016). The only recognized Bold Counselor material outside of the CIRV is a small component at the Sponemann site in the American Bottom (Jackson et al. 1992, 1998), making Bold Counselor a phase restricted almost entirely to the CIRV. Bold Counselor is highly recognizable, with similarities to other Developmental Oneota ceramic assemblages, most notably Correctionville, appearing c. A.D. 1300 (Northwest Iowa) and Moingona (Central Des Moines River Valley), appearing c. A.D. 1250 (Benn and Thompson 2014; Conrad 1991; Esarey pers. comm. 2017; Henning 1998b; Tiffany 1997:206).

Following the much-debated end of the Emergent Oneota phase in Wisconsin, a series of Developmental Oneota sites appear in Iowa (Correctionville, Moingona), southern Minnesota (Blue Earth), eastern Wisconsin (Grand River phase and Koshkonong locality), and central Illinois and the American Bottom (Bold Counselor). This relatively fast proliferation of Oneota sites featuring technologically and stylistically similar ceramic traits indicates that these people maintained long range interactions with Mississippians in the UMV and American Bottom, as well as Plains village groups on the periphery of the Prairie Peninsula. There is strong evidence for trade and migration, including possible intermarriage, captive exchange, and refugee hosting at Oneota and Mississippian sites throughout the range of Developmental Oneota sites (Esarey and Conrad 1998:53), particularly at sites showing evidence of cohabitation (e.g. Crable, Morton Village). Christenson (2003:241) describes Developmental Oneota as representing “the outcome of Late Woodland Effigy Mound groups that chose not, to or were not allowed to, participate in the Middle Mississippian sphere of influence in southern Wisconsin”. The lack of Cahokian influence from Developmental Oneota sites in Iowa implies that understanding Oneota development in the region requires a model that looks to Late Woodland societies as Oneota progenitors in the area (Benn and Thompson 2014).

Developmental Oneota material culture follows closely on the heels of the TLW ceramic High Rim Horizon, which connected TLW settlements between the Missouri and Mississippi river basins along an East/West axis, following closely the distribution of the “Cordage Horizon” (c. A.D. 700-900) (Benn and Thompson 2014:31; Esarey 2017). Diffusionist paradigms of “Mississippianization”, therefore, may be inappropriate in describing the genesis of Developmental Oneota in Iowa. Employing theories of practice embedded in historical context provides Developmental Oneota people, including Bold Counselor, with significant agency, seen in the choices made by craft specialists (e.g. potters and stone tool producers) to adhere to a particular tradition (Benn and Thompson 2014). Defining Oneota solely as a ceramic style risks eclipsing the modes of social reproduction ingrained in material culture, although the past several decades of research on the Oneota manifestation. Modes of migration of Bold Counselor Oneota people into the CIRV remain unclear, but the Bold Counselor component in the CIRV was undoubtedly linked into a large sphere of interaction connected to Plains Village groups and western Oneota expressions of the Developmental horizon (Gibbon 2012; Henning 1970; Tiffany 1997).

All Bold Counselor sites in the CIRV contain both Mississippian and Oneota components, but there is considerable variation in the degree to which each is represented in the material assemblages from these sites. The C.W. Cooper site, after A.D. 1300, is reported as "relatively pure" Oneota, whereas the Crable site shows nearly equal amounts of Mississippian and Oneota artifacts (Esarey and Conrad 1998:38), though very little is known about any of these sites with the exception of Morton Village. Skeletal analyses from the predominantly Oneota Norris Farms 36 cemetery, associated with Morton Village, show high instances of violence, including scalping, Parry fractures, arrow wounds, and head wounds (Bengtson and O'Gorman 2016, 2017; Milner and Smith 1990; Steadman 1998; VanDerwarker et al. 2013). Clearly, Oneota people migrating into the CIRV region were met with some amount of resistance but it is unclear who they were fighting with and why.

The degree to which Mississippians and Oneota people living in Morton Village cooperated, co-existed, or maintained separate beliefs, traditions, and identities is still being studied, with the latter seeming less likely as more analyses are generated. Although archaeologists rely almost exclusively on taxonomic distinctions of material culture to define and locate Oneota in the CIRV, it should be noted that Oneota ceramics do not indicate Oneota "ethnicity" as a one-to-one correlation (Esarey and Conrad 1998), and that Oneota itself may best be thought of "as a heuristic device" (Staeck 1995:3). Bold Counselor may be thought of as unique within the Oneota tradition because of the strong association with Mississippian peoples sharing the CIRV. Establishing secure chronologies at sites containing both Oneota and

Mississippian features remains a key factor in understanding the relationships between these two sets of material culture.

Theorizing Identity Through Foodways and Migration

The wide analytical leap required in making inferences about identity and ethnicity from technological aspects of material culture is a problem inherent to archaeological scholarship (e.g. Hodder 1982; Jones 1997). However, the relationship between food habits and identity is well supported by paleoethnobotanical research both within and outside of Eastern North America (e.g. Johannessen 1988; Morehart and Morrell-Hart 2013; Twiss 2007a, 2007b, 2012; VanDerwarker et al. 2007, 2013). Food production and consumption are particularly significant aspects of archaeological studies of identity because foodways involve both the performance of cultural identity and the physical embodiment of food as both sustenance and multivocal symbol (Twiss 2007a:2). Identity is a complex topic, defined by Twiss (2007a:2) as "the affiliation of an individual or group with a selected broader group and not with other groups". This definition works in multiple nested levels, from a society in its entirety to the individual people that exist within that society. This is particularly salient to the archaeological material from Morton Village because, at present, the degree to which Bold Counselor Oneota and Mississippian artifact forms represent the maintenance of separate or distinct ethnic identities is unclear, though recent analysis of Morton Village ceramics and the Norris Farms cemetery suggests visible and significant cooperation and community building at the site (Bengtson and O'Gorman 2016; Painter and O'Gorman 2019). The artifact distribution at Morton Village and other sites in the CIRV represent a collection of forms drawing influence from community traditions in the UMV and the Cahokian polity. This is further complicated by histories of contact and interaction between Oneota groups in the UMV and Cahokian agents (Pauketat et al. 2015, 2017). Studies of foodways and specialty plant use are well-situated to inform various aspects of social life that may clarify some of the ways in which Bold Counselor Oneota and Mississippian peoples interacted and co-existed.

The archaeological study of food helps construct complex, polysemic identities that address issues of political and status-based social demarcations, culturally variable notions of bodies, and how certain aspects of cuisine can act as “metaphors of the self and world” (Twiss 2007a:2-3, 2012). Archaeological studies of foodways almost invariably begin by addressing basic economic questions about subsistence, but numerous studies have approached gendered consumption and production of food (e.g. Beehr and Ambrose 2007; Fritz 1999), food and feasting as markers of status (VanDerwarker et al. 2007), and the symbolic aspects of food (Douglas 1966, 1973, 2014). There is a large suite of archaeologically-visible aspects of foodways capable of contributing to notions of Oneota ethnicity and identity, including: processes of food storage and trash deposition; cooking, eating, and food serving practices; location and scale of food preparation strategies; and choices or restrictions in food diversity. Numerous paleoethnobotanical studies have approached problems of group identity or culture change from the perspective of foodways, particularly because they are deeply embedded behaviors that people engage with multiple times a day throughout the course of their lives. Food knowledge in many forms is also handed down generationally, and is often slow to change in instances of migration and culture contact (e.g. Egan-Bruhy 2014). Much like tobacco and other specialty crops, food remains reflect group choices, worldviews and social organization strategies at multiple levels, including daily consumption and preparation, large scale community-based food processing, and feasting.

Understanding Morton Village as the destination of a migrating Oneota community necessitates an understanding of the foodways in this community not just in terms of ahistorical operation of subsistence patterns, but in ways that seek to disentangle the historical processes that developed beliefs, practices, and traditions surrounding food, eating, cuisine, and subsistence strategies. Food is a powerful mode by which people construct and maintain their ethnic or cultural identities, and honor tradition and heritage of their ancestors and relatives. These aspects of food are particularly important when understood within the context of group migration into a new region, in this case, the Bold Counselor movement into the CIRV. Discussions of migration often become discussions of coalescence, hybridity, or creolization of culture (e.g. Bengtson and O'Gorman 2017; Clark et al. 2013; Clark et al. 2019; Deagan 2013; Kowalewski 2006; Painter and O'Gorman 2019), making the role of food studies in contexts of migration or coalescence an important factor in understanding how these processes of movement and change affect the systems and traditions that sustain people. Clark et al. (2019) describe four dimensions of migration, including scale, organization, and pre-migration conditions in both the homeland of the migrating group and the destination. Their analysis further points out that migration or coalescence is a multigenerational process that is not necessarily dependent on the scale of the migration, but rather on the social distance of the groups and the identity and skills possessed by the migrating group (Clark et al. 2019:263). A paleoethnobotanical approach to understanding how inhabitants of Morton Village negotiated an ethnic identity has the potential to yield important information about the social lives of Bold Counselor Oneota and their Mississippian neighbors, adding to the primarily ceramic-based corpus of research seeking to define and distinguish Bold Counselor Oneota as an archaeological manifestation.

Morton Village: Environment and Previous Research

The Morton Village site is located within a 1.6 km long section of the upland surface of the western bluff line of the Illinois River Valley in present-day Fulton County within the Emiquon Nature Preserve (Figure 1.1). The bluffs in this region rise sharply above the floodplain and are characterized by short and deeply carved ravines (King 1990:3). Oneota settlements in the CIRV tend to occur in ecotonal regions where people could access a variety of environments, including upland and bluff ecosystems, as well as floodplain resources. Morton Village is located within an equally diverse physiographic area containing igneous and metamorphic rock deposits ideal for producing groundstone tools and thick, Illinois and Kansan age glacial loess deposits (King 1990:4).

Morton Village is located within the Western Forest-Prairie Division and is bordered by the Illinois River Bottomlands and Sand Areas Division. Upland forests are dominated by oak and hickory, but mesic forests on bluff slopes provide more diversity in available tree resources, such as *Acer saccharum* (sugar maple), *Tilia americana* (basswood), and *Ulmus rubra* (slippery elm). The Sand Areas Division of this landscape is composed of sand deposited and moved by meltwater from the retreat of Wisconsin glaciers; these soils are prone to drought and therefore support a relatively distinct set of drought-tolerant plant life. The bottomlands in the CIRV contain species like those in the American Bottom, supporting a variety of trees throughout the often-abrupt elevation differences and flooding patterns (King 1990:4). Common species include pecan (*Carya illinoensis*), black walnut (*Juglans nigra*), ash (*Fraxinus* spp.), oak (*Quercus* spp.), honey locust (*Gleditsia triacanthos*), and elm (*Ulmus* spp.). The Illinois River meander belt has created numerous meander scar lakes, relict marshes, and sloughs (King 1990:4), introducing more available aquatic plant variety to the Morton Village area.

Salvage excavations in the 1980's, conducted under the aegis of the Illinois State Museum and the Illinois Department of Transportation, were done at Morton Village to determine the impact of embankment and ditch regrading to be carried out on an area of the site (Harn 1990). These excavations revealed a habitation and cemetery component (Norris Farms #36) at Morton Village, and document an Early Woodland component, as well as Mississippian and Oneota components. Because of the paucity of Oneota material culture in Illinois at the time, special attention was paid to the Oneota component at the site. This salvage work was vitally important in that it identified and documented the largest known Oneota cemetery in Illinois, containing 264 individuals thought be ethnically Oneota. This provided a basis for later inquiry by Michael Conner (Dickson Mounds Museum) and Jodie O'Gorman (Michigan State University) that, based on radiocarbon dates obtained from further excavations, established Mississippian and Oneota cohabitation at Morton Village.

Between 2010 and 2014, a magnetometer survey of approximately 73,753 m^2 generated detailed information on habitation structures of both Mississippian and Oneota components (Conner et al. 2014, see Figure 1.2). Single post house construction is interpreted as Oneota based on previous research indicating this style as traditional of some Oneota groups, and wall trench construction as indicative of Mississippian-style construction. Several structures show evidence of both types of construction. The survey identified 97 likely and 29 possible structures, including several structures interpreted as ritual or public spaces, including a semi-circular wall trench construction building identified by GPR in the central portion of the site. The structures identified by the magnetometer are densest across a wide ridge at the northern boundary of the survey area. The site shows no evidence of a palisade, and does not conform to the CIRV Mississippian pattern of structures surrounding a central plaza area, but some structures appear to be lined in rows, indicating some planning of structure location. Wall trench and single post structures appear to be separated spatially and generally cluster together. There are two relatively open areas along the east and west boundaries of the survey area that may be common areas; features were identified in these areas, but no structures (Conner et al. 2014). Dates obtained from excavations of structures and features place the Mississippian and Oneota component as contemporaneous, between approximately A.D. 1300 and A.D. 1400. Between 2008 and 2016, the MSU and DMM field school at Morton Village partially excavated numerous habitation structures, three ritual or public structures, and 103 pit features at the site. Lithic, ceramic, and faunal analyses are in progress.

Materials and Methods

Botanical samples from Morton Village were floated between 2009 and 2014 during field seasons directed by Conner and O'Gorman. For this analysis, flotation samples from 25 features with diagnostic pottery sherds were analyzed: 12 Oneota, 4 mixed Oneota/Mississippian, and 9 Mississippian, totaling 59 individual samples and 528 liters of floated soil (Figure 1.3). Samples were divided into light and heavy fractions during flotation, passed through 1/16th inch window screen, and stored and sorted separately. Light and heavy fractions are not physically combined, but sorted according to the same protocol. All flotation samples were analyzed in the Paleoethnobotany Laboratory at Washington University in St. Louis using standard paleoethnobotanical methods under the supervision of Dr. Gayle Fritz. Samples were sorted under a low power binocular microscope (7-45X). Each light fraction and heavy fraction was size graded prior to sorting under the microscope by passing them through USDA Geological Sieves with the following mesh sizes: 4.0 mm, 2.8 mm, 2.0 mm, 1.4 mm, 0.71 mm, and 0.425

mm. Samples were sorted completely at the 2.0 mm mesh size and greater, and all charred plant remains were either given a taxonomic determination or classed based on material type (e.g. wood, bark, stem). All recognizable cultigens (e.g. maize components, squash, beans, tobacco, and Eastern Agricultural Complex crops), as well as acorn shell and other seeds, were identified at 1.4 mm and greater, and only seeds were pulled from mesh sizes less than 1.4 mm.

All flotation samples from Mississippian (n=9 features and 185 liters of floated soil) and Oneota pits (n=12 and 264 liters of floated soil) and mixed material pits (n=4 and 89 liters of floated soil) were sorted completely. Recovered macroremains were recorded in the following way: wood was weighed but not counted, all nutshell fragments with the exception of acorn were counted and weighed down to the 2.0 mm sieve size, all cultigens and acorn nutshell was counted and weighed down to the 1.4 mm sieve size, and all seeds from the <2.0 mm screens were counted but not weighed. Seed Number Estimates (SNE) were calculated as a possible measure of control for fragmentation in seeds. SNE is approximated by using anatomical parts of seeds (and whole seeds), providing an estimation of the minimum number of seeds present in a sample (Lopinot et al. 2015:215). Identifications of plant matter were made to the lowest possible taxonomic determination based on the comparative reference collection at Washington University and plant identification reference manuals (Delorit 1970; Martin and Barkley 1961; Montgomery 1977).

Results

The primary objective of this paper is to examine whether plant use differs between Oneota, Mississippian, and mixed features, and explore the implications of these differences. All analyzed features were pit features external to structures on the site, and excavators made the determination if they were Oneota, Mississippian, or mixed based on the ceramic assemblages recovered from each feature: Oneota features only contained Oneota ceramic material, Mississippian features contained only Mississippian material, and mixed was a combination of both. The site was occupied contemporaneously by both groups, as demonstrated by radiocarbon dates, apart from several Mississippian pits that likely predate the Oneota at Morton Village, and those samples are not dealt with here. Although this site is interpreted as a multi-cultural community, with Oneota and Mississippian villagers living side-by-side, it is important to note the distinction between Oneota and Mississippian features. There appears to be some demarcation between Mississippian and Oneota people at the site as pertains to house construction style and ceramic distribution, indicating that people were living together but maintaining their separate house and ceramic construction styles. The maintenance of separate construction styles for housing and ceramic decoration styles indicates that macrobotanical analysis of pit features at the site may provide important insight into whether Oneota and Mississippian peoples used plant resources differently, particularly whether there are differences in the density of certain taxa, species diversity, or differing preferences for a particular plant. Oneota and Mississippian pits are compared to each other to this end, with the mixed assemblage features providing additional comparative data for understanding any possible differences between Oneota and Mississippian plant use patterns.

Contents of Pit Features

Oneota pit features yielded a total of 51.7 grams of wood charcoal, approximately 0.20 grams of wood charcoal per liter of floated soil, and raw data from all analyzed features are summarized in Table 2. Nutshell and tropical cultigens, specifically *Zea mays*, were abundant in

Oneota pits, while EAC crops and fruits comprised a much smaller portion of recovered macroremains. Miscellaneous taxa, including seeds from some plants that produce edible leafy greens, disturbance taxa, and tobacco were also recovered. The majority of taxa present in Oneota pits were recovered from two large features, 213 and 214. Mississippian pits contained a total of 49.95 grams of wood charcoal (0.27 grams/liter of floated soil). Nutshell and tropical cultigens were also common in Mississippian samples, although they appear in differing quantities, densities, and ubiquity than some Oneota and mixed material pits. Like Oneota pits, most material recovered from Mississippian pits came from three pit features (Features 152, 174, and 209), and Mississippian features yielded similar taxa to those recovered from Oneota pits, with slightly fewer taxa present. Mixed material pits contained 92.92 grams of wood charcoal, or 1.04 grams of charcoal/liter of floated soil. Taxa recovered from mixed material pits are similar to those recovered from Oneota and Mississippian pits, including nutshell, tropical and EAC cultigens, and miscellaneous/disturbance taxa, and edible leafy greens. The volume of floated soil for mixed material pits analyzed for this study is lower than Oneota and Mississippian pits, but provides an important point of comparison. Examining Morton Village as a multicultural community requires analysis of similarities and differences between Oneota and Mississippian-designated features and structures, but mixed material pits may indicate ways in which cooperative processes related to plant use and food production played out at the site, or perhaps communal refuse or storage areas used by both Mississippian and Oneota households.

Nutshell. Oneota and Mississippian pit features yielded both thin and thick varieties of hickory (*Carya* spp.), as well as acorn (*Quercus* sp.), hazelnut (*Corylus* sp.), and walnut (*Juglans* spp.). Thick hickory was the dominant nut taxon recovered from Oneota samples, representing 77% of recovered nutshell by count (n=413 fragments), but the presence of thin-shelled hickory fragments in both Mississippian and Oneota pits indicates that Morton Village residents were either making use of several species of *Carya*, or there is significant variation in the shell thickness of one single species. Thick hickory was present in Mississippian and mixed material pits, but making up only 9% of the total nutshell assemblage in both sets of samples. Hickory is an oily, nutritious nut containing high amounts of fat, and ethnoarchaeological evidence suggests that the nuts may have been pounded in large batches to release oils and fats and then formed into balls which could be stored for later consumption (Fritz et al. 2001).

Acorn was also present in Oneota pit features, but only comprised approximately 9% of recovered nutshell. Conversely, Mississippian and mixed material pits showed much higher concentrations of acorn, which composes 89% of the total nutshell assemblage for both feature types. Acorns are high in tannins, which taste bitter and may be toxic if consumed in large quantity, requiring them to be leached before they can be consumed. Leaching is a process wherein acorns are soaked in water, either in cold, running water for several days or in boiling water for a shorter period, until the tannins have been extracted. Acorns can then be used to prepare food, such as flours for breads, stews, or other items (Scarry 2003). A small amount of acorn nutmeat was recovered from level 3 of Feature 213 (Oneota), and from level 6 of Feature 232 (mixed material). No nutmeat was recovered from Mississippian pits.

Hazelnut was recovered in small quantities from Oneota pits, comprising only 3% of the nutshell assemblage. Mississippian and mixed material pits contain similarly low quantities of hazelnut shell, approximately 1% of the nutshell assemblage for both sets of features. Hazelnuts are shrubby plants that do well in human-managed environments, and were likely processed for the nutmeat, rather than oil extraction because of the high fat content of the nutmeat (Biwer and VanDerwarker 2015:94).

Juglandaceae nutshell, either *Carya* or *Juglans*, was also recovered from Oneota pit features, comprising 11% of total nutshell, and was identified to family only, except for a single fragment of *Juglans cinerea*, or butternut. Mississippian samples contain a very small quantity (n=2) of Juglandaceae nutshell. Mixed material samples yielded similarly low quantities of Juglandaceae (n=4), and three of those fragments were identified as *Juglans nigra*, or black walnut. Identifications of *Juglans* to species were made using the comparative reference collection of experimentally charred *Juglans nigra* and *Juglans cinerea* in the Washington University Paleoethnobotany Laboratory.

Some researchers have suggested that extracting nutmeats from hazelnut and walnut may have required less processing time than creating flours or oils from hickories and acorns, though it is also possible that the opposite is true, with batch processing of hickories and acorns producing larger amounts of edible material through less total work time (Biwer and VanDerwarker 2015). These differences in processing among different nut resources likely affected the ways in the which nutshell enters into the archaeological record; nuts that are processed as part of a large batch (hickories and acorns) may have a more visible presence in the archaeological record than nuts that were processed by simply removing the nutmeat for consumption. Conversely, processing walnuts for their nutmeat by hand, which is required to remove bad tasting residues that batch processing would leave, would produce a significant amount of shell that could serve as a good fuel source and would therefore make walnut shell appear prominent in the paleoethnobotanical record if walnuts were a heavily used nut resource.

Tropical Cultigens. Tropical cultigens, including maize (*Zea mays*) and the common bean (*Phaseolus vulgaris*), were by far the most common taxa identified in all analyzed features. Oneota pits yielded a density of 4.86 fragments of maize per liter of floated soil and comprising approximately 55% of all recovered macroremains. Mississippian samples contain a lower density of maize fragments (2.55 fragments per liter of floated soil), and maize kernels, cupules, glumes, and embryos represent 30% of the total macrobotanical assemblage from Mississippian pit features. By count, mixed material samples yielded the highest density of maize fragments, containing 7.87 fragments of maize/liter of soil, and compose 39% of the total plant assemblage in these features. Evidence of common bean cultivation is present in Oneota contexts in the form of carbonized cotyledons (n=11 fragments), with a seed number estimate (SNE) of 8. Mississippian samples yielded a single bean cotyledon, and mixed material samples yielded 5 cotyledon fragments (SNE=3). The common bean did not become a significant dietary component anywhere in ENA until after AD 1200 (Hart and Scarry 1999). Monaghan et al. (2014) suggest the spread of the common bean during the 12th century closely mirrors interactions and movements of Plains, Oneota, and Northern Late Woodland people. Beans in the CIRV cluster between AD 1250 and AD 1350, which is coincident with Oneota migrations into the region. The introduction of the common bean is a vital aspect of "Three Sisters" agricultural systems, making its presence at Morton Village an important component to understanding potential shifts in cultivation strategies (Monaghan et al. 2014).

Eastern Agricultural Complex Crops. The EAC is a sophisticated suite of small, starchy and oily seeded crops that predate maize farming in Eastern North America, including squash (*Cucurbita pepo* ssp. *ovifera*), bottle gourd (*Lagenaria siceraria*), goosefoot or lamb's quarters (*Chenopodium berlandieri* ssp. *jonesianum*), maygrass (*Phalaris caroliniana*), little barley (*Hordeum pusillum*), sumpweed or marshelder (*Iva annua* var. *macrocarpa*), sunflower (*Helianthus annuus* var. *macrocarpus*), and knotweed (*Polygonum erectum* ssp. *watsoniae*). Premaize agricultural systems were variable throughout the Midwest, and the process of maize supplanting EAC cultigen use in the Late Pre-contact period likely looks different from region to region (Fritz 1990). Most EAC crops were put under selective pressure in ENA beginning around 5000 years BP, and all taxa exhibited traits of domestication by approximately 3800 years BP, with the exception of maygrass and little barley, which do not show morphological markers of domestication, but are considered domesticated because of their association with other EAC domesticates in the archaeological record (Adams 2014; Fritz 2014; Smith and Yarnell 2009). Seeds, achenes, fruits, and rinds from EAC crops appear in lower quantities at Morton Village sample than nutshell and maize, which may be a function of reduced use or because EAC botanical material recovered from archaeological contexts is typically something that is mostly edible parts of the plant, and thus produces less visible processing waste than a taxonomic category like nutshell or maize (VanDerwarker and Wilson 2016).

Evidence of North American squash rind, presumably *Cucurbita pepo* ssp. *ovifera*, was recovered in the form of carbonized rind, rather than seeds, identifiable to genus by the distinctive phytoliths present in the dermis of the rind and the cellular structure below. Mississippian and mixed material features both contained squash rind (n=19 rind fragments in Mississippian samples and 6 in mixed material samples), and only one rind fragment was present in Oneota pits (Table 2). The absence of carbonized squash rind in Oneota pits is notable; squash retained an important place in farming and gardening strategies into the Late Precontact and Historic periods alongside maize and the common bean, which may not be the case for other EAC crops, with the exception of sunflower (Shroeder 2004). Morphological changes generally associated with domestication of plants would predict thickening of squash rind and larger seed sizes, but this may not be the case with squash cultivated in ENA. Fritz (1990) suggests that the domestication of this plant may not have been the result of selection pressure based on what was best to eat, but rather on technological factors. Squashes may have been domesticated based on what made them good tools for fishing (net floats), which doesn't necessarily require morphological change. Other uses for squash, specifically containers, would likely have required selection for increased rind thickness and selection for greater size in the edible, nutritious seeds (Fritz 1990:424).

The most common EAC crop recovered from all features was *Chenopodium berlandieri* (n=43). *Chenopodium berlandieri* ssp. *jonesianum* is a now-extinct, formerly domesticated subspecies of chenopod cultivated in ENA, and shows evidence of domestication through its reduced testa thickness, truncate margins related to increased volume of starchy interior contents, and a smooth-textured seed coat; These traits appear at approximately 3800 BP, with cultivation likely occurring for many years prior to the earliest appearance of this domesticated subspecies (Fritz and Smith 1988; Gremillion 1993; Langlie et al. 2014; Mueller et al. 2017; Smith and Yarnell 2009. Evidence of chenopod cultivation in ENA is highly complex, involving a spectrum of wild, weedy and cultigen morphs and some overlap in morphometric evaluations of archaeological *Chenopodium* seeds. Thin testa (less than 20 μm) morphs do occur naturally, with some research claiming that thin testa morphs may represent about 5% of weedy chenopod seeds in modern populations, but thin testa morphs compose a much higher percentage of archaeological chenopod seeds (up to 100%) (Gremillion 1993). Gremillion (1993) suggests a crop/weed pairing of chenopod types may be responsible for variation of testa thickness and seed coat texture in archaeological assemblages, but the role of developmental plasticity in morphological features has yet to be fully explored with this plant. Researchers studying North American chenopods have expressed a need for a more thorough molecular phylogeny of *Chenopodium* species, pointing out that the fruit texture of chenopods may not be an appropriate factor for distinguishing species (Mueller, in review). In other words, the comparative basis for identifying *Chenopodium berlandieri* may shift as researchers refine the taxonomy of this plant.

The chenopods recovered from Morton Village pit features are currently identified as *C. berlandieri*, but without scanning electron microscopy of testa thickness, I do not identify the chenopods from Morton Village as *C. berlandieri* ssp. *jonesianum*. There appear to be at least two morphs of chenopod present at the site, including smooth testa and reticulate testa morphs, some with truncate margins and an overlapping embryo forming a "beak". This dimorphic chenopod assemblage may represent a crop/weed relationship, and the form of what is likely cultigen chenopod, despite a reticulate pattern on the seed coat, may be representative of changing farming practices, selective pressures, or hybridization processes (Gremillion 1993).

Taxonomically, *Chenopodium* subsect. *Cellulata*, which includes *C. berlandrieri* ssp. *berlandieri*, ssp. *nuttaliae*, and ssp. *jonesianum*, *C. bushianum*, and *C. quinoa*, among others, is grouped based on "an adherent, alveolate pericarp and strongly keeled sepals" (Wilson 1980:254). Artificial hybridization experiments performed on *Chenopodium* subsect. *Cellulata* and *Chenopodium* subsect. *Leiosperma* (containing *C. album*) support the biologically-based distinction of these subsections, but hybridization among different *Chenopodium* subsect. *Cellulata* remains possible (Wilson 1980: 256). Botanists and archaeologists have both indicated that the morphological traits that define *Chenopodium* species may be plastic (Mueller in review; Wilson 1980; need more citations, see Smith, Gremillion, Fritz). If the wild chenopods recovered from Morton Village represent *C. album* or another member of the *Leiosperma* subsection, it is unlikely that these species were part of a hybridizing crop/weed complex, as *C. album* is a nonnative species.

Fragments of sunflower (*Helianthus annuus*) pericarp were also recovered from Oneota (n=15 fragments) and mixed material features (n=9) and were not present in Mississippian pits. Based on the highly fragmentary state of these pericarp fragments, a seed number estimate is not available for this taxon. One sunflower kernel was recovered from Oneota Feature 213 in Level 3 and measured 3.8 millimeters in length and 1.5 millimeters in width, which places it outside the range of domesticated sunflower kernel size (Smith 2006; Wright 2008). Sunflower, squash,and bottle gourd are the only EAC crops that were still commonly gardened or farmed at contact (Fritz 2000), suggesting a preference based either on taste or ease of growing and tending these plants. Sunflower is closely related to sumpweed, and was domesticated in ENA farming and gardening systems after the wild ancestor spread eastward (Fritz 2000:231). The domestication syndrome of sunflower is conspicuous because of a significant increase in achene size (the kernel being the edible part and the pericarp the "shell" surrounding it).

Sumpweed, or marshelder, is present at Morton Village in Mississippian and mixed material pits (n=1 for each feature classification). The *Iva* achenes from Mississippian and mixed material pits both measure, uncorrected, 3.7 millimeters in length and 2.3 millimeters in width, indicating that they are within the size range of the domesticated variety, *Iva annua* var. *macrocarpa* (Yarnell 1972). Like sunflower, sumpweed is an oily kernel encased in a hard pericarp in the Asteraceae family, and appears in domesticated form in the archaeological record by the Late Archaic, approximately 4,400 years BP (Mueller et al. 2017). Contemporary, wild-growing sumpweed populations, as well as archaeological specimens preceding the Late Archaic, have significantly smaller achenes than those archaeological achenes, which roughly double in size, on average, over the course of 3000 years of cultivation and management (Yarnell 1972:338). Yarnell (1972) suggests that the domesticated form of sumpweed may have codeveloped with sunflower, as both are excellent sources of oil and appear at similar at approximately the same time in the archaeological record, although sumpweed is native to riverine environments along the Mississippi River and in parts of the Plains. Sumpweed has been recovered from paleofeces at the Newt Kash Rockshelter in Kentucky, which provides strong evidence for sumpweed as an important aspect of food and cuisine in the past.

A single maygrass (*Phalaris caroliniana*) seed was recovered from Oneota pits. Mississippian and mixed material pits do not contain maygrass. Maygrass appears in archaeological contexts beginning in the Late Archaic in Kentucky, Illinois, and Tennessee. Maygrass does not display common markers of domestication (e.g. increased seed size, reduced germination inhibitors), but it is known as a domesticate in the EAC suite of crops because it is often found alongside other domesticates, it appears at sites well outside its natural distribution range, and is present in the archaeological record for a significant amount of time as an important plant in Woodland and Mississippian diets (Fritz 1990, 2014). Maygrass is an early ripening (spring and early summer), nutritious seed with a high protein content, which would have made it a valuable food resource. Maygrass is also relatively easy to harvest, and requires little processing to prepare it for consumption because the palea and lemma are thin and need not be removed for ease of digestion (Fritz 2014:18).

Little barley (*Hordeum pusillum*) is present in mixed material (n=1) and Mississippian pits (n=1), and is absent from Oneota pits. Little barley is often recovered from archaeological contexts alongside other EAC domesticates, indicating that this plant was integrated into the EAC suite of crops. Little barley does not display obvious morphological traits of domestication, such as significant increase in seed size, but experimental research by Adams (2014) suggests that selective pressures by farmers caused little barley to lose its hull, producing a “naked grain”.

Little barley grains in archaeological contexts are not recovered with chaff still attached to the caryopses, and processing experiments indicate that it is nearly impossible to remove the entire palea and lemma from the grain, suggesting this was a phenotypic change in the plant spurred by farmer selection. Like maygrass, little barley is an early fruiting grass, typically ready for harvest in springtime, and would have been an important source of sustenance coming out of the winter months (Adams 2014).

Fruits. Fruit seeds make up a very small percentage of the botanical assemblage from Oneota features, less than 1%. The taxa recovered include persimmon (*Diospyros virginiana*) (n=2 fragments), grape (*Vitis* sp.) (n=2 fragments), and a *Prunus* species (n=12 fragments), likely North American plum (*Prunus americana*) or cherry (*P. serotina)*. Sumac (*Rhus* sp.) was also recovered (n=3 seeds). Sumac is edible and can be used to make lemony flavorings for food and beverages, and is also used variably as a medicinal plant, smoke plant, and for dyes throughout ENA (Moerman 1998). Mixed material pits yielded one grape seed fragment, and Mississippian pits did not contain any fruits.

Other Seeds. American lotus (*Nelumbo lutea*) seed fragments (n=2) were recovered from mixed material and Oneota pits, but were absent from Mississippian pits. Oneota Feature 288 contained a single *Ipomoea* sp. seed. Both *Nelumbo lutea* and *Ipomoea* sp. are starchy food sources. American lotus is native to ENA and produces edible, starchy tubers often added to hominy or stews, as well as small nut-like seeds that can be roasted or cracked open and eaten (Moerman 1998). Moerman (1998) also lists American lotus as a famine food of the Huron, and as having ceremonial or mystical significance to the Omaha, Ponca, and Pawnee. There are two species of *Ipomeoa* used by Native communities in ENA the past: *Ipomoea leptophylla* and *I. pandurata*. Both species produce large, starchy tubers that have uses as both food and medicine (Moerman 1998). Finding *Ipomoea* sp. seeds in the archaeological is uncommon because the tubers are the part of the plant that was most likely prepared for food or medicine, and the remains of tubers are far less visible than seeds in the archaeological record of ENA. Specific to seeds, *Ipomoea* sp. seeds are identified by Parker and Simon (2018) as part of a suite of "magic plants" because some species are used in ceremonial or ritual contexts.

Miscellaneous taxa. A variety of other taxa, including seeds of edible leafy greens and disturbance taxa, comprise approximately 20% of all recovered macrobotanical remains from Oneota pits. Mississippian and mixed material pits contained fewer of these taxa, comprising 11% and 6% of recovered taxa, respectively. The most prevalent taxon in this group was *Portulaca oleracea*, or purslane (n=307 in Oneota samples, n=68 in Mississippian samples, and n=47 in mixed material samples), which grows easily in disturbed areas and is well-known for its edible, green leaves, although it is difficult to tell based on context whether this plant was being used for food or if it appears in the archaeological record because it was growing in freshly cleared areas at the site. A variety of grass seeds were also recovered from all contexts, but were not identified to genus. Mississippian pits contained 19 grass seeds, Oneota pits contained 35 grass seeds, and mixed material pits contained 21 grass seeds. Sedges (Cyperaceae family) were also present in all contexts, the bulbs of which were sometimes consumed as food (Moerman 1998). Mississippian samples contain the highest quantity of sedge (n=20), with mixed material (n=1) and Oneota pits (n=6) containing smaller quantities of sedge seeds. Other taxa recovered include wild chenopods (Mississippian pits n=25, Oneota pits n=55, mixed material pits n=6) spurge (*Euphorbia* sp.) (n=1 in Oneota pits only), and the Caryophyllaceae family (n=3, 1 from Oneota pits, 2 from Mississippian pits), all of which may be the result of modern disturbance of archaeological strata. Amaranth (*Amaranthus* sp.), and verbena (*Verbena* sp.) were all present in

Oneota and Mississippian samples. Mississippian samples yielded a single *Rumex* sp. seed, one seed identified to the Asteraceae family, and one *Mollugo* sp. seed. *Eleusine indica*, a non-native grass, was recovered from one Oneota feature (n=2). Various taxa from the Solanaceae were recovered from Mississippian, mixed, and Oneota pits family, including *Solanum* sp. and, more commonly, *Solanum ptychanthum*, or eastern black nightshade. Eastern black nightshade has the reputation of being poisonous, but ripened berries are edible and sometimes used in cuisine (Defelice 2003). Five tobacco seeds (*Nicotiana* sp.) were found in Oneota Features 213 and 214, both of which contained much of the recovered botanical material. The presence of tobacco at Morton Village requires further inquiry into the role of this sacred plant in village life at Morton, and the seeds may be identifiable to species with high powered microscopy methods, as discussed in Chapter 3.

Analysis and Discussion

Methods of Quantification

A variety of ratio calculations, frequencies and abundance, and ubiquity and diversity measures are used by paleoethnobotanists to create datasets that are comparable across features and between entire sites (Marston 2014; Popper 1988). Raw counts and weights of macrobotanical remains from mixed, Oneota, and Mississippian pit features may differ based on the volume of soil floated per sample and sampling strategies employed by excavators, as well as factors surrounding the deposition of plants, and use patterns of the external pits. Recording absolute weights and counts is part of standard protocol for paleoethnobotanical reporting, but for the purposes of comparative inter-and intra-site analysis, some simple calculations are necessary. Ratio calculations are common in paleoethnobotanical reporting because they do not require the two values being compared to be recorded in the same unit of measurement; each variable is considered independent, allowing analysts to compare across unequal sample sizes and different categories of materials, and to standardize macroremain data as much as possible across differing sample sizes, taxonomic categories, and samples with different depositional or preservation contexts (Miller 1988:72; VanDerwarker 2010; Wright 2010).

Ratios. The following ratios were calculated for this study, with the purpose of standardizing data to make them more appropriate for inter- and intra-site comparisons: Kernel-to-cupule ratios (Figures 1.4 and 1.5), nutshell-to-wood ratios and tropical cultigen-to-wood ratios (Figure 1.6), maize-to-nutshell (Figure 1.7), and maize-to-EAC ratios (Figure 1.8). Table 3 details calculations performed and purpose of each of the ratio calculations made in this section. Comparative ratios use raw values of two mutually exclusive variables, with the ratio aspect being the means of standardization (VanDerwarker 2010:70). Maize kernel-to-cupule ratios are a crude measure of processing vs. consumption waste; higher counts of kernel (including both kernel and embryo) when standardized against counts of cupules and glumes may indicate more consumption waste, and vice-versa would indicate more processing waste (Marston 2014:174-175). This ratio may be useful in identifying spatial patterns of processing and consumption across the site, but is used with caution, and with the knowledge that higher values of kernels and embryos do not provide direct evidence of consumption, but rather "suggest the presence of shelled maize that is either ready for consumption or represents the byproducts of preparation for consumption events" (VanDerwarker and Detwiler 2002:26). Figure 1.4 shows the total ratios of kernels to cupules for Oneota, Mississippian, and mixed samples, and Figure 1.5 shows this same measure but by each feature analyzed. Each group of features contains one single sample with a spike in kernels:cupules, but the pattern presented by the kernel:cupule ratios for the feature groups as a whole generally stands.

Nutshell:wood and tropical cultigen:wood ratios were generally low for all feature groups. The nutshell:wood ratio (Figure1. 6) for Oneota pits is 0.16, which is twice the ratio of Mississippian pits (0.08). Mixed material pits had the lowest nutshell:wood ratio with only 0.04 grams of nutshell per each gram of wood charcoal. Both nutshell:wood and tropical cultigen:wood ratios were calculated based on weight, not count, because wood in this analysis was weighed and not counted. Oneota pits showed a higher ratio tropical cultigens:wood weight (0.19) than the Mississippian pits (0.08), and the mixed material samples show a much higher value of tropical cultigens to wood (0.49) (Figure 1.7). These results may suggest a higher reliance on nutshell and tropical cultigens in Oneota pits, and of tropical cultigens in mixed pits. Alternatively, this may be an effect of higher densities of these taxa in mixed material and Oneota samples.

Maize:EAC ratios were calculated based on total count of these taxa (Figure 1.8), and indicate that Oneota pits have a much higher ratio of maize to EAC crops than Mississippian and mixed pits. This reflects higher proportions of maize, as opposed to EAC crops, in Oneota pits. Mixed material pits contain the lowest values of maize standardized against EAC crop totals, which were higher in mixed pit features than in Mississippian and Oneota. Recovered EAC cultigens are primarily *Chenopodium* cf. *berlandieri* for all analyzed samples from all pit types. These ratios generally support extant data showing the slow decline in the importance of EAC crops in the late Precontact period throughout the Midcontinent (Fritz 1990, 2000; Schroeder 2004), however it is important to note that sumpweed appears in its fully domesticated form, and some thin-testa *Chenopodium* was also present, but not all chenopods exhibit a thin testa. It is possible that the variation in *Chenopodium* morphology represents a crop-weed complex that was a fully active mode of farming this plant, but alternatively, this variation may be understood as an indicator of lessening selective pressures by farmers. Further work on the phylogeny of the *Chenopodium* genus in ENA is required to move forward in interpreting this plant and how it was used at Morton Village.

Density. Density values for all recovered taxa are detailed in Table 1.4. Density is one of the most widely used ratios in paleoethnobotanical reporting, and is calculated by using the total volume of soil floated as the norming variable against a particular taxon or group of plant material (Miller 1988:73). The resulting values tell the analyst how many fragments or grams of plant matter are present, on average, in each liter of floated soil. This measure corrects for differing sample sizes by standardizing values against the total volume of soil floated, making data more appropriate for comparison. Density values were calculated for botanical remains from Morton Village because the volume of soil floated for each set of pit types was different: Oneota samples totaled 264 liters of floated soil, Mississippian pits totaled 185, and mixed material pits totaled 86 liters of floated soil. Density calculations allow comparison between these sets of pits even though Oneota features yielded a higher raw count of plant material, due to the larger volume of soil floated, because taxa are standardized using the total volume of soil floated as the denominator. Density calculations, in addition to making data appropriate for comparison to interpret use patterns of plants, are useful tools in discussing intensity of occupation or deposition and seasonality of feature use, although there are depositional factors that can affect the comparability of macrobotanical assemblages from different features (Miller 1988).

Figure 1.9 details density by taxonomic group, including nutshell, tropical cultigens, EAC cultigens, fruits, and miscellaneous/disturbance taxa. Wood charcoal density was calculated using weight in grams, because wood was weighed and not counted for this analysis (Table 1.4). Mixed material samples yielded the highest density of wood charcoal (1.08 grams/liter), and Oneota and Mississippian features have the same densities of wood charcoal (0.20 grams/liter), which affects the ratios using wood weight as a denominator. The total density of non-woody plant material is also highest in mixed material samples (18.25 fragments/liter), again with Oneota and Mississippian samples showing similar values, with Oneota total plant density measuring 7.08 fragments/liter and Mississippian 7.57 fragments/liter. One significant difference between Oneota, Mississippian, and mixed material pits is the density of hickory vs. acorn (Figure 1.10). Acorn appears in much higher densities in Mississippian (4.39 fragments/liter) and mixed material pits (9.01 fragments/liter) than in Oneota pits (0.19 fragments/liter), which contain a higher density of thick hickory (1.6 fragments/liter) than other pit types. Oneota pits have a lower total density of nutshell (2.08 fragments/liter) than Mississippian (4.91 fragments/liter) and mixed material pits (10.02 fragments/liter). These results, however, may be skewed as most of the acorn was recovered from a single Mississippian pit (Feature 152, n=804 fragments). Tropical cultigen density was lowest in Mississippian pits (2.55 fragments/liter), particularly fragments of maize kernel and embryo, as compared to mixed material (7.87 fragments/liter) and Oneota pits (4.86 fragments/liter). Maize cupules and glumes have a relatively low density across all features, with mixed material features showing the highest density (0.96 fragments/liter). Common bean also has a low density for all pit feature categories, but was recovered from Mississippian, Oneota, and mixed material samples. Mixed material pits show the highest density of EAC crops, and this value is composed primarily of *Chenopodium* cf. *berlandieri*, with small amounts of squash, little barley, and sumpweed. Fruit seeds and stones show the lowest density of all recovered taxa. Oneota features yielded the highest density of fruits (0.05 fragments/liter of floated soil). Miscellaneous taxa showed the third highest density of any plant group defined in this study, behind tropical cultigen and nutshell. Oneota features yielded the highest density of miscellaneous taxa, followed by mixed material samples, and Mississippian pits contained the lowest densities of these taxa.

Ubiquity. Ubiquity is calculated to provide a presence/absence measurement for a taxon or group of taxa, and is reported as the percentage of samples a given taxon or taxonomic group are present in (VanDerwarker 2010; Wright 2010). The most useful way of calculating ubiquity at Morton Village is by sample, rather than by feature, because of the relatively low number of total analyzed Oneota and Mississippian features (n=21), although this method may inflate ubiquity values for certain taxa in instances where levels were arbitrarily determined by excavators. Ubiquity measurements will therefore be used with caution in this analysis. Figures 1.11-1.13 show nutshell ubiquity by taxon for both individual samples and the entire feature. Thick hickory and hazelnut were ubiquitous in all Mississippian (100%) and mixed features (100%) but not ubiquitous by sample, indicating either that deposition of nutshell remnants into pit features was not uniform or, and perhaps more likely, that the sampling strategy used by site excavators created arbitrary divisions in feature levels. Oneota pits also showed a high ubiquity of thick hickory, but thick hickory was not present in all samples. Acorn was more ubiquitous in mixed material (40%) and Mississippian samples (73%) than Oneota samples (11%). All Mississippian features contained hazelnut shell. Acorn ubiquity was highest in Mississippian samples, as well, in addition to a high ubiquity of thick hickory and hazelnut.

Figures 1.14-1.16 show ubiquity values for tropical cultigens. With the exception of squash, Oneota and Mississippian pits showed very similar ubiquity values for all tropical cultigens per feature: maize in Oneota, Mississippian, and mixed material features is ubiquitous (100%), beans appear with 15% ubiquity in Oneota features and 11% ubiquity in Mississippian features, and squash appears with 8% ubiquity in Oneota features and 22% ubiquity in Mississippian features. Mixed material pits showed higher presence values for squash (30%) and common beans (30%). The higher values shown for mixed material samples may be the result of a smaller sample size, including ten analyzed samples from four features,

Shannon Diversity Index. Diversity in ecological studies is a complex concept that is usually defined by a specific index used to measure this phenomenon, leading definitions and interpretations of diversity to vary significantly among researchers (Peet 1974). Measures of diversity depend on several assumptions, the first being that “all individuals assigned to a specific class are assumed equal” and the second that “all species or classes are assumed to be equally different” (Peet 1974:286). Within these parameters, measures of diversity must include some combination of species richness, degree of heterogeneity within the dataset, and equitability (Peet 1974). Measuring species diversity in paleoethnobotanical datasets presents several unique challenges that should be addressed prior to diversity analyses. Paleoethnobotanical data are illustrative of plant use at an archaeological site, but these data are incomplete representations of total species availability at a given archaeological site. Additionally, most plant material recovered from archaeological contexts is identified only to genus or family, with exceptions in cases where only one species is known to grow in the study area, allowing for the possibility of several species being represented by one taxonomic determination. After addressing these limitations, diversity measures of paleoethnobotanical datasets can still be useful proxies for quantifying plant use and availability in the past.

Diversity at Morton Village was calculated using a Shannon-Weaver Diversity Index, which accounts for both evenness of distribution and abundance of taxa, where H is the calculated diversity index, S is the species richness, or total number of taxa in a sample, and p_i is a given taxon's proportion of the total number of taxa:

$$H = \sum_{i=1}^{s} p_i \,(\ln)(p_i)$$

Equitability is calculated by dividing Shannon's H by H_{max} (lnS), which produces a value between 1 and 0, with 1 being complete evenness, or that each species comprises the same proportion of the total number of species. Shannon's H as a measure of diversity is a heterogeneity index, reflecting species richness and evenness, and equitability describes "the distribution of individuals among those species" (Peet 1974:291).

Shannon Diversity Index was calculated with the purpose of comparing both richness and evenness of plant use between Oneota, Mississippian, and mixed material samples to investigate potential differences in plant use patterns between these feature categories. The results of the Shannon Diversity Index at Morton Village indicate that all three feature types show general consistency in the number of plants present and the evenness of their distribution throughout the assemblage (Figure 1.17). Oneota pits show the highest diversity value (1.53, 29 species present) compared to mixed material (1.25, 22 species present) and Mississippian (1.39, 23 species present), but the difference is slight.

Morphometric Analysis of Maize. Row number calculations are known to be useful predictors of maize variety, and metric analysis of maize remains is useful in estimating row number of cobs present in archaeological samples (Goette et a.1994). There are several important caveats to estimating row number from loose cupules and kernels. Based on the geometry of a corn cob, the angle occupied by a kernel from an eight-row cob would measure 45 degrees, a ten-row cob 36 degrees, twelve-row 30 degrees, and so forth (Goette et al. 1994:15), but experimental charring of cobs with known row numbers showed that kernel angle was an inaccurate predictor of row number 68% of the time (King 1987). Kernels distort during the charring process, may be irregularly arranged on the cob, and may vary in size based on its location on the ear. According to a regression analysis, charred cupule measurements were a better predictor of row number than kernel angle (R_2=.64), possibly because "the expected angles of cupules are father apart than those of kernels by a factor of 2"; it is more difficult to differentiate between 30 and 36 degrees (kernels from 10-12 row cobs) than between 60 and 72 degrees (cupules from 10-12 row cobs) (Goette et al. 1994:15) Although cupule angles are better predictors of row number, the need to use undistorted, whole cupules for measurements did not allow for cupule angle measurements in this study.

Several experimental studies (e.g. Goette et al. 1994; King 1987, 1994) document the distortions in maize kernels and cupules caused by processing and carbonization in the past, and define useful metrics for maize measurement given the potential for distortion. Given the drawbacks to calculating row number from kernel and cupule angles noted above, caution was used when selecting components of maize to measure: whole cupules that show the least amount of distortion from charring were selected for analysis (Cutler and Blake 1969; Goette et al. 1994; Picard 2010). Cupule width was measured to examine maize remains for any distinct variation that might indicate separate varieties of the plant.

Results of maize cupule measurements are presented in Table 1.5. The only measurement taken on whole cupules from Morton Village features was cupule width, as the charring process distorted the cupules too much for cupule angle measurements to determine row number. Measurements were taken using the Leica Application Suite (LAS X) on images obtained using a Leica DVM6 instrument. The average cupule width in Oneota samples is 4.40 millimeters, Mississippian-associated cupules averaged 4.66 millimeters, and cupules from mixed material features averaged 5.43 millimeters in width. The mean cupule width is highest in mixed material samples, and the average cupule widths from Oneota and Mississippian features were very similar. The mean value of mixed material samples was not notably higher than Oneota and Mississippian values, but these values likely indicate differences in processing strategies rather than different maize varieties, or may simply be the result of normal variation in maize plants.

The results of this analysis generally support the results of Frances King's (1990) analysis of 22 features (79 flotation samples totaling 420 liters) from the Oneota component of Morton Village excavated in the 1980's, detailed in Table 1.6. Methods for this analysis were not detailed in the report, so it is possible that differences in flotation recovery and laboratory methods may affect the comparability of these datasets. King identified 22 species present in flotation samples, many of which were also identified in the samples reported on here (Table 1.6). Maize was the most common taxon present in King's analysis, but beans and native cultigens, including squash, *Chenopodium*, little barley, knotweed (*Polygonum erectum*), and sunflower were also present. A low proportion of maize cupules to maize kernels is reported from the previously analyzed Morton Village samples, which King (1990:65) suggests indicates that maize may not have been processed in the habitation area she analyzed. King also recovered a more diverse assemblage of fruit seeds than this analysis, including *Malus ioensis* (prairie crab apple), *Rubus* sp. (blackberry), *Sambucus canandensis* (elderberry), and two species of *Prunus*. Thick hickory and acorn were present in the samples King analyzed, but in lower quantity than the recent Morton Village flotation samples. Acorn nutmeat was present in relatively large quantity in one sample, and was also present in Feature 214. EAC crops were present in smaller quantities in King's analysis than the present one, where *Chenopodium* cf. *berlandieri* was present in higher quantity.

Intra-Site and Inter-Site Analysis

Intra-site analysis of plant remains from Morton Village is complicated and enriched by the presence of features associated with use by people of differing heritage and group identity within the context of a single village. Oneota and Mississippian plant use can be compared as a reflection of differences between groups, or as evidence of cooperation and social negotiations involved in maintaining a functioning community of Mississippian people and their migrant neighbors. Mixed material features further complicate the Oneota/Mississippian "divide" at Morton Village by demonstrating that portions of the site, at least as evidenced by material culture, were clearly used by both groups. These features provide important comparative context for the features that contain only Mississippian or Oneota materials. It is equally important to understand the ways in which Morton villagers shared and cooperated as it is to understand what differences in plant use, taste preference, and traditions of cuisine are being maintained along the likely fluid boundaries of being considered Oneota or Mississippian. This discussion begins by reviewing the spatial patterning of plant remains at the site to identify parts of the site with high densities of plant matter, areas where processing of plants is indicated, and areas of the site where special or rare taxa are present and how the features that contain them relate to other public and domestic structures. A morphological analysis of maize cupules is presented and discussed, and differences and similarities in the use patterns of plant taxa are interpreted with respect to what these differences and similarities bring to bear on the issue of foodways, migration, threat of violence, and negotiation of group identity in a multicultural village. Finally, a comparative perspective on Oneota plant use is explored in attempt to associate patterns of plant use with long-standing affiliations between Bold Counselor Oneota ceramics and other Developmental Phase sites, including several Moingona sites and data from the Dixon site in northwest Iowa.

Intra-Site Analysis. Initial observations of the spatial analysis of excavated features, in addition to those mapped from the results of the magnetometer survey, shows general clustering of Oneota and Mississippian structures in different areas of the site, although a thorough examination of this is currently in progress. Single post structures are interpreted as Oneota and cluster on outer edges of the main habitation area of the village, whereas wall trench structures (Mississippian) and structures with evidence of both wall trench and single post construction style are primarily located in the central habitation area. The division of Oneota and Mississippian structures does not preclude pits with only Oneota ceramic material appearing in pits within zones that contain primarily wall trench structures, and vice-versa. It is clear from maps of features and structures at Morton Village that, although Oneota and Mississippian potters retained traditional (for the most part) modes of pottery production and decoration, this does not mean that the two groups were living in separation from each other. The spatial distribution of material culture, habitation and public structures at the site suggests instead that Oneota and Mississippian were actively engaged with each other as community members.

Analysis of the spatial distribution of plant matter at the site was performed to determine whether certain taxa cluster in specific areas of the site, and whether there is a clear distinction between Oneota and Mississippian use of certain plants. Using ArcMap, kernel to cupule ratios, maize density, and thick hickory and acorn densities were plotted by feature. The results indicate that kernel to cupule ratios are highest at the east and west edges of the northern extent of the magnetometer survey area. Eight Oneota pits cluster at the northwest edge of the survey area, but contained a lower density of plant matter than those analyzed from the eastern edge of the habitation area, including Features 175, 205, 213, 214, which are located in an area that contains primarily Mississippian pits. Distribution of acorn, thick hickory, and maize densities show that, while these taxa are present in most features, Morton villagers may have been processing, discarding, or consuming certain plants more in certain areas of the site. Maize density is highest at the northwestern extent of the magnetometer survey area. Acorn density is also highest in that area of the site, but this taxon still appears in lower densities in the central and eastern parts of the site; there is a gradient of acorn density that moves from high density in the western portion of the site to lower density in the eastern portion. Thick hickory is densest in the eastern portion of the habitation area, although this measure is likely skewed by the very high density of this taxon in Features 213 and 214.

There are several possible explanations, none of which are mutually exclusive, for the variation in plant use seen among Mississippian and Oneota features at Morton Village. The variation in nut taxa between feature types, as well as the conspicuous absence of cultigen chenopods in Mississippian features, may well be the result of preference or certain beliefs and traditions surrounding cuisine and food production and preparation. However, because of the high density of acorn shell in mixed material pits, and the majority of acorn shell being recovered from only a single Mississippian pit, it seems equally plausible that these differences represent a shared responsibility between Mississippian and Oneota villagers for nut processing, or some other form of labor division, and not necessarily preference. Acorn nutmeats were present in Oneota samples, along with other food remains, suggesting that Oneota villagers were consuming acorn, if not processing it in large quantity. Conversely, thick hickory, although ubiquitous in Mississippian and mixed material pits, appears in higher densities in Oneota pits than in Mississippian or mixed material pits.

Given the ample evidence for cooperative social negotiation occurring at Morton Village (Painter and O'Gorman 2019), rather than two discrete entities co-existing in geographic space, it is possible that various food preparation and farming duties were divided among Mississippian and Oneota family units. The lack of mounds and a central plaza at Morton Village suggests that life there may not have been defined by hierarchical social structures in the same way that other Mississippian sites in the CIRV were (Conner et al. 2014). Benn (1989) points out the significant differences between Oneota and Mississippian social organization: cemetery data from Oneota sites show little evidence of ascribed ranking systems, unlike Mississippian burial sites (Benn 1989; O'Gorman 2001). The lack of apparent ascribed-status social systems in Oneota groups suggests that social organization for Oneota people may have been based instead on kinship and gender, which determined the divisions of labor necessary to successful village life (Benn 1989:237; O'Gorman 2001). As part of the process of negotiating social identity and managing shared spaces and resources at Morton Village, it is likely that labor, and perhaps resource access, would have been divided along lines of kinship and gender, and that the variations seen in the macrobotanical record may represent different groups with different responsibilities for plant management, based on family or gender status. The presence of public-use structures, as well as mixed material pit features, at Morton Village indicates active cooperation between Oneota and Mississippian families living at the site. Socially-based division of labor, likely by family status or gender, may explain varying access to or preference for certain plant taxa and thus variation among and between feature types.

The diversity of plant taxa used and discarded at Morton Village is not notably high, which is unusual considering the characterization of Oneota plant use patterns as "intensively diverse" (Gallagher and Arzigian 1994; O'Gorman 2001:26; Parker 1992); in other words, the general pattern for Oneota plant use is indicated to be one of intensified farming or gardening alongside the maintenance of a diverse array of food items from hunting and gathering to supplement farms and gardens. The maximum diversity value (H_{max}) for Oneota pits was 3.37 and 3.14 for Mississippian pits, which indicates expected values if all species were equally abundant. The diversity index calculated for Oneota and Mississippian pits shows that the distribution of taxa at Morton Village is less than 50% of the maximum value for species evenness, indicating the taxa present were not completely evenly distributed. Without comparative diversity indices from other sites in the region during the 14th century, it is difficult to ascertain whether or not the Shannon diversity values for Morton Village are low, but it is important to note that increased violence in the CIRV during the time the village was occupied may have negatively affected Morton villagers access to food resources: osteological analysis from the Norris Farms #36 cemetery, containing mostly Oneota individuals, shows that approximately 43% of the individuals buried there suffered violent, traumatic injuries, such as scalpings and defensive Parry fractures (Milner and Smith 1990). This trend toward violent interaction in the area is not restricted to Morton Village. VanDerwarker and Wilson (2016:75) describe the effects of violence and warfare in the CIRV as having the effect of limiting the scope of foragers' food gathering ranges to the degree that villages suffered from nutritional deficiencies and food shortages. These deficiencies need not have occurred as a direct result of violent interaction, rather the threat or memory of violence alone could have caused villagers in the 14th c. CIRV to reduce their foraging and farming mobility. Skeletal lesions from cribra orbitalia and porotic hyperostosis present on the Oneota population buried in Norris Farms #36 indicate that this population was likely suffering from iron-deficiency anemia, and the frequency of cribra orbitalia lesions decreases with the age of the individual (Milner and Smith 1990:125-126). Other individuals in the cemetery population exhibited skeletal lesions indicative of infectious disease like tuberculosis and treponematoses. Linear enamel hypoplasias are well represented in the Norris Farms #36 population, which indicate a disruption in tooth enamel formation resulting from poor nutrition (Milner and Smith 1990:138). Skeletal data from Norris Farms #36 indicate that, in addition to the threat of violence, Oneota (and perhaps Mississippian) villagers were suffering from both infectious disease and nutritional deficiencies. This skeletal evidence suggests Oneota Morton Villagers were suffering from both direct and structural forms of violence (VanDerwarker and Wilson 2016). Morton villagers may have abandoned some farm fields and collecting areas outside of the main village as a result of the threat of violence, restricting access to gathered and cultivated foods, but it is also possible that, even with the risk of encountering violent factions, Morton villagers were able to maintain access to resources.

Milner et al.'s (2001) expanded study of the skeletal remains from Norris Farms #36 indicates that the mobility of Morton Villagers was likely restricted as result of regional violence. Notably, unlike other towns in the CIRV during this time, Morton Village shows no evidence of a defensive or palisade wall surrounding the village. Although it is unclear why a defensive wall was never built given the extreme violence in the region, it is likely that the lack of defensive architecture at Morton Village contributed to the geographic circumscription of its residents, which may have reduced available foraging land and, potentially, the diversity of available plant taxa. The Shannon Diversity Index calculated for Morton Village pit features indicates that the diversity of plant taxa is roughly similar across Oneota, Mississippian, and mixed feature types, suggesting that the circumscription by violence was not differentially affecting any one group at the village.

Inter-Site Analysis. There are many factors that define foodways beyond the use of available plant and animal taxa. Foodways are the totality of technological, ideological, symbolic, and material culture surrounding food, including planting, harvesting, trading, storage, preparation, cooking, serving, consumption, and discard and are embedded with meaning through their daily practice. Recent research at Morton Village identifies some of the ways in which the Oneota migration into the CIRV facilitated negotiation and adaptation of existing foodways for both groups, as well as evidence for the negotiation of new group identities following the contact of Mississippian and Oneota people at Morton Village.

Establishing a comparative group for Bold Counselor Oneota requires an examination of Developmental Oneota migration patterns and identification of connections between Oneota groups settled throughout the Prairie Peninsula. The Moingona Phase is the earliest Oneota manifestation in central Iowa, and is composed of 25 sites throughout the Des Moines River Valley, near present-day Des Moines. Paleoethnobotanical datasets from spaces chronologically and geographically adjacent to Bold Counselor from the Moingona Phase Oneota occupation of the Des Moines River Valley in central Iowa (c. A.D. 1250-A.D. 1410) are used here for comparative analysis of how foodways may have changed or remained the same through the course of Oneota migrations. Three Moingona Oneota sites are presented for comparative analysis: Crib's Crib (13WA105), Christensen (13PK407), and Clarkson (13WA2). The Dixon Site (13WD8), located in northwest Iowa, was also chosen for comparison because of the temporal proximity to Bold Counselor activity in the CIRV and the recent, substantive paleoethnobotanical analyses being done at the site.

Moingona Oneota sites commonly yielded maize, beans, squash, black walnut, *Chenopodium*, and other miscellaneous taxa (Table 7), although many of the taxa reported from Crib's Crib and Clarkson sites are listed only as "present", without providing details on how much of a taxon was recovered from features at the sites (Benn 1991; DeVore 1984; Osborn 1976). Maize recovered from the Crib's Crib site is identified as a flinty variety, and DeVore's (1984:210) report identifies the mean row number at Crib's Crib as 9.3. Eight, ten, and 12 row cobs are both present, with eight row composing 38% of the assemblage, ten row 58%, and 12 row 4%. Analyses from Clarkson and Christensen do not identify row numbers on recovered maize cobs (Benn 1991; Osborn 1976). These comparative data suggest that the primary focus of Oneota plant subsistence patterns is similar between Morton Village and Moingona sites, including maize, beans, squash, and sunflower, but with several exceptions. The Moingona sites do not contain thick hickory nutshell fragments, and acorn appears only at the Clarkson site, which is interesting considering the availability of oak-hickory forest resources in the upland regions surrounding the Des Moines River Valley (Osborn 1976). The focus on nut resources at Morton Village may be the result of the influence of Mississippian foodways, but it is also possible that the lack of nutshell recovered from Moingona sites represents a regional idiosyncrasy. Benn (1991:25) notes the conspicuous absence of cultigens besides maize and sunflower from the Christensen site, stating that they should be more common given research indicating that Oneota villagers are typically agriculturalists, but suggests instead that this may represent “provisions brought to the site from a storage location elsewhere”.

The Dixon site macrobotanical assemblage shows striking similarity to the assemblage from Morton Village, including maize, bean, squash, sunflower, *Chenopodium* sp., and *Solanum ptychanthum*. Further, the *Chenopodium* recovered from both Dixon and Morton Village appear in varying forms, including seeds with pitted, reticulate, or smooth seed coat textures and biconvex as well as truncate margins are present (Bush 2019). The presence of *S. ptychanthum* at both Dixon and Morton Village is interesting, considering that this plant is poisonous unless the berries are ripe, and has been described as a “magic plant” for its biochemical properties and presence in special archaeological contexts in the American Bottom (Parker and Simon 2018). Moerman (1998) notes a variety of Indigenous communities that use nightshade for several purposes, including medicine, ceremony, and food. Additionally, *Solanum ptychanthum* was recovered from what excavators at Morton Village describe as a feasting context, discussed in detail the next chapter. A significant amount of *S. ptyhcanthum* was present in the upper layers of this feasting deposit, in the same level as fragments of an Oneota pot. Further paleoethnobotanical research on Oneota components of other sites in the CIRV may provide answers as to whether this plant came into use when Oneota communities arrived in the region, or if it already had an established pattern of use by Mississippian residents of the area. To date, there are no references to *S. ptychanthum* elsewhere in the CIRV. Both the Christensen and Dixon sites yielded domesticated sunflower kernels, indicating that this plant was fully absorbed into farming traditions, but a comparison of sunflower kernel size between these sites and Morton Village is not available because only achene fragments were recovered from Morton Village samples.

The Crib's Crib and Clarkson sites, in addition to some plant taxa shared with Morton Village, showed evidence of grass-lined storage pits in the form of grass matting recovered from pit features (DeVore 1984; Osborn 1976). Two Oneota pit features (213 and 214) from Morton Village yielded a significant amount of silica froth along with some grass seeds. Jurney and Bergstrom (2001) compile evidence from the Caddoan region to suggest that silica froth is an important ecofact in determining whether a thatched house was present at a location, in the absence of post holes. Given the presence of grass-lined pits at three of four Developmental Oneota sites of Moingona designation used for analysis here, it is inferred that silica froth in Morton Village pit features may be the result of grass lined storage pits. Ethnographic and archaeological research from the Great Lakes region discussed by Arzigian (2000) suggests that lining storage pits with grass was essential to the successful winter storage of food plants by keeping mold growth at bay. Mississippian and mixed material pit features did not contain the volume of silica froth present in Oneota Features 213 and 214, although it was present in very small amounts in some features. Based on the presence of grass-lined pit features at permanent Moingona Oneota village sites in Iowa, this may have been a learned, cultural practice carried on across geographic space and time by migrating Oneota communities. Recent analysis at the Dixon site (Bush 2019) also shows evidence for the use of grass lining in storage pits in this region of Developmental Oneota villages. Bendremer et al. (1992) discuss grass-lined storage pits used specially for maize storage in the Northeast, noting that the same grass was used to line storage pits among some Plains groups. The grass used to line storage pits at Morton Village is not readily identifiable, as some grass seeds may represent seed rain, while other may have been part of the grass used for lining pits

Conclusions

Research on the Oneota material culture manifestation tends to focus on widespread regional similarities, and creates a view of Oneota people defined primarily by the attributes of the ceramics they produce. These classification schemes are useful and worthwhile, but there is much room to further refine how archaeologists conceptualize Oneota societies, the variations between these groups, and cultural shifts within the Oneota tradition (Painter and O'Gorman 2019). The notion of Oneota group identity at the numerous Oneota sites in the Midcontinent has not been thoroughly examined. Morton Village represents a unique, multicultural community configuration (Bengtson and O'Gorman 2016), where radiocarbon dates have provided clear evidence of Oneota and Mississippian groups living contemporaneously at the site. Recent research from Painter and O'Gorman (2019) provides important insights that enhance the findings presented here. Comparative ceramic analysis from Morton Village and the Tremaine site in Wisconsin demonstrate significant shifts in the ways that Oneota people living at Morton Village were actively participating in negotiating new practices and strategies for food preparation and consumption (Painter and O'Gorman 2019). Unlike ceramic use patterns at Tremaine, Oneota members of the Morton Village community were choosing to alter traditional styles of ceramic production and modes of cooking food by beginning to manufacture bowls and plates, which is not typical of the broader Oneota ceramic corpus. These shifts in ceramic vessel production may have occurred to enable Oneota people to participate in community events and meal sharing activities, which would have taken place to forge new relationships and social structures (Painter and O'Gorman 2019:250). The implication here is that Oneota villagers were making conscious choices to change tradition as a means of cooperatively coalescing with their

Mississippian neighbors, and that Oneota and Mississippian villagers were active agents in collaboration with each other as they navigated new social entanglements.

The results of the macrobotanical analysis presented here are enriched by these altered ceramic traditions. Given the ceramic evidence, food was most likely was being farmed, gathered, stored, prepared or processed, consumed, and discarded within a generally cooperative village environment. This does not imply that foodways at Morton Village became blended into a single entity, but that the traditional knowledge shared within groups was likely shared between groups, and these traditions may have been subsumed within either group's existing beliefs about food based on preference. There are several significant differences in the ways Oneota and Mississippian villagers at Morton used plant resources: EAC crops appear in the highest quantity in mixed material pits; Mississippian pits contained no cultigen *Chenopodium;* acorn shell was dense in Mississippian samples but they contained no nutmeat; and Oneota samples contained higher densities of thick hickory than Mississippian samples and yielded several acorn nutmeats but relatively few acorn shell fragments. Oneota pits also contained more fruit taxa than mixed material or Mississippian pits, and *Solanum ptychanthum* was more common in Oneota pits than mixed material or Mississippian. Five tobacco seeds were recovered from Oneota pits, and none from Mississippian or mixed material pits. These differences lead to two conclusions: first, that Oneota villagers at Morton likely retained certain preferences for specific food types, such as thick hickory and *Chenopodium*, as well as tobacco, and second, that the mutable social structures suggested by Painter and O'Gorman (2019) led to shared but distinct responsibilities for food processing and preparation among Morton villagers. The classification of features analyzed here as Oneota, Mississippian, and mixed material is based on archaeological methods of cultural classification, but evidence presented here makes clear that this division was not one to the exclusion of shared group beliefs and responsibilities. Cooperation would have been of paramount importance at Morton Village considering both the memory of and looming threat of violence in the region.

The macrobotanical remains discussed here represent domestic refuse, and reflect daily practices of eating and plant management. These practices reflect social circumstances and belief structures, illuminating processes of social negotiation through the daily habits of Morton villagers. Food is both a symbol and a mundane necessity of daily life, part of daily practice and integral to ceremonial, ritual, and religious activities. Food is therefore one of the most salient aspects of identity, both embedded in tradition and flexible to new ideas and situations.

Figures and Tables:

Figure 1.1 Late Pre-Contact Central Illinois River Valley (map created by Upton 2018)

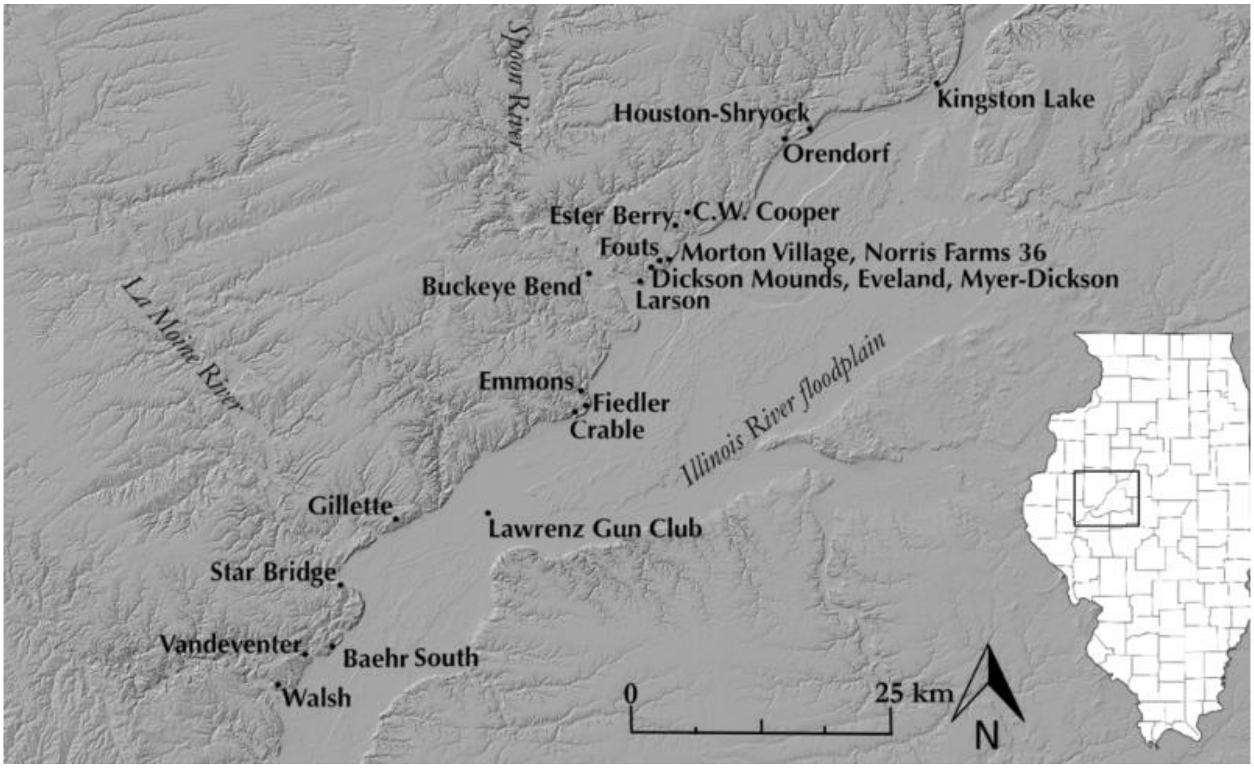


Figure 1.2 Morton Village Site Area

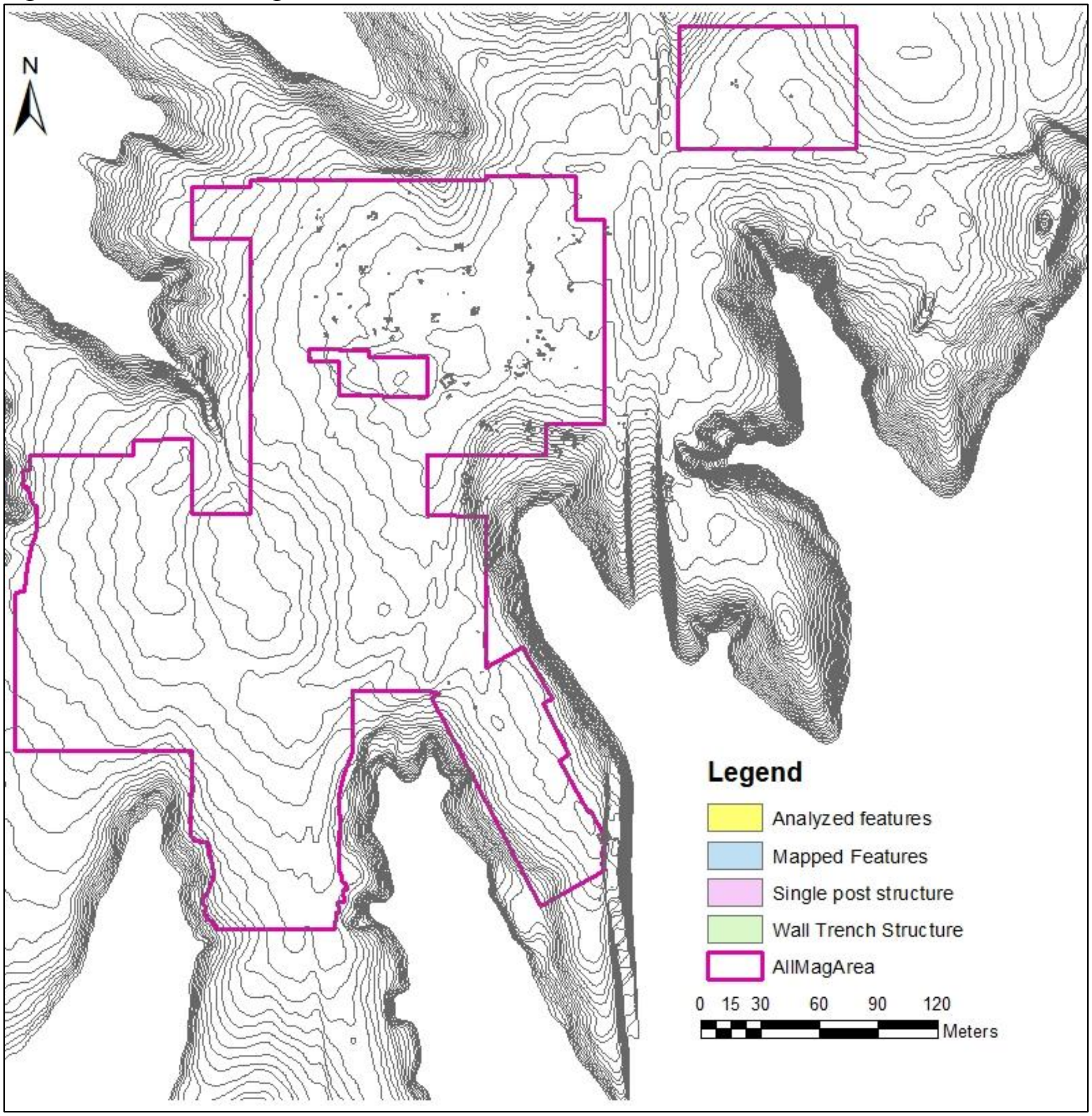


Figure 1.3 Map of features analyzed in this study

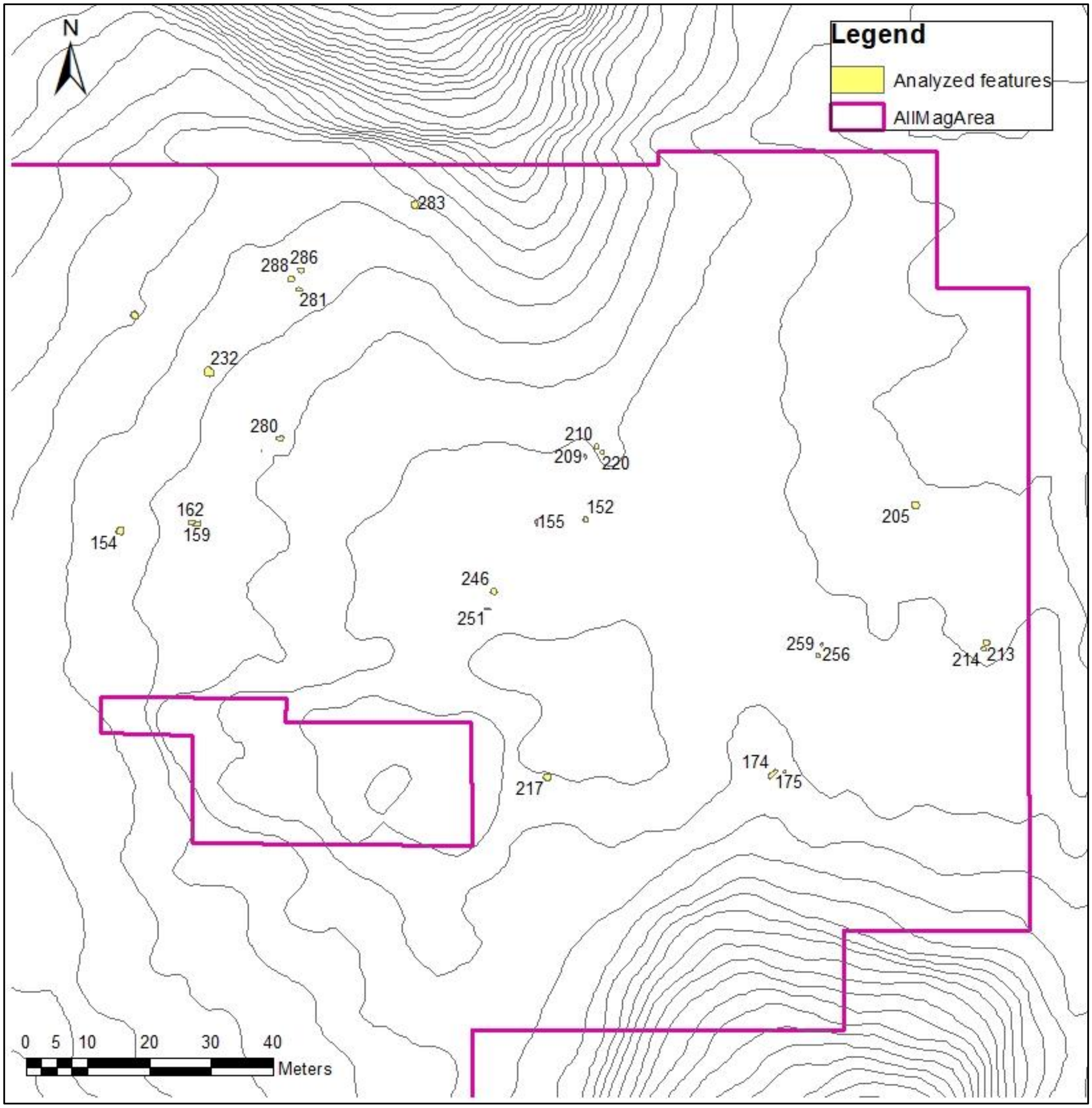


Figure 1.4 Kernel:cupule ratios by feature type (Oneota, Mississippian, or mixed material)

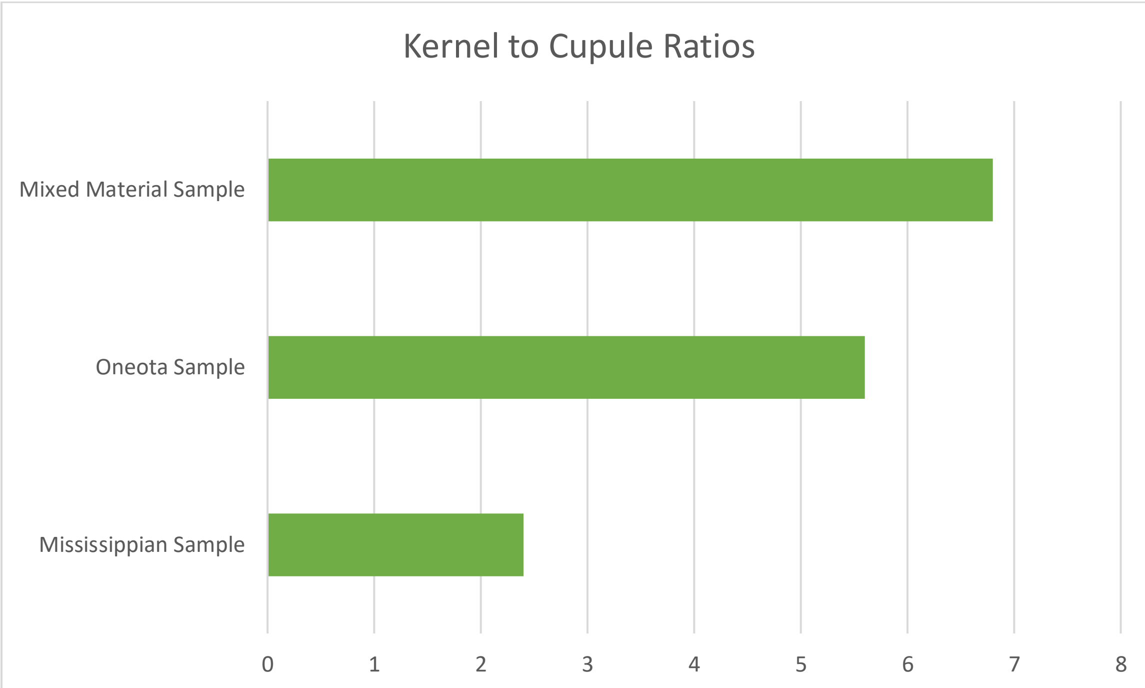


Figure 1.5 Kernel:cupule ratios by individual feature (Features 164 and 286 not included)

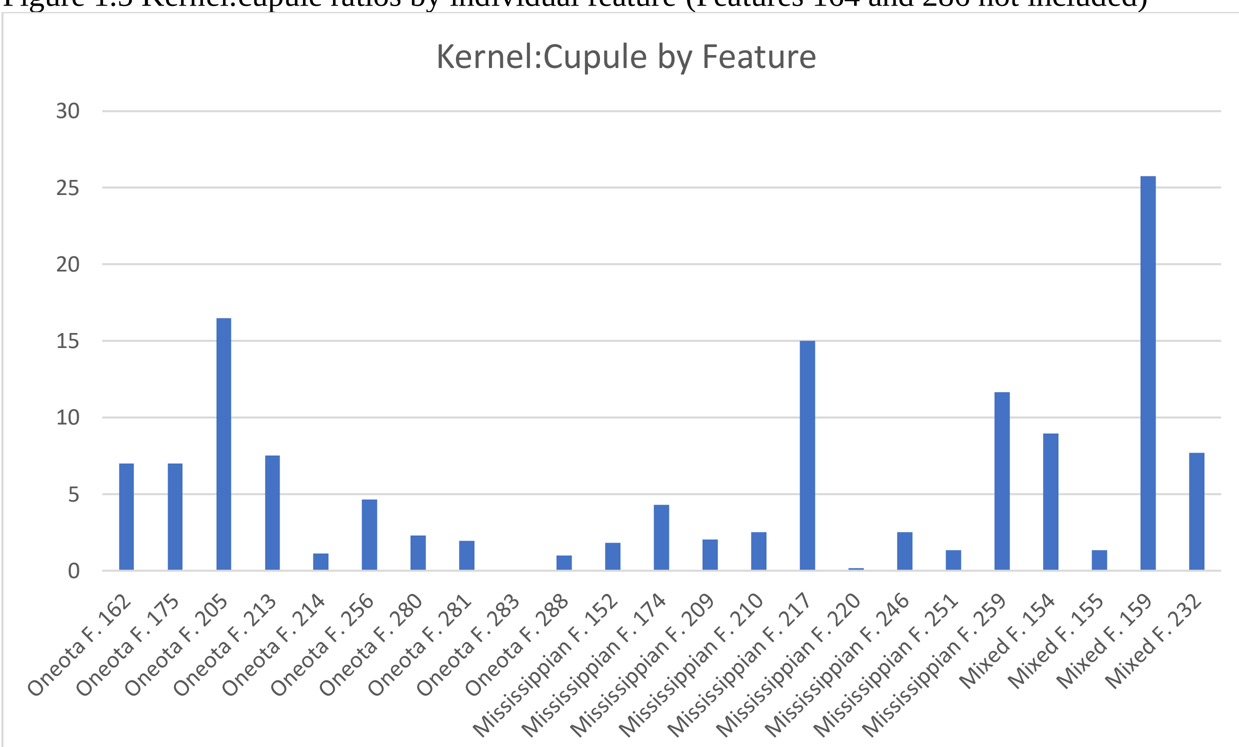


Figure 1.6 Nutshell:wood, tropical cultigen:wood ratios

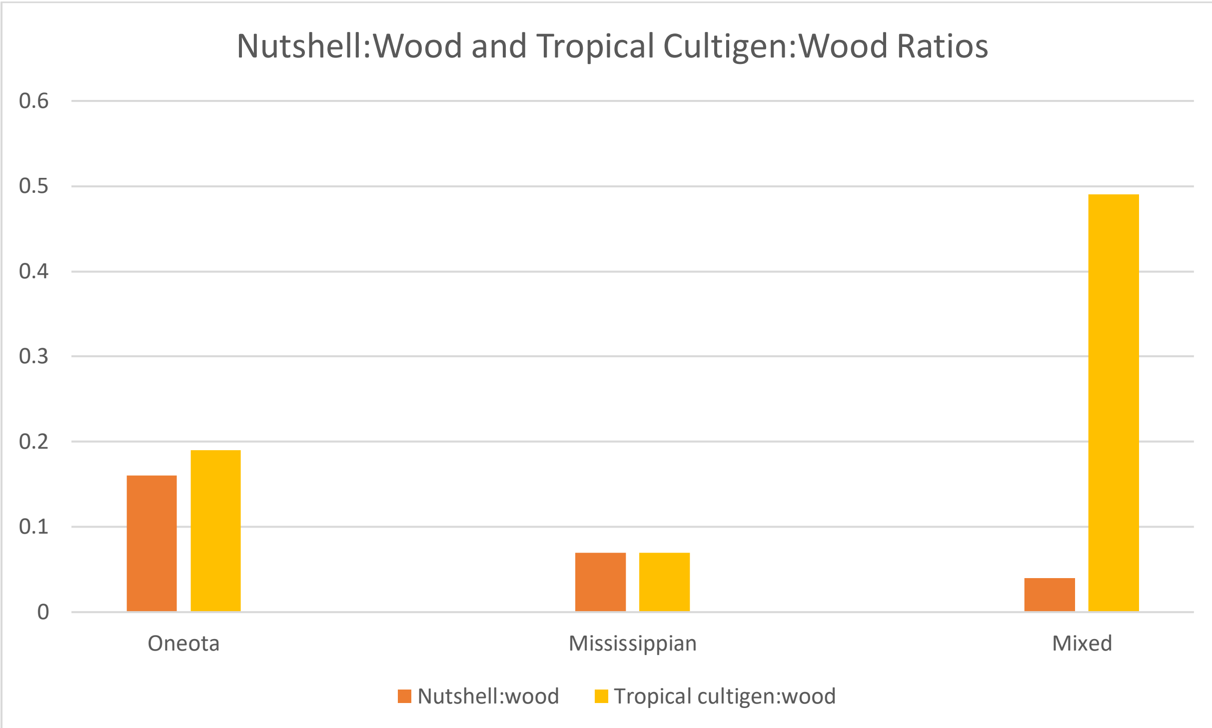


Figure 1.7 Maize:nutshell ratios

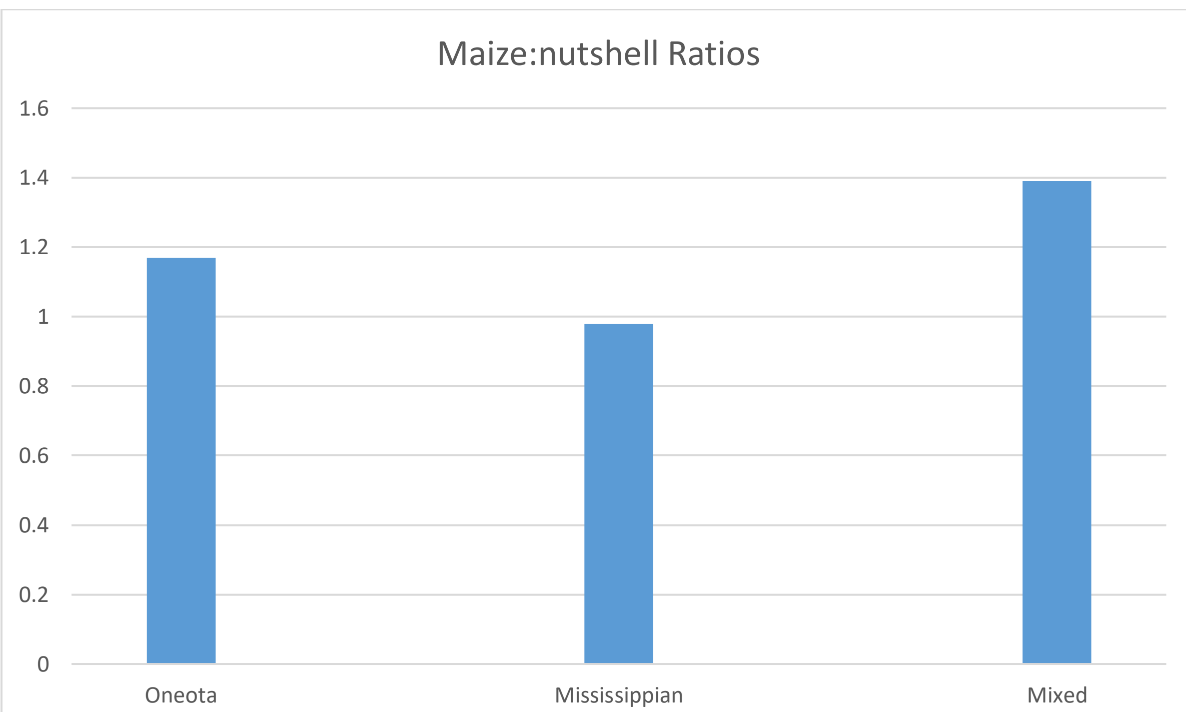
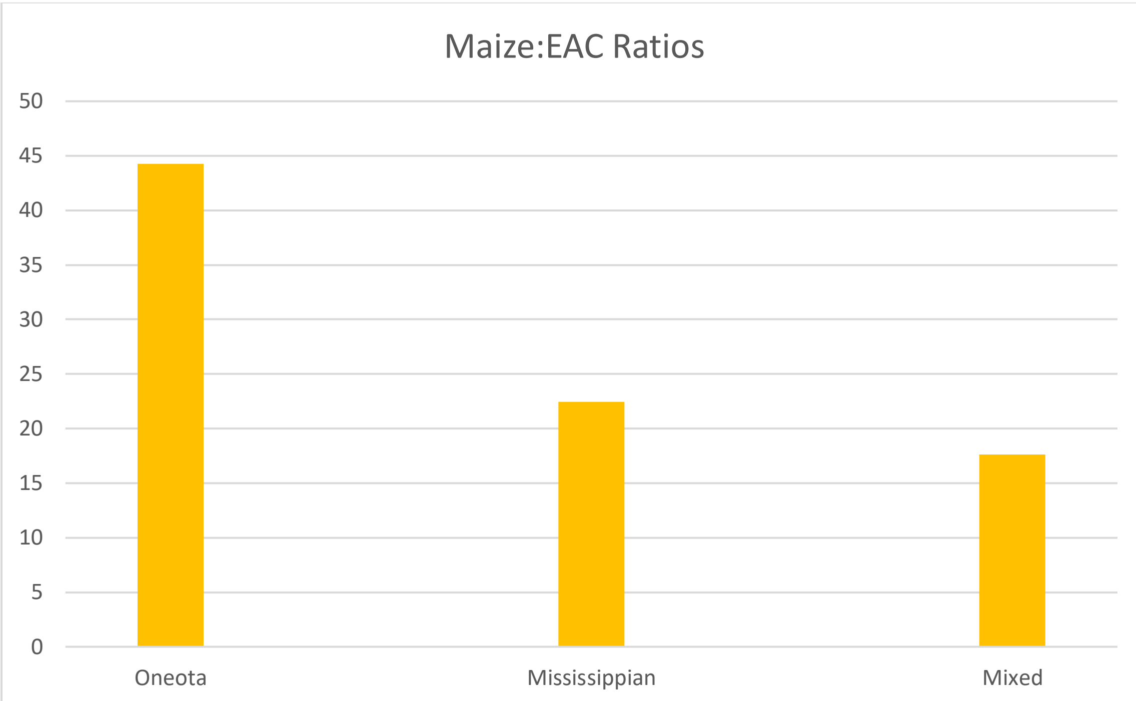


Figure 1.8. Maize:EAC ratios



Density Calculations

Figure 1.9 Density by taxonomic group

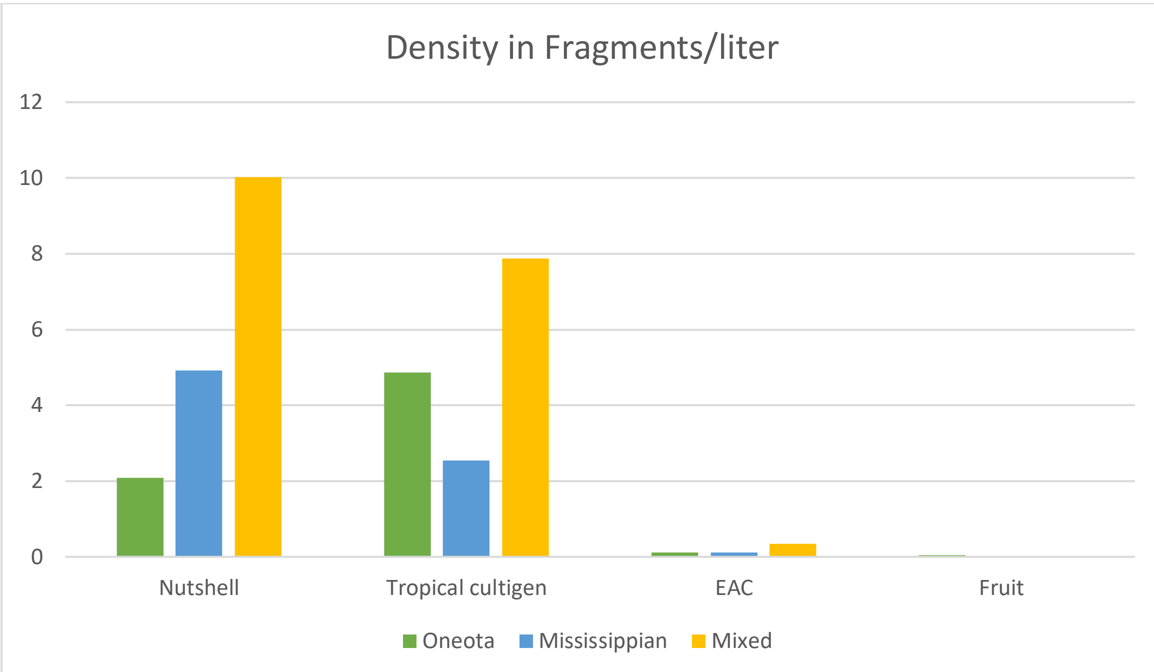
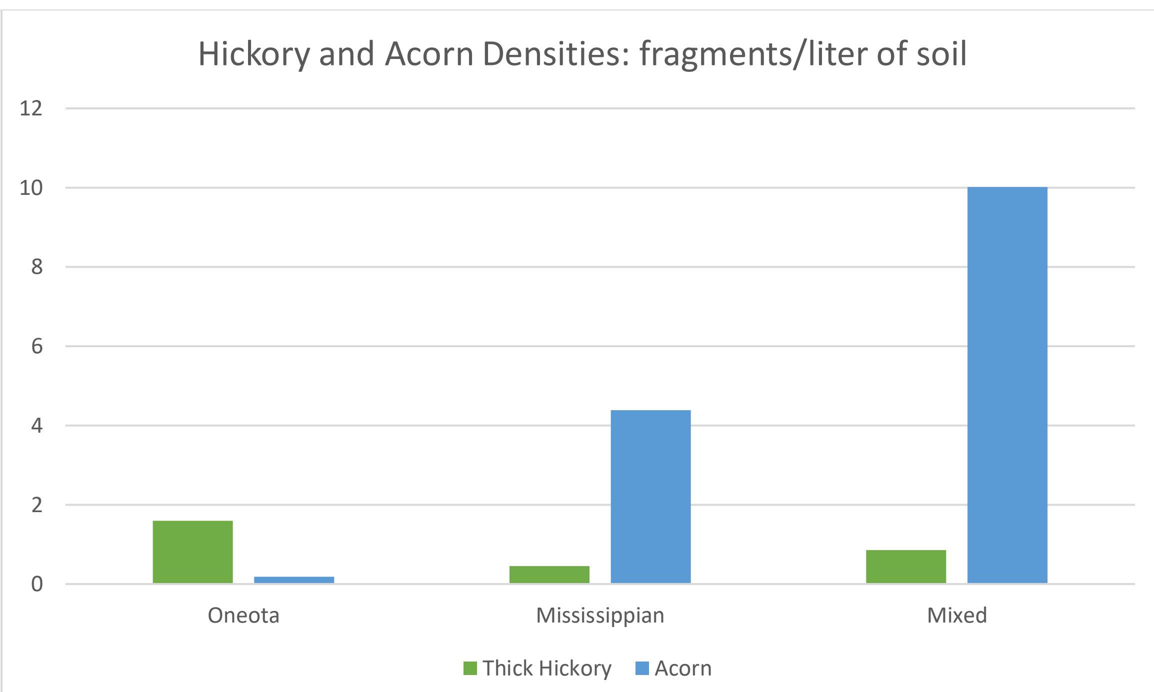


Figure 1.10 Acorn and Hickory Densities



Ubiquity Measurements

Figure 1.11 Oneota Sample Nutshell Ubiquity

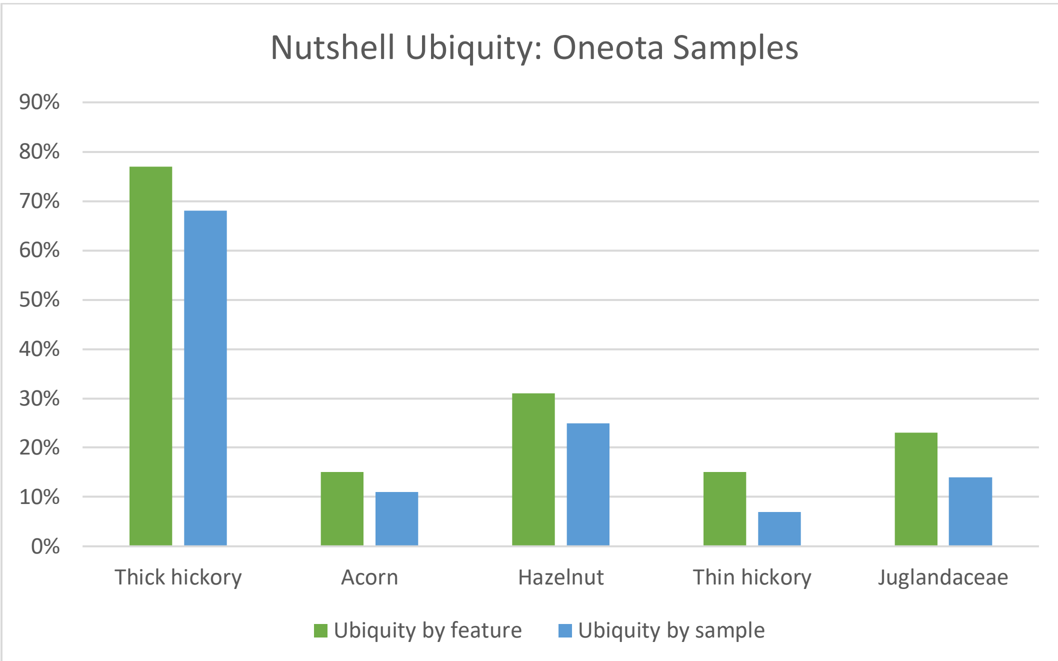


Figure 1.12 Mississippian Sample Nutshell Ubiquity

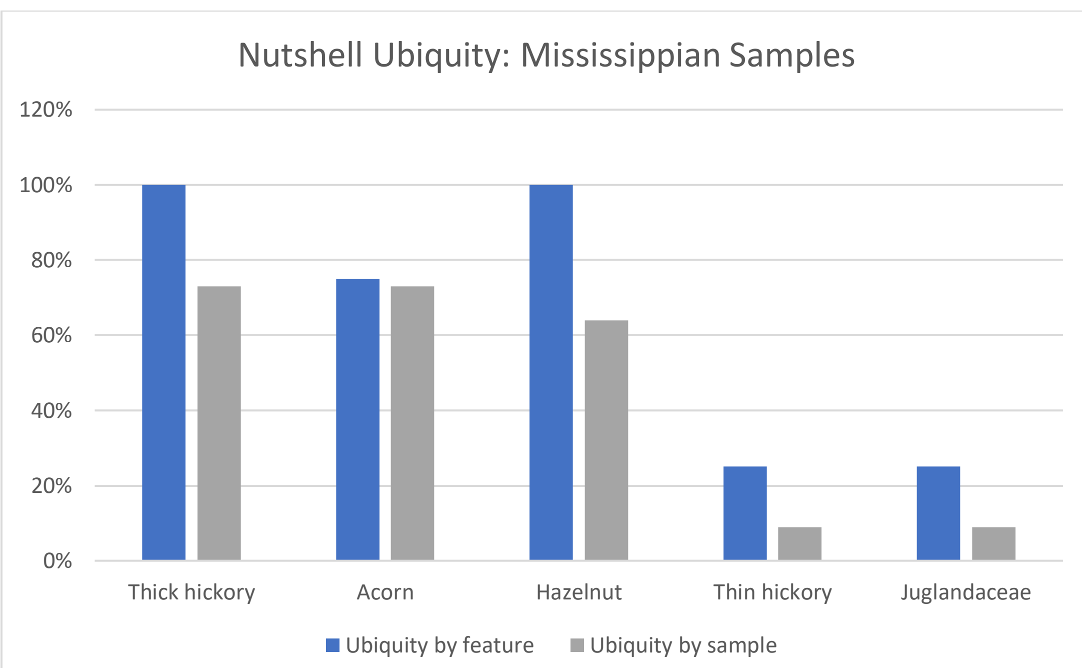


Figure 1.13 Mixed Material Sample Nutshell Ubiquity

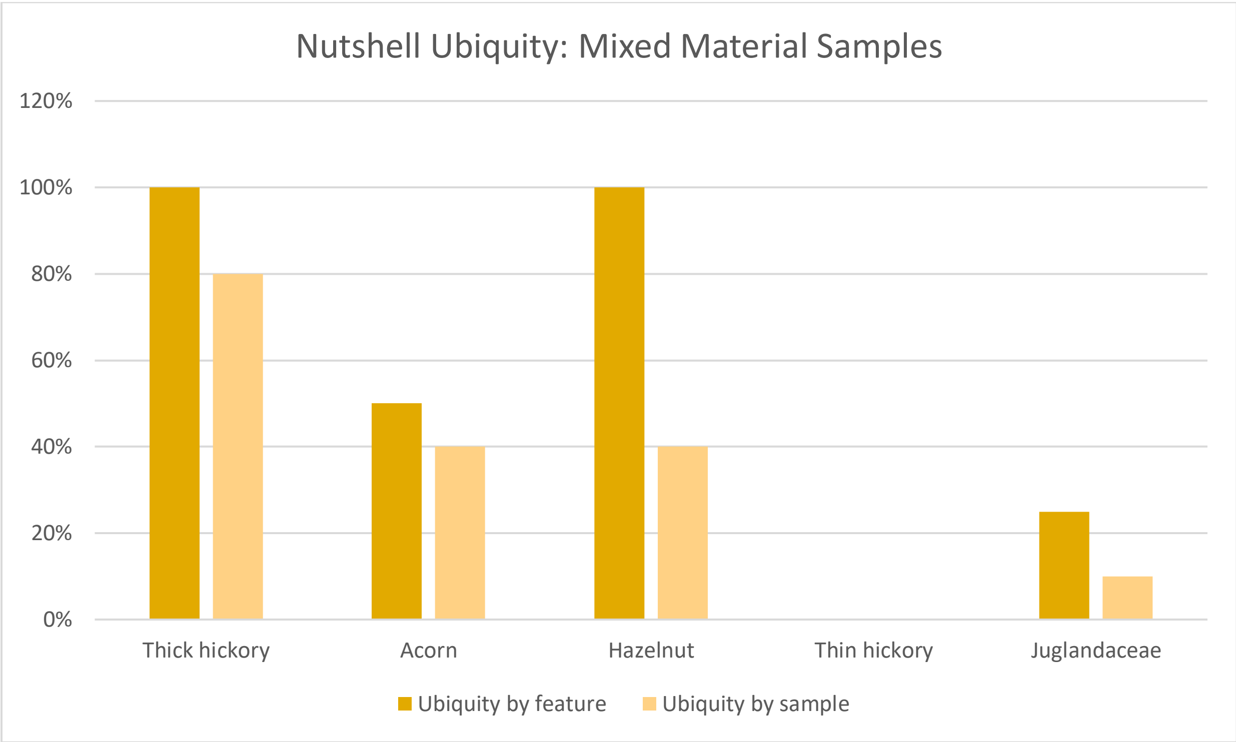


Figure 1.14 Oneota Tropical Cultigen Ubiquity

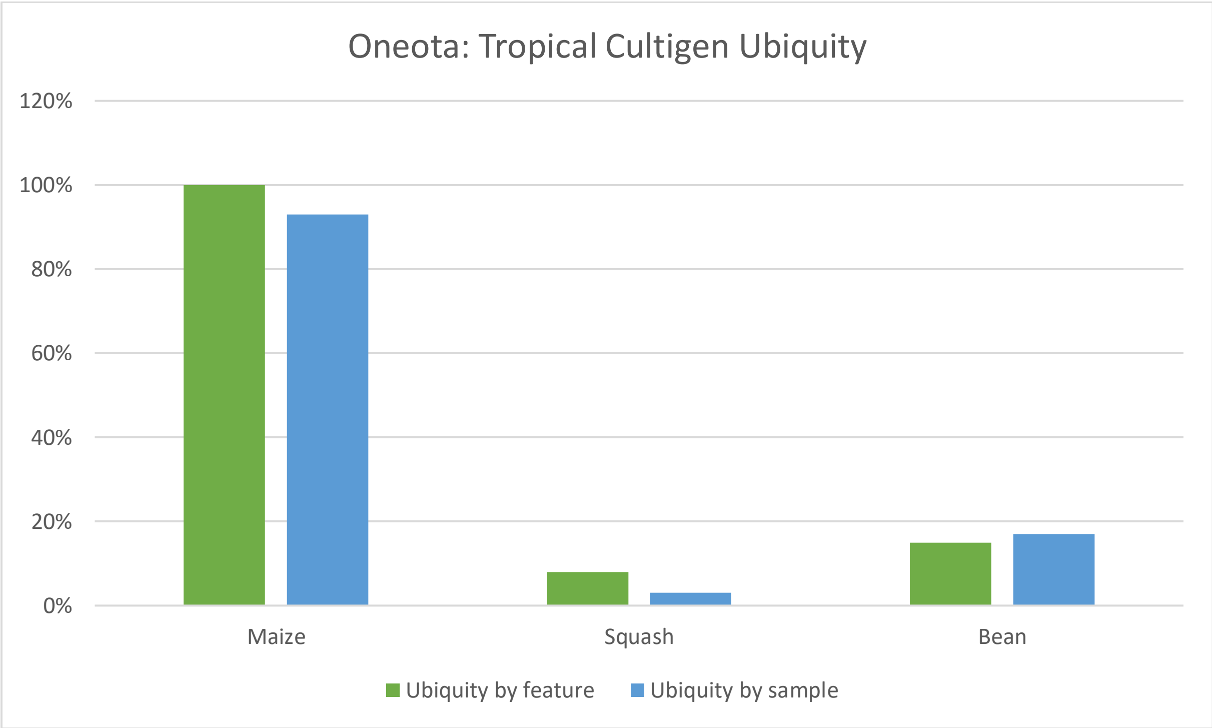


Figure 1.15 Mississippian Tropical Cultigen Ubiquity

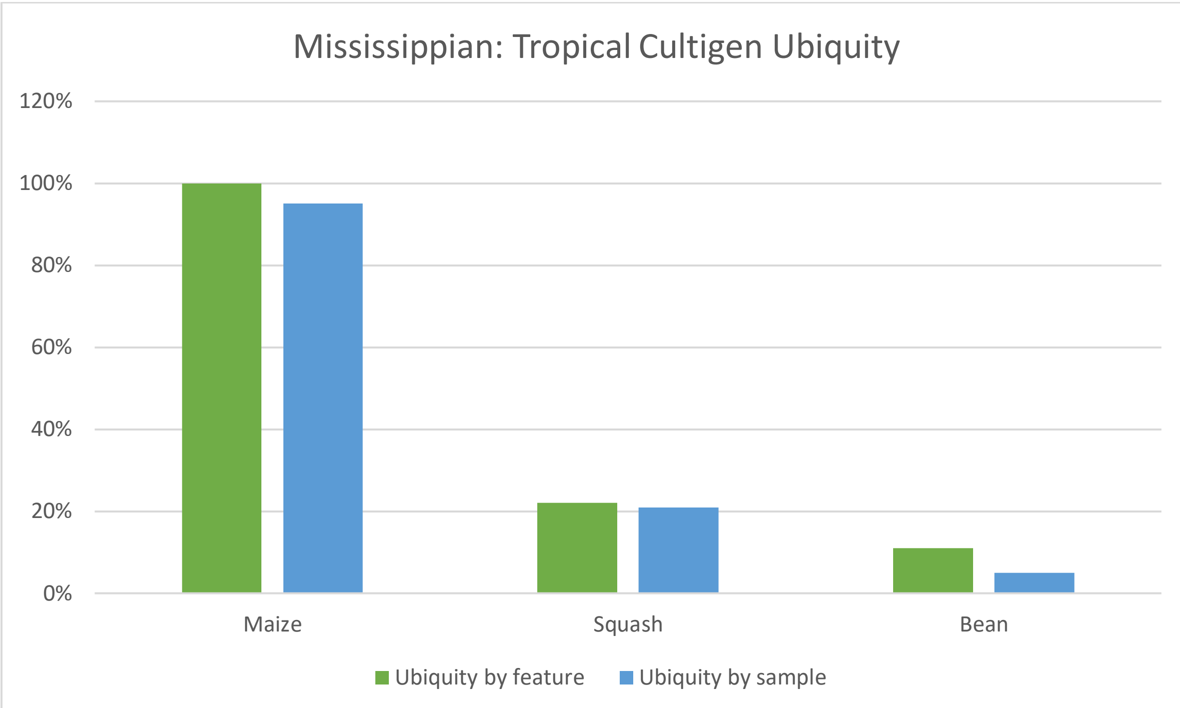


Figure 1.16 Mixed Material Tropical Cultigen Ubiquity

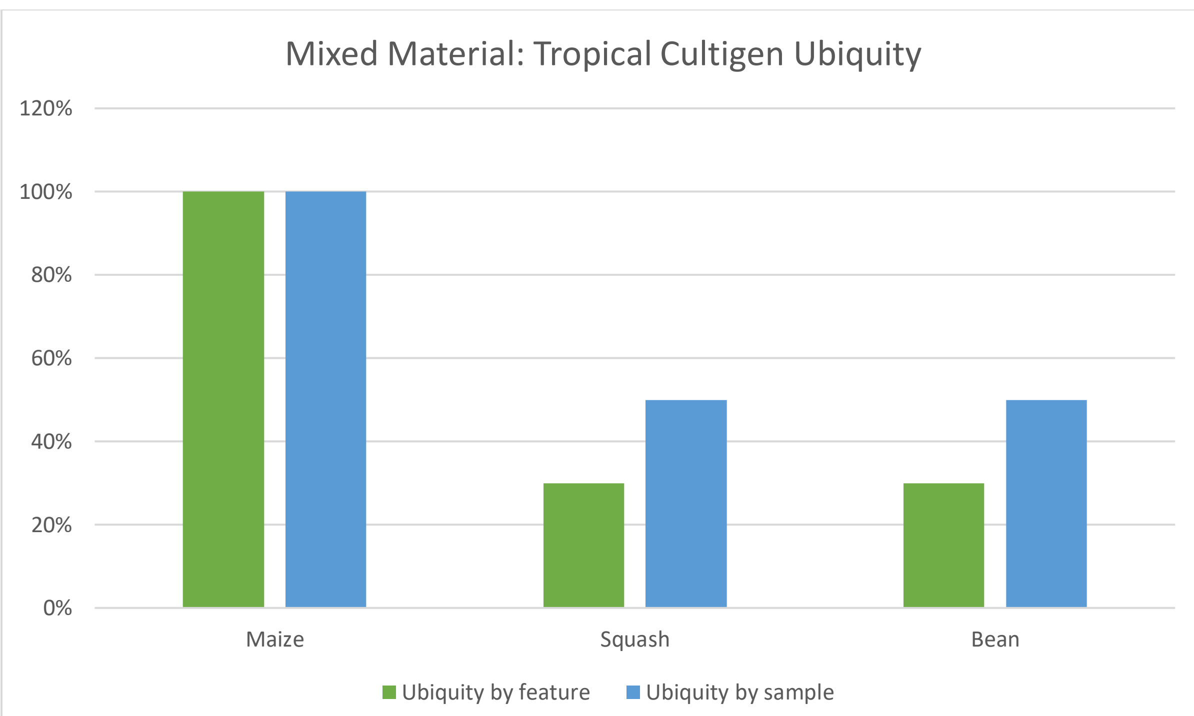


Figure 1.17 Shannon Diversity Index Results

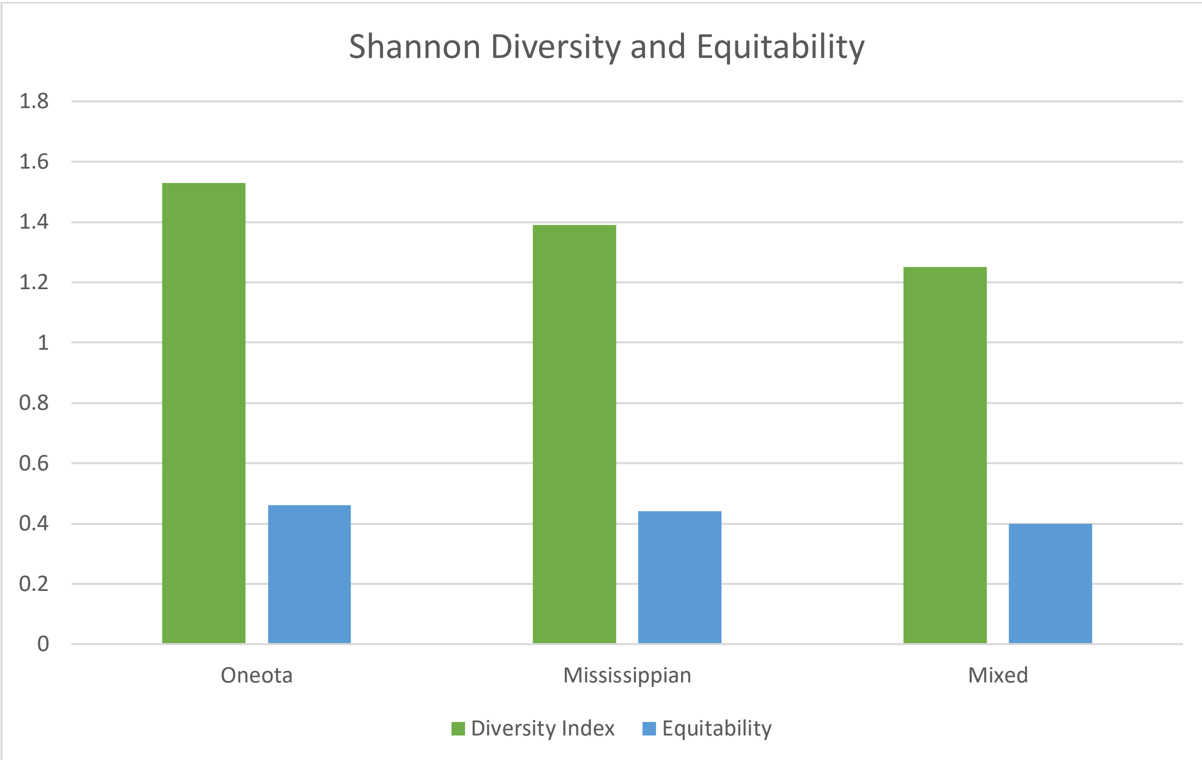


Table 1.1: Table of Oneota characteristics and horizons

(After Boszhardt 1998; Brown and Sasso 2001; Esarey and Conrad 1998; Henning 1995; Hollinger 1995; Overstreet 1995)

Attributes	Emergent	Developmental	Classic	Historic
Dates:	c. A.D. 900-1000	c. A.D. 1000-1350	c. A.D. 1350-1650	Post A.D. 1650
Ceramic technology and styles:	Armstrong Trailed; Carcajou Curviliear; Fisher Trailed; Little shoulder decoration, handles, lip modification common; some grit tempering;	Perrot Punctate; Diamond Bluff Trailed; Blue Earth Trailed; Grand River Trailed; Langford Trailed; Jars common, loop handles, curvilinear design, punctate shoulder motifs	Allamakee Trailed; Lake Winnebago Trailed; Midway Incised; Huber Trailed	Allamakee Trailed
Distribution: Regions and Localities	Eastern Wisconsin (Driftless Area, Koshkonong locality)	Central Illinois (Bold Counselor); NW Iowa (Correctionville/Moingona); C. Iowa (Central Des Moines locality); S. Minnesota (Blue Earth); SE Minnesota/SW Wisconsin (La Cross locality); E. Wisconsin (Koshkonong); E. Minnesota (Sheffield and Red Wing localities)	Upper Iowa and Root Rivers (Bastian Locality); LaCrosse Region; Chariton River; E. Wisconsin; American Bottom; Lower Lake Michigan; Mississippi Alluvial Plain	Winnebago, Ioway, Kansa, Osage, Omaha, Missouri historic groups
Other defining attributes:	Mean house size: 22.4 m^2 (single family); houses semisubterranean low frequency of end scrapers; high frequencies of fish bone; villages typically not fortified	Significant geographic expansion of Oneota sites; increase in mean house size (20-45 m^2); increase in village fortifications; cord-roughened exterior ceramic surfaces common; copper common, catlinite absent	Mean house size increases: 171.3 m^2; Increased size and permanence of sites; Bison scapula hoes; increase in trade goods, pipestone (catlinite)	Mean house size decreases: 62.3 m^2; village size decreases; increase in fur trade activity

Table 1.2 Summary Table of Recovered Macrobotanical Remains from All Analyzed Features

Summary Table:	**Oneota External Pits**		**Mississippian External Pits**		**Mixed External Pits**	
Number of Samples	29		19		10	
Number of Features	12		9		4	
Total liters of floated soil	264		185		89	
Wood weight	**51.7g**		**49.95g**		**92.92g**	
	Raw Count	**Weight in grams**	**Raw Count**	**Weight in grams**	**Raw Count**	**Weight in grams**
Nutshell (total)	**548**	**8.35**	**909**	**3.45**	**892**	**3.3**
Thick Hickory (*Carya* sp.)	413	6.96	78	1.11	76	1.3
Thin Hickory (*Carya* sp.)	8	0.3	6	0.09	0	0
Hazelnut (*Corylus* sp.)	14	0.16	11	0.19	5	0.06
Acorn (*Quercus* spp.)	51	0.31	812	2.03	802	1.84
Juglans cf. *nigra*	0	0	0	0	3	0.05
Juglans cf. *cinerea*	1	0.02	0	0	0	0
Juglandaceae	61	0.6	2	0.03	1	0.02
Tropical Cultigen (total)	**1283**	**9.76**	**472**	**3.38**	**669**	**4.58**
Maize Kernel/Embryo (*Zea mays*)	1078	7.85	331	2.3	579	3.76
Maize Cupule/Glume (*Zea mays*)	194	1.67	140	1.07	85	0.68
Common Bean (*Phaseolus vulgaris*)	11	0.24	1	0.01	5	0.14
EAC Cultigen	**29**		**21**		38	
Squash Rind (*Cucurbita pepo* ssp. o*vifera)*	1	0.01	19	0.09	6	0.04
Maygrass (*Phalaris caroliniana)*	1		0		0	
Little Barley (*Hordeum pusillum*)	0		1		1	
Chenopodium berlandieri ssp. j*onesianum*	22		0		21	
Sunflower pericarp fragments (*Helianthus annuus*)	15		0		9	

Summary Table:	Oneota External Pits		Mississippian External Pits		Mixed External Pits	
Sunflower kernel (*Helianthus annuus*)	1		0		0	
Sumpweed (*Iva annua*)	0		1		1	
Other Cultigen	5		0		0	
Tobacco (*Nicotiana* sp.)	**5**		**0**		**0**	
Fruits	**19**		**0**		**1**	
Persimmon (*Diospyros virginiana*)	2	0.01	0		0	
Grape (*Vitis* sp.)	2		0		1	
Sumac (*Rhus* sp.)	3		0		0	
Prunus sp.	12	0.14	0		0	
Other Seed Taxa	**504**		**191**		**120**	
Purslane (*Portulaca oleracea*)	307		68		47	
Mollugo sp.	0		1		0	
Wild chenopod (*Chenopodium* sp.)	55		25		6	
Cheno-am	2		4		2	
Spurge (*Euphorbia* sp.)	1		0		1	
Verbena (*Verbena* sp.)	4		6		7	
Caryophyllaceae Family	1		2		0	
Poaceae (Grass Family)	35		19		21	
Cyperaceae (Sedge)	6		20		1	
Eleusine indica	2		0		0	
Amaranth (*Amaranthus* sp.)	11		2		0	
Solanum sp.	9		1		0	
Rumex sp.	0		1		0	
Solanaceae	0		3		0	
Solanum ptychanthum	9		4		1	
Nelumbo lutea (American lotus)	1	0.01	0		1	0.02
Convolvulaceae (Morning Glory)	1		0		0	
cf. Asteraceae	0		1		0	
Unidentified seeds	22		16		12	
Unidentifiable seed fragments	38		18		21	

Table 1.3 Measures of Quantification

Comparative Ratios	**Calculation**	**Purpose**
nutshell:wood	total weight nutshell/total weight wood	gauge variability in nutshell use standardized against wood use
seed:nutshell	total count seeds/total weight wood	variability in seed use as compared to nutshell
cultigen:nutshell	total count cultigens/total count nutshell	comparison of all cultigens standardized against nutshell use
maize:nutshell	total count maize/total count nutshell	variability in maize use as compared to nutshell use
maize:EAC cultigens	total count maize/total count EAC cultigens	proportion of maize use as compared to EAC cultigen crops
maize kernel:cupule	total maize kernel and embryo/total count glumes and cupules	proportion of kernels to cupules, loose measure of processing v. consumption waste
Density Measurements	**Calculation**	**Purpose**
per taxon, Oneota pits	taxon/liters of soil floated in a given sample	Corrects for differences in sample size
per taxon, mixed pits		
per taxon, Mississippian pits		
total for Oneota features		
total for mixed features	taxon/all liters of soil floated from each cultural designation	
total for Mississippian features		
Ubiquity Measurements	**Calculation**	**Purpose**
per taxon, all contexts	% of samples a given taxon is present in	

Table 1.4 Densities by taxon for all feature types

	Fragments/ liter		Fragments/ liter		Fragments/ liter
Oneota		**Mississippian**			**Mixed**
Wood charcoal	0.2	Wood charcoal	0.2	Wood charcoal	**1.08**
Thick Hickory	1.6	Thick Hickory	0.42	Thick Hickory	0.85
Thin Hickory	0.03	Thin Hickory	0.03	Thin Hickory	0
Hazelnut	0.05	Hazelnut	0.06	Hazelnut	0.06
Acorn (*Quercus* spp.)	0.19	Acorn (*Quercus* spp.)	4.39	Acorn (*Quercus* spp.)	9.01
Juglans sp.	0	*Juglans* sp.	0	*Juglans* sp.	0.03
Juglandaceae	0.23	Juglandaceae	0.01	Juglandaceae	0.01
Total nutshell density	**2.08**	**Total nutshell density**	4.91	**Total nutshell density**	**10.02**
Maize Kernel/Embryo	4.08	Maize Kernel/Embryo	1.79	Maize Kernel/Embryo	6.5
Maize Cupule/Glume	0.74	Maize Cupule/Glume	0.76	Maize Cupule/Glume	0.96
Common Bean	0.04	Common Bean	0.01	Common Bean	0.06
Total tropical cultigen density	**4.86**	**Total tropical cultigen density**	2.55	**Total tropical cultigen density**	**7.87**
EAC Cultigen		EAC Cultigen		EAC Cultigen	
Squash rind	0	Squash Rind	0.1	Squash Rind	0.07
Maygrass	0	Maygrass	0	Maygrass	0
Little Barley	0	Little Barley	0.01	Little Barley	0.01

Oneota	Fragments/ liter	Mississippian	Fragments/ liter	Mixed	Fragments/ liter
Chenopodium berlandieri spp. *jonesianum*	0.08	*Chenopodium berlandieri* spp. *jonesianum*	0	*Chenopodium berlandieri* spp. *jonesianum*	0.24
Sunflower		Sunflower		Sunflower	
Sumpweed	0	Sumpweed	0.01	Sumpweed	0.01
Total EAC density	**0.09**	**Total EAC density**	**0.11**	**Total EAC density**	**0.35**
Fruits		**Fruits**		**Fruits**	
Persimmon	0.01	Persimmon	0	Persimmon	0
Grape	0.01	Grape	0	Grape	0.01
Prunus sp.	0.05	*Prunus* sp.	0	*Prunus* sp.	0
Total fruit density	**0.05**	**Total fruit density**	**0**	**Total fruit density**	**0.01**

Table 1.5 Results of Maize Cupule Width Measurements

Feature Number	Width in Millimeters	Feature Type
213	4.04	Oneota
213	3.51	Oneota
213	4.92	Oneota
213	4.41	Oneota
213	4.41	Oneota
213	3.9	Oneota
213	3.38	Oneota
205	3.91	Oneota
281	3.23	Oneota
281	7.18	Oneota
281	5.45	Oneota
232	3.59	mixed
232	6.33	mixed
155	4.94	mixed
155	6.22	mixed
155	6.84	mixed
155	5.88	mixed
154	5.97	mixed
154	4.75	mixed
154	5.62	mixed
154	4.14	mixed
174	5.59	Mississippian
152	4.5	Mississippian
152	3.89	Mississippian

Table 1.6 Summary Table from King (1990):

Taxon	**Raw count**
Hickory (*Carya* sp.)	n/a
Acorn (*Quercus* sp.) nutmeat	25
Maize	331
Bean	2
Squash	3
Chenopodium sp.	6
Erect knotweed (*Polygonum erectum*	1
Knotweed (*Polygonum persicaria* type	1
Little barley (*Hordeum pusillum*)	1
Sunflower	1
Blackberry	3
Apple	1
Grape	1
Black cherry	4
Plum	1
Elderberry	1
Tick trefoil (*Desmodium* sp.)	7
Vervain (*Verbena* sp.)	1
Euphorb (*Euphorbia* sp.)	4
Bedstraw (*Galium* sp.)	1
Convolvulaceae	1
American lotus (*Nelumbo lutea*)	1

Table 1.7 Summary of Comparative Macrobotanical Data from Developmental Sites in Iowa

Taxon	Christensen (13PK407)	Cribb's Crib (13WA105)	Clarkson (13WA2)	Dixon (13WD8)
Setaria sp.	5			
Cyperaceae	6			
Rumex sp.	4			
Chenopodium sp.	5	2		Present
Amaranthus sp.		2		Present
Portulaca oleracea (Purslane)	9			Present
Galium sp.	61			
cf. *Rosa* sp.			Present	
Ambrosia sp.	2			
Zea mays	Present in one sample, not counted	Present	Present	Present
Phaseolus vulgaris			Present (SNE=2)	Present
Cucurbita pepo ssp. *ovifera* (Squash) rind				Present
Juglans sp.	Present in six samples, not counted	Present		
Quercus sp.			Present	
Juglandaceae				Present
Polygonum sp. (smartweed)	1			Present
Silene sp.	2			
Croton sp.	1			
Prunus sp. (cherry or plum)			Present (SNE=2)	Present
Vitis sp.	1			Present
Solanum ptychanthum (Eastern black nightshade)				Present
Fragaria sp. (Strawberry)				Present
Sambucus nigra (Elderberry)				Present
Helianthus annuus var. *macrocarpus*	3			Present
Nicotiana sp. (tobacco)				Present

Taxon	Christensen (13PK407)	Cribb's Crib (13WA105)	Clarkson (13WA2)	Dixon (13WD8)
Allium canadense (Wild garlic)				Present
Total soil floated	>98 liters (not all samples have soil volume data)	No soil volume data available	No soil volume data available	70 liters

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NEGOTIATING IDENTITY IN A MIGRANT COMMUNITY: IDENTIFYING FEASTING REMAINS AT THE MORTON VILLAGE SITE (11F2), WEST-CENTRAL ILLINOIS

Introduction

Archaeologies of migration and community space and identity have made numerous important contributions to our understanding of migrant groups and the complex ways in which they participate in processes of migration and community integration (e.g. Anthony 1990; Ashmore 2002; Birch 2012; Burmeister 2000; Clark et al. 2013; Clark et al. 2019; Deagan 2015; Hackenbeck 2008). Archaeological perspectives on migration hold the potential to make significant contributions to contemporary discussions of this phenomenon, which is increasingly becoming important as people have become more mobile in a more and more globalized world. Following several important critiques of migration studies in archaeology for being atheoretical or asking the wrong questions (e.g. Anthony 1990; Burmeister 2000; Hackenbeck 2008), recent examinations of migration in archaeology are focusing instead on the dynamic nature of this widespread social process. At the community level, interactions between migrant and host populations are complex and historically contingent, developing into and negotiating new community forms which are reflected in a variety of material ways, including building construction and storage facilities, ceramic and lithic technologies and hybrid forms, demographic shifts and changes in group affiliation visible through mortuary analysis, and in how beliefs, traditions, and technologies surrounding food and cuisine shift as host and migrant populations negotiate their social identities. Food is a particularly salient aspect of identity, used to express group affiliation, mitigate intergroup conflict, garner allies, create political change, and draw a variety of social boundaries (Hastorf 2017), often through commensal events (Dietler 2001; Pollack 2011). The complex interactions between food, identity, community, and migration illustrate the necessity of examining any of these topics from their full social and cultural contexts: migration is not a bounded event, but a dynamic process (Hackenbeck 2008:10), just as food does not exist in a vacuum, and both of which have significant impacts on social identity and community life. Migrating populations and their host communities almost universally experience some tensions as new community forms are forged, creating a complicated web by drawing new social boundaries and choosing to maintain some traditional ones, and these choices are, and were in the past, made by the practice of active social agents operating within the domestic, ritual, and spiritual realms of a community.

Studies of feasting, in attempts to formulate theoretical perspectives on the topic and identify the wide variety of forms it takes and the social purpose of this phenomenon, often characterize feasting in terms of the social, spiritual, and political outcomes of these commensal events (e.g. Dietler and Hayden 2001; Dietler 2000; Hastorf 2017; Hayden and Villeneueve 2011; Twiss 2008). Recent theoretical developments in the study of feasting interpret these events in terms of their role in solidifying social classes and power asymmetries through politically motivated feasting (Dietler 2001), as part of critiques of studies that relegate feasting studies to examinations of how they facilitate social equilibrium (Dietler and Hayden 2001; Hayden and Villeneuve 2011). When seen in the context of a community newly home to a migrant population, feasting is an important way of navigating new forms of social interaction, new community boundaries and beliefs, creating new social roles while simultaneously maintaining some old ones, and exploration of differing sources of ritual power and the establishment of new communal symbols (Birch 2012). Older, and often criticized, conceptualizations of feasting as ways to cohere social balance or equilibrium may still be relevant to feasting events in the context of multicultural community building in a surface-level examination of the feasting process, but the complexities of building new community forms are numerous, including variable establishment of new social identities for some and the maintenance of old ones for others based on social categories such as age, gender, and social or political status. More nuanced analyses of feasting in these contexts reveal not that actors from migrant and host populations in feasting events seek total social equilibrium, but rather are participating in the complex, active negotiation of a new community form, including new roles and responsibilities, evaluating potential shifts in belief systems and values, and the expression of separate but co-existing spiritual and social beliefs and ritual behaviors. Feasting at Morton Village may have had political ramifications, but evidence from the site suggests that these outcomes may not have resulted in power asymmetries, but rather created a pathway for a community-based evaluation and negotiation of the social meaning of what it meant to be Oneota or Mississippian at Morton Village during this period of cohabitation at the site.

This study explores processes of social identity negotiation through analysis of a feasting deposit at Morton Village (11F2), a multicultural community in the Central Illinois River Valley (CIRV), home to Mississippian villagers and a migrant Oneota group during the 14th century CE. Paleoethnobotanical analysis of a unique feature containing the remains of a large, commensal event, Feature 224, yielded an interesting assemblage of plant material both in the taxa represented and the relative paucity of plant remains from the main artifact- and ecofact- bearing zone of this feature. The identification of Feature 224 as a feasting deposit was made based on criteria set forth by Kassabaum (2019), and includes the presence of an unusually high amount of animal bone and ceramic vessels in a single feature deposit, and the presence of unusual and likely ritually-charged artifacts within the deposit. Ten flotation samples were analyzed from three excavation zones for macrobotanical analysis, totaling 93 liters of floated soil and were processed in the laboratory according to standard paleoethnobotanical procedure (Pearsall 2015). This analysis also incorporates preliminary results from faunal analysis of the feature and several significant artifacts recovered from the deposit. The results of this analysis are applied to a larger examination of community-level identity negotiation between Oneota and Mississippian residents, drawing on the context of the Morton Village environment as a multicultural community. Settlement data, mortuary analysis, ceramic technologies, and excavation data (Bengtson and O'Gorman 2016; Conner et al. 2014; Lieto and O'Gorman 2014; Painter and O'Gorman 2019) all reveal that Morton Village was the site of changing social identities, shifting in complex ways as villagers made active choices regarding these identities.

Food, Feasting, and Identity

Food studies in anthropology and archaeology often frame food as one of the most salient aspects of social identity, and as an important mode by which people signal values, beliefs, affiliations, and norms (e.g. Douglas 1966; Hastorf 2017; Kassabaum 2019; Twiss 2007). Beliefs and traditions surrounding food can be viewed as "condensed social facts that reflect a group's disposition and values" (Hastorf 2017:223). Both quotidian and special meals, such as feasts, work to create and reflect social beliefs within and among groups, playing active roles in negotiation and maintenance of social identities (Dietler 2001; Dietler and Hayden 2001; Hastorf 2017; Kassabaum 2019; Twiss 2007, 2008). Food traditions are especially relevant to archaeologists in that they are material representations of group values and identities. The multicultural configuration of Morton Village makes this site an ideal place to understand the role of food in the creation and maintenance of new community norms and traditions, visible elsewhere in Morton Village through changing burial practices and ceramic traditions (Bengtson and O'Gorman 2016; Lieto and O'Gorman 2014; Painter and O'Gorman 2019). Both daily and special, ritual interactions with food at Morton Village provide important data that speak to the ways in which archaeologists can understand food as a means of negotiating new community traditions and as a reflection of cultural identity.

Many researchers have demonstrated the utility of understanding food and other processes of identity construction from the perspective of Bourdieu's *habitus*, "systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures", which are "objectively 'regulated' and 'regular' without being in any way the product of obedience to rules" (Bourdieu 1990:52). This concept is valuable to understanding social and cultural relationships with food, as it provides a model by which researchers can conceptualize the unconscious and conscious ways in which food is embedded in social knowledge systems, which is significant in the case of Morton Village because it can reveal both previously existing and new modes of how food is used to express beliefs, values, and social norms. Many researchers have invoked *habitus* in interpretations of the material remains of foodways as "culturally embodied practices of *habitus*", providing space for understanding both consensus and dissent within a community (Hastorf 2017:223, 225). If *habitus* is borne from the "structuring structures" that create social and ideological belief and value systems, and food is an embodiment of those structures, it follows that the daily and ritual uses of food are significant sources of data for archaeologists in generating narratives about the past. Understanding the ways in which food plays the part of a critical nexus of social beliefs, identities, and norms as part of daily practice and ritual behavior such as feasting is of paramount importance to reading the archaeological record as a reflection of the lived experience of social identity in the past.

Ritual and Feasting

Ritual and food are related through the act of feasting, which is a custom "used to describe forms of ritual activity that involve communal consumption" (Dietler 2001:65). A more detailed definition of feasting describes this phenomenon as "any sharing of special food (in quality, preparation, or quantity) by two or more people for a special (not everyday) event" (Hayden and Villeneuve 2011:435). Ritual as it relates to food or other aspects of social life is notoriously difficult for archaeologists and anthropologists to define, with unusual collections of material data often being placed in the category of "ritual" simply because there is no other readily available explanation for the deposit (Kassabaum 2019). Rituals do not necessarily need to exist solely in the realm of the sacred; actions that are symbolically demarcated from daily activity in their meaning and purpose can all be considered ritual behavior (Dietler 2001:67). Archaeological studies of ritual tend to understand these special contexts as material manifestations "of ideology (orthodoxies/heterodoxies), creative agency, or discursive or contestatory forms of practice" (Swenson 2015:330). Anthropologists and archaeologists have employed and developed a variety of definitions for ritual, ranging from Rappaport's conceptualization of ritual as "the basic social act", to definitions that place ritual within the realm of political and micropolitical processes intended to solidify asymmetrical power relations, to interpretations of ritual material as a heuristic device to interpret active place and culture making, and arenas of social change (Swenson 2015). The use of food in ritual behavior in a feasting context provides an important source of data for understanding past social and cultural life, but one that isn't necessarily straightforward. Food in ritual is typically understood through the identification and interpretation of feasting behavior. Dietler and Hayden (2001:8) note that

> The interest of the feast is not simply that it enables the accumulation of wealth or material goods, but that it is a remarkably supple ritual practice that allows the strategic reciprocal conversion of economic and symbolic capital toward a wide variety of culturally appropriate political goals.

Feasts are not bounded events sharing the same form and purpose across social and cultural boundaries, but rather reflect varying types of cultural behaviors, actions, and beliefs (Dietler and Hayden 2001:3; Hayden and Villeneuve 2011). Food traditions are "condensed social facts" (Hastorf 2017:223), making feasts sites of similar concentrated social meaning (Dietler 2001). Interpreting a feast involves the "triangulation" of material data and theoretical and ethnographic perspectives to understand the social function of these special meals as processes of social transactions and negotiations (Dietler and Hayden 2001). Like the trajectory of anthropological feasting studies, which have traveled through a variety of theoretical lenses, archaeological studies of feasting are moving away from simply identifying large concentrations of floral, faunal, and ceramic remains as feasts intended to facilitate social solidarity and towards an understanding of the kinds of ritual work being performed through the act of feasting (Hayden and Villeneuve 2011).

The development of feasting studies and theoretical perspectives on feasting has seen a variety of both atheoretical, descriptive accounts of feasts, as well as studies that focus on the dynamic social processes involved in and represented by feasts. Early feasting studies, informed by colonial endeavors, interpreted lavish feasting practices as wasteful because they did not make economic sense to the observers, who often interpreted these events in terms of Western economic values (Hayden and Villeneuve 2011). Later Structuralist-Functionalist interpretations of feasting interpreted this phenomenon as having the primary purpose of facilitating social solidarity (Dietler and Hayden 2001; Hastorf 2017; Hayden and Villeneuve 2011; Kassabaum 2019). A proliferation of feasting studies in the last several decades, both in archaeology and anthropology, sparked a shift away from the Structuralist-Functionalist models of social equilibrium and towards the development of feasting theories that acknowledge the wide variety of social purposes these events serve (Hayden and Villeneuve 2011). For example, Dietler and Hayden (2001:10) suggest that feasting serves "to define and inculcate social categories" such as gender and age (Hayden and Villeneuve 2011; Twiss 2008), but other researchers note that feasts can serve many purposes, including political and micropolitical action by individuals within a given social paradigm, economically-based behaviors defined by environmental parameters, the creation, negotiation, and maintenance of social identities, and the performance of religious or ritual ceremony (Dietler 2001; Dietler and Hayden 2001; Hastorf 2017; Hayden 2001; Kassabaum 2019; Twiss 2008). Within these contexts, feasts can be seen as displays of wealth and power through competitive feasting, or as modes of community building, payment of debt or tribute, garnering allies, cementing exchange networks, signaling ethnic or social identity, and celebrations of life milestones, among other things (Hastorf 2017; Hayden and Villeneuve 2011; Kassabaum 2019).

Feasts have a "metonymic relationship" to everyday meals in that they build upon the structure of everyday eating in a way that transports participants into a more symbolic world towards a desired social outcome (Twiss 2008:419). Ultimately, feasting as a behavior and process can exist as both politically and environmentally motivated but the key factor for archaeologists is not just the identification of a feast, but understanding the ways in which feasts represent varying forms of ritual practice, and what the intended consequence of that ritual might be (Dietler 2001; Hayden and Villeneuve 2011; Kassabaum 2019; Twiss 2008). In a thorough review of the archaeological correlates of feasting and their interpretation, Kassabaum (2019) identifies the importance of a multiscalar approach in interpreting feasting remains, cautioning against calling any large deposit of floral and faunal remains a feast and instead urging the addition of two significant dimensions of feasting other than floral and faunal remains- group size and level of sociopolitical competition- to conceptualize and classify feasts.

A growing body of literature related to feasting behavior has explored feasts in many ways. Some examples include how people negotiate value of materials through commensal behavior in Enga feasts in Papua New Guinea (Wiessner 2001), how feasts were used as tools to mobilize a labor force and form the basis for collective work events among the Samia in western Kenya (Dietler and Herbich 2001), how feasting can aid in interpretations of the nature of early Cahokia's political economy (Kelly 2001; Pauketat et al. 2002), and feasting as an important part of ritual mound building and world-renewal ceremonialism in Woodland societies in the American southeast (Knight 2001). These studies have built on earlier interpretations of feasting as ostentatious displays of wealth stemming from social competition, modes of creating social solidarity, and redistribution of resources (Kassabaum 2019). The required interpretive relationship between feasts and everyday consumption necessitates visualizing these ostensibly opposing modes of consumption along a continuum: every day meals generate certain social outcomes, while feasts occur to produce different ones (Kassabaum 2019; Twiss 2007). The importance of understanding the ritual significance of the feast, rather than just the identification of the feast itself, is seen in this continuum.

Many researchers have identified feasts as a universal means by which social groups create and maintain group identity, and numerous scholars have created a variety of feasting "types" through attempts to classify this particular social behavior (Dietler and Hayden 2001; Hastorf 2017; Hayden and Villeneuve 2011; Kassabaum 2019; Twiss 2008). The nature of feasts, however, can be extraordinarily variable in the types and quantities of food produced and served, the location of the feasting event, and how certain individuals participate or not (Kassabaum 2019; Twiss 2008). Feasts may involve cooking and serving large amounts of ordinary, staple foods for a community or select members of a community, or they may involve special foods outside the realm of quotidian meals (Twiss 2008). There is a great deal of focus on the classification of feasts into interpretive categories. For example, Dietler (2001:67) identifies two primary things that archaeologists need to address in discussions of feasts as identifying the material remains of feasting in the archaeological record, and exploring how feasts represent specific symbolic action and forms of ritual practice. Within these guidelines, Dietler (2001) further explores the sociopolitical dimensions of feasting through three categories of feasts: entrepreneurial, patron-role, and diacritical, while describing all feasts as a practice intended to establish, reproduce, and maintain social relations and structures. The concepts of diacritical and patron role feasts may be particularly relevant to the feasting remains at Morton Village. Diacritical feasts are described by Dietler (2001:83-85) as the "use of differentiated cuisine and styles of consumption as a diacritical symbolic device to naturalize and reify concepts of ranked differences in status of social orders or classes", whereas patron role feasts represent the "formalized use of commensal hospitality to symbolically reiterate and legitimize institutionalized relations of social power". Rather than reifying elite status or signifying social competition, however, these feast categories as applied to data from Morton Village may signify the ritual behavior employed to inculcate new community configurations resulting from the migration of Oneota people into the region, while also providing a platform to signal differences in culture and social tradition among residents of Morton Village.

Regardless of the form of the feast, they are understood to be significant stages of social activity, sometimes serving integrative social functions and sometimes as exclusionary events that are intended to consolidate political power for the hosts. Within the context of multicultural communities composed of a migrant and host population, the act of feasting is particularly salient as a mode of social integration and organization. Feasts as political events "create and maintain social relations that bind people together in various intersecting groups on a wide range of scales" (Dietler 2001:68-69). Victor Turner's (1969) concept of *communitas* is useful here in understanding feasting as a site of social change in that it articulates with the structures of Van Gennep's *rites de passage*: social actors are separated from daily action through participation in ritualized commensal behavior, enter a phase of liminality during the feast itself, and following the given ritual activity, feasting in this case, social actors are reintegrated into newly affected social structures (Turner 1969). Turner makes a key connection between liminality as "a moment in and out of time", involving those on the margins of a given social structure, and *communitas,* which is a state of social activity used to describe the temporary leveling of social inequalities through shared liminal status (1969:360-361). This extension of the theory of liminal spaces to include a temporary deconstruction of normal social structures is not universally applicable, but demonstrates an important perspective concerning the integrative function of feasts in multicultural communities that are home to both migrant and host populations.

Returning to *habitus,* this concept provides a model that structures social action while maintaining the ability of social actors to act individually, to a degree, within those structures. This perspective presents an opportunity to understand food as reflected in the archaeological record, in both every-day and special contexts, through the tensions existing at Morton Village resulting from the establishment of a newly multicultural community. In some ways, the negotiation of new social structures and norms following the coalescence of this new community places Morton villagers in a sort of liminal space. In this way, the presence of two distinct types of material culture, as well as some hybrid forms, does not indicate the co-existence of two separate, bounded cultural entities, but rather complicates the concept of social identity through participation in new social forms that arose out of this liminal space and the events that represent it. Feasting as a type of ritual behavior provides archaeologists a materially visible means of narrating the genesis of these new social forms and community configurations, and the relevance of the *habitus* concept here is that it provides a theoretical platform from which to understand the coexistence of two different sets of social structures and the complex ways in which they interact, are negotiated, and changed through daily and ritual behavior.

Identity, Migration, and Coalescence

The social landscape of the CIRV during the 14th century was actively changing as Bold Counselor Oneota groups were moving into the region and settling in Mississippian villages. The concepts of migration and community coalescence are powerful theoretical tools for complicating social relationships and behaviors represented by material data. Bold Counselor Oneota groups integrated into Mississippian villages to varying degrees throughout the CIRV, with some sites exhibiting a "relatively pure" assemblage of Oneota material, as at C.W. Cooper, while the Crable site contains nearly equal amounts of Mississippian and Oneota material, and researchers have cautioned against interpreting Bold Counselor Oneota outside of its relationship to Mississippian material culture (Esarey and Conrad 1998:38). Morton Village, the site of study for this analysis, contains a mixture of Oneota and Mississippian material culture. The arrival of Bold Counselor Oneota people in the CIRV undoubtedly presented both challenges and advantages to negotiating new social and community structures. In a discussion of migration focusing on the American Southwest, Clark et al. (2019) identify this tension between migrating groups and the populations already living at their destination as “the migrant paradox”, wherein migrating populations are either considered a positive, economically valuable presence in their new communities, or causes of social disturbance. Exploring the dimensions of migration through the lens of social coalescence and the role of these phenomena in the creation and maintenance of community identity at Morton Village is integral to understanding the role of ritual and feasting in mediating the formation of a new community at Morton Village.

Recent archaeological investigations of migration and coalescent communities deal frequently with the complex entanglements represented by population movements, production of hybrid material cultures, and coexistence of separate traditions of material culture production (e.g. Birch 2012; Clark et al. 2019; Clark et al. 2013; Deagan 2015). Migration should be conceptualized within several dimensions, including the scale and organization of migrating populations, and prior social conditions in both the homeland of the migrating group and their destination. Archaeological studies of migration are most effective when they move beyond seeking the cause of migration and focus instead on this phenomenon as a social process rather than as an explanatory model for change (Anthony 1990; Burmeister 2000; Clark et al. 2019; Hackenbeck 2008). The past decade of archaeological research has seen a move away from studies of migration that focus on identifying migration as a prime mover in the diffusion of various technologies (e.g. agriculture, tool technologies, ceramic styles) and, mostly fruitlessly, seeking the cause of a particular migration. These new research perspectives are instead moving towards developing theories of migration, understanding migration as a nearly universal, dynamic social process, models for the kinds of social change that result from migration, and models for identifying migrations in the archaeological record (Anthony 1990; Clark et al. 2013; Clark et al. 2019; Burmeister 2000; Hackenbeck 2008).

Recent examinations of migrations of Kayenta people from northeastern Arizona and Ancestral Puebloan groups from Mesa Verde indicate that the size and scale of migrating populations are not the ultimate predictors of migration outcomes; successful migrations resulting in the coalescence of new, multicultural communities are more appropriately defined by the identity and beliefs of both groups, and the new skills and opportunities afforded to communities by the migrating population (Clark et al. 2019). The migration of a small number of Kayenta people into areas bordering the Mogollon Rim and the Gila River in Hohokam territory had a significant impact on these regions, resulting in minority Kayenta groups participating in the Salado coalescence and creation of a new "meta-identity", visible through the production and exchange of Roosevelt Red Ware (in which Kayenta migrants were instrumental) and taking part in the new Salado identity through shifts in architectural tradition, burial practice, and lithic manufacturing (Clark et al. 2019:272). This case study demonstrates the complexities of migration through a multiscalar approach, highlighting the complex ways in which migrants and locals participate in negotiations of new social structures. Migrating populations often bring diversity to their destinations in the form of new beliefs regarding social organization, cultural values and beliefs, and economic and genetic diversity (Clark et al. 2019:263). The spectrum of possibilities for migration outcomes is bookended on one side by the establishment of ideologies of exclusion, segregation, and sometimes violent factionalism, and on the other by ethnogenesis, with both groups participating in a new social configuration, but hybridity of cultural forms is not coeval to ethnogenesis (Clark et al. 2019; Clark et al. 2013; Deagan 2015). Along this spectrum, and with the presence of material culture hybridity, new forms of identity construction and sociocultural metamorphosis may reflect the "artistic creativity, technological innovation, or commercial production" (Deagan 2015:261) of both groups as they draw on their knowledge of the natural, cultural, and spiritual world.

The coalescence of new communities resulting from migrating groups is a multigenerational process involving marked social change for both groups, rarely resulting in homogenous assimilation and often generating complex enclaves of hybridity (Clark et al. 2019:264), defined by Deagan (2015:261) as "creation, through interaction and negotiation, of new transcultural forms". Just as hybridity does not indicate or result in homogenous assimilation of cultural groups, coalescence is not an end-point for migrant and local groups, but it better seen as a process, or "suite of transformations that move…society in the direction of inclusivity and multiculturalism" (Clark et al. 2019:266). The term "coalescent society" originated as a term used to describe the merging of the Central Plains and Middle Missouri traditions, and was adopted to describe Indigenous polities of the southeastern United States in the 17th and 18th centuries. Initially, coalescence was considered a phenomenon involving the integration of distinct material culture traditions that results from migration, and has been critiqued for offering a viewpoint that characterized groups involved in processes of coalescence as ahistorical (Birch 2012; Kowalewski 2006). Cross-cultural examination of the coalescence phenomenon throughout the world indicates that the term "coalescent society" is not appropriate as a social type moniker, but rather that several important attributes and processes define coalescence. The attributes of and processes involved in coalescence are variably intertwined based on the environmental and cultural aspects of both local and migrant groups. In other words, they are historically contingent (Birch 2012; Clark et al. 2019; Clark et al. 2013; Hart and Engelbrecht 2012; Kowalewski 2006).

The attributes that have been used to define coalescent societies are understood as responses to common threats, including demographic decline, environmental degradation due to shifting climate patterns, warfare and violence (either inter- or intra-group), and refugee movement (Kowalewski 2006:117). There are numerous attributes of coalescent societies, and the most salient to exploring the multicultural configuration of Morton Village are: 1) drawing newcomers into multicultural settlements; 2) migration to new places in pursuit of food security and access to raw material; 3) intensification of and changes to local production and labor strategies, 4) village layout and architecture planned to facilitate community integration; and 5) collective leadership favored over hierarchical structures of authority (Kowalewski 2006:117). The presence of these attributes of community coalescence at Morton Village are important in contextualizing the nature of ritual feasting behaviors. There are inevitably tensions that arise from the migration of new groups into an already populated region, and several attributes of coalescent societies represent some of the ways in which the new community may mitigate those tensions, such as changes in architecture and village layout. As previously discussed, ritual feasting may also play an important role in navigating social change concomitant with the migration of a new group into a village community.

Bold Counselor Oneota and Morton Village: Background

The Oneota Manifestation and Bold Counselor Phase

Oneota is a widespread archaeological manifestation located primarily in the Prairie Peninsula of the Midwestern United States following the Late Woodland occupation of the same region, and into the Contact period (c. A.D. 900-1700) (Benn 1989; Brown and Sasso 2001). The distinctive mode of ceramic production and decoration employed by Oneota people has led to archaeologists defining Oneota primarily by ceramic attributes, with some researchers focusing additionally on house size and style, village layout, lithic manufacturing, and use and modification of faunal bone (Hollinger 1995; Wedel 1962). Oneota ceramics are distinctive "shell tempered, globular ceramic vessels with rounded shoulders, curvilinear or geometric designs, and strap handles" (Staeck 1995:3). The Oneota tradition is widespread, both geographically and temporally, and is therefore divided into several horizons based on time and location: Emergent (c. A.D. 900-1000), Developmental (c. A.D. 1000-1350), Classic (c. A.D. 1350-1650), and Historic (post A.D. 1650), although the dates for emergent Oneota in Wisconsin are still debated, with some researchers placing the appearance of Oneota much later, c. A.D. 1150 (Boszhardt 1989, 1998; Brown and Sasso 2001; Esarey and Conrad 1998; Hollinger 1995; Overstreet 1995). Oneota settlements tend to occur in large, dispersed village patterns in ecotonal regions, and Oneota subsistence is generally described as "flexibly adapted" (Parker 1992:485).

Bold Counselor Oneota is restricted to five sites in the CIRV, including Crable, Sleeth, Morton Village, C.W. Cooper, and Otter Creek, with a small component at the Sponemann site in the American Bottom (Esarey and Conrad 1998; Jackson 1992). Bold Counselor Oneota sites are defined almost exclusively by their distinctive ceramic material. These diagnostic ceramic forms are "nearly archetypal of a Developmental horizon Oneota vessel" (Esarey and Conrad 1998:39). Oneota decorative motifs are highly recognizable trailed line, punctate border, and “stab and drag” vertical decorations (Esarey and Conrad 1998:40). In addition to strong similarities to other Developmental Oneota horizon ceramic assemblages, Bold Counselor phase sites also contain Mississippian-style plates with deep rims, often decorated with Oneota motifs, and a shallow, broad bowl form with flared flanges or handles and Oneota decorative motifs (Esarey and Conrad 1998:40). Bold Counselor Oneota groups migrated into the CIRV in the 14th century, and although researchers have not identified the source of this migration, comparisons to other Developmental Oneota manifestations, particularly in Iowa, may be appropriate based on ceramic similarities (Benn and Thompson 2014; Conrad 1991; Tiffany 1997). Mississippian villages in the CIRV were already established when Bold Counselor Oneota groups moved into the region, and excavated sites indicate that Mississippian and Bold Counselor groups were living together in village communities during most of the 14th century. The admixture of Mississippian vessel styles into Bold Counselor Oneota ceramic production is indicative of culture contact between Mississippian and Bold Counselor groups, likely representing some degree of social cooperation and change as Oneota groups moved into the region.

The modes by which Bold Counselor Oneota and Mississippian groups distinguished themselves as separate social groups or maintained affiliation with differing ethnic identities is still being investigated in the CIRV. Bold Counselor Oneota is recognized almost exclusively by ceramic material remains, but these ceramic remains do not indicate “ethnicity” or identity as a one-to-one correlation (Esarey and Conrad 1998). Archaeologists approaching studies of migrant communities and group identity or ethnicity are bound, in an interpretive sense, by the nature of the material culture as data, which does not include the direct observation of social groups under study. Community-level interactions between Bold Counselor Oneota and Mississippian groups are complex phenomena that should be addressed from a variety of data-driven, multi-scalar perspectives that address the nature and negotiation of identity in this region beyond sorting material culture into categories of “Oneota” or “Mississippian”.

The Morton Village Site (11F2)

The Morton Village site, located in west-central Illinois near present-day Lewistown (see map), was occupied contemporaneously by Bold Counselor and Mississippian groups between approximately A.D. 1300 and A.D. 1400 (Santure et al. 1990). The site is located along an upland surface near the bluff line of the river valley in a diverse physiographic region, allowing for access to wetland, upland forest, and bottomland resources (King 1990). The site was initially excavated in the 1980s as part of salvage operations run by the Illinois State Museum and Illinois Department of Transportation, revealing a large habitation area and a cemetery component (Norris Farms #36) containing the largest sample of Oneota skeletal remains (n=264). Recent excavations between 2008 and 2016, supervised by Jodie O’Gorman (Michigan State University) and Michael Conner (Illinois State Museum/Dickson Mounds Museum) produced a series of radiocarbon dates taken from wood charcoal, nutshell, and charred ceramic residues establishing that Mississippian and Oneota groups were living together at the site at the same time. Excavations revealed both wall trench and single post houses, with single post structures being the traditional construction style of Oneota people and wall trench being traditional of Mississippian-style architecture. There is no central plaza at Morton Village, which is unlike other Mississippian villages and temple towns in the CIRV during this period. There is also ceramic evidence indicating that Bold Counselor Oneota villagers adopted the manufacture and use of a Mississippian-style plate form (Lieto and O’Gorman 2014), and the presence of Mississippian symbols in the burials of children in Norris Farms #36 cemetery (Bengtson and

O'Gorman 2016) further indicates that social boundaries were being negotiated and revised as Oneota and Mississippian people were mediating this new community configuration.

In addition to 46 partially excavated structures and 188 external pit features, recent excavations revealed at least three public structures that may be associated with ritual behavior. Structure 16 is located just west of the central area of excavations, and was constructed in a highly unusual manner that is unknown in the CIRV in either Oneota or Mississippian structures. Structure 25 is a wall trench structure containing six internal pit features and a variety of diagnostic Oneota and Mississippian sherds scattered on the floor. Within Structure 25, one pit feature (Feature 224) stood out as exceptional, containing 36.6 kg of cultural material and unmodified stone. Structure 34 is a circular, semisubterranean structure showing evidence of several building episodes that excavators are currently interpreting as a sweat lodge or some other kind of small, special function building.

Excavators at Morton Village identified structures and pit features as Oneota, Mississippian, or mixed material based on ceramic assemblages and house construction style, with single post construction being attributed to Oneota construction and wall trench to Mississippian. Several buildings show evidence of both wall trench and single post construction styles. The identification of Morton Village as a multicultural community hinges on the radiocarbon dates collected from the site, which show a contemporaneous occupation of Morton Village by both Oneota and Mississippian groups (Conner and O'Gorman 2015). Although structures and pit features were designated by the primary investigators as Oneota, Mississippian, or mixed material based on their ceramic content or construction style, it is critical to point out that these divisions based on group affiliation inferred from material culture do not indicate separate systems of lifeways at Morton Village. The presence of Mississippian style pottery forms with Oneota motifs, houses with evidence of both wall trench and single post construction styles, inclusion of Mississippian symbolism in the burials of children at Norris Farms #36, and the presence of public and ritually used structures all indicate that Bold Counselor and Mississippian groups were living together in a multicultural community configuration. Understanding the landscape of interaction at Morton Village requires a view of the material culture as both a mode of maintaining some aspects of cultural or ethnic identity while acknowledging that social boundaries at Morton Village during this time were likely shifting as they were being actively negotiated by both groups. From this perspective, the very existence of Bold Counselor Oneota material assemblages cannot be understood without respect to Mississippian lifeways (Esarey and Conrad 1998).

Shared Community Spaces at Morton Village: Feasting and Feature 224

Public and shared community spaces in archaeological sites are integral components of cultural landscapes in which past people lived and participated. The material manifestation of social and cultural landscapes in the past, particularly in built spaces intended for community participation, is inextricably linked to processes of community building, embodying "fundamental organizing principles for the form and structure of people's activities" (Anschuetz et al. 2001:161). The spatial organization of an archaeological site shares a recursive link with the social structures that exist within and around them (Ashmore 2002:1172). The connection between space and the social agents that build, organize, maintain, modify, and/or use space is at least well known, if not a point of theoretical agreement amongst archaeologists. Although architecture and the built environment represent only a small portion of social landscapes in the past, they provide important data relevant to understanding the ways in which public architecture and shared community space are culturally constructed (Anschuetz et al. 2001; Ashmore 2002). Community architecture at Morton Village is examined here because it represents shared spaces within a village undergoing significant social change as a result of Bold Counselor Oneota migration into the region, and likely formed markers for the social arena in which residents were able to "construct the past through ideational factors" (Anschuetz et al. 2001:162). It is important to note that the use of the word "public" is intended to describe shared, non-domestic space, and not to imply that these spaces were accessible to anyone. This paper focuses primarily on one feature within a structure ostensibly shared by both Oneota and Mississippian residents of Morton Village containing the ritual remains of a feasting event. Laying the framework for the social context of space, specifically public or shared, community space, is significant here because the act of feasting does not occur in a vacuum. Identifying public, shared, and domestic spaces as part of a larger social landscape enables an analysis that uses the built environment to inform the ways in which Morton Village, as an example of built environment, contextualizes social action such as feasting to inform an analysis of this kind of ritual behavior.

Structure 25, the focus of this investigation, is a burned wall trench structure in the central portion of the excavated area of the site containing six internal pit features. Excavators recovered diagnostic Mississippian and Oneota ceramics from the structure's floor, but note that it does not appear to have been burned while occupied (Conner and O'Gorman 2015). Five of the six internal pit features yielded very few artifacts, but one, Feature 224, contained a significant and unusual assemblage of material. Feature 224 is located at the western corner of Structure 25 and is approximately 103 centimeters in diameter and 72 centimeters deep and contains four major zones (Figure 2.1) (Conner and O'Gorman 2015). Zone four was the lowest excavated level, and contained about 10-15 centimeters of mostly clean B-Horizon soil deposited to form the base of the feature. Mississippian cordmarked jars, an incised plate fragment, and a slab of hematite or limonite were recovered from this level. Zone 3 was the primary artifact-bearing zone, containing 19.6 kilograms of faunal remains (over 20 species), ceramics, rough rock, and tools. A variety of ceramic forms were present, including cordmarked jars and incised plate, plain bowl, seed jar, incised jar, and cordmarked bowl fragments, all Mississippian in style. This zone also contained projectile points, modified rock, a hoe flake, and quartz crystal. Three artifacts of special interest were also recovered: a celt, a deer antler with beaver incisors embedded in it, and a deer ulna awl.

The boundary between Zone 4 and Zone 3 was abrupt, and the volume of material in Zone 3, as well as the different fill used in the zones, suggests a deliberate, single depositional episode. Zone 2 contained some artifacts but in much lower quantity than Zone 3, and appears to be a capping layer over the materials deposited in Zone 3. The ceramics present in Zone 2 include Mississippian plain jar and incised plate fragments. Zone 1 contains evidence of a small, *in situ* burning episode with some scattered, burned earth throughout the layer, possibly left there from when the structure burned. It also contained a large piece of an Oneota jar and a small, elbow-shaped sandstone pipe. While Zone 3 likely resulted from a single depositional episode and Zone 2 appears to be a capping layer, the relationship between Zone 1 and Zones 2-4 is not immediately clear (Conner and O'Gorman 2015). The feature in total yielded 36.6 kilograms of material, and a nutshell fragment recovered from the feature sent for AMS dating returned a median date of cal. A.D. 1344 (2σ range A.D. 1305-1408). Preliminary analysis of ceramic vessels represented by rims and lips in the feature show approximately 30 vessels, but there may be more than 40 present if large body sherds are included (Conner and O'Gorman 2015). All the ceramics recovered from this feature were Mississippian in style, except for a portion of an

Oneota jar in Zone 1. Some of the artifacts recovered from this feature represent what looks like domestic refuse, but the quantity of animal bone (5.9 kilograms) and the presence of special artifacts, such as the celt and the incised antler with beaver incisors, suggests that this pit "is more than a run-of-the-mill trash receptacle" (Conner and O'Gorman 2015). The quantity and diversity of the faunal remains suggests that Feature 224 contains the remains of a feast, and the special artifacts deposited in the feature indicate that it was likely very ritually charged. Paleoethnobotanical analysis of floated soil from the feature yielded unusual and interesting results, including a paucity of macrobotanical remains and plant taxa one would expect from a feasting episode.

Paleoethnobotanical Analysis of Feature 224

Methods

Ten samples from Feature 224 were analyzed for this study, totaling 93 liters of floated soil. Samples were divided into light and heavy fractions during flotation, passed through 1/16th inch window screen and catching the light fraction in cloth, and stored and sorted separately. Light and heavy fractions are not physically combined, but sorted according to the same protocol. All flotation samples were analyzed in the Paleoethnobotany Laboratory at Washington University in St. Louis using standard paleoethnobotanical methods under the supervision of Dr. Gayle Fritz. Samples were sorted under a low power binocular microscope (7-45X). Each light fraction and heavy fraction was size graded prior to sorting under the microscope by passing them through USDA Geological Sieves with the following mesh sizes: 4.0 mm, 2.8 mm, 2.0 mm, 1.4 mm, 0.71 mm, and 0.425 mm. Samples were sorted completely at the 2.0 mm mesh size and greater, and all charred plant remains were either given a taxonomic determination or classed based on material type (e.g. wood, bark, stem). All recognizable cultigens (e.g. maize components, squash, beans, and EAC crops), as well as acorn shell and other seeds, were identified at 1.4 mm and greater, with only seeds pulled from mesh sizes less than 1.4 mm. Recovered macroremains were recorded in the following way: wood was weighed but not counted, all cultigens and acorn nutshell were counted and weighed down to the 1.4 mm sieve size, and all seeds from the <2.0 mm screens were counted but not weighed. Identifications of plant matter were made to the lowest possible taxonomic determination based on the comparative reference collection at Washington University and plant identification reference manuals (Delorit 1970; Martin and Barkley 1961; Montgomery 1977).

Results

Analysis of flotation samples from Feature 224 yielded a surprising dearth of plant matter given the abundance of faunal remains. All recovered taxa are listed in Table 1. Previous research (Tubbs 2013; O'Gorman 2016) identified lipids in residues from ceramic sherds consistent with a mixture of plant and animal foods, which has interesting implications for interpreting the paucity of macrobotanical remains from this context. Feature 224 represents ritualized consumption behavior consistent with feasting, but there are significant differences in the botanical composition of Zone 1 and the main artifact zone, Zone 3. The differences in ceramic types recovered from Zone 1 and Zone 3 may indicate that, although Oneota and Mississippian groups were likely participating in this event together, they may have had different roles in this ritual performance. Results from the botanical analysis of this feature are presented in terms of which zone they were recovered from to clarify and outline differences in the botanical composition of the zones, mainly Zone 1 and Zone 3. As expected for a capping layer, Zone 2 contained very little plant material. Flotation samples were not taken from Zone 4, the redeposited B Horizon forming the base of the deposit. The results of this analysis are then discussed alongside data from Autumn Painter's (MSU) in-progress examination of faunal remains recovered from Feature 224.

Samples from Zone 3 of Feature 224 came from two different levels of excavated matrix but are combined in this report, as they represent a single cultural context. Samples from this zone were taken from both the profile of the excavation unit and from matrix within the excavation unit and totaled 50 liters of floated soil. A summary of all recovered taxa is listed in Table 1. Wood charcoal was recovered from all Zone 3 samples, totaling 22.71 grams, or approximately 0.45 grams of charcoal per liter of floated soil. Nutshell was present in small quantities throughout this zone, totaling 19 fragments of nutshell weighing 0.32 grams. This is less than 0.01 grams and 0.38 fragments of nutshell per liter of soil floated. Thick hickory (*Carya* sp.) was the dominant taxon by a small margin (n=6), and Juglandaceae (n=2) and walnut (*Juglans* sp.) (n=2), acorn (*Quercus* sp.) (n=8), and hazelnut (*Corylus americana*) (n=1) were also recovered. Thick hickory nutshell fragments may appear in higher quantity than other nutshell without suggesting that this type of nut was used or consumed more than other nut taxa because of the way that thick hickory is processed by pounding large quantities of this nut in a batch and allowing the nutmeats and oil to separate from the shell (Fritz et al. 2001). The nutshell taxa present in this zone are consistent with the taxa represented in external pits representing domestic food processing and consumption, detailed in the previous article. Notably, no nutmeats were recovered from this zone.

Maize (*Zea mays*) was the only tropical cultigen recovered from Zone 3. Although bean (*Phaseolus vulgaris*) cotyledons were present in small quantities in the external pits throughout the site, they were absent from Feature 224. Only 13 maize kernel fragments (0.09 g) and a single embryo (0.01 g) were recovered from Zone 3 samples. Maize cupules were present in almost the same quantity (n=12, 0.06 g), and six glumes (0.04 g) were recovered. Analysts categorize maize kernels and embryos as the consumable parts of the maize cob, and cupules and glumes as part of processing waste. It is significant both that maize appears in such low quantity and that there is relative parity in the quantity of consumable and inedible portions of the maize cob. Given the feasting context of Feature 224, it would be expected that kernels and embryos would dominate the maize assemblage, but this is not the case. Isotopic analysis performed on skeletal data from the Norris Farms #36 cemetery associated with the Morton Village habitation area by Tubbs (2013) indicates that Morton villagers did not consume maize at the same rate as other Middle Mississippian communities in the area, such as Orendorf. Botanical analysis of Sub-Mound 51, a large feasting deposit from the Lohmann Phase at Cahokia, yielded similarly low quantities of maize, which Fritz (2014) suggests may mean that maize was prepared elsewhere at the site and brought to the feasting location, or it may have been processed into a flour, making it unrecognizable in archaeological deposits. While it is generally agreed that maize began to supplant Native cultigens in the Late Precontact period, this process was likely variable among communities in the CIRV (Schroeder 2004; VanDerwarker et al. 2017). The low quantity of whole maize cupules recovered from Feature 224 precludes morphometric analysis to determine the row number of maize being grown at the site.

Squash (probably *Cucurbita pepo* spp. *ovifera* but possibly a different species or sub-species) and bottle gourd (*Lagenaria siceraria*) rinds were present in low quantity in Zone 3. One fragment of squash rind was present (0.01 g) and two bottle gourd rind fragments were recovered (0.02 g). Both North American squash and bottle gourd are present in the archaeological record in Illinois as early as 7000 years BP, and bottle gourd is known only in its domesticated form in North America (Fritz 1990, 1999). Both plants have a wide variety of uses and interpretive utility: researchers have suggested that squashes may have been used as net floats for fishing, cups and containers, rattles, or cultivated for their nutritious seeds, edible placental tissue surrounding the seeds, and flowers, and further discuss the role of women and children, as well as men, in the domestication of this plant (Fritz 1999). Bottle gourd is often not consumed but is suggested to have been useful as a container or rattle (Fritz 1990, 1991). The presence of squash rind in a feasting deposit is not unusual given evidence for consumption and cultivation of this plant throughout ENA. Bottle gourd rind in this context may represent a type of serving vessel or cup. Interestingly, bottle gourd is not present in any of the external pit features analyzed in the previous article, indicating that either that depositional activity in external pits did not favor the preservation of gourd rind, or that this particular plant was used only for special occasions.

Evidence from paleoethnobotanical analysis of external pit features at Morton Village indicate that residents were still cultivating Eastern Agricultural Complex (EAC) crops alongside maize and the common bean. In Zone 3, the only EAC crop present was a single *Chenopodium berlandieri* cf. ssp. *jonesianum* seed. *Chenopodium berlandieri* ssp. *jonesianum* is a formerly domesticated subspecies of *Chenopodium* cultivated in ENA, and shows evidence of domestication at approximately 3800 BP through its reduced testa thickness, truncate margins related to increased volume of starchy interior contents, and a smooth-textured seed coat (Fritz and Smith 1988; Gremillion 1993, 2014; Langlie et al. 2014; Mueller et al. 2017; Smith and Yarnell 2009). Evidence of chenopod cultivation in Eastern North America (ENA) is complex and involves an overlapping spectrum of wild, weedy and cultigen morphs. Thin testa (less than 20 μm) morphs can occur naturally, but they appear in a much higher percentage of archaeological *Chenopodium* (up to 100%) (Gremillion 1993). Based on analysis of external pit features, there appear to be at least two morphs of chenopod present at the site, including smooth testa and reticulate testa morphs, some with truncate margins and all with the characteristic overlapping embryo that forms a "beak". This dimorphic chenopod assemblage may represent a crop/weed relationship, and the form of what is likely cultigen chenopod, despite a reticulate pattern on the fruit coat, may be representative of changing farming practices, selective pressures, or hybridization processes (Gremillion 1993). More research into the phylogeny of *Chenopodium* is necessary to determine the relationships between archaeological *Chenopodium* specimens and their relationship to contemporary species.

The remainder of the botanical assemblage from Zone 3 consists of wild *Chenopodium*, verbena (*Verbena* sp.), purslane (*Portulaca oleracea*), and Cyperaceae. Wild chenopod is likely present as a disturbance taxon, and it is possible that the single wild chenopod recovered from Zone 3 is a modern intrusion into the samples. Verbena (n=1) may also be present as a disturbance taxon, but there are a variety of medicinal uses for this herb throughout the North American continent, including uses varying by species as a kidney and liver medicine, febrifuge, gastrointestinal aid, and a decoction for the treatment of worms, among other things (Moerman 1998). *Verbena hastata* is used to make a tea-like beverage among the Omaha, and among the Concow in California to make a dish called pinole, which can also be made from maize, from the seeds (Moerman 1998). Eight purslane seeds were recovered from Zone 3. Purslane is weedy and often represents disturbance at a site, but it is also grown or encouraged for its succulent, leafy greens. Given the relative lack of other disturbance taxa in this zone of the feature, the presence of purslane seeds likely represents evidence of consumption, rather than disturbance. A single Cyperaceae seed was also recovered from Zone 3. Sedges have a variety of uses depending on the species, including as food, medicine, dye, basketry material, and ceremonial uses (Moerman 1998), but without a genus-level determination it is difficult to narrow down how it was being used at the site. Zone 3 also contained significant evidence of fungal growth in the form of fungal sclerotia or mycelium and several carbonized pieces of fungus.

Zone 2 is described by excavators as a relatively clean fill zone, most likely a capping layer over the Zone 3 deposit. The botanical assemblage from the ten liters of floated soil analyzed from this level supports this interpretation, as there was very little material in this zone, with the exception of wood charcoal. Zone 2 contained a higher density of wood charcoal than Zone 3, with 0.10 grams of wood charcoal per liter of soil, totaling 11.61 grams. One maize kernel, one cupule, and one glume were also recovered, in addition to one cultigen *Chenopodium* seed. The presence of cultigens in Zone 2 does not necessarily indicate that they were initially deposited there; it is possible that the soil for this capping layer already contained botanical refuse and that the presence of food remains in this zone represents a secondary deposit.

The botanical assemblage in Zone 1 is significantly different from Zone 3, containing a higher density of plant matter and more diversity. Zone 1 flotation samples totaled 33 liters of floated soil, and contained a total of 77.54 grams of wood charcoal, or 2.35 grams per liter of soil floated. The density of wood charcoal is much higher in Zone 1 than Zone 3, and it is likely that although some of the wood was probably charred as a result of *in situ* burning, wood from the structural elements of Structure 25 probably entered the Zone 1 samples when the structure was burned. This is supported by the presence of three pieces of stem (0.03 grams), which may represent the remains of building material such as thatch for siding or roofs.

Nutshell was present in higher quantities in Zone 1 than Zone 3, as well. The species present in this zone are the same as in Zone 3, including thick hickory (n=30 nutshell fragments, 0.34 grams), *Juglans* sp. (n=1 nutshell fragment, 0.02 grams), acorn (n=107 nutshell fragments, 0.38 grams), hazelnut (n=18 nutshell fragments, 0.10 grams), and several pieces of unidentified nutshell (n=3 fragments, 0.03 grams). The total nutshell density for this zone is 4.81 fragments and 0.03 grams per liter of floated soil, which is higher than Zone 1. The relatively high count of acorn shell fragments as compared with thick hickory is notable; analysis from the previous article indicated that acorn shell was most common in mixed material and Mississippian associated pits, and thick hickory nutshell was present in higher quantity than acorn in Oneota pits. The association of higher acorn nutshell density in Zone 1 with the Oneota jar in the level adds nuance to the idea that Oneota and Mississippian had variable preferences regarding available nut taxa. The unique nature of Feature 224 becomes important to consider here in terms of how both groups were choosing to participate in the events that led to this deposit, and why certain plant taxa were chosen by participants. This is further elaborated on in the following discussion.

Maize was also recovered in higher quantity in Zone 1 than in Zone 3, and the assemblage of maize fragments is more indicative of consumption behavior than the assemblage in Zone 3. A total of 38 maize kernel fragments (0.25 grams), no embryos, eleven cupules (0.09 grams), and five glumes (0.03 grams) were present in Zone 1 samples, yielding a kernel-to-cupule ratio of 2.38 kernel/embryo fragments per each cupule/glume fragment. Maize kernel-to-cupule ratios are a rough measure of processing vs. consumption waste; higher counts of kernel and embryo fragments, when standardized against counts of cupules and glumes, may indicate more consumption waste, and the opposite configuration would indicate more processing waste (Marston 2014:174-175). When considering this deposit as evidence of ritualized feasting or commensal consumption behavior, a higher kernel-to-cupule ratio than 2.38 kernels per cupule would be expected based on data from the previous chapter showing a kernel-to-cupule ratio from external, likely domestic pit features, although it is also possible that the kernel-to-cupule ratio from the external pits represents consumption waste rather than processing waste. Mixed material pits from analyzed in the previous chapter yielded a kernel-to-cupule ratio of 6.8 kernels per cupule. What makes this unusual is twofold: the kernel-to-cupule ratio in Zone 1 is not as high as some values from the external pits, and the zone with the higher ratio may or may not have accumulated at the same time or as part of the primary feasting deposit in Zone 3. Beans, squash, and bottle gourd were all absent from this zone.

Eastern Agricultural Complex (EAC) crops were present in higher quantity in Zone 1 than in Zone 3, primarily *Chenopodium berlandieri.* Fourteen cultigen *Chenopodium* seeds and 35 *Chenopodium* perisperms (lacking testas) were recovered from Zone 1 samples. A single fragment of maygrass (*Phalaris caroliniana*) was also recovered. The cultigen *Chenopodium* seeds present in Zone 1 samples appear similar to those present in the external pit features, including morphs with both smooth and reticulate testas, most of which are fairly thick on the seeds that are whole. The presence of so many perisperm in this level may also indicate a number of thin-testa morphs that could easily have lost fragile, thin seed coats during the carbonization process or any number of site formation processes. Maygrass does not exhibit morphological characteristics of domestication like other members of the EAC, but it is widely accepted that this was an important crop in ENA based on its presence alongside other EAC domesticates in paleofeces and rockshelters (Fritz 2014). It is also noteworthy that the CIRV is outside the natural growth range of maygrass. Analysis of botanical remains from Sub-Mound 51, a Lohmann Phase feasting deposit at Cahokia, yielded high quantities of maygrass seeds, both carbonized and uncarbonized (Fritz 2014; Pauketat et al. 2002). Maygrass dominated the botanical assemblage in Sub-Mound 51, making up 82% of the starchy seed assemblage from subsampled contexts (Fritz 2014). Analysts suggest that the floral and faunal assemblages from Sub-Mound 51 represent the remains of feasting "that accompanied ritual or perhaps public works-related events held in Cahokia's Grand Plaza early in the site's history as a regional megacenter" (Fritz 2014:34). Maygrass, found in both domestic and special contexts like Sub-Mound 51, may have been ritually important, as well as a commonly used staple food. It has also been suggested that maygrass may have been used as an ingredient in fermented beverages (Fritz 2014). Interestingly, both cultigen *Chenopodium berlandieri* and maygrass were present only in Oneota-associated external pits analyzed in the previous chapter. The presence of both these taxa in the zone of Feature 224 associated with an Oneota jar suggests the association of *Chenopodium berlandieri* and maygrass with Oneota villagers may be a pattern, rather than an anomaly at the site. In addition to *Chenopodium berlandieri* and maygrass, four fragments of sunflower (*Helianthus annuus)* pericarp were also recovered from Zone 1. A seed number estimate is not possible because the achenes are highly fragmented. Sunflower is an oily-seeded plant that appears in definitively domesticated form as early c. 2255 B.C. (Smith 2006; Wright 2008) at the Hayes site in Tennessee and is one of a small number of EAC crops that was still under cultivation at contact. Sunflower was also recovered from Oneota and mixed material associated pits, discussed in the previous chapter, and was likely an important food source among other Developmental Oneota communities, such as the Dixon site in northwest Iowa (Bush 2019). The small size of the sunflower kernel recovered from the external pits analyzed in the previous chapter suggests that, while people were cultivating this plant, it may have been under less selective pressure or introgressing with wild sunflower populations in the area (Smith 2006).

Two fragments of grape (*Vitis* sp.) were recovered from one sample from Zone 1. They were identified as grape by partial chalaza and fossettes on each fragment, which indicates a seed number estimate (SNE) of two grape seeds. No other fruit seeds were recovered from any zone of Feature 224. Grape by itself, both fresh and dried, is a commonly eaten fruit among Indigenous communities, as it is around the world, but it is also an important ingredient in the cuisine of various groups, including breads, cakes, dumplings, and beverages, as well as a variety of medicinal uses (Moerman 1998). A traditional food among the Quapaw is called házitténi, which is a type of grape dumpling or soup prepared in a pastry-like base (need citation, Arkansas Archeological Survey, no date listed). The presence of grape in this level may therefore represent not just consumption of the fruits by themselves, but an ingredient in a larger culinary tradition.

Two other types of fruits were recovered from Zone 1: *Solanum* sp. and *Solanum* cf. *ptychanthum*, or eastern black nightshade. Forty-eight *S. ptychanthum* seeds were recovered from Zone 1, and six seeds identified only to the genus *Solanum*. Because of the wide variety of potential uses of species in the *Solanum* genus, this section focuses primarily on *S. ptychanthum* as a significant finding. *Solanum ptychanthum* is in the Solanaceae family, section Solanum, and is closely related to *Solanum nigrum*, or black nightshade, and the entire taxonomic section is often collectively referred to as the "*Solanum nigrum* complex", which is a source of tremendous taxonomic debate and reclassification among botanists (Defelice 2003). *Solanum ptychanthum* grows most commonly east of the Rocky Mountains. It is differentiated from *S. nigrum* by a:

> purplish or reddish color to the underside of seedling leaves, purple streaks in the corolla star under cool conditions, a more umbellate inflorescence, the presence of 4 to 15 sclerotic (stone like) granules (grain like particles) on the surface of the berry, and a diploid chromosome number (Defelice 2003:423)

Another possible complication of identifying *S. ptychanthum* lies in its similarity to *S. americanum*, which it is sometimes listed as a synonym for (Edmonds and Chweya 1997), but contemporary distribution maps do not show *S. americanum* growing in Illinois (Biota of North American Program 2015). The *S. ptychanthum* at Morton Village was identified based on its unique "beak" and seed coat texture, with the assistance of Dr. Leslie Bush and comparison to *Solanum* species from the Dixon site, a Developmental Oneota settlement, in Iowa. *Solanum ptychanthum* has not been reported on at other sites in the CIRV. However, *Solanum* sp. seeds identified as nightshade are recovered from other sites in the CIRV and it is possible, if not probable, that some of these seeds recovered from this region are Eastern black nightshade. Parker and Simon (2018:137) note that *Solanum* species recovered in the American Bottom have variably been referred to as *S. americanum* and *S. ptychanthum*, but taxonomic refinements lead them to suggest that *S. ptychanthum* is the correct species designation for nightshades recovered from the American Bottom.

Black nightshades are herbaceous and weedy, growing "in open woodlands, waste areas, rubbish dumps, gardens, and cultivated fields" and preferring nutrient-rich soils in moist environments or areas where crops are being cultivated (Defelice 2003:423). These plants are often described as poisonous, likely because of their taxonomic relationship to deadly nightshade (*Atropa belladonna*) and the presence of the steroidal alkaloids. Although they are rarely grown as a food source in contemporary contexts in the United States, many species of nightshade do actually produce edible berries, leaves, and shoots when the berries are sufficiently ripened or the shoots and leaves are processed by boiling to reduce toxin levels and are consumed commonly in Africa and Asia (Defelice 2003). *Solanum nigrum* leaves are commonly eaten by the Okiek in western Kenya (Marshall 2001). Eastern black nightshade (*Solanum ptychanthum*) contains solanine, which is a highly toxic steroidal alkaloid that appears in the highest concentrations in young plant tissue, and reduces as the plant matures (Parker and Simon 2018). Ingestion of Eastern black nightshade in high quantity can cause a variety of symptoms, including “nausea, vomiting, diarrhea or constipation, excess salivation, drowsiness, reduced circulatory or respiratory effectiveness, loss of consciousness, and, in high, untreated doses, death” (Parker and Simon 2018:138). Ripe berries of *S. ptychanthum* can be used to make pies and preserves (Defelice 2003; Heiser 1969), although there is little ethnographic data available, perhaps because of the complicated taxonomy of nightshades, to guide any suggestion of how this plant may have been used as a food source at Morton Village. Nightshades are also used as medicines throughout the world, with its earliest mention as a source of medicine appearing in the work of Dioscorides, where he describes nightshades as useful for managing heartburn, headache, skin conditions, and venereal disease, and has also been used in Western medicine as a sedative or painkiller (Defelice 2003:425; Parker and Simon 2018). Examples of medicinal uses by Indigenous Americans include treatment of insomnia among the Rappahannocks and a poultice made from crushed leaves of what is likely *S. ptychanthum* to treat worms in babies by the Houma (Edmonds and Chweya 1997). Ethnobotanical literature on medicinal uses of *S. ptychanthum* describes uses for this plant as an emetic, helminthic, sedative, and treatment for eye problems (Parker and Simon 2018). Given the potential toxicity of this plant at early stages of its growth and ethnobotanical evidence for its use in medicine and ceremony, at the very least, eastern black nightshade was likely a plant that was approached and used with some degree of caution by Morton villagers.

The use of Eastern black nightshade for medicinal or ceremonial purposes likely has deep roots among Indigenous communities in the Midcontinent. Nightshade seeds are commonly recovered from Late Woodland contexts in the American Bottom alongside domestic refuse, which Parker and Simon (2018) interpret as evidence that this plant was intentionally cultivated or encouraged and used purposefully as a food, medicine, or conduit to achieve a spiritual or religious outcome. Eastern black nightshade in Mississippian contexts in the American Bottom implicate this plant in group ceremonies or religious behavior centered around elite groups, as it is commonly found in special archaeological contexts such as ritually-used structures, and there appears to be some degree of continuity in use of *S. ptychanthum* from the Late Woodland into the Mississippian period (Parker and Simon 2018). Further, Parker and Simon (2018:122) classify *S. ptychanthum* as a "magic plant", which is defined as a plant that has chemical properties that make it special or uniquely useful, is associated with special objects, places, or archaeological contexts, is listed in ethnobotanical literature as having ritual properties, or has no other apparent uses as a food, fuel, or construction material. Its presence in samples from an *in situ* burning episode on top of a feasting deposit may suggest that this plant had some amount of ritual power within the community, particularly for Oneota residents.

The presence of *Solanum* sp. and *Solanum* cf. *ptychanthum* in Feature 224 is also significant because of this genus' well-documented association with tobacco (Parker and Simon 2018; Wagner 2000) in the archaeological record. In addition to a large Oneota jar fragment, excavators also discovered a small, elbow-shaped sandstone pipe in Zone 1. This pipe is not the distinctive catlinite disk pipe form commonly recovered from Oneota sites after A.D. 1350, but appears to be similar to the elbow pipe forms common to Mississippian manufacturers (Rafferty and Mann 2004). No tobacco was recovered from Zone 1 despite the presence of a smoking pipe, and caution should be used when associating smoking paraphernalia with tobacco, as there are a number of other species that were used as smoke plants (Haberman 1984; Rafferty and Mann

2004). The combination of a pipe and species from the genus *Solanum*, however, is highly suggestive of tobacco use, as tobacco is often found in conjunction with solanaceous seeds in the archaeological record and the two plants may have been used together as part of a suite of ritual, ceremonial, medicinal, or religious behaviors (Parker and Simon 2018; Wagner 2000). This is significant because tobacco is a highly potent and sacred plant among many Indigenous communities, often serving in ritual contexts to purify an individual or establish favorable relationships between groups (Winter 2000a).

Grass seeds (Poaceae family) were recovered in Zone 1 (n=62) in much higher quantity than Zone 2, and no grass seeds were present in Zone 3. The presence of grasses in Zone 1 is likely the result of the structure being burned, depositing grass seeds that were probably present in thatching material used in building construction. The absence of grasses in Zone 3 and the low quantity in Zone 2 is evidence that the Zone 3 matrix accumulated was capped by Zone 2 relatively quickly.

Faunal Analysis

Faunal analysis of Feature 224 by Dr. Terrance Martin and Autumn Painter at Michigan State University is in progress, but previous research by Tubbs (2013) and Tubbs et al. (2015) provides some preliminary results of faunal analysis of this feature. Tubbs et al. (2015) identify the total number of identified specimens (NISP) from Feature 224 as 1,359, weighing 1,378 grams, and the minimum number of individuals (MNI) as 114. Although mammal bone has the highest NISP weight, fish bone from the feature has the highest count of MNI and NISP. The generally larger size of mammals as compared with fish likely explains the difference in NISP weight between the fish and mammal categories. Preliminary analysis of fauna cited by Conner and O'Gorman (2015) indicates the presence of over 20 animal taxa in Feature 224, including deer, elk, squirrel, raccoon, muskrat, turkey, beaver, snapping turtle, red-eared turtle, water fowl, large-mouth bass, bowfin, gar, northern pike, catfish, and other fish. Lipid analysis from serving vessels recovered from Feature 224 suggests that the Oneota vessel in Zone 1 contained high levels of fat, consistent with a large herbivore, but the Mississippian ceramics yielded either evidence for medium fat-content animals or evidence that the samples were too degraded to process for lipids (O'Gorman 2016). The presence of these taxa supports the claim that Oneota people tended to settle in ecotonal areas with easy access to riverine or wetland resources (Tubbs 2013), but the diversity of taxa may contradict claims that Morton Village was circumscribed by violence in the region during the 14th century (Tubbs et al. 2015); however, it is possible that, despite the violence plaguing the CIRV during this time, Morton Village retained a number of hunters and fishers familiar enough with the area to move safely beyond the village boundary (Bengtson and O'Gorman 2016b). More detailed analysis of the fauna from Feature 224, including the presence of burning or any significant modifications to bone recovered from the feature, is forthcoming.

Discussion

Understanding the processes of community building in contexts of migration is critically important to both narratives of the past and our contemporary society. With issues surrounding migration being at the forefront of global political discussions and debates, looking to the archaeological record for perspectives on migrant communities and populations may provide important insight into the complexities of this phenomenon. The Oneota migration into the CIRV in the 14th century undoubtedly presented both Oneota migrants and Mississippian people living at Morton Village with a situation requiring a variety of social mediation strategies to prevent serious conflict between the two groups. While it is clear from skeletal evidence retrieved from the Norris Farms #36 cemetery, the cemetery associated with the Morton Village settlement area, that violence in the region was significant, it remains unclear who was fighting whom and why (Milner and Smith 1990; VanDerwarker and Wilson 2016). Despite this threat of violence, excavation data and ceramic analysis from Morton Village suggest that there was likely an atmosphere of cooperation at the site, where residents were producing hybrid ceramic forms (Lieto and O'Gorman 2014; Painter and O'Gorman 2019) and building houses and other structures in two different styles, sometimes superimposed on each other (Conner and O'Gorman 2014). Further, analysis of mortuary behavior at Morton Village provides evidence for community integration and shifts in how Morton villagers signified social identity (Bengtson and O'Gorman 2016). Bengtson and O'Gorman (2016) identify significant shifts in how Oneota villagers signaled identity as part of burial treatment, identifying migration not as an event but as a phenomenological process in which Oneota villagers, through their burial treatment of children, adopted some aspects of Mississippian hand and bird symbolism. Most burials in Norris Farms #36 are considered typical of Oneota burial, but the presence of Oneota copies of Mississippian ceramics in the burials of some children suggests that children may have been the "bearers or conduits of a novel and integrative social identity", possibly representing intermarriage or the beginnings of ethnogenesis (Bengtson and O'Gorman 2016:32). The timeline for the events that produced Feature 224 and the shifts in social identity signaling in child burials is not fine-grained enough to identify a temporal relationship between these two phenomena, however, the shifts in burial traditions for children are highly suggestive of new and unique social configuration at Morton Village, likely resulting in part from integrative social and ritual events such as the one that produced Feature 224. The paleoethnobotanical analysis presented in the previous chapter further suggests a cooperative climate at the site, indicating that Oneota and Mississippian villagers, while maintaining some of their traditions pertaining to food and ceramic production, were possibly sharing labor responsibilities for farming, gathering, processing, and consuming food. It is critical to understand Morton Village as a community in flux, building new traditions while maintaining some old ones, and to envision a settlement where distinctions between Oneota and Mississippian material culture do not necessarily indicate two separate lifeways. Rather, the material evidence of daily practice and ritually charged behavior likely represents the ways in which Morton villagers mediated conflict and integrated both groups as part of a community whole, while still maintaining some aspects of separate Oneota and Mississippian cultural beliefs and norms.

The concepts of daily practice and habit, ritual behavior, and commensality, or the shared consumption of food and drink (Pollack 2011), exist in a complex, interconnected web. Particularly when seen within the context of migration and community building, these concepts form the basis for understanding the ways in which two groups, a host and migrant population, mitigate conflict and generate new and different traditions surrounding material production and food. The results of paleoethnobotanical analysis of Feature 224 represent the remains of a large, commensal eating event, which, based on the floral and faunal analysis of the feature, consisted mostly of animal meats. However, previous research (Tubbs 2013; O'Gorman 2016) examining ceramic residues reported that the lipid profiles of the residues analyzed showed that low-to-medium fat content plants dominated the foods served, with animal fats included. The fat content of the animal fat lipids present in the residues was not discernable in most cases, with an exception being the Oneota vessel present in Zone 1, which was likely a large herbivore (Tubbs et al. 2015). The Mississippian vessels likely contained medium fat content animals, possibly freshwater fish or fat-depleted late winter elk, but it is possible that the residues were too degraded or that the samples were taken from an area outside of the fat accumulation range within the feature (Tubbs et al. 2015).

The research undertaken by Tubbs (2013) and O'Gorman (2016) compared with the results of this macrobotanical analysis present opposing data: if the lipid profiles from the ceramic remains suggest a meal composed primarily of plant foods, where are the plant remains in this feature? The presence of maize, nutshell, Poaceae seeds, purslane, and a few *Chenopodium* seeds in the primary artifact-bearing zone of Feature 224 is not unexpected. Maize, nuts, purslane, *Chenopodium*, and even Eastern black nightshade are all edible, and were likely commonly consumed by Morton villagers in daily meals as well as special ones, as discussed in the previous chapter. Poaceae seeds may have entered the feature as a result of Structure 25 being burned, which is a reasonable conclusion given that most grass seeds were recovered from Zone 1. None of these plants, however, occur in a quantity or density that would normally suggest feasting to a paleoethnobotanist. It is possible that plant remains did not enter the archaeological record in Feature 224 at the rate that would expected because they represent consumable and consumed matter, unlike animal bone. In other words, people may simply have eaten everything on their plate. Further, waste produced by preparation and storage of food looks different than waste produced by consumption, and based on the botanical assemblage of Feature 224, it is likely that the food served was prepared and processed at a different location within the site. The discrepancy between the macrobotanical assemblage from this feature and the lipid analysis highlights the importance of seeking multiple lines of evidence in archaeological analysis, as well as a nuanced understanding of what ritualized feasting behavior entails and accomplishes.

Although the exact function of the commensal event that took place in Structure 25 and created the Feature 224 deposit may never be known, the materials recovered from Zones 1 and 3 suggest that Oneota and Mississippian villagers were participating in this event with specific and potentially different purposes. The presence of both Mississippian and Oneota ceramic material in the feature suggests that both groups were involved in some way in this event, but the temporal relationship between Zones 1 and 3 is unclear. Zone 1, containing the Oneota jar and sandstone pipe, along with an interesting assemblage of plant matter such as Eastern black nightshade, may have been deposited directly following the feasting episode the produced Zone 3, but it is also possible that this feature was revisited by Oneota villagers well after the initial feasting event. The temporal relationship between Zones 1 and 3 remains unclear: the deposit in Feature 224 may have been the result of a single event, or Oneota villagers may have returned to the site of feast later to make the Zone 3 deposit. Regardless of the temporal relationship, Feature 224 clearly represents ritual behavior on behalf of both Oneota and Mississippian villagers, though it is possible this participation may have happened at different times. While Zone 3 represents the remains of a large feast, Zone 1 appears to be an offering of some kind, as evidenced by the *in situ* burning and the presence of a pipe, Eastern black nightshade seeds, and the presence of a lipid profile consistent with a large herbivore such as a deer or elk inside the jar recovered. The most significant contribution of this macrobotanical analysis may be the discovery of nightshade capping this feasting feature. As previously discussed, Eastern black nightshade, and other nightshades, can be toxic if consumed in too high a quantity or when the berries are not ripe (Bush 2019; Defelice 2003; Parker and Simon 2018). The presence of this plant, therefore, may represent a liminality also reflected in the act of feasting itself at Morton Village. Marking a feasting deposit that likely represents the remains of ritual activity intended to integrate a community with a plant that represents both a source of sustenance and danger is a provocative juxtaposition suggesting both a reverence for nightshade and an interesting comment on the betwixt and between nature of ritual and feasting in this case. The presence of Eastern black nightshade in both special and domestic contexts at Morton Village is not unexpected: divisions of the concepts of sacred and mundane as applied to plants likely did not exist to Indigenous communities using these resources. Ritual or "magic" plants are recovered almost entirely from domestic contexts prior to A.D. 1000, "indicating that special practices involving these plants were not tied to place, but to action" (Parker and Simon 2018:122). Whether or not the presence of Eastern black nightshade in Feature 224 represents the ritual placement of this plant in the *in situ* burning episode, the importance of this plant to Oneota villagers is clear, as Eastern black nightshade transcends categories of domestic and sacred (Parker and Simon 2018).

When considering the purpose and process of ritualized feasting behavior, Dietler's (2001:83-85) concept of the diacritical feasts provides an important comparative perspective. Further, the axes on which feasting behavior are plotted by Kassabaum (2019) provide a model by which the interplay of sociopolitical complexity and the scale of consumption can be used to describe the role of a given feast in the context of social change. The political and ritual nature of feasts are not mutually-exclusive: ritual can be politicized as a means by which, by undertaking certain activities, people can transform social relations or systems of power (Dietler 2001:71). The political function of feasts can serve to "create and maintain social relations that bind people together in various intersecting groups and networks on a wide range of scales", often fulfilling "the integrative function of *communitas*" (Dietler 2001:68-69). Feasting is further described as a practice, borne out of those "structuring structures" that define social beliefs, behaviors, and values, and establishing new social configurations or reproducing old ones. Although the politicized feast is often understood as a means by which people vie for power or status through ritual behavior, the integrative, liminal nature of these events is equally salient in the context of migrant and coalescent communities.

Within the theoretical context of feasting, archaeologists are further tasked with understanding the material correlates of feasting behavior. Kassabaum (2019) presents two axes, group size and level of sociopolitical competition, along which the material aspects of feasting can be interpreted. The feast represented in the material remains of Feature 224, measured by Kassabaum's (2019) model, was likely participated in by a large group, given the quantity of animal bone and ceramics present in the feature. The level of sociopolitical competition represented in Feature 224 is more difficult to interpret. Kassabaum (2019:615) describes the following as being indicative of high sociopolitical competition: unusual food items; preparation styles; disposal patterns; location; special ceramic forms; monumental construction as part of the feast; high amounts of wastage; and markers of prestige or status. Feature 224 is not associated with any monumental construction, unusual location or food preparation styles, significant wastage, or specialized ceramic forms, but Oneota and Mississippian style ceramic forms do not appear in the same levels together. According to Kassabaum's (2019) model, the presence of unusual artifacts in the feasting detritus, such as a celt, deer ulna awl, and deer antler embedded with a beaver incisor would further indicate some level of sociopolitical competition beyond an entirely egalitarian feasting event. Additionally, the recovery of nightshade seeds from Zone 1, associated with Oneota pottery, indicates the presence of an unusual food source or ritually-important plant. However, given the social environment of Morton Village as home to both a host and migrant population coalescing into a new community form, the presence of these artifacts might instead be interpreted as ritual contributions by both groups intended to imbue the feast with a certain amount of social power, rather than as competitive displays.

Dietler's (2001) conceptualization of feasting behavior in terms of ritual and political dimensions is an exploration beyond previous functional models of feasting as modes of achieving social equilibrium. While diacritical and patron role feasts are described as important events in cementing asymmetrical relations of social power or differences in rank, diacritical feasts achieve this by using uncommon or unusual foods and patron role feasts through the symbolic value of reciprocal obligation through hospitality. Both focus on the political outcomes of feasting, in terms of their ability to reify social rankings and distinctions, but given the lack of evidence for hierarchy and the significant evidence for social cooperation at Morton Village, this study uses these concepts to explore the role of different feasting types in terms their roles in contributing to social integration.

Faunal and macrobotanical analysis suggest that the Feature 224 deposit contained unusually high amounts of animal bone and a notable dearth of plant material, however, residue analysis suggests the opposite, that plants were the primary food source being served in the social interaction that produced the feature, although it is possible that the residue results could be representative of a previous, unrelated cooking event (Tubbs 2013; Tubbs et al. 2015). The botanical material recovered from Feature 224 is generally consistent with the kinds of foods recovered from more domestic contexts in external pit features at Morton Village, including maize, *Chenopodium*, and various nut taxa, but the paucity of botanical material recovered from Zone 3 makes it difficult to say with certainty that no special plant foods were present in this level of the feasting event. Regardless of whether Zones 1 and 3 were deposited as part of a single ceremonial event or if Zone 1 represents a later return by some village members to this feature, the presence of nightshade within this feature is significant, indicating the ritualized use of an unusual and likely powerful plant among more traditional food items.

To describe something as diacritical is to signify change or alteration to an extant phenomenon, and to use this divergence from the norm as a symbolic device intended to represent a new or different social order (Dietler 2001:85). However, various lines of archaeological evidence from Morton Village provide significant evidence for an atmosphere of social cooperation between Oneota and Mississippian villagers, while still maintaining some aspects of separate food, ceramic, and house-building traditions (Conner et al. 2014; Lieto and O'Gorman 2014; Painter and O'Gorman 2019). This configuration of material data from Morton Village is highly suggestive of a social structure in which both groups were actively negotiating separate but mutable, co-existing social and cultural identities. The concept of the diacritical feast is relevant here in that it provides a model for understanding how specific configurations of feasting remains serve a particular social purpose, although in the case of Feature 224, this purpose may not have been to solidify asymmetrical power relations, but rather may have been part of a ritual performance intended to set or blur boundaries for a new community configuration involving both the migrant and host population at Morton Village. The diacritical feast model in this sense may only be partially applicable in that whatever change in social structure that occurred because of feasting at the site may not have favored power in one group over another. The diacritical model demonstrates the importance of considering specific aspects of feasting behavior and the social context in which they occur, rather than a single category in which feasts are considered to share the same purpose across space and time.

As was the case with applying Kassabaum's (2019) axes of sociopolitical competition and group size to the feasting remains from Feature 224, it is necessary to pair the application of a diacritical feasting model with an understanding of Morton Village as a newly coalescing community. The presence of unusual taxa within this deposit may not indicate social competition or asymmetrical configurations of power, but rather the contribution of something sacred by both groups as offerings to a new way of living, or as ways of reconfiguring what it meant to be Oneota or Mississippian in this community. Diacritical feasting may be used as a tool by which archaeologists can conceptualize feasting not just as a way to establish elite status, but as a means by which people signal group identity or ethnic affiliation. This signaling would likely have been of critical importance to the Morton Village community and the ability of its residents to co-exist peacefully at the site. The successful application of the patron role feast model to Feature 224 depends on the temporal relationship between Zones 1 and 3 of this feature. If Oneota residents of Morton Village were present for the activities that resulted in the Zone 3 deposit, then the presence of only Mississippian ceramic sherds in this zone is significant in that this likely identifies Mississippian villagers as the hosts of this event. Hosting a commensal event like the one that produced Feature 224 would have created a "relationship of reciprocal obligation engendered through hospitality" (Dietler 2001:83). This relationship of social obligation between Oneota and Mississippian residents may have been one that, rather than marking the uneven distribution of social power, created a relationship intended to draw both groups into a new community configuration, placing responsibilities for community survival on both Oneota and Mississippian residents. Parker and Simon's (2018:119) review of magical plants, specifically Eastern black nightshade, notes that the use of magic plants serves a variety of important functions that often serve to solidify community solidarity.

Within the context of migration and community coalescence, feasting is an important mode of social negotiation, facilitating integration of community groups and conflict mitigation (Birch 2012). Conceptualizing a community from an archaeological perspective, particularly one composed of a migrant and host population, necessitates an approach that moves beyond environmentally-deterministic models of why people migrated and examines the historical process of how residents of a newly formed community "negotiate and respond to their new social and physical circumstances" (Birch 2012:649). Rather than view the community as a closed, static system, Yaeger and Canuto (2005:5) describe the community as "an ever-emergent social institution that generates and is generated by suprahousehold interactions that are structured and synchronized by a set of places within a particular time span", advocating for an "interactional" perspective that promotes relationships, shared identities, and invoking practice theory as a means of theorizing the ways in which all aspects of community are socially constituted.

This practice-based conceptualization of community is useful in analyzing the social environment at Morton Village because it recognizes both the "structuring structures" of individual and group *habitus* while simultaneously making space for the malleability of these structures without being subject to social rules (Bourdieu 1990). The feasting event that created the Feature 224 deposit is a representation of those complex daily and ritual practices, combining the separate extant ways of knowing, producing, consuming, and discarding food by both Mississippian and Oneota villagers, while at the same time effecting social change by the merging of both these ways of knowing into a single event. *Habitus* as it pertains to beliefs and customs surrounding plant and animal use is deeply embedded and often slow to change, and reflects not only the alimentary value of plants and animals but their symbolic lives, as well. The utility of this concept as applied to the Feature 224 deposit lies in its ability to the complexity of the social atmosphere at Morton Village during this time of transition and change. Oneota and Mississippian villagers did not simply and immediately integrate into a new community identity, but instead chose to maintain some of the various aspects that made them different while engaging in activities that developed new, shared social structures.

As previously discussed, food is an embodiment of the structures that *habitus* describes and Feature 224 therefore becomes an important locus of interaction of the "durable, transposable dispositions" held by Oneota and Mississippian villagers. Zone 1 and Zone 3 are each associated with Oneota and Mississippian ceramics, respectively, and the differences in flora and fauna between both zones indicates that each group was, to some degree, operating within their previously existing systems of knowledge and tradition surrounding food and ritual, and the foods that people consume often represent the group they wish to identify with (Hastorf 2017). What is significant about Feature 224 is that the different collections of flora and fauna are superimposed on each other, signaling a choice by both groups to contribute aspects of their group identity towards a new, shared one without abandoning food and technological traditions entirely. This complex encapsulation of community building brings both groups into "a moment in and out of time" and into the liminal state that temporarily dismantles social boundaries, described as *communitas* (Turner 1969). In addition to being a reflection of distinct but interdigitated modes of *habitus*, Feature 224 can also be interpreted as the material remains of a state of *communitas*, or the creation of a space that allowed for the integration of Oneota and Mississippian villagers through the liminal space of ritual performance. The temporal relationship between Zones 1 and 3 is unknown, and will likely remain unknown, but even if the deposits were made at different times, Feature 224 was significant enough of an event to warrant

Oneota villagers returning to the site of the feast, participating in its construction, and maintaining its ritual value to the community. The ritual behavior represented in Feature 224 would have been critical to establishing and maintaining an integrated community where both Oneota and Mississippian villagers negotiated a cooperative social identity.

Conclusions

The data explored in this study, in conjunction with previous research from Morton Village, including faunal, settlement, ceramic, and mortuary analyses, provide important insights into social life at Morton Village. The site of the Feature 224 feast is the site of ritually-charged action by Morton villagers to navigate a new community form. The narrative of this feast remains unclear in some ways: the temporal relationship between Zones 1 and 3 has not been determined and it is unlikely that it will be. The presence of only Mississippian ceramic remains in the main artifact zone (Zone 3) means it is uncertain whether Oneota villagers were also present during the commensal event that produced Zone 3. However, the Zone 1 deposit, containing a section of an Oneota jar that produced a lipid profile consistent with a large herbivore and a small, sandstone pipe, along with the unusual presence of *S.* cf. *ptychanthum*, was placed directly on top of the capping layer above Zone 3. This superimposition indicates that Oneota villagers did participate in this event in a significant way, either directly following the Zone 3 event or by later returning to the deposit. The combination of a sandstone pipe fragment and nightshades, likely recovered from an *in situ* burning episode, suggests a deliberate contribution of these items to the deposit. Whether or not Zones 1 and 3 were created immediately following each other or if there was a time gap between the two deposition events, it is clear that Oneota and Mississippian villagers each made their own unique contributions to this large, social event.

Public space, commensal feasting events, migration, and community coalescence all come together to generate a complex image of social identity negotiation at Morton Village. Previous research by Bengtson and O'Gorman (2016) suggests that the social identities of children at Morton Village were changing in part because of Oneota migrations into the village, and Feature 224 is a rare encapsulation of one of the events that likely facilitated community and social integration through feasting, likely with ritual or spiritual contributions. The process of migration does not end when a group arrives in a new community or environment. The presence of both Oneota and Mississippian ceramic and house forms at Morton Village provide evidence for the identification of migration, but analyses of migration seeking to understand this phenomenon as a social process, rather than an event, must incorporate the daily, lived experience of both migrant and host populations in a community. It is in these daily practices that the experience of negotiating social identities comes to life, which in the case of Morton Village, complicates the relationship of Mississippian and Oneota villagers. Although these two groups of people maintained some separate ceramic manufacturing and house construction styles, it would be erroneous to conclude that both groups existed within unchanging social boundaries and structures.

In addition to the variety of potential social outcomes of feasting, including political change, sociopolitical competition, and particularly community integration (Birch 2012; Dietler 2001; Hastorf 2017; Kassabaum 2019), Feature 224 contains numerous special artifacts not discussed here, as well as an unusually high concentration of fauna, reflecting the use of sacred or ritual paraphernalia as part of the event that produced this feature. Further, the presence of what is likely Eastern Black Nightshade (*Solanum* cf. *ptychanthum*) is significant for several reasons. *Solanum* cf. *ptychanthum* was recovered from the Dixon site in Iowa, an Oneota village occupied roughly contemporaneously with Morton Village (Bush 2019), and is found almost exclusively in external pits associated with Oneota ceramics at Morton Village and may therefore be a plant of significant value to Oneota people. This plant can also be dangerous if ingested at the wrong point during its ripening process, or in too high of a quantity, and is implicated in ritual at Feature 224 through this liminal status as a foodstuff. Ritual, though notoriously difficult to define archaeologically, may in some cases be conceptualized as serving the important function of bridging cultural differences but not beliefs (Metcalf 2010:220). Given the totality of archaeological evidence from Morton Village, this statement regarding the use of ritual to bridge difference, rather than beliefs, is particularly salient, and speaks to the complex processes od social negotiation and integration that occurred at Feature 224.

The ways in which people signal social, ethnic, or cultural identities are complex, and generated through daily action, both sacred and mundane. Social identity is never "neatly bounded", and appears on multiple scales in the minds and actions of individual actors, as well as at the larger community level (Metcalf 2010:2-4). Feature 224 is the site of group differentiation, as well as shared community space and active participation in the form it took. Rather than identifying, through generalizations, the "Oneota-ness" of migrants into Morton Village, I argue that Feature 224 is the site of significant cultural production and reproduction, variably embedding pre-existing beliefs and traditions of Mississippian and Oneota villagers into a coalescent community space.

Figures and Tables:

Figure 2.1 Structure 25, from Conner and O'Gorman (2015)

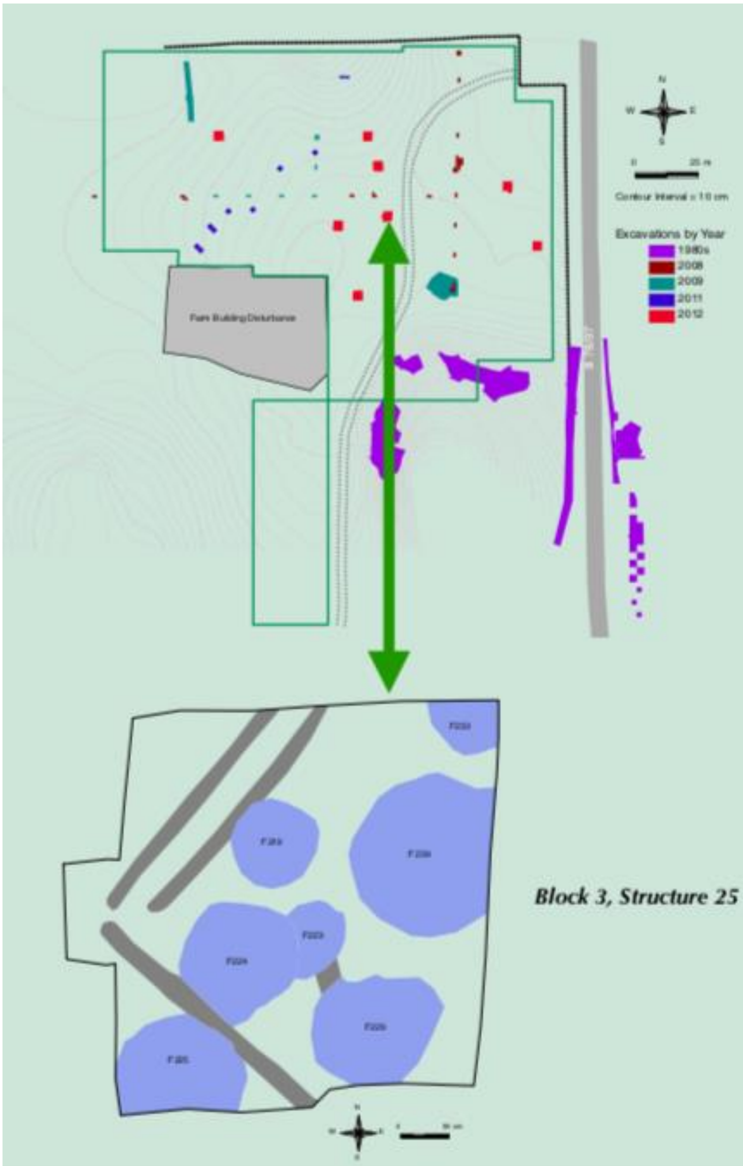

Table 2.1 Summary of all recovered plant taxa from Feature 224

	Zone 1		Zone 2		Zone 3	
Number of Samples	4		1		5	
Liters of Soil	33		10		50	
	Count	Weight	Count	Weight	Count	Weight
Wood charcoal		77.54 g		11.61 g		22.71 g
Stem	3	.03 g	0	0	0	0
Carya sp. (Thick Hickory)	30	0.34 g	0	0	6	.16 g
Juglans sp. (Walnut)	1	.02 g	0	0	2	.02 g
Juglandaceae	0	0	0	0	2	.05 g
Quercus sp. (Acorn)	107	0.38 g	0	0	8	.08 g
Corylus sp. (Hazelnut)	18	.10 g	0	0	2	.02 g
Unidentified Nutshell	3	.03 g	0	0	0	0
Zea mays (Maize kernel)	38	0.25 g	1	0.01 g	13	.09 g
Zea mays (Maize embryo)	0	0	0	0	1	.01 g
Zea mays (Maize cupule)	11	0.09 g	1	0.01 g	12	.06 g
Zea mays (Maize glume)	5	0.03 g	1	0.01 g	6	.04 g
Lagenaria siceraria rind (Bottle Gourd)	0		0	0	2	.02 g
Cucurbita sp. rind (Squash)	0		0	0	1	.01 g
Chenopodium berlandieri ssp. *jonesianum* (Cultigen Chenopod)	14		1		1	
Chenopod Perisperm	35		0		0	
Helianthus annuus (Sunflower pericarp fragments)	4		0		0	
Phalaris caroliniana (Maygrass)	1		0		0	
Vitis sp. (Grape)	2		0		0	
Solanum sp.	6		0		0	
Solanum cf. *ptychanthum* (Eastern black nightshade)	48		0		0	
Verbena sp. (Verbena)	0		0		1	
Chenopodium sp. (Wild Chenopod)	3		0		0	
Cyperaceae	1		0		1	
Mollugo verticillata (Carpetweed)	2		0		0	
Grass Spikelet	1		0		0	
Poaceae	62		2		0	
Portulaca oleracea (Purslane)	16		0		8	

	Zone 1		Zone 2		Zone 3	
Unidentifiable Seed Fragments	11		0		7	
Unidentified Seeds	10		0		6	

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TOBACCO USE AT MORTON VILLAGE: THE USE OF QUALITATIVE AND QUANTITATIVE ANALYSIS TO MAKE SPECIES-LEVEL DETERMINATIONS OF TOBACCOS IN PALEOETHNOBOTANICAL RESEARCH

Introduction

Tobacco is one of the most important and sacred plants used by Indigenous Americans both today and in the past (e.g. Bollwerk and Tushingham 2016; Dunavan and Jones 2011; Fritz 2011; Haberman 1984; Parker and Simon 2018; Tushingham and Eerkens; Wagner 2000; Winter 2000a, Winter 2000d). Figuring prominently in creation myths, religious life, shamanism, medicine, and daily activities throughout the Americas, tobacco was and continues to be used, traded for, and cultivated by Indigenous communities of all kinds, regardless of specific belief systems or subsistence economies. Tobacco is recovered from archaeological contexts in Eastern North America (ENA) after A.D. 160 (Asch and Asch 1985; Wagner 2000; Winter 2000a) and historic accounts of Indigenous and European interactions frequently note the importance of this plant in daily life, as well as in social mediation strategies and ritual performance (Blakeslee 1981; Sabo 1992; von Gernet 2000; Winter 2000d). Tobaccos belong to the *Nicotiana* genus in the Solanaceae family, and *Nicotiana tabacum* is the domesticated species grown for contemporary commercial consumption, but a wide variety of the 95 extant tobacco species were used by Indigenous groups in the past. Archaeological and ethnohistoric evidence shows that, in addition to the use of a variety of tobacco species by Indigenous communities for sacred events and performances, daily tobacco use was documented by a number of early European colonists and some archaeological studies provide evidence for this (e.g. Creese 2016; von Gernet 2000). Tobacco use should therefore be considered along a continuum of the sacred to the mundane, which need not be mutually exclusive categories. The presence of tobacco seeds and residues in archaeological contexts presents an opportunity for generating narratives of tobacco use in the past as part of an overlapping, complex suite of social, religious, and ritual behaviors that should highlight the variable ways in which this plant was used by avoiding the placement of tobacco in a pan-Indigenous ritual or religious category, and focusing on socially contextualized ways this important plant was used in the past.

This study presents a review of the important role of tobacco in Indigenous communities, including both archaeological and ethnohistoric perspectives, and presents a method using high power microscopic analysis of modern tobacco seeds for making species-level determinations of tobacco seeds from archaeological contexts. Modern tobacco seeds are compared to archaeological tobacco seeds recovered from the Morton Village site (11F2), a multiethnic community in the Late Pre-Contact Midcontinent occupied contemporaneously by Mississippian and Oneota people. Recent scholarship on Morton Village indicates that this community, home to both a host and migrant population, went through a period of significant social change as Oneota and Mississippian villagers adjusted to life together at the site (Bengtson and O'Gorman 2016a; Lieto and O'Gorman 2014; Painter and O'Gorman 2019; Tubbs 2013; Tubbs et al. 2015; Upton et al. 2015). The presence of tobacco, recovered from paleoethnobotanical analysis of Oneota-associated pit features, at Morton Village provides an opportunity for generating narratives of the role of tobacco in the context of culture contact and migration, and more specifically for an in-depth examination of which species were present at the site its implications for trade, seed saving, and identifying the domestication status of tobacco plants used in the past. Tobacco use at Morton Village is contextualized with discussions of archaeological and ethnohistoric accounts of two species, *N. rustica* and *N. quadrivalvis*, which were chosen for analysis based on previous research indicating possible presence of both species in the Pre-Contact Midcontinent (Adair 2000; Dunavan and Jones 2011; Fritz 2011; Parker and Simon 2018; Simon and Parker 2006; Wagner 2000; Winter 2000a, 2000b, 2000c, 2000d). The biochemical attributes of *N. rustica* and *N. quadrivalvis* are discussed to highlight the importance of tradition, choice, trade alliances, and belief systems in the use of tobacco, suggesting that people in the past did not necessarily select for tobacco because of its high nicotine content, but rather for a suite of other aspects relevant to understanding the role of this sacred plant.

This project explores the important aspects of smoking culture and tobacco use at Morton Village, including: 1. Feature use-types that contained tobacco seeds (domestic, refuse, ritual/ceremonial); 2. Evidence of non-tobacco smoking plants co-occurring with *Nicotiana* sp. seeds; 3. Detailed morphological analyses of tobacco seeds and comparison of the results to contemporary *N. quadrivalvis* and *N. rustica*. Scanning electron microscopy and morphometric analysis were performed on modern, uncharred tobacco seeds and compared to archaeological tobacco seeds recovered from the Morton Village site, which were imaged using a scanning electron microscope and a high power digital microscope. Analysis of flotation samples from Morton Village produced five tobacco seeds recovered from external pit features determined to be associated with Oneota use based on associated ceramic artifacts. Although archaeologists, anthropologists, and historians agree that tobacco is a plant of significant importance in Indigenous North America, the histories of species distribution, use by Indigenous groups, and timing of the introduction of the South American domesticate *N. rustica* remain poorly understood archaeologically (Dunavan and Jones 2011; Fritz 2011). The location of tobacco within the site and the presence of tobacco seeds only in Oneota-associated contexts provide data relevant to understanding the possible mediatory, domestic or daily, and ritual/ceremonial roles of tobacco at Morton Village.

High powered microscopic analysis of tobacco seeds was used following hypotheses that tobacco recovered from the Travis I site in the Plains and Cahokia in the American Bottom resemble *N. quadrivalvis* (var. *quadrivalvis*) more closely than *N. rustica* (Fritz 2011; Haberman 1984; Pauketat et al. 2002). Forty uncharred, modern tobacco seeds (twenty *N. rustica* and twenty *N. quadrivalvis* seeds) produced eighty scanning electron micrographs at high magnification to highlight aspects of seed coat morphology demonstrated by previous attempts to classify *Nicotiana* seeds to species to be important aspects in differentiating between *N. rustica* and *N. quadrivalvis* (Bahadur and Farooqi 1986; Haberman 1984; Wagner and Fritz 2002). Two additional comparative references, one for *N. quadrivalvis* and one for *N. rustica* were generated, each containing images of five seeds. The seeds from this additional comparative reference were obtained from *N. rustica* seeds grown on the Onondaga reservation in New York and tobacco seeds from the Sub-Mound 51 deposit at Cahokia in the American Bottom. Three seeds recovered from Morton Village external pit features were analyzed using scanning electron microscopy and two were imaged using a high-power Leica DVM6 digital microscope to determine whether species-level determinations can be made when compared to modern and other archaeological tobacco seeds.

Results from this analysis suggest that there are important morphological markers that may aid in species-level identifications of tobacco seeds, but these characteristics do overlap in a small percentage of the analyzed sample. Despite the interpretive complications created by variability in seed coat morphology in both species, this study presents results that generally support distinctions between *N. rustica* and *N. quadrivalvis* given a large enough sample size, and future research utilizing new methods in morphometrics, texture analysis, and nicotine residue identification will undoubtedly contribute much to archaeological narratives of tobacco use and distribution in the past.

Tobacco: Botany, History, and Archaeological Perspectives

Specialty crops, plants that are not grown as comestibles but still play a significant role in medicinal, food preparation, and religious or other ritual behaviors, are important expressions of cultural identity. Tobacco (*Nicotiana* spp.) is one of the most important sacred plants cultivated and used by Indigenous North American people prior to and during initial periods of European contact, and continues to be a significant aspect of Indigenous traditions today (e.g. Bollwerk and Tushingham 2016; Parker and Simon 2018; Tushingham et al. 2018; Winter 2000a, 2000b, 2000d, 2000e). This important plant was grown by many Indigenous communities, even those who did not grow any other crops, and was a highly sought-after trade commodity in the past (Adair 2000; Dunavan and Jones 2011; Winter 2000b). Research on pipe smoking, tobacco, and a variety of other smoking plants has proliferated in recent decades (e.g. Adair 2000; Bollwerk and Tushingham 2016; Carmody et al. 2018; Creese 2016; Cuthrell et al. 2016; Rafferty 2002, 2006, 2016; Rafferty et al. 2012; Hedden 2016; Tushingham and Eerkens 2016; Wagner 2000; Wagner and Fritz 2002; Winter 2000a, 2000b). Tobacco use has been identified in both the archaeological and ethnohistoric record as a plant of significant importance that continues to be used by Indigenous groups today in daily and ritual or ceremonial contexts (Adair 2000;

Bollwerk and Tushingham 2016; Creese 2016; Hedden 2016; Wagner 2000; Winter 2000a, 2000b, 2000d, 2000e). This section reviews the botany and taxonomy of tobacco plants, historic and ethnohistoric accounts of its use, and presents archaeological perspectives on the uses of this important, sacred plant. Based on the location of Morton Village in the North American Midcontinent and previous research concerning species ranges, distributions, and tentative identification of tobacco to species, this paper focuses solely on the two species of tobacco most likely to have been present in the region during the Late Pre-Contact: *Nicotiana rustica* and *Nicotiana quadrivalvis*, including the latter's intraspecific varieties (Adair 2000; Dunavan and Jones 2011; Fritz 2011; Haberman 1984; Setchell 1921; von Gernet 2000; Wagner 2000, Winter 2000a, 2000b, 2000e).

Botanical Descriptions of Tobacco and its Biochemical Attributes

Tobacco, *Nicotiana* spp., belongs to the Solanaceae family, which contains a variety of commonly used plants today, including potato, tomato, chili pepper, and eggplant. Within the Solanaceae family, tobacco belongs to the Cestroidae subfamily, tribe Nicotianeae, and genus *Nicotiana* (Figure 3.1). Goodspeed (1954) created one of the first basic taxonomies of tobacco, which was further refined by D'Arcy (1991), who includes 96 genera totaling 2,297 species within the entire Solanaceae family, and 95 species of *Nicotiana*. *Nicotiana rustica* is an annual plant in the subgenus *Rusticae*, growing 0.5 to 1.5 meters high. The branches are slender and range from one to several, holding slender, fleshy leaves that are minutely hirsute and viscid. The leaf shapes may be ovate, elliptic/cordate, elliptic/lanceolate, or subrotund. The corolla is a greenish-yellow color and the capsule, containing the seeds, is typically indehiscent and elliptic to subglobose in shape (Winter 2000c). *Nicotiana rustica* is a highly polymorphic species, varying considerably in size, dehiscence, and nicotine content based on cultivation pressures by groups growing this plant throughout North America (Wagner 2000; Winter 2000c). The seeds of this plant tend to be 0.7-1.1 millimeters in length and can be elliptical, angular, or oval in shape (Wagner 2000; Wagner and Fritz 2002). Tobaccos produce nicotine as part of a suite of anti-herbivory mechanisms (Knapp et al. 2004), and they produce this chemical in varying quantities, giving users a variety of smoking experiences. *Nicotiana rustica* contains a much higher nicotine content than commercially-grown *N. tabacum* and other species of *Nicotiana*, including *N. quadrivalvis* varieties: nicotine content of *N. rustica* ranges widely, and typically yields 1.9-4% nicotine, but under cultivation this percentage can reach higher. Huichol farmers in Mexico cultivate *N. rustica* plants, some of which are reported to contain a nicotine content as high as 18%, which can induce hallucinations, catatonia, altered states of consciousness, and "colorful dreamlike visions and enhanced multisensory perceptions" (Parker and Simon 2018: 135; Winter 2000d). This biochemical profile undoubtedly plays a significant role in how and by whom this plant was used.

Nicotiana quadrivalvis has a more complicated taxonomic history than *N. rustica*. Belonging to the subgenus *Petunioides,* section *Bigelovianae*, *N. quadrivalvis* has four varieties: *multivalvis*, *quadrivalvis*, *wallacei,* and *bigelovii*. Botanists have variably referred to *N. quadrivalvis* as *N. bigelovii* (Goodspeed 1954), *N. multivalvis*, and *N. quadrivalvis* (DeWolf 1957). This section follows Winter (2000c) and DeWolf (1957) in the use of *N. quadrivalvis*. The varieties *bigelovii* and *wallacei* are not dealt with in this section, as they have never been reported growing in the regions of interest to this study. *Nicotiana quadrivalvis* var. *quadrivalvis* and *N. quadrivalvis* var. *multivalvis* are known only in cultivation in the Missouri River valley and across the northwestern United States, respectively (Dunavan and Jones 2011; Haberman 1984; Winter 2000c). There are notable differences between vars. *quadrivalvis* and *multivalvis* in the dehiscence pattern and structure of the capsule: var. *quadrivalvis* (30-50 centimeters in height) has a partially dehiscent, four-chambered capsule, whereas var. *multivalvis* has a completely indehiscent, multilocular capsule and is slightly taller (50-80 centimeters in height) and broader than var. *quadrivalvis* (Winter 2000c). Both varieties produce a long, trumpet-shaped white flower and have rotund to elliptic-ovate leaves with hirsute surfaces (Winter 2000c). Although there are important differences between *N. quadrivalvis* var. *multivalvis* and var. *quadrivalvis* in how these varieties were cultivated, used, and understood by Indigenous groups, particularly the Crow, Blackfoot, Sarsi, Mandan, Arikara, and Hidatsa, identification of archaeological seeds to either of these varieties is likely not possible given the current state of research on seed morphology and available technology, and the remainder of this paper uses *N. quadrivalvis* to refer to both varieties.

Species-level identification of tobacco prior to and during Colonial occupation of ENA is a key factor in understanding beliefs and traditions surrounding tobacco use, as well as the timing and route of the introduction of tobacco from South America into ENA. *Nicotiana rustica* is described as "the tobacco of farmers" (Winter 2000d:324), and others (Tushingham and Eerkens 2016) suggest that the nicotine content of this species results from selection pressures for higher levels of nicotine, presumably for ceremonial and/or ritual uses. *N. quadrivalvis* produces much lower levels of nicotine, but it used in sacred ceremonies alongside other behaviors intended to induce a hallucinogenic experience, such as self-mutilation, in the Crow Tobacco Society (Winter 2000d). The variable nicotine content of *N. rustica* and comparatively low nicotine content of *N. quadrivalvis,* used regularly in ceremonial life among Plains groups, complicates the notion that tobaccos were and are used solely as part of ritual life that required achieving an altered state of consciousness or hallucinations.

History and Distribution of Tobaccos: *Nicotiana rustica and Nicotiana quadrivalvis*

Researchers generally agree that *N. rustica* is a domesticated variety of tobacco that originated in South America and traveled to ENA, where it was likely present in the Midcontinent by A.D. 160, and the probable *N. rustica* identification of tobacco from the Smiling Dan site is based on the known historic geographic distribution of this species (Asch and Asch 1985; Winter 2000b). *Nicotiana rustica* was the first tobacco cultivated by early Colonists in the 17th century along the East Coast, and was eventually replaced by *N. tabacum* after this species was introduced from the Caribbean, Mexico, and Latin America (Adams and Toll 2000; von Gernet 2000). Most of the sites that yielded probable *N. rustica* seeds are dated to post A.D. 1000, and a small number of these seeds have been recovered alongside other cultivated and domesticated plants from contexts dating to between A.D. 300 and A.D. 1000 (Winter 2000e). It is generally accepted that *N. rustica* traveled from South America, the putative origin of this domesticate, into the American Southwest via traders and farmers in Central America and Mexico, and may have reached ENA through contact with Plains groups, though it is also possible that *N. rustica* traveled along other routes further east (Adams and Fish 2011; Rafferty et al. 2012; Winter 2000a). *Nicotiana rustica* has been tentatively identified at Pre-Contact agricultural sites in Arizona and New Mexico (Miksicek and Gasser 1989), and may appear as early 1000 B.C. in southwestern New Mexico (Adams and Fish 2011; Rafferty et al. 2012; Winter 2000a), but was only one of several tobaccos used by Indigenous groups in the American Southwest. However, the timing, route, and Pre-Contact use and distribution of *N. rustica* remains poorly understood in ENA, and the highly polymorphic nature of *N. rustica* seeds requires further research into species-level identification of archaeological tobacco seeds to clarify these uncertainties (Dunavan and Jones 2011; Fritz 2011).

Nicotiana quadrivalvis currently grows wild in northern California and southwestern Oregon (Tushingham et al. 2018). This important plant was cultivated in California and the Pacific Northwest, including the Columbia Plateau, and was cultivated further to the north by the Haida and Tlingit (Keddie 2016). However, ethnohistoric evidence of *N. quadrivalvis* use and distribution is scant, and archaeological evidence shows that this species' growth range was extended to include the Missouri River valley and the North American northwest, with two varieties (var. *multivalvis* and var. *quadrivalvis*) known only in cultivation among northern Plains groups (Dunavan and Jones 2011; Fritz 2011; Haberman 1984; Tushingham and Eerkens 2016; Winter 2000c, Winter 2000d). several important questions remain surrounding the use of tobacco species in Pre-Contact ENA, specifically the Midcontinent.

The contemporary growth ranges of *N. rustica* and *N. quadrivalvis* are pertinent to archaeological studies examining species use and distribution, but also raise important questions surrounding the use of tobacco species in Pre-Contact ENA, specifically the Midcontinent, remain Although early ethnographic and botanical sources identify a variety of tobacco species used by Indigenous groups at and shortly after Contact in North America, including *N. tabacum* (which is not indigenous to ENA and was brought into the region by Europeans in the 17th century), *N. rustica*, and *N. quadrivalvis*, many researchers identify *N. rustica* as the most likely candidate for tobacco use in the past (Asch 1994; Dunavan and Jones 2011; Haberman 1984; Tushingham and Eerkens 2016:212; von Gernet 2000:66; Winter 2000a:14). *Nicotiana rustica* is listed by Winter (2000a:108) as present in Illinois territory during and after periods of French exploration. Setchell (1921) identifies *N. rustica* as the sole tobacco grown by the Iroquois Confederacy and the Winnebago of Minnesota, and notes the presence of possible remnant populations of *N. rustica* growing wild in Illinois, Minnesota, Wisconsin, Connecticut, New

York, and Wisconsin. The identification of *N. rustica* as the sole species of tobacco grown east of the Missouri River (von Gernet 2000; Winter 2000a:14), however, is tenuous and based on early ethnohistoric accounts of tobacco plants, later identified as likely *N. rustica*, growing in gardens along the eastern seaboard around the time of European contact (Wagner 2000).

There are two problems with this assumption: First, the scientific binomial for *N. rustica* was not created until Linnaeus wrote the Species Plantarum in 1753, well after early descriptions of what are now identified as *N. rustica* (von Gernet 2000:64-65), meaning these early descriptions would not have been able to identify tobacco to a scientifically-named species because it did not yet exist. Early colonists often referred to tobaccos used by Indigenous communities as yellow henbane or common comfrey until the scientific binomial and taxonomy of this plant was more well established (von Gernet 2000). Second, *N. rustica* has not been identified in early ethnohistoric sources in the Prairie Peninsula, but was identified along the east coast and in some parts of the Southwest (Winter 2000a). Ethnohistoric accounts of *N. rustica* distributions are complicated by fur and tobacco trading practices between French colonists and explorers; it remains a possibility that *N. rustica* may have joined or replaced other species of tobacco during this time of great change and upheaval in the Midcontinent. Further, Colonial attempts to convert Indigenous groups to Christianity frequently attacked tobacco use among Indigenous groups, changing the way people used this plant in daily, ritual, and religious contexts (von Gernet 2000). Relying on Colonial-era identifications of tobacco species and historic distributions of this plant may favor *N. rustica* as the primary, if not only, species of tobacco used in ENA, eclipsing the strong possibility that other species, in particular *N. quadrivalvis*, may have been part of tobacco use and trading patterns in the past.

Most archaeological tobacco seeds have been recovered from sites that are situated along river routes likely used for trading with Plains groups (Wagner 2000). Although this could be a product of flotation bias (tobacco seeds are typically only recovered from sites where excavators used flotation to recover plant remains), it may also provide evidence that tobacco was an important commodity in trading networks (Adair 2000; Wagner 2000). Adair (2000:183) suggests that Plains groups grew both *N. rustica* and *N. quadrivalvis*, and that *N. quadrivalvis* cultivation was "directly associated with an extensive trading network". Although there is no broad consensus on who the Oneota became in the Historic period, several Historic Plains groups are considered descendants of Oneota groups, including the Ioway, Kansa, Winnebago, Omaha, and Missouri (Brown and Sasso 2001). The temporal relationship between Central Plains tradition groups, Mill Creek, and the Initial Middle Missouri variant is still being explored, but it has been suggested that the temporal proximity of these groups and archaeological variants to the spread of Oneota material culture may indicate that groups living in the Plains region abandoned sites or were geographically circumscribed by the spread of Oneota people (Henning 2007; Logan 2010; Ritterbush 2002, 2007). Whether or not relations between Plains and Oneota groups were hostile, the proximity and movement of both groups does not rule out the possibility of trade and interaction, which is significant considering Adair's (2000) assertion that *N. quadrivalvis* was grown and exchanged within a large trading network. Fritz (2011) suggests that *N. quadrivalvis* may have been the first tobacco grown in ENA based on tobacco seeds recovered from Cahokia resembling *N. quadrivalvis* more than *N. rustica*, suggesting that tobacco use in the past was likely more complicated than commercially-grown *N. tabacum* supplanting *N. rustica* use among Indigenous communities in ENA.

The effects of domestication pressures on *N. rustica* and possibly *N. quadrivalvis* seeds has not been studied, likely because selective pressures placed these plants were likely concentrated on leaf size and nicotine production. In other words, people did not place the same pressure on the seeds of tobacco plants as was placed on the seeds of other crops, such as maize and some EAC crops, because tobacco plants were used for leaves, rather than seeds. *Nicotiana quadrivalvis* was traded and grown well outside of its natural range, which may be an argument for its status as a domesticate, and the wide range of variability in the nicotine content of contemporary *N. rustica* species indicates significant selective pressures being placed on this plant by contemporary farmers, though it is likely that these changes in leaf size and nicotine content have ancient roots.

Ethnohistoric and Archaeological Narratives of Tobacco Use

Recent scholarship on tobacco use shows a wide variety of ritual, ceremonial, social, and daily behaviors surrounding this plant, and there may be a variety of reasons beyond nicotine level that a group chooses one tobacco species over the other (Creese 2016; Hedden 2016; Rafferty 2016; Tushingham and Eerkens 2016; Winter 2000c). Tobacco is often smoked in pipes, cigars, and cigarettes, but it is also chewed and eaten, made into resins or concentrates and licked, made into infusions, snuffed, burned as incense, offered to the earth as part of planting and harvesting ceremonies, and turned into juice that can be painted on the body (Dunavan and Jones 2011; Winter 2000a:3). The difficulties of reconstructing ritual or ceremonial plant use in the archaeological past have arguably rendered tobacco use as a nebulous phenomenon across the entirety of ENA, effectively homogenizing the regional, local, and daily ways that people interacted with this important plant. Research on tobacco in ethnohistoric and Pre-Contact contexts has rightly pointed out that this homogenization, whether by the assumption that *N. rustica* was the sole species grown, traded, and used in ENA or by relegating all tobacco use to a sort of pan-Indigenous context, does a disservice to the diversity of belief systems surrounding tobacco within Indigenous communities (Bollwerk and Tushingham 2016; Parsons 2013).

Tobacco played, and continues to play, an important role in the daily, ritual, religious, and ceremonial lives of Indigenous communities, and the species of tobacco used is often considered to be of significant importance. Transcriptions of interviews with Maxi'diwiac (Buffalobird Woman) describe important gendered and age-based relationships with tobacco plants, the variety of reasons for which tobacco gardens were kept, as well as seed saving strategies and smoking rituals, noting that tobacco farming was men's work, and age played an important role in who smoked tobacco and how often (Wilson 1987). Ethnohistoric accounts of tobacco use describe the sacred and mundane aspects of this plant, which was used regularly by shamans, medicine men, religious figures, tobacco societies, and in the daily lives of people for socializing or relaxation (Creese 2016; Hedden 2016; von Gernet 2000; Winter 2000d). Among the Haudenosaunee, who grow *N. rustica* exclusively, tobacco "is a basic ingredient of the societies' ideologies and methods" (Winter 2000d:281). Among the Seneca, Mohawk, Cayuga, Onondaga, and Oneida, tobacco figures prominently in Haudenosaunee creation stories: tobacco appeared in world from the grave of Earth Mother, where it grew from her head, after she gave birth to twins: The Great Creator and The Great Rim Dweller (Winter 2000d). The False Face Society among Haudenosaunee perform a variety of public rituals, including Midwinter and Green Corn ceremonies, with the help of tobacco, and with the False Faces representing faces of the gods and tobacco and other crops serving as the only acceptable food for those gods (Winter 2000d). The masks worn by members of this society are carved from wood and blessed with tobacco, which provides the mask with both life and power throughout its use (Winter 2000d).

Religious societies that use tobacco as a means to make their actions sacred or powerful, like the False Faces, are also seen further west in the Missouri River valley and Canadian Plains in the Crow Tobacco Society (Winter 2000d). Among the Crow, who grow both the *multivalvis* and *quadrivalvis* varieties of *N. quadrivalvis*, *N. quadrivalvis* var. *multivalvis* is considered so sacred that it is not smoked under any circumstances, but used instead in ceremonial dancing (Winter 2000d). *N. quadrivalvis* var. *quadrivalvis* is obtained via trade from the Hidatsa and is used for smoking and ceremonial purposes (Lowie 1919; Winter 2000d). Vision quests form the basis for tobacco use within the Crow Tobacco Society: individuals seeking anything from the supernatural world use tobacco and other sacred objects to produce visions of sacred characters "to bestow songs, prayers, medicine, and other favors on the visionary" (Winter 2000d:287, see also Lowie 1919). The species of tobacco used among the Crow for these visions is significant; *N. quadrivalvis* has a low nicotine content compared to *N. rustica* and does not produce visions or any kind of hallucination on its own, so Crow people seeking visions often fast or engage in self-mutilation, such as cutting off a finger, to achieve an altered state of consciousness (Lowie 1919; Winter 2000d). Tobacco is so sacred to the Crow that it is considered sentient, and success in hunting, war, and daily work and life is often attributed to visions produced from tobacco use (Lowie 1919; Winter 2000d). Both the Crow and the Haudenosaunee engage with tobacco in ways that affirm the importance and sacredness of this plant, but it is clear from the ethnohistoric record that the species of tobacco being used is of great importance to the ways in which this plant is used. Indigenous groups choose particular species of tobacco and maintain them in the process of maintaining their group identity, and the biochemical differences between tobacco species, particularly nicotine content, play an important role in how this plant is incorporated into religious and ritual life. Contrary to common assumptions of why tobacco was considered so sacred, the use of *N. quadrivalvis* by the Crow Tobacco Society for vision quests suggests that Indigenous communities engaged with tobacco for reasons other than a high nicotine content. While it would be expected that high nicotine content would be favored for something like a vision quest, the Crow example demonstrates that *N. quadrivalvis* has this power despite having a lower nicotine content than other tobaccos.

The use of tobacco for diplomatic purposes is well documented in the ethnohistoric record. Calumet ceremonialism is a particularly important aspect of tobacco use, as it was often used on the Plains and in the Eastern Woodlands in times of social and political unrest to ease inter-group tensions, create political alliances, or forge fictive kin ties (Blakeslee 1981; Brown 1989; Dunavan and Jones 2011; Haberman 1984; Sabo 1992). Calumet ceremonialism likely emerged on the Plains as a means of successfully negotiating trading alliances, probably prior to European contact and possibly as early as the 13th A.D., but the spread of Calumet ceremonialism into the Eastern Woodlands remains a subject of much debate (Blakeslee 1981; Brown 1989; Haberman 1984). Central to the Calumet Ceremony is the Calumet pipe, which is made from a sacred long pipe stem and bowl and used in adoption rituals or ceremonies intended to establish fictive kin relationships between tribes, clans, or ethnic groups (Blakeslee 1981:759). The pipes used in these ceremonies eventually became known as a symbol for peace (Brown 1989; Dunavan and Jones 2011:519). Revisiting historical descriptions of French encounters with the Quapaw, living in Arkansas at the time, Sabo (1992) cites the historical account of Nicolas de La Salle, an unrelated member of René Robert Cavelier, Sieur de La Salle's expedition, to describe the Quapaw use of Calumet ceremonialism to welcome Robert René Sieur de La Salle and his men to their village in 1682:

> In order to dance the calumet, they all come into place, especially the warriors, and the chiefs set poles all about…and upon them display what they intend to give. They brought two calumets adorned with plumage of all colors, and red stones full of tobacco…these were given to the chiefs, who were in the middle of the place. These chiefs and the warriors have gourds full of pebbles and two drums, which are earthen pots covered with dressed skin. The first began a song accompanied by the chime of their gourds. These having ended others struck up the same thing; then those who have done great deeds go to a post in the midst of the place, and smite it with their tomahawks. And after relating their gallant achievements, they gave presents to M. de la Salle, for whom they made the festival…Meanwhile the chiefs are smoking the calumet and having it carried to everyone in succession to smoke. M. de la Salle received fifty or sixty oxhides. The Frenchman, with the exception of M. de la Salle, also struck the post, relating their valorous deeds, and made gifts from that which M. de la Salle had given them for the purpose (Sabo 1992:56).

The earliest accounts of Calumet Ceremonialism in the Plains come from recently recovered accounts of two Spanish trading expeditions, in 1634 and 1660, where the Spanish leaders of the trading parties participated in a ceremony involving a mock attack in which an Apache defender came to the Spaniard's aid, and sharing of a Calumet pipe (Blakeslee 1981:761-762). However, as La Salle's and other accounts demonstrate, this practice had spread widely throughout the Plains, Midcontinent, and Eastern Woodlands (as far south as Natchez villages) by the time of contact, suggesting some degree of antiquity, although it is not mentioned in earlier accounts from the de Soto expedition, which instead described large communal eating and gift giving events but without the use of any pipe ceremonialism

(Blakeslee 1981; Brown 1989). Pipes matching the description of Calumet pipes, dating to as early as the 13th century, were recovered from Nebraska., which Blakeslee (1981:766) notes is not necessarily unequivocal evidence of the existence of Calumet ceremonialism prior to European contact, but is a "compatible" interpretation based on the archaeological evidence. As described above, gift giving and the forging of alliances for the purposes of war or group safety are two of the main components of Calumet ceremonialism, and these components likely facilitated the spread of this tradition throughout the Eastern Woodlands as a response to growing diplomatic pressures facing Indigenous groups from European encroachment on their villages (Blakeslee 1981; Brown 1989; Sabo 1992). However, the Calumet likely represented different things to Indigenous and European people. The Calumet, viewed by Europeans as a form of hospitality and diplomacy to mitigate property disputes, was a way for Indigenous communities to grant Europeans social positions within their existing social structures so that both groups could successfully interact within those social structures (Sabo 1992:58). In other words, Europeans had to be adopted into Indigenous social structures before they could cooperate with each other, which they would do as fictive kin, bringing "concepts of communal order and unity" to interactions between the two groups (Sabo 1992:59).

In contrast to diplomatic, sacred, religious, and shamanistic uses of tobacco, Creese's (2016) study of the social lives of smoking pipes among the Wendat in Ontario explores smoking culture outside conceptually bounded realms of ritualized or diplomatic contexts. The Keffer site (AkGv-14) in southern Ontario dates to the 15th century and produced an extremely diverse array of smoking pipe forms, with a relatively low frequency of effigy pipes. The proliferation of diverse pipe forms is interpreted from the perspective of "relational-affective identification", where individuals create material objects to embody aspects of themselves (Creese 2016:31).

Pipes gained their power from what the people who made them imbued them with, whether through manufacture or use patterns, and the exchange of these pipes carried this power with the object as it moved from person to person through exchange and gift giving. Creese (2016:28) refers to this analysis as one of "the other 99%", demonstrating the complex ways in which tobacco and smoking pipes exist in daily life, in contrast to the specialized ritual use of tobacco in organizations like the False Face Society.

Research on the Northern Iroquoian smoking culture acknowledges tobacco's importance as a ritual plant used in shamanistic and diplomatic contexts, but further elaborates on tobacco as a "multidimensional practice" suitable for a variety of social contexts, including more mundane practices such as daily smoking and pipe construction (Creese 2016:29). Further, ethnohistoric accounts of tobacco use during the time of Colonial contact note that many Indigenous groups had daily tobacco users, highlighting the importance of understanding tobacco use on a continuum of what are likely overlapping sacred and mundane activities (von Gernet 2000). Daily smoking may be considered part of an important suite of ritual behaviors, in some ways like feasting, where socially, religiously, and politically significant acts are created from daily use items such as food, drink, serving vessels, and utensils. It is important to note the distinction between sacred and profane may not have been part of Native worldviews prior to European colonial influence (Creese 2016). Therefore, the entire suite of social behaviors concerning tobacco, such as shamanistic, diplomatic, and daily social interactions and identity expression must be considered when addressing the social meaning of tobacco in archaeological contexts. The species of tobacco used by Native peoples in any of the above contexts may have significant ramifications on how we understand ceremonies, religious experiences, and daily activities and how tobacco use may have played an important role in negotiations of identity and culture contact at Morton Village.

Identifying Tobacco Use in the Archaeological Record: Pipes, Residues, and Seeds

There are two types of evidence for tobacco use in the past: direct evidence in the form of seeds or other tobacco plant parts or residues, and indirect evidence in the form of smoking pipes. Pipes are prolific in the archaeological record of North America and appear in the Late Archaic, primarily in burial contexts, as early as 2000 B.C. in Tennessee (Rafferty and Mann 2004). Pipe forms, construction style, and raw material used vary widely across space and time, but their antiquity suggests that smoking, whether it was tobacco or other plants such as dogwood (*Cornus* sp.), bearberry (*Arctostaphylus uva-ursi*), sumac (*Rhus* sp.), *Solanum* sp., or juniper (*Juniperus* sp.) being consumed, was an ancient practice in North America (Rafferty and Mann 2004; Rafferty 2016; Rafferty et al. 2012). Some researchers have suggested that not all pipes were used for smoking, and that some may have been important tools in shamanic activity not centered around smoking, but many archaeological pipes exhibit soot and charred residues, suggesting that smoking was a common use of pipes (Rafferty 2016).

Much of the research on pipe manufacturing in North America tends to generate descriptive culture-historical classifications of pipe types that focus on creating typologies and chronologies, but recent decades have seen new research seeking to understand the social and cultural value of smoking pipes (e.g. Bollwerk 2016; Drooker 2004; Hedden 2016; Rafferty and Mann 2004). Pipes as archaeological artifacts carry significant amounts of information pertaining to trade and exchange and the social lives of these objects and the people who used them (Drooker 2004). Historic and Protohistoric accounts of pipe use in ENA describe the importance of pipes and smoking in greeting ceremonies between Indigenous groups and in situations of

European contact: pipes are excellent markers of interregional interactions and were frequently given as gifts or discarded by visitors, migrants, locals returning from long-distance travel, or captives (Drooker 2004). Pipes were often intentionally broken or "killed" and buried either with their owners or in large caches of broken pipes, perhaps because they contained some spiritual power associated with smoking or because they represented political or spiritual connection with an important figure (Drooker 2004; Rafferty and Mann 2004).

In terms of form, the earliest pipes from the Late Archaic through Early Woodland (approximately 2000 B.C. to A.D. 200) tend to be tubular in form and made of groundstone, clay, or soft stone, and some the most distinctive examples from the Ohio River Valley (ORV) were fashioned from limestone (Rafferty and Mann 2004; Rafferty 2016). This tubular pipe form is often considered to be indicative of manufacture by the Adena of the ORV and of groups living in Northeast North America and are thought to have connections to burial rites based on their common occurrence in burials and cremations, but tubular pipe forms have been recovered from sites much further south, as well (Rafferty 2016). The Middle Woodland transition (c. 200 B.C.-A.D. 500) saw a significant change in pipe form and manufacture as tubular pipes were replaced by platform pipe styles typically considered to be diagnostic of Hopewellian manufacture, although they do appear throughout the Eastern Woodlands, and most commonly display a "flat or curved base that included the stem, with a centrally- or distally-located bowl" (Rafferty 2016:16). Effigy pipe forms appear in the Middle Woodland and commonly feature animals, especially birds, and the occasional human form (Rafferty and Mann 2004; Rafferty 2016). Like earlier pipe forms, platform pipes are most commonly recovered from graves and are often interpreted as "profaned sacred artifacts" associated with burial rites and other ritual contexts (Rafferty 2016:17). After A.D. 1000, Late Woodland and Mississippian societies began producing elbow shaped pipe forms with higher frequencies of effigy pipes in the form of human faces and animals, which likely had spiritual significant to the smoker (Rafferty and Mann 2004; Rafferty 2016:19). These effigy pipes are often interpreted in terms of their relationship to Southeastern Ceremonial Complex (SECC) motifs related to the underworld, sky, powerful plants and animal spirits, and warfare (Rafferty and Mann 2004; Rafferty 2016). Not all Late Pre-Contact pipes were fashioned as elaborately as the Mississippian effigy pipes; many pipes manufactured from the 11th century until contact are simple elbow forms with minor admixture of less embellished effigy forms (Rafferty 2016). The Contact Period (post A.D. 1550) saw some changes in pipe manufacturing, but Rafferty (2016) notes a general trend towards maintaining Indigenous smoking technology, despite the availability of European-manufactured pewter pipes.

The Oneota material culture manifestation is identified primarily through stylistic and technological elements of ceramics, but Oneota pipes may be equally distinctive. Often fashioned from red pipestone, sometimes identified as catlinite, or black argillite, these disk pipes are considered diagnostic of Oneota manufacture (Brown 1989; Drooker 2004; Fishel et al. 2010). These pipes feature a wide disk into which the bowl of the pipe is fashioned and attached to a flat or tubular stem, and generally decrease in size over time (Brown 1989; Drooker 2004). While catlinite elbow pipes are largely considered to have associations to Calumet ceremonialism, the relationship between Calumet ceremonialism and Oneota disk pipes is less clear, although their significance to Plains groups is evident in their presence in medicine bundles of Historic Ioway, Osage, Omaha, Sioux, and Cherokee people (Brown 1989; Drooker 2004). These distinctive disk pipes appear most commonly in the Upper Mississippi Valley and the Prairie Peninsula after c. A.D. 1350, but are also present in the Lower Mississippi Valley (where the elbow-shaped pipe form is more common) and likely predate European contact there

(Brown 1989; Drooker 2004). Disk pipes, made from catlinite or other materials, while they slightly predate the Bold Counselor Oneota manifestation in the CIRV, are indicative of a deeply embedded smoking culture among Oneota communities, and “may have a particular history as diplomatic gifts” from Oneota traders, migrants, or social leaders (Drooker 2004:78).

Pipes are commonly presented as evidence of smoking culture in the past, an association warranted by the presence of charred residues in the bowls of many specimens housed in museums and elsewhere. However, given the variety of known smoke plants other than tobacco, care should be taken when inferring tobacco use from the presence of pipes in the archaeological record without the presence of tobacco seeds to corroborate such claims. Recent advances in residue analysis of pipe fragments may demonstrate that tobacco smoking predates the earliest paleoethnobotanical evidence of tobacco use (Rafferty 2002, 2006; Rafferty et al. 2012). Residue analyses on pipe fragments from an Adena burial at the Cresap site in West Virginia and at the Early Woodland Boucher site in Vermont identified nicotine residues, pushing back the date for the earliest evidence of tobacco use in ENA, although the results from the Cresap site are not universally accepted (Rafferty 2002, 2006). Using only results from the Boucher site, nicotine residues appear as early as 300 B.C., slightly earlier than Asch and Asch’s (1985) identification of *Nicotiana* sp. at Smiling Dan (Rafferty 2006). Carmody et al. (2018) identified nicotine biomarkers on six pipe fragments from the Feltus site in the Lower Mississippi Valley, dating to between A.D. 700 and 1150, and argue that because the analyzed pipes were recovered from ritually-charged contexts, rather than domestic ones, that tobacco is implicated in the ritual landscape of Feltus. Residue analysis is an important avenue of research into tobacco use because tobacco seeds are often underrepresented in the archaeological record. Despite each capsule on a tobacco plant containing hundreds, if not thousands, of seeds, tobacco seeds are not recovered with the same frequency as other cultigens in the archaeological record, which may be a combined product of cultivating and managing tobacco differently than other plants, seed saving strategies, and the fact that leaves, not seeds, are most commonly subject to burning.

Most archaeological tobacco seeds from ENA are either identified as *Nicotiana* sp. or *Nicotiana rustica* based on early ethnographic accounts of *N. rustica* distribution, which is problematic due to lack of careful descriptions or collection of specimens by early colonists, and the fact that *N. rustica* was not given a scientific binomial until the 18th century (von Gernet 2000). Despite this, several papers (Fritz 2011; Haberman 1984; Pauketat et al. 2002:268; Wagner 2000; Wagner and Fritz 2002) discuss the possibility that *N. quadrivalvis* may be distinguishable from *N. rustica* in the archaeological record based on morphological criteria used on charred seeds. Seeds are the most commonly recovered evidence of the presence of tobacco plants in the archaeological record, and due to their small size and fragility it is generally agreed that flotation is the only way to recover these seeds from archaeological matrix at open-air sites (Dunavan and Jones 2011; Wagner 2000). The distribution of archaeological tobacco seeds, which appear by the first century A.D. in Illinois near the confluence of the Illinois and Mississippi rivers (Asch and Asch 1985) and are more widespread after A.D. 300 (Simon and Parker 2006; Wagner 2000), shows that they tend to appear along important riverine trade routes, particularly in the Mississippi Valley, but it is also possible that this distribution reflects a bias towards sites where flotation was performed (Wagner 2000).

Tobacco seeds, contrary to the notion that the sacredness of this plant should indicate its presence most commonly in ritual or ceremonial archaeological deposits, are most often found in domestic refuse and food plants (Wagner 1987, 2000; Wagner and Fritz 2002). Notably, tobacco seeds are often recovered in association with *Solanum* sp. seeds, which may represent the use of a second popular smoke plant, perhaps combined with tobacco (Wagner 1987, 2000). The presence of tobacco in mostly domestic contexts may be the result of growing and processing strategies used in the past. With the exception of Hidatsa, who smoked the fresh calyxes of *N. quadrivalvis* dipped in buffalo fat, tobacco leaves, not seeds, are processed for smoking (Wilson 1987). It is therefore probable that charred seeds enter the archaeological record by getting stuck in the small, sticky hairs present on the leaves of this plant processed for smoking, and daily, non-ritual use of tobacco is a possible explanation for this. Processing methods of tobacco leaves for smoking, such as drying leaves, or storage of seeds for later planting, as part of daily household activity, in addition to tobacco use for smudging or making offerings in household spaces, may also lead to the deposition of seeds in domestic contexts (Wagner 2000:199). Although they usually occur in domestic contexts, tobacco seeds have also been recovered from ritual or other special contexts, and are often associated here with red cedar, nightshade (*Solanum* sp.) jimsonweed (*Datura stramonium*), special artifacts, or busk pits used in maize harvest ceremonies (Parker and Simon 2018; Pauketat et al. 2002; Wagner 2000; Winter 2000a). Tobacco seeds are generally considered rare in paleoethnobotanical assemblages throughout North America because of their small size and fragile nature. They are most commonly recovered in small quantities from domestic contexts, but there are several sites where unusually large numbers of tobacco seeds have been recovered, including the Fish Lake site and Cahokia in the American Bottom, the Bundy site in eastern Missouri, and the Auger site in southern Ontario (Wagner 2000). The Fish Lake site initially yielded 170 tobacco seeds from an ash lens, and later excavators recovered an additional 459 seeds from sixty-six features (Parker 2014). Paleoethnobotanical analysis of Sub-Mound 51 at Cahokia recovered 917 tobacco seeds from the archaeological matrix, both charred and uncharred, though many more are likely present in the remaining unsorted matrix (Johannessen 1984; Pauketat et al. 2002). Tobacco seeds were recovered from the Bundy and Auger sites in fused masses alongside nightshade seeds (Wagner 2000). Wagner (2000) suggests that tobacco seeds found in fused masses are likely the result of a burned container used for tobacco seed storage for the purposes of planting or trading, and large quantities of unfused tobacco seeds likely enter the archaeological record through people sweeping detritus from tobacco harvesting.

Tobacco seeds are sometimes identified to species by archaeologists and paleoethnobotanists (e.g. Asch and Asch 1985; Benn 1974; Haberman 1984; Miksicek and Gasser 1989), but variability and overlap in seed coat sculpturing, seed size, and seed shape are often cited as barriers to species-level identification. Several studies exist that attempt to qualify or quantify these differences in a systematic way (Bahadur and Farooqi 1986; Cuthrell et al. 2016; Haberman 1984; Wagner and Fritz 2002). Goodspeed's (1954) original classification of *Nicotiana* claims that seeds and their morphology are not useful characteristics for taxonomic classification within this genus, but later research using high powered microscopy methods demonstrates the potential utility of seed and seed coat morphology for diagnostic purposes (Bahadur and Farooqi 1986). Scanning electron microscopy has proved useful in identifying morphological criteria for species-level determinations of tobacco seeds (Bahadur and Farooqi 1986; Wagner and Fritz 2002). All tobacco seeds share similar seed coat sculpturing, with characteristic reticulations formed by "the sinking or bending in at maturity of portions of the epidermis" (Wagner 2000:188). The criteria established for distinguishing between *N. rustica* and *N. quadrivalvis* seed and seed coat morphology used in this study come from previous high powered microscopic analysis of seeds, and include 1. straightening of reticulation patterning towards the hilum; 2. bifurcation of the surface of the ridges; 3. classification of ridge width as broad or narrow; 4. the presence of tubercles on the intercellular surface; and 5. the classification of reticulation patterns as closely or more widely spaced (Table 1, Bahadur and Farooqi 1986; Haberman 1984; Wagner and Fritz 2002). Although hilum morphology is not discussed by these previous studies, this analysis identifies the degree of hilum protrusion as potentially useful in attempts to make species-level determinations of *N. rustica* and *N. quadrivalvis*. The positioning of the hilum in relation to the center of the seed has also been presented as a possible characteristic for use in identifying *Nicotiana* to species (Wagner and Fritz 2002). Previous research has also identified size and shape as potentially important in distinguishing species of tobacco, with the shape *N. rustica* described as more angular than *N. quadrivalvis* seeds, which are more often reniform in shape (Wagner and Fritz 2002). However, the carbonization process may affect seed shape, as *N. rustica* seeds tend to expand significantly during charring (Adams and Toll 2000). Results of my analysis indicate that the sizes of *N. rustica* and *N. quadrivalvis* are not distinct enough to use this criterion for species-level determinations.

Bold Counselor Oneota and Morton Village: Background and Previous Research

Morton Village is the site of a unique, multicultural community configuration in the Central Illinois River Valley (CIRV), occupied contemporaneously by Oneota and Mississippian groups during the 14th century. Oneota people likely migrated into the region sometime during or immediately prior to the beginning of the 14th century, and radiocarbon dates from ceramic residues and short-lived annual plant taxa place both groups at the site at the same time (Conner and O'Gorman 2015). The emergence of the Oneota material culture expression is still debated, but Oneota is generally considered to be an upper Mississippi River Valley manifestation, originating in southern Wisconsin sometime around A.D. 1000 (Benn 1989; Boszhardt 1998;

Brown and Sasso 2001; Hall 1962; Henning 1970, 1998). Oneota chronology divides this broad designation into several phases: Emergent (A.D. 1000-1150), Developmental (A.D. 1150-1400), Classic (A.D. 1400-1625), and Historic (Post A.D. 1625) (Boszhardt 1998; Brown and Sasso 2001). Oneota has historically been defined primarily by ceramic technologies, due to highly identifiable ceramic attributes. Oneota ceramics are considered distinctive based on the abundance of jars with "stab and drag" horizontal lines bordered by punctates, and bowls, which are typically plain but sometimes appear with lip stamping (Esarey and Conrad 1998:40). Two forms are unique to Bold Counselor: Mississippian-style deep rimmed plates with Oneota-style decoration and "a broad, shallow bowl form with flared, concave flanges or handles" decorated in Oneota motifs (Esarey and Conrad 1998:40). However, recent and current, ongoing research is exploring variation in the Oneota designation in new ways by examining changes in Developmental Phase Oneota material culture concomitant with population movement and how these changes can be used to interpret the social lives of Oneota villagers (Bengtson and O'Gorman 2016; Lieto and O'Gorman 2014; Painter and O'Gorman 2019). Bold Counselor Oneota people settled variably in the CIRV along a 35 km stretch of the Illinois River at the C.W. Cooper, Crable, Otter Creek, Sleeth, and Morton Village sites, with some sites containing almost no Mississippian ceramic material, and others a relatively even admixture of Oneota and Mississippian material culture (Esarey and Conrad 1998). With the exception of a small Oneota component at the Sponemann site in the American Bottom (Jackson et al. 1992), Bold Counselor Oneota is a material manifestation restricted to the CIRV. Sites containing Bold Counselor Oneota material culture were abandoned by approximately A.D. 1450.

Salvage excavations at the site in the 1980's identified the largest Oneota cemetery in the region, Norris Farms #36, associated with the Morton Village habitation area (Santure et al.

1990). Human remains and artifacts excavated from this cemetery have undergone a great deal of analysis and are reviewed elsewhere (e.g. Buikstra and Milner 1991; Milner and Styles 1990; Steadman 1998; Tubbs 2013). More recent investigations, under the aegis of Michigan State University (MSU) and Dickson Mounds Museum (DMM), completed a large magnetometry and ground penetrating radar (GPR) survey of 73,753 square meters of suspected site area, identifying hundreds of pit features and at least 97 likely structures (Conner et al. 2014). Excavation at the site discovered at least twenty-four structures and 103 pit features, and three of those structures, 16, 25, and 34, are being defined as public or non-domestic. Two different house construction types, wall trench and single post, were also identified. Wall trench structures are associated with Mississippian construction and single post with Oneota construction, with some structures showing evidence of both styles of construction.

Previous and ongoing research at Morton Village suggests that this community was the site of significant social change following the Oneota migration into the region, with both groups actively negotiating how to articulate new and traditional roles in their daily and ritual lives (Bengtson and O'Gorman 2016; Lieto and O'Gorman 2014; Painter and O'Gorman 2019; Tubbs 2013; Tubbs et al. 2015; Upton et al. 2015). Tobacco use as part of social mediation strategies and religious, ritual, and daily life is well-documented historically, and the presence of tobacco at Morton Village in only Oneota-associated external pit features is significant given the context of this community as a newly coalescing social group. Two pipes have also been recovered from Morton Village, including a small sandstone pipe fragment recovered from a feasting context, and a bison effigy pipe, also made from sandstone, from a burned structure. Identifying the species of tobacco used at Morton Village has significant ramifications for understanding the role of tobacco use at the site, as well as potential trade and seed saving strategies among Oneota residents. As previously discussed, the different levels of nicotine produced by *N. rustica* and *N. quadrivalvis* are important factors in considering how these species were used, and the extension of *N. quadrivalvis'* growth range from the west into the Plains would make the presence of this species in other areas of ENA significant, particularly given the association between Plains groups and Calumet ceremonialism in the Historic period, and possibly earlier.

Identifying *Nicotiana* Species: Qualitative and Quantitative Methods and Results

Methods

High powered microscopy, using a scanning electron microscope (SEM) and a digital microscope with a magnification range of 33-534X, was used in this study to analyze variation within and between *Nicotiana rustica* and *N. quadrivalvis* seeds. With the exception of the five tobacco seeds recovered from external pit features at Morton Village, the seeds for this analysis are uncharred specimens, and come from modern collections except for the tobacco seeds imaged from Cahokia, which are uncharred but ancient. 20 *N. rustica* seeds used for this study were grown by Dr. Gayle Fritz (Washington University in St. Louis) from seeds obtained from Native Seed Search in Tucson, Arizona, accessioned as the Tarahumara El Cuervo N004 variant of *N. rustica* collected from Batopilas Canyon in Chihuahua. An additional five *N. rustica* seeds from the Washington University Paleoethnobotany Laboratory comparative collection, grown on the Onondaga reservation in New York and donated and identified by Charles Heiser, were imaged. 20 of the *N. quadrivalvis* seeds used in this study were purchased from The Museum of the Fur Trade in Chadron, Nebraska, where *N. quadrivalvis* is grown in their heirloom garden alongside other crops important to the Mandan, Arikara, and Hidatsa people. Seeds in this garden were originally obtained by the founder of the museum, Charles Hanson, from the son of a

Dakota horticulturalist, who acquired the seeds from Native farmers over 125 years ago. An additional five tobacco seeds from the Sub Mound 51 deposit at Cahokia were also imaged for comparison to both modern and archaeological seeds. Scanning electron microscopy was used on 40 uncharred tobacco seeds, 20 *N. rustica* and 20 *N. quadrivalvis* seeds, producing 80 scanning electron micrographs for visual and morphometric analysis of eight morphological characteristics identified as significant to making species-level determinations within the *Nicotiana* genus, following research presented by Wagner and Fritz (2002) (Table 1). High power digital microscopy using a Leica DVM6 instrument was used to image five additional *N. rustica* seeds and five tobacco seeds from Cahokia Sub Mound 51 to provide comparative populations for analysis.

Three tobacco seeds recovered from Morton Village pit features were examined using the SEM, and two others with a digital microscope. Scanning electron microscope images were collected using a Zeiss EVO environmental SEM, which allows for specimen analysis without the use of sputter coating. Images were collected with the SEM chamber set to Variable Pressure (VP), rather than High Vacuum (HV), to reduce noise in the images. This study used a VP chamber set to 50 Pa (pascals) with an aperture opening of 25 microns and a variable working distance, between 5 and 10 millimeters. Magnification ranged between approximately 150x and 600x, depending on the specimen. Images were analyzed visually for some of the morphological criteria, including the straightening of reticulation pattern toward the hilum (Figure 3.3), bifurcation of the ridges (Figure 3.2), and the presence of tubercles (Figure 3.4). Other criteria were quantified using measurements on the micron scale, taken in the open-source image analysis program ImageJ and in the Leica Application Suite X program (LAS X). The width of one ridge on each seed was measured and averages calculated for *N. rustica* and *N. quadrivalvis,* and the total number of points where the ridges intersected on each image were counted to as a proxy for measuring how closely the reticulation patterns are spaced for both species. The degree of hilum protrusion was also measured in microns in seeds that exhibited this feature.

Results

Visual and morphometric image analysis of eight morphological characteristics on scanning electron micrographs produced data indicating that *N. quadrivalvis* and *N. rustica* seed coats exhibit several important differences, and that *N. rustica* seeds are more morphologically variable than *N. quadrivalvis.* The aspects of seed coat morphology used in this analysis are 1) the presence of bifurcated ridges (Figure 3.2); 2) straightening of the reticulation pattern towards the hilum (Figure 3.3); 3) the presence of tubercles on inter-ridge surfaces (Figure 3.4); 4) wide, rounded ridge surfaces (Figure 3.5); 5) narrow ridge surfaces (Figure 3.6); 6) closely spaced cerebellate reticulation patterns (Figure 3.7); 7) widely spaced reticulation patterns (Figure 3.8); and 8) a protruding hilum (Figure 3.9) (after Haberman 1984; Wagner and Fritz 2002). The presence or absence of these features and all measurements produced on all analyzed micrographs are detailed in Table 2.

The following section examines the results of image analysis on the 40 tobacco seeds from the Museum of the Fur Trade and Native Seed Search grown by Dr. Gayle Fritz. The additional ten seeds imaged using the Leica DVM6 are discussed subsequently. In general agreement with previous attempts to find attributes that might allow for species-level identification of tobacco seeds (Bahadur and Farooqui 1986; Haberman 1984; Wagner and Fritz 2002), 85% of *N. rustica* seeds analyzed showed straightening of the ridges that form the reticulation pattern on the seed coat toward the hilum, whereas 85% of *N. quadrivalvis* seeds do not exhibit this feature. Tubercles on the inter-ridge cellular surface of the seed are also a good predictor of whether a seed is *N. rustica* or *N. quadrivalvis*: 100% of *N. quadrivalvis* seeds have tubercles, and only 10% of *N. rustica* seeds exhibited this feature. The shape and width of the ridges also appear to be important indicators of species. *Nicotiana quadrivalvis* seeds showed wide, rounded ridges, measuring greater than twenty microns on all but one seed (*N. quadrivalvis* specimen 5) and averaging 26.43 microns. Only 20% of *N. rustica* seeds exhibited ridge widths greater than twenty microns, and the average width of all measurements was 16.73 microns. *N. rustica* seeds most commonly showed narrow ridges, often with a second long, thin ridge running along the top of the ridging. This feature was present on only one *N. quadrivalvis* seed (specimen 5). The ridges on *N. quadrivalvis* seeds are bifurcated on 100% of the analyzed specimens, whereas in *N. rustica* seeds, this feature is present in 15% of the seeds analyzed.

The length of protruding hila for both species was measured in microns, and seeds where the hilum is mostly flush with rest of the seed were not measured for hilum protrusion. In *N. quadrivalvis* seeds, nine hila were measured and averaged 39.7 microns in length, with most seeds showing a hilum length of less than 50 microns and one seed with a hilum length of 60.13 microns. Of the 20 *N. rustica* seeds analyzed, seventeen had some degree of hilum protrusion, averaging 52.12 microns, with six seeds featuring hila longer than 60 microns. The spacing or clustering of reticulations on the seed coat proved to be less useful in making species-level designations, as visual analysis suggests most analyzed seeds show closely packed surface reticulations, and using the number of points of intersection between reticulations did not yield any significant results: *N. quadrivalvis* seeds averaged 62.95 points of intersection of the ridges, and *N. rustica* averaged 58.7, which may be the result of different patterning of reticulations and not necessarily how closely packed the ridging is on the seed. This proxy may also not effectively represent differences in the spacing of the reticulation pattern.

Based on these data, the most useful morphological characteristics for differentiating between *N. rustica* and *N. quadrivalvis* are the presence of tubercles in *N. quadrivalvis*, straightening of the reticulation pattern towards the hilum in *N. rustica*, bifurcated ridging in *N. quadrivalvis*, and the width of the ridges that make up the reticulation patterns on the seed coats, where wider ridging is most common in *N. quadrivalvis* and narrow ridging is more common in *N .rustica*. Protruding hila also occur more frequently and with a higher degree of protrusion in *N. rustica* seeds than in *N. quadrivalvis,* although this trait is more variable than others. Two *N. rustica* seeds, specimens 10 and 20, appear to be unusual for *N. rustica* morphology: specimen 10 has tubercles, bifurcated ridging, no hilum protrusion, and wide ridging, and specimen 20 has wide ridges and shows no straightening of these reticulations towards the hilum. Three *N. quadrivalvis* seeds appear unusual of the population studied, including specimens 7 and 14, which both show reticulation patterns that straighten towards the hilum. Specimen 5, on which the ridging shows a second, narrower ridge running along the top, had a ridge measuring only 17.09 microns. Overall, there was more variation in morphology within the *N. rustica* seeds than *N. quadrivalvis,* although more *N. quadrivalvis* seeds appeared atypical of this species.

Ten additional seeds, five *N. rustica* and five *Nicotiana* sp. seeds from Cahokia, were imaged to examine variation in seed coat morphology among populations of these species. The results of measurements on these additional seeds are detailed in Table 3. Due to the fragmentary state of the *Nicotiana* sp. seeds from Cahokia, the degree of hilum protrusion was not measured on these seeds. Image analysis of these additional seeds showed that they generally aligned morphologically with the results of the 40 seeds discussed above. All five *Nicotiana* sp. seeds from Cahokia exhibited bifurcated ridges and had a ridge width of greater than 21 microns. Tubercles were not visible on these images due to an ashy residue covering the seeds. All five of the *N. rustica* seeds from the Onondaga reservation showed a straightening of the reticulation pattern towards the hilum and had ridge widths of less than 20 microns. Although the degree of hilum protrusion was not quantified for these seeds, the Onondaga *N. rustica* all showed some degree of hilum protrusion.

Scanning electron micrographs of three tobacco seeds recovered from Morton Village were acquired for comparison to the modern seeds imaged using the same equipment and settings. The other two tobacco seeds recovered from external pits at Morton Village were imaged using a Leica DVM6 digital microscope. Two different instruments were used to both compare results of high microscopy imaging for the purpose of determining which method is most useful for image analysis, and to better preserve the collection of macrobotanical material from Morton Village. Comparison of carbonized, archaeological seeds to modern specimens should involve corrections for changes in seed size during the process of charring. Previous research indicates that tobacco seeds may expand slightly during the carbonization process, possibly because of "swelling from residual moisture trapped inside" the seed (Adams and Toll 2000:147; Hammett 1993). In their study of tobacco use in the American Southwest, Adams and Toll (2000:147) provide data from carbonization experiments that suggest most tobacco seeds do not change significantly in size during charring, with the exception of *N. rustica,* which increased in mean seed length by as much as 90 microns. Comparison of archaeological seeds to modern specimens may also be complicated by the possibility that tobacco growing practices in the past may have led to increased seed sizes through time (Adams and Toll 2000). Future research into tobacco use in ENA should include further carbonization experiments to thoroughly document changes in seed size and shape and seed coat sculpturing that may occur as a result of charring.

The three seeds imaged with the SEM came from Oneota-associated external pit features, two seeds from Feature 213 and one from Feature 214. The three tobacco seeds discussed here were partially broken and heavily covered in sediment, making the identification of some morphological and morphometric markers difficult or impossible. The same morphological and morphometric criteria that were used on the modern tobacco seed specimens were applied to the archaeological seeds, with the exception of the number of ridge intersections, hilum protrusion, and the presence of tubercles because these were not visible, including 1. straightening of the seed coat reticulations towards the hilum; 2. bifurcated ridging; and 3. identification through morphometric analysis of ridges as either narrow and sharp or wide and rounded. Results of this analysis are detailed in Table 4. The tobacco seed from Feature 213 Level 2 (labeled subsequently as specimen A, Figure 3.10) was fragmentary, but had a ridge width measurement of 17.65 microns and showed some straightening of the reticulations towards the hilum, although this feature was partially obscured. Specimen A also showed some evidence of a thin line running along the top of the ridges in some areas, which was a common feature of the *N. rustica* seeds analyzed above. Despite documented changes in seed size during carbonization, the ridge width on specimen A falls within the range of *N. rustica*, indicating that although the charring process does sometimes affect seed size, the reticulations on the seed coat may not be significantly affected by this process. The tobacco seed from Feature 213 Level 4 (specimen B, Figure 3.11) was also missing a portion of the seed coat, obscuring visibility of the area around the hilum. This specimen had a ridge width measurement of 17.78 microns, and shows faint evidence of either bifurcated ridging or the long, narrow line running along the top of the reticulations. The area around the hilum on the seed from Feature 214 Level 1 (specimen C, Figure 3.12) was also obscured, but the reticulations appear wider and more rounded on this specimen. The ridge width measurement on specimen C was 23.16 microns, and the ridges appear bifurcated. Comparison of these images to modern specimens based on criteria established above, specimen A appears to resemble *N. rustica* more closely than *N. quadrivalvis*. Specimen B, based on the ridge width measurement, might also be *N. rustica* but without other visible morphological markers a firm identification is not made for this specimen. Specimen C, which came from a different feature than specimens A and B, appears to most closely resemble *N. quadrivalvis* based on the ridge width measurement and presence of bifurcated ridging, but a definitive identification is not presented here without further evidence from other morphological criteria. The ridging on specimen C is wide and rounded, and the ridges appear to be bifurcated, both of which are markers more common to *N. quadrivalvis* than *N. rustica.*

Two tobacco seeds from Feature 213 were photographed and analyzed using a Leica DVM6 digital microscope and the associated LAS X image measuring software. This instrument has a magnification range of 33-534X, making it suitable for producing high magnification images of *Nicotiana* seeds. Two images were taken of each seed, one at lower magnification to visualize the entire seed, and one at higher magnification for analyzing morphological characteristics of the seed coats. The tobacco seed from Feature 213 Level 1 (specimen D, Figure 3.13) was coated in soil and the region around the hilum was not visible, so no determinations about reticulations straightening toward the hilum could be made. The ridge width measurement for specimen D is 14.93 microns, falling within the range of *N. rustica* ridge widths for the modern seeds analyzed. Some areas of the reticulations also appear to have a long, narrow ridge running along the top of them, but the digital microscope was less effective at visualizing this aspect of tobacco seed morphology. The second seed imaged using the digital microscope is also from Feature 213, Level 3 (specimen E, Figure 3.14). This seed was badly broken on one side but the intact side showed some straightening of the reticulations towards the hilum, although the view was partially obscured by soil stuck to the seed. The ridge width of specimen E measured 13.03 microns, placing this seed in the range for *N. rustica* ridge width, as well. There is also a faint narrow line running along the top of the reticulations in some places on this seed. Although the degree of hilum protrusion was not measured on any of the other archaeological tobacco seeds because this feature was not present, the hilum on specimen E was protruding by approximately 48.55 microns. This characteristic was found in several of the modern *N. quadrivalvis* seeds analyzed, but was more common in the *N. rustica* seeds. Specimen E also showed some evidence of either bifurcated ridging or the long, narrow line running along top the reticulations but this feature was difficult to visualize using the digital microscope. Overall, specimens D and E appear to resemble modern *N. rustica* seeds more closely than *N. quadrivalvis* seeds. The narrow ridging, straightening of reticulations towards the hilum, and the protruding hilum in specimen E all suggest a *N. rustica* determination.

Scanning electron microscopy has been the standard for imaging at high magnification for paleoethnobotanists for decades. However, this study demonstrates that newer microscope technology produces instruments that can yield useful results to paleoethnobotanists without the need to mount the seed to a metal stump. This can inhibit future analysis of tobacco seeds in particular by making it impossible to turn and move the seed under a microscope, because tobacco seeds are often too fragile to remove from the adhesive stump without damaging them. Although the digital microscope used in this study was less effective than the SEM at producing images where bifurcated ridging, a second narrow line running along the top of the ridges, or tubercles are visible, it can produce images at a high enough magnification to measure on the micron scale and identify certain morphological features of tobacco seeds.

Discussion

The results of this analysis suggest that there are morphological and morphometric attributes that may aid in distinguishing *N. rustica* from *N. quadrivalvis* seeds in the archaeological record, but there is some overlap between the general characteristics of both species. Given the small sample size of archaeological tobacco seeds from Morton Village (n=5), it is difficult to say with certainty if two species are represented, or only *N. rustica* is present and the variation documented between specimen C and the other archaeological seeds falls within the natural range of variation for *N. rustica*. Although most of the archaeological tobacco seeds imaged for this study were either fragmented or coated in soil that obscured important morphological markers, morphometric analysis of the ridge width provided a useful criterion for distinguishing between *N. rustica* and *N. quadrivalvis*. With the exception of one seed (*N. rustica* specimen 20), all modern *N. rustica* seeds had a ridge width measurement of less than 21 microns, and specimen 20 was an outlier among *N. rustica* seeds in several ways, including bifurcated ridging and no visible straightening of the reticulation pattern towards the hilum. The average ridge width on modern *N. rustica* specimens is 17.23 microns, and 25.27 microns for *N. quadrivalvis* seeds. The difference in ridge width in the archaeological seeds analyzed appears to be equally pronounced, although the ridge width measurements tended to be smaller in the archaeological sample, which may be the result of distortion from the carbonization process. Several *N. rustica* and *N. quadrivalvis* seeds showed evidence of characteristics common to both species in the same seed, indicating that overlap between in morphological criteria is possible but uncommon. The tobacco seed from Feature 214 (specimen C), imaged using the SEM, is not identified to species but would be an unusual form of *N. rustica* based on the width of the ridging, which appears to more closely match the values of *N. quadrivalvis* ridge width. Because specimen C appears to be the only outlier among the archaeological tobacco seeds, this study notes that four of the five tobacco seeds from Morton Village conform to modern *N. rustica* accessions from New York and Chihuahua, whereas one, Specimen C, more closely resembles *N. quadrivalvis* seeds grown in an heirloom garden in Nebraska. However, without being able to observe the area around the hilum on several of the archaeological tobacco seeds from Morton Village, a definitive, species-level identification is not possible with this sample size. Without being able to visualize the region surrounding the hilum on specimen C, the possibility remains that the tobacco seed analyzed from Feature 214 could be an unusual form of *N. rustica,* but based on the results of this analysis, it is also possible that Specimen C could be *N. quadrivalvis*. This is an important point because it addresses the possibility that Morton villagers, and other groups in the Pre-Contact Midcontinent, grew, used, and maintained knowledge of different species of tobacco for different purposes in daily and ceremonial life.

In Feature 213, tobacco was found in association with a variety of plant remains and domestic refuse, including thick hickory (*Carya* sp.), hazelnut (*Corylus americana*), Juglandaceae nutshell, acorn shell and nutmeat (*Quercus* sp.), maize (*Zea mays*), common bean (*Phaseolus vulgaris*), persimmon (*Diospyros virginiana*), *Chenopodium berlandieri*, sunflower achene fragments (*Helianthus annuus*), purslane (*Portulaca oleracea*), sumac (*Rhus* sp.), nightshade (*Solanum* cf. *ptychanthum*), *Solanum* sp., grape (*Vitis* sp.), grass seeds, amaranth (*Amaranthus* sp.), and numerous unknown or unidentifiable seeds and seed fragments. Feature 214 contained a similar, though less diverse assemblage, including thick hickory, Juglandaceae nutshell, squash rind (*Cucurbita pepo* spp. *ovifera*), maize, American water lotus (*Nelumbo lutea*), *Chenopodium berlandieri*, sunflower achene fragments, nightshade, purslane, amaranth, sumac, grass seeds, and verbena (*Verbena* sp.). Features 213 and 214 contained the most taxonomically diverse botanical assemblages of any analyzed external pit feature at Morton Village, providing evidence for plant use and consumption in the form of domestic refuse or storage remnants. However, the presence of Eastern black nightshade (*Solanum* cf. *ptychanthum*) is noteworthy. Several researchers have suggested that Eastern black nightshade, which is regularly recovered alongside tobacco in paleoethnobotanical samples, may represent a second important smoke plant, possibly blended with tobacco, and based on its biochemical properties and the archaeological contexts in which it is found has been referred to, along with tobacco, as a "magic plant" in Mississippian belief systems (Parker and Simon 2018; Wagner 2000). Although tobacco has not been reported in published literature at any other sites in the CIRV (Bardolph and VanDerwarker 2015; Biwer and VanDerwarker 2015; Kuehn and Blewitt 2013; VanDerwarker et al. 2013), several sites in this region contain *Solanum* sp. seeds identified as nightshade, including the Lamb site (Bardolph and VanDerwarker 2015; VanDerwarker et al. 2013), C.W. Cooper (VanDerwarker et al. 2013), and Tree Row (Kuehn and Blewitt 2013), although these seeds are not identified to species as Eastern black nightshade (*Solanum* cf. *ptychanthum*).

The presence of tobacco at Morton Village is the first evidence of Oneota villagers in the CIRV cultivating this plant. As previously discussed, *N. quadrivalvis* and *N. rustica* have different biochemical profiles and produce nicotine in different levels. The high nicotine content of *N. rustica* and relatively low nicotine content of *N. quadrivalvis* may play a role in how and when these two species of tobacco were used. Despite this variation in nicotine content, both species of tobacco discussed in this study were, and in many places, continue to be revered as sacred or "magic" plants. Certain species of tobacco are sometimes considered more sacred than others, such as *N. quadrivalvis* var. *multivalvis,* which was considered so powerful among the Crow that they did not smoke it, but instead used it only in dance ceremonies (Winter 2000d).

Tobacco seeds at Morton Village were recovered only from Oneota-associated domestic contexts, so it is unknown whether tobacco was used as part of ceremonial or ritual life at the site, but the presence tobacco of is an important indicator that Morton villagers maintained knowledge of how to grow and use at least one species of tobacco. Additionally, two pipes were reported from excavations at Morton Village, including a small, sandstone elbow pipe from the Feature 224 feasting deposit and an effigy pipe of what appears to be a bison. Although pipes are considered indirect evidence of tobacco use, their presence along with tobacco seeds is highly suggestive of an established smoking culture by Oneota villagers and perhaps their Mississippian neighbors. Although tobacco seeds have not been recovered from any other sites in the CIRV, paleoethnobotanical analysis of a large feasting deposit in Sub-Mound 51 at Cahokia in the American Bottom revealed a massive quantity of tobacco seeds (n=917), many of which appear to resemble *N. quadrivalvis* more than *N. rustica.* The presence of tobacco seeds that appear to resemble *N. quadrivalvis* more than *N. rustica* has important implications for understanding tobacco use in the Midcontinent. Fritz (2011) has suggested that *N. quadrivalvis* may have been the first tobacco grown in ENA, and past people would likely have had knowledge of both *N. rustica* and *N. quadrivalvis*, suggesting that people may have made conscious choices to find, cultivate, and use a particular species. Further research examining the morphology of archaeological tobacco seeds is needed to refine the current understanding of species distribution and use patterns of *N. rustica* and *N. quadrivalvis* in Pre-Contact ENA.

Processes of negotiating identity and community space among Mississippian and Oneota residents of Morton Village are present in the archaeological data from the site, including houses that show evidence of both wall trench and single post construction styles, the adoption of Mississippian ceramic bowl and plate forms by Oneota villagers, and the presence of public or ritual-use structures at the site (Bengtson and O'Gorman 2016; Painter and O'Gorman 2019). The arrival of Oneota groups in the CIRV c. A.D. 1300 did not lead to a simple transplantation of Oneota lifeways into a new region, but involved complex negotiations of identity and social roles among the Morton Village community (Painter and O'Gorman 2019). Given this climate of active social negotiation, the presence of tobacco at Morton Village is further suggestive of a suite of mediation strategies used by residents, including feasting (discussed in Chapter 2) and shared responsibilities for food production and processing (discussed in Chapter 1).

The mediatory power of tobacco is well documented in the ethnohistoric record, particularly in analyses of Calumet ceremonialism. As previously discussed, this complex phenomenon involved a variety of performances by host and guest groups, including dancing, music, gift exchange, and smoking of the Calumet pipe, all intended to establish fictive kin ties between groups in order to facilitate trade and interaction (Blakeslee 1981; Sabo 1992). Calumet ceremonies were first observed by Europeans among 17th century Plains groups, but the recovery of pipes similar to those used in Historic Calumet ceremonies from a 13th century site in Nebraska suggests that this practice may have deeper historical roots (Blakeslee 1981; Brown 1989). Evidence of Calumet ceremonialism is not present at Morton Village, but is discussed here to highlight the importance of tobacco in mediating social contact and conflict. While tobacco is considered sacred and used in a variety of important ceremonies and rituals involving shamans and medicine men throughout the Americas, the use of tobacco in hospitality, situations of culture contact, and maintaining group identity is also long-standing among Indigenous groups in ENA (Winter 2000a). Among the Cheyenne, sacred tobacco is smoked as part of the

Renewal of Sacred Arrows ceremony, which "symbolizes and ensures the collective existence of tribe" (Winter 2000a:22). Recovering archaeological evidence of how tobacco was used in the past is difficult, as the complex and variable ways in which this plant was used do not always leave a material trace other than pipes and carbonized tobacco seeds. However, many of the themes present in ethnohistoric accounts of tobacco use likely extend into the Pre-Contact past.

Based on a review of ethnohistoric and archaeological literature, tobacco at Morton Village may have been used for a variety of purposes, which could range from daily use and relaxation to ritual or ceremonial use to ensure good weather and harvests, providing support in warfare and hunting, for medicinal use, and/or to facilitate community or social integration. While there are many potential uses for tobacco use in the past, social mediation strategies would have been important to Oneota and Mississippian villagers as they negotiated social roles and values within a new, multicultural community configuration. Smoking may have been part of daily behavior, which was common among Indigenous groups at contact, as well as an important component of establishing both Oneota and Mississippian groups as part of the Morton Village community. The adoptive kinship aspect of Calumet ceremonialism is particularly relevant to this issue, as well as the function of tobacco as a display of hospitality. Tobacco was recovered only in Oneota-associated pit features, which may suggest a connection between tobacco use at Morton Village and the arrival of Oneota people there. Although the details of tobacco use at Morton Village are obscured by time, this paper demonstrates that Morton villagers had access to and knowledge of at least one species of tobacco, most likely *N. rustica*, and the mediatory, religious, medicinal, and ceremonial power these plants embodied in the past.

Conclusions and Directions for Future Research

Indigenous tobacco use in North America is a practice with deep historical roots, often an integral part of both daily and ceremonial life in both contemporary and past communities. Tobacco, often considered sentient and agentive, is one of the most sacred plants known to Indigenous people throughout the Americas, appearing in creation myths, rituals to ensure successful harvests, hunts, warfare, and trading, and as an important medicinal plant (Parker and Simon 2018; Winter 2000a, 2000d). The roles played by tobacco in historic accounts of its use among Native communities were critically important to the religious, ritual, and daily functioning of these groups, and it is generally agreed that the ethnohistorical record reflects ancient practices and beliefs surrounding tobacco (Parker and Simon 2018). The importance of this plant to Indigenous communities cannot be overstated. Ethnohistorical accounts of tobacco use are numerous and describe important details of tobacco use that are often not available from the archaeological record, providing important comparative data for interpreting tobacco use in the past. Archaeological evidence, both direct and indirect, of tobacco use has established a framework, though incomplete, for the timing, distribution, and use of tobacco throughout North America (Adair 2000; Asch and Asch 1985; Dunavan and Jones 2011; Fritz 2011; Miksicek and Gasser 1989; Rafferty 2016; Wagner 2000). While archaeological evidence and ethnohistoric accounts of tobacco use provide a great deal of information regarding tobacco use in the past, important questions pertaining to species distribution, identification, and use patterns remain. *Nicotiana rustica* is commonly identified as the only tobacco species that can grow in ENA (e.g. Winter 2000a), but the distribution of other species, specifically *N. quadrivalvis,* has, with a few exceptions, not been examined in depth by archaeologists and paleoethnobotanists. Methods, such as the ones presented in this study, for identifying tobacco seeds to species in the archaeological record need to be expanded on to refine interpretations of how tobacco plants were grown, used, and understood by people in the Pre-Contact Midcontinent and ENA more broadly.

This paper presents the first evidence for the potential cultivation of *N. rustica* in the Pre-Contact CIRV, and leaves open the possibility that two species, *N. rustica* and *N. quadrivalvis*, were being grown at Morton Village. Results of high powered microscopy of archaeological tobacco seeds recovered from the Morton Village site and modern comparative specimens suggest that *N. rustica* and *N. quadrivalvis* exhibit morphological traits that are sufficiently different to allow species-level identifications of these seeds. Several criteria, identified by previous research (Bahadur and Farooqui 1986; Wagner and Fritz 2002), proved useful in making species-level determinations of tobacco seeds from Morton Village, including 1. straightening of cerebellate reticulations towards the hilum; 2. the presence of bifurcated ridging on the seed coat; 3. the width of ridging on the seed coat; and 4. the degree of hilum protrusion. While there is some overlap in these features between *N. rustica* and *N. quadrivalvis*, both species exhibit distinctive characteristics. This paper also demonstrates that while scanning electron microscopy has been the standard mode of imaging seeds for analysis among paleoethnobotanists, new digital microscope technology provides high power magnification without having to alter the seed, thus better preserving archaeobotanical assemblages for future analysis. Research examining different tobacco species is in its early stages, and future work refining methods for species-level identification should include further morphometric analysis and carbonization experiments to document changes in seed shape and seed coat texturing during charring, as well as analysis of additional modern and archaeological populations of tobacco.

The identification of archaeological tobacco seeds to species has significant ramifications for how archaeologists create narratives of tobacco use in the past. Different tobacco species often have different uses, as seen in the Crow Tobacco Society case (Winter 2000d), and traditions surrounding tobacco use likely come from well-established suites of beliefs extending deep into the archaeological past. Although the domestic refuse context from which all five tobacco seeds were recovered does not provide any significant evidence for how these tobaccos were used, ethnohistoric accounts of the mediatory power of tobacco and its uses for purposes of social cohesion are particularly relevant to the multicultural setting of Morton Village. If two species are indeed present at Morton Village, which further research may clarify, it is also possible that one species of tobacco was used for daily smoking or relaxation, while another was involved in ritual or ceremonial life at Morton Village. Active social negotiations at Morton Village between Mississippian and Oneota villagers are apparent in the presence of public use or ritual structures, a large feasting deposit containing both Oneota and Mississippian material culture, changes in ceramic manufacture, and shifting foodways (Painter and O'Gorman 2019). Tobacco is a powerful plant that likely figured prominently in these social negotiations, specifically as a means of solidifying community identity or to ease inter-group conflict and tension, between Oneota and Mississippian villagers.

Few studies in Eastern North America have examined archaeological tobacco seeds with the purpose of identifying them to species, though paleoethnobotanists do cite seed shape and straightening of the reticulation patterns on the seed coats as evidence of a seed matching the form of *N. rustica.* Future work in this important area of study may clarify issues of morphological overlap between *N. rustica* and *N. quadrivalvis.* Cuthrell et al. (2016) demonstrated high levels of success in species-level classification of tobacco seeds, both modern and archaeological, using morphometric analysis of modern seeds from the *Nicotiana* genus and classing specimens using a Linear Discriminant Analysis. Cuthrell et al. (2016) had trouble in differentiating between *N. quadrivalvis* and *N. attenuata* in their California study, but *N. attenuata* has never been recorded historically in the Midcontinent and it is not likely that *N. attenuata* was used by groups in the Plains or east of the Mississippi. Removing *N. attenuata* from consideration for species classification may improve the likelihood of distinguishing *N. quadrivalvis* from other species in the *Nicotiana* genus, specifically *N. rustica*, through rigorous collection of morphometric data including basic measurements such as length and width, as well as aspect ratio, convexity, shape factor, elongation, and feret diameter and central distance measurements (Cuthrell et al. 2016). In addition to expanded morphometric studies, further research into the utility of texture analysis in distinguishing between *N. rustica* and *N. quadrivalvis* may yield important results. Texture analysis is often used in attempts to classify homogenous regions in an image, where image texture is defined as “a function of the spatial variation in pixel intensities (gray values)” (Tuceryan and Jain 1998:3). Analysis of tobacco seed coat image texture to determine the utility of this method in distinguishing between seed coats of different species would be a novel contribution to the field. Finally, further research into the study of nicotine residues may illuminate differences in the nicotine peaks of *N. quadrivalvis* and *N. rustica* identified by Gas Chromatography/Mass Spectrometry (GC/MS). *Nicotiana rustica* and *N. quadrivalvis* produce very different levels of nicotine, which future research may be able to identify through the use of GC/MS methods. Future studies of tobacco will be aided in the use of multiple comparative populations for analysis and identification, and expanded carbonization experiments.

Figures and Tables:

Figure 3.1

Tobacco Phylogeny, after Winter (2000b:88)

Family: Solanaceae

|

Subfamily: Cestroidae

|

Tribe: Nicotianeae

|

Genus Nicotiana

Subgenus Petunioides	Subgenus Tabacum	Subgenus Rustica
Sections:	Section	Section
Bigeloviannae, *N. clevelandii*, *N. quadrivalvis*, vars. *bigelovii, wallacei, quadrivalvis, multivalvis*	Genuinae, *N. tabacum*	Rustica, *N. rustica*
Acuminatae, *N. attenuata*		Paniculatae, *N. glauca*
Trigonophyllae, *N. trigonophylla*		

Figure 3.2 Scanning electron micrograph of bifurcated ridging (modern *N. quadrivalvis*)

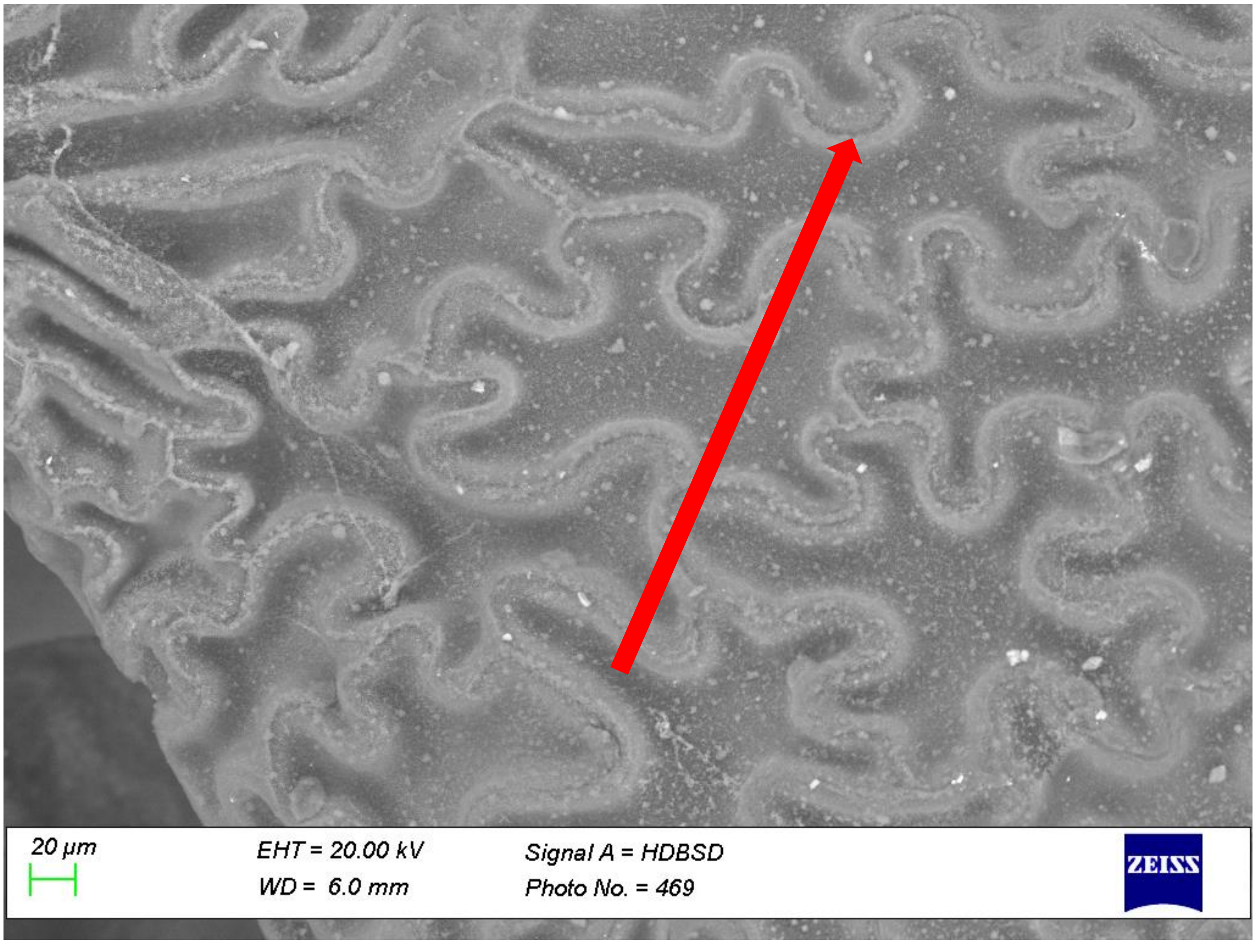


Figure 3.3 Scanning electron micrograph showing straightening of reticulations towards hilum (modern *N. rustica*)

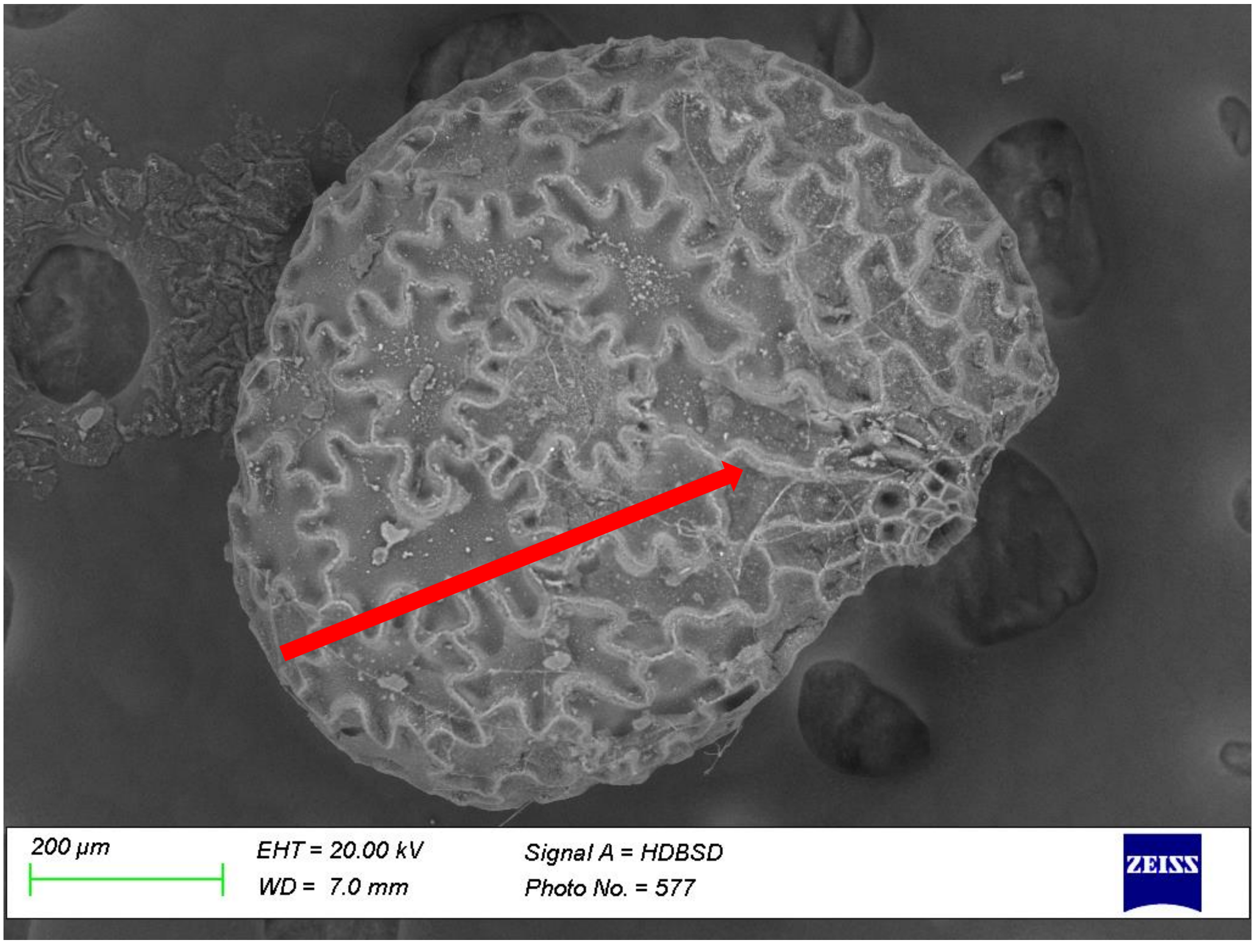


Figure 3.4 Scanning electron micrograph showing tubercles on inter-ridge surface (modern *N. quadrivalvis*)

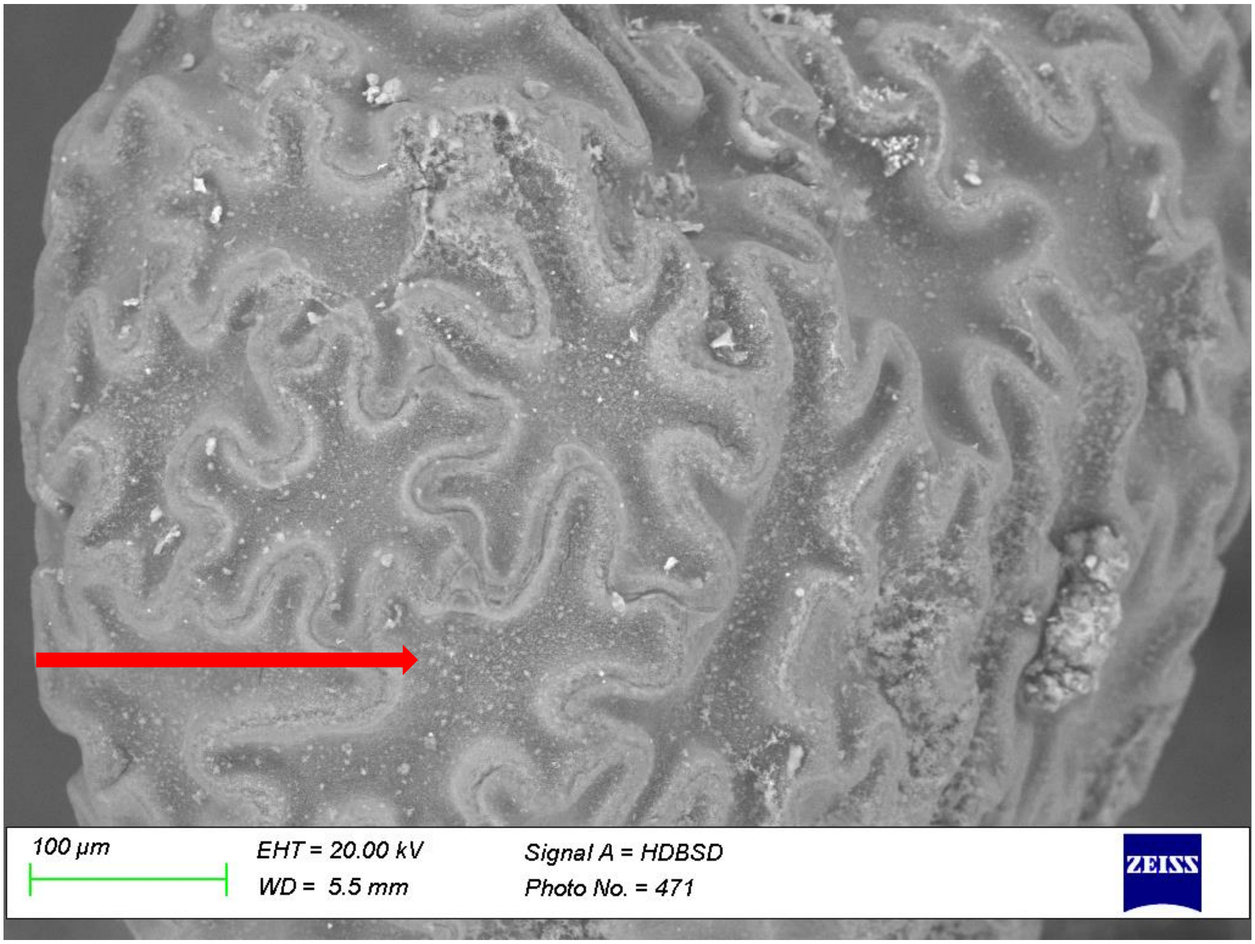


Figure 3.5 Scanning electron micrograph showing wide, rounded ridge surface (modern *N. quadrivalvis*)

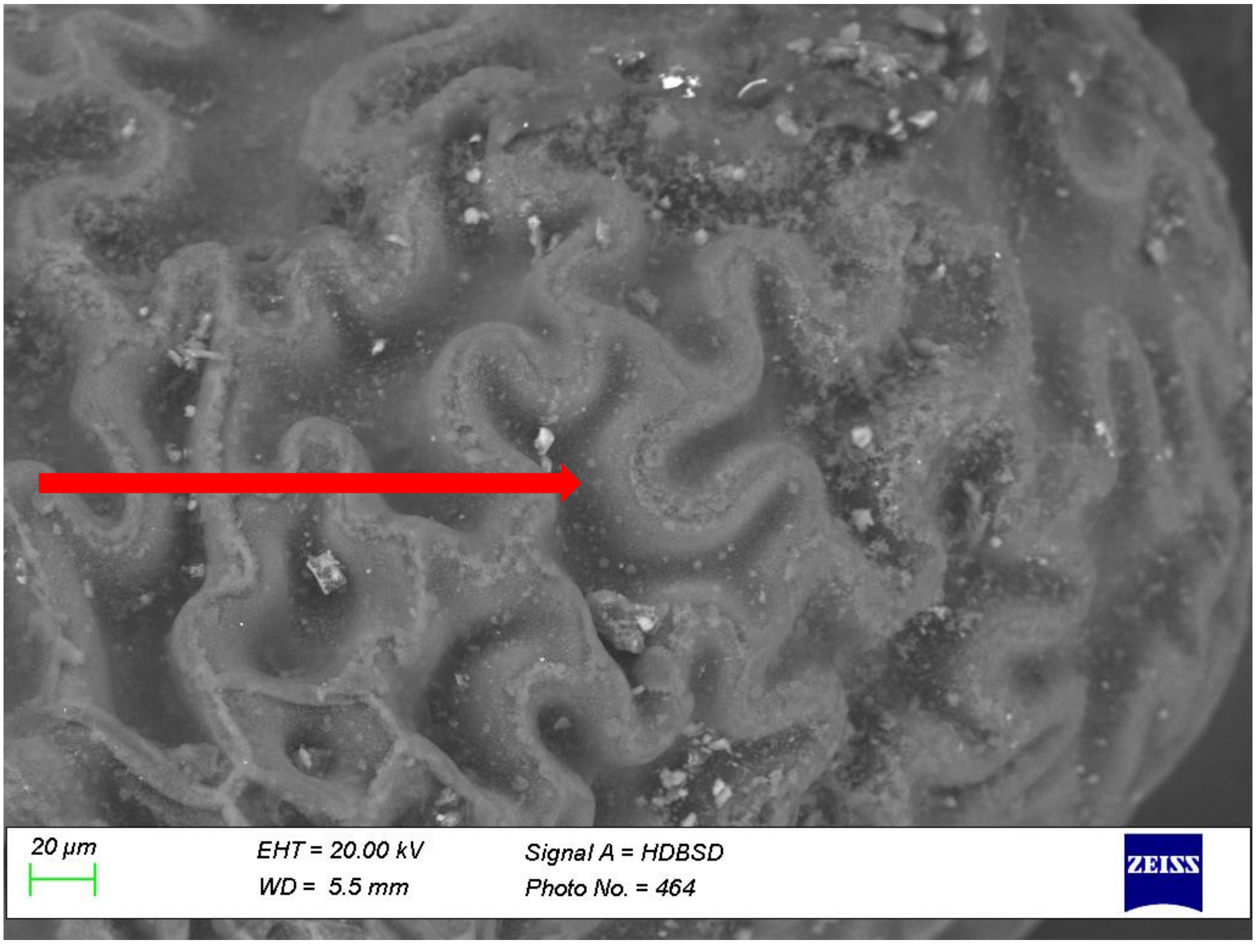


Figure 3.6 Scanning electron micrograph showing narrow reticulations (modern *N. rustica*)

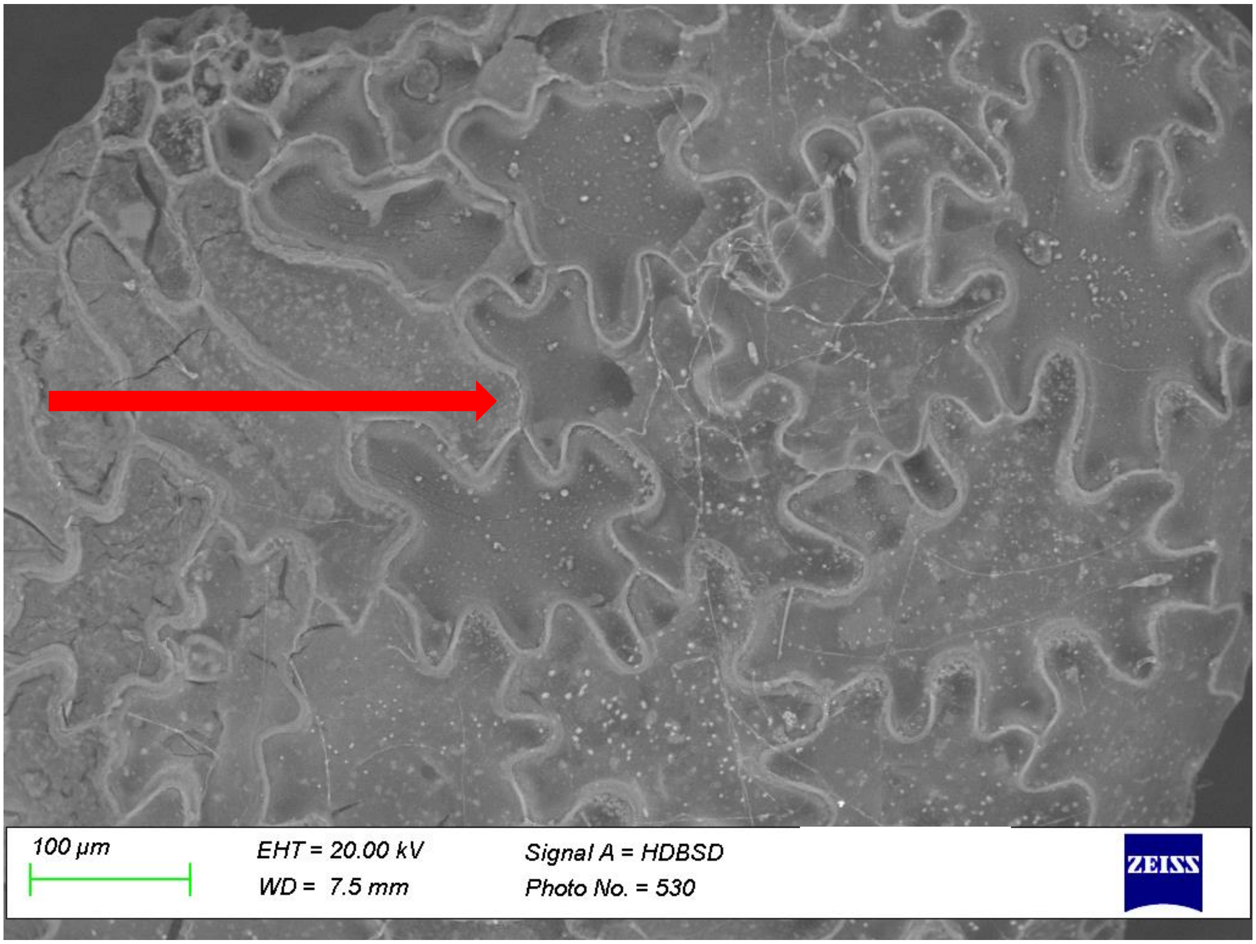


Figure 3.7 Scanning electron micrograph showing closely spaced reticulations (modern *N. quadrivalvis*)

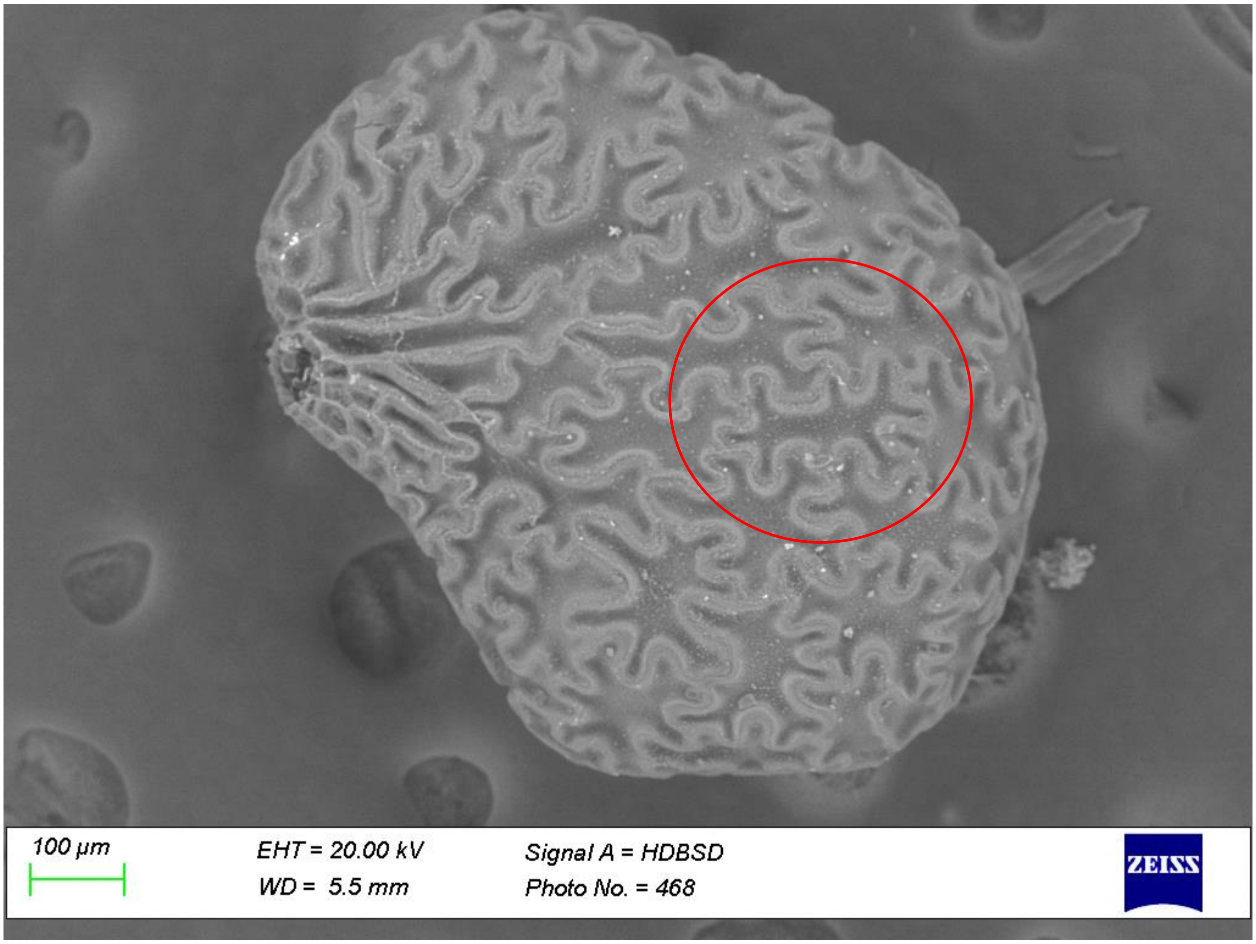


Figure 3.8 Scanning electron micrograph showing more widely spaced reticulations (modern *N. rustica*)

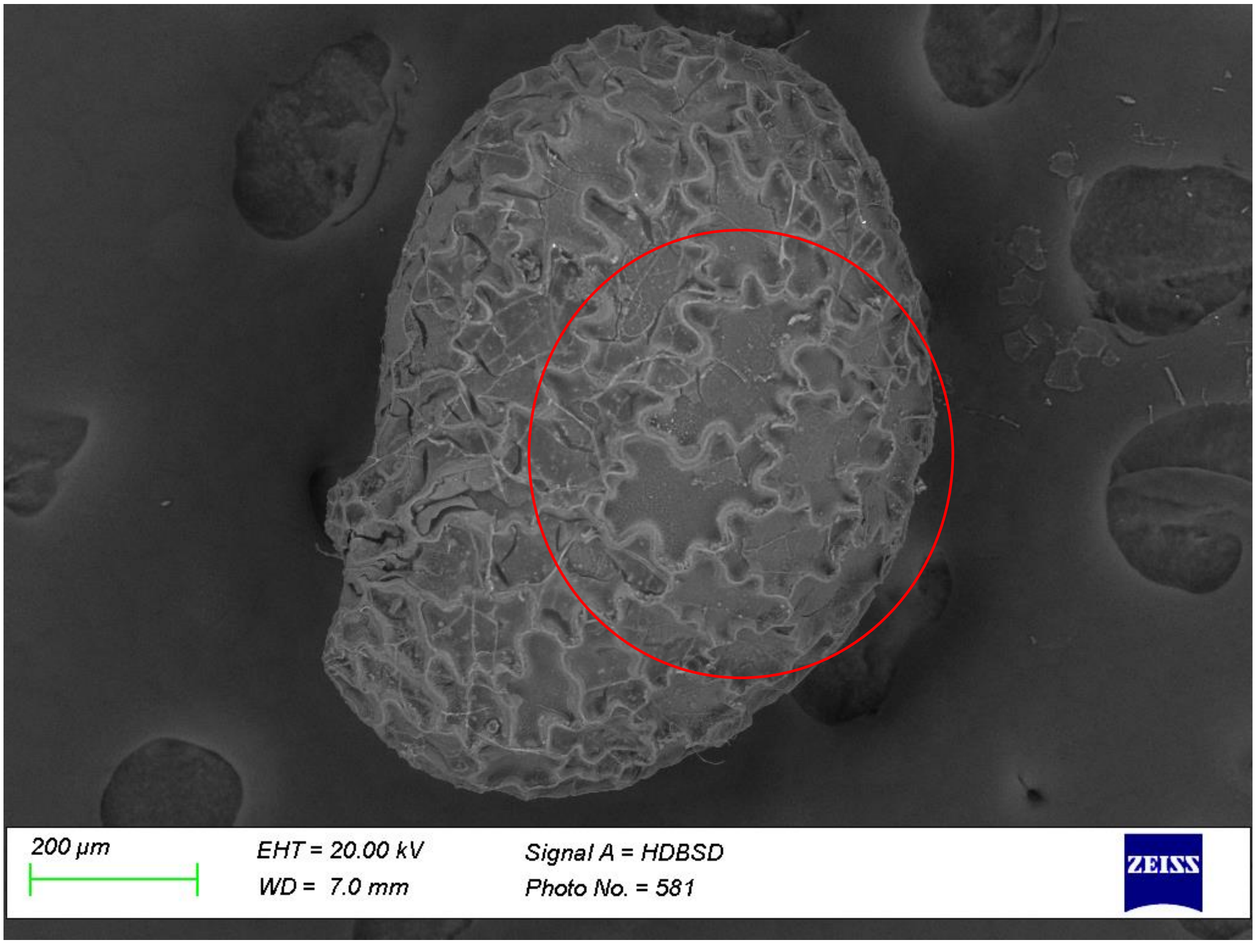


Figure 3.9 Scanning electron micrograph showing a protruding hilum (modern *N. rustica*)

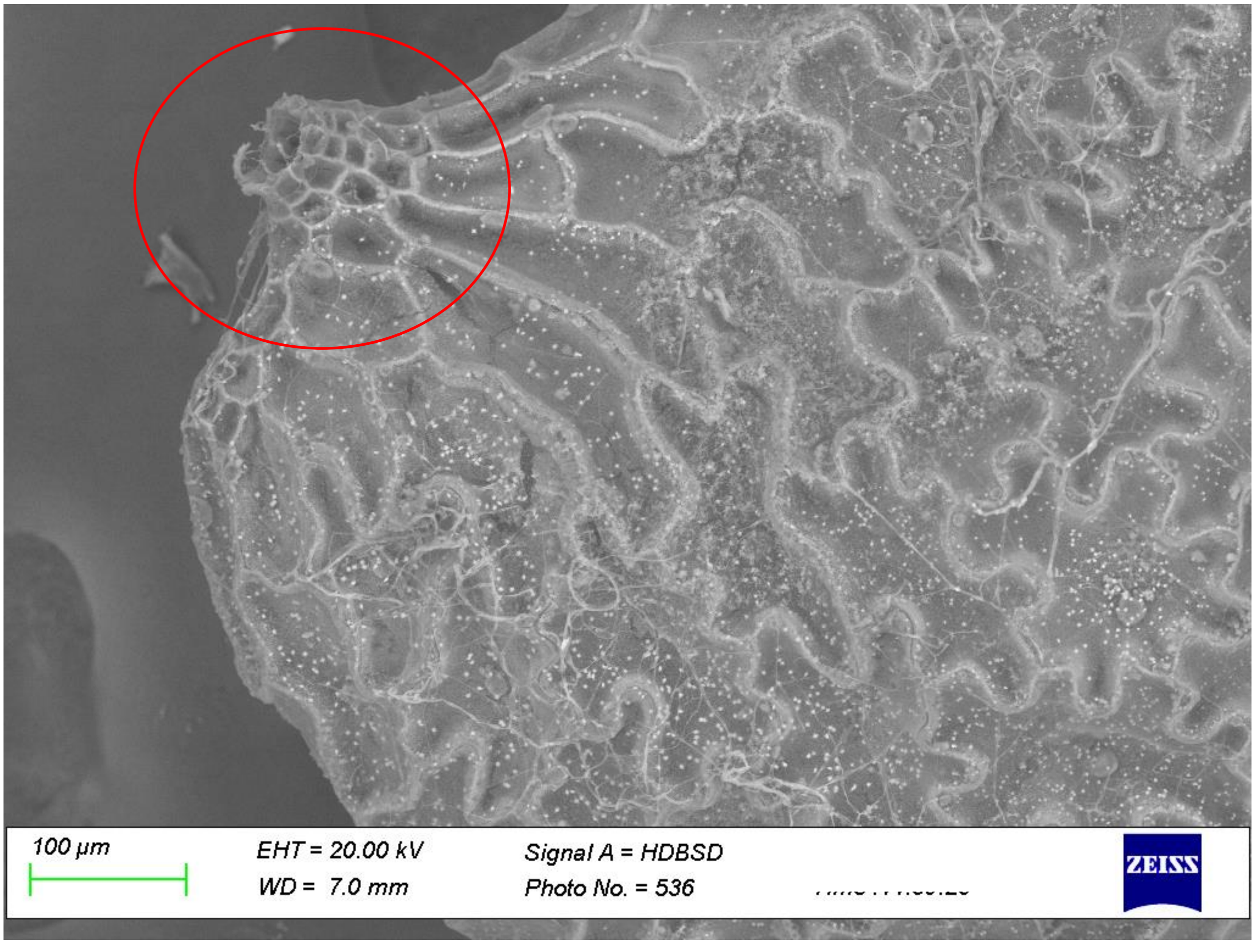


Figure 3.10 Scanning electron micrographs of tobacco specimen A, Feature 213 Level 2

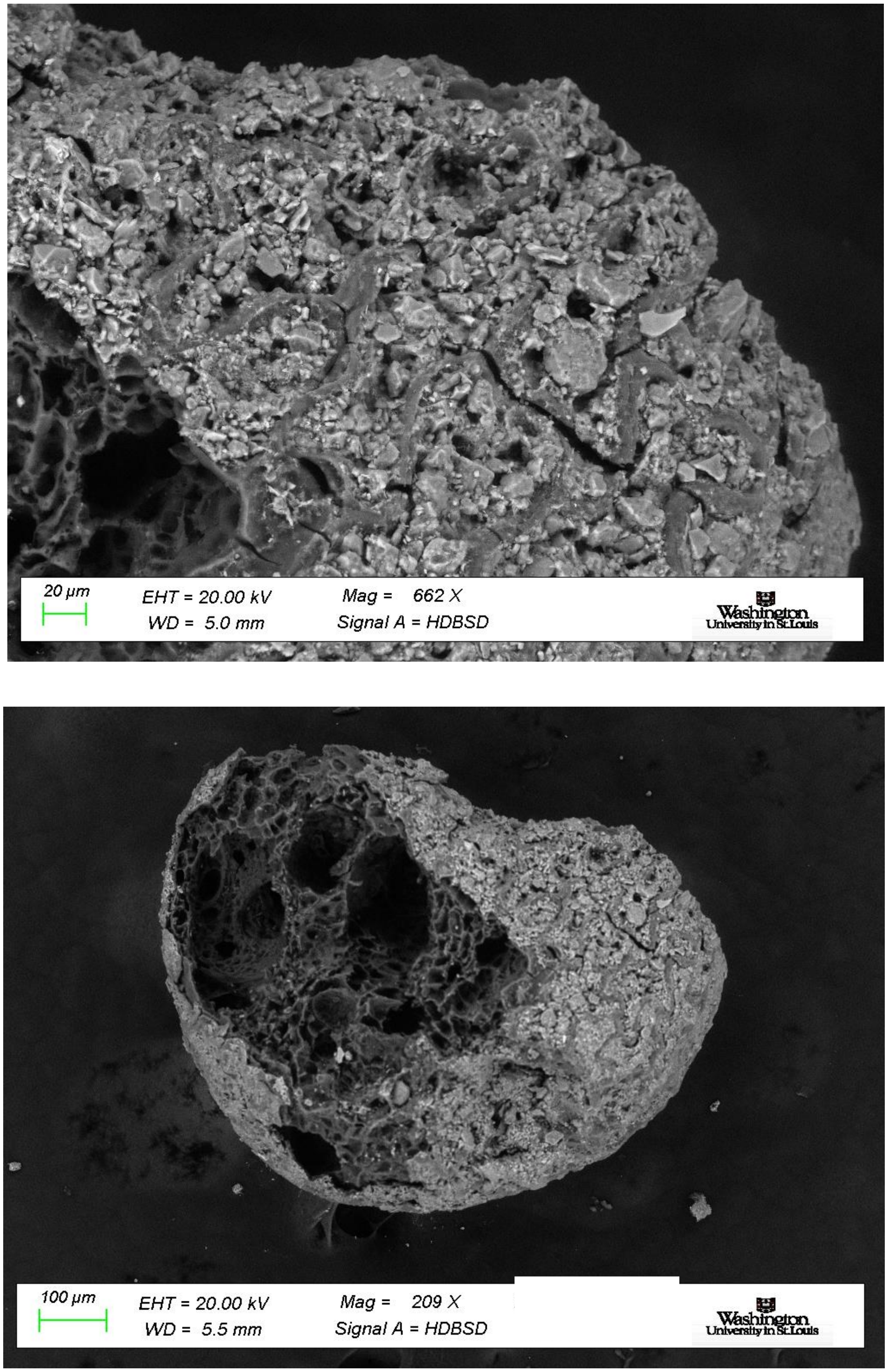
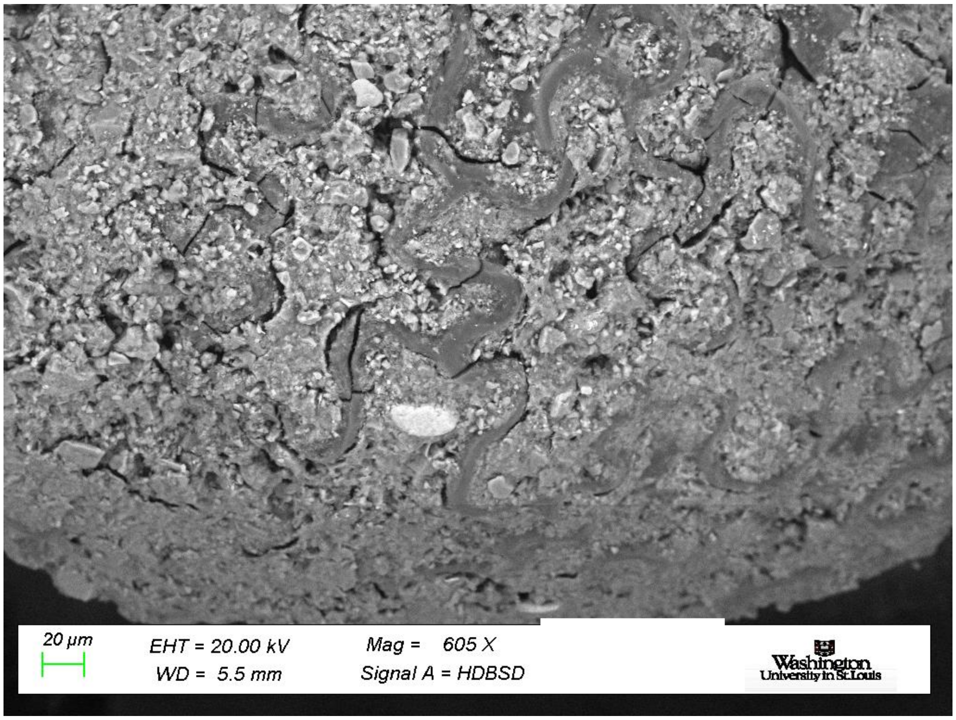


Figure 3.11 Scanning electron micrographs of archaeological tobacco specimen B, Feature 213 Level 4



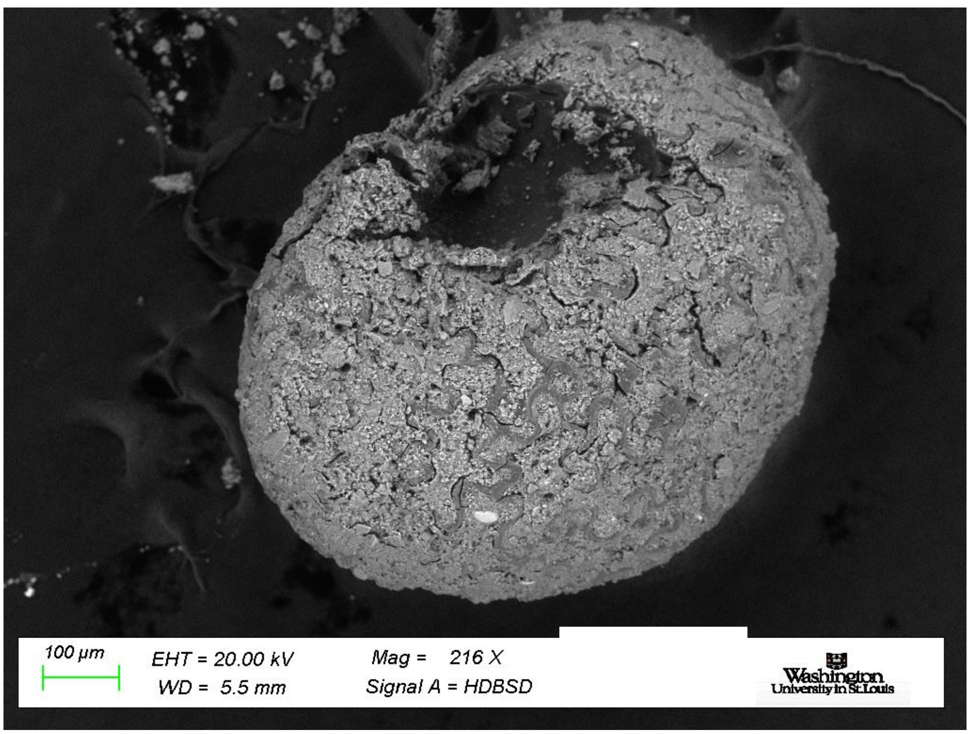
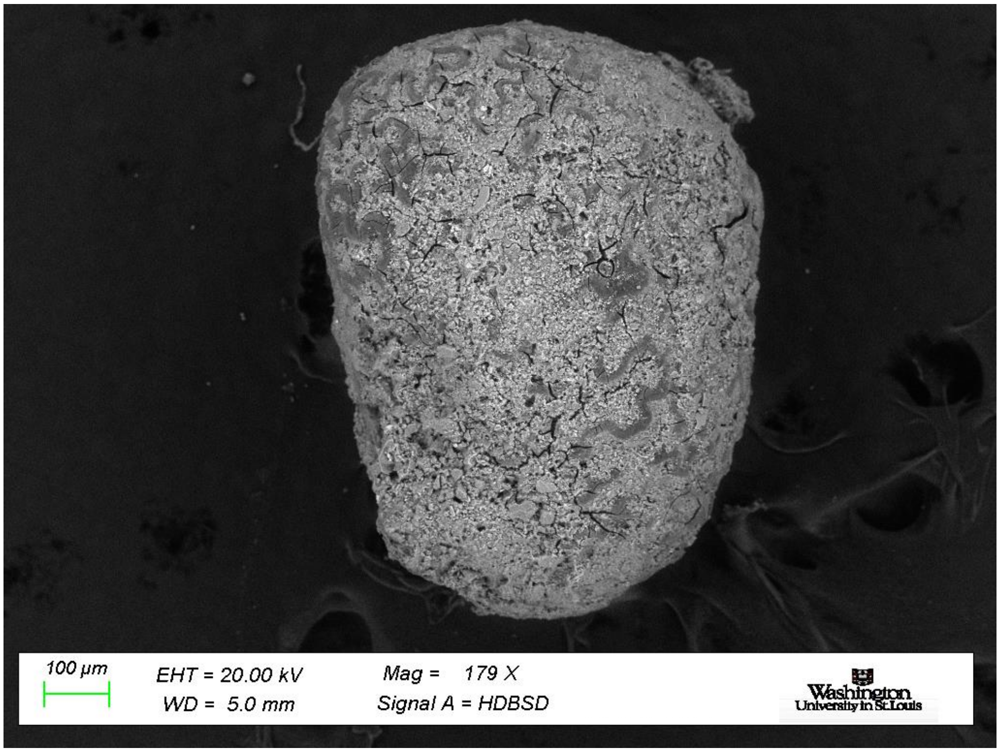


Figure 3.12 Scanning electron micrographs of tobacco specimen C, Feature 214 Level 1



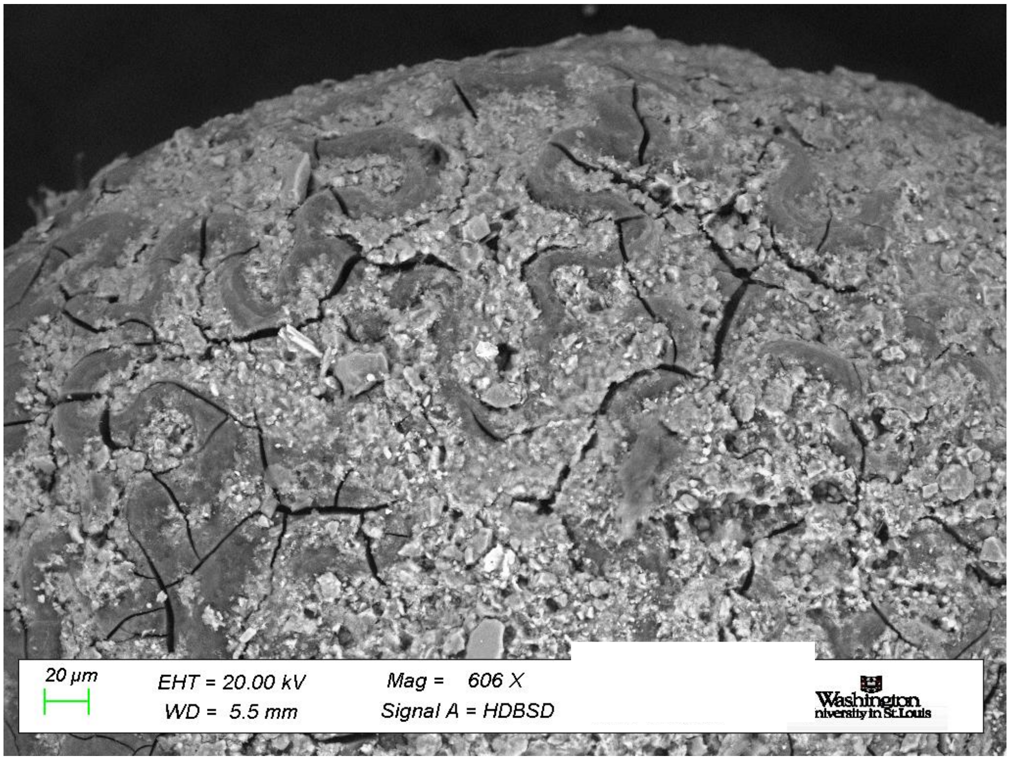


Figure 3.13 Leica DVM6 digital images of tobacco specimen D, Feature 213 Level 1

Figure 3.14 Leica DVM6 digital images of tobacco specimen E, Feature 213 Level 3

Table 3.1 Distinguishing characteristics of *N. rustica* and *N. quadrivalvis*, after Wagner and Fritz (2002)

N. rustica	*N. quadrivalvis* vars.
• Angular seed shape, rarely reniform • Reticulations elongate towards hilum • Ridges narrow, more unridged surface area • No bifurcated ridges • “No tubercles on inter-ridge cell surface” (Wagner and Fritz 2002)	• Seed shape reniform or oval • Ridges do not straighten toward hilum • “Closely spaced reticulations; little surface area between ridges” • Wide, rounded ridge, sometimes bifurcated at top • “may have tubercles on inter-ridge cell surfaces”

Table 3.2 Results of SEM image analysis of modern tobacco seeds

Specimen Number and Species Designation:	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Length of hilum protrusion (microns)	Reticulation ridges narrow (<20 microns) or wide (>20 microns)	Reticulations pattern spacing	Number of ridge intersections
Nicotiana quadrivalvis 01	x		x	none	wide	close	60
N. quadrivalvis 02	x		x	45	wide	wide	69
N. quadrivalvis 03	x		x	48.5	wide	close	54
N. quadrivalvis 04	x		x	60.13	wide	close	58
N. quadrivalvis 05	x		x	none	wide	close	73
N. quadrivalvis 06	x		x	none	wide	close	60
N. quadrivalvis 07	x	x	x	28.05	wide	close	63

Specimen Number and Species Designation:	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Length of hilum protrusion (microns)	Reticulation ridges narrow (<20 microns) or wide (>20 microns)	Reticulations pattern spacing	Number of ridge intersections
N. quadrivalvis 08	x		x	none	wide	close	65
N. quadrivalvis 09	x		x	none	wide	wide	46
*N. quadrivalvis*10	x		x	none	wide	close	60
N. quadrivalvis 11	x		x	none	wide	close	56
N. quadrivalvis 12	x		x	none	wide	close	62
N. quadrivalvis 13	x		x	28.37	wide	close	58
N. quadrivalvis 14	x	x	x	27.8	wide	close	67
N. quadrivalvis 15	x		x	none	wide	close	67
N. quadrivalvis 16	x		x	none	wide	close	70

Specimen Number and Species Designation:	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Length of hilum protrusion (microns)	Reticulation ridges narrow (<20 microns) or wide (>20 microns)	Reticulations pattern spacing	Number of ridge intersections
N. quadrivalvis 17	x		x	27.34	wide	close	75
N. quadrivalvis 18	x		x	48.54	wide	close	66
N. quadrivalvis 19	x		x	none	wide	close	63
N. quadrivalvis 20	x		x	43.6	wide	close	67
Nicotiana rustica 01			x	41.8	narrow	close	45
N. rustica 02				40.25	narrow	close	62
N. rustica 03		x	x	44.58	narrow	wide	65
N. rustica 04		x		60.61	narrow	close	55
N. rustica 05		x		40.04	narrow	close	58
N. rustica 06		x		68.54	narrow	close	76
N. rustica 07		x		51.84	narrow	close	48
N. rustica 08		x		61.71	narrow	close	58
N. rustica 09		x		none	wide	close	56
N. rustica 10	x	x	x	none	wide	close	62
N. rustica 11	x	x		57.88	narrow	close	70

Specimen Number and Species Designation:	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Length of hilum protrusion (microns)	Reticulation ridges narrow (<20 microns) or wide (>20 microns)	Reticulations pattern spacing	Number of ridge intersections
N. rustica 12		x		83.37	narrow	close	70
N. rustica 13		x		30.3	narrow	close	57
N. rustica 14		x		none	narrow	close	56
N. rustica 15		x		35.39	narrow	close	53
N. rustica 16		x		44.51	narrow	close	66
N. rustica 17		x		39.41	narrow	close	62
N. rustica 18		x		85.73	narrow	close	54
N. rustica 19		x		60.08	narrow	wide	54
N. rustica 20	x			34.94	wide	wide	47

Table 3.3 Results of digital microscope image analysis on Onondaga *N. rustica* and *Nicotiana* sp. from Cahokia Sub Mound 51

Specimen Number and Species Designation	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Ridge width (microns)
Onondaga *N. rustica* 01		x	not visible	17.93
Onondaga *N. rustica* 02		x	not visible	16.35
Onondaga *N. rustica* 03		x	not visible	19.68
Onondaga *N. rustica* 04		x	not visible	15.89
Onondaga *N. rustica* 05		x	not visible	18.78
Sub Mound 51 *Nicotiana* sp. 01	x		not visible	21.22
Sub Mound 51 *Nicotiana* sp. 02	x		not visible	26.07
Sub Mound 51 *Nicotiana* sp. 03	x		not visible	23.84
Sub Mound 51 *Nicotiana* sp. 04	x		not visible	25.96
Sub Mound 51 *Nicotiana* sp. 05	x		not visible	23.41

Table 3.4 Results of SEM and digital microscope image analysis of archaeological tobacco seeds from Morton Village

Specimen Number and Species Designation:	Bifurcated ridging on seed coat	Straightening of reticulations toward hilum	Tubercles	Length of hilum protrusion (microns)	Ridge width (microns)
Specimen A		x	not visible	none	17.65
Specimen B	possible	not visible	not visible	none	17.78
Specimen C	x	not visible	not visible	none	23.16
Specimen D		not visible	not visible	none	14.93
Specimen E		not visible	not visible	48.55	13.03

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Conclusions

This dissertation contributes new paleoethnobotanical data pertinent to understanding Bold Counselor Oneota and Mississippian interaction in the Late Pre-Contact Midcontinent. Botanical data is an important source of information in defining and understanding daily practice of Morton villagers, as well as ritual and ceremonial behavior. The major contribution of this dissertation is a thorough botanical dataset for comparison to other Developmental Oneota sites throughout the Midcontinent, and local-level analysis of Oneota and Mississippian interaction in the Central Illinois River Valley (CIRV). There is a great deal of extant research on the Oneota material culture manifestation that focuses on shared ceramic technologies, house construction styles, and village layout, which provide data necessary to classifying and organizing the archaeological record. However, less research has focused on variability of the Oneota manifestation at the local level. The Morton Village site represents a unique opportunity to analyze the ways in which Bold Counselor Oneota migrants negotiated their social environments in scenarios of migration, culture contact, and community coalescence. A major theme of this project is identity at various levels, including discussions of communal identity at Morton Village, and the nature of group identity as Oneota and Mississippian. The archaeological and paleoethnobotanical data presented here indicate that, while Oneota and Mississippian villagers maintained some aspects of a separate group or ethnic identity, as reflected in ceramic technology and house construction styles, the level of cooperation and social participation visible in domestic and ceremonial spaces by both groups is interpreted as evidence of an actively coalescing new community form. Paleoethnobotanical studies provide important data for interpreting past landscapes and environments, but also speak to social categories and constructs such as gender, age, religion, and status. Paleoethnobotanical studies contribute much to archaeological understandings of the social lives of past people by making these social categories and constructs visible through patterns of plant use.

The chapters presented above demonstrate the utility of paleoethnobotanical analysis in investigating questions pertaining to group and community identity, migration and coalescence, and the use of public spaces for ritual or ceremonial consumption events. Analysis of flotation samples from external pit features at Morton Village, discussed in Chapter 1, revealed several important differences and similarities in the botanical assemblages of pits associated with Oneota, Mississippian, and mixed use. Eastern Agricultural Complex (EAC) crops appeared in the highest quantity in mixed material external pits, and *Chenopodium berlandieri* was common in Oneota and mixed material pits, but conspicuously absent from Mississippian ones. Oneota pits contained more thick hickory (*Carya* sp.) than Mississippian ones, which contained higher quantities of acorn (*Quercus* sp.). However, Oneota pits were the only features that contained acorn nutmeat. Oneota pits also contained higher quantities of fruit seeds. Notable among the fruit seed assemblage of Oneota-associated external pits is the presence of Eastern black nightshade (*Solanum* cf. *ptychanthum*), which is found in association with tobacco seeds and considered a "magic plant" in Mississippian belief systems (Parker and Simon 2018). Eastern black nightshade was also recovered from Dixon, a Developmental Oneota site in western Iowa (Bush 2019), and nightshade has been recovered from several sites in the CIRV, although the determinations for nightshade in this region are *Solanum* sp., without any suggestion that they are *S. ptychanthum*. Domestic plant refuse is a representation of the daily responsibilities of

Morton villagers, allowing for interpretations of plant matter from daily or domestic use contexts in terms of daily practice and habit. These domestic contexts represent valuable information relating to the lived, daily experience of Oneota and Mississippian residents of this community. These data further help to define Morton Village as a community in the sense that Morton Village is not simply a bounded, archaeological entity containing the remains of two separate material cultures, but is a dynamic social space where villagers of both Mississippian and Oneota affiliation actively negotiated their social roles and beliefs. The differences in the botanical assemblages from Oneota, Mississippian, and mixed material external pits indicates that both groups likely maintained some aspects of food traditions that existed prior to the Oneota migration to Morton Village while they worked cooperatively to grow, gather, harvest, process, and consume plant foods.

In addition to botanical data from external pit features, this study presented data from Feature 224, a feasting context found inside what is likely a public-use or ceremonial structure. Feasting is a ritualized consumption event that occurs almost universally throughout the world, both geographically and temporally, serving as a process by which people can create or build social solidarity at household, community, or regional scales. Feasting also has important political ramifications, and is often interpreted as a means of reifying asymmetrical relations of power within and between groups. However, at Morton Village, feasting is interpreted in terms of its importance to establishing community solidarity, integrating Oneota and Mississippian villagers through this important practice. Feature 224 is composed of four zones, and Mississippian and Oneota ceramic material are separated in the stratigraphy of this feature. The temporal relationship between the main artifact zone (Zone 3, containing only Mississippian ceramics) and the zone containing Oneota ceramic material and evidence for an *in situ* burning episode is unclear, but whatever the timeline of these deposits, it is apparent that both Oneota and Mississippian villagers participated in this event. Feasting would have provided an important platform from which Morton villagers could cooperate to establish and negotiate new social roles, integrating both Oneota and Mississippian residents within a ritual space. The botanical data from Feature 224 is sparse for a feasting context, but it based on the macrobotanical assemblages of Zones 1 and 3, it is evident that both Oneota and Mississippian groups made important contributions to this event. Eastern black nightshade appears again in the Zone 1 deposit, which is associated with Oneota use based on the ceramic material in this layer. Eastern black nightshade appears to be a plant of significant importance to Oneota villagers, appearing in both domestic and ritual contexts. The biochemical attributes of Eastern black nightshade, which can be toxic if the berries are consumed before they are sufficiently ripened, may play a role in why this plant was used in special contexts such as feasting. Eastern black nightshade is also associated with tobacco seeds at Morton Village, and the Zone 1 deposit of Feature 224 contained a sandstone elbow pipe, which is also associated with smoking culture. Botanical analysis of Feature 224, despite the relatively low quantity of macrobotanical remains compared to the faunal assemblage, plays an important role in demonstrating the ritual and social significance of communal consumption events at Morton Village. The presence of public-use or ritual structures on the Morton Village landscape, combined with evidence of feasting, suggests that Morton villagers were actively using strategies to adapt to changing circumstances in this newly coalescing community.

Paleoethnobotanical analysis of external pit features at Morton Village yielded the first direct evidence of tobacco use in the CIRV in the form of tobacco seeds. Tobacco is a plant of significant power, revered as sacred by many Indigenous communities in present day.

Ethnohistoric accounts of tobacco use suggest that this reverence for tobacco has deep, historical roots among Indigenous groups. The presence of tobacco at Morton Village in external pit features, and the recovery of smoking paraphernalia in the form of a sandstone elbow pipe and a bison effigy pipe from Feature 224 and Structure 26, respectively, suggests that smoking was a well-established practice at the site. Tobacco was found only in Oneota-associated pit features, but this does not mean that tobacco was used only by Oneota villagers. The mediatory power of tobacco is well-documented in the ethnographic present and ethnohistoric records, where tobacco is used in gestures of good will and hospitality, and in the creation of fictive kin relationships to aid in situations of potential conflict. The social climate of Morton Village would have required significant social and ritual work by Mississippian and Oneota residents, and tobacco likely played an important role in this work. As noted in the previous discussion, a variety of tobacco species were used by Indigenous North Americans. Previous ethnohistoric and botanical research indicates that the species of tobacco is an important factor in how it is used, particularly with regard to nicotine content. A common narrative of past tobacco use is that people used tobacco to achieve an altered state of consciousness through the consumption of high quantities of nicotine, leading researchers to suggest that *Nicotiana rustica* would have been the preferred tobacco species. This study, in addition to recovering tobacco seeds from external pit features, also presents data intended to aid in making species-level determinations to expand on those narratives that suggest *N. rustica* was the favored tobacco in Eastern North America by discussing the possibility that *N. quadrivalvis* may also have been present in the Midcontinent. Several morphological markers were found to be useful in making species-level determinations of tobacco seeds, including ridge width, straightening of the reticulation pattern towards the hilum, bifurcated ridging, the presence of tubercles, and the degree of hilum protrusion. This study tentatively identifies the presence of *N. rustica* at Morton Village based on the results of comparative analysis with modern seeds, and documents some overlap in morphological markers of *N. rustica* and *N. quadrivalvis*. Although *N. quadrivalvis* is not unequivocally identified at Morton Village, this study leaves open the possibility that two tobacco species were being grown, likely for different uses, at the site. Future research involving carbonization experiments, expanded morphometric analyses of tobacco seeds, and further research in nicotine residue analysis will undoubtedly contribute a great deal to making species-level identifications of tobacco seeds in the archaeological record.

Theoretical perspectives on community and identity are important aspects of archaeological research seeking to understand and outline those aspects of the past that are defined through active social engagement by individual actors. Archaeological research at the Morton Village site demonstrates the importance of community-based studies seeking to understand negotiations of social, cultural, or ethnic identity. Communities are conceptualized in this research not as isomorphic with an archaeological site boundary, but as “an ever-emergent social institution that generates and is generated by supra-household interactions”, focusing on the importance of daily practice and ritual process as significant aspects of community building in the past (Marcus 2000; Yaeger and Canuto 2000:5). The local scale at which this research was conducted provides comparative paleoethnobotanical data for understanding important variability in the social lives of Oneota people, and the ways in which they adapted to new environments. Morton Village, and likely other Developmental Oneota settlements in the CIRV and elsewhere, was a community undergoing significant social change in the 14th century Midcontinent as traditions, beliefs, and identities shifted to accommodate new living situations. The combined paleoethnobotanical and archaeological data from Morton Village provide an image of this past community that acknowledges the complex and nuanced ways in which Oneota and Mississippian villagers interacted to create and maintain this community.

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