2020

Vol. 2 Ch. 2 Havana-Hopewellian Cultural Dynamics in West Michigan and Northwest Indiana

Jeff Chivis
Nottawaseppi Huron Band of the Potawatomi

Chapter 2

Havana-Hopewellian Cultural Dynamics in West Michigan and Northwest Indiana

Jeff Chivis

Previous Hopewell research within west Michigan and northwest Indiana has revolved around several pertinent (and often contested) issues: the central mechanism responsible for the introduction of Havana-Hopewell into the study region, the ambiguous cultural affiliations and importance of sites in the Kalamazoo and St. Joseph River Valleys in west Michigan, and the role of burial mounds in the potential integration of Hopewell-related peoples within the study region and beyond.

The goal of this chapter is to utilize the results of my dissertation (Chivis 2016) to address these key issues. Employing a bottom-up approach, small-scale intraregional residential communities within the Muskegon, Grand, Kalamazoo, St. Joseph, and Kankakee River Valleys (Figure 1) were identified as a first step, followed by the examination of their unique and sprawling interaction and mobility patterns. Subsequently, the mechanisms that were likely responsible for the introduction, spread, and maintenance of Havana-Hopewell were identified. Based upon the compositional (i.e., ceramic petrography) and stylistic analysis of Havana and Hopewell Ware sherds (from both domestic and mortuary contexts), as well as the incorporation of new Accelerator Mass Spectrometry (AMS) dates, a significantly more complex and multifaceted situation related to the introduction and temporal development of Hopewellian communities in the study region is introduced.

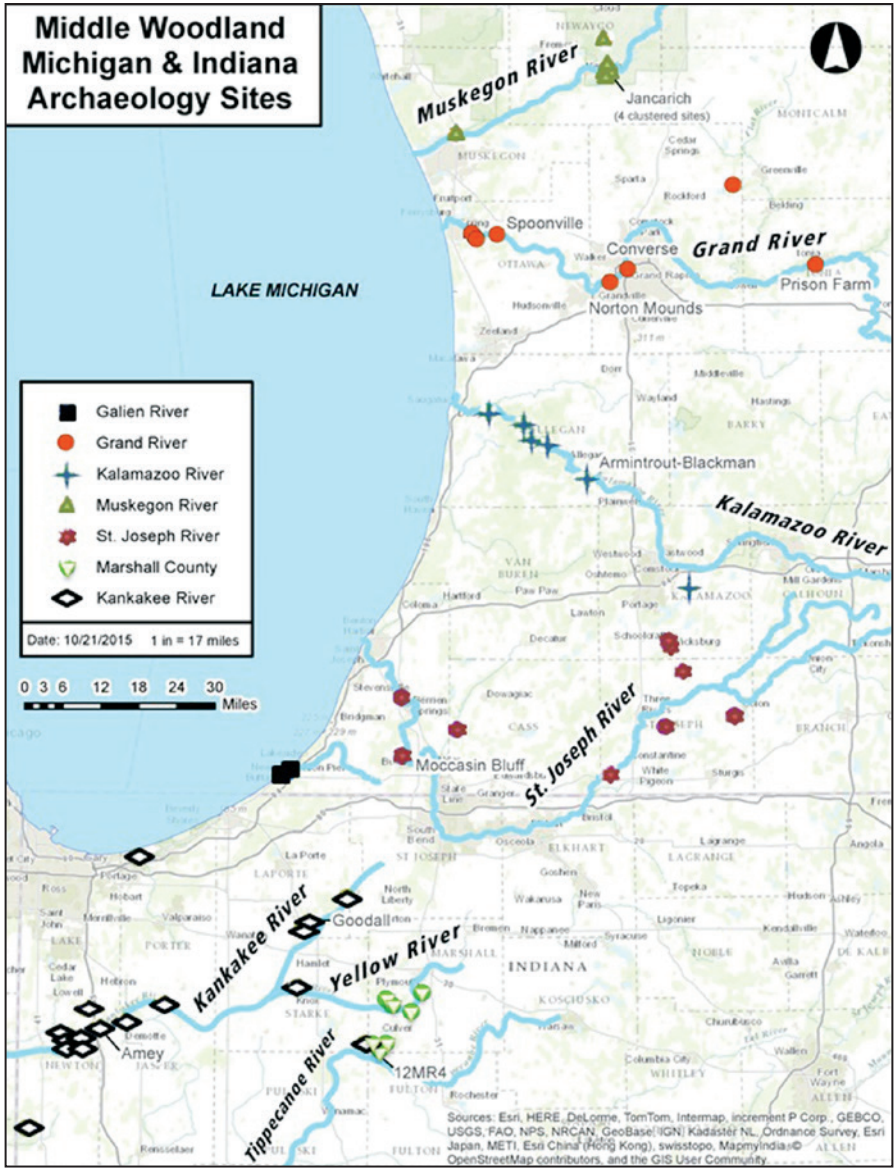

Figure 1. Study region.

The data suggest that the original Havana-related communities likely originated due to interaction and selective adaptation involving diffusion of Havana-related socioreligious information and ceramic technology, rather than migration.

Furthermore, results suggest the Kalamazoo and St. Joseph River Valleys were likely used as a *buffer zone* (or shared seasonal locale) between a) Grand and Muskegon River Valley peoples and b) Kankakee valley peoples. Also, ceramic data from all burial mounds in the study region strongly suggest that mortuary practices involved the participation of multiple communities throughout the study region (rather than being used by one cultural group). Lastly, a new temporal model was developed in order to better understand these temporal dynamics and to tie the once-disparate traditions and phases applied to both west Michigan and northwest Indiana into a unified chronology.

PREVIOUS HAVANA-HOPEWELLIAN RESEARCH IN THE STUDY REGION

In several areas of the Eastern Woodlands inhabited by Hopewellian peoples (e.g., Ohio and Illinois), societies incorporated varying degrees of horticulture into their subsistence bases during the Middle Woodland period (e.g., Cowan 1978; Dancey and Pacheco 1997, 2006; Ford 1979; Gremillion 1993; MacNeish 1991; Patton, this volume; Smith 1989, 1992, 2006; Wymer 1992, 1996, 1997, this volume). In contrast to these regions, west Michigan and northern Indiana Middle Woodland societies appear to have relied almost exclusively on hunting and gathering as their primary mode of subsistence, based upon the lack of archaeological evidence pointing towards a heavy reliance on cultigens in both of these regions (Brashler et al. 2006; Brashler, Garland, and Lovis 1994; Brashler and Holman 2004; Mangold 2009; Mangold and Schurr 2006).

In west Michigan, groups appear to have been characterized by a relatively low population density, a high level of seasonal mobility, and the continued practice of a Late Archaic subsistence pattern distinguished by a heavy reliance on large game, especially white-tail deer (Brashler, Garland, and Lovis 1994; Brashler et al. 2006; Garland and DesJardins 2006). "A pattern of nonintensive use of available plant foods, in which cultigens were known but marginally significant, may have persisted from Late Archaic times well into the Late Woodland period in western Michigan" (Brashler et al. 2006:275). An example of the known existence of a cultigen is illustrated in Raviele's (2010) recent discovery of the use of a dried version (i.e., kernels or flour) of maize dating to as early as the early Middle Woodland period in the Saginaw Valley basin of eastern Michigan. Despite these relatively new findings, however, there is no evidence that this early presence and use of maize (or other domesticates) resulted in a transition to a settled agricultural village lifestyle anywhere in Michigan (Hart and Lovis 2013; Hart and Means 2002).

Similarly, there is a general lack of evidence for Eastern Agricultural Complex domesticates, substantial architectural construction, or food storage in the "Goodall Tradition" of northwest Indiana (Mangold and Schurr 2006). A comparably highly mobile lifestyle revolving around seasonal movements between the marsh, marsh edge, and the uplands of the Kankakee River Valley is evident (Mangold 2009:225; Mangold and Schurr 2006). As Mangold and Schurr (2006:226) state, "the Goodall Tradition was at the lower end of complexity for Middle Woodland societies, and it is not certain if they represent 'Big Men' societies or something even less complex."

Considering the aforementioned circumstances in both west Michigan and northwest Indiana, it became apparent that simply applying general models from Illinois or Ohio to the study region was untenable. As a result, this chapter is aimed at providing new insights into the complexities connected to the spread of the Havana-Hopewell phenomenon within the study region, an area considered to be outside the relatively more socio-politically complex, more horticulturally-dependent, and more popular Ohio and Illinois "core areas."

PRIOR IDEAS ON THE INTRODUCTION OF HAVANA-HOPEWELL

The issue that has perhaps received the most attention amongst scholars revolves around how the predominately hunting and gathering communities of Michigan and northern Indiana adopted and incorporated the Havana-Hopewellian phenomenon into their cultural systems. Due to documented cultural similarities to Illinois Havana-Hopewell populations (e.g., sub-mound log-lined central tombs with ramps and burials associated with ceramic vessels, copper, mica, engraved turtle shell, and other exotic materials encountered in Illinois site assemblages: see Flanders 1979; Griffin et al. 1970; Quimby 1941a, 1941b), the vast majority of archaeologists during the 1960s and into the 1990s viewed the introduction of Havana-Hopewell into west Michigan (and northern Indiana) as resulting from the migration of peoples out of the central Illinois River Valley during the Fulton phase, with subsequent resettlement along the Kankakee River Valley in northwest Indiana and along the major river basins of west Michigan (Brown 1964; Faulkner 1961; Flanders 1977; Garland and DesJardins 1995, 2006; Griffin et al. 1970; Kingsley 1981, 1990, 1999; Quimby 1941a). Another model that relies on a central Illinois origin was put forth by Holman (1990), who suggested that the fissioning of groups from the central Illinois valley could account for the introduction of Havana-Hopewell. This hypothesis has not been adequately tested, however, until now.

Conversely, another major hypothesis for the origin of Havana-Hopewell in Michigan and northwest Indiana has recently become more en vogue. This hypothesis suggests that Havana-Hopewell resulted from the spread of ideology or information (i.e., diffusion; Brashler 2003; Brashler et al. 1998; Hambacher, Robertson, Brashler et al. 2003; Mangold 2009; Mangold and Schurr 2006; Prahl 1991; Schurr 1997; Wilkinson 1971). Whereas proponents of the migration (and fission) hypothesis relied upon what they interpreted as the lack of early diagnostic Illinois Havana Wares (e.g., Naples Ovoid Stamped, Neteler Stamped, etc.) and a "clear lack of a developmental sequence from Early to Middle Woodland" (Kingsley 1999:151) in Michigan, more recent research supporting diffusion points out the drawbacks of relying on an Illinois-derived Havana-Hopewell model in Michigan. This research cites the early Middle Woodland Prison Farm site (Brashler et al. 2006) as evidence of a potential Early to Middle Woodland development and states that nearly every Havana site in Michigan with Middle Woodland ceramics also contains Early Woodland ceramics (suggesting continuity in settlement patterns). The recent discovery of very early Middle Woodland Naples Ovoid Stamped sherds in the Grand River Valley points out that, despite the adoption of Havana-Hopewell stylistic traits, ceramic technology in Michigan was not as sophisticated as that seen in the Illinois Valley (see Brashler et al. 2006 for a summary). Similarly, Schurr (1997) points out the unlikelihood of the migration theory for northwest Indiana by stating that there is a presence of a pre-Hopewell, Havana tradition occupation at the Bellinger site (and other sites), that northwest Indiana pottery types are stylistically and technologically distinct from central Illinois River Valley types (i.e., constituting a regionally distinct pottery tradition), that changes in ceramic style in northwest Indiana likely paralleled stylistic changes in the Illinois valley centuries before the inception of the Middle Woodland period (suggesting continuity of settlement of the region), and that there are differences in mound construction, site distributions, and occupation intensities between sites in both regions.

THE KALAMAZOO AND ST. JOSEPH RIVER VALLEYS OF WEST MICHIGAN

Previous scholars have pointed out the geological uniqueness of the Kalamazoo River Valley, as well as the ambiguous cultural affiliation of sites in both the Kalamazoo and St. Joseph valleys. The Kalamazoo River Valley has long been recognized as being geologically and environmentally distinct from the Muskegon, Grand, and St. Joseph Rivers in west Michigan (Kingsley 1981). While the

latter three river valleys are all geologically similar, the Kalamazoo River Valley lacks well-developed floodplains, large backwater lakes, and disturbed mudflat habitats that are characteristic of the other river basins (Kingsley 1981). Rather than floodplains, the Kalamazoo largely contains swamps and marshlands that are almost always inundated. Additionally, most of the Kalamazoo River flows through the heart of a pine plain, which lacks nut-bearing species, while sites in the other river valleys are generally located next to deciduous hardwood forests and nut-bearing trees.

Culturally, the Kalamazoo valley is also the only major drainage in west Michigan that did not bear evidence of a substantial Hopewell presence (Kingsley 1981; Quimby 1941a, 1941b), containing only five known sites (Garland and DesJardins 2006). Perhaps the lack of floodplains, backwater lakes for fishing, and high-yielding deciduous trees were critical factors that prevented substantial Hopewell settlement in the Kalamazoo River Valley (Kingsley 1981). Garland and DesJardins (2006) suggest that the five known Kalamazoo sites are best regarded as primarily being culturally affiliated with sites in the lower Grand River Valley. Although Kalamazoo River sites generally stand in contrast to St. Joseph River Valley sites (Garland and DesJardins 2006), there is ceramic evidence for potential interactions between peoples of the two river valleys. The Kalamazoo valley also has not yielded evidence of the mound groups that have been documented in the other river basins, although past historical documents detail their presence (e.g., Hinsdale 1931; Post 1881). These are generally regarded as being inaccurate, however, and it is believed Hopewell mounds did not exist along the Kalamazoo River or were destroyed without leaving any trace (Kingsley 1981).

The St. Joseph River Valley, termed the "Goodall periphery" by Garland and DesJardins (2006), represents the southern-most boundary of Michigan Havana-Hopewell and exhibits a more "mixed" sociocultural nature than the Muskegon, Grand, and Kalamazoo River Valleys (Garland and DesJardins 2006; Mangold 1981; Mangold and Schurr 2006). Ceramics from sites in the St. Joseph valley are more stylistically similar to those observed in northwest Indiana, but they also contain some attributes that are similar to ceramics from sites in the Grand and Muskegon valleys (Garland and DesJardins 2006). As a result, the St. Joseph has been subsumed under the Goodall Tradition by some archaeologists (e.g., Mangold 1981; Mangold and Schurr 2006; Schurr 1997), but excluded by others (e.g., Mangold 2009). Therefore, as is the case for the Kalamazoo valley, sites in the St. Joseph River Valley also exhibit an ambiguous cultural affiliation.

BURIAL MOUNDS AND ASSUMPTIONS OF MULTI-COMMUNITY INTEGRATION

Archaeologists studying Hopewell in west Michigan and in all regions of the eastern United States have frequently assumed that the interment of individuals and cultural objects in Middle Woodland burial mounds involved the aggregation and participation of several distinct regional communities originating from different parts of a region (Mainfort 1996; Reid 1991; Struever 1964; Yerkes 2002). Although burial mounds in west Michigan do not exhibit the scale, variability in functional types (e.g., lacking platform mounds and earthworks), or social complexity (lacking evidence of rank), as those in Illinois (Brown 1981; Carr 2006b) and Ohio (Greber 1976, 1979; Greber and Ruhl 1989), it was also expected that these mounds were used by multiple communities.

THEORETICAL FRAMEWORK AND CERAMIC ANALYSES

This study acknowledges that the diversity of economic, sociopolitical, and ideological processes operating inside each cultural group is as important as external processes (i.e., long distance exchange and interaction) in shaping the overall organization of an interaction network (Dobres and Hoffman 1994; Stein 2002). Accordingly, I took a "bottom-up" approach by first utilizing ceramic compositional and stylistic groupings to identify intraregional (i.e., within river valleys) residential communities and then examining how these groups incorporated themselves into interaction networks with other communities on larger spatial scales. *Residential communities* are defined by coresidence or close residence amongst their members, regular face-to-face interaction, and a shared communal identity (Carr 2006a; Mahoney 2000; Ruby et al. 2006; Varien 1999). Sharing and gift-giving are the types of exchange most common between these communities and usually consist of the exchange of subsistence-maintenance goods (Kelly 1995; Whallon, Lovis, and Hitchcock 2011).

It was important to identify residential communities as a first step in order to examine and understand the complex cultural dynamics operating on the intraregional spatial scale. Although archaeologists have begun to consider and demonstrate the development and nature of Havana-Hopewell on multiple spatial scales (e.g., Bolnick and Smith 2007; Buikstra 1976; Buikstra and Charles 1999; Carr and Case 2006a; Carr and Komorowski 1995; Carr and Maslowski 1995; Charles 1995; Greber 1976, 1996, 1997; Griffin 1967; Pacheco 1993, 1996; Pacheco and Dancey 2006; Prufer 1964; Prufer et al. 1965; Smith 1992; Stoltman 2015; Wymer 1996, 1997), there was a dire need within the study region to examine and better understand local

contexts. As Brashler et al. (2006) stated, "we need to understand what was happening here first and then look at how the relationships between the Grand and other areas during the Middle Woodland can advance our understanding of Middle Woodland cultural processes." Only recently, however, have sufficient data been available within the study region to address these types of issues from an approach relying on both stylistic and compositional ceramic analyses. The more comprehensive multiscalar approach this study employs surpasses previous studies that have employed a more narrow focus on interregional interactions which have tended to define Hopewell in singular interregional terms (e.g., a wide network of trade of raw materials and exchange of ideas, a specific mortuary cult, a worldview, or a network of peer polities; see Carr 2006d and Fie 2006, 2008).

To this end, I relied upon the combination of visual style with technical style (focusing on ceramic petrography). Havana-related samples and Hopewell-related samples were studied separately in order to ensure that differences in function between the two ware categories would not skew any interpretations regarding the identification of community identity. Each sherd's decorative, morphological, and compositional/petrographic attributes were recorded and descriptive statistics were calculated for each variable (summarily described below; but see Chivis 2016 for a more exhaustive discussion of the types of variables used in this research). The descriptive and inferential statistics results for the petrographic variables was able to initially distinguish between compositionally distinct patterns (described below). In this chapter, ternary diagrams are utilized simply to display the clay and recipe compositional differences from sherd samples, deriving from the original descriptive and inferential statistics analyses. Interestingly, these initial patterns were almost always supported by the decorative and morphological analyses. Relatively more advanced statistical analyses (e.g., *t*-tests at the 95% level) were also calculated (described in relevant sections in Chivis 2016).

VISUAL STYLE

Morris (1995) defines visual style as the visible, elaborate formal variation that is actively used to communicate messages. Examples of visual style variables are surface decoration type or surface finish (e.g., slip). Visual styles commonly have extensive distributions because messages that are deemed most important culturally (i.e., society-wide values) are encoded in attributes that are the most visible due to their effectiveness for communication (Carr 1995b; Carr and Maslowski 1995; Lowman and Alland 1973). These types of messages can be easily copied, quickly diffused, and

incorporated into preexisting pottery traditions, as is demonstrated by the various and unique regional stylistic expressions observed on Hopewell pottery vessels from the Marksville culture in the Lower Mississippi River Valley (Gibson and Shenkel 1988; Mainfort 1996; Mainfort and Sullivan 1998), the Copena, Swift Creek, and Miller complexes in the Southeast (Bense 1994), the Kansas City Hopewell (Logan 2006; Wedel 1943), the Mann phase occupation in the lower Wabash River Valley area (Kellar 1979; Ruby 2006; Ruby, Carr, and Charles 2006; Ruby and Shriner 2006; Stoltman 2015), the Waukesha phase in southeastern Wisconsin (Jeske 2006; McKern 1942), the Trempealeau phase in southwestern Wisconsin (McKern 1942; Stoltman 1979, 2006), or the Crab Orchard Tradition in the American Bottom (Fortier 2006; Fortier et al. 1989; Struever 1964). The most visual aspects of ceramic vessels, then, have the potential for playing a role in the active communication of identity of larger social units than residential communities (Carr 1995b).

TECHNICAL STYLE

Technical style, on the other hand, is the formal variation (both visible and non-visible) that results from individual or group choices in the techniques of production (Morris 1995). Technical styles are analogous to the choices that artisans make during the collection of materials and construction of pottery vessels. These choices are drawn from a socially constrained pool of attributes that are the product of the history of a particular community (Carr 1995b; Dobres and Hoffman 1994; Hoffman 1995; Hoffman and Dobres 1999; Lechtman 1977; Mahias 1993; Sackett 1982, 1985, 1990; van der Leeuw 1993).

Technical styles, in contrast to visual styles, commonly exhibit significantly more restricted geographic distributions that reflect *localized* technical systems and their populations (e.g., residential communities; Morris 1995). This is because they are generally learned as a result of close interaction among producers and/or through hands-on instruction (Dobres and Hoffman 1994; Galaty 2008; Gosselain 1998; Hegmon et al. 2000; Hodder 2000; Hoffman and Dobres 1999; Ingold 1990; Lemonnier 1986, 1990, 1993a, 1993b; Miller 2007; Schiffer and Skibo 1987; Skibo and Schiffer 2008; Stark 1999; Wallaert-Petre 200; Wright 1993). Therefore, technical styles represent the learned recipes of ceramic construction in this research and contained the most appropriate variables to initially identify the statistical parameters of intraregional residential communities. Once the recipes and diagnostic characteristics were defined for each residential community, any *nonlocal* samples (i.e., imports or samples made by members of other communities) derived

from the initial definition of residential communities were then used to identify that site's interaction with other communities elsewhere.

Some non-petrographic morphological and continuous "decorative" technical style variables were also helpful in identifying patterning or differences between residential communities. Examples of non-petrographic technical style variables related to vessel morphology included rim shape, lip shape, rim height, lip thickness, rim thickness, body thickness, and rim angle. These variables are likely passive indicators of social identity since they are not visible at a large distance and are poor candidates for effective communication (Carr 1995b). Visually obscure continuous variables relating to surface decoration include decorative element/motif length, element width, and distance between decorative elements. These "small and simple relational" obscure attributes can reflect a wide variety of active and passive personal and personal-physiological processes (Carr 1995b).

PETROGRAPHIC METHODS

The petrographic methodology employed in this project adhered to Stoltman's (1989, 1991, 2001, 2015) approach, which is designed to extract both qualitative and quantitative data from ceramic thin sections. Each thin section is subjected to a two-step analysis. The first, or qualitative, step involves forming initial observations of the thin section, including observing the mineral inclusion types and compiling a list of natural inclusions and temper types (Stoltman 1991). Qualitative/categorical petrographic variables recorded in this study included temper type, natural inclusion type, void type within the clays, ARF (argillaceous rock fragment) presence (di Caprio and Vaughn 1993), the optical activity of the clay matrix, and the matrix/fabric type (also called the b-fabric: see Whitbread 1995 or Josephs 2005).

The second step involves the derivation of quantitative data through point counting, in which a 1 mm grid is superimposed over a thin section and every observation at a grid intersection point is recorded (Stoltman 2001). The quantitative and calculated petrographic variables included mean grain size (sand size index: see Stoltman 1991), mean temper size (temper size index: see Stoltman 1991), mean void size, the percentage of grains of each mineral and temper types, and the percentage of artifact volume comprised by each mineral type, temper type, and void type.

Although the qualitative identification of temper may signal personal or social identity, the total composition of pottery was expected to be more pertinent to the identification of residential communities in this research. The reason for this is because this within-vessel composition is assumed to have been learned as a

"recipe" of ceramic production and proved essential to identifying personal and family identity markers and, thus, small-scale residential communities.

A strength of petrographic analysis, unlike INAA and other compositional techniques, is that it characterizes both the *body* (bulk composition of the vessel, including clays, all courser natural inclusions, and temper) and the *paste* (mixture of natural materials, clays, and coarser inclusions found in the raw sediments collected by potters before tempers are added) (Stoltman 2001). While the body is a gauge of technology, function, and production, the paste is more conducive to studying the acquisition of raw materials. Studying paste and body ultimately yielded data that characterized clay types and natural raw materials, but also identified patterns that were interpreted to align with communities and their culturally constituted recipes of ceramic production.

PAST CHRONOLOGIES AND A PROPOSED NEW TEMPORAL MODEL

Before results can be discussed, a new temporal model designed to encompass the entire study region must be introduced. The focus of this study includes the Norton Tradition (including the Muskegon, Grand, and Kalamazoo basins) and the "Goodall periphery" (St. Joseph River Valley), and their relationships to the Goodall Tradition along the Kankakee River Valley in northwest Indiana and those in Marshall County, Indiana (an area not previously studied outside of the earliest surveys of the county: see Faulkner 1960, 1961).

Havana-Hopewell in west Michigan is currently defined by the Norton Tradition (Griffin et al. 1970; Kingsley 1981, 1999), consisting of the Norton and Converse phases. Griffin et al. (1970) originally proposed the Norton phase as representing the initial occupation of Havana-Hopewellian peoples (presumably characterized by Illinois-derived Havana Ware) in west Michigan, dating between 10 BC and AD 200. Recently, however, the inception of the Norton phase (along with Norton phase ceramics/Havana Ware analogs) has more accurately been determined to date to approximately 100 BC, based on recent radiocarbon dates from Havana Ware analogs from the Prison Farm site (Brashler et al. 2006; Chivis and Brashler 2007). This reveals an earlier introduction of Havana-like (and related Norton Ware) pottery in west Michigan, at least 90 years earlier than what was traditionally accepted.

The Converse phase theoretically represented the latter half of Hopewellian occupation in Michigan and was assumed to be distinguished by the introduction of Hopewell Ware, between AD 200 and 400 (Flanders 1977; Griffin et al. 1970). More recent excavations have also called into question the dates of the Converse

phase. It now appears that there was also an earlier introduction of Hopewell Ware pottery into west Michigan, based upon examination of Hopewell Ware analogues from the Converse village site in the Grand valley (Brashler 2003). Several Hopewellian ceramics originally believed to belong to the Converse phase (those with plain rocker stamping, incising, and dentate rocker stamping) produced dates of AD 40, AD 50, and AD 60. These dates are approximately 150 years younger than what was believed to be the initiation of the Converse phase (AD 200) and they even predate the single Norton phase Havana Ware-like sherd at Converse.

Taken together, these new studies have provided evidence of an earlier-than-expected introduction of both Havana- and Hopewell-related pottery into west Michigan. As a result, this has led to the creation of a new temporal model detailing the Middle Woodland sequence in west Michigan (Brashler 2003; Brashler et al. 2006; Hambacher, Robertson, Brashler et al. 2003). The Norton phase is now posited to date from 100 BC to AD 100 and is characterized by the presence of Havana Ware-related ceramics. The dates of the subsequent Converse phase have been shifted to AD 100 to AD 400, roughly coinciding with the appearance of Hopewellian ceramic technology and designs, such as plain rocker stamping, incising, combing, brushing, cross-hatching, hemiconical punctates, and thin zone lines. This chronological model is compared to the current chronology of the Kankakee River Valley (Mangold and Schurr 2006) in Table 2.

In this study, these models have been fused into a new temporal framework in order to yield more meaningful comparative results regarding the types of mechanisms responsible for the introduction and practice of Havana-Hopewell in the study region. After exploring the data patterns of all ceramics in this research and examining the available AMS dates, it became evident that the spread of Havana-Hopewell information, ceramic styles, and technology did not simply spread *in toto* throughout west Michigan but instead in varying intensities that were temporally and geographically distinct. The main purpose for the implementation of this new framework was to rectify the slight temporal differences between phases defined for west Michigan and northwest Indiana so that relatively contemporary communities could be defined and compared. This allowed for the identification of residential communities and their participation in regional scale interaction networks.

A NEW TEMPORAL MODEL

Seven new AMS dates collected as part of this project and completed by Beta Analytic, Inc. were instrumental to the definition of this new model (Table 1). Uti-

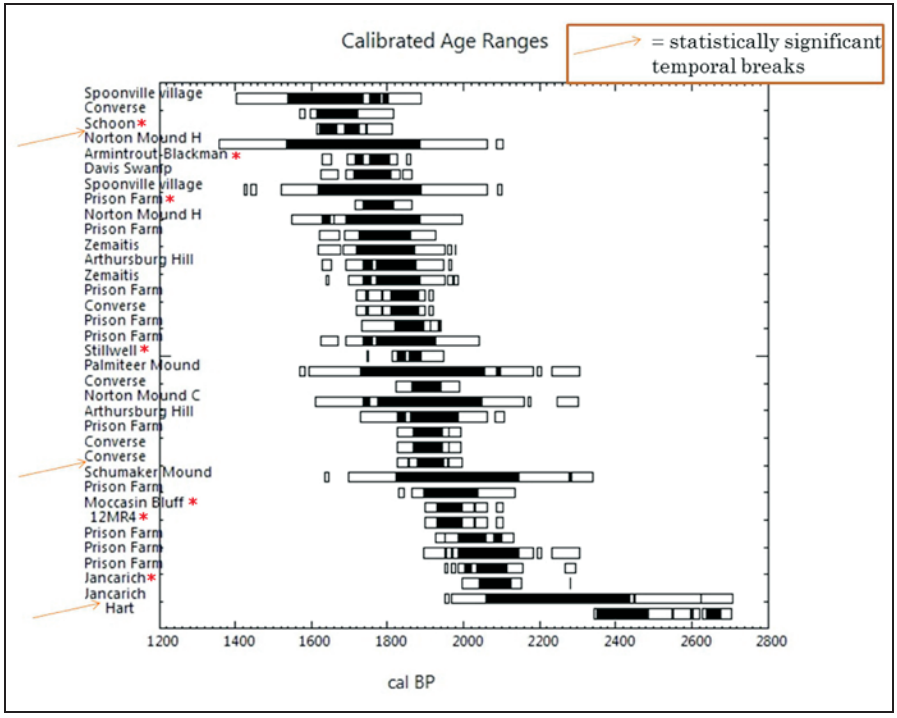

Figure 2. One and two sigma calibrated age ranges of available radiocarbon dates (*new radiocarbon dates provided in this research).

lizing the CALIB Radiocarbon Calibration program (version 7.1; Stuiver and Reimer 1993),[1] new AMS dates were calibrated with previous radiocarbon dates to yield the results shown in Figure 2.

Table 1. New Radiocarbon Dates.

Lab Number	Site	Site #	CONVENTIONAL AGE	CALIBRATED AGE/RANGE	Dated Sample
Beta-327507	Jancarich	20NE113	2110 +/- 30 BP	Cal BC 200 to BC 50	Havana Plain
Beta-327503	12MR4	12MR4	2030 +/- 30 BP	Cal BC 110 to AD 30/Cal AD 40 to AD 50	Probable Havana Zoned, Incised
Beta-327505	Moccasin Bluff	20BE1	2030 +/- 30 BP	Cal BC 110 to AD 30/Cal AD 40 to AD 50	Havana Cord-marked

Lab Number	Site	Site #	CONVENTIONAL AGE	CALIBRATED AGE/RANGE	Dated Sample
Beta-327500	Stillwell	unrecorded	1920 +/- 30 BP	Cal AD 20 to AD 130	Havana Zoned Dentate St.
Beta-327506	Prison Farm	20IA58	1850 +/- 30 BP	Cal AD 80 to AD 240	Havana Dentate, Incised, noded everted rim
Beta-327504	Armintrout-Blackman	20AE812	1820 +/- 30 BP	Cal AD 130 to AD 250	Havana Smoothed-over Cord-marked, noded
Beta-327502	Schoon	12LA55	1780 +/- 30 BP	Cal AD 140 to AD 260/Cal AD 270 to AD 330	Havana Zoned Dentate St.

Studying the cumulative radiocarbon dates yielded the identification of three temporal periods for the spread of Havana-Hopewell information and the rise of particular communities: 1) Early Communities, 2) Middle Communities, and 3) Transitional Communities. T-test results (all at the 95% level) derived from CALIB strongly support the use of this three-tiered framework. All available radiocarbon dates within the study region were tested against one another in order to determine if they derive from the same time period. This process yielded the proposed three-tier framework. The arrows in Figure 2 illustrate the statistically significant break points for these three groupings.[2]

The earliest Middle Woodland group consists of the two early Jancarich dates (M-1982, Beta-327507), three Prison Farm dates (Beta-113899, 113897, and an unknown Beta #), 12MR4 (Beta 327503), Moccasin Bluff (Beta 327505), Prison Farm (Beta-113898), and the Schumaker Mound (M-1938) dates. CALIB determined that this group of nine total dates was not significantly different ($df = 8.0$, $t = 8.4$). This group correlates to the Early Communities period in this research, which is temporally defined as occurring between 150 BC and terminating at roughly AD 30 (Table 2). The 150 BC date was chosen because it roughly corresponds to the earliest Jancarich and Prison Farm dates and accommodates the earliest phases in the Kankakee. This period includes the previous Norton phase

in west Michigan and the North Liberty, Stillwell, and early Goodall phases in the Kankakee. It includes the use of a Havana-related pottery assemblage lacking Hopewell Ware-related types and includes the rise of the earliest Havana-related communities in the study region.

The second major Middle Woodland grouping produced by CALIB consisted of 22 radiocarbon dates (Figure 2), correlating to the proposed Middle Communities period (Table 2). It begins with the two earliest Converse site dates and terminates with the Norton Mound H radiocarbon date. This group of dates is not significantly different from one another ($df = 21$, $t = 26.4$) but is significantly different from the Early Communities group ($df = 1$, $t = 96.4$). The two earliest Converse dates (Beta-148361 and 153908) derive from residue adhering to the earliest dated Hopewell Ware pottery vessels in the study region (Brashler 2003; Hambacher, Robertson, Brashler et al. 2003) and they therefore represent a logical starting point for the second group of Middle Woodland dates. The inception date of AD 30 chosen for this period strikes a fair balance between the median probability ages (AD 28 and AD 38) produced by CALIB for both of these early Converse Hopewell Ware dates. This period, then, witnessed the introduction and use of Hopewell Ware-related vessels in the study region and represents the height of both Havana and Hopewell participation in the study region. Vessels (and designs such as dentate stamping) become thinner, but, importantly, recipes employed (and defined by the author) in the Early Communities period extend and persist into the Middle Communities period. The Middle Communities period includes the previous late Norton and the early-middle Converse phases in west Michigan and the middle-late Goodall and early LaPorte phases in the Kankakee.

Table 2. Proposed Middle Woodland Temporal Framework.

Period	Temporal Range	West Michigan Phase(s)	Northwest Indiana Phase(s)
Early Communities	150 BC–AD 30	early-middle Norton	North Liberty, Stillwell, early Goodall
Middle Communities	AD 30–AD 250	late Norton, early-middle Converse	middle-late Goodall, early LaPorte
Transitional Communities	AD 250–AD 400	late Converse	middle-late LaPorte

The third and final Middle Woodland grouping produced by CALIB includes dates from the Schoon, Converse, and Spoonville sites, and correlates to the Transitional Communities period (Table 2). This set of three dates were not significantly

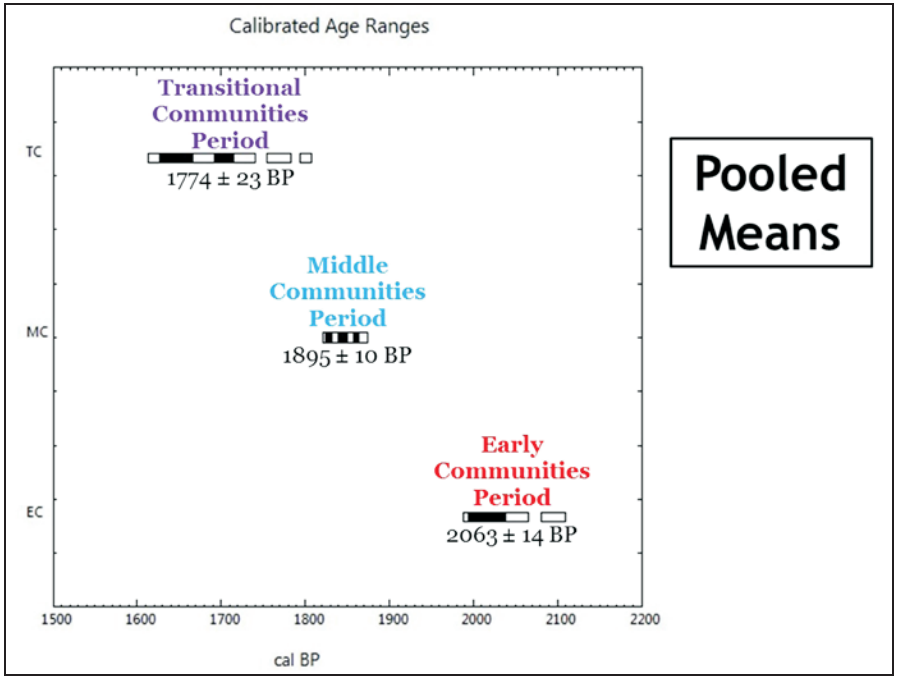

Figure 3. One and two sigma calibrated age ranges of pooled mean values.

different from one another ($df = 2$, $t = 0.2$) but were significantly different from the Middle Communities grouping ($df = 1$, $t = 22.5$). This final Middle Woodland period represents the waning and eventual decline of Havana-Hopewell in the study region and is proposed to encompass the previous late Converse phase in Michigan and the middle to late LaPorte phase in the Kankakee. Two late radiocarbon dates from the Mushroom site (M-1427 and Uga-2347) would presumably be included in this time period as well, but conventional ages were unavailable to test this. However, dates of AD 265 and AD 410 for both would support this inference.

Next, I followed Hart and Lovis (2007) in utilizing CALIB to calculate the pooled means for the three statistically different Middle Woodland groupings, which are displayed in Figure 3. The pooled mean values of these temporal periods, along with the standard deviation, represent a more precise representation of the probable age or central tendency than individual ages (Hart and Lovis 2007). The pooled means calculated for each period are: 2063 ± 13.9 BP for the Early Communities group, 1895 ± 9.9 BP for the Middle Communities group, and 1774 ± 23.4 BP for the Transitional Communities group.

Therefore, the results produced by the CALIB Radiocarbon Calibration program strongly supported the designation of three distinct Middle Woodland temporal periods. Importantly, these groups crosscut both west Michigan and northern Indiana regions, making a convincing case for the use of a uniform chronological framework for the study region. The use of a uniform temporal framework will also assist in creating archaeological cultural units that make more sense in the future since they are not restrained by modern sociopolitical boundaries (such as state boundaries). The use of the new temporal framework proposed here proved to be extremely useful in this research because clear temporal trends became readily apparent, informing on changing cultural dynamics across space and time.

CLAY CHARACTERIZATIONS

The final results of this study allowed for the identification of what I call the *most commonly used clays*: clays that potters used to construct their pottery vessels at individual sites within the study region. Based upon ethnographic data (e.g., Arnold 1985), it is assumed that locally available clays and raw materials located in close proximity to archaeological sites were used more frequently (due to ease of access) by potters inhabiting these sites than those located farther away. This process relied primarily on the study of the paste and was useful in characterizing the raw materials available in the clays chosen for pottery manufacture. In fact, regional differences in the distinct clays Middle Woodland potters used became very clear and were quantified (Figure 4). Subsequently, this information was successfully used to define the statistical parameters of the most commonly used clay types on the local scale, identify the geographical origin of the nonlocal samples present at each site, and designate these nonlocal samples as either imported vessels or copies.

As illustrated in Figure 4, inter-river valley clay type variability became easily identifiable. This diagram plots the mean local clay types representative of sites in each river valley. Keep in mind that these observations are quantified and are drawn from descriptive statistics calculated for each individual site (see below). Again, the circles in this ternary diagram were drawn by the author in order to make these distinctions more visually apparent to the reader; they do not necessarily match the exact statistical boundaries of each cluster of sites but they do approximate them. Nonetheless, these separate clusters illustrate the variation (borne out of the statistical analyses) between river valleys/regions and represent the paste differences of the clays most commonly used by potters in different regions.

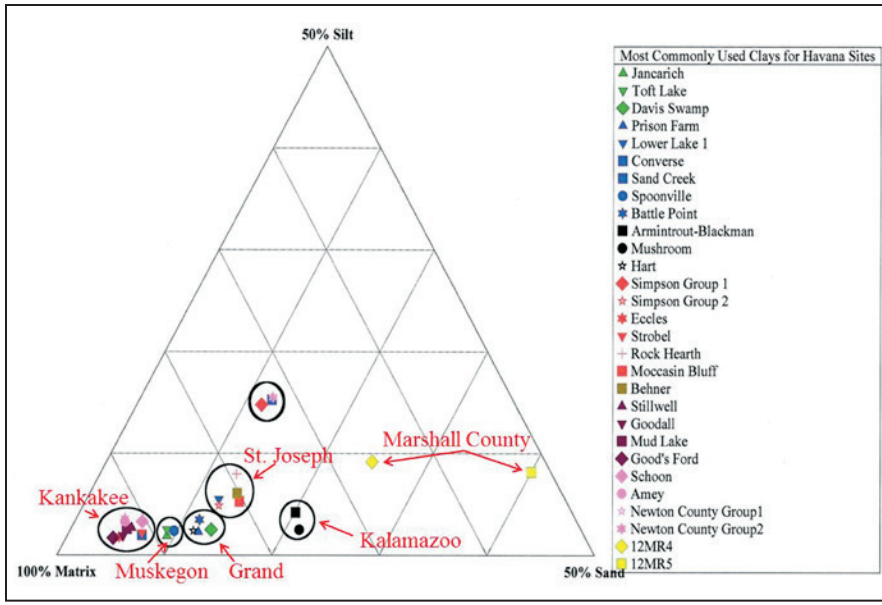

Figure 4. Mean paste parameters for all Havana sites within their respective river valleys/region (Note: "Muskegon" in diagram illustrates paste characteristics of sites located in the Muskegon River Valley; the same format is used for the remaining river valleys).

The lowest percentage of sand present in the study region was found in clays originating from pots recovered from Kankakee valley sites (statistically calculated to 4.4%–6.9%). The next highest percent sand comes from the Jancarich, Toft Lake, and Spoonville site cluster (9.0%–9.7%). There is also a tendency for lower Kankakee River Valley sites to possess samples with clays that are unusually high in the amount of silt present in their pastes. Although these are minority types present in the study region, they do appear more common at sites such as Amey, Watson, or Schoon. It appears that these people more frequently employed the use of siltier loessic clays in contrast to people located in all other areas of the study region, where the use of alluvial clays predominated.

The two sites in the Marshall County region (12MR4 and 12MR5) possess the highest percentages of sand (24.7% and 40%, respectively) and slightly more silt (8.2%–9.2%) than all other clusters, excluding the siltiest cluster including the Simpson, Newton County, and Sand Creek site samples (14.8%–15.5%). The two Kalamazoo River Valley sites (Armintrout-Blackman and Mushroom) clearly stand out, as well, by possessing relatively more sand (20.1–21.3%) than the Mus-

kegon, Grand, St. Joseph, and Kankakee River Valley clusters. There also is a potential diagnostic lower St. Joseph River Valley (Moccasin Bluff, Rock Hearth, Behner region) feature which is characterized by roughly twice as much silt compared to Grand River Valley clays.

In addition to these compositional signifiers, it was found that each clay cluster also contained its own distinct frequencies of natural inclusion types, argillaceous rock fragments (ARFs), (di Caprio and Vaughan 1993), and average sand sizes (see Chivis 2016 for more information). Ultimately, the differences in clays illustrated in Figure 4 closely mirrored the differences in recipe values (i.e., body) described below, a fact that allowed for the straight-forward identification of the boundaries of residential communities and the most commonly used clays employed during the ceramic production process.

EARLY COMMUNITIES PERIOD: RESIDENTIAL COMMUNITIES AND THE ORIGIN OF HAVANA-HOPEWELL IN WEST MICHIGAN AND NORTHWEST INDIANA

The Early Communities period represents the initiation and adoption of Havana socioreligious information into west Michigan and northwest Indiana, as well as the construction of primarily Havana-related pottery with its associated style and technology. Therefore, a discussion of the primary mechanism for the introduction of Havana information and ceramic technology in the study region is discussed here. Figure 5 illustrates the body recipes for the five earliest residential communities, which appear to be geographically divided (Figure 6). Note that the recipe/body groupings in Figure 5 approximate the statistical boundaries of each residential community described below (based upon the descriptive statistics results).

The **Jancarich residential community** includes the Jancarich, Toft Lake, and Sand Creek sites and contains several defining characteristics. The low percent of temper (4.8%–14.2%) is especially diagnostic of this community, lower than any other residential community defined in the study region. The dominant use of granite temper (88.9%) is also characteristic of this community and is characterized by 5.6%–11.2% sand. Regarding firing technology, this community possesses the lowest percent of paste vitrification (which occurs between 850° and 900°C; see Rice 1987) in the study region (2.8%). Stylistically, the strong presence of burnishing and brushing on exterior surfaces characterizes this community.

The **Prison Farm residential community** includes the Prison Farm and Lower Lake 1 sites, and the relatively later addition of the Davis Swamp site during the Middle Communities period. Percent temper for locally manufactured vessels

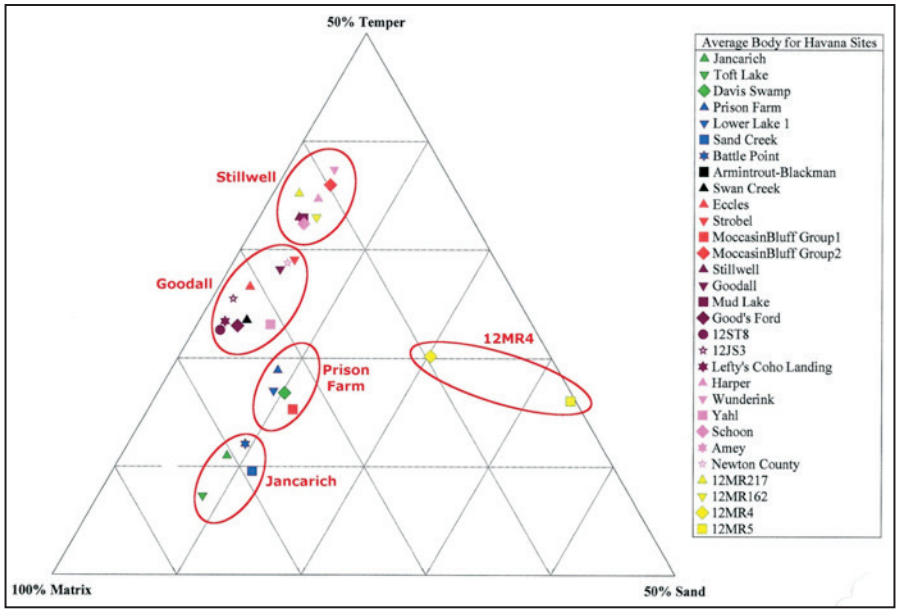

Figure 5. Earliest residential communities and their mean body values.

ranges from 12.9%–23.6%, while percent sand ranges from 6.1%–16.1%. The Prison Farm residential community generally exhibits high percentages of active clay matrices (67.6% or 25 of 37 total samples). Low percentages of paste vitrification are also characteristic of this community (5.4% or 2 of 37 total samples). Relatively thin average lips are present at both the Lower Lake 1 (7.7 mm) and Prison Farm (7.4 mm) sites. Conversely, a very thick average body thickness is also characteristic, with the Prison Farm site containing the largest average body thickness (11.2 mm) in the study region. Lastly, a high percent of cordmarking, smoothed-over cordmarking, and noding characterize the Havana Ware-related samples from this community.

The **Stillwell residential community** includes primarily the Stillwell and Mud Lake sites in the upper Kankakee River Valley and the 12MR217 site in Marshall County, Indiana. There is also strong evidence for later occasional logistical forays into Marshall County (at 12MR162 and 12MR10) and in the lower Kankakee (at Harper and Wunderink), based upon the presence of Stillwell community recipes in these regions. The mean percent temper of locally manufactured samples from this community is the highest of any other community in the study region, averaging between 30.5% and 37.4%, while percent sand averages between 2.1% and 4.8%. An extremely weathered gabbro temper type was identified only at the Still-

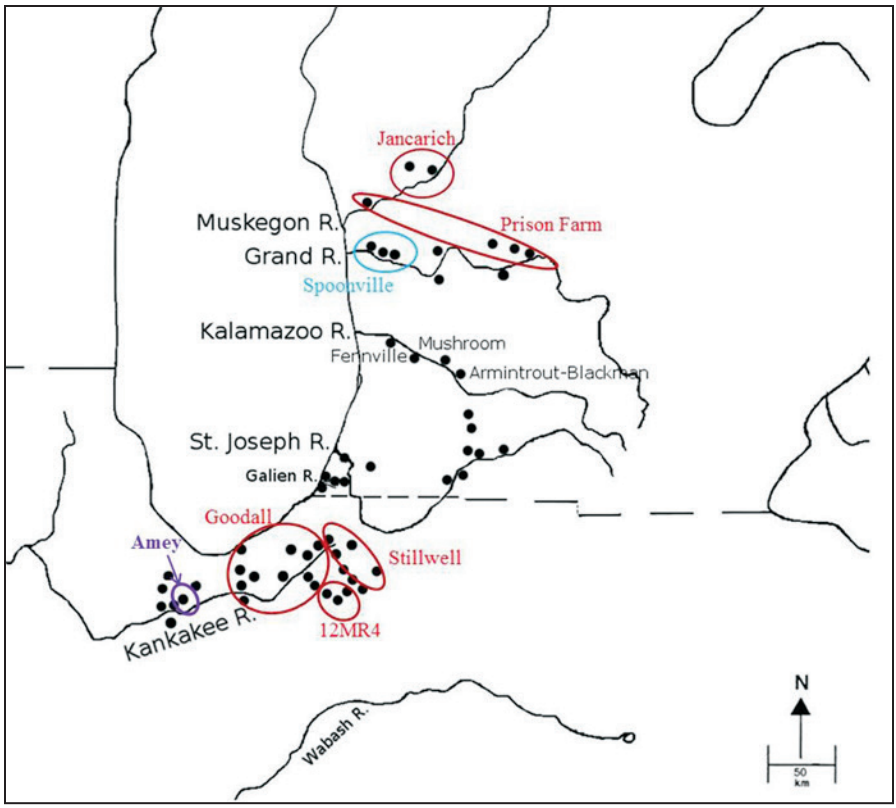

Figure 6. Geographic location of residential communities and ancillary sites (Note: Early communities period communities include Jancarich, Prison Farm, Goodall, Stillwell, and 12MR4 communities. The Spoonville residential community arose during the Middle Communities period, while the Amey community formed during the Transitional Communities period).

well and Mud Lake sites and is assumed to originate from this region. Gabbro temper, in general, is mostly an upper and middle Kankakee valley phenomenon: 80% of all gabbro tempered samples in the study region come from this area.

Another especially diagnostic trait is the presence of ARFs in the clays used at these sites, which occur in 57.1% of all samples from this community. Roughly 38.5% of all pastes in this community are vitrified, which suggests a slightly more advanced pyrotechnology being employed by people in this upper Kankakee valley community, especially compared to early west Michigan communities. The Stillwell community contains the highest percent of interior lip notching in the

study region at 71.4%, with the next closest being the Goodall community at 55.6%. Beveled interior lips are very common at Stillwell community sites (71.4%). Thick dentate width (mean of 1.9 mm) is also diagnostic.

The **Goodall residential community** includes the Goodall, Good's Ford, 12ST8, Brems, Lefty's Coho Landing, and Big Grape Island sites. Somewhat later temporal use of the Strobel, Eccles, Yahl, and Schissler sites also characterizes the territorial expansion of this community through time. The body values of the Goodall community range from 16.8%–29.6% temper and 1.8%–7.6% sand. The temper percent range was uncomfortably large because other residential community recipes did not share a similarly wide range. In fact, samples containing below 20% temper were initially outside the statistical parameters of Goodall recipes. However, it became apparent that samples containing between 16.8% and 20% temper, as long as they still contained 1.8%–7.6% sand, overwhelmingly matched the morphological and stylistic parameters of Goodall residential community sites. Therefore, it became necessary to extend the percent temper range in this instance to accommodate the 16.8%–20% range and designate these as locally manufactured Goodall community vessels. The highest percent (61.4%) of ARFs in clay types in the study region is also diagnostic of sites in this community. Diorite and gabbro temper is relatively common in samples in this community, especially at the Goodall and Good's Ford sites.

Stylistically, this community is characterized by the common occurrence of dentate stamping, which represents the main decorative trait of the community. This community also possesses the second highest percent of lip notching in the study region at 55.6%. Lastly, the high frequency of beveled interior lips at the Good's Ford and Goodall sites is another characteristic trait.

The fifth and final residential community defined during the Early Communities period is the **12MR4 residential community**. This community was unique and included the 12MR4 and 12MR5 sites, and the later occupation of the 12MR78 and 12MR115 sites. The body values include 13.0%–22.1% temper and 14.9%–33% sand, while paste values are characterized by 24.7%–40% sand and 7.9%–9.2 % silt. The percent sand really distinguishes the body and paste values for this community. These Marshall County pastes are also characterized by the presence of quartzite (77.8%), microcline (88.9%), and epidote (77.8%).

Pyrotechnology is another important diagnostic trait of the 12MR4 community. Eight of nine total Havana samples (88.9%) contained slightly active pastes, rather than entirely active pastes. This is the only early Middle Woodland commu-

nity in the study region with such high percentages of slightly active pastes. Despite this, only one sample was partially vitrified, which suggests a pyrotechnology revolving around quick firings occurring at slightly higher temperatures than other communities: between 700°C and 850°C, the latter of which designates the "vitrification point" (Rice 1987). This community is also characterized by the use of microgranite temper and gneiss temper. Arkose sandstone temper is also present, while the presence of granite temper is the lowest in the study region (23.1%). Additionally, the 12MR4 site has the largest (average) temper size index of any site in the study region (4.09). Morphologically, this community contains amongst the largest averages for rim thickness (9.4 mm), lip thickness (8.6 mm), and body thickness (9.9 mm). Vertical rims with flat lips dominate rim samples from these sites. One last stylistic trait unique to this community is the relatively frequent use of slip, which is present on 54.5% of all samples from 12MR4 and 12MR5.

Related to the origin of Havana within the study region, the most important conclusion in this study is that the most likely mechanism responsible for the establishment of all five of the earliest residential communities is the common interactions and selective adaptions resulting in diffusion of Havana socioreligious information, pottery styles, and technology. Despite abundant evidence for short-term travel or family visitation occurring within and between regions that has been documented in this research (see below), none of the unique residential community recipes were supplanted by recipes from other residential communities over time. In other words, these recipes persisted geographically and temporally. Thus, it is probable that resident populations were already present in most of the major river basins in the study region. This conclusion deviates considerably from earlier hypotheses positing migration (e.g., Brown 1964; Faulkner 1961; Flanders 1977; Garland and DesJardins 1995, 2006; Griffin et al. 1970; Kingsley 1981, 1990, 1999; Quimby 1941a) or fission (Holman 1990) as the mechanism for the inception of Havana in the study region.

LATER RESIDENTIAL COMMUNITY FORMATION

Although all five of the Early Communities period residential communities likely arose due to diffusion, further evidence suggests other mechanisms were responsible for the formation of two other residential communities during the Middle Communities and Transitional Communities periods. The Spoonville residential community (Figure 6) appears to have arisen during the Middle Communities period and includes the Spoonville, Battle Point, and Boom Road sites in the

lower Grand valley, as well as the likely seasonal use of the Armintrout-Blackman and Mushroom sites in the Kalamazoo basin. Interestingly, the data suggest that it is likely that this community represents an offshoot from the Jancarich residential community located farther north in the Muskegon River Valley. Thus, fission from the Jancarich community best explains this community's establishment. The body recipe values diagnostic of this community match only the diagnostic Jancarich community recipe described above. The percent temper for the Spoonville residential community ranges from 8.1% to 16.9%, while sand spans from 2.3% to 10.2%. The Spoonville site is characterized by a relatively high percent of mafic temper types in which 50% of samples contained either gabbro or diorite temper. The Spoonville community is also characterized by the nearly complete lack of ARFs in the pastes.

No other two communities in this research share so many similarities in style and morphology as Jancarich and Spoonville. For example, mean rim thickness at Spoonville is 8.3 mm while the Jancarich mean is 8.5 mm. Lip thickness mean at Spoonville is 6.7 mm while Jancarich's mean is 6.8 mm. The ratio of lip shapes is almost identical at both sites as well. Spoonville samples are characterized by 30% flat, 50% round, and 20% beveled interior lips, while Jancarich is characterized by 30% flat, 30% round, 20% beveled interior, and 20% wedged lip shapes.

Some differences between the two communities can be explained by expected temporal changes in design and technology. For example, Spoonville is characterized by a higher frequency of Havana samples with slightly active clay matrices (43.8%) than Jancarich (19%), suggesting a slightly more advanced firing strategy employed by Spoonville potters. Spoonville also has an average temper size index of 3.57, which is slightly smaller than Jancarich's mean of 3.71. Both of these are expected from samples from sites that are slightly later in time. Rim shapes also support the somewhat later temporal placement of Havana-related samples at Spoonville in relation to Jancarich. At Spoonville, one sample has a pronounced everted rim and three have inverted rims, rim profiles that usually characterize later Middle Woodland pottery vessels. Lastly, the frequency of Hopewell-related samples at Spoonville far exceed that observed at the Jancarich site.

Thus, the data suggest that it is likely that the mechanism for the inception of the Spoonville residential community revolved around the fission (Bandy 2004; Cameron 2013; Carneiro 1987; Johnson 1982; Rappaport 1968; Turner 1957) of one group (e.g., one or two extended families) from the Jancarich community, perhaps due to intra-group conflict or resource depletion. Another possible explanation is that Jancarich community members simply incorporated the Spoonville and Battle

Point site locales in the lower Grand River Valley as part of their seasonal round. However, the sheer density of cultural material and the presence of three burial mounds at the Spoonville site point towards a more intensive long-term use of the site that would seem to preclude the mere seasonal use of this region by the Jancarich community. The continuation of the Jancarich recipe at Spoonville community sites and the similarity of technical style variables that are resistant to change and not easily copied (e.g., percent temper, rim and lip thickness, body thickness, lip shape ratios, dentate width; Carr 1995a, 1995b) support the inference here of fission as the mechanism for the rise of this particular residential community. It is likely that the new Spoonville community maintained close contact with its parent community through time, as indicated by the occasional difficulty in distinguishing between the recipes and styles of these two communities and the presence of both communities' signatures at sites within both communities.

The last residential community identified in this research is the Amey residential community, present only at the Amey site in the lower Kankakee valley (Figure 6). The paste and body values at the Amey site were entirely unique. The local body or recipe of the Amey residential community ranges from 7.1% to 11.5% temper and 1.8% to 8% sand. As a whole, the local body values for this site are within the range of both the Jancarich and Spoonville communities, suggesting the possibility of a migration or fission from one of these two communities into the lower Kankakee. Although I cannot completely rule out this possibility, the stylistic and morphological variables are certainly more akin to other Kankakee communities rather than the Jancarich and Spoonville communities. For example, the thin dentate stamping that characterizes the Goodall and Stillwell communities' occupation of the lower Kankakee valley is very similar to Amey's (mean of 1.0 mm).

There is a relatively strong Goodall community stylistic influence at Amey, but there are several Amey site traits that support its designation as a separate residential community. First, the petrographic body/recipe values are entirely distinct from Goodall and Stillwell body parameters. Second, mean Havana body thickness at Amey (8.9 mm) is significantly higher than other lower Kankakee Goodall and Stillwell community-affiliated sites. Third, the pyrotechnology practiced at the Amey site is another clue to this site's distinctiveness. All five of the Amey site Havana samples contained active clay micromasses, which is rare for other lower Kankakee sites (e.g., Newton County, Schoon, Schissler, and Watson). The ceramic data from the latter sites generally suggest an increasing frequency of slightly active micromasses over time.

Based upon the available data, it is suggested that the occupation of the Amey site represents the introduction of a new residential community into the lower Kankakee region. Although we cannot completely rule out the migration of the Jancarich or Spoonville community to the lower Kankakee, it is more likely that another immigrant population from outside the study region arrived here to interact with lower Kankakee peoples or to inhabit the valley seasonally. This is supported by the stylistic and morphological influence from the Goodall community but also the Amey site's distinctiveness from other Goodall styles, morphological traits, and body values. In this case, small-scale migration and subsequent seasonal use of this region appears to be the most logical mechanism for the presence of this community in the lower Kankakee. This migration was likely composed of individuals or small family units, as Mangold (2009) suggests.

In summary, the available evidence points towards a dynamic and changing set of circumstances that led to the eventual rise of residential communities in the study region through time. There was not just one singular mechanism that contributed to the rise of Havana-Hopewell in the study region (although the earliest communities likely arose due to diffusion), but there were several mechanisms at play that led to the formation of distinct communities through time. This is a more complex, and probably more realistic, explanation than has previously been posited.

THE BUFFER ZONE: THE KALAMAZOO AND ST. JOSEPH RIVER VALLEYS

As stated above, Garland and DesJardins (2006) point out that sites in the Kalamazoo valley are more culturally affiliated with west Michigan Havana-related groups, while the St. Joseph valley is termed the "Goodall periphery," highlighting the stronger cultural affiliation with the Kankakee valley region. This research generally agrees with these assessments but was able to comment on more specific relationships between the two regions and provide new information that was not available to previous scholars.

It is probably more useful to conceive of both the St. Joseph and Kalamazoo valleys as shared "buffer zones" and/or travel regions in which Havana information was widely shared and proliferated between west Michigan and northern Indiana populations. The frequency of the number of distinct recipes unique to different communities is greatest in this region. Importantly, there is no evidence for a separate and unique residential community recipe in either of these two river valleys. Results from all early Middle Woodland Kalamazoo and St. Joseph River Valley pottery samples strongly suggest that this region was being utilized by all residential communities in this research.

As a buffer zone and a location of frequent interaction and travel between west Michigan groups and upper-middle Kankakee River Valley groups, various risk reduction strategies common to small-scale societies were likely implemented. These probably included mechanisms such as intermarriage, information exchange/informational mobility (Whallon 2006), seasonal scheduling of resources, visitation among friends and relatives (network mobility), or the reciprocal exchange of food or other material resources (Halstead and O'Shea 1989; Ingold 1987; Kelly 1995; Spielman 1986; Whallon 2006).

Early on, these activities likely centered on the use of the Moccasin Bluff and Rock Hearth sites in the St. Joseph valley and the Kalamazoo valley sites of Hart and Swan Creek. Thus, it is primarily within these two river valleys that frequent travel, interaction, gift-giving, and the use of this buffer zone likely occurred, allowing for the initial proliferation of Havana information and the long-term survival of these populations. Later, during the Middle Communities period, the Portage-Thornapple Corridor gains importance as a relatively new interaction region that facilitated the heightened spread of Havana and Hopewell information and ceramics into west Michigan. The location of this movement centered on the more interior portion of the St. Joseph valley and included the use of the Strobel, Eccles, Simpson, Schilling, and Dieffenderfer sites.

BURIAL MOUND RESULTS

Mortuary mound ceremonialism likely played a vital role in the inception and maintenance of Havana-Hopewell through time. The evidence suggests that all communities in this research participated in extralocal ceremonies involving the simultaneous interment of the dead with members of different residential communities. This practice is evident from ceramics recovered from all of the mound complexes in this research. Table 3 briefly summarizes which residential community's vessels were used in mortuary ritual at various burial mound sites throughout the study region. For example, the table reveals that four Prison Farm residential community vessels were recovered from the Norton Mounds complex and one Prison Farm-made sample was found from the Paggeot Mound. Overall, Goodall residential community-manufactured vessels were the most numerous (n = 26) in the study region, occurring at the Brooks (n = 1), Norton (n = 4), Spoonville (n = 2), Moccasin Bluff (n = 1), Mud Lake (n = 13), and Weise Mound (n = 5) sites. In descending order, the Spoonville (n = 9), Jancarich (n =6), Prison Farm (n = 5), 12MR4 (n = 5), and Stillwell (n = 4) residential communities also participated in

mortuary ritual at various burial mound sites in west Michigan and northwest Indiana. Note that the Amey residential community is excluded here because no Amey recipes were found in ceramic samples from burial mounds in this research (perhaps due to its relatively late temporal appearance).

The use of mortuary sites by multiple residential communities is in agreement with results deriving from other recent Middle Woodland studies in Ohio and Illinois (e.g., Carr 2008a; Carr and Case 2006a; Case and Carr 2008; Charles 1995). Burial mounds likely functioned to create new Havana-Hopewell related ties and to cement previous relationships on both the intra- and interregional spatial scales. The simple act of burying one's ancestors with those of another community not only creates a shared identity, but also unites those ancestors together in "an essentially permanent afterlife existence, thereby giving the living strong reasons for upholding the principles of alliance" (Carr 2006c:266).

CONCLUSION

This research studied over 500 Havana-Hopewellian pottery samples from roughly 56 habitation and mortuary sites in west Michigan and northwest Indiana. By using an approach that combined a technical style (focusing on the use of ceramic petrography) with a visual style analysis, the comprehensive identification of communities and their interaction and mobility patterns on multiple spatial scales was documented for the first time in the study region. It was vital to employ a bottom-up approach to first identify intraregional residential communities before examining their participation in interactions with other communities on larger spatial scales. This approach yielded results capable of addressing the ways in which various types of information (specifically socioreligious and technological ideas related to Havana-Hopewellian identity, interaction networks, and the adoption of a foreign belief system) were introduced, adopted, or incorporated into an extant cultural system. Specifically, this study was able to address long-standing (and contested) hypotheses related to the mechanism responsible for the initial adoption of Havana-Hopewell in the study region (e.g., diffusion, migration, or fission), the ambiguous cultural affiliations and importance of sites in the Kalamazoo and St. Joseph River Valleys in west Michigan, and the role of burial mounds in the integration of Hopewell-related peoples.

One of the most important findings was that the diffusion of Havana-related socioreligious information and ceramic technology is the most apt explanation for the initial spread of Havana in the study region. This scenario precludes the long-

Table 3. Residential Community Participation in Mortuary Mound Ceremonialism in Study Region.

	Burial Mound Sites											
Residential Community	Brooks	Norton	Converse	Spoonville	Paggeot	MB*1	Sumnerville	Scott	Mud Lake*2	Goodall	Weise	**Total**
Goodall	1	4		2		1			13		5	**26**
Spoonville	1			3			2				3	**9**
Jancarich	2		1				2			1		**6**
Prison Farm		4			1							**5**
12MR4				1				1	2		1	**5**
Stillwell		2							1		1	**4**
Total	4	10	1	6	1	1	4	1	16	1	10	**55**

(*1 MB = Moccasin Bluff site) (*2 Mud Lake samples were surface collected but were likely from mound contexts)

held belief that migration (or fission) accounted for the initial spread of Havana in west Michigan. The only evidence of migration in this research explains the inception of the Amey residential community during the Transitional Communities period. In this case, Amey community peoples arrived as a result of the probable small-scale migration of small family units and subsequent occupation of the lower Kankakee valley. Additionally, fission was determined to likely account for the rise of the Spoonville residential community during the Middle Communities period.

Another mechanism that probably contributed to the spread and continuing practice of a Havana-Hopewell way of life was the use of buffer zones and the sharing and scheduling of resource areas in these regions. This was observed in the Kalamazoo and St. Joseph valleys during the Early and Middle Communities periods. This type of activity likely also involved the implementation of information exchange/informational mobility, the granting of rights to resources, intermarriage, or the reciprocal exchange of food or other material goods as a form of "social storage" (Halstead and O'Shea 1989; O'Shea and Milner 2002).

The results also suggest that the social boundaries of communities in the study region were open, fluid, and probably unbounded. There was abundant evidence for the frequent movement of vessels and people within and between regions. In fact, roughly one-third (34.4%) of all Havana samples and half of all Hopewell samples were determined to be "nonlocal" in this study. This strongly suggests that intercommunity relationships were common within the study region and were probably peaceful, conforming to the "Pax Hopewelliana" model of social cooperation (Carr and Case 2006a; Hall 1977). The likely unimpeded movement over long distances observed in this research for Havana-Hopewellian peoples and pots, and the gathering of peoples from distinct communities for economic means (risk reduction, exchange of resources, seasonal scheduling of resource zones, etc.) or for various ceremonies is in agreement with studies from elsewhere in the Havana-Hopewellian world (e.g., Carr 2006c, 2006d; Case and Carr 2008; Fie 2006, 2008; Hughes 2006; Ruby 2006; Ruby and Shriner 2006; Spence and Fryer 2006; Stoltman and Mainfort 2002; Walthall, Stow, and Karson 1980). Thus, Havana-Hopewellian interactions within the study region overwhelmingly focused on the *cooperation* of these peoples for common social, religious, economic, and political purposes.

One entity which played a key role in the integration of these highly mobile and cooperative communities was the use of Havana and Hopewell vessels in mortuary rituals at burial mound sites. Evidence suggests that mortuary mound ritual participants did not derive from a limited geographic region. Instead, participants

appear to have derived from all areas of the study region, to varying degrees. It was revealed that all burial mound sites in this research were utilized by multiple residential communities, a situation which appears to have defined membership in larger regional-scale interaction networks.

In conclusion, this study holds potential to help us to better understand the spread of the Middle Woodland Havana-Hopewell phenomenon outside of the relatively more popular Illinois and Ohio "core areas." It provides a comparative case study of how Havana-Hopewell was introduced and maintained by peoples in west Michigan and northwest Indiana who lacked well-developed agriculture, craft specialization, centralized distribution, and a hierarchical social structure. It also was able to expose the different and extremely complex types of interactions and mechanisms (such as diffusion, migration, mobility, fission, buffer zones, etc.) that allowed the Havana-Hopewell phenomenon to flourish in west Michigan and northwest Indiana. Ultimately, it appears that the Middle Woodland period was significantly more dynamic and complex than has been previously envisioned for the study region.

ACKNOWLEDGMENTS

This chapter briefly summarizes findings from my dissertation research (Chivis 2016), which was primarily supported by a Doctoral Dissertation Research Improvement Grant (Award #1135612) from the National Science Foundation. Additional funds were provided by the Department of Anthropology at Michigan State University and the Nottawaseppi Huron Band of the Potawatomi's Education Department. I am indebted to the Ohio Archaeological Council (OAC) for the invitation to present a version of this chapter at the OAC's "Third Chillicothe Conference on Hopewell Archaeology." I also want to thank my dissertation committee members at Michigan State University (Jodie O'Gorman, Bill Lovis, John Norder, and Lynne Goldstein) for their guidance and contributions to my research. Thanks to James Stoltman for sharing his expertise in ceramic petrography with me and to Bill Mangold for our discussions on Hopewell within the study area. Lastly, I am grateful for Janet Brashler, who initially sparked my interests as an undergraduate student at Grand Valley State University in ceramic petrography and Havana-Hopewell in west Michigan.

NOTES

1. (http://calib.qub.ac.uk/calib/).

2. The Hart site date, an Early Woodland date, is statistically different than all three Middle Woodland groupings, and is therefore disregarded for the purposes of this chapter.

REFERENCES CITED

Arnold, Dean E. 1985. *Ceramic Theory and Cultural Process*. Cambridge University Press, Cambridge.

Bandy, Matthew S. 2004. Fissioning, Scalar Stress, and Social Evolution in Early Village Societies. *American Anthropologist* 106:322–333.

Bense, Judith. 1994. *Archaeology of the Southeastern United States: Paleoindian to World War I.* Academic Press, San Diego, California.

Bolnick, Deborah A., and David Glenn Smith. 2007. Migration and Social Structure among the Hopewell: Evidence from Ancient DNA. *American Antiquity* 72:627–644.

Brashler, Janet G. 2003. Ceramics. In *Phase III Archaeological Data Recovery for the US 131 S-Curve Realignment Project, Grand Rapids, Michigan*, Report No. R-0446, edited by M. J. Hambacher, J. G. Brashler, K. C. Egan-Bruhy, D. R. Hayes, B. Hardy, D. G. Landis, T. J. Martin, G. W. Monaghan, K. Murphy, J. A. Robertson, and D. L. Seltz, Section/Chapter 5.0, pp. 1–57. Michigan Department of Transportation, Lansing.

Brashler, Janet G., Elizabeth B. Garland, and William A. Lovis. 1994. Recent Research on Hopewell in Michigan. *Wisconsin Archeologist* 75:2–18.

Brashler, Janet G., Michael J. Hambacher, Terrance J. Martin, Kathyrn E. Parker, and James A. Robertson. 2006. Middle Woodland Occupation in the Grand River Basin of Michigan. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 261–284. University Press of Florida, Gainesville.

Brashler, Janet G., and Margaret B. Holman. 2004. Middle Woodland Adaptation in the Carolinian/Canadian Transition Zone of Western Lower Michigan. In *An Upper Great Lakes Archaeological Odyssey: Essays in Honor of Charles E. Cleland*, edited by William A. Lovis, pp. 14–29. Wayne State University Press, Detroit, Michigan.

Brashler, Janet G., Matthew R. Laidler, and Terrance J. Martin. 1998. The Prison Farm Site (20IA58): A Woodland Occupation in the Grand River Basin of Michigan. *Midcontinental Journal of Archaeology* 23:143–197.

Brown, James A. 1964. The Northeastern Extension of the Havana Tradition. In *Hopewellian Studies*, edited by Joseph R. Caldwell and Robert L. Hall, pp. 107–122. Scientific Papers 12. Illinois Archaeological Society, Springfield.

———. 1981. The Search for Rank in Prehistoric Burials. In *The Archaeology of Death*, edited by R. Chapman, I. Kinnies, and K. Randsborg, pp. 25–37. Cambridge University Press, Cambridge.

Buikstra, Jane E. 1976. *Hopewell in the Lower Illinois Valley: A Regional Study of Human Biological Variability and Prehistoric Mortuary Behavior.* Scientific Papers 2. Archeological Program. Northwestern University, Evanston, Illinois.

Buikstra, Jane E., and Douglas K. Charles. 1999. Centering the Ancestors: Cemeteries, Mounds, and Sacred Landscapes of the Ancient North American Midcontinent. In *Archaeologies of Landscape: Contemporary Perspectives*, edited by Wendy Ashmore and A. Bernard Knapp, pp. 201–228. Blackwell, Malden, Massachusetts.

Cameron, Catherine M. 2013. How People Moved among Ancient Societies: Broadening the View. *American Anthropologist* 115:218–231.

Carneiro, Robert L. 1987. Village Splitting as a Function of Population Size. In *Themes in Ethnology and Culture History: Essays in Honor of David F. Aberle*, edited by Leland Donald, pp. 94–124. Archana Publications, Meerut, India.

Carr, Christopher. 1995a. Building a Unified Middle-Range Theory of Artifact Design: Historical Perspectives and Tactics. In *Style, Society, and Person: Archaeological and Ethnological Perspectives*, edited by Christopher Carr and Jill E. Neitzel, pp. 151–170. Plenum Press, New York.

———. 1995b. A Unified Middle-Range Theory of Artifact Design. In *Style, Society, and Person: Archaeological and Ethnological Perspectives*, edited by Christopher Carr and Jill E. Neitzel, pp. 171–258. Plenum Press, New York.

———. 2006a. Salient Issues in the Social and Political Organizations of Northern Hopewellian Peoples: Contextualizing, Personalizing, and Generating Hopewell. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 73–118. Springer, New York.

———. 2006b. The Question of Ranking in Havana Hopewellian Societies: A Retrospective in Light of Multi-Cemetery Ceremonial Organization. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 238–257. Springer, New York.

———. 2006c. The Tripartite Ceremonial Alliance among Scioto Hopewellian Communities and the Question of Social Ranking. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 258–338. Springer, New York.

———. 2006d. Rethinking Interregional Hopewellian "Interaction." In *Gathering Hopewell: Society, Ritual, and Ritual Interaction,* edited by Christopher Carr and D. Troy Case, pp. 575–623. Springer, New York.

———. 2008. Settlement and Communities. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*, edited by D. Troy Case and Christopher Carr, pp. 101–150. Springer, New York.

Carr, Christopher, and D. Troy Case (editors). 2006. *Gathering Hopewell: Society, Ritual, and Ritual Interaction*. Springer, New York.

Carr, Christopher, and Jean-Christophe Komorowski. 1995. Identifying the Mineralogy of Rock Temper in Ceramics Using X-Radiography. *American Antiquity* 60:723–749.

Carr, Christopher, and Robert F. Maslowski. 1995. Cordage and Fabrics: Relating Form, Technology, and Social Processes. In *Style, Society, and Person: Archaeological and Ethnological Perspectives*, edited by Christopher Carr and Jill E. Neitzel, pp. 297–343. Plenum Press, New York.

Case, D. Troy, and Christopher Carr (editors). 2008. *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*. Springer, New York.

Charles, Douglas K. 1995. Diachronic Regional Social Dynamics: Mortuary Sites in the Illinois Valley/American Bottom Region. In *Regional Approaches to Mortuary Analysis*, edited by Lane A. Beck, pp. 77–99. Plenum Press, New York.

Chivis, Jeff. 2016. The Introduction of Havana-Hopewell in West Michigan and Northwest Indiana: An Integrative Approach to the Identification of Communities, Interaction Networks, and Mobility Patterns. Unpublished PhD dissertation, Department of Anthropology, Michigan State University, East Lansing.

Chivis, Jeffrey A., and Janet G. Brashler. 2007. Middle Woodland Features at the Prison Farm Site, 20IA58. Paper presented to the 45th Annual Midwest Archaeological Conference, South Bend, Indiana.

Cowan, C. Wesley. 1978. Prehistoric Use and Distribution of Maygrass in Eastern North America: Cultural and Phytogeographical Implications. In *The Nature and Status of Ethnobotany*, edited by Richard I. Ford, pp. 263–288. Anthropological Papers 67. Museum of Anthropology, University of Michigan, Ann Arbor.

Dancey, William S., and Paul J. Pacheco. 1997. A Community Model of Ohio Hopewell Settlement. In *Ohio Hopewell Community Organization*, edited by William S. Dancey and Paul J. Pacheco, pp. 3–40. Kent State University Press, Kent, Ohio.

———. 2006. Integrating Mortuary and Settlement Data on Ohio Hopewell Society. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 3–25. University Press of Florida, Gainesville.

Di Caprio, Ninina Cuomo, and Sarah J. Vaughan. 1993. An Experimental Study in Distinguishing Grog (Chamotte) from Argillaceous Inclusions in Ceramic Thin Sections. *Archeomaterials* 7:21–40.

Dobres, Marcia-Anne, and Christopher R. Hoffman. 1994. Social Agency and the Dynamics of Prehistoric Technology. *Journal of Archaeological Method and Theory* 1:211–258.

Faulkner, Charles H. 1960. *Hopewellian and Middle Woodland Occupation of the Kankakee Valley*. Unpublished report on file at the Glenn A. Black Laboratory of Archaeology, Indiana University, Bloomington.

———. 1961. *An Archaeological Survey of Marshall County*. Indiana Historical Bureau, Indianapolis.

Fie, Shannon M. 2006. Visiting in the Interaction Sphere: Ceramic Exchange and Interaction in the Lower Illinois Valley. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 427–445. University Press of Florida, Gainesville.

———. 2008. Middle Woodland Ceramic Exchange in the Lower Illinois Valley. *Midcontinental Journal of Archaeology* 33:5–40.

Flanders, Richard E. 1977. Some Observations on the Goodall Focus. In *For the Director: Essays in Honor of James B. Griffin*, edited by Charles E. Cleland, pp. 144–151. Anthropological Papers 611. Museum of Anthropology, University of Michigan, Ann Arbor.

———. 1979. New Evidence for Hopewell in Southwestern Michigan. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi B. Greber, pp. 113–114. Kent State University Press, Kent, Ohio.

Ford, Richard I. 1979. Gathering and Gardening: Trends and Consequences of Hopewell Subsistence Strategies. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi B. Greber, pp. 234–238. Kent State University Press, Kent, Ohio.

Fortier, Andrew C. 2006. The Land between Two Traditions: Middle Woodland Societies of the American Bottom. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 328–338. University Press of Florida, Gainesville.

Fortier, Andrew C., Thomas O. Maher, Joyce A. Williams, Michael C. Meinkoth, Kathryn E. Parker, and Lucretia S. Kelly. 1989. *The Holding Site: A Hopewell Community in the American Bottom*. American Bottom Archaeology FAI-270 Site Reports, Vol. 19. University of Illinois, Urbana.

Galaty, Michael L. 2008. Ceramic Petrography and the Classification of Mississippi's Archaeological Pottery by Fabric: A GIS Approach. In *Time's River: Archaeological Syntheses from the Lower Mississippi River Valley*, edited by Janet Rafferty and Evan Peacock, pp. 243–273. University of Alabama Press, Tuscaloosa.

Garland, Elizabeth B., and Arthur L. DesJardins. 1995. The Strobel Site (20SJ180): A Havana Middle Woodland Encampment on the Prairie River in Southwestern Michigan. *The Michigan Archaeologist* 1:1–40.

———. 2006. Between Goodall and Norton: Middle Woodland Settlement Patterns and Interaction Networks in Southwestern Michigan. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 227–260. University Press of Florida, Gainesville.

Gibson, Jon L., and J. Richard Shenkel. 1988. Louisiana Earthworks: Middle Woodland and Predecessors. In *Middle Woodland Settlement and Ceremonialism in the Mid-South and Lower Mississippi Valley: Proceedings of the 1984 Mid-South Archaeological Conference, Pinson Mounds, Tennessee-June, 1984*, edited by Robert C. Mainfort Jr., pp. 7–18. Archaeological Report No. 22. Mississippi Department of Archives and History, Jackson.

Gosselain, Olivier P. 1998. Social and Technical Identity in a Clay Crystal Ball. In *The Archaeology of Social Boundaries*, edited by Miriam T. Stark, pp. 78–106. Smithsonian Institution Press, Washington.

Greber, N'omi B. 1976. Within Ohio Hopewell: Analysis of Burial Patterns from Several Classic Sites. Unpublished PhD dissertation, Case Western Reserve University, Cleveland, Ohio.

———. 1979. Variations in the Social Structure of Ohio Hopewell Peoples. *Midcontinental Journal of Archaeology* 4:35–78.

———. 1996. A Commentary on the Contexts and Contents of Large to Small Ohio Hopewell Deposits. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 150–172. Ohio Archaeological Council, Columbus.

———. 1997. Two Geometric Enclosures in the Paint Creek Valley: An Estimate of Possible Changes in Community Patterns through Time. In *Ohio Hopewell Community Organization*, edited by William S. Dancey and Paul J. Pacheco, pp. 207–229. Kent State University Press, Kent, Ohio.

Greber, N'omi B., and Katharine C. Ruhl. 1989. *The Hopewell Site: A Contemporary Analysis Based on the Works of Charles C. Willoughby*. Westview Press, Boulder, Colorado.

Gremillion, Kristen J. 1993. Crop and Weed in Prehistoric Eastern North America: The *Chenopodium* Example. *American Antiquity* 58:496–509.

Griffin, James B. 1967. Eastern North American Archaeology: A Summary. *Science* 156:175–191.

Griffin, James B., Richard E. Flanders, and Paul F. Titterington. 1970. *The Burial Complexes of the Knight and Norton Mounds in Illinois and Michigan*. Memoirs No. 2. Museum of Anthropology, University of Michigan, Ann Arbor.

Hall, Robert L. 1997. A*n Archaeology of the Soul: North American Indian Beliefs and Ritual*. University of Illinois Press, Urbana.

Halstead, Paul, and John O'Shea. 1989. Introduction: Cultural Responses to Risk and Uncertainty. In *Bad Year Economics: Cultural Responses to Risk and Uncertainty*, edited by Paul Halstead and John O'Shea, pp. 1–7. Cambridge University Press, Cambridge.

Hambacher, Michael J., James A. Robertson, Janet G. Brashler, and Debra Muller. 2003. *The Norton Mounds Site: A Description and History of a Prominent Cultural National Historic Landmark*. Report No. R-0480. Commonwealth Cultural Resources Group, Inc., Jackson, Michigan.

Hart, John P., and William A. Lovis. 2007. A Multi-Regional Analysis of AMS and Radiometric Dates from Carbonized Food Residues. *Midcontinental Journal of Archaeology* 32:201–262.

———. 2013. Reevaluating What We Know about the Histories of Maize in Northeastern North America: A Review of Current Evidence. *Journal of Archaeological Research* 21:175–216.

Hart, John P., and Bernard K. Means. 2002. Maize and Villages: A Summary and Critical Assessment of Current Northeast Early Late Prehistoric Evidence. In *Northeast Subsistence-Settlement Change: AD 700–1300*, edited by John P. Hart and C. B. Rieth, pp. 342–358. New York State Museum Bulletin 496, University of the State of New York, Albany.

Hegmon, Michelle, Margaret C. Nelson, and Mark J. Ennes. 2000. Corrugated Pottery, Technological Style, and Population Movement in the Mimbres Region of the American Southwest. *Journal of Anthropological Research* 56:217–240.

Hinsdale, Wilbert B. 1931. *An Archaeological Atlas of Michigan*. University of Michigan Press, Ann Arbor.

Hodder, Ian. 2000. Agency and Individuals in Long-Term Processes. In *Agency in Archaeology*, edited by Marcia-Anne Dobres and J. E. Robb, pp. 21–33. Routledge, London.

Hoffman, Christopher R. 1995. The Making of Material Culture-The Roles of Metal Technology in Late Prehistoric Iberia. In *The Origins of Complex Societies in Late Prehistoric Iberia*, edited by Katina T. Lillious, pp. 20–31. International Monographs in Prehistory, Ann Arbor, Michigan.

Hoffman, Christopher R., and Marcia-Anne Dobres. 1999. Conclusion: Making Material Culture, Making Culture Material. In *The Social Dynamics of Technology: Practice, Politics and World Views*, edited by Marcia-Anne Dobres and Christopher R. Hoffman, pp. 209–222. Smithsonian Institution Press, Washington.

Holman, Margaret B. 1990. The Bolthouse Site (20OT11/52) and Woodland Settlement in the Grand River Valley. In *Pilot of the Grand: Papers in Tribute of Richard E. Flanders*,

Part 1, edited by Terrance J. Cleland and Charles E. Cleland, pp. 171–190. *Michigan Archaeologist* 36:171–190.

Hughes, Richard E. 2006. The Sources of Hopewell Obsidian: Forty Years after Griffin. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 361–375. University Press of Florida, Gainesville.

Ingold, Tim. 1987 Territoriality and Tenure: The Appropriation of Space in Hunting and Gathering Societies. In *The Appropriation of Nature: Essays on Human Ecology and Social Relations*, pp. 130–164. University of Iowa Press, Iowa City.

———. 1990. Society, Nature and the Concept of Technology. *Archaeological Review from Cambridge* 9:5–17.

Jeske, Robert J. 2006. Hopewell Regional Interactions in Southeastern Wisconsin and Northern Illinois: A Core-Periphery Approach. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 285–309. University Press of Florida, Gainesville.

Johnson, Gregory. 1982. Organizational Structure and Scalar Stress. In *Theory and Explanation in Archaeology*, edited by Colin Renfrew, Michael Rowlands, and Barbara A. Segraves, pp. 389–421. Academic Press, New York.

Josephs, Richard L. 2005. Short Contribution: Applying Micromorphological Terminology to Ceramic Petrography. *Geoarchaeology: An International Journal* 20:861–865.

Kellar, James H. 1979. The Mann Site and "Hopewell" in the Lower Wabash-Ohio Valley. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi B. Greber, pp. 100–107. Kent State University Press, Kent, Ohio.

Kelly, Robert L. 1995. *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways.* Smithsonian Institution Press, Washington.

Kingsley, Robert G. 1981. Hopewell Middle Woodland Settlement Systems and Cultural Dynamics in Southern Michigan. *Midcontinental Journal of Archaeology* 6:131–178.

———. 1990. Rethinking Hopewell Ceramic Typology in Michigan. In *Pilot of the Grand: Papers in Tribute to Richard E. Flanders*, edited by Terrance J. Martin and Charles E. Cleland. *The Michigan Archaeologist* 36:211–232.

———. 1999. The Middle Woodland Period in Southern Michigan. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by John R. Halsey, pp. 148–172. Bulletin 64. Cranbrook Institute of Science, Bloomfield Hills, Michigan.

Lechtman, Heather. Style in Technology—Some Early Thoughts. In *Material Culture: Styles, Organization, and the Dynamics of Technology*, edited by Heather Lechtman and R. Merrill, pp. 3–20. 1975 Proceedings of the American Ethnological Society, West Publishers, St. Paul, Minnesota.

Lemonnier, Pierre. The Study of Material Culture Today: Toward an Anthropology of Technical Systems. *Journal of Anthropological Archaeology* 5:147–186.

———. 1990. Topsy Turvy Techniques: Remarks on the Social Representation of Techniques. *Archaeological Review from Cambridge* 9:27–37.

———. 1993a. Introduction. In *Technological Choices: Transformation in Material Cultures since the Neolithic*, edited by Pierre Lemonnier, pp. 1–35. Routledge, London.

——— (editor). 1993b. *Technological Choices: Transformation in Material Cultures since the Neolithic*. Routledge, London.

Logan, Brad. 2006. Kansas City Hopewell: Middle Woodland on the Western Frontier. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 339–358. University Press of Florida, Gainesville.

Lowman, Cherry, and Alexander Alland. 1973. *Displays of Power: Art and War among the Marings of New Guinea*. Studies 6. Museum of Primitive Art, New York.

MacNeish, Richard S. 1991. *The Origins of Agriculture and Settled Life*. University of Oklahoma Press, Norman.

Mahias, Marie-Claude. 1993. Pottery Techniques in India: Technical Variants and Social Choice. In *Technological Choices: Transformation in Material Cultures since the Neolithic*, edited by Pierre Lemonnier, pp. 157–180. Routledge, London.

Mahoney, Nancy M. 2000. Redefining the Scale of Chacoan Communities. In *Great House Communities Across the Chacoan Landscape*, edited by J. Kantner and N. M. Mahoney, pp. 19–27. Anthropological Papers of the University of Arizona 64. University of Arizona Press, Tucson.

Mainfort, Robert C., Jr. 1996. Pinson Mounds and the Middle Woodland Period in the Midsouth and Lower Mississippi River Valley. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 370–391. Ohio Archaeology Council, Columbus.

Mainfort, Robert C., Jr., and Lynne P. Sullivan. 1998. Explaining Earthen Enclosures. In *Ancient Earthen Enclosures of the Eastern Woodlands*, edited by Robert C. Mainfort Jr. and Lynne P. Sullivan, pp. 1–6. University Press of Florida, Gainesville.

Mangold, William L. 1981. Middle Woodland Ceramics in Northwestern Indiana and Western Michigan. Unpublished MA thesis, Department of Anthropology, Western Michigan University, Kalamazoo.

———. 2009. The Middle Woodland Occupations of the Kankakee River Valley and Beyond. Unpublished PhD dissertation, Department of Anthropology, Indiana University, Bloomington.

Mangold, William L., and Mark R. Schurr. 2006. The Goodall Tradition: Recent Research and New Perspectives. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 206–226. University Press of Florida, Gainesville.

McKern, W. 1942. The First Settlers of Wisconsin. *Wisconsin Magazine of History* 26:153–169.

Miller, Heather M. L. 2007. *Archaeological Approaches to Technology*. Academic Press, New York.

Morris, Craig. 1995. Symbols to Power: Styles and Media in the Inka State. In *Style, Society, and Person: Archaeological and Ethnological Perspectives*, edited by Christopher Carr and Jill E. Neitzel, pp. 419–433. Plenum Press, New York.

O'Shea, John M., and Claire McHale Milner. 2002. Material Indicators of Territory, Identity, and Interaction in a Prehistoric Tribal System. In *The Archaeology of Tribal Societies*, edited by William A. Parkinson, pp. 200–226. International Monographs in Prehistory, Ann Arbor, Michigan.

Pacheco, Paul J. 1993. Ohio Hopewell Settlement Patterns: An Application of the Vacant Center Model to Middle Woodland Period Intracommunity Settlement Variability in the Upper Licking River Valley. Unpublished PhD dissertation, Department of Anthropology, Ohio State University, Columbus.

———. 1996. Ohio Hopewell Regional Settlement Patterns. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 16–35. Ohio Archaeological Council, Columbus.

Pacheco, Paul J., and William S. Dancey. 2006. Integrating Mortuary and Settlement Data on Ohio Hopewell Society. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 3–25. University Press of Florida, Gainesville.

Post, H. D. 1881. The Rabbit River Mounds and Circles. *Michigan History and Pioneer Collections* 3:296–298.

Prahl, Earl J. 1991. The Mounds of the Muskegon. *The Michigan Archaeologist* 37:58–125.

Prufer, Olaf H. 1964. The Hopewell Cult. *Scientific American* 211:90–102.

Prufer, Olaf H., Douglas H. McKenzie, Oriol Pi-Sunyer, Hugh C. Cutler, Richard A. Yarnell, Paul W. Parmalee, and David H. Stansberry. 1965. *The McGraw Site: A Study of Hopewellian Dynamics*. Scientific Publications 4(1). Cleveland Museum of Natural History, Cleveland, Ohio.

Quimby, George I. 1941a. *The Goodall Focus: An Analysis of Ten Hopewellian Communities in Michigan and Indiana*. Prehistory Research Series 2(2). Indiana Historical Society, Indianapolis.

———. 1941b. Hopewellian Pottery Types in Michigan. *Papers of the Michigan Academy of Science, Arts, and Letters* 26:489–495.

Rappaport, Roy A. 1968. *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People*. Yale University Press, New Haven, Connecticut.

Raviele, Maria E. 2010. Assessing Carbonized Archaeological Cooking Residues: Evaluation of Maize Phytolith Taphonomy and Density through Experimental Residue Analysis. Unpublished PhD dissertation, Department of Anthropology, Michigan State University, East Lansing.

Reid, C. S. "Paddy," and Grace Rajnovich. 1991. Laurel: A Re-evaluation of the Spatial, Social and Temporal Paradigms. *Canadian Journal of Archaeology* 15:193–234.

Rice, Prudence M. 1987. *Pottery Analysis: A Sourcebook*. University of Chicago Press, Chicago.

Ruby, Bret J. 2006. The Mann Phase: Hopewellian Community Organization in the Wabash Lowland. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 190–205. University Press of Florida, Gainesville.

Ruby, Bret J., Christopher Carr, and Douglas K. Charles. 2006. Community Organizations in the Scioto, Mann, and Havana Regions: A Comparative Perspective. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 119–176. Springer, New York.

Ruby, Bret J., and Christine M. Shriner. 2006. Ceramic Vessel Compositions and Styles as Evidence of the Local and Nonlocal Social Affiliations of Ritual Participants at the Mann Site, Indiana. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 553–572. Springer, New York.

Sackett, James R. 1982. Approaches to Style in Lithic Archaeology. *Journal of Anthropological Archaeology* 1:59–112.

———. 1985. Style and Ethnicity in the Kalahari: A Reply to Wiessner. *American Antiquity* 50:154–159.

———. 1990. Style and Ethnicity in Archaeology: the Case for Isochrestism. In *The Uses of Style in Archaeology*, edited by Margaret Conkey and Christine Hastorf, pp. 32–43. Cambridge University Press, Cambridge.

Schiffer, Michael B., and James M. Skibo. 1987. Theory and Experiment in the Study of Technological Change. *Current Anthropology* 28:595–622.

Schurr, Mark R. 1997. The Bellinger Site (12SJ6) and the Origin of the Goodall Tradition. *Archaeology of Eastern North America* 25:125–142.

Skibo, James M., and Michael Brian Schiffer. 2008. *People and Things: A Behavioral Approach to Material Culture*. Springer, New York.

Smith, Bruce D. 1989. Origins of Agriculture in Eastern North America. *Science* 246:1566–1571.

———. 1992. Hopewellian Farmers of Eastern North America. In *Rivers of Change: Essays on Early Agriculture in Eastern North America*, edited by Bruce D. Smith, M. P. Hoffman, and C. W. Cowan, pp. 201–248. Smithsonian Institution Press, Washington, DC.

———. 2006. Household, Community, and Subsistence in Hopewell Research. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 491–509. University Press of Florida, Gainesville.

Spence, Michael W., and Brian J. Fryer. 2006. Hopewellian Silver and Silver Artifacts from Eastern North America: Their Sources, Procurement, Distribution, and Meanings. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 714–734. Springer, New York.

Spielmann, Katherine A. 1986. Interdependence among Egalitarian Societies. *Journal of Anthropological Archaeology* 5:279–312.

Stark, Miriam T. 1999. Social Dimensions of Technical Choice in Kalinga Ceramic Traditions. In *Material Meanings: Critical Approaches to the Interpretation of Material Culture*, edited by Elizabeth S. Chilton, pp. 24–43. University of Utah Press, Salt Lake City.

Stein, Gil J. 2002. From Passive Periphery to Active Agents: Emerging Perspectives in the Archaeology of Interregional Interaction. *American Anthropologist* 104:903–916.

Stoltman, James B. 1979. Middle Woodland Stage Communities of Southwestern Wisconsin. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi B. Greber, pp. 122–139. Kent State University Press, Kent, Ohio.

———. 1989. A Quantitative Approach to the Petrographic Analysis of Ceramic Thin Sections. *American Antiquity* 54:147–160.

———. 1991. Ceramic Petrography as a Technique for Documenting Cultural Interaction: An Example from the Upper Mississippi Valley. *American Antiquity* 56:103–120.

———. 2001 The Role of Petrography in the Study of Archaeological Ceramics. In *Earth Sciences and Archaeology*, edited by Paul Goldberg, Vance T. Holliday, and C. Reid Ferring, pp. 297–326. Kluwer Academic/Plenum, New York.

———. 2006. Reconsidering the Context of Hopewell Interaction in Southwestern Wisconsin. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 310–327. University Press of Florida, Gainesville.

———. 2015. *Ceramic Petrography and Hopewell Interaction*. University of Alabama Press, Tuscaloosa.

Stoltman, James B., and Robert C. Mainfort Jr. 2002. Minerals and Elements: Using Petrography to Reconsider the Findings of Neutron Activation in the Compositional Analysis of Ceramics from Pinson Mounds, Tennessee. *Midcontinental Journal of Archaeology* 27:1–33.

Struever, Stuart. 1964. The Hopewell Interaction Sphere in Riverine-Western Great Lakes Culture History. In *Hopewellian Studies*, edited by Joseph R. Caldwell and Robert L. Hall, pp. 86–106. Scientific Papers 12. Illinois State Museum, Springfield.

Stuiver, Minze, and Paula J. Reimer. 1993. Extended ^{14}C Database and Revised CALIB Radiocarbon Calibration Program. *Radiocarbon* 35:215–230.

Turner, Victor W. 1957. *Schism and Continuity in an African Society: A Study of Ndembu Village Life*. Manchester University Press, Manchester.

Van der Leeuw, Sander. 1993. Giving the Potter a Choice: Conceptual Aspects of Pottery Techniques. In *Technological Choices: Transformation in Material Cultures since the Neolithic*, edited by Pierre Lemonnier, pp. 238–288. Routledge, London.

Varien, Mark D. 1999. *Sedentism and Mobility in a Social Landscape*. University of Arizona Press, Tucson.

Wallaert-Petre, Helene. 2001. Learning How to Make the Right Pots: Apprenticeship Strategies and Material Culture, a Case Study in Handmade Pottery from Cameroon. *Journal of Anthropological Research* 57:471–493.

Walthall, John A., Stephen H. Stow, and Marvin J. Karson. 1980. Copena Galena: Source Identification and Analysis. *American Antiquity* 45:21–42.

Wedel, Waldo R. 1943. *Archaeological Investigations in Platte and Clay Counties, Missouri*. Bulletin 183. United States National Museum, Smithsonian Institution, Washington, DC.

Whallon, Robert. 2006. Social Networks and Information: Non-"Utilitarian" Mobility among Hunter-Gatherers. *Journal of Anthropological Archaeology* 25:259–270.

Whallon, Robert, William A. Lovis, and Robert K. Hitchcock (editors). 2011. *Information and Its Role in Hunter-Gatherer Bands*. Ideas, Debates, and Perspectives 5. Cotsen Institute of Archaeology Press, California.

Whitbread, Ian K. 1995. *Greek Transport Amphorae: A Petrological and Archaeological Study*. Fitch Laboratory Occasional Paper 4. British School at Athens, Greece.

Wilkinson, Richard G. 1971. *Prehistoric Biological Relationships in the Great Lakes Region*. Anthropological Papers No. 43. Museum of Anthropology, University of Michigan, Ann Arbor, Michigan.

Wright, Rita P. 1993. Technological Styles: Transforming a Natural Material into a Cultural Object. In *History from Things: Essays on Material Culture*, edited by W. D. Kingery and S. Luber, pp. 242–269. Smithsonian Institution Press, Washington, DC.

Wymer, DeeAnne. 1992. Trends and Disparities: The Woodland Paleoethnobotanical Record of the Mid-Ohio Valley. In *Cultural Variability in Context: Woodland Settlements of the Mid-Ohio Valley*. Midcontinental Journal of Archaeology Special Paper No. 7, edited by Mark F. Seeman, pp. 65–76. Kent State University Press, Kent, Ohio.

———. 1996. The Ohio Hopewell Econiche: Human-Land Interaction in the Core Area. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 36–52. Ohio Archaeological Council, Columbus.

———. 1997. Paleoethnobotany in the Licking River Valley, Ohio: Implications for Understanding Ohio Hopewell. In *Ohio Hopewell Community Organization*, edited by William S. Dancey and Paul J. Pacheco, pp. 153–171. Kent State University, Kent, Ohio.

Yerkes, Richard W. 2002. Hopewell Tribes: A Study of Middle Woodland Social Organization in the Ohio Valley. In *Archaeology of Tribal Societies*, edited by William A. Parkinson, pp. 227–245. International Monographs in Prehistory: Archaeological Series 15, Oxbow Books, Oxford.