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Chapter 1

Hopewellians in a Non-Hopewellian World? Interpreting the Hopewellian Domestic-Ritual Landscape at the Heckelman Site in Northcentral Ohio

Brian G. Redmond

Since the beginnings of American Archaeology, scholars have recognized distinct foci of human presence on the landscape. These locations regularly yield compelling evidence of use over many generations and often represent important places even to this day. Such “persistent places” (Schlanger 1992) represent the accumulated records of human activity, often of highly varied forms, which ranged from the mundane to the esoteric. Among the most notable of these persistent cultural landscapes in the North American Midwest are the expansive enclosures and mound constructions of the Early Woodland (Adena) and Middle Woodland (Hopewell) societies of the Middle Ohio Valley (Brose and Greber 1979; Clay 1986; Otto and Redmond 2008; Pacheco 1996; Seeman 1986; Wright and Henry 2013). These localities provide some of the most vivid examples of long-term use and undoubtedly possessed deep religious and social meanings for their original inhabitants, as well as continuing importance for modern archaeologists, Native Americans, architects, astronomers, and the public (Jones and Shiels 2016).

Less well-recognized are the persistent cultural landscapes of smaller scale, but of no less importance to local human social groups living at the periphery of

the Adena-Hopewell core areas. In the tributary drainages along the southern shore of Lake Erie, such landscapes most often include small Early and Middle Woodland mound clusters and earthworks (Belovich and Brose 1992; Bragg 2015; Brose 1974; Gramly et al. 1985; Magrath 1945; Mills 1914; Stothers 1976; Stothers et al. 1979; Whittlesey 1871). Also in this region, a singular form of meaningful place developed which manifested as small enclosures situated on high hilltop promontories. In-depth study of a small sample of these sites indicates that at least some of these places hosted human settlement of varying sizes and permanence for multiple generations over thousands of years (Belovich 1998; Redmond and Scanlan 2015; Stothers and Abel 1993, 2008). These studies in turn generate more focused questions about the nature and use of these enigmatic places and how their cultural meanings changed over time. Most recently, and in the broader archaeological context of Woodland societies to the south, the question of ritual-ceremonial versus domestic uses of such locations has garnered significant scholarly interest (Byers 2004, 2011; Cowan 2006; Dancey and Pacheco 1997; Pacheco and Dancey 2006; Yerkes 2006).

Recent multiyear investigations of one hilltop locality, the Heckelman site in northcentral Ohio (Figure 1), provide new data that acutely address such research questions. It is now clear that Heckelman is the archaeological remnant of a dramatically shifting cultural landscape; that is, the transformation from an Early Woodland (ca. 300 BC) place of spiritual power and practice, through intervening occupations, to ultimately a Late Precontact (ca. AD 1400) domestic (village) landscape of everyday living (Redmond 2016; Redmond and Scanlan 2015). The current focus of research at this site is on an intervening, Middle Woodland, occupation whose inhabitants left behind intriguing traces of Hopewellian ritualistic and domestic behaviors of a scale nearly unprecedented in the Lake Erie basin. In fact, as is argued below, this evidence for a distinct mix of ritualistic and domestic living marks this occupation as unlike any “non-Hopewellian” archaeological component yet defined for northern Ohio but also distinguishes it from most current conceptions of Ohio Hopewell residential and household life.

NON-HOPEWELLIANS IN A HOPEWELLIAN WORLD?

In the 1979 volume of the first Ohio Hopewell Conference, David Stothers, G. Michael Pratt, and Orrin C. Shane III argued for a northwestern Ohio Middle Woodland tradition that exhibited little to no evidence of interaction with the Ohio Hopewell Core (Core). Additional research caused Stothers to eventually reject the concept of a “Western Basin Middle Woodland” archaeological complex

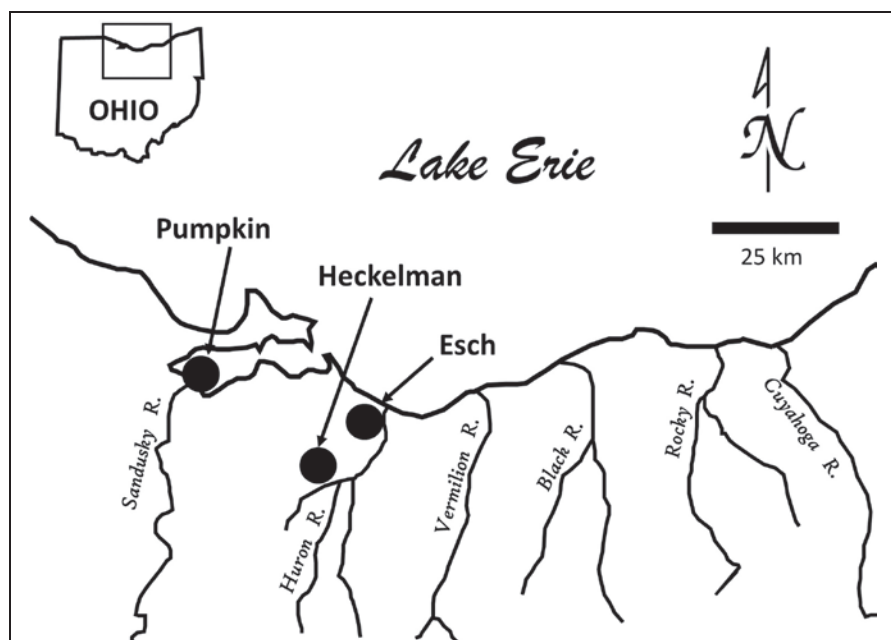


Figure 1. Map showing location of Esch, Heckelman, and Pumpkin sites in northern Ohio.

in favor of the “Western Basin Tradition” that was seen as essentially a Late Woodland (post-AD 500) cultural intrusion from Ontario (Stothers and Abel 2002). Nevertheless, the original chapter retains scholarly value, since it includes one of the only detailed descriptions of the Hopewellian Esch Phase of northcentral Ohio. This short section, most likely written by Shane, reviewed mostly unpublished archaeological data for the Esch Mounds (33ER01) and the Heckelman site (33ER14), both situated on the Huron River in Erie County, Ohio (Figure 1). The authors positioned the Esch Phase as a northern extension of the Hopewell Interaction Sphere, and one with which their Western Basin Middle Woodland neighbors “... did not choose to participate” (Stothers et al. 1979:47).

Since the publication of this chapter, professional study of the Hopewell presence in northcentral Ohio has languished. The Esch Mounds appear to have been destroyed by development and natural erosion. Shane’s excavations at Heckelman were never formally reported or published. Most subsequent discoveries have been limited to exposures of water-eroded deposits of Hopewellian material culture and features around Sandusky Bay (Redmond 2008; Stothers 1992; Stothers and Abel 1990). Such localities provide varying amounts of classic Hopewell Interaction

Sphere artifacts of copper, Flint Ridge chert, and mica. Some of these are, or were, mound sites, but many more appear to lack earthen constructions and may instead represent places of domestic rather than mortuary activity. Since most of these non-mound localities remain uninvestigated beyond surface collection, many important questions regarding the nature of Core interactions with the Sandusky Bay-Huron River region and the social changes resulting from such interactions could not be adequately addressed. This regrettable situation ultimately stimulated a renewed interest in the Heckelman site, which took the form of a cooperative research project geared to updating our understanding of this important locality in order to address questions regarding its place in the greater Hopewellian world.

Recent investigations of the Heckelman site reveal significant traces of Hopewellian Middle Woodland domestic occupation in the context of pit clusters, post mold configurations, and a midden-filled ditch. Such remains in one sense equate well with an interpretation of a residential community, perhaps similar to the sedentary hamlet model of Hopewell settlement proposed by Dancey and Pacheco (1997) for the Core (Pacheco et al., this volume). Closer examination, however, reveals that Heckelman also hosted non-domestic activities related to the production of spiritually-charged objects best suited to the implementation of ritual-ceremonial behaviors. Taken together, the domestic and ritual aspects in evidence at Heckelman point to a cultural landscape marked by seasonal occupations by local populations with clear material and ideological ties to the Core.

HOPEWELL IN THE SANDUSKY-HURON DRAINAGES

Although informally defined more than thirty years ago, Shane's Esch Phase is still the best working description of the Middle Woodland components at Esch Mounds and the Heckelman site. The Esch locality originally consisted of two sand mounds that produced classic Ohio Hopewell mortuary artifacts such as copper earspools, copper panpipes (sheaths), platform pipes, marine shell, slate gorgets and pendants, Flint Ridge bladelets and points, a few apparently local productions of Hopewell decorated ware, and an unusual "alligator" (feathered serpent?) pipe. The mounds were excavated by Emerson Greenman of the Ohio Historical and Archaeological Society in 1930 following amateur (Boy Scout) digging (Greenman 1930). Both extended and cremation burials were discovered on the mound floors and in a few subfloor graves (Case and Carr 2008:355–356). Of particular note was the identification of a large artifact scatter adjacent to the mounds (33ER02) that produced Flint Ridge bladelets and corner-notched points, slate gorget fragments, and grit-tempered pottery resembling Scioto Series, McGraw Plain and McGraw Cordmarked

ceramic types from the Core (Prufer and McKenzie 1965:19–23; Stothers et al. 1979:55). This artifact scatter likely represented a habitation area of some kind; plow-exposed pit features were noted as well during subsequent surface collections by A. G. Smith and Shane in the 1960s and 1970s (Stothers et al. 1979:55). No systematic excavation of this habitation area was carried out, and the mounds no longer exist.

As noted above, several other localities bordering Sandusky Bay produced significantly large numbers of these Hopewellian artifacts along with human remains from disturbed (inundated) contexts. These sites indicate once substantial habitation and mortuary localities (Redmond 2008:226; Stothers and Abel 2001:25). Nonsystematic surveys by avocational archaeologists have identified a few other sites in northcentral Ohio with small numbers of Flint Ridge bladelets and Lowe Cluster points (Stothers 1992:4–5).

A more comprehensive series of investigations was carried out by Shane at Heckelman between 1968 and 1974 as summer field school projects through Kent State University (Stothers et al. 1979:55–56). This work resulted in the identification of a linear ditch feature enclosing one end of the upland promontory overlooking the Huron River. The ditch was filled with stratified, organic soil containing abundant artifacts, including Flint Ridge bladelets, corner- and side-notched (Lowe Cluster) points, cordmarked pottery, and faunal remains. Further excavations inside the ditched enclosure exposed numerous features including 13 Esch Phase pits. Charcoal from one feature produced an uncalibrated date of AD 470 \pm 150. Other excavated contexts included artifacts representing occupations by Early Woodland (Leimbach Phase) and “Late Woodland” (Late Precontact, Sandusky Tradition) social groups. Shane concluded that the site’s primary occupation was a Leimbach Phase “hamlet” defended by the ditched enclosure (Stothers et al. 1979:55). Of particular note is Shane’s description of a two-meter-high mound that once “... stood immediately west of the habitation area” until it was removed by the landowner around 1929 (Stothers et al. 1979:55).

Some 34 years after Shane’s project, the Heckelman site was revisited by archaeologists from the University of Toledo and the Cleveland Museum of Natural History (CMNH), aided by volunteers of the CMNH and members of Firelands Archaeology, a nonprofit professional-avocational organization located in Amherst, Ohio. This renewed effort resulted in six consecutive field seasons of investigations utilizing geophysical survey, chemical analyses of soils, and systematic excavations (Redmond and Scanlan 2010, 2011, 2012, 2013, 2014). The results of this investigation are summarized in the following sections.

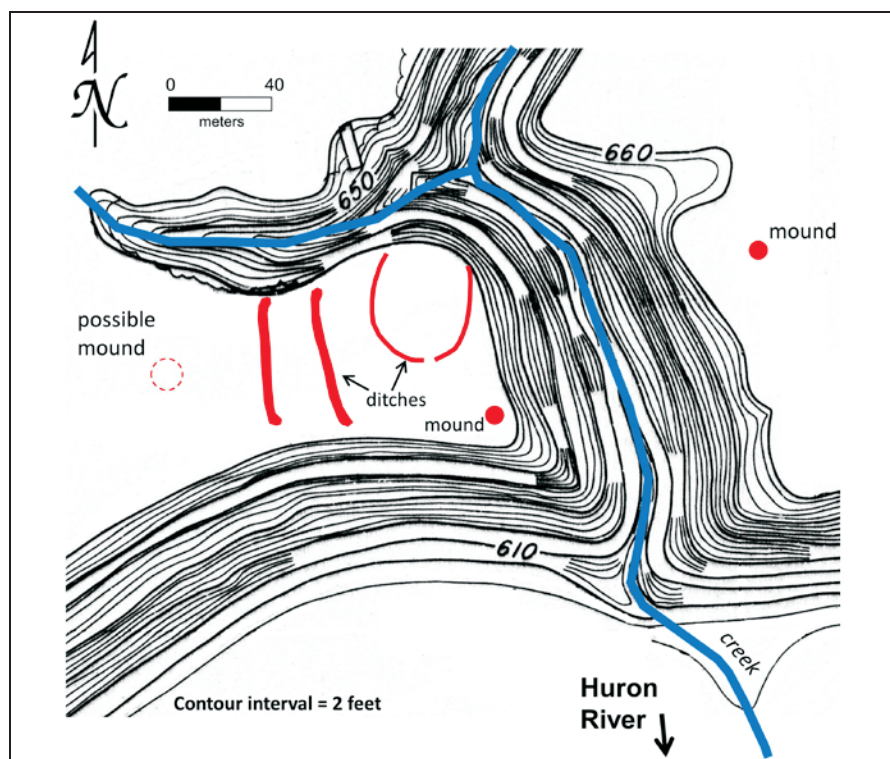


Figure 2. Topographic setting of the Heckelman site showing positions of earthwork (ditch) features and mounds.

HOPEWELL AT HECKELMAN

The physical landscape of the Heckelman site (33ER14) is dominated by a dissected section of glacial Lake Erie plain sediments that rises approximately 18 meters above the Huron River floodplain. The site is situated at the eastern end of this landform on a narrow promontory formed by the intersection of two tributary creek ravines and the 15 m high escarpment to the river (Figure 2).

The initial magnetic (gradiometer) survey of the enclosed area of the promontory by Jarrod Burks revealed not one but two parallel ditches and an unusual oval ditch enclosure (Figure 2). The most prominent use of the oval enclosure was during the Early Woodland occupation (700 to 50 cal BC) and involved ceremonies that featured the erection of large free-standing poles arranged in clusters (Redmond 2016). This same area was also heavily utilized during the Late Wood-

land (cal AD 540 to 690) and Late Precontact period (cal AD 1290 to 1450) occupations (Redmond and Scanlan 2015).

At least one small mound still exists along the eastern margin of the site overlooking the eastern creek drainage (Figure 2). The original form of this mound has been altered by farming, and the current remnant is ovoid in plan and measures approximately 7.0 m north–south by 4.6 m east–west at the base. The maximum height is between 0.3 and 0.4 m. Another mound of similar size is located across the creek ravine to the northeast (Figure 2). Since neither mound has been systematically excavated, their periods of construction and use are unknown.

The Middle Woodland component at Heckelman was recognized in the form of several small pit clusters spread out across the enclosed area of the promontory. Calibrated radiocarbon determinations place this Middle Woodland occupation within a maximum date range of cal AD 93 and 421 (Table 1). A second locus of Middle Woodland use was identified through limited testing of a surface concentration of bladelets situated 180 m west of the main excavation area (Boatman 2014). These pits contained diagnostic Hopewell material remains such as Flint Ridge bladelets, Lowe Cluster points, and mica fragments.

The best documented Middle Woodland feature concentration at Heckelman is Cluster A, which includes 15 pits situated within the Early Woodland-era oval enclosure. Significant quantities of similar Hopewell artifacts, as well as fire-cracked rock (FCR) and animal bone, were recovered from four sampled sections of the eastern parallel ditch (East Ditch). Both these apparent domestic contexts are discussed in greater detail below and then compared with what are interpreted as non-domestic, ritualized contexts.

Table 1. Middle Woodland Radiocarbon Determinations from Heckelman Site.

Lab. No.	Provenience	Material	¹⁴ C ± years BP	δ ¹³ C	2σ cal AD	2σ cal Median AD
Beta-276822	Fea. 09-36	charcoal	1790 ± 50	-24.0	93–381	237
Beta-288609	Fea. 09-37	residue	1780 ± 40	-28.6	131–376	254
Beta-290291	Fea. 10-21	charcoal	1770 ± 40	-24.9	135–379	257
Beta-290293	Fea. 10-34	nutshell	1730 ± 40	-25.9	223–403	313
Beta-288613	Fea. 10-54	charcoal	1690 ± 40	-25.1	249–421	337
Beta-335374	Fea. 12-34	nutshell	1780 ± 30	-27.5	138–334	236

Calib 7.0 (Reimer et al. 2013)

DOMESTIC CONTEXTS

In most traditional archaeological interpretations, midden-filled pits and ditches are believed to contain the remnants of everyday domestic activities such as tool-making, animal and plant processing, food preparation, and the construction and occupation of dwellings. As noted above, both the small and large pit features in Cluster A and the sampled fill from the East Ditch produced similar assemblages of Hopewell artifacts consisting primarily of Lowe Cluster points (i.e., Chesser Notched and Steuben Expanded Stemmed types [Justice 1987:208–214]) and hafted scrapers made from such points, mica fragments, and lamellar bladelets that are morphologically identical to those from the Core. Most formal tools are made of Flint Ridge chert with a minor representation of Wyandotte chert in the bladelet assemblage.

FEATURE CLUSTER A

The Cluster A pits are spread across an area of about 425 m² (Figures 3 and 4). All contained some diagnostic Hopewellian artifacts including bladelets. Although some of these features appear to be randomly distributed, there is a concentration of six pits of varying forms and contents near the center of Cluster A (Figure 4). For example, Feature 12–34 is a thermal feature, presumably a cooking pit as indicated by its contents of charred deer bone, charcoal, and burned soil (Figure 5) (but see below). A much larger thermal feature is 10–21, a deep, ovoid, flat-bottomed basin containing a basal layer of carbonized logs and heavily oxidized walls. This was by far the largest pit in Cluster A with a volume of 2.76 m³. Perhaps it was a type of earth-oven; however, typical cooking remains, such as food residues and abundant quantities of fire-cracked rock, are conspicuously absent. The tight grouping of these pits suggests enclosure within some kind of structure. Indeed, several possible alignments or arcs of large and small post molds surround this grouping; however, no definitive wall outlines are apparent.

Beyond the inner pit group are two large flat-bottomed basins, Features 11–45 and 11–46, which appear well-suited for use as storage facilities (Figures 4 and 6). Each pit contained very small amounts of pottery, lithics, and FCR, as might be expected for such a function (Figures 7A and 7B). Feature 11–45 also produced a complete Lowe Cluster point made of Flint Ridge chert (Figure 8B). Seven of the remaining pits within the cluster contained unusually large quantities of chert debitage as well as a few biface fragments; these are discussed in greater detail below.

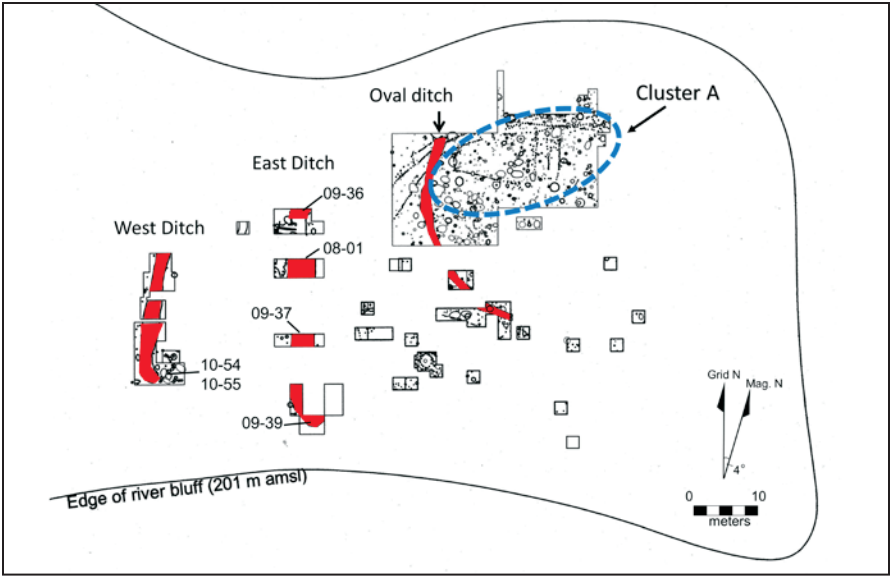


Figure 3. Heckelman site excavation plan showing locations of Cluster A pits and East Ditch features.

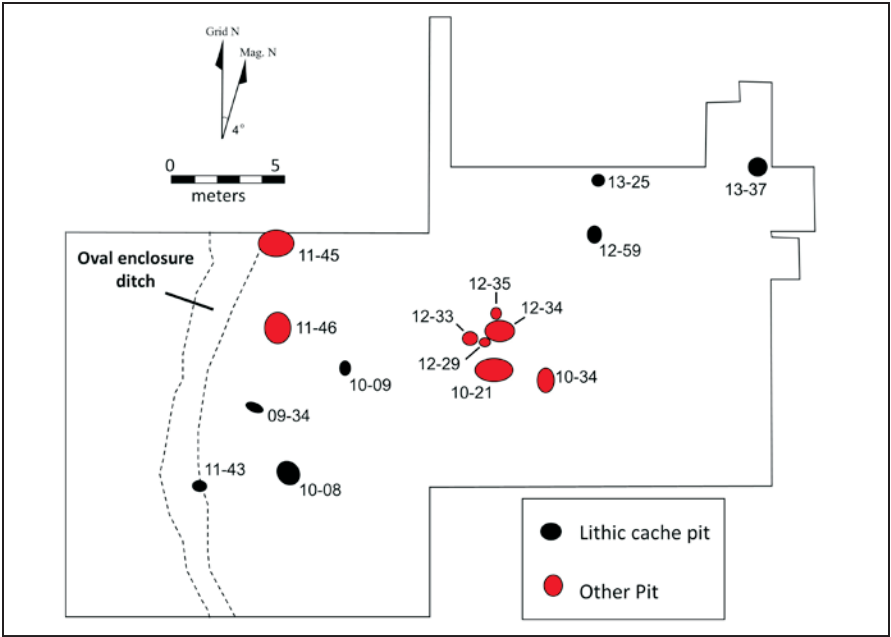


Figure 4. Location of Cluster A pits within large block excavation area (only Middle Woodland pit features are shown).



Figure 5. View of partially sectioned Feature 12-34 showing FCR concentration, charcoal staining, and bladelet in situ (at arrow).

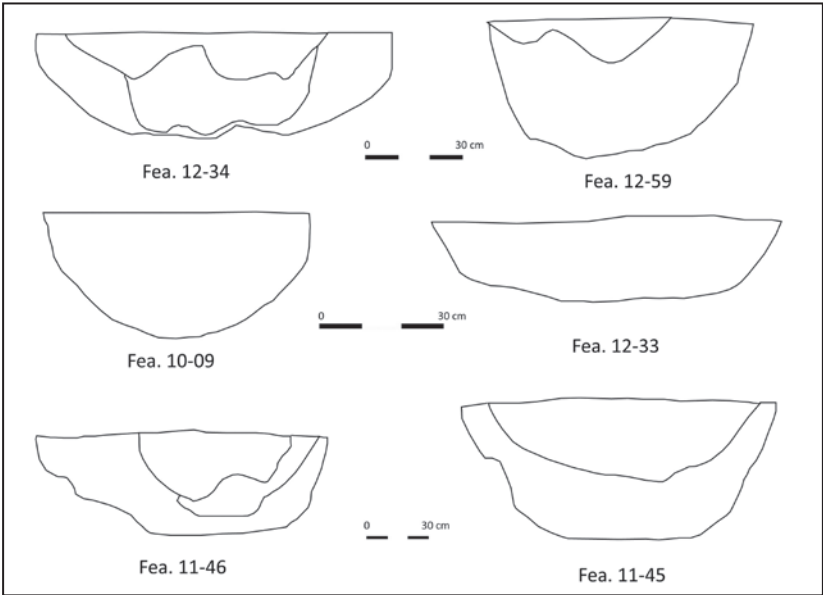


Figure 6. Cross-section drawings of selected pit features in Cluster A.

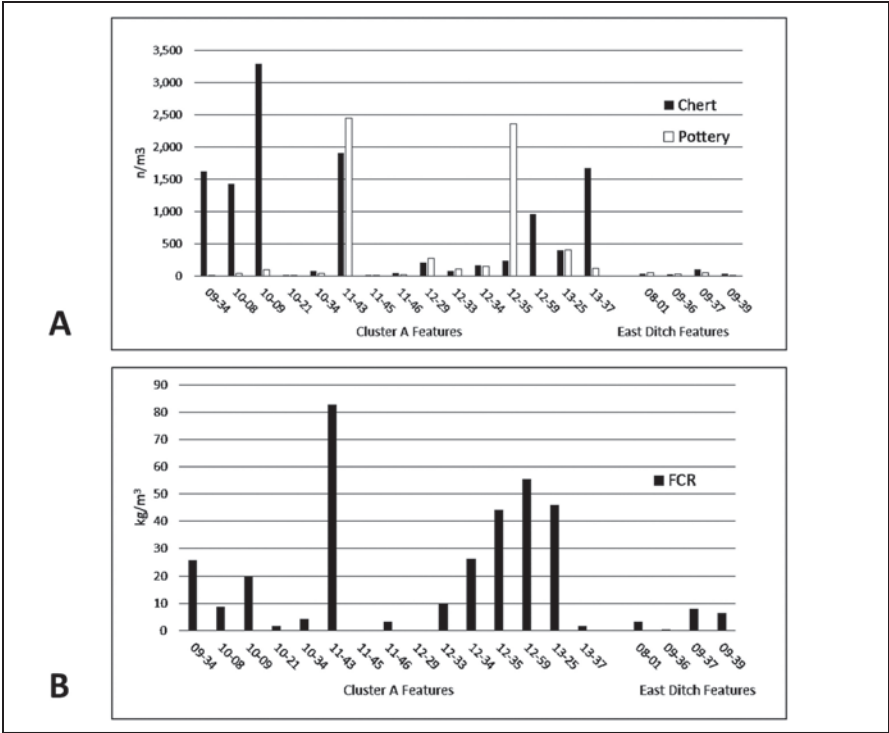


Figure 7. Density distributions of: A, chert debitage and pottery and B, fire-cracked rock in Cluster A and East Ditch features.

Densities of pottery were generally low in all Cluster A pits, with the exception of Features 11–43 and 12–35, both small basins. Feature 12–35 contained 120 body sherds of which 30 were sufficiently intact for analysis¹ (Table 2; Figure 7A). This pit also produced one rimsherd with a plain exterior rim zone above a cordmarked body. This sherd is somewhat similar in style to “subclass B” of the McGraw Cord-marked pottery type (Prufer and McKenzie 1965:20, Figure 9B).

Further analysis of the pottery assemblage from Cluster A revealed that, in addition to decoration, both surface treatment and sherd thickness were important variables for differentiating ceramic forms and identifying Hopewellian-like vessels (Matheny 2016). For example, a comparison of mean thicknesses of cord-marked and plain body sherds from these pits (i.e., only samples with $n > 4$) revealed that surface treatment was a statistically significant variable only in the case of Feature 12–34 ($t = 2.193$, $P = 0.043$). This pit contained exceptionally thin cord-

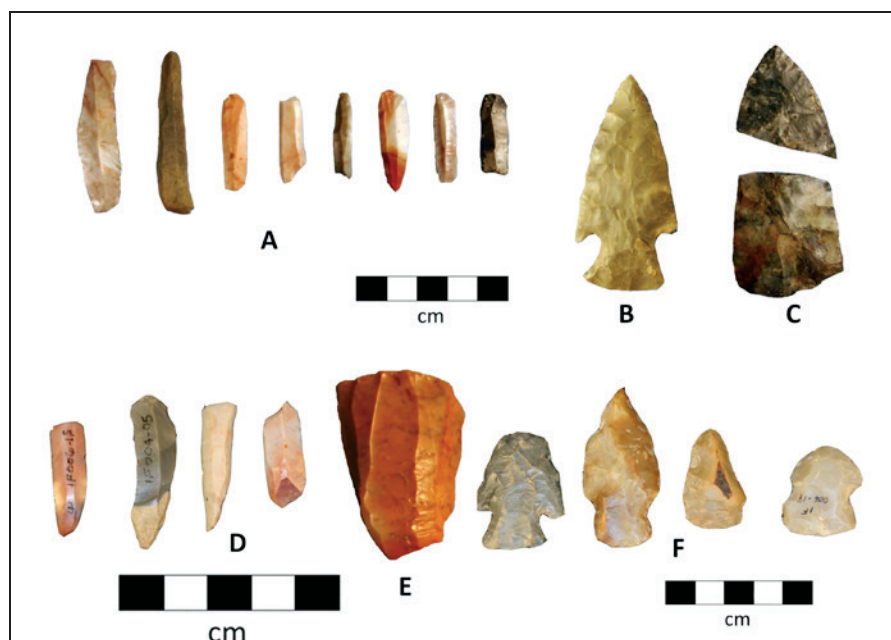


Figure 8. Selected Hopewellian artifacts from Cluster A pits (top row) and East Ditch (bottom row): A, bladelets; B, Lowe Cluster point from Feature 11-45; C, tip and base fragment from two trianguloid preforms (cache blades) from Feature 12-59; D, selected bladelets from East Ditch features; E, bladelet core from Feature 09-36; F, selected projectile points and bifaces from East Ditch features.

marked sherds compared with the sample of thicker, plain sherds from the same feature (Table 2; Figure 9C and 9D). Features 10-09 and 12-33 produced a similarly thin assemblage of cordmarked sherds (Table 2). These thin sherds resemble Scioto Series, McGraw Cordmarked and Plain sherds from the McGraw site which have mean thicknesses of 5.6 and 6.0 mm, respectively (Prufer and McKenzie 1965:19-23). Furthermore, a recent study of ceramics from numerous Hopewell sites within the Scioto Valley (Nolan et al., this volume; Pacheco et al., this volume) reveals that most earthwork and non-earthwork sites produced pottery with mean thicknesses between 5.0 and 6.0 mm. In contrast, Feature 12-35 produced considerably thicker cordmarked and plain sherds (Table 2; Figure 9A), which may reflect the continued use of Leimbach wares during the Middle Woodland period occupation.

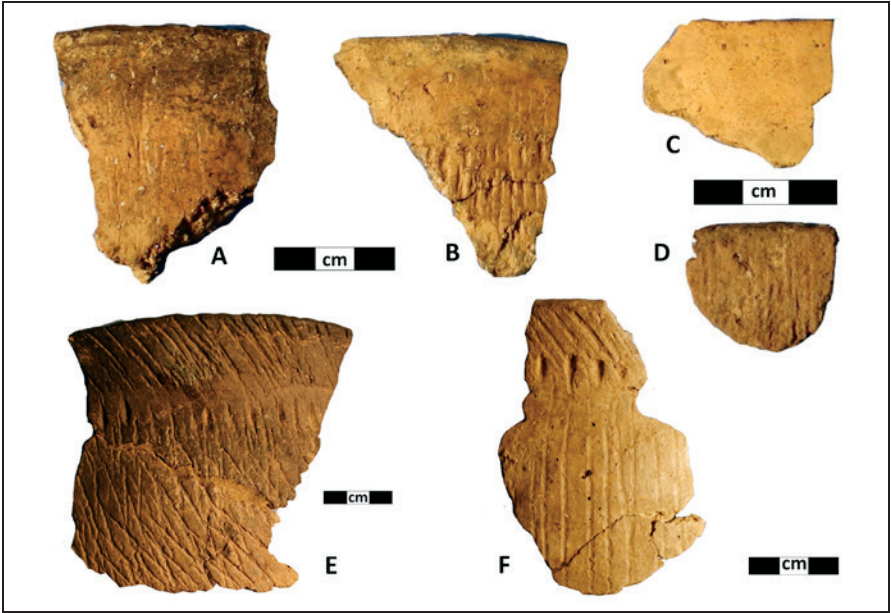


Figure 9. Selected pottery rim sherds from Middle Woodland pit and East Ditch contexts: A, Esch Cordmarked rim from Feature 12-35; B, Plain rim with cordmarked neck from Feature 12-35; C, thin plain rim and D, thin cordmarked rim from Feature 12-34; E, punctated and cordmarked rim from Feature 09-37 (East Ditch); F, *Chillicothe Incised* rim from Feature 10-55.

Table 2. Surface Treatment and Thickness Data for Selected Cluster A Pottery.

Feature No.	Total Count	Cordmarked Count (n>4)	Cordmarked Sherd Thickness (mean; std. dev.)	Plain Count (n>4)	Plain Sherd Thickness (mean; std. dev.)
10-08	13	7	9.01; 3.03	0	
10-09	11	5	5.95; 0.52	0	
11-43	45	7	7.59; 1.72	0	
11-45	13	5	8.75; 2.79	0	
11-46	20	5	10.58; 1.86	0	
12-33	16	8	5.13; 0.34	0	
12-34	64	10	5.75; 1.73	9	7.46; 1.66
12-35	120	24	10.57; 1.90	6	9.72; 1.51
13-25	53	20	12.8; 2.6	0	

Soil samples from three pits in Cluster A (Features 10–34, 12–34, 12–35) were processed by flotation. Of these, only Feature 12–34 provided relatively large quantities of botanicals. These remains include abundant hickory nutshell along with walnut, butternut, and hazelnut shells. One maygrass and 18 squash seeds were recovered. Therefore, based on this limited sample, Eastern Agricultural Complex seeds do not appear to have been an important part of the vegetal diet of the Middle Woodland inhabitants. The generally poor (acidic) soil conditions for organic preservation resulted in meager recovery of faunal remains from the Middle Woodland pit features. One exception is Feature 12–34 which contained burned bone fragments of deer, fish scales, and a long bone fragment from a small bird. Of the total 50 g sample of identifiable bone, 46 g (92%) could be classified as mammalian, 3 g (6%) avian, and 1 g (2%) fish.

EAST DITCH

Four separate sections of the East Ditch (Features 08–01, 09–36, 09–37, and 09–39) were tested (Figure 3). The ditch feature, as exposed at the base of the plow zone, had a maximum width of 200 cm and maximum depth of 110 cm. At least three distinct fill strata were apparent. The excavated sections of the East Ditch varied considerably in size and volume due to the necessary avoidance of disturbed soils and partial backfilling from the previous (possibly Shane's) excavations. In general, much of the formal stone tool assemblage from the East Ditch samples appears well-worn and even exhausted compared to the pit contents. Most bladelets are represented by fragments which show significant evidence of utilization (Figure 8D). The recovery of a bladelet core (Figure 8E), cortical flakes, and blocky fragments of raw material points to on-site manufacture of stone tools from nonlocal Flint Ridge and possibly Wyandotte cherts.

Densities of chert debitage, pottery, bone, and FCR recovered from the East Ditch features are significantly lower than for most of the Cluster A pits (Figures 7A and 7B). But when comparing artifact samples from the four ditch sections alone, it appears that deposition within the East Ditch was highly varied (Plevniak 2016). For example Features 08–01 and 09–36 produced the highest counts of Flint Ridge chert tools ($n=21$ and 16, respectively) in the forms of bladelets, points, and scrapers (Figure 8D). Conversely, these two sections contained the lowest overall densities of chert debitage compared to the other sampled sections (Features 09–37 and 09–39, Figure 10). A variety of local and nonlocal kinds of chert raw material are represented in the debitage samples from the East Ditch; however, 82.4% of the chert tools were made

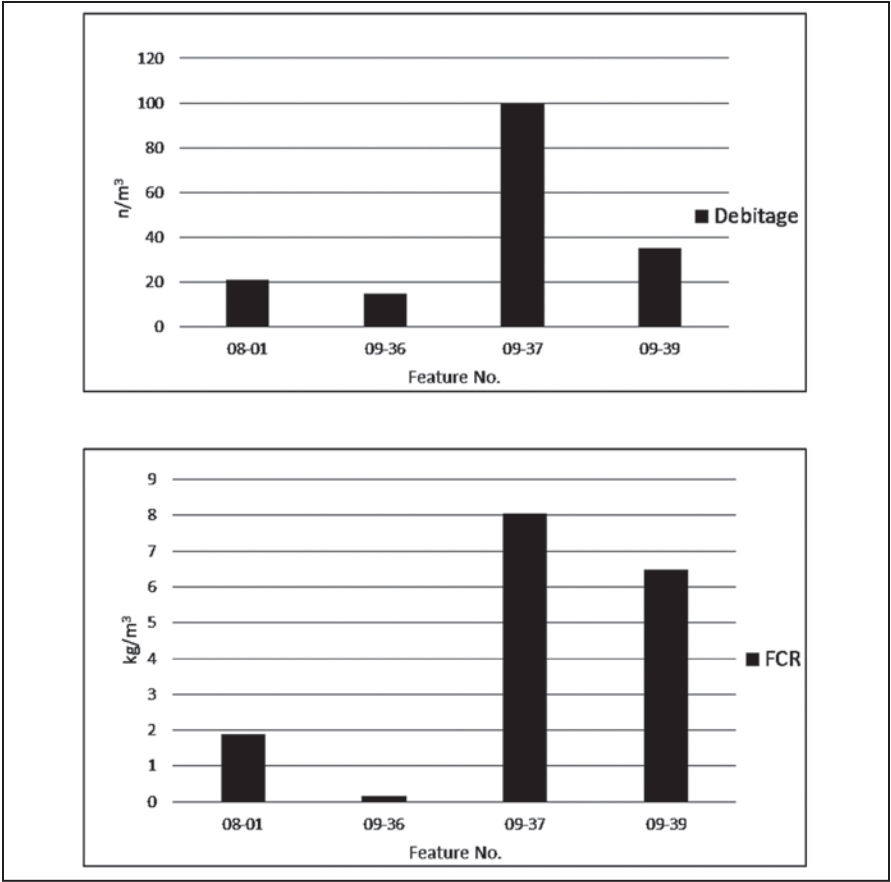


Figure 10. Density distributions of: chert debitage and fire-cracked rock in East Ditch features.

of Flint Ridge chert. Fire-cracked rock was particularly abundant in Features 09-37 and 09-39 but poorly represented in Features 08-01 and 09-36 (Figure 10). Faunal remains were sparse in all ditch sections except Feature 09-37 from which 935 g of bone was collected. This amounts to 92% of all animal bone recovered from the East Ditch excavations. Preliminary analysis of this assemblage by Jonathan Bowen indicated that deer was predominant, with minor amounts of bone from turtle, turkey, and small birds. Other notable finds from the ditch fill were several thumbnail-size fragments of mica, a section of a cut and ground canid jaw, and numerous fragments of a red-colored sediment (described below).

Pottery remains from the East Ditch were by far most abundant in Features 08–01 and 09–37. A comparison of mean sherd thicknesses with surface treatments for these two sections revealed no statistical difference between sherds with cord-marked and plain surface treatments. Combined sherd thicknesses for both feature samples ranged rather continuously from 5.1 to 9.5 mm with no discernable breaks in the distribution. However, several small fragments of one or more small, heavily smudged, sandy-paste vessels were also recovered from the ditch fill. The morphology of these sherds indicates that they are derived from extremely thin-walled vessels (i.e., <5.0 mm), which may have been small bowls. In addition, a small number of rimsherds with cordmarked, plain, or punctated exteriors were recovered from the ditch fill. The most notable of these are several conjoining fragments of the rim and neck of a vessel found near the bottom of the East Ditch in Feature 09–37. The 10 mm thick lip of this grit-tempered vessel fragment is marked by a single row of tool impressions on the inner edge; the interior surface of the rim is plain. The rim exterior exhibits a band of obliquely-oriented cordmarks just below the lip and above a plain band decorated with one horizontal row of ovoid punctates above a cordmarked neck (Figure 9E). This use of ovoid punctates to separate zoned areas of cordmarking above and below mimics the more recognizable Hopewellian motif executed on a small vessel section recovered from Feature 10–55, a Middle Woodland pit located close to the southern end of the West Ditch (Figures 3 and 9F). The walls of this vessel are rather thin and the paste is sandy. The rim area exhibits a somewhat similar motif to the rim just described in that it consists of a band of oblique incisions above a row of ovoid punctates. Cordmarking is lacking and instead the neck and shoulder is covered with vertical incisions over a plain surface. This small pot most closely resembles the Chillicothe Incised pottery type included by Prufer in his Hopewellian Series from the Core (Prufer and McKenzie 1965:26–27).

RITUALIZED CONTEXTS

A number of Middle Woodland features documented at the Heckelman site appear to represent special, non-domestic activities with ritualistic overtones. Most notable in this regard are what appear to be deliberate (i.e., *structured* [Pollard 2001; Richards and Thomas 1984]) deposits of stone tool debris. Seven of the pits within Cluster A (Features 09–34, 10–08, 10–09, 11–43, 12–59, 13–26, and 13–37) produced unusually large quantities of Flint Ridge chert debitage as well as a few biface fragments (Figure 7A). In all pits, the flakes were mixed together with

unstratified soil, which appears to reflect single episodes of deposition. The only other contents in general were small amounts of FCR, a few fractured bifaces, and a single bladelet. Length measurements of 853 complete flakes from five of these pits reveal that the majority of flakes are small: 60.4% range from 11–20 mm and 19.2% are from 1–10 mm long. Based on these observations, these pits are thought to represent the deliberate burial or caching of debitage resulting from the manufacture of late stage preforms, as well as biface knapping failures.

One of the debitage cache pits (Feature 12–59) contained a two-thirds complete preform basal fragment that reveals the likely subtriangular form of the intended product (Figure 8C). The width (35.0 mm) and thickness (7.3 mm) of this fragment fall within the metric ranges of Flint Ridge cache blades recovered from the Pumpkin site, a Hopewellian mortuary locality now inundated by Sandusky Bay (Redmond 2008, Figure 1). Measurements of the flake scars on the Feature 12–59 biface and five others of similar form found elsewhere on the site were compared to the flake size data. Of the 31 flake scars measured, 74.2% ranged from 11–20 mm and 16.1% from 0–10 mm. This appears then to indicate a direct relationship between the crafting of trianguloid bifaces (“cache blades”) and the debitage deposited in the pits.

Of particular interest is a fragment of bedrock shale that was found in another of the debitage cache pits (Feature 10–09). It has been worked into this same subtriangular shape and incised with a cross-hatched pattern (Figure 11B). This preform “effigy” may have been part of a ritual that surrounded the production of such cache blades and would, therefore, signal the sacredness surrounding not only production but also the disposal (caching) of the residues of manufacture. Such ritualized deposition is a pattern of behavior also documented at sites within the Hopewell Core (Greber and Ruhl 2000:152–153).

Some of the Cluster A pits and the East Ditch also contained significant quantities of an iron-rich sediment. These reddish-colored chunks of silt to clay-sized particles may represent raw material for the manufacture of an ochre-like pigment. The discovery of several ceramic vessel sherds with remnants of a reddish slip suggests that some of this material may have been incorporated into the ceramic production process (DeMuth et al. 2016:111–112; Redmond and Scanlan 2014:19–20). Further evidence of this practice may be represented by the recovery of a basal fragment of a pottery vessel containing what appears to be a dried quantity of this same iron-rich soil. These remains were collected from a Middle Woodland pit adjacent to the West Ditch, Feature 10–54 (Figure 3). This 48 g mass appears to conform to the interior

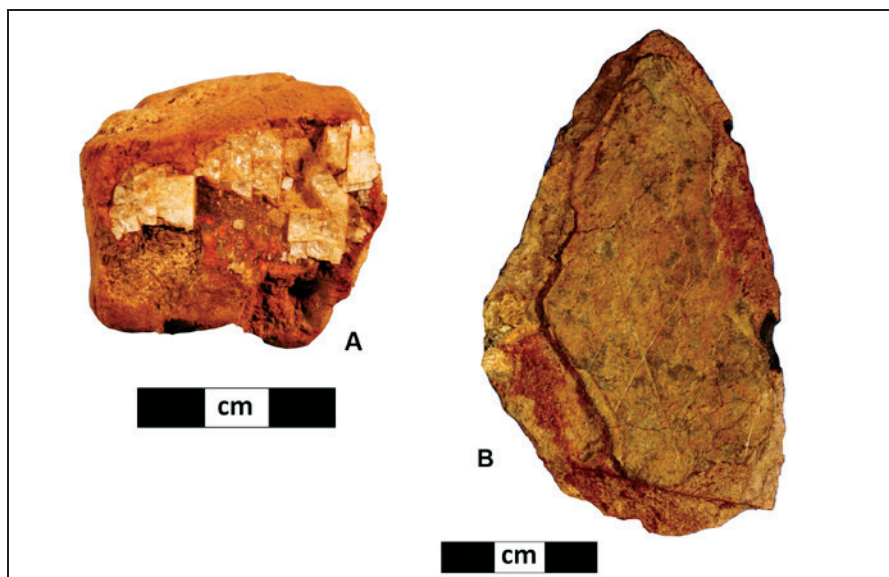


Figure 11. A, Sample of iron-rich sediment with barite crystals from Feature 08-01; B, Engraved shale bifacial effigy from Feature 10-09.

contours of the vessel bottom, as if deposited in a semi-liquid state and then dried. If so, this sediment may be evidence for the systematic production of raw material used in the production of the red clay slip. Of possible ritual significance is the fact that some of the iron-rich sediment samples found in the East Ditch also contain small crystals (Figure 11A). EDS (Energy Dispersive X-ray Spectroscopy) analysis of one crystal revealed it to be barite (barium sulfate, BaSO_4).² Such colorless to pale yellow, tabular crystals are known to naturally occur in and around dolomite concretions that form in the Huron member (Devonian) shales of north-central Ohio (Carlson 2002; Criss et al. 1988:6; Holden and Carlson 1979). Large and small concretions of this type, with iron-rich clays, are abundant in outcrops located very near the Heckelman site (Carlson 1991:84–84; Hansen 1994; Vasichko 2016). The formation of crystals in the sediment itself may have been seen by the Hopewell inhabitants as incorporating a unique spiritual power or significance to the material as well as to its collection and processing (Carr et al. 2008; Wright and Loveland 2015:149–150).

DISCUSSION

The current study is only a preliminary assessment of the Hopewellian Middle Woodland occupation at Heckelman, yet some reasonable inferences can be made

at present. Pit Cluster A is similar in configuration and form to better known Hopewell components to the south such as McGraw (Prufert 1965), Murphy (Dancey 1991) and Jennison Guard (Blosser 1996; Kozarek 1997), among others (Carskadden and Morton 1996; Ruby et al. 2005 148–152). In fact, Cluster A exhibits most of the attributes originally cited by Bruce Smith in his foundational characterization of the “Hopewellian household unit” (Smith 1992:213–214). The archaeological signature of this domestic configuration included a single wall post structure for a nuclear or extended family; pits for food storage and processing; C-shaped shelters for warm season tasks; scattered post molds; shallow sheet middens on escarpments; debris-filled erosional stream channels or gullies; and isolated interments or small clusters of human burials. Noticeably lacking at Heckelman is clear evidence for substantial post-walled dwellings; however, there are distinct similarities to documented Hopewell household components in the presence of pits for food preparation and storage, and in the non-overlapping, dispersed configuration of these features. The East Ditch, with its contents of well-worn formal tools including bladelets, animal bone, mica fragments, and fire-cracked rock, resembles descriptions of midden-filled ravines at other Hopewellian habitations such as the Smiling Dan site in the lower Illinois Valley (Smith 1992:230–233) and Lady’s Run in the Scioto Valley (Pacheco et al. 2009; this volume).

Given these affinities, it would seem that the domestic activity represented at Heckelman could most directly be interpreted as another example of either Smith’s Hopewellian household unit or the sedentary hamlet or community model of Dancey, Pacheco, and colleagues (Dancey and Pacheco 1997; Pacheco and Dancey 2006). However, these models do not account for the non-domestic, ritualistic aspects of the Heckelman Hopewellian occupation described above. Instead, these archaeological phenomena appear to point to something more complex than a simple congregation of Hopewell households. The occurrence of numerous pits containing large quantities of debitage from the manufacture of preforms/cache blades indicates that such production was a prioritized activity at the site. This may of course be the residue from making bifaces for use on-site; however, chert debitage resulting from such activity is comparatively scarce in the remaining Middle Woodland pit features recorded at the site. Furthermore, utilized examples of triangular preforms are conspicuously absent from excavated contexts and rare in the extensive surface collection of the landowner. Instead it seems more likely that at least some of the finished bifaces were taken off-site, possibly to be used in mortuary caches of the kind recorded at the Pumpkin site. If so, then the debitage cache pits

found at Heckelman take on a different character as deposits of residue from potentially ritualized craft production. Similar, concentrated deposits of numerous chert flakes and other debitage within some large Ohio Hopewell enclosures have been interpreted as specialized activity areas devoted to the production of ritual objects (Ruby et al. 2005:155). An alternative interpretation of such large artifact concentrations views them as deliberate deposits representing ritual offerings (Claassen 2015:211; 2016:278). In a similar fashion, the local production of red pigment and red slip from iron-rich sediments takes on a ritualistic essence given both the common use of red ochre in spiritual contexts across the continent, as well as the association of the Heckelman pigment with spiritually-charged (barite) crystals.

A closer look at Cluster A, reveals that several of the pits are less easy to categorize as simple subsistence- or storage-related facilities. In particular, the small cluster of features at the center of Cluster A possess characteristics which could as reasonably be interpreted as non-domestic in nature. Feature 10–21 is a large fire pit that does not bear the tell-tale traces of use as either an earth oven or typical hearth feature. A large and hot fire was kindled in this bathtub-shaped pit, but for what practical purpose remains uncertain. Only small quantities of pot sherds, flakes, and FCR, along with three bladelets, were recovered from the fill of this pit. One possible function might have been use as a cremation facility, since its volume could have accommodated a human corpse, or perhaps more likely several bundles of de-fleshed bones. However, only 0.1 g of calcined bone was recovered from the fill of Feature 10–21, and none of these three small fragments can be identified as to species.

Nearby smaller pits, Features 12–33 and 12–34, contained the remains of a few small, thin, finely cordmarked vessels in addition to the more typical, thicker *Esch Cordmarked* cooking and storage jars found elsewhere. Small, finely made vessels of the former kind are likely to have functioned as serving vessels, possibly for use in special rituals and subsequently discarded (or deposited) in pits. The same explanation might hold for the larger, thicker vessel remains also found in these pits. That is, they served as cooking vessels for the preparation of special meals associated with on-site rituals. A similar conclusion was reached for the nearby, small, pottery-filled, “North Cluster” pits associated with Early Woodland ceremonialism within the oval ditched enclosure (Redmond 2016:55).

Feature 12–34 also contained an unusual (for the Middle Woodland component) assemblage of burned bone from deer, bird, and fish, as well as mica fragments, and rare botanicals such as maygrass and squash seeds. All of this material appears to have been deposited with a concentration of charcoal from a previous

burning episode. Of course these remains might also be explained as the residue from domestic cooking; however, this unusual combination of charcoal, mica, bladelets, rare plants, and bone from animals inhabiting the water, earth, and sky may more likely reflect a ritual deposit with cosmological associations.

Finally, the midden-filled East Ditch may also represent more than a simple domestic refuse deposit. The apparent segregation of cultural materials and subsistence remains filling discrete sections of the ditch suggest that their deposition was not random. In particular, the relatively dense concentrations of Hopewell bladelets, used projectile points, and other tools in Features 08–01 and 09–36, taken in conjunction with the significant lack of manufacturing debris, FCR, or animal bone, may reflect deliberate artifact deposits rather than simply random trash discard. The same inference can be drawn from the apparent segregation of deer bone and FCR in Feature 09–37 and 09–39. It should also be remembered that the East Ditch represents part of a human-made, Early Woodland ceremonial enclosure rather than a natural erosional feature such as the midden-filled ravines at Smiling Dan and Lady's Run. As such, the Heckelman site's East Ditch likely existed as an open trench when the Middle Woodland occupants arrived. It could have been used as a handy trash receptacle, but this seems unlikely since these people would undoubtedly have recognized this ditch and the entire enclosure complex as an important, spiritually powerful, construction made by their predecessors or ancestors. More in line with the evidence is a scenario in which the Middle Woodland inhabitants systematically deposited offerings of stone tools as well as deer bone and cooking debris (pottery and FCR) derived from episodes of ritual feasting in separate sections of the open ditch. Perhaps these deposits were made as offerings to the ancestors or as a means of closing out or decommissioning the work of their predecessors. Such practices are not unprecedented in Ohio. For example, similarly segregated deposits containing pottery, FCR, lithic artifacts, debitage, and animal bone were recovered from pits within the enclosing ditch at the Dominion Company Land site in Franklin County, Ohio (Cramer 2008:294–295). In the Scioto Valley, midden-like deposits of cultural material and soil were used to cover (mantle) the former locations of seven ritual structures at the Seip Earthworks (Greber 2009a). Such acts have been proposed as the means of decommissioning this “place of ritual” (Greber 2009b:79).

I argue, then, that such site elements as the atypical Cluster A pits, the production of red pigment/slip and harvesting of crystals, the manufacture of cache blades, the presence of mica fragments, and the material deposits within the East Ditch

cannot be classified as simply domestic in nature but instead need to be examined within a much broader context more closely tied to the crafting of objects for, and the implementation of, ritual-ceremonial functions. In a narrower sense, this perspective of crafting for ritual purposes is generally accepted by other Hopewell scholars to explain the presence of mica fragments at numerous other Hopewell residential sites (Spielmann 2009). Most scholars interpret mica fragments as directly related to the production of objects destined for use in ritualistic contexts (Carr et al. 2008). Yet, the evidence from Heckelman suggests that such crafting extended to other media and was associated with other ritualized behaviors such as caching. Then the question becomes, who were the crafters involved in the production of these materials and in what social-cultural context was this work done?

It now seems clear that during the Middle Woodland period Heckelman hosted at least several short-term, residential occupations involved in both domestic and ritualistic activities, some of which may have encompassed use of the Early Woodland enclosures dating to several centuries before their arrival. As such, this locality was significantly more than the ordinary living sites of Hopewell households where seed plants were cultivated, small houses constructed, food prepared, and refuse systematically discarded.

In a series of publications, Martin Byers has proposed an explanatory framework that views “Hopewell” as the purely religious manifestation of Middle Woodland lifeways in southern Ohio. Such religious practice is embodied in heterarchically configured, mortuary cult sodalities charged with the execution of world renewal ritualism at enclosure sites (cult sodality nodal centers). Byers views these sodalities as companion rather than kin-based in nature, with auxiliary localities charged with the provisioning of cult sodality ceremonial activities and specialized production of objects utilized in the ceremonies carried out at nodal centers (Byers 2004, 2011). Since the specialized activities at the auxiliary localities would have necessarily required the provisioning of the crafters, typical domestic activities involving food procurement and preparation, storage, housing, etc. would be required. Thus, such sites will look much like typical household habitations with dispersed pit features, refuse middens, and post mold patterns but also with a preponderance of exotic lithics, bladelets, mica fragments, and other remains of crafting activities. In order to avoid ritual contamination of implements such as bladelets used to make ritually-charged craft items, systematic disposal (caching) of the residues of manufacture would be required. In addition, these localities would have been relatively short-term in nature (seasonal?) rather than fully sedentary sites.

In my view, Byers's model of Hopewell ritualism and settlement adequately accounts for some of the domestic and ritualistic activities in evidence at Heckelman and does so more fully than the sedentary hamlet model. Unlike typical domestic sites documented in the Core, Heckelman, along with Esch, stand out as anomalous against the cultural background of lower Great Lakes Woodland societies documented in the surrounding region. The strong material ties to southern Ohio Hopewell seen in the Huron River Valley mark these sites as *special* in some way, having a different purpose than simple everyday living. Whether Heckelman represents a nodal center or auxiliary locality in the context of Byers's model cannot be determined at this time; however, its presence within the greater "Non-Hopewellian" world of northern Ohio marks it as an archaeological manifestation in need of alternative explanation.

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NOTES

1. Only sherds larger than 2.0 cm in diameter and with intact interior and exterior surfaces were selected for analysis in the current study.
2. EDS analysis performed by Michelle Bebbler of Kent State University.

REFERENCES CITED

- Belovich, Stephanie J. 1998. Defensive or Sacred? An Early Late Woodland Enclosure in Northeast Ohio. In *Ancient Earthen Enclosures of the Eastern Woodlands*, edited by Robert C. Mainfort Jr. and Lynne P. Sullivan, pp. 154–180. University Press of Florida, Gainesville.
- Belovich, Stephanie J., and David S. Brose. 1992. Late Woodland Fortifications in Northern Ohio: The Greenwood Village Site. *Kirtlandia* 47:3–23. Cleveland Museum of Natural History, Cleveland, Ohio.

- Blosser, Jack K. 1996. The 1984 Excavation at 12D29s: A Middle Woodland Village in Southeastern Indiana. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 54–68. Ohio Archaeological Council, Columbus.
- Boatman, Glen. 2014. Heckelman Site (33ER14) Exploratory Trench No. 2 Excavation Report. *Ohio Archaeologist* 64(1):16–21.
- Bragg, Chloe. 2015. *Towner Mound: Creating Content and Sparking Curiosity for the Portage County Parks*. Honors thesis, Honors College, Kent State University, Kent, Ohio. https://etd.ohiolink.edu/!etd.send_file?accession=ksuhonors1430692663&disposition=inline.
- Brose, David S. 1974. The Everett Knoll: A Late Hopewellian Site in Northeastern Ohio. *Ohio Journal of Science* 74(1):36–46.
- Brose, David S., and N'omi B. Greber (editors). 1979. *Hopewell Archaeology: The Chillicothe Conference*. Kent State University Press, Kent, Ohio.
- Byers, A. Martin. 2004. *The Ohio Hopewell Episode: Paradigm Lost, Paradigm Gained*. University of Akron Press, Akron, Ohio.
- . 2011. *Sacred Games, Death, and Renewal in the Ancient Eastern Woodlands: The Ohio Hopewell System of Cult Sodality Heterarchies*. AltaMira Press, Lanham, Maryland.
- Carlson, Earnest H. 1991. *Minerals of Ohio*. Bulletin 69, Ohio Division of Geological Survey, Columbus.
- . 2002. Ohio Mineral Locality Index, Part 2: Concretions and Miscellaneous Occurrences. *Rocks & Minerals* 77(5):306–319.
- Carr, Christopher, Rex Weeks, and Mark Bahti. 2008. The Functions and Meanings of Ohio Hopewell Ceremonial Artifacts in Ethnohistorical Perspective. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*, edited by D. Troy Case and Christopher Carr, pp. 501–21. Springer, New York.
- Carskadden, Jeffery, and James Morton. 1996. The Middle Woodland-Late Woodland Transition in the Central Muskingum Valley of Eastern Ohio: A View from the Philo Archaeological District. In *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, edited by Paul J. Pacheco, pp. 316–338, Ohio Archaeological Council, Columbus.
- Case, D. Troy, and Christopher Carr. 2008. Ceremonial Site Locations, Descriptions, and Bibliography. In *The Scioto Hopewell and Their Neighbors: Bioarchaeological Documentation and Cultural Understanding*, edited by D. Troy Case and Christopher Carr, pp. 343–418. Springer, New York.
- Classen, Cheryl. 2015. *Beliefs and Rituals in Archaic Eastern North America: An Interpretive Guide*. University of Alabama Press, Tuscaloosa.
- . 2016. Abundant Gifts of Stone and Bone. *Midcontinental Journal of Archaeology* 41(3):274–294.
- Clay, Berle R. 1986. Adena Ritual Spaces. In *Early Woodland Archaeology*, edited by Kenneth B. Farnsworth and Thomas E. Emerson, pp. 581–595. Kampsville Seminars in Archaeology Vol. 2. Center for American Archeology, Kampsville, Illinois.
- Cowan, Frank L. 2006. A Mobile Hopewell? Questioning Assumptions of Ohio Hopewell Sedentism. In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 26–49. University Press of Florida, Gainesville.

- Cramer, Ann C. 2008. The Dominion Land Company Site: An Early Adena Mortuary Manifestation in Franklin County, Ohio. In *Transitions, Archaic and Early Woodland Research in the Ohio Country*, edited by Martha P. Otto and Brian G. Redmond, pp. 284–333. Ohio University Press, Athens, Ohio.
- Criss, R.E., G.A. Cooke, and S.D. Day. 1988. *An Organic Origin for the Carbonate Concretions of the Ohio Shale*. US Geological Survey Bulletin 1836, US Government Printing Office, Washington, D.C.
- Dancey, William S. 1991. A Middle Woodland Settlement in Central Ohio: A Preliminary Report on the Murphy Site (33LI212). *Pennsylvania Archaeologist* 61:37–72.
- 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.
- DeMuth, George B., Glenwood Boatman, William Young, Roger Edgerly, Richard Gross, and Timothy Edwards. 2016. Metz Transitional Ware (BC 300-AD 700): A Case for Cultural Continuity in North Central Ohio from the Leimbach Culture to the Sandusky Tradition. *Archaeology of Eastern North America* 44:99–130.
- Gramly, Richard M., Edward Richards, and Dave Lehberger. 1985. Excavations at the Yant Mound, Stark County, Northwestern Ohio. *Ohio Archaeologist* 35(2):13–16.
- Greber, N’omi B. 2009a. Stratigraphy and Chronology in the 1971–1977 Ohio Historical Society Field Data. *Midcontinental Journal of Archaeology* 34(1):19–52.
- . 2009b. Final Data and Summary Comments. *Midcontinental Journal of Archaeology* 34(1):171–186.
- Greber, N’omi B., and Katharine C. Ruhl. 2000. *The Hopewell Site: A Contemporary Analysis Based on the Work of Charles C. Willoughby*. Reprinted. Eastern National in cooperation with the Harvard Peabody Museum of Archaeology and Ethnology. Originally published 1989, Westview Press, Boulder, Colorado.
- Greenman, Emerson F. 1930. *The Esch Mounds, Erie Co., Ohio*. Manuscript on file, Department of Archaeology, Ohio History Connection, Columbus.
- Hansen, Michael C. 1994. Ohio Shale Concretions. *Geofacts*, No. 4. Ohio Department of Natural Resources, Division of Geological Survey, Columbus, Ohio.
- Holden, William F., and Ernest H. Carlson. 1979. Barite Concretions from the Cleveland Shale in North-Central Ohio. *Ohio Journal of Science* 79(5):227–232.
- Jones, Lindsay, and Richard D. Shiels (editors). 2016. *The Newark Earthworks: Enduring Monuments, Contested Meanings*. University of Virginia Press, Charlottesville.
- Justice, Noel D. 1987. *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States*. Indiana University Press, Bloomington.
- Kozarek, Sue Ellen. 1997. Determining Sedentism in the Archaeological Record. In *Ohio Hopewell Community Organization*, edited by William S. Dancey and Paul J. Pacheco, pp. 131–152. Kent State University Press, Kent, Ohio.
- Magrath, William H. 1945 The North Benton Mound: A Hopewell Site in Ohio. *American Antiquity* 11(1), 40–46.
- Matheny, Alicia. 2016. Heckelman Site (33ER14) Pit Cluster A Analysis. Unpublished report of analysis. Manuscript on file, Department of Archaeology, Cleveland Museum of Natural History, Cleveland, Ohio.

- Mills, William C. 1914. *Archaeological Atlas of Ohio*. Ohio State Archaeological and Historical Society, F. J. Heer, printer.
- Otto, Martha P., and Brian G. Redmond (editors). 2008. *Transitions: Archaic and Early Woodland Research in the Ohio Country*. Ohio University Press, Athens, Ohio.
- Pacheco, Paul J. 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.
- Pacheco, Paul J., Jarrod Burks, and DeeAnne Wymer. 2009. The 2007–2008 Archaeological Investigations at Lady's Run (33Ro1105). *Current Research in Ohio Archaeology 2009*, <http://www.ohioarchaeology.org>, accessed January 23, 2017.
- Pollard, Joshua. 2001. The Aesthetics of Depositional Practice. *World Archaeology* 33:315–333.
- Plevniak, Kelly L. 2016. The Heckelman Site Eastern Ditch and Flint Tool Analysis Report. Unpublished report. Manuscript on file, Dept. of Archaeology, Cleveland Museum of Natural History, Cleveland, Ohio.
- Prufer, Olaf H. 1965. *The McGraw Site: A Study in Hopewellian Dynamics*. Scientific Publications n.s. 4(1). Cleveland Museum of Natural History, Cleveland, Ohio.
- Prufer, Olaf H., and Douglas H. McKenzie. 1965. Ceramics. In *The McGraw Site, a Study in Hopewellian Dynamics*, edited by Olaf H. Prufer, pp. 18–59. Scientific Publications, n.s. 4(1). Cleveland Museum of Natural History, Cleveland, Ohio.
- Redmond, Brian G. 2008. Hopewell on the Sandusky: Analysis and Description of an Inundated Ohio Hopewell Mortuary-Ceremonial site in North-Central, Ohio. *North American Archaeologist* 28(3):189–232.
- . 2016. Connecting Heaven and Earth: Interpreting Early Woodland Nonmortuary Ceremonialism in Northern Ohio. *Midcontinental Journal of Archaeology* 41(1):41–66.
- Redmond, Brian G., and Brian L. Scanlan. 2010. A Report of Archaeological Investigations at the Heckelman Site (33Er14):2009 Season. Archaeological Research Reports No. 158. Cleveland Museum of Natural History, Cleveland, Ohio. https://www.academia.edu/7101710/a_report_of_archaeological_investigations_at_the_heckelman_site_33er14_2009_season
- . 2011. A Report of Archaeological Investigations at the Heckelman Site (33Er14):2010 Season. Archaeological Research Reports No. 159. Cleveland Museum of Natural History, Cleveland, Ohio. https://www.academia.edu/7101709/a_report_of_archaeological_investigations_at_the_heckelman_site_33er14_2010_season
- . 2012. A Report of Archaeological Investigations at the Heckelman Site (33Er14):2011 Season. Archaeological Research Reports No. 161. Cleveland Museum of Natural History, Cleveland, Ohio. https://www.academia.edu/7101711/a_report_of_archaeological_investigations_at_the_heckelman_site_33er14_2011_season
- . 2013. A Report of Archaeological Investigations at the Heckelman Site (33Er14):2012 Season. Archaeological Research Reports No. 162. Cleveland Museum of Natural History, Cleveland, Ohio. https://www.academia.edu/7101776/a_report_of_archaeological_investigations_at_the_heckelman_site_33er14_2012_season

- . 2014. A Report of Archaeological Investigations at the Heckelman Site (33Er14): 2013 Season. Archaeological Research Reports No. 164. Cleveland Museum of Natural History, Cleveland, Ohio. https://www.academia.edu/8011420/A_Report_of_Archaeological_Investigations_at_the_Heckelman_Site_33ER14_2013_Season
- . 2015. Changes in Precontact Domestic Architecture at the Heckelman Site in Northern Ohio. In *Building the Past: Precontact Wooden Post Architecture in the Ohio Valley-Great Lakes*, edited by Brian G. Redmond and Robert A. Genheimer, pp. 188–217. University Press of Florida, Gainesville.
- Reimer, P. J., E. Bard, A. Bayliss, J. W. Beck, P. G. Blackwell, C. Bronk Ramsey, C. E. Buck, H. Cheng, R. L. Edwards, M. Friedrich, P. M. Grootes, T. P. Guilderson, H. Haflidason, I. Hajdas, C. Hatté, T. J. Heaton, A. G. Hogg, K. A. Hughen, K. F. Kaiser, B. Kromer, S. W. Manning, M. Niu, R. W. Reimer, D. A. Richards, E. M. Scott, J. R. Southon, C. S. M. Turney, and J. van der Plicht. 2013. IntCal13 and MARINE13 Radiocarbon Age Calibration Curves 0–50000 Years Cal BP. *Radiocarbon* 55(4).
- Richards, Colin C., and Julian S. Thomas. 1984. Ritual Activity and Structured Deposition in later Neolithic Wessex. In *Neolithic Studies*, edited by R. Bradley and J. Gardiner, pp. 189–218. British Archaeological Reports, British Series 133. Oxford University Press, Oxford.
- Ruby, Bret J., Christopher Carr, and Douglas K. Charles. 2005. Community Organizations in the Scioto, Mann, and Havana Hopewellian Regions. In *Gathering Hopewell: Society, Ritual, and Ritual Interaction*, edited by Christopher Carr and D. Troy Case, pp. 119–176. Springer, New York.
- Schlanger, Sarah H. 1992. Recognizing Persistent Places in Anasazi Settlement Systems. In *Space, Time, and Archaeological Landscapes*, edited by J. Rossignol and L. Wandsnider, pp. 91–112. Plenum Press, New York.
- Seaman, Mark F. 1986. Adena Houses and the Implications for Early Woodland Settlement Models in the Ohio Valley. In *Early Woodland Archaeology*, edited by Kenneth Farnsworth and Thomas E. Emerson, pp. 564–580. Center for American Archaeology Press, Kampsville, Illinois.
- Smith, Bruce D. 1992. Hopewellian Farmers of Eastern North America. In *Rivers of Change: Essays on Early Agriculture in Eastern North America*, edited by Bruce D. Smith, pp. 201–248. Smithsonian Institution Press, Washington, DC.
- Spielmann, Katherine A. 2009. Ohio Hopewell Ritual Craft Production. In *In the Footprints of Squier and Davis: Archeological Fieldwork in Ross County, Ohio*, edited by Mark J. Lynott, pp. 179–209. US Department of the Interior, National Park Service, Midwest Archaeological Center, Lincoln, Nebraska.
- Stothers, David M. 1976. The Waterworks Burial Mound and Habitation Site (33-LU-6): Archaeological Investigation and Research—A Preliminary Statement. *Toledo Area Aboriginal Research Bulletin* 5(1):1–39.
- . 1992. The Baker II Site and Cultural Utilization of the Sandusky Bay Region. *Ohio Archaeologist* 42(2):4–9.
- Stothers, David M., and Timothy J. Abel. 1990. Filling the Gap: Baker I and the Green Creek Phase in Northcentral Ohio. *Ohio Archaeologist* 40(1):36–49.

- . 1993. Archaeological Reflections of the Late Archaic and Early Woodland Time Periods in the Western Lake Erie Region. *Archaeology of Eastern North America* 21:25–110.
- . 2001. Vanished Beneath the Waves: The Lost History and Prehistory of Southwestern Lake Erie Coastal Marshes. *Archaeology of Eastern North America* 29:19–46.
- . 2002. The Early Late Woodland in the Southwestern Lake Erie Littoral Region. In *Northeast Subsistence-Settlement Change AD 700–1300*, edited by J. P. Hart and C. B. Rieth, pp. 73–96. Bulletin 496, New York State Museum.
- . 2008. Early Woodland Prehistory (1000–1 BC) in the Western Lake Erie Drainage Basin. In *Transitions: Archaic and Early Woodland Research in the Ohio Country*, edited by Martha P. Otto and Brian G. Redmond, pp. 79–116. Ohio University Press, Athens.
- Stothers, David M., G. Michael Pratt, and Orrin C. Shane III. 1979. The Western Basin Middle Woodland: Non-Hopewellians in a Hopewellian World. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi B. Greber, pp. 47–58. Kent State University Press, Kent, Ohio.
- Vasichko, Joseph W. 2016. Septarian Minerals of the Huron River Near Lamereaux Road Bridge, Monroeville, Huron Co., Ohio. <http://www.vasichkominerals.com/Lamereaux1.html>, accessed January 7, 2016.
- Whittlesey, Colonel Charles. 1871. *Ancient Earth Forts of the Cuyahoga Valley, Ohio*. Western Reserve and Northern Ohio Historical Society Tracts, No. 5, Fairbanks, Benedict and Company, Cleveland, Ohio.
- Wright, Alice P., and Edward R. Henry. 2013. Emerging Approaches to the Landscapes of the Early and Middle Woodland Southeast. In *Early and Middle Woodland Landscapes of the Southeast*, edited by Alice P. Wright and Edward R. Henry, pp. 1–16. University Press of Florida, Gainesville.
- Wright, Alice P., and Erika Loveland. 2015. Ritualised Craft Production at the Hopewell Periphery: New Evidence from the Appalachian Summit. *Antiquity* 89(2015):137–153.
- Yerkes, Richard W. 2006. Middle Woodland Settlements and Social Organization. In *the Central Ohio Valley: Were the Hopewell Really Farmers?* In *Recreating Hopewell*, edited by Douglas K. Charles and Jane E. Buikstra, pp. 50–61. University Press of Florida, Gainesville.