2020

Vol. 2 Ch. 8 Moving Beyond the Question: Were the Hopewell Really Farmers? Evidence from the Hocking Valley, Ohio

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Chapter 8

Moving Beyond the Question: Were the Hopewell Really Farmers? Evidence from the Hocking Valley, Ohio

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Since the publication of the Smithsonian Institution's *Ancient Monuments of the Mississippi Valley* (Squier and Davis 1848), scholars have been fascinated by the prehistoric construction of large earthworks and mortuary centers generally associated with the Hopewell Culture. Despite considerable scholarly interest in these important structures, domestic sites culturally affiliated with these mounds and earthworks received less attention until the last half century. With excavation and analysis of the Murphy site (Dancey 1991, 1992; Dancey and Pacheco 1997; Wymer 1987, 1996), Jennison Guard (Kozarek 1987), and more recently, Brown's Bottom #1 (Kanter et al. 2015; Pacheco et al. 2009a), and Lady's Run (Pacheco et al. 2009b), a more complete picture of Ohio Hopewellian domestic life and subsistence is emerging.

Theoretical models aimed at explaining these Middle Woodland communities can be divided into two general approaches: (1) the dispersed sedentary community model (DSC) and (2) the complex foragers model (CFM). The construction of both models relies heavily on data from south and central Ohio, particularly the Licking and Scioto Valleys, and emphasizes the concept of sedentism (Pacheco 2010; Pacheco and Dancey 2006; Yerkes 2006, this volume). The neighboring

Hocking Valley has received limited attention with respect to questions concerning the lifeways of Middle Woodland populations despite its proximity to the aforementioned watersheds and early archaeological contributions from sites in the valley that established the Eastern Woodlands region as an independent center of plant domestication (Smith 1985).

This chapter provides a summary of the DSC and CFM and the archaeological expectations of each while describing recent architectural, archaeobotanical, and experimental data from the Hocking Valley to further elucidate Middle Woodland subsistence and domestic economy. Ultimately, we conclude that the archaeological evidence from domestic sites in the Hocking Valley is consistent with the expectations of the DSC and call for renewed research efforts to better understand how Hopewellian populations were managing their landscapes with respect to food production and residential stability (Rafferty 1985).

DISPERSED SEDENTARY FOOD PRODUCERS MODEL

Prufer (1965) first proposed the concept that Middle Woodland communities were *dispersed sedentary agricultural hamlets*. Since this initial assessment, Prufer's model has undergone extensive refinement by regional archaeologists to define Middle Woodland hamlets as small-sized dispersed communities (Abrams 2009; Pacheco and Dancey 2006) constructed around a central earthwork complex and practicing food production (Smith 2001; Wymer 1996, this volume). Under this model, communities subsisted on a number of domesticated annual plant species including pitseed goosefoot (*Chenopodium berlandieri* Moq. ssp. *jonesianum* Smith and Funk), marsh elder (*Iva annua* L. var. *macrocarpa* Blake), sunflower (*Helianthus annuus* var. *macrocarpus* L.), squash (*Cucurbita pepo* L. var. *ovifera* D. S. Decker), and erect knotweed (*Polygonum erectum* ssp. *watsoniae* N. G. Mueller). In addition, Middle Woodland populations cultivated maygrass (*Phalaris caroliniana* Walter) and partially supplemented their diet with foraged resources including arboreal nuts and brambles.

Increased investment in food production, as observed from archaeobotanical remains spanning from the Late Archaic period through the Middle Woodland period, has been associated with decreased mobility that culminated in the establishment of *essentially* sedentary hamlets (Weaver et al. 2011); i.e., each local residential group anchored themselves in one habitation site for several years but with the flexibility of situational movement. For the Scioto and Licking drainages of the Middle Ohio Valley, these economic trends and settlement patterns have been summarized under the Dispersed Sedentary Community model (Dancey and

Pacheco 1997; Pacheco and Dancey 2006). Middle Woodland communities meet the following characteristics according to this model:

1. Ohio Hopewell habitation sites were consistently small in size (averaging 0.45 ha), dispersed, and centered around residentially vacant ceremonial centers (Abrams 2009),
2. Communities were relatively sedentary and economically self-sufficient but tied to a larger super-regional trade network (described as the Hopewellian Interaction Sphere; Lepper 2006; Seeman 1979), and
3. Ohio Hopewellian communities were food producers that maintained numerous farming plots where native domesticated plants were grown in a swidden food system (Wymer 1997:159), and surrounding these farms, wild resources were collected and consumed (Wymer 1996; Pacheco and Dancey 2006).

COMPLEX MOBILE FORAGERS MODEL

Yerkes (2002, 2006, this volume) and others (Cowan 2006) have challenged the DSC model and offered an alternative explanation for the existing material remains at non-mortuary Middle Woodland sites. Particularly, Yerkes (2006) posed the question "Were the Hopewell really farmers?" calling for a critical reassessment of the degree to which domesticated native crops, known collectively as the Eastern Agricultural Complex (EAC), contributed to the Middle Woodland period diet. These critiques centered on three primary questions:

1. Were Middle Woodland populations more sedentary or did they instead practice routine seasonal mobility?
2. To what degree did native domesticated plants and cultigens rely on human intervention for their continued propagation?
3. Is the material evidence associated with Middle Woodland sites—including tools, architecture, and domestic features—more consistent with farming or foraging subsistence strategies?

The Complex Mobile Foragers (CMF) model has been posed as an alternative to the DSC model. Yerkes (2006) outlined the expectations of sedentary food producing communities and argued that the existing data for Ohio Hopewell do not meet these criteria. Instead, the CMF is built on the following assumptions:

1. Middle Woodland populations cultivated and harvested "weedy" annual plants that were not dependent on humans for their propagation

(Yerkes 2006:57), nor is there "evidence that the Ohio Hopewell invested substantial amounts of labor in food production activities" (Yerkes 2006:61).

2. Hopewellian habitation sites lack "substantial dwellings (which may have evidence of rebuilding), [thick middens], and numerous storage pits" (Yerkes 2006:56), which is consistent with mobile foragers.
3. Ohio Hopewell ceremonial sites were gathering places for mobile foraging populations and the "biface-dominated assemblage [of Middle Woodland sites is] suggestive of high mobility, not sedentism" (Cowan 2006:48).

In testing the explanatory power of these settlement and subsistence models for the Middle Woodland period in the Hocking Valley, this chapter compares the expectations for each model to the results of excavations and analyses of archaeological materials recovered from six sites in the Hocking Valley.

THE HOCKING VALLEY REGION

The Hocking Valley has played a significant role in our understanding of early native plant domestication in Eastern North America. Upon excavating Ash Cave in the mid-Hocking Valley, E. B. Andrews recovered over nine million *Chenopodium berilanderi* ssp. *jonesianum* fruits that were later analyzed by Smith (1985, 1992) to establish seed coat thicknesses indicative of domestication. The Ash Cave chenopod cache dates to the Middle Woodland period (ca. 230 AD; Fritz and Smith 1988), although the process of plant cultivation began much earlier in Hocking Valley prehistory (Patton and Curran 2016; Smith 1985). By the Late Archaic period (ca. 4000–700 BC), human populations within eastern North America had already domesticated native seed-bearing botanical species for consumption (Smith and Yarnell 2009).

In order to better understand the emergence of Middle Woodland community subsistence in the Hocking Valley, architectural and archaeobotanical data from six open-air sites are described (Figure 1): Monday Creek Workshop site (MCWS; 33HO413), County Home site (33AT40), Boudinot 4 site (33AT521), Taber Well site (33HO611), Patton 1 site (33HO990), and Greendale Ridgetop site (33HO369). All six sites were excavated by the Ohio University Archaeological Field School and are located in either the Monday Creek or Sunday Creek drainages. Some of these sites, as described below, date to the Late Archaic period (ca. 4000–700 BC) and Early Woodland period (ca. 700–200 BC); these sites are used here as a baseline for understanding the emergence of Middle Woodland communities and their food systems.

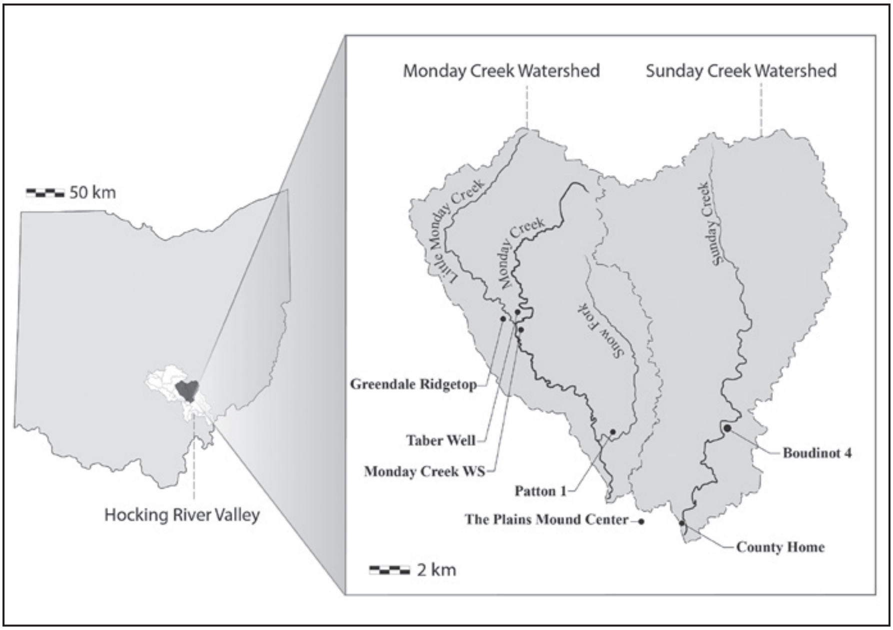

Figure 1. Location of sites described in the text.

LATE ARCHAIC PERIOD ARCHITECTURE AND SUBSISTENCE

Many of the cultural characteristics that are associated with Hopewellian populations have their origins in the preceding Late Archaic and Early Woodland periods (Abrams and Freter 2005; Pacheco and Burks 2008). The Late Archaic period throughout Ohio is generally marked by an increase in the number of sites over the preceding temporal periods (Stump et al. 2005); however, our understanding of Late Archaic domestic architecture and subsistence still remains obscure (Purtill 2009). Although post molds are regularly documented at Late Archaic sites, only twenty-one Late Archaic structures have been identified in the upper to mid-Ohio valley, until recently (Purtill 2015:13).

Excavations at the Monday Creek Workshop site (33HO413), located atop a floodplain terrace at the confluence of Monday Creek and Little Monday Creek, documented the remains of six to eight ovoid structures and associated activity areas (Patton and Buchanan 2017). These post mold outlines represent some of the most complete evidence of Late Archaic domestic dwellings for the region. The best preserved of these structures were composed of approximately 20 small posts (10–20 cm in diameter) and contained an interior area of roughly 12.5 m² (Figure

2; Patton and Buchanan 2017). A series of radiocarbon assays, primarily from carbonized walnut and hickory hulls, date the site occupation to ca. 5300–4850 RCYBP (calibrated two sigma range; 3350–2900 BC; Table 1). These structures predate Hopewell by about three millennia.

Table 1. AMS ^{14}C Assays from Sites Described in the Text.

Site	Feature	Age, Radiocarbon-calibrated years BP			Age, radiocarbon years BP	Laboratory sample no.	Material dated
		Median	1σ age range	2σ age range			
Monday Creek Workshop							
	88	4891	4889–4848	4968–4843	4330 ± 30	β386825	Charred Walnut Hull
			4959–4929				
	550	4915	4960–4927	5030–5018	4350 ± 30	β413009	Charred Hickory Hull
			4915–4900	4975–4850			
			4892–4860				
	40	4922	4960–4867	5034–5013	4360 ± 30	β383016	Charred Walnut Hull
				4978–4853			
	96	4927	4961–4873	5038–5004	4370 ± 30	β387165	Charred Hickory Hull
				4980–4856			
	U508L5	4927	4961–4873	5038–5004	4370 ± 30	β415905	Charred Wood
				4980–4856			
	515	4944	5035–5018	5041–4867	4390 ± 30	β413008	Charred Hickory Hull
			4975–4877				
	76	5104	5269–5221	5285–5159	4450 ± 30	β398203	Charred Hickory Hull

Site	Feature	Age, Radiocarbon-calibrated years BP			Age, radiocarbon years BP	Laboratory sample no.	Material dated
		Median	1σ age range	2σ age range			
			5215–5185	5142–5100			
			5119–5113	5088–4960			
			5063–5029	4926–4920			
			5019–4974	4897–4894			
	65	5172	5278–5165	5290–5036	4480 ± 30	β385817	Charred Walnut Hull
			5130–5107	5008–4979			
			5073–5046				
	Frag-ipan	—	—	—	>43500	β415048	Charred Material
County Home							
	30	3577	3679–3670	3820–3794	3340 ± 70	β169747	Charred Wood
			3641–3479	3761–3752			
				3725–3440			
				3433–3400			
	62	3448	3556–3532	3613–3326	3220 ± 70	β141235	Charred Wood
			3508–3375	3294–3253			
	47	3355	3387–3338	3444–3426	3130 ± 30	β398201	Charred Hickory Hull
			3287–3270	3407–3320			
				3308–3249			
	45	3278	3379–3180	3465–3060	3080 ± 80	β141234	Charred Wood
	47	3274	3360–3212	3440–3433	3070 ± 60	β136254	Charred Wood
				3401–3138			
				3129–3108			
				3094–3079			

Site	Feature	Age, Radiocarbon-calibrated years BP			Age, radiocarbon years BP	Laboratory sample no.	Material dated
		Median	1σ age range	2σ age range			
	48	3262	3334–3289	3350–3175	3050 ± 30	β398202	Charred Walnut Hull
			3265–3212				
	30	3215	3321–3308	3340–3286	3020 ± 30	β398200	Charred Marshel-der
			3248–3166	3271–3140			
				3126–3113			
				3093–3080			
	48	2935	3056–3052	3142–3092	2820 ± 70	β139636	Charred Wood
			3034–2864	3080–2776			
Boudinot 4							
	7	4480	4780–4770	4807–4759	4000 ± 70		Charred Wood
			4580–4404	4699–4672			
			4367–4357	4649–4246			
			4323–4317				
	16	3039	3143–3091	3209–2872	2900 ± 60	β27478	Charred Wood
			3082–2955				
	14	2722	2844–2815	2919–2910	2610 ± 80	β26743	Charred Wood
			2806–2698	2884–2434			
			2633–2616				
			2589–2537				
			2528–2511				
	11	2446	2696–2634	2723–2300	2370 ± 90	β27479	Charred Wood
			2615–2591	2250–2159			

Site	Feature	Age, Radiocarbon-calibrated years BP			Age, radiocarbon years BP	Laboratory sample no.	Material dated
		Median	1σ age range	2σ age range			
			2504–2316				
	8	2388	2652–2645	2701–2631	2340 ± 70		Charred Wood
			2490–2306	2618–2562			
			2230–2206	2542–2295			
			2192–2187	2270–2155			
	5A	2215	2307–2226	2335–2060	2190 ± 50		Charred Wood
			2208–2145				
	5B	2042	2121–1970	2299–2258	2070 ± 60	β26752	Charred Wood
			1960–1951	2159–1887			
Taber Well							
	5	2112	2291–2276	2304–2240	2130 ± 40	β178277	Charred Wood
			2153–2042	2181–1995			
	21	1962	2060–1868	2152–1737	2000 ± 80	β169752	Charred Wood
	12	1914	2002–1818	2115–1720	1960 ± 80	β178278	Charred Wood
Patton 1							
	4	1890	1931–1861	1994–1815	1940±40	β218883	Charred Wood
			1850–1828				
	32	1809	1868–1779	1892–1712	1870 ± 40	β249733	Charred Wood
			1757–1740				
Greendale Ridgetop Site							
	520	1749	1810–1754	1823–1692	1810 ± 30	β445999	Charred Che-nopod Fruits

Site	Feature	Age, Radiocarbon-calibrated years BP			Age, radiocarbon years BP	Laboratory sample no.	Material dated
		Median	1σ age range	2σ age range			
			1742–1709	1667–1628			
	500	2976	3032–3013	3067–2878	2860 ± 30	β437992	Charred Hickory Hull

Architectural energetics, a method of using ethnographic analogs to estimate the amount of effort in building different types of structures (Abrams 1989a, 1994; Abrams and LeRouge 2008; Lee 1979; Wilk and Rathje 1982), has assisted in measuring degrees of mobility and sedentism of a structure's occupants (Abrams and Patton 2015). This method assumes that populations will invest more time and energy into the construction of a domestic dwelling that they intend to use for a greater duration. Archaeological remains related to architecture that are often used to infer degrees of mobility include post mold diameters, house shape (i.e., transition from curvilinear to rectilinear; Gilman 1987), structure size, and building materials (Abrams 1989a).

The structures at Monday Creek Workshop site are most consistent with low investment dwellings that were probably constructed in less than a day by four to five people and are typical of more mobile populations (Abrams and Patton 2015:75–76). The presence of interior hearths and large exterior earth ovens used for the mass processing of arboreal nuts suggest an autumn through winter occupation of the site (Purtill 2015:26–27). Aside from large quantities of walnut and hickory nutshell at the site, a few bramble seeds, chenopods, and other plants later associated with the EAC were recovered from the site. The materials from Monday Creek Workshop site are thus largely congruent with the expectations of the CMF model.

By at least 1250 BC, Archaic populations within the Hocking Valley had adopted domesticated native plants into their subsistence system. Archaeobotanical analysis of the County Home site (33AT40), located on a small knoll at the confluence of Sunday Creek and Hocking River (Figure 1), yielded domesticated chenopod, squash, marsh elder, erect knotweed, and cultivated maygrass (Patton and Curran 2016). Direct AMS dating of a large marsh elder kernel (*Iva annua var. macrocarpa*) confirmed an age of 1260 BC (see Table 1). Other domesticated seeds from the site were affiliated with even earlier dates, ca. 1650 BC (See Table 1). Omitting samples of squash rind from Maderia Brown (Church 1995), Davisson Farm (Purtill 2009),

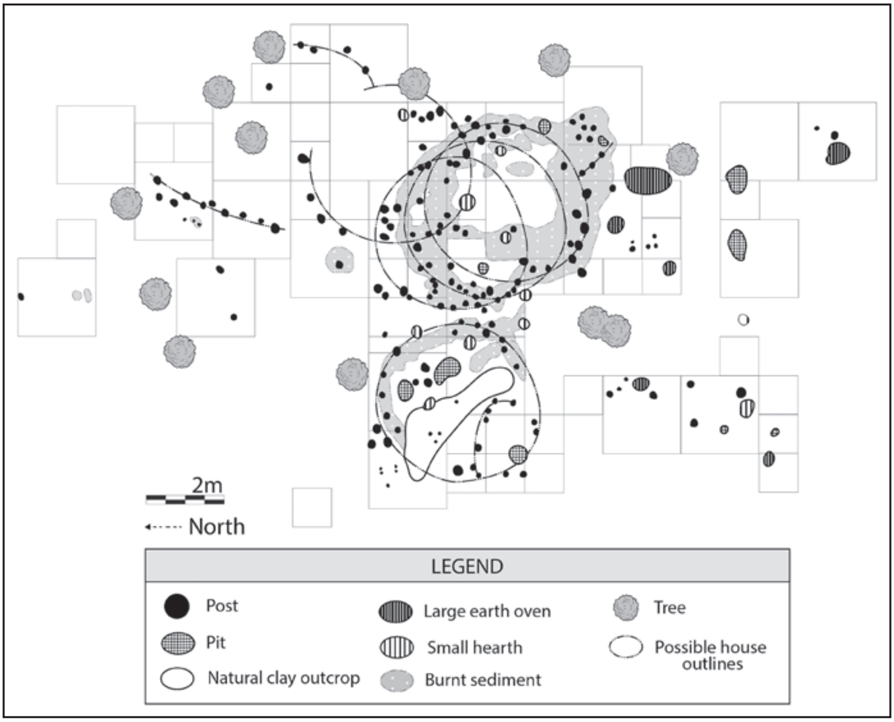

Figure 2. Map of feature locations on the Low Terrace of Monday Creek Workshop site.

and Ohio Horse Park (Purtill 2003), these archaeobotanical materials represent the earliest evidence of domesticated plants in the state of Ohio (Purtill 2009).

These data indicate that cultivation of EAC species was underway in the Hocking Valley by at least the Late Archaic period; however, based on the quantities of arboreal nut hulls, wild resources continued to play an important role in the prehistoric diet. Given that the Hocking Valley is outside of the natural growing range of many of these native plants (Patton and Curran 2016:Figure 7), their presence at the County Home site indicates that Late Archaic populations had imported these crops into the region and were managing their propagation and maintaining seed stock. These data are consistent with materials from other Late Archaic sites throughout eastern North America (Smith 2006; Smith and Yarnell 2009) that indicate communities were investing greater time and energy in food production before the beginning of the Woodland period (ca. 700 BC).

EARLY WOODLAND PERIOD DOMESTIC LIFE AND MORTUARY CEREMONIALISM

Archaeological data from the Early Woodland period in the Hocking Valley are sparse, as few sites dating to this temporal period have been excavated, omitting small ridgetop mounds (Abrams and Freter 2005; Murphy 1989). The Boudinot 4 site, excavated by Abrams (1989b; Wymer and Abrams 2003), overlaps the Late Archaic and Early Woodland temporal division and yielded thick pebble-tempered plain pottery (Patton et al. 2009), numerous hearths and pits, and ovate-stemmed points (Abrams 1989b). The site is located on a small floodplain terrace along Sunday Creek. Archaeobotanical analysis of materials from hearths and pits provided evidence of maygrass, squash, erect knotweed, marsh elder, and chenopods, indicating the EAC continued to be utilized as a dietary resource throughout the Early Woodland period. Unfortunately, the site was too damaged by historic agricultural plowing to preserve any domestic structure outlines (Abrams 1989b). However, based upon the locations of hearths, pits, and post molds, a domestic dwelling of some kind was likely present at the site in prehistory.

Immediately east of the site at the ridgetop peak, a small mound (33AT37) was constructed. These mortuary features are typical throughout the valley and are generally located atop ridges with an affiliated, open-air domestic site located below them on a floodplain terrace. Hicks et al. (2008) argued that ridgetop mounds constructed throughout the Hocking Valley, at least partially built for ancestral veneration, provide a physical and conspicuous territory marker that united geographical space with lineage identity; under this hypothesis, these structures serve to communicate ownership or use-rights of the landscape by those lineages who invested in their construction. Thus, mounds may represent ancestral presence in their surrounding geographical landscape and potentially provide a familial bond for the descendants living in the region (Charles and Buikstra 1983; Hicks et al. 2008).

Further, Waldron and Abrams (1999:106) found that, based on a sample of 42 small mounds, at least one other mound in the sample was visible from atop another, and, as these mounds were associated with domestic sites, the earthen structures served as visible markers of community presence. Ultimately, these ridgetop mounds served as a signal of territoriality and may have even been used by prehistoric populations to communicate with other communities in the vicinity.

Bowles and Choi (2013) have recently considered the coevolutionary relationship between food production and the development of private property that models many of the themes and ideas previously described by North and Thomas

(1977), as well as others (Alvard and Kuznar 2001; Crothers 2008; Dyson-Hudson and Smith 1978). At the core of this argument is the concept that foragers who are supplementing their subsistence with food production are prone to limit investment in farming, essentially relying on a "mixed" subsistence strategy, so long as property and access to resources is lax and remains open. Greater reliance on food production requires a change in the cultural perception of resource ownership as otherwise the initial investment costs of production (e.g., preparing land, sowing seeds, garden tending, etc.) would not be returned, as resource access would be open to free-riders.

Since plant foods are tied directly to the landscape from sowing until harvest, ownership of botanical resources should be evident in land claims as well as defense of the subsequent harvested product and seed retained for the next year's planting. Research in other regions of the world has indicated a transition from the communal access of resources to household autonomy with the development and implementation of farming subsistence strategies (Kuijt et al. 2011). Such a transition would be associated with moving food processing to the interior of spaces directly associated with domestic structures versus more communally located areas and/or by marking the landscape with highly visible cultural signals to indicate restricted access to managed or cultivated resources. Ridgetop burial mounds likely served this purpose as emphasis on food production continued throughout the region. It is within the cultural framework of increasing food production teamed with changing cultural concepts of land tenure and resource ownership that Hopewell culture emerged.

MIDDLE WOODLAND ARCHITECTURE AND SUBSISTENCE

The Middle Woodland period in the Scioto and Licking valleys is marked by the construction of large central mound and earthwork complexes that have come to define what most people think of as Hopewell. In the Hocking Valley, mortuary ceremonialism never reached the same climax as it did in the neighboring valleys; however, mound construction is markedly distinct from earlier regional examples. The construction of these monuments shifts from ridgetops to a central location in The Plains, an expansive terrace located between the confluences of Sunday Creek and Monday Creek along the Hocking River.

Subject to numerous excavations during the late nineteenth and early twentieth centuries, The Plains was the location of over thirty earthworks including large conical mounds, enclosures, and sacred circles. The site has been regarded as "Late Adena" (Murphy 1989) or "pre-Hopewell" (Greber 2006), despite the fact that radiometric assays have confirmed the construction of earthworks at The Plains overlaps extensively with constructions at other Middle Woodland earthwork complexes (Blazier et al. 2005:107; Greber 2006:88–92). Rather than adopt the former designations, which imply a progress-latent typological scheme (Dunnell 1980), The Plains mound center here is regarded as evidence of a Hocking Valley manifestation of Hopewell ceremonialism, representing variation within a cultural framework. Burial goods recovered from The Plains mounds, including copper beads, mica, and bear claws, are consistent with those recovered from earthworks in the Licking and Scioto river valleys, thus supporting this designation (Blazier et al. 2005; Murphy 1989).

Archaeological data from Middle Woodland period habitation sites in the Hocking Valley are more complete than those described from earlier temporal periods. Two sites, Taber Well and Patton 1, have both yielded the remnants of rectilinear domestic structures with interior and exterior activity zones for food processing and cooking. In addition, both sites yielded archaeobotanical remains consistent with food production.

The Taber Well (33HO616) site is a Middle Woodland habitation that appears to have specialized in the production of projectile points, perhaps for trade (Peoples et al. 2008). Located on a small terrace near the confluence of Monday Creek and Little Monday Creek, Taber Well yielded the remains of a rectilinear domestic structure with interior and exterior activity areas (Figures 3 and 4). Data from the site are consistent with materials from other small Middle Woodland habitations such as the Patton 1 site (Weaver et al. 2011), the Jennison Guard site (Kozarek 1997), the Murphy site (Dancey 1991), and the Wade site (Church and Ericksen 1997). Despite the high degree of site disturbance due to agricultural plowing and the planting of eastern white pines by the Citizens Conservation Corps (Peoples et al. 2008), the layout of activity zones and other aspects of the domestic economy could be inferred from the location of features, stains, and artifacts at the Taber Well site. Additionally, archaeobotanical materials are consistent with those from other Middle Woodland habitation sites (Patton 2013; Wymer 1997), and include EAC species such as domesticated chenopods and cultivated maygrass, as well as brambles and fruits, and arboreal nuts (Patton 2013).

The most complete structure outline (Structure 1) was located in the center of the site core (Figure 4). The eastern wall of this structure was not recovered due to the placement of excavation units around the locations of white pine trees. Based

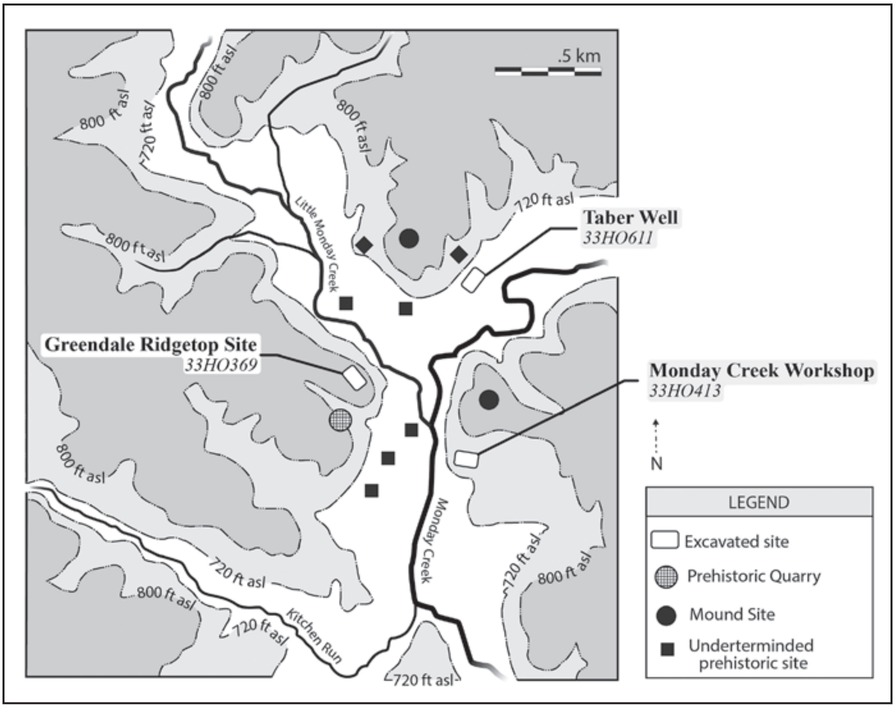

Figure 3. Site locations near the Monday Creek and Little Monday Creek confluence.

on structures identified at comparable sites (Abrams and Patton 2015; Formica et al. 2009; Weaver et al. 2011), Structure 1 at Taber Well measured approximately three meters by five to six meters with an interior area of 15 to 18 m^2. The presence of two interior posts and two exterior posts, probably used as roof support beams, and the lack of a central post suggests the structure was topped with a pitched roof constructed of thatch (Weaver et al. 2011). Presence of daub from post molds that contributed to the outline of the north, south, and western walls indicates the house was a wattle and daub structure (Patton 2013).

The posts supporting the daub walls were placed using two different methods: by digging out holes for main structural posts and placing the beams inside with sandstone or pottery chinking, and by pressing the support posts into the clay soils of the terrace and packing daub around their base. Similar behaviors have been noted at the Patton 1 site (Weaver et al. 2011) and Jonathon Creek (Schroeder 2011); they have also been observed ethnographically (Wauchope 1938:28). This phenomenon may explain the absence of posts at other Middle Woodland habitation sites

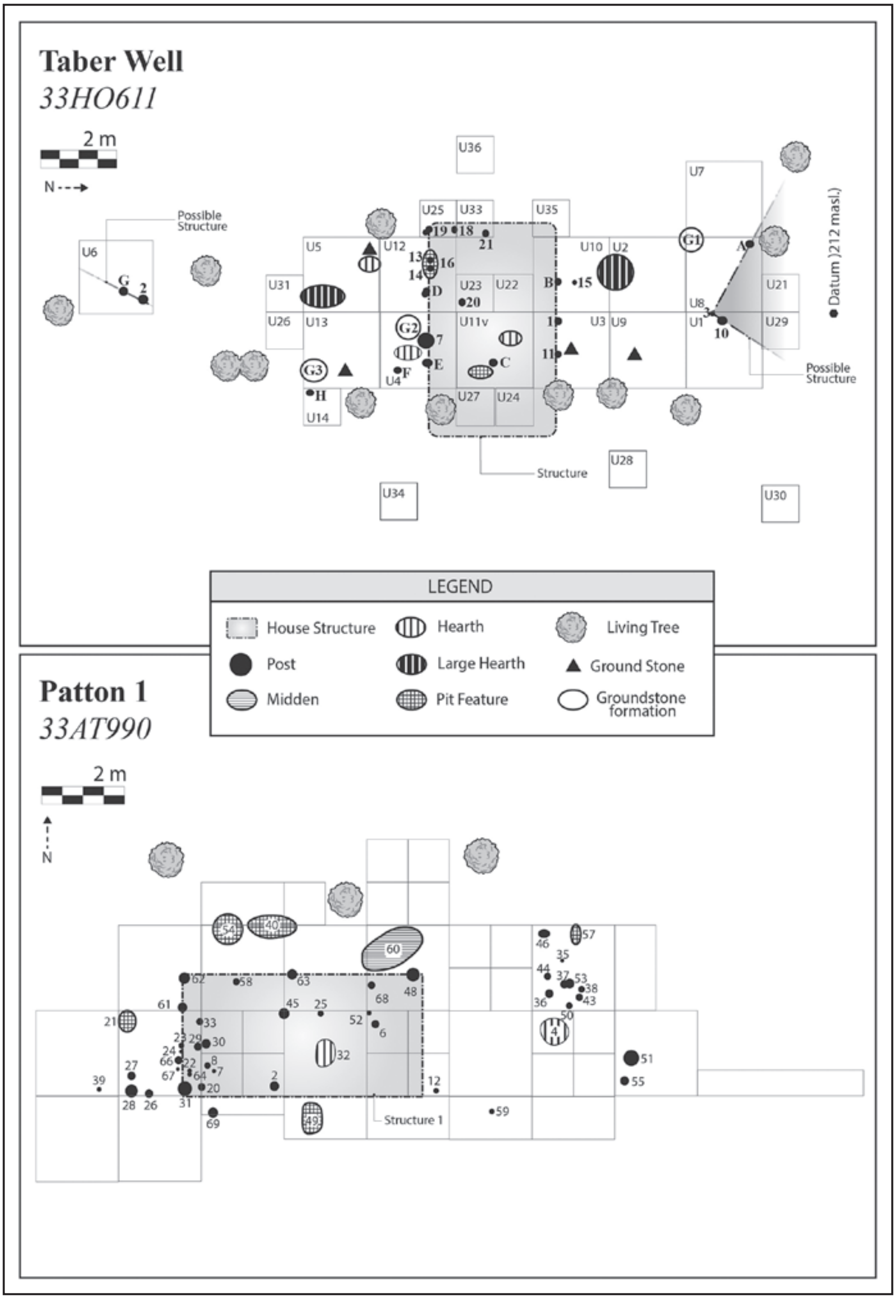

Figure 4. Maps of feature locations at the Taber Well and Patton 1 sites.

where the historic plow zone appears to have removed all traces of these features (Church and Ericksen 1997; Dancey 1991; Kozarek 1997).

Based on the characteristics of the domicile and its comparison to ethnographic analogs, Structure 1 was constructed over the course of 40 to 60 person days or by four to five people working for approximately ten days (Abrams 1989a; Abrams and Patton 2015). The energetic investment in the house construction and the presence of a central interior hearth (Feature 12) and an exterior hearth (Feature 9) located approximately 1.5 meters outside of the structure (Figure 4) indicate this domicile was intended for all-season occupation (Purtill 2015). Immediately to the south of the structure, a ground stone formation suggested the location of an activity zone for processing plant-foods. Together these features and activity zones represent a Middle Woodland *house lot*, a term applied by Weaver and colleagues (2011) to a single household economic unit.

Two other house lots were evidenced at the Taber Well site, although neither of the associated structures was as clearly preserved as Structure 1. Feature 2, located approximately seven meters south of Structure 1, was a relatively large (i.e., >20 cm in diameter) architectural post. Nearby, a large quantity of ground stones (G2) may represent a plant-food processing area associated with this house lot, and Feature 5 was potentially the associated exterior hearth. Additionally, 4.5 m to the north of Structure 1 was another relatively large architectural post (Feature 10) and two smaller posts (Feature 3 and Stain A). Another ground stone formation was associated with these posts (G1).

Altogether, the Taber Well site was probably composed of three domiciles with associated activity zones intended for the processing of plant-foods and other domestic activities. Assuming all structures were comparable in size and based on Carskadden and Morton's (2000:173) formula of 3.4 m^2 of living space per house occupant, the Taber Well community was likely composed of approximately 15 individuals, assuming that all structures were occupied simultaneously. Based on Pacheco and Dancey's (2006) generational model for community formation, the site was likely occupied by a parental unit, their offspring, and their offspring's spouses. Given this estimated population and the number of domiciles, the architecture at the Taber Well hamlet would have taken approximately 30 days to construct. Warrick (2008) estimates that long houses in the Huron and Petun territories of Ontario were occupied for 7 to 8 years depending on the post materials used (whether cedar or white pine). Milner (1999) estimates house occupation duration for architecturally similar structures in the American Bottom to be five to ten years. Assuming the lesser duration of these two analogs, the site was used for five to ten years before the Taber Well inhabitants moved on to a neighboring terrace within the catchment zone and constructed a new hamlet. Other prehistoric sites located on the terraces surrounding Taber Well may represent such hamlets (Figure 3) and are consistent with the expectations of the DSC model (Abrams 2009; Pacheco and Dancey 2006).

The site layout and spatial organization of Patton 1 is remarkably similar to that of the Taber Well site. Patton 1 (33AT990) is located atop a floodplain terrace near the confluence of the Snow Fork and Monday Creek. Approximately 100 m northeast of the site a wetland (Patton's Bog) feeds a seasonal stream, both of which would have provided a number of resources including clay for pottery production and aquatic flora and fauna. Unlike most sites in southeastern Ohio, Patton 1 has not been plowed, and a cap of sediment from the construction of a modern house has been placed over the site, further contributing to its preservation. Excavations yielded 53 cultural features associated with the Middle Woodland period, most of which were architectural post molds that marked the remains of a rectilinear wattle and daub house, Structure 1 (Figure 4). Based on overlapping post molds and hearth features, the structure was rebuilt twice over the original structure. Patton 1 provides some of the most complete domestic and architectural data concerning Ohio Valley Middle Woodland populations including the preservation of daub walls measuring approximately 10 cm in thickness and a visible distinction (soil discoloration) between the interior and exterior of a rectilinear structure (Abrams and Patton 2015; Weaver et al. 2011).

The structure at Patton 1 measured approximately six meters by three meters with an interior area of approximately 18 m^2, comparable to that at Taber Well. Similarly, the house would have been occupied by approximately five individuals (Carskadden and Morton 2000:173) and would have taken approximately 40–60 person days to construct (Abrams and Patton 2015; Weaver et al. 2011; Abrams 1989a). External activity areas were composed of groundstone clusters (Figure 5; Features 21 and 57), large storage pits (Features 40, 49, 54), an exterior and interior hearth (Feature 4 and 32), a refuse pit (Feature 60), and numerous small posts. The features at the site, including Structure 1, are consistent with the expectations of a small sedentary community (Weaver et al. 2011; Yerkes 2006). Additionally, the overlap of hearths and posts, as well as the intentional introduction of sediment between these building surfaces as described by Weaver et al. (2011), indicate the house lot was probably continuously occupied for a span of approximately 15–30 years (23 years on average).

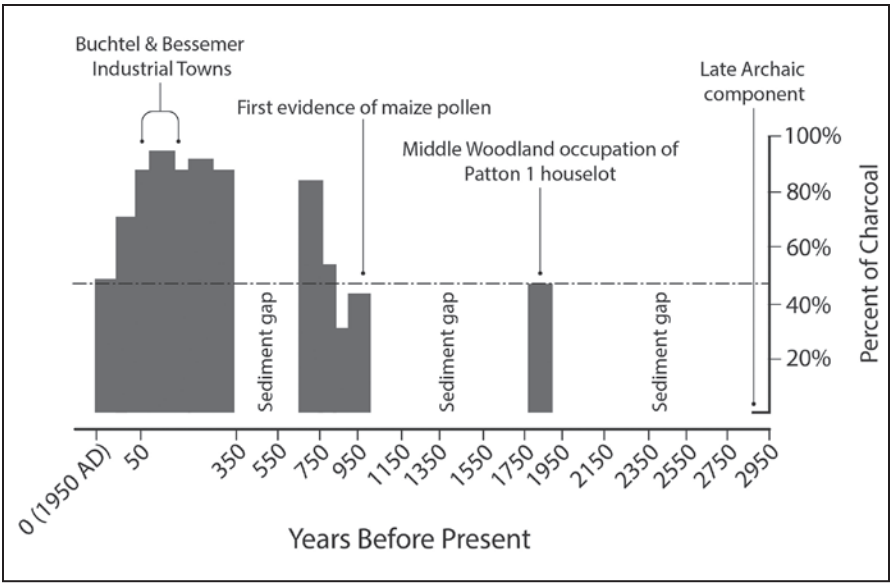

Figure 5. Charcoal percentages from Patton's Bog with years before present denoted.

In addition to the archaeological recovery of artifacts and documentation of features at the Patton 1 site, three piston sediment cores were pulled from Patton's Bog in 2008 by LacCore (National Lacustrine Core Repository), Department of Earth Sciences, University of Minnesota-Twin Cities. Only one of these core samples proved sufficient for chronological analysis of changes in vegetation composition (Core 2A). The methods used for analysis of this core are described in detail elsewhere (Abrams et al. 2014). The chronological record of this core spans from ca. 3000 cal. BP to present, with linear interpolation between these dates proving consistent within known changes in the vegetation record (see Abrams et al. 2014). The core included two breaks in the chronological assessment spanning from ca. 2650 to 2150 BP and ca. 1800 to 1250 BP. Pollen grains were corroded for these periods and encounter rates were too low to calculate vegetation percentages by type. These breaks may represent periods of drying in the region that negatively affected the taphonomy of the pollen.

Analysis of charcoal content from the sediment cores indicated high rates of burning during historic industrial times, consistent with the establishment of two mining communities near the site during the latter half of the nineteenth century and beginning of the twentieth century, and a century of forest clearance for agricultural

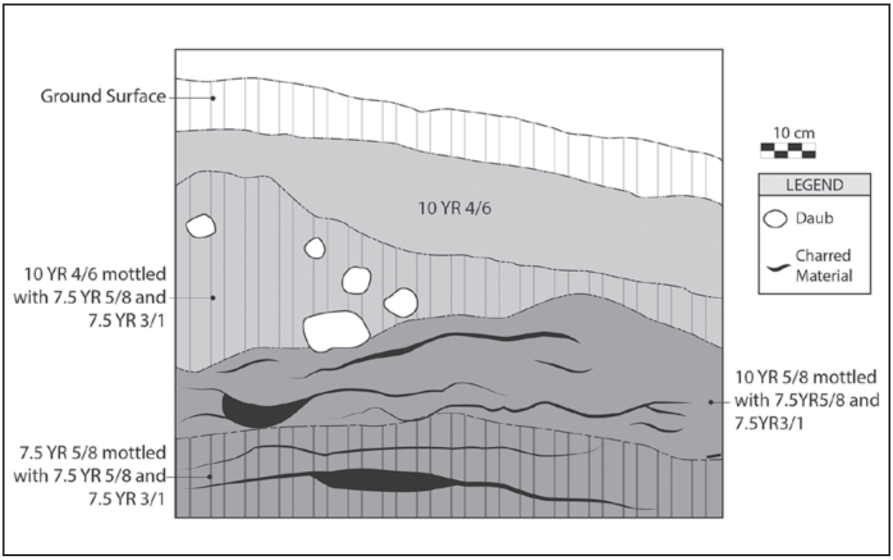

Figure 6. Stratigraphic profile of Unit X at Patton 1 site.

fields (Murphy 1989; Abrams and Freter 2005). When the rate of burning during the Middle Woodland is compared to this period, using the percentage of charcoal as a proxy, management of the landscape via fire equals approximately 50% of the rate of burning during the period when industry and agriculture were at their historic heights in the region. These data suggest that Middle Woodland communities in the vicinity of Patton 1 were clearing the landscape of vegetation for cultivation.

Excavations along the eastern slope of the terrace at Patton 1 may explain the degree of burning evidenced from Patton Bog's pollen cores. Profiles of excavation units reveal thin layers of ash and charcoal indicative of prehistoric burning. Flotation samples from these strata yielded small charred twigs and a few carbonized chenopod seeds. These data are consistent with expectations of seasonal burning of garden plots, suggesting the use of fire in landscape management and support previous assessments that Middle Woodland communities were practicing a form of swidden agriculture (Wymer 1997).

Middle Woodland data from the Hocking Valley also indicates that subsistence behaviors were not limited to the floodplain slopes surrounding habitation sites. The Greendale Ridgetop site, excavated in the summer of 2016, is located atop a ridge that overlooks MCWS and Taber Well. The ridge is dotted with numerous quarry pits likely dug in prehistory for the procurement of Upper Mercer chert.

AMS dates obtained from features associated with the quarry indicate affiliation with the Late Archaic period. Additionally, two large pits from the site contained pottery and Upper Mercer preforms and points (Baker's Creek, Snyder). These pits were marked by large piles of sandstone blocks. The pits also contained thousands of seeds of domesticated chenopods and small quantities of maygrass, sunflower, marsh elder, erect knotweed, tobacco, and squash.

The presence and large quantities of seeds associated with the EAC suggest that Middle Woodland populations were growing crops outside of the floodplains and in the ridgetop environment where these plants do not naturally grow. A direct date from a sample of chenopods from the Greendale Ridgetop site (Feature 520) overlaps with dates for the occupation of Taber Well. We propose that these caches represent tools and seed stock intended for propagation of garden plots along the peak of the ridge. The archaeobotanical assemblages from the Greendale Ridgetop site confirm the need for further research on non-floodplain sites to better document and understand the variability and complexity of Hopewellian food-producing systems.

EXPERIMENTAL DATA ON EAC PROPAGATION

In 2015, an experimental crop plot measuring 24 m^2 was planted with chenopods (*Chenopodium berlandieri*) in order to test the plant's economic potential through harvest yield. Seeds were broadcast in disturbed soils and hand-harvested. Fruits were later winnowed and cleaned, producing approximately 3.1 kg of edible seed. Extrapolating from these data, a hectare of cultivated land would produce approximately 1291.1 kg of edible chenopods (Mueller et al. 2017; Patton and Williams 2016) in contrast to 500–1200 kg per hectare of organically grown quinoa (Bermejo and Leon 1994).

In addition to experimentally quantifying harvest yields, recent data (Patton and Williams 2016) have highlighted the role that stratification (exposure of seeds to cold conditions to simulate winter) played in propagating domesticated chenopods. Comparing the germination rates of the wild chenopod variety (*C. berlandieri*) and the Mexican cultivar (*C. berlandieri* var. *berlandieri*) indicates germination rates at approximately two percent for the wild variety and almost ninety-five percent for the cultivated variety without stratification. With stratification, the wild variety germinated at a greater rate while the cultivar did not produce any viable seedlings. These results suggest that the thin-coated domesticated *C. berlandieri* var. *jonesianum*, with *C. berlandieri* var. *berlandieri* serving as a proxy, is not successful when exposed to the freeze-thaw growing conditions of southeastern Ohio winters. These data indicate that the domesticated varieties were dependent on humans for their ongoing propagation and the preservation of viable seed stock. Currently, additional studies are being conducted to further verify the results of this research.

DISCUSSION AND CONCLUSIONS

Wymer (1996) established the importance of domesticated and cultivated plants to the economy of Middle Woodland populations. Her work overturned the previous assessment by Ford (1979:234) that "no native cultigens, maygrass, sumpweed, or sunflower have been found in Ohio Hopewell sites." Despite claims to the contrary since that time (Yerkes 2002, 2006), excavations of Hopewellian period habitation sites have continued to yield evidence of Middle Woodland food production and landscape management (Wymer, this volume; Pacheco et al., this volume). We can conclusively answer the question posed by Yerkes (2006, this volume) in the affirmative: yes, the Hopewell really were farmers. Indeed, the data from the Licking and Scioto valleys have supported this conclusion for some time (Dancey and Pacheco 1997; Pacheco and Dancey 2006; Wymer 1987, 1996), and the archaeological materials from the Hocking Valley similarly align with the expectations of the DSC model.

Late Archaic sites in the Hocking Valley have yielded evidence of food production beginning by at least 3200 BP (Patton and Curran 2016), while architectural materials from the MCWS match expectations of an autumn/winter basecamp occupied by mobile foragers that relied heavily on masting arboreal nut species as a stopgap during the cold months of the year. The increase in Late Archaic sites throughout the Hocking Valley (Stump et al. 2005) is probably a result of the growth in human populations due to food production teamed with residential mobility, consistent with a complex mobile foraging-farming subsistence.

Continued use of the EAC during the Early Woodland and the construction of small ridgetop mounds from this period suggest that prehistoric Hocking Valley food producers considered associated crop plots as territory and created cultural markers on their landscape to delineate use-rights (Bowles and Choi 2013). Although currently no Early Woodland house outlines have been encountered, the data suggest populations were beginning to establish more permanent communities during this period (Abrams 1989b; Wymer and Abrams 2003) that would later culminate in the dispersed sedentary communities of the Middle Woodland.

By the Middle Woodland period, high time-energy investment in domestic dwellings was commonplace as evidenced at the Patton 1 and Taber Well sites and the management of crop fields was occurring on various landforms as data from the Greendale Ridgetop site demonstrate. These data are consistent with expectations of the DSC model and conform to claims by Yerkes (2006:56) that "excavations of [stable, formally organized, year-round settlements] should reveal substantial domestic dwellings (which may have evidence of rebuilding) and numerous storage pits," which are clearly in evidence at the Patton 1 site. Domestic residences by this period are marked by changes in shape from circular or ovoid to rectilinear, larger post molds, and greater investment in construction time—characteristics that are ethnographic correlate with decreased mobility, and residential stability (Rafferty 1985). The similar layouts of the Patton 1 and Taber Well sites indicate formal organization of dispersed Hocking Hopewell communities. Furthermore, experimental data indicate that domesticated chenopods were dependent on human beings for their propagation (Patton and Williams 2016) and the presence of numerous non-native crops (i.e., sumpweed, pepo squash, tobacco, and maygrass) at Hocking Valley Middle Woodland sites indicate their reliance on Middle Woodland food producers.

Given that the preponderance of archaeological data indicate that Hopewellian subsistence and residential stability is most consistent with the DSC model, future research should *move beyond* the question "were the Hopewell really farmers" and instead, consider questions related to the management of subsistence tasks—like the timing of crop planting and harvesting—the division of labor, and the effects of a sedentary lifestyle on human health and nutrition. More exploration of upland environments and landscapes surrounding habitations sites should elucidate the size of crop plots, prehistoric methods used to offset risks of crop failure, practices of crop rotation, and how seed stock was maintained. Ultimately, there is still much to be explored about the many complexities of Hopewellian food systems and domestic economy.

ACKNOWLEDGMENTS

The archaeological record in the Hocking Valley and what we know of the sites referenced in this chapter are largely due to the work of students enrolled in the Ohio University Archaeological Field School. Special thanks go to Elliot Abrams, AnnCorinne Freter, and Sabrina Curran for their comments on earlier drafts of this manuscript. The Hudnell Fund of Ohio University, Wayne National Forest, US Forest Service, the Ohio University Department of Sociology and Anthropology, and the Voinovich School of Leadership and Public Affairs supported parts of the research presented. The authors take responsibility for any errors.

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