RITUAL, CRAFT, AND ECONOMY IN OHIO HOPEWELL: AN EXAMINATION OF TWO EARTHWORKS ON THE LITTLE MIAMI RIVER

Dissertation

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By

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Abstract

In this dissertation I examine the organization of craft production in a small-scale society through the lens of ritual economy. Specifically, I examine the structure of the production of craft goods at Hopewell earthworks by studying the production and function of flint bladelets. Measures of the production and function of Hopewell bladelets are used to examine the structure of craft production. The use-wear on bladelets, and the manufacturing tasks inferred therein, serves as a proxy measure of the production of craft goods.

The examination of bladelets is ultimately aimed at gaining insight into how ritual processes structure the organization of production. Privileging ritual institutions in economic studies is the realm of ritual economy. Ritual economy is the analysis of the economic aspects of ritual and the ritual aspects of economic transactions as they relate to the materialization of ideology. Thus, ritual economy focuses on the *economics of ritual*—the economic acts necessary to properly participate in or host ritual events—and the *ritual of economy*—ritualized economic interactions between individuals. My analysis suggests that the dual forces examined by ritual economy were at work within Hopewell society.
The materials for my study come from two Hopewell earthworks on the Little Miami River in southwest Ohio; The Fort Ancient Earthworks and the Stubbs Earthworks. In order to examine how production was distributed across excavated contexts at Fort Ancient and Stubbs I compare the microwear traces from bladelets associated with multiple locations at each earthwork. Results indicate that bladelets were produced in moderate amounts at numerous locations at both earthworks. Additionally, while bladelets were used in a generalized manner throughout the earthworks, they were also used of a number of potential craft production activities. At Fort Ancient, ritual craft production was organized in domestic spaces by households, larger kin groupings, or tribal segments. Each domestic context examined produced craft objects from a distinct set of raw materials. At Stubbs, inhabitants of each context participated in the same types of productive activities.

Previous research has demonstrated that independent groups were drawn to the earthworks in order to create social ties through participation in communal ritual and reciprocal exchange. These exchanges were fueled by intensified production of craft products organized and orchestrated by ritual participation. Ultimately, craft production documented at Fort Ancient and Stubbs was probably more about the creation of relationships than the creation of objects. Ritual economy’s focus on the materialization of these relationships allows archaeologists to reconstruct complex social processes by tracing economic processes recorded in materials recovered in archaeological assemblages.
Dedication

To Lindsey, Punca, Mooi, and Jasper

For all of your love, support, and constant companionship
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The first time I read the acknowledgements section of a dissertation I remember thinking what a novel idea it was to attribute the work to many people rather than only one. Do not ask me what I was doing reading the acknowledgements section of a random dissertation, probably at some late hour, graduate school does that to a person. Anyway the point is that after going through the process, I get it. This work really is a collaborative effort between people I both have and have not met.

This dissertation would never have gotten off the ground, let alone been completed, without the dedication of everyone I have had the pleasure of coming into contact with over the years. First and foremost I need to thank my wife Lindsey for all of her help with research and writing as well as just putting up with me in general through the many years of graduate school. Rick Yerkes served as my advisor and mentor throughout my time at Ohio State. Rick graciously provided lab space, equipment, and supplies in addition to countless bits of advice, comments, criticisms, and recommendations. In short, it was an honor and a privilege to work with him. Julie Field took it upon herself to make sure this research was theoretically sound. Our theory meetings helped to crystallize my thoughts on Hopewell into a coherent model. Rob Cook helped to situate the research into the broader culture history of the Eastern Woodlands. He provided helpful advice and alternative viewpoints at every turn. Victor
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I did very little fieldwork for this dissertation, meaning that I relied upon the consent of numerous individuals and institutions to collect my samples. In the end, I was able to draw upon over 30 years of fieldwork—an academic lifetime—from the likes of Richard Morgan, Patricia Essenpreis, Robert Connolly, Adrienne Lazazzera, Ted Sunderhaus, Frank Cowan, Bob Genheimer, and Bob Riordan. Without their dedication, and that of their field crews, to sound archaeological excavations our knowledge of Ohio Hopewell would be greatly hindered. The majority of my sample was courteously loaned to me by the Ohio Historical Society. Thanks to the Collections Management Team at OHS for officially approving my many requests for artifacts and extensions. Bill Pickard served as my go to contact at OHS, while we also spent many happy hours with Linda Pansing and Brad Lepper. It seemed as if half of OHS’s collections and records pertained to Fort Ancient so I would have been completely lost without the help of Bill, Brad, and Linda. The Cincinnati Museum Center also approved artifact loans for my research. Bob Genheimer was willing to offer anything I needed in a timely manner to minimize my long drives down I-71. Frank Cowan also shared unpublished maps, papers, and insights into the Stubbs excavations. Brent Eberhard of the Ohio Historic preservation office facilitated access to the online OAI data and supplemental diagnostic artifact data used to create Figure3.2. Finally, Bob Riordan at Wright State University gave me access, with the blessing of OHS, to artifacts from the Moorehead Circle. Beyond that, Bob shared numerous unpublished pictures, plan maps, radiocarbon dates, and other excavation
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Chapter 1: Introducing Ritual, Craft, and Economy in Ohio Hopewell

In this dissertation I examine the organization of craft production in a small scale society through the lens of ritual economy. Specifically, I examine the structure of craft production at Hopewell earthworks by studying the production and function of flint bladelets.

The term Hopewell describes horticultural populations in what is now the eastern United States who lived 100 BC - AD 400, built earthworks, and participated in long-distance exchange networks. Through their extensive trade networks, Hopewell people in Ohio were able to obtain copper and silver from the Lake Superior region, marine shells and pearls from the Gulf Coast, obsidian and grizzly bear canines from Wyoming, as well as mica and quartz crystal from the Appalachian Mountains. These raw materials were then crafted into ritual or ceremonial artifacts. These objects included copper and mica cutouts, copper celts, shell and bone ornaments, metal ear spools, stone platform pipes, and copper headdresses all inscribed with rich symbolic content (Giles 2013, Seeman 1995). Finished craft objects are largely restricted to earthworks and mounds, having been deposited in burials or ritual caches. Analysis of these objects tends to focus on their finished form and depositional context or determining raw material sources from chemical signatures, with comparatively little work done on the stages in between. These production stages of Hopewell craft objects constitute the focus of my dissertation. The
comparative dearth of work on the organization of production lies in the difficulty in identifying production areas. For example, no large, permanent features existed for smelting metal or firing ceramics. Even production debris may have been highly valued and deposited away from the location of manufacture—as in the case of obsidian debitage recovered in Mound 11 at the Hopewell site that had been curated for several generations (Hatch et al. 1990; Stevenson 1992; see also Cowan 2005). It is with these caveats in mind that I look for evidence of the organization of production from stone tools potentially used in the manufacture of these craft objects. I make the assumption that these tools are more likely to be deposited at, or near, the production locale than the finished products or exotic raw materials. Thus, the use-wear on stone tools, and the manufacturing tasks inferred therein, serves as a proxy measure of the production of craft goods (e.g., mica mirrors, shell beads, textiles, etc.).

In archaeological research, studies of craft production are often situated within the framework of political economy, which is an analysis of social relations based on the premise of unequal access to wealth and power (Cobb 1993:44). Non-utilitarian craft objects made from rare or exotic raw materials that are deposited in burials and caches, such as those in the Hopewell case, are often described as prestige goods. Prestige goods are those items that signify rank through their controlled acquisition and distribution by a relatively small subset of society (Bayman 2002:71). As items that signify rank, prestige goods are durable, highly valuable objects that are imbued with cultural symbolic meaning through their acquisition, production, and/or consumption (Whalen 2013:629). Elites gain exclusive control over the raw materials necessary to produce prestige goods.
through two means. One strategy is to monopolize their acquisition through control of essential technology, territory, and/or knowledge. A separate but potentially concurrent strategy involves commissioning their production by craft specialists (Schortman and Urban 2004:191). In this way, elites are able to mobilize labor even without taking full control of the means of production (Cobb 2000:31). The accumulation of prestige goods also allows elites to transform their bulky and perishable surplus staple (i.e., subsistence) goods into more portable and long-lasting wealth goods (i.e., Kantner 2010). Elites may distribute these goods to others through elaborate ceremonies as a means to accumulate social debts, as was the case with the potlatch in the American Northwest coast (Schortman and Urban 2004:190). In this case prestige goods may not be completely restricted to elite contexts, although their production will be. The accumulated debts garnered from the distribution of prestige goods provide a means to control the labor of others (Cobb 1993:5). Thus, in prestige goods economies labor control is the true source of power (Whalen 2013:629). Prestige goods simply provide a means to this end. As political leadership becomes more institutionalized, elites tend to abandon prestige goods in favor of more stable means for mobilizing labor such as tribute or taxation (Whalen 2013:629). As power over the labor of others does not typically extend beyond the kin group in non-ranked societies, the ability to mobilize non-kin labor is a major step in human socio-political evolution. In other words, prestige goods economies are often seen as the first step towards complex socio-political hierarchies.

At first glance, the Hopewell case provides an excellent example of a prestige goods economy. In fact, numerous scholars have sought to explain aspects of
Hopewellian economy through a prestige goods model (Braun 1986; Dancey 2005:128; Levy 1995:9; Struever and Houart 1972). In the Hopewell case, exotic raw materials were transported from sources all across North America to eventually be deposited in the graves of, presumably high status, individuals interred in mounds within elaborately constructed monumental earthworks (Brown 1979; Struever and Houart 1972). Consistent with the strategies for elite monopolies over prestige goods, Hopewell archaeologists have argued for restricted access to exotic raw materials that were transformed by craft specialists (Baby and Langlois 1979; Spielmann 2008:64).

Similarly, Hopewell mounds, earthworks, and monumental wooden architecture would have required massive labor investments from relatively large numbers of individuals conscripted from a large geographical area (Bernardini 2004). However, as more non-earthwork or mound sites have been excavated, the distribution of exotic goods such as copper, mica, pipestone, and bear canines has become less restricted (Blosser 1996; Pacheco et al. 2009a, 2009b; Prufer 1965). Likewise, Hopewell earthworks have been shown to be constructed over prolonged periods, thus reducing the labor force necessary for any single construction episode (Bernardini 2004; Connolly 1997).

In reference to prestige goods, Baby and Langlois (1979) outlined a highly influential model of craft specialization at earthworks. Baby and Langlois’ model was built upon the discovery of specialized craft production workshops within the Seip earthworks in Ross County, Ohio. This model fits well with models of a prestige goods economy as outlined above. Recent research, however, has called into question the association of these structures with the recovered artifact assemblages (Greber 2009a,
This suggests that Hopewell craft goods were not manufactured by specialists working in designated workshops.

Another major blow to the prestige goods model is that major social classes and complex political hierarchies were not present in Hopewell populations (Carr and Case 2005; Greber 1979; Yerkes 2002, 2003a). Hopewell populations are best described as small scale societies that contained several hundred to several thousand people united by diffuse political structures organized around kin groups (Spielmann 2002:195; see also Hall 1980, 1997). These societies are often described as bands or tribes (Fowles 2002; Griffin 1967; Parkinson 2002; Yerkes 2002, 2003a). Small scale societies with complex and far-reaching trade networks have often posed problems for archaeological interpretation. Certainly cases exist in which access to exotic raw materials is relatively open and not restricted to specific subsets of society as outlined in prestige goods models. Similarly, evidence for craft specialization is not always apparent in societies that contain objects made from exotic materials (Clark 2007; Schortman and Urban 2004). Also, widely used categories for describing craft specialization such as full- or part-time specialization by attached or independent specialists (Costin 1991; Yerkes 2003a) are inadequate for documenting the diversity of production in these societies as all production would simply be labeled part-time independent specialization. In small scale societies, items that fit the characteristics of prestige goods (i.e., objects made from exotic material and imbued with important symbolic imagery) may be better characterized as socially valued goods. Socially valued goods are those items desired by all members of a society due to their importance to social reproduction and ideology.
(Spielmann 2002). However, in small scale societies they are more than symbols of rank and their acquisition is not controlled by one particular social class. To be clear, prestige goods are socially valued goods but not all socially valued goods are prestige goods. In the case of socially valued goods in small scale societies, it is necessary to look outside of the political realm to understand their acquisition and consumption. This is necessary because political institutions have not taken control of the means of production from households and other kin groups. Thus, while politics may still be involved it is necessary to look to other social and ritual processes to understand the production and consumption of socially valued goods.

Recently, Spielmann (1998, 2008) has highlighted the role of ritual contexts as important factors in the organization of craft production in many small-scale societies. Importantly, it is the ritual settings, rather than markets or highly ranked individuals, which attract many craft producers. Privileging ritual, rather than political, institutions in economic studies is the realm of ritual economy. Ritual economy is the analysis of the economic aspects of ritual and the ritual aspects of economic transactions as they relate to the materialization of ideology (Wells 2006:284). Here materialization refers to the open process of reproducing and transforming cultural symbols into material objects (Wells and Davis Salazar 2007:3). Many scholars view political and ritual economy as complimentary (see chapters in Wells and Davis-Salaar 2007; Wells and McAnany 2008), but in small scale societies ritual institutions can function independently to direct economic practices. Ritual economy provides a means to study the intensification of production in the absence of a centralized political force (Spielmann 2002).
In order to understand the organization of craft production, I study the production and function of Hopewell bladelets. Composed of high quality exotic flint, Hopewell bladelets were produced from a prepared core, have a length to width ratio of at least two to one, roughly parallel margins, and a triangular, trapezoidal, or prismoidal cross section (Greber et al., 1981; Nolan et al., 2007; Pi-Sunyer, 1965:61). Bladelets, because of their distinctive style and association with other Hopewell craft items, are hypothesized to have served as important components of Hopewell ritual production (e.g., Byers 2006; Odell 1994). They were, however, much more than craft implements as studies have shown them to be multipurpose tools utilized at all sites within the settlement system (Genheimer 1996; Lemons and Church 1998; Miller 2010; Snyder et al. 2008; Yerkes 1990, 1994). I concentrate on bladelets not because they were specialized craft production tools but because: 1) they are a diagnostic marker of the Hopewell horizon (Genheimer 1996; Greber et al. 1981; Griffin 1967); 2) they were multipurpose tools serving as a possible proxy measure of all stone tool use in a context (Yerkes 1990, 1994); 3) bladelets greatly outnumber any other formal tools type at most Hopewell sites (Genheimer 1996); 4) they were relatively expedient tools thus largely eliminating the interpretive problems caused by artifact curation (Yerkes 1990, 1994).

Expectations for the production context of bladelets vary based on the use of models in political or ritual economy. For example, if bladelets were used in the production of prestige goods their production should be restricted to the workshops or residences of craft specialists. If, however, bladelets were used in the production of socially valued goods their production would be more dispersed and open to all members
of society. Nolan (2005; Nolan et al. 2007) argues that bladelets were not produced by specialists due to the high degree of metric variation and large number of errors in their production. In order to replicate or refute Nolan’s findings, I analyze the coefficient of variation for selected bladelet metric attributes (see chapter 6). Additionally, I tabulate the occurrence of knapping errors and bladelet production debris at Fort Ancient and Stubbs.

In order to determine the function of bladelets, I employ microwear analysis method developed by Semenov (1964) and modified by Keeley (1980) to identify the wear traces on the artifacts. This includes examination of micropolishes, striations, and damage scars that form on the edges of stone tools when they are used to perform specific tasks on specific types of materials. Examination is conducted at both low-power and high-power under incident light with magnifications ranging between 50x and 500x (Gijn 1990; Keeley 1980; Yerkes 1987). Wear traces from archaeological specimens are then compared to those from experimental tools of known function to determine the method of use of the former. Similar to bladelet production, the analysis of bladelet function can serve to distinguish between use in the production of prestige goods or socially valued goods. If bladelets were used to produce prestige goods, I expect their function to be limited to use on a restricted range of raw materials such as stone or shell. If bladelet use is better characterized by a ritual economy model, I expect bladelet use to be more generalized and for the production of socially valued goods to follow the models outlined in Chapter 2.
Ultimately, I hypothesize that ritual economy provides an improved method of understanding Hopewell production over political economy. This is because political models put a disproportionate amount of emphasis on the elite control of resources and labor, elements that are not characteristic of the relatively open access to exotic goods in small scale societies such as Hopewell. The examination of bladelets is aimed at gaining insight into how ritual processes structure the organization of production. Spielmann (1998, 2002, 2008, 2009; Spielmann and Livingood 2005) has written extensively on Hopewell through the lens of ritual economy. In terms of craft production, Spielmann (1998:153) describes Hopewell craftspeople as attached to the ritual context in which crafts were used for authority or power, participation in communal ritual, or as a means of preparation for communal rituals (Spielmann 2008:64). Importantly, Spielmann argues that Hopewell craft production was multifaceted and difficult to define as purely political, economic, or ideological. While Spielmann (2008:66) argues that craft production took place largely, though not exclusively, at earthworks, she admits that little archaeological evidence exists as to how production was organized in these contexts. In order to address the question of how production was organized I examine bladelets within their larger archaeological context.

The materials for my study come from two Hopewell earthworks on the Little Miami River in southwest Ohio. The Fort Ancient Earthworks (33WA2) are located on a promontory about 80 meters above the Little Miami River in central Warren County, Ohio (Figure 1.1). The Stubbs Earthworks (33WA1) were located in on a low terrace of the Little Miami about seven km downstream from Fort Ancient. The Stubbs Earthworks
have subsequently been destroyed by agriculture, gravel mining, and development (Figure 1.2). Both sites have been the focus of archaeological investigations over the past 100 years (Connolly and Lepper 2004; Essenpreis and Mosely 1984; Genheimer 1992; Hosea 1874, Moorehead 1890; Morgan 1946, Whittlesey 1851). Modern field school excavations at Fort Ancient by several universities began in the early 1980s and have continued off and on up to the present (Connolly 1996a, 1997; Essenpreis and Mosely 1984; Riordan 2007). Large-scale salvage excavations were also conducted at the site in the mid-1990s in advance of construction projects within and outside of the embankment walls (Cowan et al. 2004; Lazazzera 2004, 2009). The Stubbs samples analyzed in my study are from salvage excavations in advance of construction projects in the 1990s and early 2000s (Cowan and Sunderhaus 2001; Cowan et al. 2003, 2005; Sunderhaus et al. 2001). Further details on the archaeological loci at Fort Ancient and Stubbs are given in chapter 5.

Due to their spatial proximity and temporal overlap, Fort Ancient and Stubbs were likely built and used by some of the same human populations. In fact, Pacheco and Dancey (2006:Figure 1.6) place Fort Ancient and Stubbs in the same central Little Miami River polity. The notion that the same Hopewell groups constructed and utilized both a hilltop and geometric enclosure has also been demonstrated in the upper Little Miami River Valley by Riordan (2010).

In many ways, Fort Ancient and Stubbs are similar to other Ohio Hopewell earthworks. They were centers of relatively large-scale aggregations, they incorporate geometric shapes into their structure, there is evidence of astronomical alignments, and
numerous artifacts crafted from exotic raw materials have been recovered at each (Connolly and Lepper 2004; Genheimer 1997). They are, however, different from central Ohio Hopewell earthworks in many ways. For example, numerous examples of non-mortuary wooden architecture were present at both sites (Connolly 1997; Cowan et al. 2004; Lazazzera 2004a; Sunderhaus et al. 2001). This is in contrast to other Hopewell earthworks in which wooden architecture is either not present or related to charnel house construction (Abrams 2009; Brown 1979; Dancey 2005; Greber 1979, 1996; Griffin 1967; Milner 2002). Additionally, no human burials have been discovered at Stubbs while the majority of burials at Fort Ancient occur outside of the earthwork walls (Genheimer 1992; Moorehead 1890; Whittlesey 1851). Other earthworks were centers of extensive mortuary activity in which individuals were interred within mounds inside the earthworks (Abrams 2009; Brown 1979; Dancey 2005; Greber 1979, 1996; Griffin 1967; Milner 2002).

Earthworks were not monolithic entities that were built for singular purposes. In fact, many different types of activities occurred across space and through time at these monumental constructions (Burks and Pederson 2006; Connolly 1997). In order to examine how production was distributed across excavated contexts at Fort Ancient and Stubbs, I compare the microwear traces from bladelets associated with multiple loci at each earthwork in an attempt to elucidate intrasite patterns (see chapter 7). Examining evidence from two earthworks provides a means to examine variation in craft production through intersite analysis as well. Thus a comparison of the microwear patterns evident at both Fort Ancient and Stubbs will illuminate variation in the types of crafts produced
Figure 1.1 Map of Fort Ancient. From Squire and Davis (1848:Plate VII).
Figure 1.2 Map of the Stubbs Earthworks. From Whittlesey (1851:Plate II)
as well as their production context. Due to differences in the nature of archaeological investigations, a great deal more contextual information exists for Fort Ancient than for Stubbs. Therefore, while my analysis also includes a discussion of changes in the organization of production through time, only the Fort Ancient materials are included.

**Summary of Research Questions**

In order to examine the topics outlined above I will be addressing several research questions:

- Were bladelets produced at Fort Ancient and Stubbs? If so, is there any evidence for how their production was organized?
- Were bladelets used for craft production tasks at these sites?
- Is there evidence for differential production of crafts between contexts within each site? If so, does differential production correspond with other changes in material culture?
- Is there any evidence of variation in the organization of production through time and/or between earthworks?

**Outline of Dissertation**

In this dissertation, I examine the organization of production of Hopewell craft items by studying the organization of technology within the framework of ritual economy. Ultimately, I present evidence that, despite the lack of a centralized political hierarchy, Hopewell craft production was a complex, multi-faceted process centered at earthworks and accomplished by many different groups of people. Craft production served as one of many unifying factors that brought together tribal groups to establish and
renew their social ties through ritual activities. In chapter two, I present an overview of the theory of ritual economy as well as its relationship to studies of craft production. These two topics serve as unifying themes throughout the study and I return to them in later chapters. The discussion of ritual economy includes a comparison with political economy and the production of prestige goods, as well as, a distinction of two separate but interrelated aspects of ritual economy: the *economics of ritual* and the *ritual of economy*. Chapter three begins with an outline of the culture history of the Eastern Woodlands from the Archaic through the end of the Middle Woodland period. Also in chapter three, I introduce the Hopewell horizon. This includes a culture history component as well as an extensive description of the Hopewell bladelet industry. Additionally, I describe some Hopewell craft items as well as ethnographic and experimental evidence as to how stone tools may have been involved in their manufacture. I also include a review of previous research on Hopewell craft production in order to put later findings in context. Chapter four provides a background and description of the analytical methods used in my study of Hopewell bladelets. These methods involve those variables aimed at studying the production of bladelets such as raw material sourcing, production standardization, retouch, and minimum analytical nodule analysis. Additionally, the microwear method, employed to identify the objects that bladelets were used to produce, is described. Chapter five consists of a summary of the context of the bladelet samples including a description of the rather extensive amount of previous archaeological research at Fort Ancient and Stubbs. In chapter six, I present the technological analysis of the bladelet industry from Fort Ancient and Stubbs. The
technological analysis includes a discussion of raw material sourcing and the evidence for the production of bladelets on-site. Additionally, indices of standardization along with descriptions of retouch and hafting configurations as well as the distribution of bladelets struck from the same core are used to discuss bladelet production in light of expectations based in models of political and ritual economy. In chapter seven, I present the evidence for the production of socially valued goods at various contexts within both Fort Ancient and Stubbs. This includes a microwear analysis of the bladelets as well as evidence of craft production from additional artifact classes. In chapter eight I revisit the research questions outlined above in order to evaluate whether satisfactory answers have been generated. The final chapter is a summary of the important findings of the dissertation as well as a presentation of lingering questions and future research possibilities.
Chapter 2: Political Economy, Ritual Economy, and the Production of Socially Valued Goods

Political Economy

Political economy is an analysis of social relations based upon the assumption of unequal access to wealth and power (Rosebury 1989:44). It is relatively easy to see this process in the modern world which is full of large, powerful nations with massive differences in wealth. Some (e.g., Johnson and Earle 2000:26) argue that all societies have at least a rudimentary political economy. This is true in that individual families must interact at some level and there is always the potential for differential resource distribution between two or more groups. However, political economic studies usually focus on societies with a well defined elite class. This elite class is freed, at least in part, from subsistence production and may be recognized by, among other things, the presence of a special artifact type known as prestige goods. Prestige goods are those items that signify rank and status through their exotic acquisition, symbolic content, and/or specialized production (Cobb 1993, 1996). Prestige goods are not usually produced by elites but by attached specialists (Cobb 2000:40). Thus, elites and craft specialists enter into a patron-client relationship in which food or other objects are exchanged, directly or indirectly, for the specialist’s labor. These prestige goods are then manipulated by elites as a means to create or maintain power through the accumulation of social or material
debts. Thus, political economic models of prestige goods economies assume elite control of resources, exchange, and labor that make them unsuitable for the analysis of small scale societies in which these conditions do not exist.

**Ritual Economy**

Economy and ritual are often falsely dichotomized with the former argued to be subject to the rules of rationality and the latter non-rational (McAnany and Wells 2008:1; Wells and Davis-Salazar 2007:2). However, they are both intricately linked as ritual acts often involve extensive economic components and economic acts can involve ritual performances (Watanabe 2007). Ritual economy is the analysis of the economic aspects of ritual and the ritual aspects of economic transactions as they relate to the materialization of ideology (Wells 2006:284). This definition of ritual economy has much in common with political economy. However, in societies without a well defined political hierarchy, ritual economy extends well beyond a political economy to processes outside of the control of political actors. Additionally, ritual economy favors the role of the ritual context, rather than political, in organizing economic activities. As Watanabe (2007) argues, in order for ritual economy to become a valid theoretical paradigm it must, at least at some level, become divorced from political economy. Before this can happen it must be demonstrated that ritual acts and institutions can influence economic processes without relying on political institutions or actors. In the remainder of this chapter I discuss how this is not only possible, but expected given what is known of small scale societies. A comparable argument has been made by Watanabe (2007:313) for the importance of the ritual economy in kin based societies without political hierarchies.
Similarly, Spielmann (2002:203) argues that, in small scale societies, the ritual cycle largely dictates the rules for production, distribution, and consumption of goods and services. Thus, any discussion of the economics of a small scale society must include a consideration of ritual economy.

As the above definition implies, analysis based in ritual economy can take two forms, the *economics of ritual* or the *ritual of economy* (Watanabe 2007:301; Wells and Davis Salazar 2007:3). Most discussions of ritual economy analyze what Watanabe (2007:301) describes as the *economics of ritual*, or the economic acts necessary to properly participate in or host ritual events. Ritual production is surplus production with raw materials often consisting of exotic items (Wells and Davis-Salazar 2007:1). These items are often used in communal ritual events such as festivals, feasts, and fairs which provide opportunities to reinforce and/or renegotiate social relationships. In this way ritual, is a major factor in regulating the production, distribution, and consumption of goods. In stratified societies, these processes are often manipulated by the dominant class to mask inequalities while in non-hierarchical societies they often foster group cohesion, but both processes may be at work in any society.

Analysis of the *economics of ritual* focuses on the materialization of worldview through the study of the contexts in which objects are assigned meaning and worth (Wells and Davis-Salazar 2007:5). Some objects or materials have high “use value” or natural physical properties that make them superior to others (Gregory 1984:13). For example, Hopewell artisans probably selected obsidian for its superior knapping ability and copper for its malleable nature. However, value is always created and never strictly implicit
(Ballvé 1994:116-117; Clark 2007:27; Flad and Hruby 2007:11). This is especially true of socially valued goods produced in or for the ritual context. For example, oversized obsidian bifaces or grizzly bear canines inlaid with pearls have very little use value but nonetheless were important Hopewell socially valued goods. There are numerous ways to impart value onto objects, one of which is through ritual practice. Ritual economy analyzes the materialization process through the study of acquisition and consumption. The study of acquisition emphasizes the appropriation, manufacture, and circulation of socially valued goods (Wells and Davis-Salazar 2007:6). Similarly, the act of consumption is essential for understanding the materialization of values and beliefs.

As an example of the *economics of ritual*, Swenson and Warner (2012) argue that diverse groups of commoners were included in the production of copper objects at the Moche site of Huaca Colorada. Copper and production knowledge were supplied by elites at the site. Copper processing and production took place at this important ceremonial center in conjunction with other social/ceremonial gatherings (Swenson and Warner 201:314). The copper objects were important elements of the ritual process as well, serving as “rituals of embodied transformation” as their creators became part of the community’s symbolic structures (Swenson and Warner 2012:331). In this way, elites gave up some of their control of ritually significant symbols in order to negotiate social relations. Thus production for ritual performance became embedded within ritual performance through the careful structuring of production.

As Watanabe (2007:301) argues, ritual economy is also about ritualized economic interactions between individuals, or the *ritual of economy*. In order to maintain itself,
each household must reproduce itself, but in order to reproduce itself a household must enter into social relationships with other households which threaten its independence (Gilman 1984:122). These interactions between households encourage production and consumption beyond that needed for household maintenance while entangling households in cycles of ritualized reciprocal relationships (Watanabe 2007:304). According to Watanabe (2007:305), by standardizing the interactions between households the ritual of economy provides a means to structure production, exchange, and consumption in the absence of a centralized political authority. Thus, ritual economy provides a means of redistribution of surplus outside, or in the absence of, elite control while at the same time providing individuals with opportunities to manipulate means and relations of production to their advantage. For example, Watanabe (2007:306) cites Rappaport’s work on ritual and feasting in New Guinea as ethnographic evidence for the nature of the ritual of economy. Among the Maring, the ritual cycle structures production and consumption—among other things—of food and ritual objects in a manner outside of the political control of any one group or individual. In this case economic interactions became embedded in the ritual cycle as a means to ensure peace and reciprocity while uniting groups outside of the bonds of kinship. The following discussion is based largely on Watanabe’s (2007) model of the way in which household interactions may become ritualized economic transactions.

Sahlins (1972) was one of the first to formally argue that households routinely underproduce (i.e., do not produce a surplus), especially in the absence of a strong outside influence like a state government or market economy. Sahlins referred to this
pattern of producing only what was necessary for household maintenance and risk mitigation as the domestic mode of production. Sahlins (1972:95) saw this as the ultimate household independence which acted contrary to the development of a larger social order, as no household had any real desire or obligation to enter into structured relations with any other. However, while it is true their productive outputs are variable, household economies often result in intensification and surplus production. According to Watanabe (2007:312), the economic links between households can become ritualized, resulting in the intensification of production that can continue in an ever increasing spiral of intensification—not necessarily competitive—and increasing interdependency.

Again, it is worth noting that all of this occurs in a heterarchical fashion among relatively egalitarian households, as surplus production is used to enter into social relations necessary for reproduction (such as spouse exchange) with other households [e.g., through feasting (Muller 1997:263)]. At the same time it provides a means for those in a position to out produce others to draw increasing numbers of households into their realm of social influence.

The interactions between households in small scale societies often take the form of gifts, or the exchange of inalienable objects (Mauss 1990). To Mauss gifts are more than objects, they are pledges to enter into a social relationship as inalienable objects can never be completely divorced from their producer. However, the giving of gifts always leaves open the possibility that they will not be repaid in kind at any point. Thus, gifting is risky business from thegifter’s point of view. Watanabe (2007:318) argues that it is precisely because of this uncertainty that gifting can take on ritual form. As Rappaport
(1999) argues, performing a defined ritual shows that both parties are agreeing to a previously established set of conventions: that a gift will be returned in the future. This ritualized exchange may be especially common among dispersed groups that do not come into contact with one another frequently (Hall 1997).

Recent insights provided by cross-cultural applications of game theory shed important light on the conditions in which the ritualized gifting process may occur. Game theory studies the interactions between two or more agents competing for some sort of payoff, usually economic (Stanish 2009:99). Game theory developed out of classical economics with its major assumption being that people are inherently rational and will tend toward optimal solutions (Myerson 1991). Problems with this assumption are that rational behavioral can vary cross-culturally and that people do not usually have all of the information necessary to select the most optimal solution (Axelrod 1997:14). Another problem is that cross-cultural studies have shown that people are not always selfish or “ego-directed”, often making individually costly, group-oriented decisions (Stanish 2009:100). A modified game theory approach understands that humans make rational choices based on a combination of past experiences and cultural norms and that any problem may have several rational solution.

A classic game theory experiment is the prisoner’s dilemma (Axelrod 1997). In the prisoner’s dilemma scenario, the optimal solution is for both agents to cooperate and, in prisoner’s terms, keep their mouths shut. However, with no assurance that the other will cooperate, the rational solution is to be the first to talk and implicate the other. In the classic prisoner’s dilemma, this selfish strategy tends to dominate. Introducing multiple
interactions into the game results in a change in the optimal solution of the iterated prisoner’s dilemma. When agents can remember who has cooperated and who has not the optimal solution of not talking can become the norm because cooperation can be anticipated and it is in each agent’s best interest. In this way cooperation results from an inherently selfish strategy to produce the “autarkic production and necessary interdependence” described by Watanabe (2007:304). Thus, when social memory can be induced to reference past instances of cooperative payoffs, perhaps through ritual performance, reciprocation for gifts can be ensured and cooperation ensues.

The preceding suggests that cooperation always occurs as the optimal solution of rational self-interest. It is prudent to question whether this is always the case. The ultimatum game can shed light on this issue. In the ultimatum game one player is given a quantity of money and has the opportunity to offer any amount to the other player (Nowak et al. 2000). This other player can choose to accept or reject the offer based on what is determined to be fair. If the offer is accepted both players get the money, if it is rejected neither gets it. Classic game theory suggests that players should accept any offer as they are receiving the money, or other resource, at no cost. As Stanish (2009: 102) notes, “[c]ultural norms affect the amounts that people consider fair, but in all experimental studies, people do not behave as rational economic agents”. Often receivers go out of their way, at a cost to themselves, to reject unfair offers and givers increase their offers to what is deemed fair for both parties. Similar to the iterated prisoner’s dilemma, when agents become attached to a history of their actions which are shared with other agents, cooperative strategies dominate (Nowak et al. 2000). Participating in rituals
is one way to encourage continued cooperation while ensuring fairness and punishing defectors by not allowing them to participate. Those that properly and fully participate in rituals demonstrate themselves to be trustworthy reciprocal exchange partners.

The preceding discussion of game theory provides a theoretical model and a set of expectations for how individuals, in instances of social reciprocity, can be assured of a return on their gifts. As illustrated by the discussion of the ritual of economy, the importance of examining production rather than consumption in small scale societies becomes clear. It is in the production of socially valued goods for ritually mediated exchange that important social processes take shape. These processes may include prestige building activities but they are not restricted to competitive displays. Instead, production and consumption may be aimed simply at building the relationships necessary for survival. By standardizing the interactions between households the ritual of economy provides a means to structure production, exchange, and consumption in the absence of a centralized political authority (Watanabe 2007:305).

**Producing Socially Valued Goods**

To focus the analysis of ritual economy in prehistory, I concentrate on craft production. As one of the most distinctive aspects of the Hopewell horizon, these crafts must have played a pivotal role in ritual interaction (Seeman 1995). Most definitions of craft specialization identify a specialist as some entity (either an individual or household) that produces goods in a regular fashion which are distributed to others, while the specialist does not produce all of the goods which it consumes (Costin 1991:4). For example, a specialist may make pottery and distribute it to others in exchange for
agricultural products. One common way to analyze craft specialization is by identifying full versus part-time specialists and attached versus independent specialists (Seeman 1984). Costin (1991:8-9) recognized even more variation and described eight types of specialized production: individual specialization, dispersed workshops, community specialization, nucleated workshops, dispersed corvé, individual retainers, nucleated corvé, and retainer workshop. While they are listed as distinct types they are meant to describe a continuum of production on several different levels such as degree of elite sponsorship, concentration, scale, and intensity (Costin 1991:Figure 1.4).

As her discussion is based in political economy, there are a number of issues with Costin’s (1991) types of craft specialization when applied to small-scale or societies (Muller 1997; Spielmann 1998). For example, Costin (1991:3) follows the law of supply and demand in that “the level of demand describes the number of items in circulation and the number required to satisfy the demand crowd”. Spielmann (2002:196) argues that there is a consistent high demand for socially valued goods yet producers do not try to maximize profits. Instead the end goal is “often superlative performance and participation” (Spielmann 2002:197). This illustrates one issue with traditional discussions of craft production; the failure to distinguish between the production of commodities and the production of gifts (Clark 2007:26). Costin’s discussion focuses on the production of commodities which entails the production of alienable objects, or those not connected to any particular individual. Objects actually form a continuum from commodities to gifts, the latter being inalienable objects intimately tied to a particular individual. In an economy of gifts, producers and consumers tend to focus on the
relationships created by exchanges, not a demand for objects (Clark 2007:26; Mauss 1990).

Hirth (2009:14) argues that archaeologists have largely been concerned with distinguishing between full- and part-time specialization and attached and independent specialists because studies of craft production are often used to reflect political complexity. In this case, part-time independent producers, usually structured within household production, are at the lowest level of complexity. They are seen as relatively inefficient and produce utilitarian as opposed to elite goods. However, Spielmann (1998:153) argues that craft specialists may be attached to or sponsored by a particular ritual context rather than elites. Hirth (2009:14-15) argues that the distinction between full- and part-time specialists is misleading because it does not consistently reflect the economic system of society and full-time production is not always more efficient. In other words, part-time production may predominate even in market economies and in times of uncertain demand part-time specialization will ensure greater household security.

Discussions of craft specialization often struggle to identify and classify domestic level or household craft production. Craft products produced at this level are generally thought of as “utilitarian” (Costin 1991:11) and produced from “widely available raw materials” (Shortman and Urban 2004:198) produced on a part-time basis. Typical examples include utilitarian pottery and general-purpose stone tools. In this sense, household crafts are often seen as more mundane with crafts produced strictly for political or economic purposes. However, a great deal of recent research has emphasized
the diversity of productive activities within households, particularly in complex societies (Hirth 2009).

**Ritual Economy and Craft Production: Archaeological Implications**

A ritual economy model posits reciprocal exchange of goods among numerous individuals, households, and corporate groups all with relatively open access to raw materials resulting in highly dispersed and variable signatures of production and deposition (Thompson 2012:50). Here, open access refers to a lack of elite control over the means of production as power, authority, and leadership are based on ideological control and are relatively diffuse. However, some items, usually highly symbolic ritual items, may be restricted due to circumstances of their acquisition and therefore confer more prestige to their holders due to the integration with ritual performance (Spielmann 1998; Thompson 2012:12).

Using research from Mississippian mound centers, Thompson (2012) outlined three models, based in ritual economy, of the acquisition and consumption of craft products. While there are substantial differences between the economic and political structures of Mississippian and Hopewell populations, I feel that the following models are general enough to be applied to either situation. An important starting point for all of the models, and also a point that helps them transcend specific culture groups, is that the populations examined are bound by ritual obligations rather than economic transactions or political factors. As such, the models describe how production for ritual events—the *economics of ritual*—is tied to the relationships created and maintained through ritualized social interactions—the *ritual of economy*. 
By examining ethnographic data from the Osage and artifact distributions at Cahokia, Kelly (2006) argues that production was structured through a ritual process in which different corporate groups, represented by habitation clusters, specialized in different production stages of the same artifact types. For example, among the Osage, ritual objects and religious bundles were crafted by different clans and assembled during the stages of various ceremonial processes (Kelly 2006:242-243). At Cahokia, Kelly (2006:248) notes that shell debris and the stone microliths used to drill holes in shell are spatially segregated. Kelly suggests that the initial shaping of beads was carried out in one area (the Ramey Tract), then the shell was transported to where the final holes were drilled (the Kunnemann Tract). If different social segments inhabited or controlled each area then the archaeological evidence mirrors the movement of ritual items between clans in the Osage analogy. Kelly (2006:251-255) identifies similar patterns of production among chipped stone celts and arrowheads. Therefore, in an archaeological context, Kelly’s model predicts evidence for segregated stages of production of the same artifact class as different corporate groups are producing parts of the whole. This is similar to Spielmann’s (1998:154, 2002:202) argument that Hopewell craft production took place with multiple artisans from corporate groups often collaborating on a single object.

After examining archaeological evidence for production activities in mound top habitations, Knight (2010) argues that different corporate groups at Moundville specialized in the production of different objects, not stages of the same objects as argued by Kelly (2006) at Cahokia. For example, Knight (2010:358) argues that “if one group had craftspersons skilled in the painted arts, another had special access to potters adept in
engraving religious imagery. If one had lapidary workers specially skilled in making axes and beads of polished stone, another had access to master hunters”. Based on the relative abundance of finished objects and raw materials Knight (2010:Table 9.4) documents more intensive production among such categories as decorative arts, lapidary working, stone tool manufacture, and fine wood carving on different mounds. Knight (2010:360) argues that, because different groups produced different objects, they were tied together in reciprocal exchange patterns in order to receive the entire suite of socially valued goods.

A third model forwarded by Blitz (2007b, cited in Thompson 2012) argues that corporate groups were spatially segregated at Moundville and functioned autonomously. As independent entities, each group organized their own rituals and produced all of the necessary paraphernalia in house. Therefore, each corporate group would have had access to the same types of materials. Using archaeological data from pottery, chipped stone, and greenstone assemblages, Thompson (2012) demonstrates that these materials were dispersed across the site with each corporate group active in their production and consumption. In this case the archaeological record contains a great deal of “duplication and replication” (Thompson 2012:35 emphasis in original) in terms of the activities conducted and artifacts represented between separate residential units. Thus, multi-group integration was not accomplished through ritual production or exchange, but some other means such as feasting (Thompson 2012:35).

In summary, based on the assumptions of a ritual economy model, I propose three possible scenarios for the organization of production at Hopewell earthworks. Groups
may have focused on producing different stages of the same artifacts (Kelly 2006),
producing artifacts from a limited range of raw materials (Knight 2010), or reproducing
the same types of artifacts as other groups (Blitz 2007b, cited in Thompson 2012). Each
variation in the organization of production should produce distinctive microwear
signatures. For example, Kelly’s model predicts that bladelets from separate contexts
should be used on the same raw material types but perhaps in different motions (e.g.,
cutting vs. drilling shell). Knight’s model predicts that bladelets should be used to work
different raw materials in each context. Finally, Blitz’s model predicts that bladelet use
should be uniform throughout each context with production spread across multiple raw
material types.

In terms of ritual economy, craft production—the economics of ritual—is tied to
the interactions among domestic groups in ritual contexts—the ritual of economy—in
different ways. Each particular model describes variations in the economics of ritual in
that they describe the production of craft products used in the ritual process. Both Kelly
and Knight’s models involve the exchange or sharing of socially valued goods among
autonomous households. Thus their models predict that socially valued goods played an
important role in the ritual of economy in that they were involved in ritually mediated
exchanges. Blitz’s model of production for use by one particular group would not
involve exchanges of socially valued goods, although the ritual of economy could have
played out in the exchange of other goods.
Chapter 3: Hopewell

Eastern Woodlands Culture History: A Brief Review

Many of the characteristics of Middle Woodland Hopewell remains such as earthen mound and monument building and the long distance exchange of exotic materials actually emerged several thousand years earlier in the Eastern Woodlands during the Archaic period (Griffin 1967; White 2013:123). North America’s Eastern Woodlands extend from the Atlantic Ocean to the Mississippi River Valley and the Gulf of Mexico to the boreal forests of Canada. Earthen mound construction had commenced by the terminal Middle Archaic/early Late Archaic period (about 6,000 cal. BP) in many portions of the southeast (Kidder and Sassaman 2009). These early mounds occurred singly, in groups, and sometimes—as is the case at Watson Brake and the Nolan site in Louisiana—were associated with earthen enclosures (i.e. earthworks) (Kidder and Sassaman 2009:672). Moundbuilding often co-occurred with long-distance exchange networks, although the two activities were not always linked (Anderson and Sassaman 2004). For example, mounds in northeast Florida contained Jasper beads from Mississippi and bannerstones from Georgia or South Carolina (Kidder and Sassaman 2009:675). However, mounds in the lower Mississippi Valley, such as Watson Brake, Nolan, and Mound A of Poverty Point, contain no exotic artifacts. These two processes of moundbuilding and long-distance exchange often combined to produce highly
elaborate burial ceremonialism in which some individuals were interred in constructed tombs with elaborate burial goods (Milner 2002). For example, at Monte Sano in Louisiana human cremations were scattered over the surface of a dismantled rectangular building and deposited with an exotic flint biface and jasper beads before being covered by several layers of mound fill (Kidder and Sassaman 2009:673). These very early mounds and earthworks were constructed by hunter-gatherer group that continued to subsist on the same wild plant and animal resources as groups from earlier time periods (Smith 1989). After this early florescence, earthen monument construction ceased for 1,000 years from about 4,700 cal. BP to 3700 cal. BP (Saunders 2012).

Late Archaic mound and earthwork construction re-emerged with Poverty Point in Louisiana. The Poverty Point earthworks consist of six elliptical rings and five earthen mounds spread over about 3 square km. Poverty Point was certainly the center of extensive ceremonial activities but the level of domestic settlement at the site remains unknown (Kidder and Sassaman 2009:680). Poverty Point is an anomaly as after its abandonment monument building and long-distance exchange in the region decrease substantially. Elsewhere in the Eastern Woodlands, the construction of burial mounds—often accompanied by caches of ceremonial objects—and long-distance exchange networks began a process that ultimately culminated in the elaborate ceremonial gatherings and constructions at Hopewell earthworks. Milner et al. (2009) demonstrate that mortuary ritual gatherings, mound buildings, and the deposition of artifacts with the dead and as separate offerings start to become more common in the Late Archaic. They
(Milner et al. 2009:121) also attribute the rise of formal cemeteries toward the end of the Late Archaic period to reduced territory size and intensified resource use.

Inter-regional exchange especially of copper, flint tools, and marine shell ornaments began during the Late Archaic. By the end of the Late Archaic, formalized interaction spheres such as Red Ocher and the Williams mortuary complex can be identified through the distribution of artifacts found in burial mounds and caches (Purtill 2009).

Much of the increasingly complex ceremonial activity of the Late Archaic co-occurred with significant subsistence changes. The characteristic aspect of Late Archaic subsistence is a marked increase in the quantity and diversity of seed remains such as goosefoot, sumpweed, maygrass, and sunflower (Simon 2009). For example, Poverty Point produced evidence of mound and earthwork building, baked clay objects, exotic raw materials, and evidence for wide diet breadth in the absence of domesticated foods (Ramenofsky 1986). Pepo squash rinds are often recovered outside of their presumed natural range during this time indicating cultivation if not domestication (Simon 2009). However, it is important to remember that collected nuts remained the most important plant food from the Middle Archaic through the Late Woodland in most parts of the Eastern Woodlands (Watson 1989). In terms of faunal remains, Christianson (1986:43) documents an increase in the use of aquatic resources such as fish and mussels beginning in the Late Archaic. The domestication of gourd, goosefoot, sumpweed, and sunflower is documented by 4,000-5,000 cal. BP in the Lower Ohio Valley (Jefferies 2009:234). Beyond simply domesticating certain plants, Simon (2009) argues for the existence of
low-level food production economies in parts of the Eastern Woodlands by the end of the Late Archaic.

At the same time that weedy seed crops are being domesticated in the Ohio Valley, ceramic technology appears in parts of the southeast. Kay (1983:43) notes the introduction of pottery at 4,500 cal. BP in the Ozark highlands of Missouri. Milner (2002:37) puts the earliest appearance in the Eastern Woodlands at 4,500 cal. BP in the Atlantic coastal plain. Both Kay’s and Milner’s estimates for the emergence of ceramic technology are in line with Griffin’s (1967:180) assertion that the technology arose in coastal Georgia and Florida 4,500 years ago.

Many of the above processes are reflected at Late Archaic sites in Ohio. For example, pottery is often found in contexts dating from 2,600 to 4,500 cal. BP in Ohio (Purtill 2009:576). Formal cemeteries with elaborate grave goods of shell, copper, channel coal, and slate are associated with the Late Archaic period Glacial Kame complex in Ohio (Purtill 2009:589). Other groups in Ohio also began to erect small mounds during this time (Pacheco and Burks 2008). Some Late Archaic groups in Ohio participated in formal inter-group gatherings for exchange and mortuary ritual, described as trade fairs (Purtill 2009:590). Late Archaic populations in Ohio were still largely hunter-gatherers whose diet consisted of nuts, collected seeds, and wild game (Purtill 2009:586). Several sites, mostly from near the Ohio River, have yielded remains of domesticated squash during the Late Archaic however.

The Early Woodland period (800 cal. BC – 100 cal. BC) is characterized by a number of elaborations on cultural practices that began during the Archaic (Griffin 1967;
Lepper 2011). For example, the use of pottery became even more widespread by the Early Woodland period (Brown 1986; Clay 1992; Jefferies 2004; Schweikart 2008). Seasonal movements to exploit a wide range of wild resources are well documented (Clay 1998; Gibbon 1986; Lewis 1986; Morgan et al. 1986; Munson 1986; Stothers and Abel 2008; Yerkes 1988). However, many archaeologists have argued for the existence of horticultural economies in different areas by the Early Woodland (Jefferies 2004; Seeman 1992; Smith 1992; Watson 1989; Yarnell 1993). With this greater reliance on cultivated foods comes a shift to smaller territories and more sedentary residences.

During the Early Woodland period, numerous interaction spheres emerged across the Eastern Woodlands, especially in the northern regions. These interactions spheres included Meadowood, Middlesex, Red Ocher, and Adena in the Midwest (Mason 1981:218; Taché 2011). These interactions spheres—known almost exclusively from burials—are characterized by long-distance exchange of non-utilitarian objects and raw materials. Burial ceremonialism in the form of mound building and elaborate grave goods are common throughout the Eastern Woodlands (Abrams 1992; Clay 1986; Milner 2002; Seeman 1986).

There is a strong Adena (500 cal. BC – cal. AD 200) presence during Ohio’s Early Woodland period (Clay 1986). The most common Adena earthen constructions are mounds while circular earthworks do occur (Clay 1998; Carskadden 2008:264). Mounds can occur singly or in groups (Clay 1998:2). Mounds usually occur at the edges of suspected groups territories, often on ridgetops as visible symbols of ownership (Carskadden 2008:267) or to facilitate interaction with outside groups (Clay 1992:80;
Where circular earthworks do occur, two or more are usually found in close spatial proximity (Carskadden 2008:264). Mound sites are often accompanied by another distinctive Adena trait, circular paired post structures (Clay 1998; Purtill et al. 2013; Seeman 1986). These paired post structures are often described as mortuary facilities because of their association with burial mounds and the lack of associated domestic refuse (i.e., Seeman 1986). A recent re-examination of known paired post structures suggests that they were home to broader types of ritual activity that may not have included mortuary processing at all (Purtill et al. 2014). This argument is partly based on the discovery of paired post structures away from known burial mounds (Purtill et al. 2014:60). Additionally, examination of the stratigraphic relationships of paired post structures and burial features suggests that mortuary activities occurred after the structures were taken down and removed (Purtill et al. 2014:61). Thus, Adena ritual spaces represent palimpsests of behavior that reflect their transformation from non-mortuary sacred spaces to places of human burial through time.

Few obvious Adena domestic structures have been identified and settlements usually only include pit features (Abrams 1992, 2008; Schweikart 2008). This is not to suggest that Adena domestic sites did not contain structures, just that, if they did, they were usually too ephemeral to leave archaeological traces. For example, Schweikart (2008:204) identified the main Adena domestic sites as open air concentrations of pit features with evidence for resource acquisition as well as a broad range of domestic activities. They may have been occupied during the warm or cold months. Rockshelters
were also used by Adena groups, possibly as winter camps (Abrams 1992:20; Schweikart 2008:204).

Long-distance exchange and burial ceremonialism reach their peak in many parts of the Eastern Woodlands during the Middle Woodland (Abrams 2009; Brose and Greber 1979; Fortier 1998; Seeman 1992, 1995; Yerkes 1988). Most areas still show evidence for seasonal settlement patterns (Butler 1979) but some have suggested that groups established semi-sedentary communities in a number of regions (Dancey 1991; Dancey and Pacheco 1997; Smith 1992). Most regions show evidence of developed small-scale food production or horticultural subsistence economies by the Middle Woodland (Smith 1992; Watson 1989, 1992; Yarnell 1993). However, compete reliance on wild foods does persist in some areas of the Eastern Woodlands (Johnson 1979; Kay 1979).

The Middle Woodland period (100 cal BC – cal. AD 400) marks the rise and fall of the Hopewell Interaction Sphere (Abrams 2009; Caldwell 1958; Griffin 1967). The most recognizable Hopewell earthen constructions are earthworks, many of which have associated mounds either within the enclosures or nearby (Lepper 2011; Milner 2002:74). The earthworks are usually constructed in geometric shapes such as circles, squares, octagons or any combination of the three (Milner 2002:74). Hilltop enclosures, which appear to follow the natural contour of elevated ridges but may be built upon anthropomorphic features, are also common (Connolly 2004a, b). These earthworks can range in size from 5 to 100 hectares (Griffin 1967:183). Hopewell is a further elaboration of many of the themes evidence in Adena ritual although there is not a direct linear evolutionary relationship between the two as evidenced by Adena practices extending
into the Middle Woodland in Ohio (Abrams 2009). Greater detail on the Hopewell horizon is presented in the next section.

The end of the Hopewell horizon is marked by the cessation of earthwork building, elaborate burial ceremonialism, distinctive lithic and ceramic styles, and the reconfiguration of inter-regional trade networks about cal. AD 300- cal AD 500. Some scholars argue that this period is marked by settlement nucleation in villages (Braun 1982; Dancey 1996; Pacheco 2010). Others see a lack of definitive evidence of such settlements, instead arguing that seasonal residential movements by small groups were the dominant settlement feature (Clay and Creasman 1999; Niquette 1992). While all scholars agree that the end of Hopewell marks a profound shift in social and ceremonial practices, no universally accepted explanation for the demise of the Hopewell horizon has been put forth. For example, no major subsistence shifts mark the end of the Hopewell Interaction Sphere (Wymer 1992, Smith 1992). There is also no evidence of population replacement or migrations (Dancey 1996:396). Concomitantly, the Hopewell decline does not involve a complete break with previous cultural practices. Earthen mounds—but not earthworks—continue to be built over much of the Eastern Woodlands. Additionally, through the identification of lightning whelk shell and southern grown cotton in the plaque of teeth from a Late Woodland individual in northern Ohio, Blatt et al. (2011) documented the continuation of long distance exchange networks after the cessation of the Hopewell Interaction Sphere.

Many discussions of the end of the Hopewell horizon begin with the interpretation of the gatherings at earthworks as events that allowed interaction among
dispersed populations (similar to historic Shoshoni fandagoes) or as risk-buffering strategies in time of food shortages (Abrams 2009:187; Braun 1982; Fortier 1998; Hall 1980, Yerkes 2002, 2003a, 2005, 2006). The emergence of different systems of social integration and interaction and/or risk-buffering strategies then led to the abandonment of the Hopewell earthwork complexes. For example, Nolan and Howard (2010) argue that small increases in the productivity of native crops due to subsistence intensification led to greater subsistence security, population increase, and settlement in previously marginal areas away from earthworks. The increased subsistence security and self-sufficiency and local autonomy eliminated the need for large periodic ceremonial gatherings. Nolan and Howard (2010:145) do admit that further botanical, environmental, settlement, and population data are needed to test their model. Blitz and Porth (2013) argue that subsistence autonomy was further ensured by an earlier adoption of the bow and arrow than conventionally argued (cal. AD 300 as opposed to cal. AD 600) in the Eastern Woodlands. The increased accuracy and efficiency of the bow and arrow over the atlatl resulted in greater subsistence autonomy and productivity. Once again, these advantages allowed groups to settle away from floodplain habitats and reduced the need for social aggregations that promoted risk buffering alliances. Measuring shoulder width, Blitz and Porth (2013:89) used a threshold value of >2cm to identify the emergence of arrow points in the archaeological record. While Shott (1997:98) demonstrates that shoulder width is the single most important variable in distinguishing between darts and arrows, he is very clear to note that the “best classification results occur when shoulder width is used in a one-variable discriminant analysis, not as a simple threshold value”. This simplification
of Shott’s classification, along with the emergence of differing classification schemes (Hildebrandt and King 2012) and renewed debate on the utility of using ethnographic samples to create universal metric distinctions between darts and arrows (Erlandson et al. 2014; Walde 2014), point to the necessity of further research on the introduction of the bow and arrow. Dancey (1996) argues that settlement nucleation, which began during the Middle Woodland period but away from Hopewell earthworks, eliminated the need for populations to maintain separate ceremonial precincts for social aggregations. The decline in large social aggregations of geographically diverse populations also eliminated the need for the stylistic expression that characterizes Hopewell assemblages (see also Braun and Plog 1982). However, others find no evidence for settlement nucleation in the Middle or Late Woodland periods of the Ohio Valley (Clay and Creasman 1999; Niquette 1992). Thus, further research into the timing of horticultural intensification, the adoption of the bow and arrow, and settlement nucleation is needed to further elucidate the Hopewell decline.

Others have defined the end of the Hopewell horizon as a result of various social processes. For example, it has been attributed to a unique historical event (Carr and Case 2005; Case and Carr 2008); the rejection of ritual authority and its associated objects (Spielmann 2013); the dissociation between mound-building and world renewal through an emerging elite class (Hall 1997:167); and conflict among social classes (Bender 1985). While some or all of these forces may have been at work at the end of the Middle Woodland, they only provide proximate factors and not true causal explanations (O’Brien and Lyman 2004; Nolan and Howard 2010:126).
Regardless of why the Hopewell Interaction Sphere and Hopewell ceremonialis
cism declined, numerous changes mark the succeeding Late Woodland period (cal. AD 500 – cal. AD 1000) (Griffin 1967; Lepper 2011). The large Hopewell earthworks were largely abandoned and the frequency of elaborate artifacts made from exotic materials decreased substantially (Lepper 2011). However, burial mounds continued to be built during the Late Woodland period, with effigy mounds becoming common in parts of the Midwest (Milner 2002). There is also evidence that at least one Hopewell earthwork—Hopeton—was modified during the Late Woodland (Lynott and Mandel 2009). Similarly, long-distance exchange networks continued to exist between the Great Lakes region and the Southeast, although some of the trade routes changed (Blatt et al. 2010; Seeman and Dancey 2000). In the Ohio Valley, Late Woodland groups are often characterized as sedentary, residing in large, palisaded villages (Dancey 1992; Lepper 2011; Munson 1986; Seeman 1992; Seeman and Dancey 2000; Shott and Jefferies 1992). Others see a lack of definitive evidence of such settlements arguing that seasonal residential movement was still the normal settlement pattern (Clay and Creasman 1999; Niquette 1992).

Wymer (1993) found that diet breadth decreased from the Middle to Late Woodland periods. Late Woodland domesticated plant use across the Eastern US included starchy seeds such as goosefoot, maygrass, erect knotweed, and little barley as well as oily seed-like sumpweed and sunflower (Simon 2000). The large scale adoption of maize agriculture began at about cal. AD 800-900 with maize initially replacing EAC crops in west-central Illinois (Greenlee 2006; Watson 1988). Jefferies (2004) argues that
maize becomes the most important crop, replacing many indigenous cultigens and wild foods, throughout the Eastern Woodlands at different times during the Late Woodland period.

Several important technological changes occurred during the Late Woodland as well. For example, the emergence of the bow and arrow is often attributed to the Late Woodland Period (Griffin 1967 but see Blitz and Porth 2013). Regardless of the timing of introduction, the bow and arrow probably contributed to the rise in inter-personal violence, especially during the latter part of the Late Woodland (Milner 2002). Ceramic technologies continue to improve, by becoming thinner and conducting heat more efficiently allowing pots to be placed directly on or over cooking fires (Braun 1988; Seeman and Dancey 2000).

**Hopewell**

In a frequently repeated passage, Caldwell (1964:136) noted that the term Hopewell has been used to refer to “a civilization, a culture, a complex, a phase, a regional expression of a phase, a period, a style, a cultural climax, migrations of a ruling class, a technological revolution, a social revolution, [and] an in place development out of previous antecedents.” As his contribution, Caldwell added an additional description, an interaction sphere. Seig and Hollinger (2005:127) list the major issues with the term Hopewell as: the use of the term began before any explicit use of a formal taxonomic system, the concentration on mortuary and exchange goods in defining the concept, the frequent use of trait lists to identify Hopewell, and the implied cultural similarity by defining archaeological remains from large geographic areas as Hopewell based on the
presence of artifact types. The extent of variability in Hopewell remains across the Eastern Woodlands caused Dancey (1996:402) citing a comment by James Griffin, to lament that “[i]f there was a Hopewell, perhaps it was only in Southern Ohio”. While clearly a muse on the preponderance of Hopewell research generated in recent years, Griffin’s comment serves to highlight the importance of defining Hopewell based on local traits. For example, if Hopewell is defined by the traits observed in the Scioto Valley then Hopewell is confined to southern Ohio as no other regional traditions look exactly the same. If, however, Hopewell is defined by a broad set of time-space material expressions with regional variability then it can exist in many different places. Due to this factor I largely concentrate my discussion of Ohio Hopewell remains while examining comparisons at larger or smaller levels when necessary. I define Hopewell as Middle Woodland groups from the Miami, Muskingum, and Scioto river valleys in Ohio who built earthworks and acquired exotic artifacts while practicing horticulture and residing in sedentary or semi-sedentary dispersed hamlets. But which, if any, of Caldwell’s modifiers best describe these Hopewell remains. Seig and Hollinger (2005) conclude that Hopewell is best defined as a horizon. A horizon is an integration of time, space, and form in that horizons define shared cultural traits whose appearance seems to be the result of a rapid spread (Seig and Hollinger 2005:131).

As considerable variation can occur in the economic, social, and ideological realms of groups that share some similar artifact types, my definition of Hopewell is necessarily restricted. This emphasis on regional variability reflects recent, and not so
recent, trends in research on Middle Woodland ceremonialism (Brose and Greber 1979; Charles and Buikstra 2006).

The modern conceptualization of Hopewell results from a long taxonomic struggle that mirrors many of the major developments in Americanist archaeology. While sites that are today recognized as Hopewell affiliated had been investigated for well over a century (Atwater 1920; Moorehead 1890; Putnam 1885; Squire and Davis 1848; Thomas 1894), Mills (1906:135) was the first to introduce the term Hopewell to the archaeological literature. In his brief description, he designated the Hopewell Mound Group as the type site for this archaeological culture. Shetrone (1930) was the first to attempt to define the regional limits of Hopewell remains by noting similarities in mounds and earthworks and their associated artifact assemblages throughout the Midwest. These early characterizations of Hopewell described it as a culture type by defining trait lists in the spirit of the Midwestern Taxonomic Method (McKern 1939).

One early attempt to move beyond the trait list conceptualization of Hopewell remains highly influential in Hopewell archaeology today. Caldwell (1964) defined the Hopewell Interaction Sphere (HIS) as a set of primarily mortuary-religious interactions among a number of regional cultural traditions joined together to form one great tradition. This great tradition was responsible for the rise of similar mound building, exchange, and symbolism throughout the eastern US during the Middle Woodland (Hall 1980, 1997).

The regional traditions which comprised the HIS were a set of discontinuous entities corresponding to natural vegetation zones in what are now Illinois, Michigan, Wisconsin, Iowa, Ohio, Indiana, Missouri, Oklahoma, Georgia, the Carolinas, and Florida (Caldwell
1958). Each regional tradition (Havana, Crab Orchard, Scioto, Northeastern, Southern Appalachian, and Gulf) practiced unique non-mortuary aspects such as settlement patterns but shared symbols and objects related to the mortuary realm.

Numerous revisions have been made to the HIS concept over the years. For example, the methods of interaction and exchange were more complex than Caldwell originally outlined (Carr and Case 2005), and the concept of a single interaction sphere has been challenged. Similarly, HIS objects and interactions are viewed in broader social, ideological, and economic terms in addition to Caldwell’s mortuary-religious interactions (Hall 1980; Spielmann 1998). However, the interaction sphere concept remains a useful analytical tool for describing social processes at work during the Middle Woodland.

Recent definitions characterize the Hopewell as regionally integrated groups whose ties are identified by earthwork construction and exotic artifacts whose form may vary by region (Abrams 2009:172). Pacheco (1996:18) defines Ohio Hopewell tribes as Middle Woodland groups located in the Mid-Ohio Valley who “participated in a pan-eastern Hopewellian cosmology” partly by constructing earthworks. Madsen (2001:280) defines Ohio Hopewell as Middle Woodland groups, presumably from Ohio, who constructed earthworks and imported exotic objects such as obsidian, mica, marine shell, galena, and copper.

Hopewell has become nearly synonymous with the Middle Woodland period in the middle Ohio Valley (Seeman 1986:567). There is general agreement that the appearance and disappearance of Hopewell marks the beginning and end of the Middle
Woodland period. However, numerous non-Hopewelian groups existed during the Middle Woodland period even in Hopewell core areas like Ohio and Illinois (Brose and Greber 1979). Therefore while Hopewell remains may be restricted to the Middle Woodland period the two terms refer to different units and cannot be substituted for one another.

_Hopewell Subsistence_

The question of Hopewell subsistence is of perennial debate (Bender et al. 1981; Ford 1979; Dancey and Pacheco 1997; Smith 1992; Wymer 1992; Yerkes 2005, 2006). Nutshell and faunal remains indicate a heavy reliance on wild foods at Hopewell sites. Domesticated starchy and oily seeds form the vast majority of crops recovered from Hopewell sites (Smith 1992). Together these plants constitute the Eastern Agricultural Complex (EAC). Clearly the presence of domesticated seed crops at Hopewell sites indicates some form of food production economy (Smith 1992, 2001; Watson 1989; Wymer 1992, 1996; Yarnell 1993). Some maize has been found at Hopewell sites in Ohio but it is a rare occurrence, and has only been found at earthwork complexes (Watson 1989:560). In fact, maize does not become a major staple crop in Ohio until after A.D. 1,000, well after the decline of Hopewell (Simon 2000).

The majority of Hopewell botanical data comes from a handful of habitation sites; Murphy, Campus, Nu-Way, and Jennison Guard (Wymer 1996). Nutshell, from hickory, acorn, hazelnut, and walnut, forms a major class of paleobotanical remains from Hopewell habitations (Wymer 1996:Table 3:3). Substantial amounts of squash rind (_Curcurbita pepo_) were recovered as well. Domesticated taxa of starchy EAC weedy
plants form the majority of the seed assemblages from these sites (Wymer 1996:Table 3:4). Goosefoot (*Chenopodium* sp.), erect knotweed (*Polygonum erectum*), and maygrass (*Phalaris caroliniana*) constitute the largest number of seeds. Oily EAC seeds like sunflower (*Helianthus annuus*) and marshelder (*Iva annua*) along with wild fruits such as honey locust (*Gleditsia triacanthos*), grape (*Vitis* sp.), and hackberry (*Celtis* sp.) are also present (Wymer 1996).

Hopewell faunal assemblages are dominated by remains of white-tailed deer (Styles and Purdue 1985; Yokell 2004). Other resources such as small mammals, birds, fish, and shellfish are often present but rarely in significant quantities.

Early researchers assumed that the impressive cultural accomplishments of the Hopewell could only have been accomplished with a subsistence base of maize agriculture. The importance of maize has been refuted but most scholars argue that domesticated native weedy crops played a significant role in Hopewell subsistence. Some scholars (Smith 1992; Wymer 1996:41) refer to the Hopewell as farmers not to imply that they had vast field of crops but to stress that cultigens played a very important role in the diet. For example, Wymer (1996) argues that cultigens constituted most of the diet at excavated Hopewell hamlets based on the large percentage of seeds from the EAC crops recovered. Others (Yerkes 2003:17, 2005, 2006) have severely downplayed the role of domesticates in Hopewell diets.

Much of the current debate may be due to variability within subsistence strategies. The most striking example of this is Milner’s (2002:87) plot of the relative abundance of domesticated plant seeds in archaeological assemblages throughout the midcontinental
United States. There is a clear increase in the overall use of cultigens beginning 2,500-2,000 years ago but a number of sites contain almost exclusively wild foods, even into historic times. Subsistence strategies were probably adjusted to meet any number of ecological, political, social, or ritual needs. Another source of contention is the difficulty inherent in comparing the subsistence contribution of nuts and seeds. Differing interpretations lie in the comparison between the relative contribution of seeds and nuts in which Wymer views seeds from native domesticates as the staple plant food while Yerkes does not believe that these domesticated weeds were real crops, since they could be sewed and harvested without tilling the soil (cf. Harris and Hillman 1989). Ruby (2006) and others (Johannessen 1988) have documented a decline in the importance of nuts in the Midwest beginning in the Archaic by measuring rations of seeds to grams of nutshell and nutshell fragments to wood charcoal fragments. When, or if, this reduction becomes significant enough to warrant a new subsistence label is still a matter of debate.

Hopewell subsistence seems to fall clearly within the range of Smith’s (2001) low-level food production with domesticates. Similarly, it might be described in terms of Rindos’ (1980) domesticatory society. Calling the Hopewell farmers may be a bit extreme as low-level food producers, not just agriculturalists, are intensive managers of their environments (Terrell et al. 2003:359). Similarly, the Hopewell lived in an increasingly domesticated landscape in which the food procured and its procurement strategies were changing and possibly highly variable (Terrell et al. 2003). Recently, Carr (2008:83-85) concluded that the Ohio Hopewell diet consisted of about ¾ wild plants and animals and ¼ domesticated weedy plants. Carr bases his characterization on
the similarities between Hopewell subsistence and those of historically known groups, the lack of stone hoes and grinding stones from Hopewell sites, rarity of storage pits, lack of an agricultural iconography, and a general lack of women in positions of authority. This assessment fits well with the current data on Hopewellian subsistence and models of food production described above.

**Hopewell Settlement Patterns**

After extensive excavations at the McGraw site and limited excavation at other habitation in central Ohio, Prufer (1965) described the Ohio Hopewell settlement pattern as a series of small semi-permanent hamlets clustered around vacant ceremonial centers, or earthworks. Stemming from work at the Murphy site, Dancey and Pacheco (1997; Pacheco 1996, 1997, 2010) modified and expanded Prufer’s model in what they called the Dispersed Sedentary Community Model. Dancey and Pacheco (1997) envisioned the basic settlement unit as a sedentary hamlet, or household, with several of these units located around an earthwork. Pacheco (1997:43-44) lists the archaeological signatures of hamlets as artifact clusters of less than one hectare characterized by a single artifact concentration composed of a generalized domestic toolkit in the general vicinity of an earthwork. Communities were generally spaced 300 to 500 meters apart (Pacheco and Dancey 2004:6). Each community was largely self-sufficient in terms of subsistence but formed larger peer polities centered at advantageously positioned earthworks as a risk buffering strategy (Dancey and Pacheco 1997:9-10). Following Prufer, Dancey, and Pacheco argue that earthworks were the centers of specialized activities related to mortuary programs or social gatherings. As such, remains at earthworks should reflect
short-term and/or specialized activities. Since Dancey and Pacheco’s reformulation of the Dispersed Sedentary Community Model similar hamlets have been excavated at Jennison Guard (Blosser 1996; Koarek 1997), Brown’s Bottom #1 (Pacheco et al 2006, 2009a), and Lady’s Run (Pacheco et al. 2009b).

Smith (1992) identified a similar settlement pattern across much of the Eastern Woodlands during the Middle Woodland period. In line with the Dispersed Sedentary Community model, Smith (1992:24) documents a “consistent, redundant pattern in the archaeological record of spatially discrete and dispersed single household settlements in valley edge tributary mouth settings or adjacent to floodplain lakes and marshes”. Smith (1992:213) argues that economically independent households could be recognized by the presence of structures, c-shaped windbreaks, pit features, scattered post holes, shallow midden deposits, and gully trash dumps. These household units resided away from corporate ceremonial centers but periodically gathered at such places for ritual purposes.

Similarly, Ruby et al. (2005) argue that the Hopewell household unit comprised each residential community but also that two other levels of social affiliation among Hopewell groups. Ruby et al. argue that Hopewell populations formed sustainable communities, or those composed of enough people to assure the long-term demographic success of groups, and symbolic communities aimed at social, political, and/or economic interaction. As with Smith’s identification of dispersed households, Ruby et al.’s analysis indicates that similar sustainable and symbolic communities were present across the Eastern Woodlands and influenced settlement patterns during this time.
The Dispersed Sedentary Community model has generated considerable debate. Alternate models have been advocated emphasizing either settlement nucleation or residential mobility. For example, Griffin (1996, 1997) argues that Hopewell populations occupied nucleated villages within or near earthworks. Griffin’s position is largely based on observations in 1934 of extensive numbers of refuse pits, post molds, and habitation debris in an area just east of the north fort of Fort Ancient where the upper few feet of soil had been stripped away (Griffin 1996:8, 1997:418), although he cites numerous other large surface artifact concentrations near earthworks as evidence. Despite Griffin’s arguments, no well documented Hopewell nucleated villages have been excavated. Nucleated settlements may exist during the end of the Middle Woodland period but they lack the typical Hopewell suite of artifacts and tend to be located away from earthworks (Dancey 1992). Thus, while some settlement variation certainly existed, the general pattern of small dispersed settlements described in the Dispersed Sedentary Community model stands.

Taking issue with the sedentary part of the model, Yerkes (1990, 1994, 2003a, 2005, 2006; Lepper and Yerkes 1997) and Cowan (2006) argue that Hopewell groups practiced seasonal residential mobility. Yerkes (1994:116) argues for seasonal occupation of Hopewell domestic sites like Murphy due to the lack of structures, and the absence of thick midden deposits, food storage pits, gully trash dumps, commensual species (i.e., rodents), and human burials in addition to long sequences of non-overlapping radiocarbon dates. Yerkes (2006) also cites ethnoarchaeological evidence (i.e., Kelly et al. 2005) to counter the argument that certain elements of Hopewell
habitation sites such as the existence of refuse disposal areas, organized activity areas, and non-overlapping features are characteristic of sedentary rather than seasonally mobile sites. According to Yerkes, the hamlets described in the Dispersed Sedentary Community model were one component of a seasonal round which also included rockshelters and earthworks. Additionally, Yerkes (2003a:17) argues for continuity in settlement patterns back through the Early Woodland and into the Archaic. Cowan (2006) uses evidence from the Hopewell lithic toolkit and wooden architecture at earthworks to argue that Hopewell populations were seasonally mobile. Cowan argues that, outside of bladelets, Hopewell lithic assemblages are dominated by the products of bifacial reduction, a sign of high mobility (Kelly 1988). Cowan does not view the structures present at earthworks as regular domestic structures. Instead Cowan argues that they are temporary housing for distant travelers to use while attending ceremonies at the earthworks.

Demonstrating that a site was occupied for all seasons of the year is exceedingly difficult. Expressing frustration with this difficulty, Griffin (1979:278) lamented “[s]omeone ought to investigate where many of these populations hibernated because they seem to have operated only in the spring, summer, and fall”. The only definitive evidence of winter activity of which I am aware comes from Fort Ancient where Yokell (2004:206) identified an attached antler pedicle on a white-tailed deer cranial fragment which indicates winter as the season of death.

Another aspect of the debate has to do with how Hopewell archaeologists conceptualize the archaeological record. Human mobility patterns are not simply split
into nomadic and sedentary. Instead, a great deal of variation exists between the two ends of this continuum. The differences between mobile and sedentary groups, and their associated habitation sites, are quantitative rather than qualitative because of this (e.g., Kelly et al. 2005). Therefore rather than trait lists of sedentism or seasonal mobility (i.e., patterned use of space, large storage features, etc.) a more nuanced view of the changes in these traits through time is needed to settle the debate. More than likely a considerable degree of settlement diversity existed across the Hopewell area. This probability was recognized early on (e.g., Dancey and Pacheco 1997:8) in the development of the Dispersed Sedentary Community model. Dancey and Pacheco have continually maintained that by sedentary they mean a site was occupied by at least a portion of the residential group throughout the year. Despite the back and forth about sedentism, the core of the Dispersed Sedentary Community model has always been dispersion. In fact, Pacheco (1996:21) left the possibility of increased residential mobility open by stating that “[a]s long as these households maintained the dispersed hamlet residence pattern throughout their seasonally scheduled cycle, the Vacant Center Model retains its validity”.

The Dispersed Sedentary Community model predicts that earthworks played host to periodic gatherings. In this model, as vacant ceremonial centers earthworks may still contain evidence of substantial prehistoric activity but lack permanent residences (Dancey and Pacheco 1996:7). In other words, people did not live at earthworks but visited for short periods for ceremonial activities. Some earthworks, however, do contain what some argue to be domestic remains (Connolly 1997; Lazazzera 2004a; Lepper and
Yerkes 1997). The best evidence for the domestic habitation of an earthwork comes from Fort Ancient (Connolly 1997; Griffin 1996, 1997; Lazazzera 2004a, 2009). At Fort Ancient, domestic structures have been uncovered inside of, and directly adjacent to, the earthwork enclosure. The extensive number of structures, pit and hearth features, FCR, pottery, lithics, and other generalized habitation debris from these areas points to something more than just periodic, short-term ritual activities. At the same time, it is not prudent to describe these areas as areas where only domestic subsistence activities occurred. Clearly the inhabitants of these areas at Fort Ancient must have been aware of their proximity to the massive earthwork. In fact, this proximity may well have been a major reason why people chose to reside in these particular places, especially considering that most habitations from this time period are found on floodplains (Dancey and Pacheco 1997; Pacheco and Dancey 2006). Fort Ancient, on the other hand, is located on a high terrace 80 meters above the Little Miami River (Connolly 1997:252).

As habitations located within or near earthworks, the domestic contexts at Fort Ancient bridge the often rigid dichotomy between the domestic and ceremonial spheres of Hopewell society (i.e., Smith 1992). The people living at Fort Ancient were almost certainly aware of, and participating in, the periodic ceremonial activities occurring around them. The act of living in the shadow of the earthwork while preparing for and participating in ceremonial activities and landscape alteration would have infused these places with special meaning so that they became more than just habitations. Schlanger (1992) labels these places, where the line between sacred and profane is nonexistent and everyday actions can have profound social meaning, persistent places. Viewing Fort
Ancients, and other Hopewell earthworks, as persistent places where repeated actions permeate the landscape with meanings provides a means to characterize the domestic use of these ceremonial centers.

**Hopewell Ceremonialism**

Earthworks, defined as earth or stone enclosures, are the most conspicuous Hopewell remains making it easy to see why they were the earliest sites to be discovered (e.g., Squire and Davis 1848). While Hopewellian artifacts are found throughout eastern North America, earthworks are largely restricted to a few river Valleys in southern Ohio (Bernardini 2004:Figure 3). Despite the fact that they are usually referred to as vacant ceremonial centers (Dancey and Pacheco 1997; Prufer 1964), Hopewell earthworks were important parts of the settlement system (Ruby et al. 2005). Earthworks were centers of ceremonial, social, and economic activities (Abrams 2009; Baby and Langlois 1979; Byers 2006; Smith 1992; Yerkes 2005:242) and some were home to relatively intensive domestic habitations (Connolly 1997; Genheimer 1997; Lepper and Yerkes 1997).

Early investigators largely interpreted the earthworks as defensive fortifications similar to the hill forts of Europe (Squier and Davis 1848). There was also the widespread belief that they were constructed by a lost civilization of moundbuilders who were subsequently wiped-out by Native American groups (Milner 2002; Silverberg 1968). Early research debunked the idea that the moundbuilders were a separate race of people from historically known Native American groups (Thomas 1894). While the defensive nature of all earthworks cannot be completely ruled out (e.g., Riordan 1995)
analysis of the structures and artifacts discovered at Hopewell earthworks demonstrates that their main purpose was social or ceremonial (Connolly and Lepper 2004).

Initial archaeological interest in Hopewell earthworks was spurred by the investigation of burial mounds (e.g., Moorehead 1890; Squier and Davis 1848; Thomas 1894). Based on the large number of elaborate burials discovered at earthworks, it is reasonable to assume that funerary rites played an important part in Hopewell social gatherings. However, many of the constructions associated with earthworks (embankment walls, wooden architecture, and even some mounds) and even many earthworks contain no burials, meaning that other factors must have drawn people together at these monumental places. With the development of the Hopewell Interaction Sphere concept, earthworks began to be viewed in largely economic terms and labeled transaction or redistribution centers (Struever and Houart 1972). While there was certainly an economic aspect to earthwork gatherings, there was more going on than just the transfer of goods.

Recent conceptualizations of earthworks stress the compound nature of these gatherings as mortuary, economic, social, and ceremonial. For example, Hall (1997:155-157) draws an analogy between ceremonial activities at Hopewell earthworks and the Calumet ceremonialism of many historic Native American groups. Calumet ceremonialism culminated in the spirit adoption of visiting individuals or groups by a host group but also included feasting, gift giving, and ritual activities (Hall 1997). Calumet ceremonialism ultimately functioned to create peaceful social ties between tribal groups by creating fictive kinship ties (Hall 1997:156-157). This was accomplished by
spirit adoption as well as feasting, gift giving, and ritual activities. Similarly, Fortier (1998:57) describes earthwork gatherings as analogous to the fandangos of Great Basin Shoshone groups. Fandangos were large social gatherings that involved feasting, dancing, ceremonies, and other types of social interaction among dispersed tribal groups. Yerkes (2005:246)—drawing on the ideas of Hall and Fortier—describes Hopewell earthworks as centers of “feasting, adoption, mortuary ritual, exchange, and social interaction,” and noted that the construction of the elaborate earthworks may have helped integrate the members of dispersed Hopewell tribes (Yerkes 2002). Carr (2005b) likens earthwork gatherings to the Feast of the Dead among the Algonquin and Huron. As the name implies, the Feast of the Dead combined feasting with mortuary rituals for those who had passed since the last gathering, usually 10 to 15 years prior. DeBoer (1997) and Pacheco (1996) compared Hopewell gatherings to those of South American groups with similar dispersed settlement patterns. Similar to others, DeBoer and Pacheco both argue that funerary rites, feasting, games, and marriages occurred at earthwork gatherings. Smith (1992) lists the four major types of activities at earthworks as corporate labor projects, feasting, mortuary ritual, and craft production. Thus, there is extensive evidence for multitudes of activities at earthworks from economic to social to ideological.

The scale of earthwork gatherings is another contentious issue in Hopewell research. Some (Dancey and Pacheco 1997; Pacheco and Dancey 2006) view earthworks as gathering places for local populations inhabiting the areas immediately surrounding a particular enclosure. Others (Bernardini 2004; Byers 2006; Lepper 2006) argue that earthworks drew people from much larger, often overlapping, regional catchments. The
truth may lie somewhere in between as there is certainly evidence for variation in the size of earthwork gatherings (Carr 2005b; Greber 1996).

Studies have utilized DNA, stable isotopes, and biodistance to analyze the scale of Hopewell social interactions based on human remains. Mitochondrial DNA from Hopewell burials in Ohio and Illinois indicate a great deal of genetic similarity between populations in the two regions. Mills (2003:Table 11) successfully extracted mtDNA from the teeth of 34 individuals from 5 separate mounds at the Hopewell Mound Group in Ross County, Ohio. Bolnick and Smith (2007:Table 2) successfully extracted mtDNA from the remains of 39 individuals from 5 separate mounds at the Pete Klunk Mound Group in Calhoun County, Illinois. Comparison of the DNA haplotypes from individuals in both mound groups indicates that a relatively large number of haplotypes were shared between the populations at both mound centers. Bolnick and Smith (2007:640) argue that this could be due to the migration of some individuals between the two regions or “the cumulative effects of short-range and incremental movements” within smaller scale mating networks. Additional DNA studies on human remains in the intermediate area between Ohio and Illinois may allow researchers to distinguish between these two possible scenarios.

Strontium isotopic analysis indicates that many individuals from Hopewell burial mounds in Illinois and Ohio had isotopic signatures that were distinct from those found in the local environments (Beehr 2011). Beehr (2011) compared enamel from the teeth of 38 individuals from the Hopewell Mound Group to samples taken from faunal material at the site. Strontium isotope ratios indicate that seven of these individuals spent their
childhood outside of the region. Based on contextual and carbon isotopic data, two of these individuals may be intrusive burials from later time periods. The five remaining individuals were identified as female of probably female. Similar methods identified two two individuals as outliers in the strontium isotope ratios at the Albany Mound group in Illinois (Beehr 2011:48).

Biological distance analysis of epigenetic cranial features also suggests frequent inter-regional biological interaction between populations at Hopewell mound centers and earthworks. Pennefather-O’Brien (2006) examined 573 individuals from Hopewell sites throughout the Midwest including the Turner earthworks and the Hopewell Mound Group. Principal component analysis of Smith’s mean measure of divergence values for the samples from each site indicates that the Turner and Hopewell samples form a cluster with the Utica and Pete Clunk mound groups in Illinois (Pennefather-O’Brien 2006:82). In other words, individuals from these four sites are statistically indistinguishable in terms of their cranial features, indicating that a great deal of biological interaction.

The overarching message from these studies is that gatherings at Hopewell earthworks not only involved monumental construction, ceremonial activity, and material exchange but also the integration of widely dispersed groups through the movement of people. These movements could have involved marriage exchange, spirit adoption, and/or migration. The use of ceremonial gatherings to create or maintain biological relationships among widely dispersed groups is consistent with Hall’s (1997) ethnographic analogies and the expectations of the ritual of economy in which
participation in reciprocal exchange partnerships through ritualized actions provides a means to engage with dispersed groups for household and/or kin group reproduction.

**Hopewell Socio-Political Organization and the Question of Complexity**

Interpretations of the nature of Hopewell socio-political organization have gradually decreased in political complexity through time. When early antiquarians first started systematically examining burial mounds and earthworks they argued for the existence of a vast kingdom covering much of eastern North America due to elaborate burials and similar material culture throughout the area (e.g., Squire and Davis 1848). With the definition of the band-tribe-chiefdom-state model Hopewell groups were downgraded to the chiefdom level (e.g., Seeman 1979; Struever and Houart 1972). In this view, Hopewell earthworks served as central places for the redistribution of goods by a social class supported by agricultural surplus. Relatively soon after Hopewell groups were labeled as chiefdoms numerous archaeologists began referring to Hopewell groups as tribes (e.g., Braun and Plog 1982; Smith 1992). These tribal groups were united through bonds of kinship and reciprocal ties that functioned to buffer these dispersed groups against subsistence shortages.

There was certainly a great deal of geographic and temporal variation in Hopewelian socio-political organization (Carr and Case 2005; Coon 2009). As the archaeological remains from my study come from southwest Ohio, I will focus my discussion on this region. Coon (2009) describes Hopewell populations in southwest Ohio as more on the corporate end of the spectrum of socio-political organization while populations in central Ohio practiced more network tactics. In other words, populations
in southwest Ohio focused on group identity while those in central Ohio put more emphasis on individual achievement and prestige. Coon cites the preponderance of communal burials and non-mortuary related exotic artifact caches at Fort Ancient, as well as the relatively inconspicuous central mound and even distribution of burial goods at Turner, as evidence of this group-oriented corporate political organization. These patterns are in contrast to the richly adorned individual burials in maintenance intensive mortuary facilities covered by large mounds that characterize earthworks in south-central Ohio. Individuals of high prestige certainly still existed within southwestern Ohio but individual differences were minimized at death in favor of corporate identity (Coon 2009:67). In both regions Hopewell leadership was situational and achieved (Braun and Plog 1982; Coon 2009; Yerkes 2002, 2003a, 2006). In this sense, Hopewellian populations were not complex chiefdoms or ranked societies. If, however, complexity refers to a system which is more than simply the sum of its individual parts (i.e., has emergent characteristics) then Hopewellian groups can be characterized as complex tribes (Alt 2010; Parkinson 2002). Consider the following quote from Abrams (2009:182):

The creation of clans (or simply, allied but ranked lineages), their specific histories of internal and external negotiation and conflict, and the materialization of those relations through collective construction and access to exotica reflect the regional integration that defines Hopewell.

Clearly complex processes must have been involved in the creation and maintenance of regional level social groups, the negotiation of conflict, materialization
through collective action, and trade in exotic materials (see also Fowles 2002). Abrams (2009) is correct to note that these are the processes that define Hopewell. In fact these are the same processes that led many archaeologists to define Hopewell as a complex chiefdom or rank society. However, socio-political complexity is not necessary to account for all of these processes. They can all (identity creation, negotiation, materialization, trade) be accounted for through ritual processes, or *ritual complexity.* Ritual systems can provide a self-organizing force for many complex human phenomena (McAnany and Wells 2008; Wells and Davis-Salazar 2007). There may be no better, or more universal, way to bring people together, negotiate conflict, materialize relationships, and conduct reciprocal exchange than through ritual action. Of course, ritual is not all about cooperation. The ritual sphere can also be an important arena for competition between the various hierarchically or heterarchically related groups brought together in the ritual precinct (Knight 2010:358; Spielmann 1998, 2002). The system itself is essentially self-perpetuating as rights and obligations pass through groups without the organization of any particular individual. It is this process that has created so much confusion and frustration among those attempting to classify Hopewell remains into political typologies. In other words, ritual complexity has long been recognized in Hopewell research but has often taken a back seat to categorical discussions of political complexity. A focus on the cooperative and competitive aspects of ritual action through the lens of ritual economy will provide the most effective means to document the full range of Hopewellian social complexity. The complex ritual processes involved in Hopewell socio-political organization make it difficult to place these populations within
the neo-evolutionary band-tribe-chiefdom model (see Yerkes 2002:Table 1). Yet Fowles (2002) argues that these categories retain analytical relevance if they are considered trajectories of change— in which organization variability across space and through time are expected—rather than static types. Fowles argues that tribal trajectories are characterized by malleability in social categories that cycle through time as a result of intra-generational, multi-generational, and long-term processes. In this sense, Hopewell populations fall within the tribal trajectory (see Yerkes 2002). In fact, tribal trajectories are defined by the same processes described by Abrams (2009:182) for Hopewell populations.

Lazazzera (2009) described a model of tribal political cycling at the Fort Ancient earthworks based on changes in settlement and ceremonialism. Lazazzera argues that the presence of both a large, nucleated settlement and smaller more ephemeral houses at the site signifies that the surrounding population cycled between periods of greater and lesser political inequality. During times of settlement nucleation at the earthwork, regional groups were drawn in by influential ritual specialists, thus indicating greater social inequality. The ritual specialist and his/her family occupied the nucleated settlement within For Ancient (Lazazzera 2009:373). In other times, households were dispersed across the landscape and the earthworks were uninhabited or only housed small caretaker populations. According to Lazazzera, these periods—which correspond more closely with the Dispersed Sedentary Community model (Dancey and Pacheco 1997)—were characterized by more egalitarian social relations. Lazazzera’s model therefore links
changes in settlement structure with emerging political inequality all within the context of continuing corporate group ceremonial behavior.

There may well have been shifts in the duration, extent, and social make-up of population aggregations at Fort Ancient in particular and Hopewell earthworks in general (Greber 1997; Ruby et al. 2005). However, there is no need to link these shifts to power fluctuations among a single individual or position—the religious specialist as argued by Lazazzera (2009:372-375). A stronger argument could be made for this scenario if only a single, or very small number of houses, existed within the earthwork. This seems to be Lazazzera’s contention, that a small group achieved a highly ranked ritual position for a short period of time and took up residence in the sacred space within the earthen walls. On the other hand, further exploration within Fort Ancient indicates that a number of additional domestic structures exist throughout the earthwork. For example, a variety of lithics, faunal remains, and ceramics have been recovered from surface collections throughout the North Fort (Sunerhaus 2004b:143). Additionally, the contents of a midden in the North Fort suggest that it was formed through the periodic cleaning of a nearby residential area (see Waterline Trench 6 in Chapter 5). Domestic refuse recovered from a test pit west of the Moorehead Circle (see Chapter 5) also indicates the presence of houses in this area (Robert Riordan personal communication 2013). Thus, rather than pointing to a single anomalous occupation, the houses identified by Lazazzera within the walls of Fort Ancient represent a sample of the many structures that were built and inhabited through the hundreds of years that the earthwork was in use. Rather than representing political advantages gained by a few elite members of society, these
habitations reflect the shifting make-up of tribal groups gathered at the earthworks to re-affirm and re-negotiate their social relationships.

The large numbers of wooden house-like structures at Stubbs may be evidence of similar processes occurring at that earthwork as well (Cowan et al. 2001, 2003). What this brief outline demonstrates is the cyclical tribal trajectory of Hopewell social dynamics in southwestern Ohio. As such, Hopewell tribes are not static descriptions of a cultural type but a reference to ongoing cultural trajectories.

**Hopewell Bladelets**

Blades are flakes struck from a prepared core that are at least twice as long as they are wide, have parallel lateral edges, and dorsal flake scars parallel to these edges that originate from the same platform (Parry 1994:87). This definition encompasses both blades and bladelets but the latter are distinguished from the former by being less than 5 cm long and less than 1.2 cm wide (Tixier 1974; Yerkes 1994). Hopewell bladelets represent one of a limited number of blade industries in prehistoric North America (Parry 1994). Before discussing the specifics of Hopewell bladelets, I present a brief review of the current status of archaeological research on blade technology with a special concentration on the reasons for its emergence.

A common reason given for the emergence of blade industries is that the production of blades maximizes the ratio of cutting edge to mass from a given core (Parry 1994:93). Blade reduction is said to be more efficient by producing more blanks and more cutting edge while converting a greater percentage of initial core mass into usable material than other reduction strategies (Eren et al. 2008:952).
Recent experimental replication studies have raised doubts as to the increased efficiency of blade production (Eren et al. 2008; Jennings et al. 2010). Comparing blade and discoidal reduction, Eren et al. (2008) found that while blade reduction did produce about 1.5 times more cutting edge, it also wasted more of the core mass and left a larger unusable end product. When allowing for retouch, discoidal flakes actually produced more cutting edge because of their greater width and thickness (Eren et al. 2008:959). Jennings et al. (2010) came to a similar conclusion and stated that blade reduction does not produce more usable flake blanks than either bifacial or informal core reduction.

Jennings et al. do note a relationship between core size and the efficiency of particular reduction strategies, although blade reduction is never the most efficient. For example, when core size is small (<300 g) informal reduction is the most efficient reduction strategy but all strategies become equally as efficient as core size increases (1,000 g) (Jennings et al. 2010:2160). Thus, blade technologies can no longer be viewed in terms of maximization of toolstone or reduction efficiency (contra Bar Yosef and Kuhn 1999; Parry 1994). Additionally, Eren et al. (2008:953) argue that blade production is less efficient than other strategies because of a number of restrictions it imposes such as the requirement for high quality toolstone, advanced skill needed for core preparation, increased fragility of blades, increased risk of knapping errors, and less opportunity for resharpening.

Blade technologies in the Old World seem to replace other reduction technologies soon after their introduction (Bar Yosef and Kuhn 1999). The traditional argument for why the replacement occurred has been that blade technologies were more efficient. As
demonstrated above, this argument is no longer feasible. Even if blade reduction was more efficient it would still be necessary to explain why blade technologies never rose to the same level of prominence in the New World as they did in the Old. What does appear to be different in the Old and New Worlds is that, in the Old World, blades were often used as inserts for composite tools whereas in the latter blade tools were rarely hafted (Bar Yosef and Kuhn 1999; Odell 2012:199). As relatively standardized tools, at least when compared to amorphous flakes, blades provide a simple way to make replacement parts. Microwear studies of samples from a number of North American blade industries including Clovis, Poverty Point/Jaketown, and Hopewell have concluded that hafting was not common (Kay 1999; Miller 2013, 2014; Yerkes 1983, 1990, 1994). Thus, it is possible that when blades are not used for composite tools, blade industries will not replace bifacial production systems. Odell (2012:199) makes a similar argument, suggesting that Clovis blades developed their distinctive curvature because they no longer needed to be straight enough to fit into composite tools. Regardless of the reason for their emergence and demise, blade industries in the New World represent a number of relatively short-lived spatially and temporally discontinuous technologies.

The Hopewell Bladelet Industry

Hopewell chipped stone technology included bifacial, unifacial, and flake tools in addition to bladelets (Pi-Sunyer 1965; Yerkes 1990). However, bladelets were the most common formal tool type found at the vast majority of Hopewell sites (Genheimer 1996). Hopewell bladelets are defined as the product of a prepared core technique with a length to width ratio of at least two to one, roughly parallel margins, and a triangular,
Figure 3.1 Examples of Hopewell bladelets including complete specimens (top row); proximal (2nd row), medial (3rd row), and distal (4th row) fragments; rejuvenation and trimming flakes (bottom row).
trapezoidal, or prismoidal cross section (Figure 3.1) (Greber et al., 1981; Nolan et al., 2007; Pi-Sunyer, 1965:61). Hopewell blades average between 4 and 5 cm in length and 1-2 cm in width (Greber et al. 1981; Pi-Sunyer 1965). While bladelets are found throughout the Eastern Woodlands during the Middle Woodland period, two centers of blade technology are recognized; one in Ohio and the other in Illinois. Illinois blades are, on average, longer and wider than Ohio blades (Pi-Sunyer 1965:68). Metric studies have shown that variation in bladelets is internally consistent within the two areas (Greber et al. 1981; however see Jeske 2012 for an example of an Illinois style bladelet industry in Ohio). Some researchers (e.g., Sunderhaus 2004b:144; Vickery and Sunderhaus 2004:170, 174) even suggest that it is possible to distinguish individual bladelets made in either Illinois- or Ohio-style based on their size. However, as a great deal of internal variation exists within each regional type it is probably only possible to distinguish between the two at the level of the assemblage.

Hopewell blades were manufactured on as many as nine distinct core types, most of which were conical in shape (Greber et al. 1981:Figure 5; Parry 1994:92). It has been suggested that blades were removed by soft hammer, indirect percussion using a punch, and/or by pressure with the former attributed to Illinois bladelets and the latter two to Ohio (Greber et al. 1981:518; Pi-Sunyer 1964:60). Cores were often heat treated to improve fracture mechanics and knapping ability (Greber et al. 1981:513). In Ohio, bladelets were rarely retouched or hafted (Genheimer 1996; Pacheco and Pickard 1992; Snyder et al. 2008; Yerkes 1990, 1994, 2003b) although this was not necessarily the case in other areas (Fortier 2000; Kimball 1992; Odell 1994). Nolan and Deppen (2006)
found that an average core produced about 115 blades. Hopewell blades were often made of a limited number of high quality, colorful lithic raw materials. Discarded bladelets are often found hundreds of km from these lithic sources. They may have been obtained by trade or direct procurement and transport (Hoffman 1987; Morrow 1987; Yerkes 1994, 2003a).

For all of the work focused on bladelets, their emergence and diffusion are poorly understood. The direct predecessor of Hopewell blade-core technology appears to have emerged from an Archaic bifacial technique in the Illinois Valley (Montet-White 1968). This Cobden technique was a flexible technology used to produce blades, flakes, and pre-forms resulting in irregular cores (White 1968:28). With the beginning of the Middle Woodland period the Cobden technique was replaced by the highly distinctive Fulton technique in the central and lower Illinois Valley (Morrow 1987). The Fulton technique is a highly inflexible technology used to produce bladelets from conical, prepared cores. Montet-White (1968) believes the Fulton technique evolved directly from the Cobden technique while Hofman (1987) sees the Fulton technique as a distinct break from earlier technologies.

The timing of the emergence and decline of the Hopewell bladelet industry is generally assumed to coincide with the larger Hopewell horizon or Hopewell Interaction Sphere which spread throughout the Eastern Woodlands between 100 BC and AD 400. However, after examining bladelets from Twenhafel, a habitation site in southern Illinois, Morrow (1998) found that a bladelet industry existed before and after the introduction and decline of Hopewell Interaction Sphere goods (150 cal BC – cal. AD 600). Other
studies in Illinois (e.g., Fortier 2000) have noted a correlation between the rise and fall of Hopewell Interaction Sphere items and the manufacture of Hopewell bladelets. To my knowledge, no similar studies have been conducted in Ohio. While the importance of explaining the emergence of Hopewell bladelets cannot be overstated, it will not be addressed in this study.

A number of scholars have suggested that bladelet production was a difficult task limited to specialists (Cowan 2006; Jeske 1989; Parry 1994:94). Recently, Nolan and Deppen (2006; see also Snyder et al. 2008) demonstrated that bladelets can be produced with minimal core preparation and knapping ability. Additionally, Nolan et al. (2007) demonstrated that Hopewell bladelet producers were not particularly skilled at their craft as 43% of the bladelets from the Turner Workshop resulted from some form of production error. Nolan’s studies (Nolan 2005; Nolan and Deppen 2006; Nolan et al. 2007), along with observations of Hopewell blade core variability, demonstrate that bladelet production was not a restricted activity but was probably open to any number of individuals. Snyder et al. (2008) provide additional anecdotal support for Nolan’s findings. In order to get a better understanding of the bladelets from the Browns Bottom #1 site in Ross County, Ohio, two undergraduate students with no flint knapping experience were taught to produce bladelets. According to Snyder et al. (2008:49) “the experimental flintknappers crossed a distinctive experience threshold after about 30 hours of practice” and could then make recognizable Hopewell bladelets. While the exact experience threshold necessary to produce bladelets may never be known, I propose that
the experiments described above support the hypothesis that any member of a Stone Age society could have manufactured bladelets.

In addition to being produced by non-specialists, bladelets were manufactured at a number of different types of sites, not solely specialized production workshops (contra Caughlin and Seeman 1997:237; Cowan 2006:30-31). It appears that bladelets and cores were planned products at the initial stage of raw material acquisition in some cases as Lepper et al. (2001) identified extensive evidence of bladelet manufacture at the Ohio Flint Ridge quarry. Lepper et al. also identified a switch to a direct acquisition strategy, as opposed to the embedded strategy identified for Archaic and Late Woodland periods, during the Early and Middle Woodland periods. That the switch in acquisition strategy pre-dated the emergence of bladelets suggests that, rather than altering them, bladelets were incorporated into existing lithic procurement strategies. In Indiana, Seeman (1975:58) did not find any evidence for bladelet manufacture or core preparation during his survey of the Wyandotte (Harrison County) flint quarries. Research by Kozarek (1997:135) at Jennison Guard (12D29S) supports Seeman’s findings as she argues that special logistical task forces were organized to collect Wyandotte Flint and return with raw nodules. After the nodules were taken to Jennison Guard further lithic reduction, including bladelet production, occurred. Similarly, minimal evidence for bladelet production, or any other type of lithic reduction, was identified during excavations at two outcrops of Knox flint in Tennessee (Boyd 1985). Boyd argues that raw material was simply collected at outcrops and further reduced at nearby habitation sites. For example, at the Icehouse Bottom site, which lies just across the Little Tennessee River from an
outcrop of Knox flint, several hundred bladelets and several dozen bladelet cores made of Knox flint were recovered (Chapman 1973:91-92). It seems as though, at Flint Ridge, specific flint nodules were destined to become bladelets from the moment of acquisition. With Wyandotte and Knox flint, that decision appears to have been made later on, probably after transport to a habitation site although future studies may document bladelet manufacture at these lithic quarries.

In Ohio, bladelets were not only produced at lithic quarries. Large numbers of cores and bladelet production debitage have been recovered near earthwork contexts such as the Liberty Earthworks (Caughlin and Seeman 1997; Greber et al. 1981), Turner Earthworks (Nolan et al. 2007), and the Stubbs earthworks (Genheimer 2005). It can be assumed that prepared cores were brought to the earthworks for bladelet removal but early stage blade core preparation may have occurred there as well. Production may also have occurred in domestic contexts. For example, Pacheco (2010:52) argues that bladelets were produced for export and exchange in the Murphy Tract although potential difficulties with the identification of early vs. late stage bladelets may undermine his argument (Nolan and Deppen 2005).

Regardless of where they were produced, bladelets represent the most numerous formal tool category at most Hopewell sites including both earthworks and habitations (Genheimer 1996; Greber et al. 1981; Nolan et al. 2007; Pacheco 1997). Probable logistical sites, such as upland rockshelters, contain variable proportions of bladelets either as a function of technological choice or differential discard rates (Seeman 1996). Figure 3.2 displays the distribution of sites with at least one bladelet in the Great and
Figure 3.2 Distribution of Middle Woodland sites with and without bladelets in the Miami Valley.
Little Miami River valleys in southwest Ohio based on data from the Ohio Archaeological Inventory collected in 2010. The mean geographic centers of all Middle Woodland sites and those sites with bladelets were calculated using ArcGIS version 9.2. The mean geographic center of sites with bladelets is less than 5 km south of the mean center for all sites indicating that bladelets are evenly distributed across all sites in the region during this time period. Unfortunately, as the vast majority of Middle Woodland sites were classified as type unknown, it was not possible to distinguish bladelet distribution between earthwork, habitation, and logistical sites. However, data from across Ohio suggests that bladelets played an integral part of the Hopewell toolkit both at and away from earthworks.

Greber et al. (1981:525) may have been the first to argue for “both a technological and a social aspect” of bladelet function. Subsequent researchers have tended to favor either the technological or social aspect. For example, a number of archaeologists (Cowan 2006; Genheimer 1996; Jeske 1989) have argued that bladelet production either conserves raw material or produces more usable cutting edge than other reduction strategies. Recent experiments regarding blade reduction, as described above, demonstrate that blade production is no more efficient than other types of lithic reduction. Most technological arguments for the use of bladelets point to their utility as standardized tools to be used in craft specialization (Baby and Langlois 1979:18; Montet-White 1968:95; Nolan et al. 2007:322; Snyder et al. 2008). Use-wear studies of Hopewell blades have demonstrated that they were multipurpose tools (Kimball 1992; Lemons and Church 1998; Miller 2010; Odell 1994; Snyder et al. 2008; Yerkes 1990, 1994, 2009).
However, individual blades are not often employed for long periods or for more than one task (Yerkes 1994:118). For example, at the Murphy site, a small habitation site in central Ohio, Yerkes (1990) found that blades were used to cut, scrape, engrave, and whittle such materials as meat/fresh hide, dry hide, bone/antler, wood, plants, and stone. Similarly, at the Seip earthworks, Yerkes (2009) found that blades were used to cut, scrape, engrave, and perforate meat/fresh hide, bone/antler, dry hide, stone, and plant materials. Few bladelets were used for multiple tasks or for extended periods of time. The lone exception to the pattern of multipurpose blade use comes from Illinois where Odell (1994) found that while blades were multipurpose tools at a habitation site—Smiling Dan, their use became more restricted, largely to soft materials, at a nearby mortuary site—Napoleon Hollow. Unfortunately, due to the low magnification used in the study, Odell was not able to identify types of soft materials processed at Napoleon Hollow. The use-wear results presented above provide sufficient evidence that Hopewell blades were not specialized tools used for specific tasks.

A number of non-functional explanations have been put forth for the existence of Hopewell blades (summarized in Genheimer 1996; Pacheco and Pickard 1992:12). They have been described as funerary offerings, status markers, trade objects, and regional identification markers (e.g., Hofman 1987; Morrow 1987; Reid 1976). For example, largely influenced by Odell’s (1994) study (outlined above), Byers (2006) suggested that blades were made to be used by members of world renewal cults due to a cultural prescription requiring the use of a distinct tool to distinguish the dual spheres of society. The blade’s technological equivalent, the unmodified flake, was used in non-world
renewal ritual situations (Byers 2006:69). Reid (1976) and Morrow (1987) suggest that bladelets were essential commodities in Hopewell exchange. Using Hall’s (1997) observation that gift giving was a common occurrence during social aggregations among Native American groups, Yerkes (2002, 2003a) has suggested that blades served as a means to produce a large number of standardized, highly recognizable tools to give to others, who could use the gift bladelets as they wished. Gift giving, some of which included bladelets, provided one of the mechanisms, along with feasting and rituals, through which social contacts were made and maintained (Yerkes 2005).

Evidence presented above suggests that Hopewell bladelets were not produced purely for technological reasons. However, their predominantly social or symbolic nature must be demonstrated rather than presumed as well. Using information exchange theory, Gero (1989) defines five variables [1) raw material, 2) size, 3) longevity, 4) number of production stages, and 5) restrictiveness of production)] that may be selected to project various levels of social information. As a basic summary in reference to Gero’s variables Hopewell bladelets are made from a small range of visually striking raw materials (1), are relatively small (2), short lived (3), simple to produce (4), and made by many members of society (5). Analysis of these variables has important implications for the role of bladelets in Hopewell society. Bladelets are rarely manufactured from local raw materials. Instead, most bladelets in assemblages from sites within a given region are manufactured from a few select lithic raw material sources (i.e., Greber 1981; Morrow 1987). This suggests distinct preferences for a small number of acceptable lithic raw
materials for bladelet production. Manufacture from these recognizable lithic raw materials would have been an important element of bladelet symbolism.

Bladelets are relatively small (Greber et al. 1981), especially when compared to other Hopewell horizon artifacts, intuitively suggesting that they would be unsuitable for information exchange. However, Gero (1989:93) argues that small implements can contain important social information in that they serve as “check-markers for social conformity within large population centers”. Thus, the use of bladelets may have been an important marker of Hopewellian identity in the context of social gatherings at earthworks among numerous autonomous groups.

Similarly, bladelets are expedient tools with relatively short use-lives (Yerkes 1994) making them appear to be poor conduits for information exchange as implements important for information exchange tend to have long use-lives. Gero (1989:94) suggests that short use-life items “can carry statements of one’s ability to conform to normative values and to squander production energy for displays of social information”.

The number of production stages and restrictiveness of production also display important aspects of Hopewell bladelets. Gero (1989) argues that artifacts with more production stages contain more cultural information than those with single stages because more choices must be made and are therefore reflected in production. In this sense, bladelets require more production stages than their functional equivalent, the unmodified, amorphous flake. However, their production is far less complex than Hopewell bifacial objects such as Ross Barbed Spears and cache blades. This may be due to the category of restrictiveness of production in which, as described above, bladelets were probably
produced by numerous segments of society. Thus, Hopewell bladelets appear to have been used for social exchange of cultural information while their production and use was open to nearly all members of the society (Yerkes 2003b).

In summary, over a half century of bladelet studies have clarified a number of aspects of the use lives of these unique tools, but a great deal of ambiguity remains.

Craft Production at Hopewell Earthworks: Previous Research

The study of Hopewell bladelets is ultimately aimed at gaining insights into the structure of Hopewell craft production. Recently, a number of scholars have examined Hopewell remains for evidence of full-time craft specialization (Nolan et al. 2007; Spielmann 1998; Yerkes 1990; 2003b). None of these studies have found conclusive evidence for full-time specialization. This is not surprising as little evidence exists for full-time craft specialization at any point in North American prehistory (Seeman 1984). While these studies have provided a good idea of what Hopewell craft producers were not, relatively little research exists to characterize the actual organization of Hopewell craft production. For example, in a recent review Bruce Smith (2006:55) asks, “How were the acquisition of exotic raw materials and the manufacture of ritual objects and mortuary goods accomplished?”

The seminal study of Ohio Hopewell craft production was conducted by Baby and Langlois (1979) at the Seip earthworks. Excavations inside the earthworks in the 1970s revealed the outlines of seven complete and three partial rectangular structures that were associated with something other than mortuary activity (Baby and Langlois 1979:16). The presence of exotic materials such as mica and sea shells, specialized lithic
assemblages, and lack of habitation debris led Baby and Langlois (1979:18) to characterize the structures as specialized craft workshops. Additionally, Baby and Langlois (1979:18) suggest that the existence of a “social class of skilled artisans” was necessary to produce many of the elaborate Hopewell artifacts and they conducted their work in specialized workshops. Since the publication of Baby and Langlois’ paper, a number of other supposed craft workshops have been identified. For example, Pacheco and Dancey (2006:10) suggest that structures at the Fort Ancient and Stubbs earthworks may be craft workshops. Pedersen Weinberger (2009:18) excavated three post molds and a partial structure floor at the Hopewell Mound Group and suggested the presumed structure functioned similar to the Seip workshops. Even in the absence of physical evidence of craft workshops, numerous authors cite the Seip craft workshops as typical remains, apparently waiting to be discovered, at other Hopewell earthworks (Dancey 2005:127; Fagan 2009:293; Ruby et al. 2005:154; Smith 1992; Spielmann 1998).

Baby and Langlois’ (1979:18) use of the term specialized workshop implies that the structures were used strictly for the relatively intensive manufacture of craft goods (sensu Costin 1991). The presence or absence of specialized craft workshops at Hopewell earthworks is not merely an issue of semantics. Indeed, the identification of specialized workshops would have important ramifications for the organization of production. The existence of craft workshops identifies the existence of some form of corporate, probably hierarchical, entity with at least limited control over the means of production. Failure to identify crafting structures does not deny the existence of larger social groupings, only that craft production activities were organized at a smaller scale.
Coon (2009:57) argues that craft workshops may be less prevalent than often depicted by arguing that, aside from Seip, no other craft workshops have been definitively identified within Hopewell earthworks. A recent re-examination of the Seip structures questioned whether these iconic structures can be classified as workshops. Baby and Langlois’ (1979) paper was relatively brief but nonetheless became “engrained into the ‘common wisdom’ of North American archaeology for a generation” (Greber 2009b:171). While Baby and Langlois (1979:18) claimed that “[f]urther analysis and statistical correlations of the artifact assemblages are in progress” no subsequent reports ever materialized. Several decades later, N’omi Greber (2009a, 2009b) led a team of investigators bent on thoroughly examining the stratigraphy and finding correlations between artifacts from the supposed Seip craft workshops. Based on a reexamination of excavation records it appears that the complex stratigraphy described by Baby and Langlois (1979:17) is a result of the decommissioning of several of the structures. This involved capping dismantled structures with, sometimes several layers of, mound fill that was subsequently disturbed by historic plowing (Greber 2009a). The fill materials used in the mounds were borrowed from unknown areas of the site and were largely responsible for introducing many of the craft materials and specialized tools to each structure. Additionally Baby and Langlois’ (1979:18) assertion that different crafts were produced in each structure cannot be upheld due to lack of evidence from primary context, nor do all structures appear to be contemporaneous as originally argued (Greber 2009b). Greber (2009b) concludes that while the Seip structures were special places and
that craft production activities probably occurred somewhere in their general vicinity, they were clearly not specialized workshops.

It seems logical to assume that most Hopewell craft items were constructed, acquired, and meant to be used at earthworks due to their relatively restricted occurrence at such sites and the presumed social, political, and ideological nature of Hopewell earthworks (Seeman 1979; Spielmann 1998, 2008, 2009). However, since a major blow has been struck to the existence of specialized workshops within earthworks, no widely tested model exists to explain the organization of production within Hopewell earthworks. However it is possible to look beyond the earthworks, as not all evidence for craft production has come from Hopewell earthworks, for evidence of the structure of craft production activities.

While relatively few Ohio Hopewell habitation sites have been excavated, several show evidence for the manufacture of Hopewell Interaction Sphere goods. For example, Pacheco (2010:52) notes the large number of cores and the lack of trapezoidal, in relation to triangular, bladelets at various locations within the Murphy Tract as evidence of the manufacture and exportation of bladelets. However, Nolan and Deppen (2005) demonstrated through replicative experiments that there is no relation between reduction stage and the production of triangular or trapezoidal bladelets. However, the large number of bladelets and cores from Murphy (Dancey 1991) suggest that bladelet manufacturing was occurring. Due to the recovery of hundreds of mica scraps as well as half a dozen mica effigies from the site midden, Blosser (1996) argues that the occupants of Jennison Guard were involved in mica craft production. While evidence from two
sites is hardly definitive, and a number of excavated Hopewell habitation sites do not contain evidence for craft production, it is clear that the manufacture of some interaction sphere items occurred away from earthworks in domestic contexts.

Spielmann (1998:154; 2008:67) argues that craft production could have occurred either at or away from earthworks depending on the social relations of production. For example, Spielmann (2008:66) argues that in the majority of ethnographic cases ritual production takes place away from ritual centers. The production of ritual craft items does occur at ritual centers if ritual practitioners are the primary users of the items, the products can only be viewed by certain members of society, or when the items are too large to move long distances. Thus, according to Spielmann, when ritual craft production occurs at ritual centers, like earthworks, it signals the existence of a special social class imbued with privileged ritual knowledge. This ethnographic pattern, however, needs to be confirmed by further archaeological investigation.

Emerson et al. (2013:61) argue that Hopewell ritual craft items, or at least smoking pipes, were manufactured at or near their source locations and transported as finished objects throughout the Eastern Woodlands. Emerson et al. cite the relatively large amount of manufacturing debris found near the Sterling pipestone quarry in northwestern Illinois and general lack of manufacturing debris, especially in Ohio, at sites where these pipes were ultimately deposited. This may represent a third pattern of production in which objects are crafted at the source of the raw material by special task groups.
While not denying that variation certainly existed across space, time, and material, my study assumes that a great deal of craft production occurred at Hopewell earthworks. This view is in general agreement with Spielmann’s (1998) assertion that craft specialists were attached to the ritual context. Spielman’s characterization is a play on the common pattern of craft specialists attached to political leaders. In this case Hopewell earthworks were major centers of craft production for various social, economic, and ideological reasons. However, the organization of production may have involved non-earthwork domestic or raw material source contexts at some level, thus influencing the organization of production in the ritual context. For example, the production of crafts within households may spill over into the ritual context or the production of crafts at their source will leave no evidence of their production in the ritual context.

Regardless of where they were produced, Hopewell craft items were inextricably linked to the ritual context. Spielmann (1998, 2002, 2007, 2008, 2009; Spielmann and Livingood 2005) argues that ritual craft production was centered at earthworks as craft producers were attached to the ritual context. According to Spielmann (1998:154, 2002:202) production took place in specialized structures with multiple artisans from a large corporate group often collaborating on a single object. In addition to multiple individuals working on one object, Spielmann (1998:157) suggests that individual producers may have been skilled in multiple materials. Spielmann largely cites Baby and Langlois’ (1979) work at Seip as evidence for the existence of specialized craft workshops at earthworks although she admits that it is unclear exactly how production
was organized within these ritual settings (Spielmann 2008:66). As ritual production was limited to ritual places, the production of craft goods may have been subject to centralized control (Spielmann 2007:291). In terms of raw materials, Spielmann (2009:182) argues that the distribution of pipestone, copper, sharks teeth, and marine shell was restricted to earthworks as an attempt to control access to the materialization of ideology. Despite Spielmann’s focus on centralized control, she notes that as ritual materials were obtained in external areas by direct procurement and ceremonial events were focused on inclusion rather than exclusion, opportunities for ritually based prestige and status appear to have been relatively open (Spielmann and Livingood 2005:166). Thus control was probably instilled in the ritual precinct rather than any political entity. Spielmann and Livingood (2005) argue that Hopewell artisans focused raw material acquisition on distant goods as a way to obtain pieces of places that were used to grant ritual power. Although raw materials moved over long distances, each earthwork or polity seemed to have its own craft producers and finished goods were rarely imported as evidenced by distinctive copper earspool, modified grizzly bear canine, and textile styles at different earthworks (Spielmann and Livingood 2005:160). Many Hopewell Interaction Sphere craft goods or offerings are “one of a kind,” and the lack of evidence for standardized production suggests that individuals rather than supervised specialists produced these unique items (Yerkes 2003b).

Ultimately, as recognized by Spielmann (2008:66), the archaeological record has not been suitably explored to the extent that clear cut answers to these assertions can be made. This dissertation provides an initial attempt at providing archaeological
documentation of the organization of production at Hopewell earthworks in an attempt to fill this void in our knowledge.

**Producing Hopewell Craft Goods**

Numerous authorities have asserted that Hopewell bladelets were used in the production of ritual craft items (Hofman 1987:91; Spielmann 2008:66, 2009:184; White 1963:48). While most use-wear studies emphasize that bladelets were not specialized tools used solely for craft production (Kimball 1992; Lemons and Church 1997; Lepper and Yerkes 1997; Yerkes 1990, 1994, 2003b; 2009) some bladelets have been linked to craft production activities (Miller 2014; Yerkes 1994). Craft items, found largely in mounds and burials, are often recognized as signature traits of Hopewell assemblages. The full range of Hopewell exotic material includes copper, silver, meteoric iron, mica, galena, marine shell, obsidian, pipestone, pearls, shark teeth, and bear canines. However, any one particular site may not contain the entire suite of exotic materials. Thus a discussion of the exotic artifacts and raw materials discovered at Fort Ancient and Stubbs provide clues as to the types of objects likely manufactured at each site.

Early reports indicate that artifact collecting was rampant at both Fort Ancient and possibly Stubbs as well. For example, Moorehead (1890:87) estimated that as many as 100,000 artifacts had been removed from the site in the 50 years prior to his work at Fort Ancient in the 1880s. Later he (Moorehead 1908:127) put forth a more conservative estimate of 50,000 artifacts removed in the prior century. Moorehead also noted that residents near Fort Ancient maintained extensive private collections, each containing thousands of artifacts. Moorehead personally examined many of these collections and
reports that one contained numerous copper axes and stone effigy pipes (Moorehead 1890:58) while another contained drilled slate artifacts and a sandstone abrader used to work copper (Moorehead 1908:127-129). Both Connolly (1997:265) and Genheimer (1992:50) suggest that similar collecting activities continued into more recent times. Thus numerous artifacts have undoubtedly been lost from both sites but professional excavations provide a sample of the prehistoric artifacts present at both sites.

Moorehead’s early excavations of mounds and burials at Fort Ancient uncovered numerous Hopewell craft items. For example, associated with a burial in a mound on the plateau to the east of the North Fort, Moorehead (1908:88) discovered three mica discs. A grave located on the terrace to the west of the South Fort contained “a beautiful ornament…made of black slate, with a hole drilled in it” (Moorehead 1908:94). A nearby grave contained numerous shell beads and other perforated shell objects. Additionally, Moorehead (1908:Plates XXXIII-XXXV) reports finding numerous drilled slate objects, including an owl effigy, during work at Fort Ancient. Finds by subsequent researchers were no less impressive. Morgan (1946:39) reports that platform pipes, quartz projectile points, gorgets, mica, and various slate artifacts were discovered in the habitation area east of the North Fort. In this same area a cache of 59 copper artifacts, 44 pieces of galena, eight fragmented slate pendants, and hundreds of mica sheets was discovered in 1889 (Morgan 1946:39). A similar cache that contained obsidian bifaces, flint bifaces, and crystal quartz blades was found further east towards the termination of the Parallel Walls in the early 1980s (Essenpreis and Mosely 1984). Prufer (1961:342) reports the discovery of copper earspools with meteoric iron overlay from Fort Ancient.
Surface surveys in the late 1990s recovered a drilled fossilized shark tooth in the Middle Fort (Sunderhaus 2004b:144).

In contrast to Fort Ancient, the Stubbs Complex sites contain almost no finished artifacts of exotic materials outside of chipped stone. It must be noted, however, that considerably less archaeological work has been done at Stubbs than Fort Ancient, possibly biasing the data. Surface surveys at Stubbs recovered manufacturing debris from a more restricted range of raw materials than at Fort Ancient including mica, obsidian, quartz, and copper (Genheimer 1992, 1997). For example, while a few finished tool fragments were recovered, most of the material from the Koenig quartz deposit at the Barnyard West site (33WA760) was quartz debitage and unmodified pieces (Cowan et al. 2005). Excavations of a large pit (feature 37) at the Smith site yielded a dozen pieces of mica scraps with probable cut edges along with thousands of unmodified mica scraps.

Based on the artifacts recovered from decades of archaeological work, copper and stone objects are the most common Hopewell craft items at Fort Ancient and Stubbs.

As numerous objects made from exotic materials have been recovered from Fort Ancient and Stubbs, it is probable that at least some of them were manufactured at these sites. It is also probable that craft objects made from local perishable materials such as ceramics, wood, feathers, or plant and animal fibers were also produced at the sites. While not meant to be an exhaustive list or definitive reconstructions of prehistoric productions techniques, the following section provides a brief summary of how bladelets may have been used in the production of some of the artifacts recovered at Fort Ancient and Stubbs.
Due to its ubiquity within Middle Woodland contexts, mica working is often cited as a major task for which bladelets were used (Yerkes 1990, 1994; 2003b). Snyder et al. (2008) experimented with several different methods of working mica using replicated bladelets. Snyder et al. (2008:54) found that while cutting and sawing motions produced rough edges, engraving (i.e., using a sharp point to systematically perforate) produced clean edges like those found in archaeological specimens.

Minich (2004:46-49) has identified a basic production sequence for Hopewell platform pipes that involves pecking, grinding, drilling, polishing, and sculpting. Based on her analysis of unfinished specimens, Minich argues that tabular pieces of pipestone were pecked into a rough shape with a hammerstone before being ground smooth with a sandstone abrader. After forming the basic shape of the pipe, holes were drilled using one of several methods. Wand and cane drilling is one method that uses drills made of sticks or reeds to work sand against the stone. Flint or chert drills could also have been used to make smaller holes or drill harder material. Minich (2004:48) also argues that copper drills could have occasionally been used. Polishing was carried out by rubbing animal fats or plant materials mixed with abrasive agents over the pipe with a strip of leather. Finally, incised details such as animal features and abstract symbols would have been etched with a sharp flint tool, something like a bladelet. Similar techniques were probably used to produce slate or shale gorgets.

Shell beads could have been drilled by methods similar to those described by Minich (2004) for pipestone (see also Yerkes 1983). On the other hand, Kozuch
(1998:85) describes an ethnographically documented method of producing holes in shell by using focused flames to weaken the area and then punching it out with a hammer.

Crafts made from perishable materials, such as plant fibers and wood, may not be present in the archaeological record due to differential preservation but nonetheless could also have involved bladelets at certain manufacturing stages. On the other hand, Seeman and Wilson (1984) found that cutting the seed bearing stems from *Chenopodium* plants is a more efficient means of harvesting than hand stripping the seeds. This method of harvesting would produce similar wear patterns to harvesting materials for textiles or basketry, making additional contextual clues necessary to distinguish between the two behaviors. Hurcombe (1998:Table 1) argues that a wide variety of siliceous and non-siliceous plants were worked in a number of different ways to produce fiber crafts. For example, reeds, grasses, sedges, or weeds many be cut, scraped, split, pounded or shredded in fresh, dry, or rehydrated states using a variety of lithic and non-lithic tools. The most relevant of these motions to Hopewell bladelets is scraping. Scraping plant material may be done at several stages in the processing of materials for fiber objects (Hurcombe 1998, 2000, 2008a, 2008b). Hurcombe (1998:206-208) argues that a stone tool may be used in a scraping motion to flatten stems, separate fibers, and remove pith. Scraping soft plant material has not been identified with any subsistence processing activities in the archaeological record (e.g., Juel Jensen 1994; Van Gijn 1990). A scraping motion is also not expected to be employed in non-subsistence harvesting activities such as collecting thatching for structure roofs. Therefore any examples of scraping soft plant material can confidently be assigned to fiber production.
Other aspects of the use wear pattern are characteristic of fiber production. Juel Jensen (1994:61) describes a unique wear pattern on microdenticulates inferred to be used in fiber production. The non-contact tool face, that facing the tool user, forms a “highly reflective, vitreous, metallic polish” (Juel Jensen 1994:61). The contact face, that facing the worked material, forms “a bright smooth, flat band, or facet of polish with a series of perpendicular striations” (Juel Jensen 1992:61). These differing patterns on each face of the tool edge suggest the application of differential force such as that which occurs while pushing the tool in a scraping motion away from the body. While Juel Jensen (1994:62) makes a convincing argument that these implements were used to scrape plant material, she was unable to exactly replicate the wear patterns through experimentation. More recently, Hurcombe (2008a) replicated the wear pattern described by Juel Jensen. Through consultation with a spinner and weaver, Hurcombe (2008a:92) used serrated tools “to lightly scrape harvested nettle stems” in order to produce fibers for textile production.

Bone presents similar problems to plant material in terms of both preservation and its occurrence in both craft and subsistence contexts. Microwear evidence for bone craft production is less ambiguous because bone engraving and drilling would have been limited to craft activities. For example, Seeman (2007:173) notes the common occurrence of flutes, rattles, and gorgets made of human bone in Hopewell contexts. Motions such as engraving and drilling bone or antler have not been associated with subsistence practices as these practices have not been documented in ethnographic accounts (Keeley 1980; Van Gijn 1990; Vaughan 1985; Yerkes 1987).
The production of leather crafts, like those discovered at the Mount Vernon site/GE Mound (12PO885) (Seeman 1995; Tomak and Burkett 1996), would have required cutting and scraping of both fresh and dry hide as part of the preparation process. These same cutting and scraping motions would also be sued to process hides for non-craft uses as well. Finishing of the “decorated leather objects” (Tomak and Burkett 1996:359), however, would have involved engraving and perforating in order to make the final intricate designs. Thus, these finer, finishing motions probably reflect craft production.
Documenting the organization of craft production by studying bladelets is a two stage process. The first stage involves documenting the production of bladelets while the second involves documenting the function of bladelets to determine the objects they were used to produce. In this chapter I describe the methods used to examine the technological and functional aspects of the Hopewell bladelet industry at Fort Ancient and Stubbs. Technological analysis of bladelets includes raw material sourcing, as well as evidence for bladelet production, production skill, and bladelet modification. Functional determinations are made through microwear analysis.

Technological and functional analyses are aimed at distinguishing between the production and use of bladelets for manufacturing prestige goods or socially valued goods. If bladelets were used by craft specialists to produce prestige goods then they should be produced from a limited range of exotic raw materials, in a limited number of contexts, by producers with a high degree of skill (Costin 1991). Additionally, the bladelets should be highly modified—through retouch or hafting—and used for a restricted range of craft production tasks. If bladelets were used for the production of socially valued goods then they may still be produced from a limited range of exotic raw materials but their production should be more open in terms of spatial extent and skill level. Bladelets may or may not be modified as they are used for a wide variety of tasks.
Technological Analysis

Numerous raw material sourcing studies have been conducted on lithic materials recovered from Fort Ancient and Stubbs (Connolly 1991; Genheimer 1992; Miller 2009; Shaffer 2009; Van Pelt 1997; Vickery 1996; Vickery and Sunderhaus 2004). I undertook a lithic sourcing study to compare my results to previous findings, provide context specific proportions of each raw material, and because some of the more recently excavated bladelets were not included in earlier studies. Flint raw material sources were identified visually, through the use of low power magnification (10x) and comparative samples. Artifacts that fell within the range of color, luster, and texture of the source material were assigned to the particular source. As my available comparative collection was small, source identification was limited to Ohio Flint Ridge, Wyandotte (Indiana Hornstone), Knox flint, and obsidian as previous studies indicated that over 75% of the bladelets from Fort Ancient and Stubbs were manufactured on the first three raw material sources (i.e. Vickery 1996; Vickery and Sunderhaus 2004).

Ohio Flint Ridge flint is part of a Pennsylvanian age formation that outcrops in eastern Licking and western Coshocton County, Ohio. Carlson (1991; see also DeRegnaucourt and Georgiady 1998; Lepper et al. 2001) identified five types of Flint Ridge flint. The two most common types are “milky white or bluish white with light gray patches and streaks” and a “highly colored variety with its intricate combinations of red, yellow, brown, blue, and green” (Carlson 1991:15). Wyandotte flint (aka Indiana Hornstone or Harrison County flint) outcrops in the Mississippian age system in southern Harrison and Crawford counties, Indiana and Meade county, Kentucky. Wyandotte flint
is “medium to dark grey” with a “yellow or white chalky cortex” (DeRegnaucourt and Georgiady 1998:109). Knox flint outcrops in Paleozoic age layers in Blount and Louden counties, Tennessee. While Kimball (1985:98-100) identifies seven distinct types, the Knox flint identified here is “dark grey to almost black” with a thin, usually tan, limestone cortex (DeRegnaucourt and Georgiady 1998:188), corresponding to Kimball’s (1985:98) type 1.

As a measure of the existence and intensity of bladelet production I identify the relative frequency of bladelet cores, trimming flakes, rejuvenation flakes, and cortical flakes in each context at Fort Ancient and Stubbs. Trimming flakes result from preparing the core for bladelet production and include Lame à crête, or crested blades, as well as platform preparation flakes. Rejuvenation flakes are the result of major removals from the bladelet core in order to restore a desirable platform angle.

Following Nolan (2005; Nolan et al. 2007), I measure bladelet production skill by recording production errors and bladelet standardization as indicated by the coefficient of variation adjusted for bias (CV*). Bladelet production errors are measured by examining the distal termination. In Bladelet production, proper application of force from a hammer or pressure flaker results in a feather termination which conserves raw material and produces a sharp working edge. Hinge and overpass fractures are considered to be production errors because they result from improper applications of force or striking angles (Nolan et al. 2007:306; see also Andrefsky 1998:18 and Odell 2004:47-52). The coefficient of variation measures the relative variability of continuous attributes by dividing the sample mean by the sample standard deviation. Therefore the coefficient of
variation measures the level of standardization in a particular artifact class. Standardization is important as it is a prerequisite to specialized production although further lines of evidence outside of standardization are needed to document specialization (Nolan et al. 2007:302). The CV* can be successfully employed in cases of low sample size to combat errors caused by sampling bias (Sokal and Braumann 1980). Numerous studies of craft production have successfully employed the coefficient of variation to measure standardization (Nolan et al. 2007:303).

Stone tools used by craft specialists should be highly specialized and have relatively long use lives due to their time consuming manufacture (Yerkes 1990). As a measure of tool specialization and longevity I examine the patterns of retouch on bladelets from Fort Ancient and Stubbs. An additional means to increase the use life of a stone tool is through hafting. Therefore, I identify the microscopic evidence of hafting when present.

In order to identify production sequences, breakage patterns, and contextual linkages using bladelets I undertook a lithic refitting program. Archaeologists have long attempted to piece broken artifacts back together, if only to make them presentable for museum display. With the rise of scientific archaeology in the mid-20th century, refitting studies began to take a greater role in hypothesis testing, especially in identifying reduction sequence and site formation processes (Cahen et al. 1979). Refitting studies are relatively uncommon in North America, especially when compared to Europe (Schurman 2007), as evidenced by a single brief mention in one (Odell 2003:5) of the major North American lithic analyst’s handbooks (Andrefsky 1998 makes no mention of
refitting). The terminology associated with refitting is relatively standardized but there is some inter-analyst variation making it important to define terms at the outset. A lithic refit is “the matching of one flake’s ventral side with a scar on the dorsal side of another flake, or a flake scar on a tool” while a conjoin is the matching of “two pieces of a broken flake, e.g., its proximal and distal portions, or tool” (Laughlin and Kelly 2010:428). Despite the uniqueness of the Hopewell bladelet industry and numerous discussions of reduction strategies, no documented attempts exist to formally refit a bladelet reduction sequence. Thus, while this study is limited by a lack of comparative data, I hope it will serve as the baseline of future studies.

Lithic refitting can be a powerful tool to apply to an archaeological assemblage but it does have drawbacks and limitations. An often cited reason for not undertaking lithic refitting is the time involved, which has exceeded several thousand person hours in some studies. Another limitation is that if some pieces are missing it will be impossible to refit artifacts that clearly come from the same tool or core. This may be especially true for blades as the removal of just a few will eliminate an entire face of a core and thus a stage in the reduction sequence. In response to the difficulties inherent in refitting, Larson (Larson and Ingbar 1992; Larson and Kornfeld 1997) has formalized a complimentary approach known as Minimum Analytical Nodule Analysis (MANA). Larson and Kornfeld (1997:4) define Minimum Analytical Nodules (MAN) as “groups of chipped stone with intra-raw material similarity”. Perhaps a more useful definition is that “pieces in a nodule share a specific constellation of features that differentiate these pieces from others of the same raw material type” (Larson and Kornfeld 1997:4). As such,
individual MANs are all of the artifacts recovered from a site that belong to an individual chipped stone nodule or core. MANs are defined on the basis of similarities in “color, texture, inclusions, luster, etc” (Larson and Ingbar 1992:153).

**Microwear Analysis**

In order to research a number of salient issues about Hopewell bladelets and craft production, a major portion of my study is devoted to the functional analysis through microwear. Lithic microwear analysis is based upon the observation that the use of stone tools on a certain material will produce wear patterns that are distinct from those of other materials as well as those caused by non-use related processes. The first systematic attempt to examine the effects of use-wear on stone tools microscopically was initiated by the Russian archaeologist Sergei Semenov (1964) in the 1930s. A considerable amount of interest in the topic was generated after the English translation of Semenov’s *Prehistoric Technology* and two relatively distinct approaches appeared soon after: low-power and high-power. These two approaches have been used, with varying success, to interpret the area of use on tools, motion employed in use, and material worked (Keeley 1980; Odell 1979). In order to interpret the uses of stone tools, both methods focus on various aspects of edge damage—scars on the edges of stone implements, edge rounding, striations—linear features in the surface of the stone indicating direction of use, and polishes—bright spots caused by use on different materials ( Vaughan 1985:10-12).

The low-power approach uses a binocular microscope with magnifications from 4-100x ( Odell 1979) to identify traces of use. Traces of use in this case are largely confined to edge damage while polish and striations are also employed when visible. The
low-power approach has proven to be successful in interpreting the motion of use of stone tools (cutting, scraping, drilling, etc.) (Odell 1994:104). The method can also distinguish between general classes of materials worked on an ordinal scale (soft, medium, and hard) (Andrefsky 1998:5). Keeley (1980) produced the major work developing and testing the high-power approach. While his is commonly referred to as the high-power approach, Keeley (1980:12-14) actually advocated the use of both low-power microscopy (4-50x magnification) using a binocular microscope and high power (50-500x) using an incident light microscope. The high-power approach uses edge damage, edge rounding, polish, and striations to identify the motion of use as well as the specific material worked (meat, dry hide, plant, etc.) (Keeley 1980; Vaughan 1985).

Each method has its adherents who cite purported advantages of their own choice and disadvantages of the other (Juel Jensen 1988; Keeley 1980; Odell 1979; Yerkes and Kardulas 1993). Proponents of the low-power approach cite blind tests in which both the motion of use and general hardness of material worked were reliably identified (Odell 1994:104). Additionally, the low-power approach is faster due to less intensive artifact preparation procedures and therefore capable of producing larger sample sizes in more reasonable time frames (Odell 1979), although recent analyses have shown that the examination of large samples under higher magnification does not require very much more time (Longo and Skakun 2008). The low-power approach is often argued to be amenable to more sophisticated statistical analysis due to the larger sample size, although this is often not true in practice (e.g., Odell 1994). The stereomicroscopes employed in low-power analysis are also less expensive than the incident light microscopes used in the
high power approach (Yerkes and Kardulias 1993:102). Another advantage of the stereomicroscope is that, due to the decreased magnification, it provides a wider field of view (Keeley 1980:12). This makes the identification of overall patterns of wear on a tool easier. Critics of the low-power approach emphasize that it cannot distinguish variation within classes of material worked (Andrefsky 1998:6). For example, which “hard” materials (such as bone, stone, and wood) were worked can have substantial impacts on interpretation of tool or site function (Yerkes and Kardulias 1993).

Proponents of the high-power approach argue that the additional information gained by the ability to distinguish between materials worked is worth the extra cost and effort (Van Gijn 1990; Keeley 1980; Vaughan 1985). Additionally, a number of studies have found that edge damage scars relied upon in the low power approach can come from a variety of sources including prehistoric activities like knapping, resharpening, transport, and trampling; post-depositional such as plowing; and post-excision such as storage and processing (Van Gijn 1990; Keeley 1980; Vaughan 1985). Even when experiments have been conducted to control for the formation of edge damage, patterns between specific motions and materials are not always consistent or mutually exclusive (Van Gijn 1990:4; Vaughan 1985:20). To further complicate matters, edge damage does not always occur, even with extensive use (Van Gijn 1990:4). Additionally, the stereomicroscope produces a lower quality image at higher magnifications due to reduced depth of field and lighting capabilities (Keeley 1980:12). In turn, this makes photography, and therefore replication, more difficult.
As noted above, the main advantage of the high-power approach is the additional accuracy in the identification of specific materials worked (Yerkes and Kardulias 1993:102). This is due to the use of the incident-light microscope which provides increased light and image quality as magnification increases (Keeley 1980:13). Increased light also makes photography more feasible. Despite its advantages, a number of criticisms have been levied against the high power approach. For example, Keeley’s (1980) original blind test interpretations were not accurate in determining specific material worked. However, Keeley (1980:77) attributed this to the use of a wooden cutting board by the experimenter. Additional blind tests have verified the ability of the high power approach to identify specific types of materials worked (Juel-Jensen 1988; Yerkes and Kardulias 1993:102). While they are more descriptive than the low power approach, those who employ the high power approach often still only identify classes of artifacts, such as bone or antler, as wear patterns must be sufficiently developed in most cases to make a distinction (Juel-Jensen 1988:59-60). Users of the high-power approach must also be attuned to the effects of post-depositional modifications to flint surfaces (Andrefsky 1998:6). This issue was recognized early on by Keeley (1980) and has been addressed by a number of subsequent researchers (Van Gijn 1990; Levi Sala 1986; Pevny 2012; Vaughan 1985).

It is also not fully understood how polish formation occurs. Three hypotheses, abrasion, frictional-fusion, and amorphous silica gel, have been put forth as possible explanations for the formation of polishes on stone tools (Vaughan 1985:13). In the abrasion model, polish is formed by the wearing down of edges and surface roughness.
The friction-fusion model argues that heat from use causes the breakdown of silica on the surface of the tool. The amorphous silica gel model states that silica transforms into a gel-like state during use and is removed from some areas of the tools and redeposited in others. Critics of the high-power approach state that, with such a high reliance on polish identification, the technique cannot be reliable until the method of polish formation is resolved (Vaughan 1985:13). Work continues on this topic with recent support for the abrasion and friction-fusion models while the silica-gel model has been rejected (Ollé and Vergès 2008). In a similar vein, critics have pointed out that some activities only produce generic weak polish despite extended periods of use (Juel-Jensen 1988:59). Vaughan (1985:30) described generic, weak polish as dull, stucco-like, and flat and attributed its formation to a number of contact materials. Part of this critique is a misrepresentation of the high power technique. While polishes do form an integral part in interpretation of use, striations, edge damage, and edge rounding are also used to provide multiple lines of evidence for use (Gijn 1990; Keeley 1980; Vaughan 1985). Increased artifact processing time and decreased range of view both increase the amount of time invested in high power studies reducing the number of artifacts analyzed (Keeley 1980:12, Yerkes and Kardulias 1993:102). Overall, as with every analytical technique, the high power method has advantages and disadvantages but has the ability to distinguish between different types of worked materials making it perfectly suited my purposes.
The Bladelet Sample

For this study, I examined 1,797 bladelets, bladelets fragments, and bladelet production debitage as well as 11 bladelet cores from excavations and associated surface collections in and around the Fort Ancient and Stubbs Earthworks. The bladelets examined in this study are curated at the Ohio Historical Society (OHS) (OHS collection # A1039), Wright State University (OHS collection # A4797), and the Cincinnati Museum Center. The context of each excavated assemblage is briefly introduced here and will be described in greater detail in the following chapter.

The OHS collections from Fort Ancient include artifacts from excavations by Morgan (Morgan and Ellis 1939, 1940) in the North, Middle, and South Forts, as well as the Twin Mounds area. Unfortunately, many of the records, including maps, from Morgan’s excavations have been lost. As such, the contexts of the artifacts for which context could not be determined through the examination of his field notes (OHS cat # 323-497 except 377) had to be excluded from analyses where context was important. Fortunately this only affected 36 artifacts. Additional OHS collections include excavations by Essenpreis (1982, 1985, 1987, 1988) and Connolly (1990, 1991, 1992, 1995) that concentrated on the Twin Mounds area but also investigated various areas in the North, Middle, and South Forts. Finally, OHS curates the materials from salvage excavations associated with the Fort Ancient museum expansion and infrastructure update conducted in 1995 and 1996. As excavations are ongoing, the materials from excavations by Riordan (2007, 2009, 2011, 2012) at the Moorehead Circle are currently housed at Wright State University but will eventually be curated by OHS. The Cincinnati
Museum Center collections from Fort Ancient resulted from salvage excavations conducted from 1995-1997 after “the 21-hectare Gregory farm to the east of the Fort Ancient State Memorial was sold for subdivision development” (Cowan et al. 2004:114). Cincinnati Museum Center collections from the Stubbs earthwork included material from the 2001 salvage excavations at the Smith Site (33WA362) and the Circle Overlook site (33WA765) (Cowan et al. 2003; Sunderhaus et al. 2001). The bladelet sample included 106 complete bladelets, 611 proximal segments, 708 medial segments, 302 distal segments, 8 rejuvenation flakes, 62 trimming flakes, and 11 blade cores.

Following procedures from previous studies of Hopewell bladelets, fifteen attributes were recorded for complete bladelets while the same attributes were recorded for bladelet fragments and bladelet production debitage when present. Nine represent continuous attributes (maximum length, maximum width, maximum thickness, weight, striking platform width, striking platform thickness, and thickness below the bulb of force) while nine are categorical attributes (blade type, cross-section shape, distal termination type, cortex, raw material type, number of facets, edge angle, retouched edge angle, and area of retouch).

Definitions of recorded attributes generally follow those of Greber et al. (1981:Figure 2) and Nolan (2005:44-46) but are repeated here for clarity. Maximum length is the longest dimension along the percussion axis. Maximum width is the greatest dimension between two lateral margins of a bladelet. Maximum thickness is the thickest dimension below the bulb of force. Striking platform width is the “lateral margin to lateral margin dimension of the platform” (Nolan 2005:46). Striking platform thickness
is the “the dorso-ventral thickness of the platform” (Nolan 2005:46). Thickness below the bulb of force is the thickness just distal to the bulb of force. Weight was recorded to the nearest 0.1 gram using a digital scale. Blade type refers to the completeness of a bladelet and was recorded as complete, proximal, medial, or distal. For those artifacts deemed to be products of bladelet production but lacking one or more of the definitive attributes outlined above, two additional categories were added to blade type. Trimming flakes result from preparing the core for bladelet production and include Lame à crête, or crested blades, as well as platform preparation flakes. Rejuvenation flakes are the result of major removals from the bladelet core in order to restore a desirable platform angle. Cross-section was recorded as triangular, trapezoidal, or irregular. Distal termination was recorded as feather, hinge, or overpass. Cortex was recorded as present or absent on the proximal, medial, and/or distal thirds. Facets are blade removal scars which extend more than 1/3 of the bladelet. Edge angle was measured to the nearest 5 degrees using a graniometer. If variation existed along the bladelet edge, the average edge angle was taken. If edge angle varied considerably between left and right sides of a bladelet, both values were recorded. If a bladelet was retouched, the retouched edge angle was measured in the same way as edge angle. The area of retouch was recorded as proximal, medial, or distal and divided into left and right sides with the striking platform away from the observer and the dorsal side facing up.

Ten attributes were recorded for bladelet cores. Six attributes were continuous (maximum length, maximum width, maximum thickness, maximum face length, face circumference, and weight) and four were categorical (shape, number of faces, cortex,
and platform preparation scars). Maximum core length is the maximum dimension along the axis of bladelet removal. Maximum width is the maximum dimension along the plane which crosses the bladelet removal face. Maximum thickness is the maximum dimension along the axis which is perpendicular to both the length and width. Face length is the length of the longest bladelet removal scar on a core. Face circumference is the length around a core which is covered by contiguous bladelet removal scars as measured with a string. Weight was measured to the nearest 0.1 gram using a digital scale. Determination of core shape was made by comparison with the nine types defined by Greber et al. (1981:Figure 5). A face is a set of contiguous bladelet removal scars. Cortex was recorded as present or absent and located on the proximal, medial, or distal third and divided into left and right sides with the platform away from the observer. Platform preparation scars and edge grinding were recorded as either present or absent.

All bladelets from undisturbed sub-surface contexts (i.e., non-plowzone), along with all bladelets included in MANs, were subjected to microwear analysis (n=993). Additionally, all bladelet cores (n=11), regardless of provenience, were subjected to microwear analysis. Prior to microscopic analysis, artifacts were photographed so that locations of use-wear could be noted. Each artifact was then washed in an ultrasonic cleanser, first in a bath of liquid soap then in water, in order to remove any soil and finger grease which may mask use traces. The artifacts were then examined with an Olympus model BHM incident light microscope at magnifications of 50 to 500x with photomicrographs taken of significant features. In order to interpret material worked and motion employed, microwear traces on the artifacts were compared to wear traces from a
reference collection of over 200 tools composed of over a dozen raw material types from experiments conducted by Miller (2010) and Yerkes (1983:504, 1990:171). Table 4.1 summarizes the diagnostic features for material worked based on these experiments, and those described in the published literature (Keeley 1980; Van Gijn 1990; Vaughan 1985; Yerkes 1983). Photographs of experimentally produced microwear patterns can be found in Appendix B.
Table 4.1 Microwear Signatures of Common Materials Worked by Stone Tools

<table>
<thead>
<tr>
<th>Very Bright Polish</th>
<th>Bright</th>
<th>Moderately Bright</th>
<th>Relatively Dull</th>
<th>Dull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft Plant</td>
<td>Wood</td>
<td>Bone/Antler</td>
<td>Stone</td>
<td>Shell</td>
</tr>
<tr>
<td>Very Smooth polish when well developed</td>
<td>Very smooth polish which is curved with troughs and crests</td>
<td>Micro pitted polish confined to worked edge</td>
<td>Very smooth and very flat</td>
<td>Smooth domed polish</td>
</tr>
<tr>
<td>Filled-in and comet tail striations</td>
<td>Distinct broad and shallow striations</td>
<td>Many deep and narrow striations</td>
<td>Similar striation patterning to shell</td>
<td>Unique striations in geometric patterns</td>
</tr>
<tr>
<td>Little edge damage</td>
<td>Some edge damage</td>
<td>Extensive edge damage</td>
<td>Extensive edge damage</td>
<td>Extensive edge damage</td>
</tr>
</tbody>
</table>
Chapter 5 : The Archaeological Contexts of Fort Ancient and Stubbs

Fort Ancient Earthworks

The Fort Ancient Earthworks (33WA2) are located on a promontory 80 meters above the Little Miami River in central Warren County, Ohio. Fort Ancient is composed of 5.7 km of earthen walls divided into sections by 67 openings or gateways (Otto 2004:3). Fort Ancient contains four basic architectural units; the North, Middle, and South forts, and the Parallel Walls. Most archaeologists argue that the South Fort was constructed earliest, followed by the Middle and North Forts (Connolly 2004; Essenpries and Moseley 1984; Moorehead 1890). Recently, Riordan (2010:227-228) has suggested that initial stages of the entire earthwork may have been built simultaneously. Regardless of when it was built, all evidence suggests that no portion of the site was static as additions were continually added to all sections and spaces often were used for different activities (Connolly 2004). To the northeast of the North Fort two earthen walls, known as the Parallel Walls, extended 0.85 km out from the earthwork before their destruction by plowing (Otto 2004:3).

The earliest documented fieldwork at Fort Ancient focused on mapping the earthen walls and other visible features of the site. The first map of Fort Ancient was published in the Philadelphia based Portfolio in 1809. Subsequent attempts have resulted in at least 30 published maps of the site (Sunderhaus 2004a). Agricultural activities and
other modern modifications, such as those by the Civilian Conservation Corps in the 1930s, make it impossible to determine the accuracy and precision of each map although Locke’s 1843 map (Squire and Davis 1848:Plate VII) is most often pictured and Connolly’s map (1996b:Figure 15.1) is most often used in modern discussions of the site (e.g., Connolly and Lepper 2004).

Archaeological excavations have been conducted sporadically at Fort Ancient for well over 100 years. Hosea (1874) was the first antiquarian to excavate at Fort Ancient and publish a report of his findings. The first well documented excavations at Fort Ancient were conducted by Warren King Moorehead between 1888 and 1891 (Moorehead 1890, 1908). As was customary at the time, and because a portion of his excavations were aimed at collecting artifacts for the Columbian Exposition in Chicago, Moorehead focused much of his work on mounds and burials (Moorehead 1890; Otto 2004:5). Moorehead did identify habitation areas in the South Fort and in the floodplain of the Little Miami River outside of the earthwork (Otto 2004:5). Moorehead designated these areas as the dwelling places of the earthwork builders, although subsequent research would attribute them to the Late Prehistoric period Fort Ancient culture and lead to the contradictory site and culture complex nomenclature (Harper 2004).

In addition to excavating several stone pavements and circles as well as two earthen mounds, William C. Mills tried to relocate Moorehead’s excavations in the South Fort to explore the habitation area and possible associated burials (Mills 1908). Following Moorehead, Mills believed the site to be primarily defensive in nature,
although he envisioned people of the Fort Ancient culture as violently capturing the site and its contents from the Hopewell builders (Mills 1920:21).

In the 1930s, the Civilian Conservation Corps (CCC) made numerous structural modifications to Fort Ancient and in the process conducted some of their own, essentially undocumented, excavations. The most infamous CCC excavation involved stripping the topsoil from a large portion of the plateau to the east of the North Fort walls and south of SR 350 to use as fill for the site manager’s house (Connolly 1997:253; Griffin 1996:8, 1997:419). The excavation reportedly uncovered numerous post molds and pit features, the remnants of possible domestic structures but no features were ever formally recorded or mapped.

In 1939 and 1940, Richard Morgan opened about half a dozen sub-surface excavation units across Fort Ancient including in the Twin Mounds area, outside of the North Fort, a mound in the Middle Fort, Moorehead’s burial area in the South Fort, as well as a portion of the embankment wall in the South Fort (Morgan and Ellis 1939, 1940). Morgan concluded that people of the Hopewell culture constructed Fort Ancient who used the site was used for ceremonial, rather than defensive, purposes (Morgan 1946).

After Morgan’s excavations in 1940, there was a break in archaeological excavations at Fort Ancient until 1982 when Patricia Essenpreis investigated areas around the Twin Mounds to the northeast of the earthwork. Thus, began the modern archaeological investigation at Fort Ancient. Robert Connolly (1992, 1996, 1997; Connolly and Sullivan 1998) continued Essenpreis’ research agenda into the early 1990s.
Essenpreis and Connolly’s excavations included portions of all three Forts as well as the Northeast Plateau, which once contained the Parallel Walls, though the majority of excavations have focused on the northern portion of the site. A conscious effort was made to focus on areas with no visible surface features though a number of sections of the earthen walls and pond features were investigated.

Salvage excavations in the mid to late 1990s produced extensive evidence of wooden architecture in the North Fort (Lazazzera 2004a) and eastern plateau (Cowan et al. 2004). A geophysical survey in advance of a proposed erosion control project identified a circular “woodhenge” feature in the North Fort in 2005. Excavations of the Moorehead Circle, as the feature came to be known, began in 2006 and are ongoing (Riordan 2010). All bladelet material from Morgan’s to Riordan’s 2009 excavations has been included in this study and the specific contexts of bladelet assemblages are discussed in the remainder of the chapter (Figure 5.1).

Fort Ancient Contexts

North Fort Gateways

As noted above, Fort Ancient contains 67 prehistoric gateways between the embankment walls. In the North Fort, several of these have been excavated and produced bladelets for analysis. For example, construction of a new access road into Fort Ancient in 1938 necessitated excavation of a portion of Gateway 3 (Otto 2004:9). This excavation revealed what Morgan referred to as a refuse pit, likely a midden deposit, associated with the gateway’s exterior pond (OHS collection A1039 catalog #’s 65 and 70 provenience notes).
Figure 5.1 Archaeological contexts at Fort Ancient
Gateway 13 may represent the most thoroughly investigated gateway at Fort Ancient, at least in terms of the horizontal scale of investigation (Figure 5.2). In 1992, Connolly (1996b:Figure 15:3) used a combination of soil coring, 50 cm test pits (n=10), 1x2 m excavation units (n=6), and 1x4 m units (n=1) to determine the structure and evidence for use of the gateway complex. Construction of Gateway 13 began with the artificial enclosure of a natural gully and extension of the plateau to accommodate earthwork construction (Connolly 1996a). A substantial amount of activity preceded earthwork construction as evidenced by cultural remains directly on top of sterile subsoil. For example, a cooking feature, represented by a ring of limestone slabs, charcoal, and numerous artifacts, was present at the base of the embankment wall north of Gateway 13 (Connolly 1996b:263). The base of the pond constructed in the gully just inside Gateway 13 yielded evidence of another limestone cooking feature and an artificial, artifact rich gravel lens. In summary, prior to embankment construction the Gateway 13 area was modified to extend the flat plateau and create an artificial pond from an erosional gully. These surfaces were the location of prehistoric activity prior to their burial by earthwork construction.

In 1993, Connolly (1996b:263) excavated two 1x1 m shovel test pits and took a series of soil cores at three meter intervals in the Gateway 7 and 8 complex (Figure 5.3). Construction of the Gateway 7 and 8 complex began with the removal of soil to level the plateau for earthwork construction and to create three artificial ponds (Connolly 1996b:266-267). Pond floors were lined with gravel and sand while the edges of ponds were lined with limestone pavements which contained an abundant number of artifacts.
Figure 5.2 Gateway 13 structural features and excavation units. Adapted from Connolly 1996b:Figure 15.3.
Connolly (1996b:268). Connolly (1996a, 1996b) argues that the Gateway 13 and 7 complexes display similar “architectural grammar” rules in the construction of ponds, gateways, and terraces. Connolly (1996a, 1996b) argues that gateway complexes, especially the peripheries of ponds, were centers of prehistoric activity associated with ritual events at the earthworks.

Excavations in advance of a waterline project in 1995 resulted in a 1x21 m trench through the south side of Gateway 84 (Seig and Connolly 1997). Excavations revealed that the embankment wall at Gateway 84 was also built over previous activity areas in the form of posts and pit features which Lazazzera (2004a:103) interprets as two building episodes of a large unroofed structure. A clay floor was laid over the previous features before embankment wall construction began in three stages utilizing successive layers of colored soils and limestone pavements (Figure 5.4) (Connolly 2004a:41). In the first stage, the embankment wall actually consisted of three low (~0.5 m) parallel walls composed of “alternating layers of colored soils” (Connolly 2004a:41). The second stage was produced by alternating layers of “orange and dark gray soils” (Connolly 2004a:41). The embankment wall served as an activity area at this point, as evidenced by numerous post and pit features. Stage three is represented by a limestone pavement along the outside face of the embankment wall. The pavement was rebuilt once after a period of intense use signaled by the accumulation of organically rich soils containing abundant Middle Woodland cultural debris (e.g., pottery and bladelets).

Yokell (2004) suggests that stage three of Gateway 84 may have been the location of, or simply the disposal area for, the remains of feasting events. Yokell (2004:199)
Figure 5.3 Idealized model of the Gateway 7 and 8 complex. Adapted from Connolly (1996b:Figure 15.8).
Figure 5.4 South Wall profile of Gateway 84 embankment wall. Adapted from Connolly (2004a:Figure 4.4)
notes that the recovery of 23 swan bones (from at least 8 individual swans) in addition to complete skeletons of a juvenile deer and five fish seem to be evidence of feasting. However the deer and fish appear to have been intentionally deposited. Additionally, none of the fish bones show signs of heating while only a few of the bones from the deer show evidence of boiling or burning. As such, ritualized deposition or offering may be a more apt description of the faunal remains than feasting. Connolly (2004a:41) adds that the uniqueness of the ceramic assemblage—numerous types usually associated with ceremonial or mortuary features such as Hopewell and Brangenburg series [from Illinois] rim sherds—represents further evidence for “ritual or feasting activity”.

**Gregory’s Field**

Fort Ancient is bordered on most sides by steep slopes leading to the Little Miami River or tributary streams. The lone exception lies to the northeast of the earthwork in the area surrounding the Parallel Walls often referred to as the Eastern Plateau (Figure 5.5). This relatively level area contains extensive evidence of prehistoric activity (Connolly 1997; Connolly and Sullivan 1998; Cowan et al. 2004). I refer to the area in this level plateau around the Parallel Walls, outside of the boundaries of the Fort Ancient State Memorial, and bounded by State Route 350 and Middleboro Road as Gregory’s Field after the former landowner (and following Cowan et al. 2004). Connolly (1997; Connolly and Sullivan 1998) conducted several surface surveys in Gregory’s Field in the early 1990s. After analyzing the type and distribution of several thousand artifacts recovered Connolly identified several household clusters (1146, 518, and 519) and a lithic manufacturing area (588) (Figure 5.5).
Figure 5.5 Map of Gregory’s Field showing sub-divided house lots, surface artifact concentrations, and excavation units and previous surface collection areas. From Cowan et al. (2004:Figure 8.3) and Connolly (1997:Figure 10.1).
Opportunistic salvage excavations by the Cincinnati Museum Center in the mid-1990s exposed subsurface features in four areas of Gregory’s Field (Figure 5.5). For example, observations of bulldozing activity in between lots six and nine identified two square or rectangular structures along with large pit features and a thick midden (Cowan et al. 2004:116). Unfortunately the construction schedule did not allow any more than limited archaeological excavation in the area making functional interpretation nearly impossible. Mechanical removal of the plowzone to be impacted by construction in lot two revealed post molds, pit features, and an area of burned soil (Cowan et al 2004:117). No individual structures were identified in the field but the excavators “are now quite convinced that the scattered posts represent several prehistoric structures” (Cowan et al. 2004:117).

A large area in lots 17 and 18 was mechanically stripped, exposing the remains of at least three structures along with a number of additional postmolds and pit features (Cowan et al. 2004:119). Two of the structures, each about seven meters square, partially overlap while the third, about 6 meters square, is located about 20 meters west of the others (Figure 5.6). Thanks to the cooperation of the landowners and the construction crew, excavations in this area are the most complete in Gregory’s Field. A number of posts and 20 pit features were excavated as a result (Cowan et al. 2004:119). Pit features contained large numbers of bladelets, blade cores, and debitage (including obsidian and quartz crystal) while pottery, fire-cracked rock, bone, and botanical remains were present but relatively scarce (Cowan et al. 2004:120). Due to the paucity of FCR, pottery, bone, and charcoal Cowan et al. (2004:120) interpret this area as the specialized production
Figure 5.6 Structure 2 and 3 area in lots 17/18, Gregory’s Field. Image courtesy of Robert Genheimer.
Excavations in lot three, in advance of additions to an existing farmhouse, produced a number of pit features and possible structure outlines (Cowan et al. 2004:121). The greater number of pits, FCR, pottery, bifacial tools, and nutshell in this area lead Cowan et al. (2004:122) to suggest that it had a more generalized residential function than lot 17/18. Cincinnati Museum Center investigations also noted several surface concentrations of artifacts both north and south of the Parallel Walls.

As mentioned above, Cowan et al. (2004:120) argue that the structure two and three location in Gregory’s Field “was definitely not a residential area” but “was used primarily for highly specialized activities, primarily the production of bladelets and other ritually oriented chipped stone paraphernalia”. Cowan et al. base their conclusion on the recovery of a large amount of lithic debitage recovered from the area in addition to the relative paucity of FCR, pottery, bone, and other cultural materials in pit features. On the other hand, Lazazzera (2009:268) places structures two and three in her specialized domestic category because of the presence of “thermal and trash-filled features” as well as the discovery of midden deposits nearby.

Both Cowan et al. (2001:120) and Lazazzera (2009:268) argue that numerous overlapping structure outlines and pit features in the structure two and three location are signs of repeated short term occupations of the area. These numerous, short term occupations were almost certainly associated with periodic visits to the earthwork for social-ceremonial activities. While the inhabitants would have participated in the Hopewell rituals—and even prepared some of their own objects to use in these rituals—
they also would have conducted the everyday domestic activities that occur in habitation contexts. Thus, the structure two and three area of Gregory’s Field fits the persistent place model in which the domestic and ceremonial/ritual spheres intersect (Schlanger 1992).

Lepper and Yerkes (1997) make a similar argument for the Hale’s House site, a postmold and feature concentration, just outside of the Newark earthworks. Lepper and Yerkes (1997:188) note that some specialized features and exotic artifacts have been recovered from the site. However, they ultimately conclude that the numerous overlapping structures represent short term habitation areas for groups gathered at the earthworks to participate in Hopewell ceremonialism (Lepper and Yerkes 1997:188). The evidence of ceremonial production activities inside short-term use domestic structures from structures two and three in Gregory’s Field (Cowan 2006; Cowan et al. 2004) suggests that they represent the same type of occupation documented by Lepper and Yerkes at the Newark earthworks.

Twin Mounds Area

East of Gateway 84, there are two relatively large earthen mounds known as the Twin Mounds. Before their destruction by modern agricultural activity, the Parallel Walls extended nearly one km northeast from the Twin Mounds (Figure 5.8). Morgan (Morgan and Ellis 1939) excavated a drainage ditch north of the northern Twin Mound and found it was filled with cultural material either from the intentional deposition of prehistoric refuse or the build-up of sediments and artifacts from water run-off from the surrounding area. Essenpreis returned to this area in 1985 and excavated two units
Figure 5.7 Unit 1/85 North Wall Profile. Adapted from Connolly (1996a:Figure 6.7).
through the eastern half of a portion of the ditch (Connolly 1996a:146). Units 1/85 and 2/85 were excavated to determine the structure and composition the drainage ditch and borrow pit feature north of the northern most of the Twin Mounds (Figure 5.9). After construction, possibly as a borrow pit for the Twin Mounds, the base of the ditch—which lies below the modern water table—was lined with gravel (Connolly 1996a:148). A single-use “fire ring” associated with this gravel lens at the base of the ditch may have been used during a season when the water table was unusually low (Connolly 1996a:148). Similar to Morgan’s excavations, Connolly reports encountering extensive refuse deposits at the base of the ditch. Connolly (1996a:149) concluded that after the carefully constructed ditch was abandoned, it was filled with refuse.

Soil coring near the Twin Mounds identified an extensive area of sub-surface prehistoric activity (Connolly 1997). Excavations in the late 1980s revealed hundreds of postmolds as well as pit features and the remains of several overlapping limestone pavements (Figure 5.9). However, the earliest use of the area did not involve limestone pavements. Instead, numerous structures must have been built and rebuilt in the area as evidenced by “overlapping walls, erratic patterns, and varying depths” of posts (Connolly 1997:255). Lazazzera (2009:265) identified the partial outlines of eight separate structures, each about 10 meters square, by identifying patterns of straight lines of recorded post holes. At least one structure was built on the same level as the limestone pavements. The eastern portion of the excavated area contains three overlapping limestone pavements. The earliest pavement (Connolly’s Pavement 3) is “composed of a mixture of gravel, sand, small pieces of limestone, and clay” and is superimposed upon the layer
Figure 5.8 Map of excavation units in the Twin Mounds area. Adapted from Connolly (1997:Figure 10.2).
Figure 5.9 Overview of cultural features in the main excavation block of the Twin Mounds area. Adapted from Connolly (1997:Figure 10.3) and Lazazzera (2009:Figure 6.5).
containing the numerous posts and pits described above (Connolly 1997:257). The middle pavement (Connolly’s pavement 2) is composed of a layer of gravel over small limestone slabs. The upper-most pavement consists of a layer of gravel over larger limestone slabs (Connolly 1997:256). A layer of soil high in cultural and organic content separates pavement two and three as well as one and two. Connolly (1997:256) attributes its presence to either gradual accumulation over time or preparation for a new pavement.

Connolly (1997:259) argues that the early features in the Twin Mounds area are evidence of habitation activity which continued even after the construction of the limestone pavements. The structure outlines, feature types, and artifact assemblage all point to a domestic function for the area. Connolly (1997:259) also argues that the habitation in the Twin Mounds area were a continuation of the more extensive domestic features to the south exposed in the 1930s and discussed by Griffin (1996:8, 1997:418). Soil coring and limited excavations south of SR 350 document a continuous distribution of prehistoric features. Only after the construction of the Parallel Walls did the function of the switch to the corporate-ceremonial sphere. Lazazzera (2009:261) largely concurs adding that the structures here were not normal households but “residences that were occupied only temporarily during ritual events” or “they may be the result of long-term residential occupations that transcended more periodic ritual activity”.

**Interior Household Cluster**

In the mid-1990s the rebuilding of the Fort Ancient museum and related updates to the infrastructure necessitated large scale excavations within the North Fort (Lazazzera 2004a). Excavations exposed the remains of 11 separate structures, seven in the
Figure 5.10 Interior Household Cluster. Adopted from Lazazzera (2009:Figures 5.2 and 5.8).
mechanically stripped area and four south of the tree line (Lazazzera 2004a:Figure 7.2). Significant historic disturbances, such as a plowzone as deep as 40 cm in some areas, impacted seven of the structures. Despite the disturbance, many postmolds and pit features remained intact below the plowzone and allowed for the reconstruction of structure outlines (Figure 5.10). The only completely excavated structure outlines were in the mechanically stripped area of the new museum. Structures 1 and 2 were paired post structures and were about seven meters square (Lazazzera 2004a:90). Extrapolation from the sampled sections of the remaining structures indicates that 7x7 meters is a good estimate for their sizes as well. Structure 1 contained one earth oven while structure 2 contained two ovens as well as an exterior ash filled pit (Lazazzera 2004a:Figure 7.4).

Lazazzera (2004a:90) argues that gaps in the post mold pattern in the southwest corner of both structures represent doorways although similar gaps in the southeast and western walls of structure 2 could be interpreted in the same way. Lazazzera’s (2004a:90) argument that the structures are arranged around a central plaza used for common storage and processing facilities is based on the assumption that all structures were contemporary and no additional structures lie outside of the area tested for the museum footprint. The second point is especially unlikely given the large number of structures discovered in the area and the location of several structures (i.e. structures 7 and 8) on the edge of the archaeologically investigated area.

Four structures were located directly south of structures 1 and 2 in an area not subjected to historic plowing (Lazazzera 2004a:Figure 7.2). In addition to the structures a 25-40 cm thick midden extended over the area (Lazazzera 2004a:88). Structures 5 and
8 were associated with large refuse pits while features in structure 8 contained scraps of copper, galena, mica, and obsidian (Lazazzera 2004a:92-93). Structure 8 also contained two earth ovens, one roasting pit, one surface hearth, and two processing pits while structure 5 also contained a hearth, five earth ovens, and as many as eight processing pits. Lazazzera (2004:Table 7.1) notes that structure 5 may have been rebuilt once based on postmold patterns. This interpretation is bolstered by the fact that the refuse pit associated with structure 5 appears to have been used for an extended period of time (Lazazzera 2004:94). Structure 4 contained three shallow basins and structure 6 contained an ash filled pit. None of these structures were completely excavated, making interstructure feature comparison difficult. Whether all structures were occupied simultaneously or structures were added through time remains to be demonstrated. Lazazzera (2004a:105) notes that both scenarios are possible in that the relative paucity of overlapping features indicates the planned use of space, but this planning could have occurred over a long period of habitation in which new structures were positioned away from the still visible remains of previous structures. To the west of these structures, in an area mechanically stripped for a water treatment facility and access road, two similar structures were discovered. The partial outlines of these structures revealed that one contained an ash filled pit and numerous features were located in the open space outside of their outlines.

Most of the structures show no evidence of rebuilding. In addition to structure 5 noted above, an exception occurs at the extreme eastern end of the access road area where an array of overlapping features was uncovered (Lazazzera 2004a:Figure 7.2). The area
contained the remains of two types of structures each rebuilt once, for a total of at least four different structure outlines (Lazazzera 2004a:Figure 7.10). The earlier structures were heavily built with large posts set in basins with limestone chinking stone for support. Later structures resembled the others found in the area (Lazazzera 2004a:95).

Aside from these early structures in the access road area Lazazzera concludes that all of the other structures represent households similar to those found away from earthworks based on similarities in structure size, construction type, settlement layout, and feature types.

The aggregation of several households in close proximity at Fort Ancient suggests that they were integrated into a larger multi-household group (Lazazzera 2004a:105). Smith (2006) discusses whether the households in the Interior Household Cluster may represent the coalescence of a larger corporate group. He suggests that this may represent a “suprahousehold kin grouping” due to the arrangement of structures around a central plaza (Smith 2006:504). If this is the case then the Interior Household Cluster may represent “the long-term relocation of outlying households related to their work on the Fort Ancient earthwork, or…a ‘permanent’ settlement of a kin group that resided at Fort Ancient” (Smith 2006:504).

Contrary to the interpretations of Lazazzera (2004a, 2009) and Smith (2006), Pacheco and Dancey (2006:10) argue that the structures in the IHC are not regular domestic structures but “guest/dignitary housing, craft workshops (as Baby and Langlois [1979] argued), or perhaps even exclusive spaces like men’s or women’s clubs”. Dancey and Pacheco offer no support for their assertion other than that their designation as
specialized structures more closely fits the expectations of the Dispersed Sedentary Community model. Due to the large number and variety of artifacts and associated features, the structures seem to resemble domestic spaces used for subsistence and manufacturing tasks. Lazazzera (2004a) and Smith (2006) have presented thorough summaries of the evidence for domestic habitation of the IHC from artifact and feature content.

More recently, Pacheco (2010:42) argued that the IHC structures may represent “houses from a sedentary Late Hopewell/Early Late Woodland nucleated village.” Here Pacheco concedes that the structures represent domestic residences but argues that they were inhabited after the end of Hopewell ceremonialism. This interpretation also suffers from the assumption described above that all structures in the area have been identified. In other words, the identification of additional structures would change the somewhat circular arrangement of the current structures. The nucleated sites of Strait, Waterplant, and Zencor, cited by Pacheco (2010:42) have distinctly non-Hopewellian artifact assemblages. In other words, these three sites do not contain the exotic materials, bladelets, and pottery types so characteristic of Hopewell domestic and ceremonial sites. The IHC, on the other hand, contains mica, copper, galena, bladelets, and Hopewell pottery (Lazazzera 2004a). Similarly the structure pattern does not resemble post-Hopewell nucleated villages which typically only contain clusters of pit features (Clay and Creasman 1999; Dancey 1992; Seeman and Dancey 2000). Precise dates for the structures in the IHC cluster are needed to determine how many of them are contemporary with each other, but the summed probability of radiocarbon dates from the
IHC ranged from 124 and 245 cal. AD, suggesting that this area was occupied during the middle of the long Hopewell occupation sequence at Fort Ancient (see Appendix A below).

**Moorehead Circle**

Using magnetometry and electrical resistivity, Burks (2014:9) discovered a circular anomaly approximately 60 meters in diameter in the North Fort which seemed to be prehistoric (Figure 5.13). Burks interprets the feature as an enclosure with an opening at its north end. Magnetometry survey recorded a second circular feature contained within the larger enclosure which, through the use of soil cores, Burks determined to be composed of burned soil and charcoal (located within Trench B in Figure 5.13). Burks also identified two probable structure floors on the grid east of this central circular feature.

Excavations at the Moorehead Circle, as the circular feature came to be known, began in 2006 and are ongoing (Figure 5.14). The outer circular feature identified by Burks turned out to be a ring of 200 post holes (estimated), which, before their removal, contained wooden posts two to four meters tall (Riordan 2009:88). Excavations in Trench A and C revealed that as many as two additional smaller rings of posts may have existed within the larger circle (Riordan 2010). At this point, it is still unclear whether or not the multiple rings were contemporaneous or represent multiple periods of construction. The central feature (Feature 06-22) is composed of a mound of culturally sterile bright red soil surrounded by an apron of ash and burned timbers (Feature 06-42) all covered by unburned soil and located within a larger pit (Riordan 2009:23-28). Four
Figure 5.11 Initial excavation units over geophysical interpretation of the Moorehead Circle. Adapted from Riordan (2007:Plate 4).
Figure 5.12 View of Trench B of the Moorehead Circle, facing grid east, at the end of the 2007 field season. The central feature (6-22) surrounded by an apron of ash and charcoal (6-42) is visible in the center outlined by string. Numbered circles represent postholes, while squares are pit features. Three of the intercardinal pits had been excavated at this point. Three of the sand-and-gravel-filled trenches, labeled with truncated circles, also found in Trench C are outlined with string on the grid north side of the excavation. (Photo courtesy of Robert Riordan).
pit features, located at the intercardinal points, surround the central feature (Riordan 2009:31). Three parallel trenches are located grid north of the central feature.

In 2010 excavations confirmed the presence of one of the structures identified in the initial geophysical survey by Burks. The excavated portion contained eight postholes and a series of overlapping structure floors (Riordan 2010). The postholes of this structure were greater in depth and diameter than others found within Fort Ancient leading Riordan to conclude that it was probably an unroofed ritual structure associated with the central feature (Riordan 2011b:76).

In Trench C alternating bands of meter-wide clay floors and sand and gravel filled trenches that follow the arc of the outer circle are located inside the outer ring of posts (Riordan 2010). A ground penetrating radar survey of the Moorehead Circle found that the floors and trench features cover the entire northern portion of the Circle and they terminate just before the central feature (Burks 2014:10; Riordan 2012). In 2012, excavations at the presumed entrance to the Moorehead Circle, on the grid north side, uncovered a stratified record of two limestone pavements (Robert Riordan, personal communication 2012). Radiocarbon dates from features within the Moorehead Circle indicate that it was constructed and use in the late 1st to early 2nd centuries AD (Riordan 2011a:Table 4).

Artifacts recovered from the Moorehead Circle include stone tools and lithic debitage, ceramics, mica, shell, floral and faunal remains, and a small piece of textile (Riordan 2007, 2009). Large quantities of refitted ceramic sherds recovered from around the central feature indicate that pots were smashed in place, either after depositing some
since decomposed offering or as a ceremonial offering themselves (Riordan 2009:40). This direct evidence for ceremonial activity, coupled with large scale construction (in the form of a massive ring of posts, extensive ditches, stone pavements, larger than normal structures, and the central feature) and a lack of habitation debris, prompts Riordan (2007, 2009, 2010, 2011a, 2011b, 2012) to interpret the Moorehead Circle as a major ceremonial feature within Fort Ancient (see also Miller 2010, 2014).

About 100 meters west of the Moorehead Circle, electrical resistivity revealed an oval anomaly approximately 20 m east-west and 8 m north-south with linear feature marked by low resistance along the east-west dimension (Riordan 2011a:92). Excavations at the Oval—as the area came to be known—began with a trench placed north-south across the suspected center of the Oval. Near the center of the trench, excavations revealed six postmolds which correspond to the linear anomaly identified in the geophysical survey (Riordan 2011a:92). No historic plowzone was identified and all artifacts (which included bladelets, pottery, animal bone, and FCR) were recovered in the first 25cm of subsoil. A single radiocarbon date from the Oval returned a two sigma date range of 40 cal. BC – cal. AD 130 (Riordan 2011a:Table 4) indicating that it is roughly contemporary with, if not slightly older than, the Moorehead Circle.

*Waterline Trench 6*

Construction of the same waterline that passed through Gateway 84 also necessitated the excavation of a trench through a portion of a CCC enhanced drainage feature in a small ravine in the North Fort [as pictured in Mills (1920:Figure 21)]. While the CCC operations certainly impacted the archaeological remains in the area, (see the
Figure 5.13 Profile of gully trash dump associated with Waterline Trench 6 in the North Fort. Adapted from Lazazzera (2009:Figure 5.21).
two essentially modern radiocarbon dates cited in Lazazzera 2009:198), at least a portion of the Middle Woodland midden (feature 52/96) discovered in the area remained intact (Figure 5.13). The midden fits Smith’s (1992) profile of a gully trash dump, a feature type used for the disposal of habitation refuse. At the portion exposed by the excavation trench, the midden extended about 2.5 m down the ravine and varied from 20-40 cm in depth. Due to the “presence of large amounts of animal bone, FCR, and charcoal, Lazazzera (2009:196) attributes the feature to hearth cleaning activities. The presence of ceramics, lithics (including several dozen bladelets), and a platform pipe in the feature, however, suggest a more generalized domestic dumping function. While no further excavation has been carried out in the area, the feature is located on the margins of a surface artifact concentration that reflects habitation activities (Sunderhaus 2004b:143).

Middle Fort

In 1939, Morgan (Morgan and Ellis 1939) cut a trench through a stone mound and part of the surrounding soil first excavated by Mills in 1908 (Mills 1920:7). The excavation recovered several bladelets along with bifaces, pottery sherds, and mica sheets. In 1940, Morgan returned to excavate a portion of the pond inside of Gateway 58 (Morgan and Ellis 1940). Unfortunately, either due to the loss of records or to the fact that Morgan did not screen excavated soils, no bladelets can be attributed to this excavation. Similar to Connolly’s (1996a) discoveries in the North Fort gateways, Morgan (1946) uncovered a limestone pavement intermixed with various pit and post features. In 1988, Essenpreis reopened and expanded Morgan’s trench near Gateway 58 (Connolly 2004:39). In addition to documenting a three stage construction sequence for
Figure 5.14 Map showing the location of the excavation unit near Gateway 58. Inset displays the plan view of postmolds at the lowest excavation level. Horizontal lines denote different levels of embankment fill. Adapted from Connolly (1996a:Figures 9.4 and 9.6).
the embankment wall, Essenpreis’ excavations revealed two linear arrangements of postmolds that Connolly (2004:40) suggests may be the remains of a palisade (Figure 5.14). Riordan (1996, 2004) adds that wooden stockades may have been present at other Miami Valley hilltop enclosures such as Milford Township I, the Foster Works, and Miami Fort in addition to the confirmed stockade at the Pollock Works. Based on the limited horizontal exposure (Connolly 2004:Figure 4.3), about one m, the post pattern could potentially be attributed to many types of wooden architecture from palisade to house.

In 1982, Essenpreis excavated a portion of the terrace to the east of Gateway 18 in the Middle Fort (Connolly 1991:83). No features were identified but substantial amounts of lithics, FCR, and charcoal were recovered (Figure 5.15). Connolly returned to the area in 1991 by excavating four units and taking a series of soil cores at 1 m intervals on the terrace (Connolly 1996b:Figure 7.4). Connolly’s excavations revealed a limestone pavement extending out of the gateway area and onto the terrace. A single postmold was discovered associated with the pavement (Connolly 1996b:209). The upper levels of the excavation unit were composed of eroded embankment wall soils but Connolly (1996b:206) reports excavating an intact “living floor” associated with the pavement and postmold. Further east of Gateway 18, Connolly (1996b:212) placed an excavation unit over the remnants of a stone mound excavated by Moorehead. Moorehead discovered two human burials in the mound and Connolly excavated the remains of an undisturbed pit feature.
Figure 5.15 Map of features and Excavation units outside of Gateway 18. Adapted from Connolly (1996a:Figure 7.4).
Structure and Activity Types at Fort Ancient

While I have summarized most of the previous investigator’s interpretations of various contexts of Fort Ancient in the above discussion, Lazazzera’s (2004a, 2009) structure types have not been described. Through her work at Fort Ancient, Lazazzera (2004a, 2009) defines three categories of Hopewell structures: generalized domestic, specialized domestic, and specialized ceremonial (Table 5.1). Her generalized domestic structures contain evidence for “a wide range of activities and a low occurrence of features used outside of the everyday realm (e.g., ritual caches)” (Lazazzera 2009:259). Generalized domestic structures are similar to those defined by Smith (1992), as associated with clusters of pits, middens, and gully trash dumps and diverse artifact assemblages reflecting generalized activities. Specialized domestic structures may have been “occupied only temporarily during ritual events” or result from “long term residential occupations that transcend more periodic ritual activity” (Lazazzera 2009:261). Implicit in Lazazzera’s definition of specialized domestic structures is the assumption that the residents of these structures somehow directly participated in ritual activities at the earthworks. Specialized ceremonial structures “may have been ritual-use dwellings but were not used as residences” and have evidence of a narrow range of activities (Lazazzera 2009:259).

Lazazzera (2004a, 2009) places most of the structures in the Interior Household Cluster of Fort Ancient in the generalized domestic category. The lone exception is the early construction episodes of the eastern-most structure which Lazazzera (2004a:101) places in the specialized domestic category. Other structures in Lazazzera’s specialized domestic category are those near the Twin Mounds and those in lot 17/18 of Gregory’s
Table 5.1 Fort Ancient structure types identified by Lazazzera (2004a:Table 7.1)

<table>
<thead>
<tr>
<th>Context</th>
<th>Site Type</th>
<th>Characteristics</th>
<th>Archaeological Localities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized Domestic</td>
<td>base camps</td>
<td>Maintenance activities</td>
<td>IHC</td>
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<tr>
<td></td>
<td>hamlets</td>
<td>High diversity of tool types</td>
<td></td>
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<tr>
<td></td>
<td>villages</td>
<td></td>
<td></td>
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<tr>
<td>Specialized Domestic</td>
<td>seasonal camps</td>
<td>Manufacturing and exchange</td>
<td>Access Road area of IHC</td>
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<tr>
<td></td>
<td>ritual camps</td>
<td>Low diversity of subsistence remains</td>
<td>Twin Mounds Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specialized tools</td>
<td>Gregory's Field</td>
</tr>
<tr>
<td>Specialized Ceremonial</td>
<td>earthworks</td>
<td>Burials</td>
<td>Gateway 84</td>
</tr>
<tr>
<td></td>
<td>charnel houses</td>
<td>Limited range of activities</td>
<td>Middle Fort</td>
</tr>
<tr>
<td></td>
<td>mortuary centers</td>
<td>Large corporate structures</td>
<td>Gateways 7 and 13?</td>
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<tr>
<td></td>
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<td>Moorehead Circle</td>
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Field. Specialized ceremonial structures are represented by postmolds and pit features beneath the embankment wall at Gateway 84 (Lazazzera 2004a:103). Based on her criteria, the Moorehead Circle, with its large posts, limited range of activities, and unique design, would be placed in the specialized ceremonial category as well.

Lazazzera (2004a, 2009) created her structure types based on feature data and artifact assemblages. Microwear analysis of Hopewell bladelets (presented in chapter 8) indicates that craft production related to ceremonial activities at the earthworks occurred in both generalized and specialized domestic contexts. Therefore, manufacturing and exchange can be attributed to generalized domestic contexts as well. In this case it is prudent to modify her definitions of structure types by creating a single domestic category at the other end of the spectrum from the ceremonial category. Similarly, structures that are constructed within or directly adjacent to major ceremonial earthworks probably were not considered normal, everyday, or general residences by their inhabitants. However the domestic label is retained here for the category that includes those places where people stayed while participating in activities at the earthwork and also going about their daily business of maintenance and processing activities. The ceremonial category includes those places in which people gathered for specific activities such as feasting, burial, or earthmoving. Ceremonial structures, features, and activity areas are characterized by monumental construction, purposeful deposition of artifacts, and mound construction. For example, the posts from the outer ring at the Moorehead Circle (Riordan 2007) are substantially larger than the postholes in the IHC or Twin Mounds area (Lazazzera 2004a, 2009). Gateway 84 contained the near complete
skeletons of an immature deer and a large catfish (Lazazzera 2009:287; Yokell 2004:197-198) that may represent the intentional deposition as offerings during the construction of the embankment. The artifact caches recovered on the plateau to the northeast of the earthwork (Cowan et al. 2004; Connolly 1997) and ceramics recovered from around the central feature at the Moorehead Circle (Riordan 2009) are additional examples of purposeful deposition in ceremonial contexts. While not analyzed here, deposits and burials found in mounds and charnal houses at other Hopewell earthworks would also fall under this category (Greber 1996). Domestic areas are characterized by a distinctive lack of these types of remains.

Ceremonial activity may have occurred in domestic contexts but the big distinction between the two is that no one lived in the ceremonial spaces (note the lack of habitation refuse in places like the Moorehead Circle and Gateway 84). Similar to Lazazzera’s (2004a:85) argument that her types exist as modes along a continuum, my types break down at some level when the area is viewed as a ceremonial landscape rather than a series of discrete localities. Inhabitants of the domestic areas could certainly see the monumental constructions around them and had memories of the ceremonial activities conducted in the past. Thus, it is important to keep in mind that while domestic and ceremonial designations are used for heuristic purposes, Fort Ancient and Stubbs were persistent places that served numerous social and ceremonial purposes for their builders (see also Burks and Pederson 2006; Pederson Weinberger 2009).
**Stubbs Earthworks**

The Stubbs Earthworks were located on a low terrace of the Little Miami River about 7 km downstream from Fort Ancient. Stubbs was first mapped by Charles Whittlesey (1851) in 1839. Recent gravel mining has largely destroyed the earthworks, and due to agricultural practices and poor weather conditions during the survey (Whittlesey 1851:8), the exact form of the earthworks may never be known (see summaries in Genheimer 1992; White 1996). As mapped by Whittlesey, Stubbs was composed of a large rectanguloid structure with a connected semicircular enclosure which enclosed a total area of about 20 hectares (Genheimer 1992:34). To the east of the main enclosure stood a series of linear earthworks which some have interpreted as a serpent effigy (see Genheimer 1997:284-285; White 1996). Unlike other Hopewell geometric enclosures, the rectangular portion of Stubbs was left open, leaving about a 550 meter opening along the river bluff (Genheimer 1992:34). Whittlesey depicted two openings in the earthen walls, one in the southern-most section and one in the southwest corner. The first well documented excavations at Stubbs were conducted by Harlan Smith in 1892 and were aimed at resolving the issue of the supposed serpent effigy (Smith 1892). The area escaped further professional archaeological attention until the late 1970s, after the destruction of the earthworks, when extensive surface surveys were conducted by Genheimer (1984, 1992).

Surface surveys sponsored by the Miami Purchase Association for Historic Preservation and conducted by Genheimer (1984, 1992, 1997) in 1979-1980 and 1983 identified 28 sites within the Stubbs Cluster, a six km east-west by 1 km north-south area
around the former Stubbs earthworks. Many of the sites were restricted in spatial extent or produced miniscule numbers of artifacts. Three sites, however, produced sufficient quantities of prehistoric debris to allow Genheimer (1992, 1997) to assess the nature of prehistoric occupation. 33WA256, the Stubbs Mill Blade site, covered an area of almost 5 hectares and probably overlapped or abutted the southern wall of the Stubbs enclosure. Genheimer (1997:290-291) interprets 33WA256 as a domestic area for those visiting the earthwork in which numerous prehistoric structures were built and rebuilt over an extended period of time. Evidence for his interpretation comes from the generalized nature of the artifact assemblage, the diffuse artifact distribution, large amounts of FCR, and several possible midden deposits. 33WA362, the Smith site, encompassed .75 hectares and is located on a bluff overlooking the former Stubbs earthworks on the eastern margin of Big Foot Run. Genheimer (1997:294) suggests that 33WA362 contained several individual households due to the peaks in generalized artifact densities throughout the site. 33WA317, Hayner #3 site, is located about 2.5 km downstream from the Stubbs earthworks. Based on its small size (0.125 hectares), and single peak in surface artifact density, Genheimer (1997: 292) argues that the site closely corresponds to Pacheco’s (1997) expectations for a Hopewell hamlet. In summary, previous surface surveys in the Stubbs Cluster have identified numerous concentrations of domestic debris with decreasing density as a function of distance from the earthwork.

The construction of a high school on the Stubbs earthworks in the late 1990s provided the opportunity for subsurface investigations on portions of The Fleischman Ancient Indian Culture Reserve maintained by the Archaeological Conservancy (Cowan
et al. 1999). Around 3,800 discontinuous square meters of excavations revealed extensive evidence of prehistoric wooden architecture. An excavation block positioned at the southern portion of the presumed location of Whittlesey’s effigy mound (Figure 5.16) uncovered the partial footprint of a large post structure similar to the Big Houses discovered at other Hopewell earthworks (Cowan et al 1998:12). The 16.5m by 8m structure may have been connected to an additional structure or room to the north. The Big House interpretation is based on the large size of the postholes and that a prepared clay floor was installed after stripping the soil of the A-horizon in the area. No features—other than posts—were discovered within the structure and no artifacts were recovered to give clues to its function (Cowan et al. 1998:12). A 73 m diameter circle of 172 postholes—dubbed the Great Post Circle— that may have once supported wooden posts three meters in height was identified in the location of a large circular earthwork mapped by Whittlesey (1851:Plate II). A four by four meter c-shaped structure was uncovered within the area encircled by the posts. The excavated features in the Great Post Circle contained few artifacts (i.e., 22 lithics, 22 ceramic sherds, and 20 faunal elements [Rippl 2009:Table 6]). The few artifacts that were recovered were probably introduced from other portions of the site after posts were deliberately removed and the former ring of posts was replaced by an earthen enclosure (Cowan et al. 1999). Both the Stubbs Big House and the Great Post Circle fall into Lazazzera’s (2004a) specialized ceremonial category due to their monumental construction.

Three additional areas of smaller scale mechanical stripping and excavation (Transects 2, 10, and 26 in Cowan 2006:Figure 2.10; see also Cowan et al. 1998, 1999)
exposed the outline of nine smaller structures. These structures range in size from 8m x 5m (structure 1) to 10m in diameter (Cowan et al. 1998:9-10). Seven of these structures date to the Middle Woodland period (Cowan and Sunderhaus 2001; Cowan et al. 2003). The lone non-Middle Woodland structure identified is a circular structure located about 360 m south of the embankment walls that dates to 1200 cal BC – 900 cal BC at two-standard deviations (Cowan and Sunderhaus 2001). Cowan et al. (1998, 1999) note that these structures are characterized by a great deal of structural diversity. Structure shapes include rectangular with rounded corners, square with rounded corners, circular, c-shaped, and circular with paired inner and outer wall posts. Despite the large number of features and structures in the excavation areas, artifacts were exceedingly rare in excavated features (Cowan 2006:44; Cowan et al. 1998:10).

Further investigations focused on a 9.0 m x 48.5 m area in the southeast portion of 33WA256 (Cowan et al. 1999:Figure 1). Mechanical stripping of the plowzone along with hand removal of up to 20 cm of subsoil revealed the partial outline of at least eight structures. The rectangular structures with rounded corners were all constructed using wall trenches—an uncommon construction technique during the Middle Woodland period in the Ohio Valley (Cowan et al. 1999: Figure 3, Figure 4). Additionally, six pit features were identified in the area (Cowan et al. 1999: Figure 2). Aside from a profusion of fire-cracked rock in the plowzone the features associated with these structures were nearly devoid of artifacts.

Several hundred meters east of the Archaeological Conservancy’s land, lies the Barnyard site (Genheimer 2005). This dense lithic scatter may contain as many as 12
million flakes and bladelets from more than a dozen different saw material sources in the Midwest as well as crystal quartz from the Appalachian Mountains and obsidian from Wyoming. Mechanical stripping of a portion of the plowzone revealed the partial remains of at least 4 structures, one of which was rectangular with rounded corners and likely dates to the Middle Woodland period (Genheimer 2005). However, the excavated features contained very few artifacts, suggesting that the knapping debris may post-date the structures. In this same area, artifacts collectors uncovered a pit—named the Koenig Cache—containing over 150 kg of lithic material (Cowan et al 2005). The Koenig Cache assemblage was dominated, in terms of overall weight, by cobbles of vein quartz but thousands of flakes and broken tools of crystal quartz and obsidian were also recovered (Cowan 2005; see also Romain 2009:174-175).

Although the salvage excavations conducted in the late 1990s and early 2000s at Stubbs produced extensive evidence of Middle Woodland activity—especially in the form of wooden architecture—artifacts from the majority of these excavations were not included in my analysis. The reason for this exclusion is that most excavation areas contained more features than artifacts (Cowan et al. 1999). In other words, there simply were not enough artifacts, let alone bladelets, to form reliable conclusions and make comparisons with other locations. Those locations with sufficient numbers of bladelets to warrant investigation are described below.
**Stubbs Earthwork Contexts**

**Smith Site**

The Smith Site (33WA362) is located on a terrace above Big Foot Run overlooking the Stubbs earthworks from the south (Figure 5.16). Salvage excavations in the late 1990s facilitated sub-surface exploration of three spatially distinct areas of the site (Sunderhaus et al. 2001). An eight meter square structure with a wide entry way and a few shallow associated pit features was revealed in the southern portion of the site (Sunderhaus et al. 2001:Figure 2). About 30 meters north of the structure, mechanical stripping revealed around 100 prehistoric features including numerous postmolds and pits on the crest of a ridge (Sunderhaus et al. 2001:Figure 3). While artifact concentrations were low and hearths were absent, the area appears to represent the remains of several overlapping structures. About 30 meters north of the feature concentration, mechanical stripping revealed a large (1.5m diameter by 90 cm depth) pit (feature 37) on a narrow terrace (Sunderhaus et al. 2001). The pit was associated with a few probable postmolds but the expedient nature of the excavations prevented the search for further features or patterns (i.e., structure outlines). Pit fill could be separated into three levels. The upper level contained obsidian (two bladelet fragments and one flake), flint bifaces, bladelets, and FCR. The middle level contained large amounts FCR, as well as burnt soil and bone. This level also contained nearly 400 pottery sherds representing at least 23 different vessels. Additionally about a dozen cut pieces of mica and thousands of unmodified mica fragments were recovered from this level. The lowest level contained sparse amounts of pottery, debitage, and FCR. Sunderhaus et al. interpret all areas of the Smith
Figure 5.16 Stubbs Earthworks and relevant archaeological sites.
site as short-term specialized structures or activity areas related to ceremonial activity at the earthwork. Specifically, feature 37 probably formed by the “cleaning of adjacent, special purpose activity areas” (Sunderhaus et al. 2001). The presence of three distinct (in both stratigraphy and content) levels of fill suggests that the refuse was generated during specific events instead of the gradual accumulation expected in domestic settings. Being located near the Stubbs earthworks suggests that these specific events were related to ritual activities conducted therein. These activities must have required cleaning either before, during, or after the events that created the debris.

Circle Overlook

The Circle Overlook Site (33WA765) is located about 125m west of the Smith site on the same terrace of Big Foot Run (Figure 5.16). Archaeological testing at the site consisted of surface collection as well as the excavation of five test one by one meter hand excavated test units (Figure 5.17). The excavations uncovered numerous post and pit features but no discernible structure outlines due to the limited nature of subsurface testing. Nearly two dozen bladelets were found in test unit 2. Bladelets were not recovered from any of the other test units. A substantial number of ceramic sherds—several orders of magnitude greater than any of the other sites in the Stubbs Cluster—were recovered from the test units as well. The make-up of the ceramic assemblage suggests that the site may have served as domestic space for local and regional—due to the high variability in temper types—visitors to the earthwork (Sunderhaus 2005).
Figure 5.17 Plan view of excavations at the Circle Overlook Site (33WA765). Image courtesy of Frank Cowan.
Chapter 6: Technological Analysis

Technological Analysis

The Hopewell chipped stone toolkit contained a variety of unifacially and bifacially retouched tools in addition to a distinctive core-and-blade industry (Montet-White 1968; Pi-Sunyer 1965). Bladelets represent the most numerous type of Hopewell diagnostic tools recovered from contexts in and around the Fort Ancient and Stubbs earthworks. For example, in their sample from Fort Ancient, Vickery and Sunderhaus (2004:Table 12.9) found that 92.5% of the formal tools were bladelets. Connolly (1991:Table 2) found that 85.7% of formal tools from excavations and surface collections in the vicinity of the Twin Mounds and Parallel Walls outside of Fort Ancient were bladelets. Similarly, Connolly noted that bladelets constituted 85.3% of the formal tools recovered from excavations in the Middle Fort. Lazazzera (2009:Table 5.8) reports that 79.4% of the tools from the IHC were bladelets. The percentage of bladelets ranged from 78.8% in generalized domestic contexts to 87.1% in specialized ceremonial contexts throughout Fort Ancient (Lazazzera 2009:Table 6.2). In the Moorehead Circle, 84.7% of the formal tools were bladelets (Miller 2009:51). At sites within the Stubbs cluster, bladelets constitute between 72.5% and 96.0% of the formal tool assemblages found in surface collections (Genheimer 1996:Table 6.4).

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At Fort Ancient and Stubbs, bladelets consistently constitute 75%-95% of the formal tool assemblage from each surface collected or excavated context. It seems obvious that bladelet production and use were important activities at these sites. However, several factors may be responsible for the abundance of bladelets at Hopewell sites. For example, most bladelets were not hafted and had short use-lives (Yerkes 1994), meaning higher discard rates, and this may help explain their abundance. Additionally, a single bladelet is much easier to make than a bifacial tool and many bladelets could have been produced in a short time. Another point of interest is that the highly fragmentary nature of most bladelet assemblages may artificially inflate their relative abundance. Finally, perhaps not all artifacts classified as bladelets were seen as tools by their makers and numerous studies (e.g., Lepper and Yerkes 1997; Yerkes 1990, 1994, 2009) have demonstrated that unmodified flakes were also often used as tools, even if they were classified as debitage.

Despite these caveats, the evidence is overwhelming that bladelets were abundant at Fort Ancient and Stubbs. For example, the fragmentary nature of most bladelet assemblages does not appear to significantly overestimate their prevalence. To examine this, a large-scale refitting program was conducted to compare all identified bladelets from excavations and associated surface collections from Fort Ancient and Stubbs. The goal was to identify refits (reconstructions of the lithic production sequence), conjoins (mending of broken artifacts), and Minimum Analytical Nodules (all chipped stone artifacts produced from a single core) to study site formation processes as well as the organization of lithic technology. Of relevance here are the 30 conjoins, 27 at Fort
Ancient and 3 at Stubbs, involving 64 bladelet fragments that were identified among the 1,703 bladelets and bladelets fragments (≥10.0mm) examined. In other words, 3.8% of the bladelets identified were simply fragments of a single bladelet broken at some point between manufacture and my examination. Complete bladelets cannot be conjoined so a more relevant comparison would be between the number of conjoined fragments and the total number of bladelet fragments (n=1,597). This procedure only slightly increases the initial calculation to 4.0%. Thus, the highly fragmented nature of most bladelet assemblages only increased their proportion by 4%. In fact, this number is likely much less than, or at least even with, the number of complete bladelets removed from sites by amateur artifact hunters. Examination of private collections by Moorehead (1890) and Genheimer (1984) confirm that this was common practice at both Fort Ancient and Stubbs (see also Connolly 1997:265-266).

Every stone tool begins its use life as an unmodified package of raw material. Raw material selection was an important choice for the prehistoric flint knapper that was tied up in various economic, social, and ideological opportunities and constraints. Numerous raw material sourcing studies have been conducted at Fort Ancient and Stubbs. After examining chipped stone tools and debitage from the Museum Expansion excavations at Fort Ancient, Van Pelt (1997) identified ten different raw material types among the bladelet assemblage. The most numerous raw material type included varieties of Ohio Flint Ridge flint (26.17%) followed closely by Knox flint from Tennessee (25.7%), and Wyandotte flint from Indiana (23.4%) (Van Pelt 1997:Table 3.2). Van Pelt (1997:Appendix C) also identified Brush Creek, Delaware, Upper Mercer, and Zaleski
flints and cherts from Ohio, as well as Boyle, Carter County, Haney, and St. Louis flints and cherts from Kentucky in the bladelet assemblage. Vickery and Sunderhaus (2004) examined chipped stone artifacts from surface collections and excavations in the North Fort of Fort Ancient as well as the Northeast plateau. Vickery and Sunderhaus (2004:Table 12.6) identified 18 known raw material types in the bladelet assemblage. All types identified by Van Pelt, except St. Louis chert, were present in addition to Cedarville-Guelph, Plum Brook and Plum Run flints and cherts from Ohio, Crescent chert from Missouri, Ferdinand and Laurel cherts from Indiana, Paoli, Sonora, Ste. Genevieve, and Tygart cherts from Kentucky as well as crystal quartz. Examination of the entire chipped stone assemblage from Fort Ancient (i.e., bladelets, other tools,debitage, and cores) demonstrates that raw materials were used both for bladelet and bifacial reduction (Van Pelt 1997:Appendix C; Vickery and Sunderhaus 2004:Table 12.6). In other words, as summarized by Van Pelt (1997:45), certain colorful, high-quality flint types were preferred for bladelet manufacture but these flint types were also used to produce other tools as well (see Morrow 1998 for a similar conclusion for sites in southern Illinois).

Vickery (1996:Table 7.1) identified six raw material types among bladelets recovered during surface surveys by Genheimer (1992) at sites in and around the Stubbs earthworks. The largest percentage of bladelets was made of Wyandotte flint (42.78%) while substantial percentages were also made of Ohio Flint Ridge (22.96%) and Knox (17.4%). Other raw materials include Upper Mercer from central Ohio, Boyle from Northern Kentucky, and Knife River flint from North Dakota (Vickery 1996:Table 7.1).
As at Fort Ancient, Ohio Flint Ridge and Wyandotte made up significant portions of the bifacial debitage at Stubbs but Knox flint was only used for bladelet production. The Ohio Flint Ridge and Harrison County flint quarries are each about 200 km northeast and southwest of Fort Ancient and Stubbs respectively. Knox flint is quarried about 400 km to the southeast.

In summary, over 75% of bladelets from Fort Ancient and Stubbs were manufactured on Ohio Flint Ridge, Wyandotte, or Knox flint quarried between 200 and 400 km away. These raw materials are all of relatively high quality, suggesting that was a requirement of some aspect of the bladelet industry, although these materials were not restricted to bladelet production. Among my sample from Fort Ancient, 30.2% are made from Flint Ridge, 29.6% from Wyandotte, and 10.2% from Knox flint. Among the Stubbs sample, 41.5% are made from Flint Ridge, 26.3% from Wyandotte, and 1.8% from Knox. The other 30.0% at Fort Ancient and 30.4% at Stubbs are bladelets composed of unknown sources.

Based upon the paucity of debitage and cores, Connolly (1991:56) argued that bladelet production was limited at Fort Ancient, although he (Connolly 1991:66) notes bladelet workshops may remain to be discovered. Later excavations have led some to argue that bladelet production did occur at Fort Ancient. The recovery of relatively large numbers of blade cores and production debitage prompts Cowan et al. (2004a:120) to argue that the production of bladelets occurred in or near structures 2 and 3 in Gregory’s Field. Lazazzera (2004a:99 citing Connolly, personal communication 2001) argues that bladelet production occurred in the eastern portion of the Access Road area. Even though
no blade cores were recovered they may have been curated or disposed of elsewhere. At
the Barnyard site, outside of the Stubbs earthworks, Genheimer (2005) found extensive
evidence for both bladelet and bifacial production. Extrapolating from excavated
contexts, Genheimer estimates that the site may contain as many as 12 million flakes,
making it one of the densest known concentrations of lithic debris at any Hopewell
earthwork. After an extensive surface survey of the areas around the Stubbs earthworks,
Genheimer (1992:156) concludes that bladelets were produced near the earthworks and
then taken to other areas for utilization. Thus, previous evidence suggests that bladelets
were only produced in moderate numbers at Fort Ancient. There is more evidence for
bladelet production near Stubbs but the massive number of flakes and bladelets with
relatively few cores present on the surface at the Barnyard site is puzzling. It is certainly
possible that the bladelet cores were deposited elsewhere or removed by artifact
collectors.

The nearest, large collection of bladelet core material comes from the Turner
Workshop at the confluence of the Little Miami and Ohio Rivers about 30 km
downstream. Nolan et al. (2007:321) argue that the bladelets manufactured at Turner
were meant to be used on-site. Similarly, Genheimer (1992) suggests that bladelets were
manufactured close to or within the enclosure at Stubbs and taken to localities within the
general vicinity (Stubbs Cluster) to be used. Thus, Nolan et al. and Genheimer suggest
that bladelets were manufactured at earthworks to be used at, or in the general vicinity of,
those earthworks. However, I see no reason that many of the bladelets were taken away
from the site or involved in exchanges (i.e., Yerkes 2002, 2003a).
The presence of numerous discarded bladelet cores is often seen as evidence for bladelet production. All bladelet cores examined in this study were recovered outside of Fort Ancient on the Northeast Plateau. Bladelet cores compose 0.7% of the total Fort Ancient bladelet assemblage and 2.0% of the assemblage from the Northeast Plateau (Gregory’s Field and the Twin Mounds area). In contrast, complete bladelet cores and core fragments account for 7.8% of the Turner Workshop bladelet assemblage (Nolan 2005:41). A chi square test demonstrates that the difference between the two assemblages is significant ($\chi^2=26.307, df=1, p<0.001$). Although no bladelet cores from Stubbs were included in this analysis, Genheimer (1992:Table 3) found that bladelet cores constitute 1.4% of the total bladelet assemblage at 33WA256, 1.9% at 33WA257, 2.9% at 33WA258, and 5.3% at 33WA260. For all of the Stubbs Cluster assemblage, bladelet cores account for 2.2% of the artifacts, meaning that there are significantly fewer at Stubbs than at the Turner Workshop ($\chi^2=62.616, df=1, p<0.001$). Additionally, significantly fewer bladelet cores were recovered from Fort Ancient than from Stubbs ($\chi^2=15.182, df=1, p<0.001$).

While both Fort Ancient and Stubbs contain significantly fewer bladelet cores than the Turner Workshop, the Fort Ancient data may not be directly comparable to the other two due to differences in collection strategies and increased collector activities at the latter site. Overall, if the relative number of bladelet cores is an accurate indicator of the intensity of bladelet production, then there is greater evidence for bladelet production at Turner than either Fort Ancient or Stubbs.
The distribution of bladelet production debitage (trimming and rejuvenation flakes) can also be used to identify areas of bladelet manufacture. Recall that trimming flakes are defined as flakes removed during the preparation of a bladelet core while rejuvenation flakes are large removals meant to realign the core platform angle. Microwear data indicate these flakes were not always seen as waste flakes by their producers as 15% of trimming flakes (6 of 40) and 50% of rejuvenation flakes (2 of 4) examined were utilized. As such, they may have been transported away from their place of manufacture but their relative proportion still provides a crude estimate of bladelet manufacturing. Table 6.1 lists the relative proportion of bladelets and bladelet production debitage from contexts at Fort Ancient and Stubbs. The occurrence of bladelet production debitage is relatively low in areas with domestic structures (i.e., Gregory’s Field Structures 2 & 3 and the Twin Mounds structure area). The IHC does not follow this pattern but the inclusion of more bladelets from activity areas located outside of the structure walls may inflate the amount of production debitage in this area. In other words, lithic reduction usually occurs outside of the confines of structure walls, meaning that if more of this area is investigated, it is more likely that lithic reduction loci would be identified. For example, designated areas for chipped stone reduction have been identified outside of suspected structure areas at Murphy and Jennison Guard (Kozarek 1997; Pacheco 1997). Bladelet cores, on the other hand, are more likely to be recovered from within, or very near to, structures (see Table 6.1) indicating that they may have been stored or curated within these areas. Overall, the occurrence of bladelet production debitage and bladelet cores in over two thirds of the contexts identified indicates that
Table 6.1 Bladelet production debitage from selected contexts at Stubbs and Fort Ancient

<table>
<thead>
<tr>
<th></th>
<th>Bladelets</th>
<th>Bladelet Debitage</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stubbs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33WA362</td>
<td>96.5%</td>
<td>3.5%</td>
<td>141</td>
</tr>
<tr>
<td>33WA765</td>
<td>90.0%</td>
<td>10.0%</td>
<td>30</td>
</tr>
<tr>
<td><strong>Fort Ancient</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gateway 13</td>
<td>92.3%</td>
<td>7.7%</td>
<td>65</td>
</tr>
<tr>
<td>Gateway 3</td>
<td>100.0%</td>
<td>0.0%</td>
<td>18</td>
</tr>
<tr>
<td>Gateway 84</td>
<td>95.5%</td>
<td>4.5%</td>
<td>66</td>
</tr>
<tr>
<td>Gateway 7</td>
<td>100.0%</td>
<td>0.0%</td>
<td>19</td>
</tr>
<tr>
<td>Gregory's Field Lot 2</td>
<td>90.9%</td>
<td>9.1%</td>
<td>11</td>
</tr>
<tr>
<td>Gregory's Field Str 2 &amp; 3</td>
<td>98.2%</td>
<td>1.8%</td>
<td>224</td>
</tr>
<tr>
<td>Middle Fort</td>
<td>100.0%</td>
<td>0.0%</td>
<td>50</td>
</tr>
<tr>
<td>Moorehead Circle</td>
<td>95.2%</td>
<td>4.8%</td>
<td>210</td>
</tr>
<tr>
<td>IHC</td>
<td>95.8%</td>
<td>4.2%</td>
<td>452</td>
</tr>
<tr>
<td>Oval</td>
<td>94.4%</td>
<td>5.6%</td>
<td>18</td>
</tr>
<tr>
<td><strong>South Fort</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.0%</td>
<td>0.0%</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td><strong>Twin Mounds Ditch</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.0%</td>
<td>0.0%</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td><strong>Twin Mounds Structures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98.1%</td>
<td>2.3%</td>
<td>172</td>
<td></td>
</tr>
<tr>
<td><strong>Waterline Trench 6</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90.7%</td>
<td>9.3%</td>
<td>43</td>
<td></td>
</tr>
</tbody>
</table>
bladelet production was widespread within the earthworks. It appears that numerous individuals produced the bladelets and production was not restricted to a few specialists.

At the Turner Workshop, Nolan (2005:41) identified 2.2% of bladelets as “blade core maintenance/shaping debris”. A chi square test demonstrates that the relative percentage of bladelet production debitage from a combined sample of Fort Ancient and Stubbs is significantly greater than at the Turner Workshop ($\chi^2 = 19.814$, $df = 1$, $p < 0.001$). Thus, if the relative proportion of trimming flakes and rejuvenation flakes is an accurate indicator of bladelet production, then there is greater evidence for bladelet production at Fort Ancient and Stubbs than at the Turner Workshop.

The relative abundance of cortical bladelets can also provide an estimate of production stages (Vickery and Sunderhaus 2004; White 1963). At Fort Ancient, 11.4% of bladelets retained some form of cortex while at Stubbs 11.7% were cortical bladelets. From surface collections at the Stubbs Cluster, Genheimer (1992:Table 15) identified cortex on 10.5% of bladelets from 33WA256 and 9.6% of bladelets from 33WA362. Nolan (2005:Table 9) identified cortex on 11.4% of the bladelets from the Turner Workshop. Based on chi square tests, differences in relative numbers of cortical bladelets are not significant between the samples. Based on these data, cortical bladelet ratios cluster around 10-11% at earthworks in the Little Miami Valley.

Analysis of the relative percentage of bladelet cores, debitage, and cortical bladelets has produced ambiguous results as to the relative intensity of bladelet production in the Little Miami Valley. If the Turner Workshop really was a specialized production center, which is the traditional meaning of the term workshop, the assemblage
should be distinct from other, non-workshop, assemblages (Nolan et al. 2007 also question the utility of the term workshop to designate the site). The relative abundance of bladelet cores is higher at Turner while the relative number of bladelet productiondebitage is higher at Fort Ancient and Stubbs. On the other hand, the proportion of cortical bladelets is similar at all three sites. What does this mean for models of bladelet production? Studies have found the presence or absence of cortex may be a poor indicator of lithic reduction stages depending on the type of reduction and the amount of cortex present initially (e.g., Andrefsky 2012:187; Johnson 1981; Sullivan and Rozen 1985). Additionally, differences in definitions and identification of categories such as trimming and core rejuvenation flakes may hinder comparison between assemblages. However, my own designations of these anomalous flake categories were restricted to the most extreme examples and, when in doubt, artifacts were classified as bladelets. I expect this to reduce the number of trimming and rejuvenation flakes in comparison to the Turner assemblage. Another possible confounding factor is the nature of the recovery of archaeological materials from the Fort Ancient and Stubbs assemblages and the Turner Workshop. The Turner Workshop assemblage was entirely surface collected while the Fort Ancient and Stubbs assemblages came from surface collected and excavated contexts. I expect this to reduce the number of cores, and other large objects, recovered from surface collections making the Turner assemblage deflated in comparison to the others. The contradictory evidence suggests that bladelets were not produced at specialized workshops as some have suggested (Cowan 2006:31; Ruby et al. 2005:154) but that production was organized at a much smaller scales, perhaps the household or
logistical task group, and bladelets were produced as needs arose. This finding does not support the use of bladelets for prestige goods manufacture because bladelets were not manufactured in restricted spaces or by only a certain segment of society. Instead, it is consistent with a pattern of open access to the materials and knowledge necessary for bladelet manufacture as predicted by a theory ritual economy operating in a small scale, relatively egalitarian society.

**Bladelet Standardization**

Numerous metric studies of bladelets from Fort Ancient and Stubbs confirm that the width and thickness values fall within the range of those from other Ohio Hopewell sites (Connolly 1991; Genheimer 1992; Shaffer 2009).

Nolan (2005; Nolan et al. 2007) compared indices of production skill and standardization among numerous Hopewell sites and sites from other North American core-and-blade industries. As a measure of production skill, Nolan et al. (Nolan et al. 2007:306; see also Andrefsky 1998:18 and Odell 2004:47-52) note that proper knapping technique results in feather terminations. Conversely, hinged or overpass terminations are argued to be production errors (Andrefsky 1998:18). Nolan et al. (2007:320) calculated that 43% of 1,117 bladelets with intact distal terminations from the Turner Workshop resulted from production errors. Following the same procedures, 17.7% of the 406 Fort Ancient bladelets with intact distal terminations represent production failures. A chi square test demonstrates that the difference in error rates between the two assemblages is significant ($\chi^2=82.08$, $df=1$, $p<0.001$). At Stubbs, 24.5% of the sample of 49 bladelets with intact distal terminations consisted of production errors. A chi square
test demonstrates that the difference in error rates between the Stubbs and Turner assemblages is significant ($\chi^2 = 6.574$, $df = 1$, $p = 0.01034$) while the difference between Stubbs and Fort Ancient is not. Thus, while the error rates at Fort Ancient and Stubbs are significantly lower than the error rates at Turner, they are more than double the error rate—9%—of the specialist-produced Tula blades from Post-Classiic Mexico reported by Nolan et al (2007:320).

As a comparative value of standardization, Nolan et al. (2007) compare the coefficient of variation adjusted for bias (\(CV^*\), see Sokal and Braumann 1980) for a number of continuous bladelet attributes from the Turner Workshop and other North American blade-and-core industries. One of the other core-and-blade industries is from an obsidian workshop in the Post-Classiic Mayan (A.D. 900 – A.D. 1225) site of Tula (Healan et al. 1983; Nolan et al 2007). The other is from the Dorset culture (900 B.C. – A.D. 900) of the Arctic represented by microblades of crystalline quartz and nodular chert from the Joss site (McGhee 1970; Nolan et al. 2007). The Tula blades were made by full-time craft specialists while non-specialized production characterizes the Joss site hunter-gatherers (Nolan et al. 2007:319). I will compare \(CV^*\) for the Fort Ancient and Stubbs bladelets with those from Tula, Joss, and Turner. In order to test for significant differences between \(CV^*\) I use the modified t-test recommended by Sokal and Braumann (1980:61-62). For blade length, \(CV^*\) is higher at Fort Ancient than Joss but the difference is not signifiicant ($t = 0.6726$, $df = \infty$, $p > 0.05$). For blade width, \(CV^*\) is significantly higher among the Fort Ancient bladelets than the Joss sample ($t = 6.931$, $df = \infty$, $p < 0.001$). The bladelet thickness \(CV^*\) is also significantly higher at Fort Ancient
than Joss \((t = 10.532, df = \infty, p < 0.001)\). The results from Stubbs are similar as blade width and thickness CV* were significantly larger than at Joss \((t = 3.965, df = \infty, p < 0.001, t = 13.229, df = \infty, p < 0.001)\).

Following Nolan et al. (2007), comparisons are made between the tertiary (i.e., those with a prismatic cross section) blades from Tula, Stubbs, and Fort Ancient. As with the Joss sample, CV* for blade length is higher at Fort Ancient than at Tula but the difference is not significant. The CV* for Fort Ancient bladelet width is significantly larger than the Tula CV* \((t = 3.592, df = \infty, p < 0.001)\). The platform thickness CV* is significantly larger at Fort Ancient than at Tula as well \((t = 5.993, df = \infty, p < 0.001)\). Fort Ancient’s CV* for thickness below the bulb of force is larger than Tula but the difference is not significant \((t = .8472, df = \infty, p > 0.001)\). While all of the Stubbs CV* values are greater than the Tula values, none of the differences are significant. Due to inherent difficulties in accuracy (Andrefsky 1998:93), bladelet platform angle was not measured (see also Greber et al. 1981:495) and therefore cannot be compared across sites.

Comparisons between the Fort Ancient and Turner Workshop bladelets indicate that CV* for bladelet length, width, and thickness is not significantly different between the two samples. Fort Ancient’s CV* for platform thickness is significantly lower than the values at the Turner Workshop \((t = 4.661, df = \infty, p < 0.001)\). The same pattern holds when comparing the Stubbs bladelets to the Turner bladelets as the only significant difference occurs as the lower CV* for platform thickness at Stubbs \((t = 3.604, df = \infty, p \)
< 0.001). None of the differences in CV* values between Fort Ancient and Stubbs were significant.

In summary, while there is some significant variation between bladelets from Fort Ancient, Stubbs, and Turner, both assemblages are consistently less standardized than blades from either Joss or Tula. On the other hand, error rates from bladelets at Fort Ancient, while higher than Tula, are significantly lower than at the Turner Workshop. At this point it is unclear why a significant difference in error rates would exist between the sites. All that is clear is that the presence of bladelet cores, rejuvenation flakes, and the relatively un-standardized nature of the Fort Ancient and Stubbs bladelets suggest that bladelet manufacture by non-specialists did occur on-site.

Retouch

Once produced, retouch and resharpening provide a means to prolong or otherwise alter the use-lives of most stone tools, including bladelets. Pi Sunyer (1965:Table 4.15) reports that 8.1% of the bladelets from McGraw were retouched. Yerkes (1994:Table 1) reports that 16% of the bladelets from the Murphy site were retouched. At Fort Ancient and Stubbs, 4.6% of the bladelets were retouched. The numbers of retouched and unretouched bladelets from Fort Ancient and Stubbs are significantly less than McGraw and Murphy ($\chi^2=5.403$, $df=1$, $p<0.05$, $\chi^2=51.07$, $df=1$, $p<0.001$). Among Ohio Hopewell bladelets, nearly all retouch takes the form of marginal retouch. Unlike Hopewellian sites in Illinois and the southeast (see Fortier 2000; Kimball 1992) very few Ohio Hopewell bladelets are reworked into other formal tools types. Only three bladelets, two drills and an end scraper (Figure 6.1), were retouched to
Figure 6.1 Bladelets retouched into formal tool types.
produce other tool types at Fort Ancient while none of the Stubbs bladelets were reshaped.

It is unclear why so few bladelets were retouched at Fort Ancient and Stubbs in comparison to other sites. It seems that if a certain degree of raw material stress was present, as suggested by Genheimer (1996) due to the distance from high quality chert outcrops, then retouch would be higher than at those sites farther from raw material sources. The relatively low amount of retouch present of bladelets from Fort Ancient and Stubbs may be due to an abundance of bladelets at these sites, among other factors.

Overall, 29 of 40 (72.5%) of the retouched bladelets from Fort Ancient and Stubbs that were examined for microwear traces were utilized. Most of the retouched bladelets were used for meat/fresh hide, dry hide, stone, and bone working while fewer numbers were used on plant, wood, and shell. Use-wear traces were found along the retouched edge in 24 of the 29 (82.8%) utilized bladelets. That means in five cases the retouched edge was not the utilized edge. Several of these bladelets were retouched near the proximal tip to a length that easily accommodates a human finger (Figure 6.2). Thus some retouch may have functioned to dull the bladelet edge and protect the finger while working. The bladelets retouched into drills were used to drill bone or stone and the bladelet retouched into an endscraper was used to scrape dry hide. Based on the high occurrence of use-wear, bladelets were retouched in preparation for use. However only those bladelets retouched into recognizable formal tools types (e.g., drills and scrapers) were used for specific tasks. Other marginally retouched bladelets were used for the
Figure 6.2 Bladelets retouched for prehension rather than use. Retouch occurs on the upper right margin on all specimens.
same range of tasks as unretouched bladelets and sometimes retouch was used to facilitate prehension rather than use.

Hafting is another way to extend the life of a stone tool, or at least make it part of a longer lived tool. Evidence for hafting was exceedingly rare at Fort Ancient and Stubbs, a finding which is consistent with other studies of Ohio Hopewell bladelets (Yerkes 1990, 1994; Genheimer 1996; Pacheco and Pickard 1992). Only three of the bladelets examined microscopically showed evidence of hafting (Figure 6.3). The sample size is too small to examine differences in context or tasks associated with hafted bladelets. All that can be said is that Hopewell bladelets were rarely hafted.

Attempts to extend a stone tool’s use-life may result from toolstone scarcity. Several factors might suggest that the inhabitants of Fort Ancient and Stubbs were under a high degree of toolstone stress, making them heavily inclined to conserve the resources they had. For example, no known flint outcrops occur within 60 km of the sites (Connolly 1991:33). Additionally, the most common materials used to make bladelets outcropped several hundred kilometers away.

Despite the evidence to the contrary, the bladelet assemblages do not exhibit the characteristics expected of behaviors intent on conserving toolstone. Toolstone conservation behaviors should be directed at extending the use-life of tools made from scarce raw materials by resharpening or utilizing all available cutting edges. As described above retouch or resharpening is rarely observed on bladelets from Fort Ancient or Stubbs. Use-wear rates were also relatively low as many potential tools were
Figure 6.3 Hafting polish and edge damage on a complete bladelet from the Twin Mounds area (OHS collection A1039 cat. # 1238.62). 187.5x magnification.
discarded unutilized. As such, there are no spatial differences in raw material use that may suggest differential access to raw materials based on social or political factors.

**Raw Material Types**

In agreement with previous studies, three major flint types were identified in the bladelet sample: Flint Ridge, Wyandotte, and Knox. This leads to the question, given the differences in raw material acquisition discussed above, of whether bladelet use differed based on raw material type?

Due to the small number of bladelets crafted from Knox flint in the Stubbs sample, bladelets from Fort Ancient and Stubbs are combined into one sample for the following discussion. Significant differences exist in the number of cortical bladelets composed of each raw material type ($\chi^2 = 81.437, df = 2, p < 0.001$) as 4.3% of Flint Ridge, 16.7% of Wyandotte, and 27.8% of Knox bladelets had cortex on at least one third of one face. Several factors may be at play here. For one, Flint Ridge flint often lacks traditional cortex, only acquiring a patina after extensive weathering (Carlson 1991). Wyandotte and Knox flints both occur as nodules covered in cortex, but Wyandotte flint often occurs in “large” nodules (Seeman 1975:47) while Knox flint occurs in “small” nodules (Boyd 1985:117). Larger nodules have relatively less cortical surface area than smaller nodules meaning that the former will have relatively fewer cortical flakes than the latter. Of course, large and small are far from ideal, precise, scientific terms but the point remains that the difference in the amount of cortex between the two types may be due to package size. Thus, based on the amount of cortex the evidence suggests that Wyandotte and Knox flint were brought to the site as raw nodules. While evidence from
the source area suggests that Flint Ridge flint may have been largely formed into blade cores prior to arrival (Lepper et al. 2001), blocks of unworked flint may have been transported to the earthworks as well. Once the materials were transported to Fort Ancient and Stubbs, they had to be fashioned into bladelets. As discussed above, there is evidence of minimal bladelet production at the two sites. Further analysis of this evidence indicates that there may be some differences in bladelet production based on raw material. Of the 11 cores examined, nine were made from Flint Ridge flint, one from Wyandotte, and one from an unknown material. No cores of Knox flint were analyzed but all seven of the core rejuvenation flakes identified were made of Knox flint. While the evidence of admittedly limited, it does suggest that Knox flint bladelet cores were more intensively processed, and perhaps conserved to a greater extent, than Flint Ridge or Wyandotte cores.

Once produced, bladelets of all raw materials were utilized in a similar manner. Intentional retouch is one way to track an artifact’s use-life. As discussed above, there is minimal evidence for retouch on the bladelet assemblage as a whole. Broken down by raw material type, 4.1% of Flint Ridge bladelets, 4.9% of Wyandotte, and 6.3% of Knox bladelets were retouched. A chi square test indicates that the difference in retouch rates across raw material types is not significant ($\chi^2=1.456, df=2, p=0.483$). Similarly, microwear analysis indicates that all three raw material types were used to accomplish the same range of tasks. In summary, while differences existed in the acquisition and production of bladelets based of raw material type, all raw materials were used in a similar manner.
Figure 6.4 Ternary graph showing the relative proportion of cutting, scraping, and crafting (drilling perforating, and engraving) motions performed with complete (blue), proximal (green), medial (yellow), and distal (aqua) segments.
A 4 x 6 table comparing material worked across all blade segments (complete, proximal, medial, and distal) through a chi-square test supports the null hypothesis of no difference ($\chi^2=18.17$, $df=15$, $p=.2538$). In other words all bladelet types were essentially used to work the same materials. A 4 x 3 table comparing motion of use across all bladelet segments (complete, proximal, medial, and distal) through a chi-square test supports the null hypothesis of no difference ($\chi^2=8.161$, $df=6$, $p=.22654$). In the chi-square table and subsequent ternary graph drilling, perforating, and engraving motions were lumped into the sing category of crafting. While the differences are not significant, small differences in use motions do exist between bladelet types. A ternary graph of the different motions of use evident on different bladelet segments (Figure 6.4) provides some insight into the functional characteristics and use of bladelets. The majority of all bladelets were used for cutting motions, however, cutting was highest among complete bladelets. This does not necessarily mean that complete bladelets were preferred for cutting tasks over others. As all, or nearly all, bladelets started their use lives as complete bladelets it can be assumed that the low levels of scraping and crafting present on complete blades is due to the fact that those motions result in higher breakage rates. Distal bladelet segments are furthest from the scraping axis while highest in crafting, indicating that sharp distal terminations were preferred. Proximal and medial segments are nearly identical indicating that, once the distal end of a bladelet was removed, the remaining tool fragment was used in a similar fashion until discard.
**Conjoins, Refits, MAN, and MANA**

All artifacts with a largest dimension greater than or equal to 10.0 mm were included in the refitting program. The refitting program identified 30 conjoins, 27 at Fort Ancient and 3 at Stubbs, involving 64 bladelet fragments among the 1,703 bladelets and bladelets fragments examined. The single identified refit is a great example of the risk involved in blade reduction. A blade removal attempt resulted in a hinge fracture and premature termination of the bladelet (Figure 6.5). In order to remove the flaw in the blade removal face, the knapper removed a larger portion of the face with a trimming flake. Both artifacts were recovered from the structure 5 area of the IHC. Thus 66 of 1,703 bladelets, or 3.9% were refit or conjoined. A highly successful refitting program can have a success rate of 20% or above (Cziesla 1990:24). However, 4% is well within the lower range of success rates according to a comparative study by Laughlin and Kelly (2010:Table 1).

A few scholars have assigned Hopewell bladelets to specific flint nodules in the past. For example, Blosser (1989:112-113) recognized nine multi-item MANs (“core groups”) among the bladelets from Jennison Guard. Seeman (1996:307) identified 13 bladelets from a single core at the Yant Mound in Stark County, Ohio. Connolly (2004:41) identified “several flint bladelets made from a single core” associated with a stone pavement in gateway 84 at the Fort Ancient earthwork. Of the above examples, only Blosser explicitly looked for MANs among bladelets while Seeman and Connolly seem to have made fortuitous discoveries.

One essential requirement of MANA is sufficient intramaterial variation to
Figure 6.5. Refit bladelets. OHS # 2845.006 (left) was removed from 2770.003 (right) as evidenced by the flake scar on the left of the bladelet.
distinguish between two or more nodules of the same raw material. Therefore in addition to the size cutoff discussed above, several raw material types had to be excluded from the MANA due to the extreme homogeneity of the materials. For example, obsidian, volcanic glass presumably from what is now Yellowstone National Park (Griffin et al. 1969), was excluded due to a lack of inclusions as was Knife River flint, a brown vitreous material from South Dakota (Ahler 1986; Luedtke 1992:134). Similarly, a black, fine grained flint identified as Knox had to be excluded for the same reasons (Kimball 1985).

The study sites were differentially affected by the exclusion of these artifacts with Stubbs (five from 33WA362 and none from 33WA765) less so than Fort Ancient (n=181). After unsuitable artifacts were removed, 1,512 bladelets, bladelet fragments, and pieces of bladelet production debitage as well as 11 bladelet cores were included in the MANA.

At Fort Ancient, 129 multiple item MANs containing 295 bladelets were identified among the 1,357 artifacts examined (Figures 6.6, 6.7, 6.8, 6.9). One hundred and three of the MANs contained two items, nineteen contained three items, three contained four items, three contained 5 items, and one contained 10 items. 21.7% of the bladelets and 36.4% of the bladelet cores belonged to multiple item MANs. Twenty-six of the MANs were composed of two or more conjoined bladelet fragments while one MAN represents a single refit in a bladelet production sequence.

At the Stubbs sites, 15 multiple item MANs containing 36 bladelets were identified among the 155 artifacts examined (Figure 6.10). Twelve of the 15 MANs contained 2 bladelets, two contained three bladelets, and one had six bladelets. These 15 MANs contained 23.2% the bladelets from both sites with 26.0% of the bladelets from
Figure 6.6. Multiple item MANs from the Moorehead Circle at Fort Ancient.
Figure 6.7. Composite image (not to scale) of multiple item MANs from the IHC in Fort Ancient.
Figure 6.8 Multiple item MANs from the Gregory’s Field area of Fort Ancient.
Figure 6.9. Bladelets matched to their cores. All artifacts were recovered from Gregory’s Field.
Figure 6.10 Multiple item MANs from Stubbs sites.
33WA362 and 10.7% of the bladelets from 33WA765 included. Three of the MANs were composed of two conjoined bladelet fragments, all of which came from feature 37 in 33WA362. All three of the multiple item MANs from 33WA765 were located within TU 2 and were linked with bladelets from 33WA362.

The only comparative data of bladelet MANs from other Hopewell sites comes from Jennison Guard. At Jennison Guard, Blosser (1989) identified nine multiple item MANs containing 30 bladelets among the 71 artifacts examined. That is, 42.3% of the bladelets from Jennison Guard were included in multiple item MANs. The modal number of artifacts per MAN was 2 (n=4) while other MANs contained three (n=1), four (n=2), n=5 (1), and eight (n=1). The larger percentage of single item and double item MANs at Fort Ancient and Stubbs are consistent with their use as corporate ceremonial centers used by large numbers of people for hundreds of years as opposed to Jennison Guard’s use as a single household domestic site for much shorter periods. Consistent with the interpretation that bladelets may have been exchanged and individual toolkits may have contained bladelets from multiple cores, is the relatively large percentage of single item MANs at all sites.

Seventy-nine of 129 (61.2%) multiple item MANs from Fort Ancient had at least one bladelet with evidence of use-wear. Of those 79, 40 MANs contained two or more bladelets with evidence of use-wear. In 22 of those 40 cases, the bladelets were used for the same task while in 18 cases the bladelets were used for different tasks. In all but two cases, agreement involved only two bladelets. One MAN (65) in which more than two bladelets were used for the same task involved scraping dry hide while the other (72)
involved sawing bone. The nearly 50/50 split between MAN used and not used for the same task suggests that bladelets were not mass produced for single, immediate tasks—as might be expected if used in prestige goods production—but were used for numerous types of tasks. This finding is consistent with the generalized nature of use-wear found in this and other studies (Kimball 1992; Lemons and Church 1998; Miller 2014; Odell 1994; Snyder et al. 2008; Yerkes 1990, 1994, 2009).
Chapter 7: Results of the Microwear Analysis and MANA by Context

**Gregory’s Field**

Overall, 58 of 132 bladelets (43.9%) examined from Gregory’s Field showed evidence of utilization (Figure 7.1). Only one bladelet was utilized on more than one material. Meat/fresh hide was by far the most common material worked while bone/antler, dry hide, and wood were found on similar, lesser numbers of bladelets (Figure 7.2). Bladelets used on plant, shell, and stone were present in minimal numbers (Figure 7.3). Cutting, scraping, and sawing were the most common motions used while perforating and engraving were minimally represented. One bladelet shows evidence of hafting. Two of the ten blade cores from Gregory’s Field were utilized. One was used to scrape fresh hide and the other was used in a general butchering motion on meat/fresh hide. As an interesting aside, these represent the first documented Hopewell bladelet cores with use-wear (Yerkes 1990, 1994), and seem to represent expedient use of discarded artifacts.

Grouping all of the contexts from Gregory’s Field into one assemblage undoubtedly masks a great deal of variation. Data from surface collections and excavations have led various researchers (e.g., Connolly 1997; Connolly and Sullivan 1998; Cowan et al. 2004) to interpret various contexts from generalized to specialized and domestic to ceremonial. Thus a breakdown of the Gregory’s Field
Figure 7.1 Percentage of bladelets exhibiting use-wear from selected contexts at Stubbs and Fort Ancient.
Figure 7.2 Microwear summary showing the proportions of utilized bladelets used to work various materials.
Figure 7.3 Examples of microwear traces on bladelets from Gregory’s Field. a) dull, greasy meat polish viewed at 125x magnification on proximal right edge of CMC cat. # A41637.002; b) edge rounding and greasy, pitted polish from scraping dry hide viewed at 187.5x magnification on retouched distal end of CMC cat. # A416-25.005; c) edge rounding and bright polish associated with engraving shell viewed at 187.5x magnification on lateral edge of CMC cat. # A42418.025; d) bright polish confined to the edge viewed at 187.5x magnification of left lateral edge of CMC cat. # A42483.001 indicating use to scrape bone/antler; e) bright, flat polish and edge damage from engraving stone viewed at 187.5x magnification on lateral edge of CMC cat. # A62312.062; f) edge damage and bright, smooth polish confined to the high points of surface topography viewed at 187.5x magnification indicating use to scrape wood on CMC cat. # A42418.043.
Figure 7.4 Microwear summary of three different contexts within Gregory’s Field.
assemblage into its constituent parts will prove informative for understanding the variation present within the area (Figure 7.4).

Feature 144 is a large (6 m diameter) pit, although only the bottom 2 cm was encountered intact, which contained thousands of chipped stone artifacts and two Hopewell series rim sherds (Cowan et al. 2004:120). A total of 26 of 71 (36.6%) bladelets from feature 144 showed evidence of utilization. Overall, 10 distinct tasks were represented. Meat/fresh hide, dry hide, bone/antler, wood, and soft plant working are all present on at least two bladelets. Sawing, scraping, and cutting were the most common motions used with only one implement used for perforating. Of the four bladelets examined from postmolds in this area (features 128 and 260) only one was utilized— to scrape bone/antler. Eleven of 29 bladelets (37.9%) recovered from artifact rich deposits in and around structures two and three were utilized. Only three tasks were represented with meat butchering being most common, bone scraping present on a couple of bladelets, and one bladelet used to cut meat and stone.

Although the abundance of postmolds around feature 144 might indicate that it was once housed within a structure, there is a possible connection with structures two and three. Unfortunately, due to the nature of the salvage excavations, all mechanically stripped topsoil from the excavations in lot 17 and 18 was screened together. However, Cowan et al. (2004:Figure 8.6) note that most bladelets recovered from the area, outside of feature 144, were recovered from the area in and around structures two and three. Eight multiple item MANs, containing 17 bladelets and two bladecores, were shared between feature 144 and the surrounding backdirt. In other words about 10% of the 179
bladelets recovered from feature 144 and the surrounding area can be linked through MAN. The shared number of bladelets in multiple item MANs in the two contexts equals the number of multiple MANs contained within feature 144 \((n=3)\) and the backdirt \((n=5)\) combined. Thus, the high number of MANs with shared elements found in both areas indicates a connection between feature 144 and the surrounding area. Schiffer’s (1995:175) McKeller hypothesis states that smaller items are more likely to remain as primary refuse in activity areas. In other words, if the cultural materials in an area are cleaned up and deposited elsewhere as secondary refuse, it is unlikely that every last piece of material will be accounted for and smaller objects are more likely to be left behind. A student’s t-test comparing the \(\log_{10}\) of the lengths—the largest dimension—of bladelets from feature 144 and those recovered from backdirt from structures 2 and 3 demonstrated that those from the feature were significantly larger \((t=5.7680, df=90, p<.0001)\). Thus feature 144 may have been a dumping ground for refuse from activities conducted by the occupants of structures two and three. Alternatively, the non-feature bladelets were largely recovered from the plowzone, suggesting that post-depositional breakage may be a factor in their smaller size.

Cowan et al. (2004:120) suggest that structures two and three were not typical habitation areas due to low amounts of fire-cracked rock, subsistence remains, pottery and storage facilities coupled with the abundance of bladelet production and late-stage bifacial reduction debitage. The microwear data from structures two and three suggest that the preparation of meat was a common activity at the structures. However, a number of bladelets associated with the structures were deposited in feature 144. If the feature
144 bladelets are included in the functional interpretation, activities were more generalized at structures two and three.

Examination of a minimal number of bladelets (n=4) from excavation backdirt and surface collections along the presumed path of the Parallel Walls, in lots two and four, found that two were used for meat butchery and one was used to scrape dry hide. The sample is too small and the context too questionable to make any interpretation other than to note that the activities represented at the Parallel Walls are common throughout Fort Ancient.

Connolly (1997; Connolly and Sullivan 1998) conducted a systematic surface survey in Cowan et al.’s (2004) lot 3. Connolly’s survey 1146 encompassed a 60m x 55m area in which over 1,700 lithic artifacts were recovered. The artifact distribution formed three clusters which Connolly (1997:266) interprets as individual households. Four of eight (50%) bladelets examined were utilized with three used to butcher animals (e.g., meat/fresh hide microwear traces) and one was used on wood.

Exact provenience records for a number of surface collected areas could not be located. Twelve of 14 bladelets (85.7%) collected somewhere in lot 3 were utilized. The most common activities were butchering meat and scraping dry hide. Wood working, in the form of sawing and scraping, was also present. A few bladelets were used for finer, possible craft activities, like engraving shell and bone. According to Cowan et al.’s (2004:115) summary, many of these bladelets may have come from areas previously surveyed by Connolly (1997; Connolly and Sullivan 1998). One bladelet from Connolly’s (1997:Figure 10.1) survey 519, corresponding with Cowan et al.’s
(2004:Figure 8.3) artifact cluster in lot 11, was used to scrape wood. Four of eight bladelets from Connolly’s (1997:Figure 10.1) survey 1146 in lot 3 were utilized. Butchering was the most common activity while one bladelet was used to work wood. Two of four bladelets recovered from surface collections south of SR 350 were utilized with one for butchering and one for scraping bone/antler.

The minimal MANs shared between Gregory’s Field and the rest of Fort Ancient can be attributed to the fact that I did not have access to bladelet samples from the Moorehead Circle, Interior Household Cluster, or Waterline Trench 6 at the same time.

**Moorehead Circle**

Overall, 77 of 89 (86.5%) of the bladelets from the Moorehead Circle showed evidence of utilization (Figure 7.1). This is substantially higher than any other locality at Fort Ancient or Stubbs, indicating that the Moorehead Circle was a center of intensive prehistoric activity involving bladelets. The Moorehead Circle bladelets were used for 13 distinct tasks. Eleven bladelets were used for more than one task. The majority were used on meat/fresh hide while substantial numbers were also used on dry hide, bone/antler, and wood (Figure 7.2). Stone, plant, and shell microwear was identified on minimal numbers of bladelets (Figure 7.5). Cutting, sawing, perforating, and engraving were all common motions employed while scraping was less prevalent. None of the Moorehead Circle bladelets show evidence of hafting. Analysis of an initial sample of 66 bladelets has been presented elsewhere (Miller 2010, 2014). However, 23 additional bladelets were subsequently analyzed. An updated summary of the materials worked by bladelets from three main excavation trenches within the Moorehead Circle is presented
Figure 7.5 Examples of microwear traces on bladelets from the Moorehead Circle. a) bright, flat polish and edge damage from engraving stone viewed at 187.5x magnification on left proximal edge of A4797 781-5; b) bright streaks of smooth, fluid polish associated with cutting soft plant viewed at 187.5x magnification on left distal edge of A4797 331-27; c) dull, greasy meat polish viewed at 187.5x magnification on medial right edge of A4797 151-4; d) edge rounding and greasy, large-pitted dry hide polish viewed at 187.5x magnification on left lateral edge of A4797 721-3; e) edge rounding and bright polish associated with engraving shell viewed at 187.5x magnification on left distal edge of A4797 744-4; f) edge damage and bright, smooth polish confined to the high points of surface topography from scraping wood viewed at 125x magnification on A4797 452-2.
Figure 7.6 Microwear breakdown of bladelets from three excavation trenches in the Moorhead Circle. Two bladelets from Trench D not included.
Figure 7.7 MAN linkages within the Moorehead Circle and with other contexts at Fort Ancient
in Figure 7.6. Meat butchering, dry hide, bone/antler, and wood working were common activities in each of the excavation trenches. Possible motions associated with craft production, especially perforating dry hide were relatively common in the Moorehead Circle. Some variation is present in that butchering is more common in Trench B and dry hide working is prevalent in Trench C. Additionally, seven bladelets recovered from the Oval were examined for wear traces. None of the bladelets from the Oval showed evidence of utilization.

Numerous multi item MANs were identified within Trench B of the Moorehead Circle (Figure 7.7). Additionally, there are numerous multi item MANs with items shared between Trench B and Trenches A and C. Two MANs from the Oval also have shared elements with Trench B. The MANA evidence supports the interpretation (Riordan 2010) of the central feature of the Moorehead Circle, located within Trench B, as the central hub of prehistoric activity. MAN linkages with structure eight in the Interior Household Cluster, units in the Twin Mounds Area, and a stone mound in the Middle Fort further attest to the Moorehead Circle’s importance as a ritual locus during the occupation of Fort Ancient. Additionally, MAN linkages follow both east-west and north-south directions suggesting that, even though many artifacts came from the plow zone, historic plowing cannot account for the shared elements between contexts.

**Interior Household Cluster**

Overall, 80 of 261 bladelets (30.7%) from the Interior Household Cluster (IHC) were utilized (Figure 7.1). The IHC bladelets were used for 16 distinct tasks. Five were used for more than one task. Most bladelets were used on stone and meat/fresh hide
while more than 10% of the utilized bladelets were also used on dry hide and wood (Figure 7.2). Fewer numbers of bladelets were used for bone/antler and soft plant (Figure 7.8). Cutting, sawing, and engraving were the most common motions employed while scraping, perforating, and drilling were present on smaller numbers of bladelets. None of the IHC bladelets show evidence of hafting or prehension.

The majority of the bladelets from the IHC were associated with structures five and eight. This can be attributed to the complete excavation of large pit features associated with each of the structures. It is entirely possible that similar features were associated with other structures in the cluster but went unexcavated. Thirteen of 49 bladelets recovered from units associated with structure five were utilized. Engraving stone, working dry hide, and cutting soft plant were the most common activities undertaken while one bladelet was used to butcher meat/fresh hide. In the excavation units within structure eight, 22 of 89 bladelets (24.7%) recovered were utilized. Engraving stone and butchering meat/fresh hide were the most common activities performed. Other bladelets were used to cut soft plant, work dry hide, work bone/antler, and scrape wood. To the northwest of structure 5 excavations uncovered a large (1.8m diameter, .45m depth) refuse pit (feature 316/95) with slumping walls, suggesting a long period of deposition (Lazazzera 2004a:94). Twelve of 24 bladelets (50.0%) recovered from feature 316 were utilized. Wood and stone working (including some of the only examples of drilling in the entire study assemblage) were the most common activities conducted by bladelets within the pit while dry hide working and meat butchering were also represented. Similarly, a large (2m diameter, .2m depth) refuse pit (feature 483/95)
Figure 7.8 Examples of microwear traces on bladelets from the IHC. a) bright, flat stone polish viewed at 187.5x magnification on right medial edge of OHS cat. # A1039 2198.016; b) dull, greasy meat polish viewed at 187.5x magnification on proximal right edge of OHS cat. # A1039 2228.305; c) edge damage and bright, smooth soft wood polish confined to the high points of surface topography viewed at 187.5x magnification on OHS cat. # A1039 2250.009; d) bright pitted polish confined to the edge indicating scraping bone/antler viewed at 187.5x magnification on distal edge of OHS cat. # 2453.002; e) edge rounding and greasy, pitted polish from engraving dry hide viewed at 250x magnification on broken edge of OHS cat # A1039 2766.002; f) bright, smooth, fluid polish with striations parallel to the left proximal edge viewed at 187.5x magnification indicating cutting soft plant by OHS cat. # A1039 2832.031.
was excavated on “what may have been the [NE] exterior” of structure eight (Lazazzera 2004a:93). Seven of 36 bladelets (19.4%) examined from feature 483 were utilized. Butchering meat/fresh hide was the most common activity noted on bladelets from this feature while single bladelets were used for engraving stone and scraping wood and bone/antler. One bladelet was used on an unknown material.

Combining the structure and associated refuse pit feature microwear results indicates that the major difference between the two structures is the larger portion of bladelets in structure 8 used to butcher meat/fresh hide. Minor differences include more hide, wood, and plant working in structure five with bone/antler present in structure eight but absent in structure five (Figures 7.9, 7.10).

Other structures in the IHC produced substantially fewer bladelets for study due to the lack of associated pit features as noted above. One of two bladelets from features in structure two was used to scrape bone/antler. Three of eight bladelets examined from structure four were utilized: two for butchering meat/fresh hide and one cutting soft wood. Neither of the two bladelets examined from structure six showed evidence of utilization. Minimal numbers of bladelets were examined from contexts outside of structures. For example, two of four bladelets from features associated with the northern plaza area were utilized. One was used to butcher meat/bone and the other was used to scrape bone/antler. Three of 13 bladelets recovered from the general sheet midden, but not associated with any particular structures, were utilized. Among this sample, two bladelets were used to saw wood and one was used to scrape dry hide. East of the IHC, in what Lazazzera (2004a) refers to as the Water Treatment/Access Road area, bladelets
Figure 7.9 Microwear breakdown of selected contexts within the IHC.
Figure 7.10 Materials worked comparison between structures 5 and 8 in the IHC
were recovered from nine of eleven 2x2m test units. Due to the small sample size and lack of definitive association with specific structures, the 26 bladelets from these units are treated as a single sample. Twelve of the bladelets were utilized, mostly for meat butchering but also for engraving stone, bone/antler working, and perforating dry hide.

Numerous multi item MANs were found within structures five and eight, including the only refit in the entire study, suggesting bladelet use and disposal occurred within those contexts (Figure 7.11). Only one multi item MAN was shared between structures in the IHC. This linkage suggests that structure five and at least the refuse pit of structure eight were contemporaneous. In addition to its link with structure five, structure eight also shares two multi item MANs with units from the Moorehead Circle located several hundred meters to the west suggesting that residents of structure 8 were somehow involved in the ceremonies conducted at the latter location. MANs also link the IHC with Waterline Trench 6 and structure one, Gateway 84 and structure eight, and Gateway 12 and unit 8/96 in the Access Road area. Based on the MAN data, there is little support for Lazazzera’s (2004a, 2009) assertion that the structures in the IHC were contemporary. On the other hand, the findings do not necessarily refute her claim for several reasons. First, the majority of bladelets were recovered from structures five and eight which do show evidence, albeit minimal, for contemporaneity due to the recovery of bladelets from a single multi-item MAN in both. Second, relatively few bladelets from the study area were included in multi item MANs. When this is combined with the low numbers of bladelets recovered from other structures, the low MAN inclusion rate makes the lack of linkage between structures expected regardless of their temporal affiliation.
Figure 7.11 MAN linkages within the IHC and with other contexts within Fort Ancient
A student’s t-test comparing the log_{10} of the lengths of bladelets from two pit features (features 316 and 483) in the Interior Household Cluster and those found outside of features in the same area showed that bladelets from the features were significantly larger (t=4.9822, df=340, p<0.0001). Unlike in Gregory’s Field, relatively few of the bladelets from the Interior Household Cluster were recovered from plow zone contexts. Thus, in this case, the smaller size of the non-feature bladelets can be attributed to prehistoric processes, probably the periodic cleaning of activity areas with the disposal of lithic debitage and discarded tools in refuse pits.

**Gateway 84**

Overall, 13 of 57 bladelets (22.8%) from Gateway 84 were utilized (Figure 7.1). Six separate tasks were performed by the bladelets from this context (Figure 7.2). None of the bladelets were used for more than one task. Stone and meat/fresh hide were the most common materials worked followed by dry hide and bone/antler (Figure 7.12). Cutting and engraving were the most common motions employed while scraping was minimally represented. No bladelets were hafted.

The majority of bladelets from Gateway 84 were recovered from the artifact rich deposit associated the two pavements on the outer face of the embankment wall [Connolly’s (2004a:41) form 3]. Within this deposit, most bladelets were used to engrave stone while meat/fresh hide butchering, hide and bone/antler working were also represented. Thus, while this deposit may represent the remains of a feasting event (i.e., Connolly 2004a:41; Yokel 2004:199) other activities occurred there as well.
Figure 7.12 Examples of microwear traces on bladelets from Gateway 84. a) edge rounding and greasy, pitted polish from cutting dry hide viewed at 187.5x magnification on left distal corner of OHS cat. # A1039 2325.060; b) edge rounding and greasy, large-pitted polish from scraping dry hide viewed at 187.5x magnification on right proximal end of OHS cat. # A1039 2325.115; c) bright, flat polish and edge damage from engraving stone viewed at 250x magnification on lateral edge of OHS cat. # A1039 2348.043; d) bright polish confined to the edge indicating engraving bone/antler viewed at 187.5x magnification on broken corner of OHS cat. # A1039 2348.055; e) dull, greasy meat polish viewed at 187.5x magnification on proximal right edge of OHS cat. # A1039 2413.018; f) generic weak polish viewed at 187.5x magnification on left distal edge of A1039 2405.002.

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Nearly all of multi item MANs found within the Gateway 84 units were associated with these pavements as well. One multi item MAN linked with a unit in structure eight in the Interior Household Cluster. Another multi item MAN links Gateway 84 with a unit on the terrace east of Gateway 18 in the Middle Fort. Two artifacts from the uppermost excavation level in unit 15, a level that contained both historic and prehistoric artifacts, were conjoined. As all multi item MANs from Gateway 84 that link the gateway with other contexts at the site are associated with the pavement activity area it is likely that the use of the pavement was contemporary with the occupation of structure 8 and the Gateway 18 terrace.

Waterline Trench 6

Overall, 12 of the 34 bladelets (35.3%) examined from Waterline Trench 6 showed evidence of utilization (Figure 7.1). The Waterline Trench 6 bladelets were used for seven distinct tasks and none were used for more than one task (Figure 7.2). Bone/antler and stone were the most common materials worked while meat/fresh hide and soft plant cutting were also present (Figure 7.13). Cutting was the most common motion employed, followed by engraving and then scraping. None of the bladelets were hafted.

The majority of the bladelets examined from this context came from feature 52/96 where 9 of 29 bladelets were utilized. Stone and meat/fresh hide wear was most common on bladelets from this feature with bone/antler, and plant wear present on one bladelet each. Three of four bladelets examined from nearby features were utilized (two on bone/antler and one on stone). One bladelet from backdirt was unutilized.
Figure 7.13 Examples of microwear traces on bladelets from Waterline Trench 6. a) bright, flat polish from engraving stone viewed at 187.5x magnification on left lateral edge of OHS cat. # A1039 3278.001; b) dull, greasy meat polish viewed at 187.5x magnification on left edge of OHS cat. # A1039 3364.004; c) bright polish confined to the edge viewed at 187.5x magnification of left lateral edge of OHS cat. # A1039 3364.004 indicating contact with bone during butchering; d) streaks of smooth, bright polish from cutting soft plants viewed at 187.5X on OHS cat. # A1039 3324.001.
The bladelet from the backdirt was in the same multi item MAN as a bladelet from a postmold associated with structure 1 in the Interior Household Cluster.

**North Fort Gateways**

Overall, 32 of 81 (39.5%) bladelets from three different excavations in North Fort Gateways were utilized (Figure 7.1). The North Fort Gateway bladelets were used for eight different tasks (Figure 7.14). Two bladelets were used for more than one task. Meat/fresh hide butchering was the most common tasks performed with bladelets (Figure 7.2). Relatively large proportions of bladelets were used to cut soft plant as well as work dry hide and bone/antler. Fewer numbers were used on stone. One bladelet was hafted.

In conjunction with the construction of a new entrance road to Fort Ancient, Morgan (Morgan and Ellis 1939; see also Connolly 1996a:Figure 2.5) excavated a refuse pit associated with Gateway 3. Five of the 18 bladelets examined from the pit feature were utilized. Bladelets from the feature were used to butcher meat, cut dry hide, scrape bone/antler, and incise stone (Figure 7.15).

In the Gateway 13 area, 20 of 48 (41.7%) bladelets were utilized. The most common task was meat/fresh hide butchering followed in descending order by plant cutting, dry hide working, bone/antler working, and incising stone (Figure 7.15). Cutting was the most common motion employed, followed by scraping, sawing and engraving. Unit 10/92 provided the most sub-plow zone bladelets in this area and provides a good representation of the rest of the units. Eleven of 21 bladelets were utilized with meat/fresh hide butchering being the most common activity followed by dry hide and bone working as well as soft plant cutting.
Figure 7.14 Examples of microwear traces on bladelets from the North Fort gateways. a) discontinuous spots of bright, fluid polish indicating cutting soft plant as viewed at 125x magnification on the right distal end of OHS cat. # A1039 1707.035; b) bright bone/antler scraping polish confined to the edge viewed at 187.5x magnification on lateral edge of OHS cat. # A1039 1847.027; c) dull, greasy meat polish viewed at 187.5x magnification on broken edge of OHS cat. # A1039 1850.015; d) edge rounding and greasy, pitted polish from scraping dry hide viewed at 187.5x magnification on right medial edge of OHS cat. # A1039 1749.025.
Figure 7.15 Microwear breakdown of North Fort Gateway assemblages.
Multi item MANs link several of the units in the Gateway 13 area. Additionally multi item MANs link the area with a unit in gateway 58 in the Middle Fort, unit 2/86, 5/87, 4/88, 2/90 in the Twin Mounds area, and a unit in the Access Road area of the IHC. All bladelets from outside contexts that are linked to the Gateway 13 area through multi item MANs come from plowzone, or otherwise disturbed, contexts, making actual prehistoric relationships impossible to reconstruct.

In the Gateway 7 area, 7 of 15 (46.7%) bladelets were utilized. Microwear evidence indicates that bladelets were used for butchering meat, cutting soft plant, working bone/antler, and engraving stone (Figure 7.15). The one multi item MAN identified in the Gateway 7 assemblage shared an item from a shovel test pit inside Gateway 13. Units in this area were excavated to examine the structure and contents of an artificial pond inside of gateway 7 in the North Fort. Connolly (1995:106) describes the limestone pavement lining the pond as “the secondary discard location of the by-products of more specialized activities or the appropriate location for performing those activities”.

**Twin Mounds Area**

Overall, 51 of 128 (39.8%) bladelets from the Twin Mounds area were utilized (Figure 7.1). The Twin Mounds bladelets were used for 10 distinct tasks (Figure 7.16). No bladelets were used for more than one task. Soft plant was the most common material worked followed closely by meat/fresh hide and including bone/antler, wood, dry hide, shell, and stone in descending order (Figure 7.2). Cutting was the most common motion
employed followed by scraping, engraving, and sawing. One bladelet from the Twin Mounds area was hafted.

Units 1/85 and 2/85 were excavated to determine the structure and composition of a possible drainage ditch and borrow pit feature north of the northern most of the Twin Mounds. As a drainage feature, the artifacts deposited there probably represent secondary refuse from the surrounding area deposited by either human or natural means. Nine of 30 (30%) bladelets from the units were utilized. Meat/fresh hide and soft plant cutting was recorded twice while scraping wood, cutting dry hide, engraving stone, and scraping bone/antler were recorded once each (Figure 7.17).

Units within the main excavation block of the Twin Mounds area can be divided into three basic contexts; those with stone pavements, those without stone pavements, and plowzone (Figure 7.17). Connolly (1997) classifies those units without stone pavements, which contain numerous post molds and pit features, as habitation areas while describing the stone pavements as corporate activity areas. Comparison of utilized bladelets from the habitation units and the pavement units shows that those from the former context were used for a wider variety of tasks. In the habitation contexts, 15 of 40 (37.5%) bladelets were utilized. Dry hide and wood working were the most common tasks in the habitation sample followed but plant cutting, bone/antler working, and butchering meat. Additionally, one bladelet was used to engrave stone. In the pavement contexts, nine of 23 (39.1%) bladelets were utilized. Bladelets from the pavement contexts were only used to work plant, meat, and bone/antler. This finding is in contrast to Connolly’s (1997:265) assessment, based on artifact assemblages, that the habitation and pavement areas were
Figure 7.16 Examples of microwear traces on bladelets from the Twin Mounds Area. a) bright, smooth polish with comet-tailed striations (187.5x magnification) indicative of cutting soft plant on lateral edge of OHS cat. # 564.003; b) bright bone/antler scraping polish confined to the lateral edge of OHS cat. # A1039 533.002 viewed at 187.5x magnification; c) bright, smooth polish confined to the high points of surface topography viewed at 187.5x magnification indicating scraping wood on OHS cat. # A1039 674.006; d) edge rounding and greasy, large-pitted polish from scraping dry hide viewed at 187.5x magnification on right medial edge of OHS cat. # A1039 703.004; e) dull, greasy meat polish viewed at 187.5x magnification on left medial edge of OHS cat. # A1039 758.003; f) bright, flat polish and edge damage from engraving stone viewed at 187.5x magnification on right proximal edge of OHS cat. # A1039 742.002.
Figure 7.17 Microwear breakdown of contexts within the Twin Mounds Area.
centers of similar generalized activities. The restriction of materials worked in the pavement sample to plant and animal products suggests possible feasting related activities. However the use of one bladelet to scrape soft plant material is more likely related to fiber artifact production and not food consumption.

In the plowzone, 18 of 35 (51.4%) bladelets were utilized. The plowzone contexts are more similar to the pavement contexts than the habitation contexts in that bladelets were used for a more restricted range of tasks, mostly related to meat and plant processing. However, there is a great deal of continuity in microwear patterns in units above habitation and pavement contexts. For example, of nine utilized bladelets that were recovered in the plowzone above limestone pavements, six were used to process soft plants and three were used to butcher meat. The plant processing activities included another example of a bladelet used to scrape plant for fiber processing. Conversely, the nine utilized bladelets recovered in the plowzone above habitation contexts were used to butcher meat, cut soft plant, saw bone/antler, scrape wood, and cut shell. Thus, there is continuity in each context extending from undisturbed prehistoric deposits up through the plowzone. Connolly (1997:256) suggests that the plowzone in this area is composed of soil from the Parallel Walls but this continuity in microwear patterns suggests that historic plowing truncated prehistoric deposits below the Parallel Walls as well.

Numerous multi item MANs contained within the Twin Mounds excavations were identified (Figure 7.18). Despite the evidence for extensive prehistoric rebuilding in the area (Connolly 1997) there is minimal evidence for the vertical displacement of bladelets. All multi item MANs recovered from different arbitrary excavation levels could be
Figure 7.18 MAN linkages within the main excavation block of the Twin Mounds area.
attributed to the same soil layer being crosscut by the excavation levels. Horizontally separated multi item MANs may owe their distribution to one of two processes. Several were located within the plowzone suggesting that their distribution may be related to historic plowing. Many others, however, were linked with two units containing refuse pits (1/85 and 8/90) once again pointing to the periodic cleaning of activity areas. Multi item MANs also show numerous connections with contexts throughout Fort Ancient including surface collections in Gregory’s Field as well as excavation units in the Middle Fort, North Fort Gateways, and the Moorehead Circle. Notably absent from the MAN linkages are the Interior Household Cluster and structures one and two in Gregory’s Field. As stated earlier the Gregory’s Field and IHC bladelets were not available for analysis at the same time but the Twin Mounds bladelets were compared to both assemblages at different times. This makes the Twin Mounds the only link between the three contexts with house-like structures. The lack of shared elements in multi item MANs between the three contexts suggests that they were either occupied at different times or did not interact in a manner than involved the exchange of bladelets. The temporal and/or social affiliation of these three contexts is important for understanding the history of Fort Ancient and I will return to the topic later.

**Middle Fort**

Overall, 20 of 39 bladelets (51.3%) examined from Middle Fort contexts were utilized (Figure 7.1). The Middle Fort bladelets were used for 8 distinct tasks (Figure 7.19). One bladelet was used for more than one task. Meat/fresh hide and bone/antler were the most common materials worked while dry hide, stone, and plant wear was
Figure 7.19 Examples of microwear traces on bladelets from the Middle Fort. a) edge damage and greasy, pitted polish from perforating dry hide viewed at 187.5x magnification on lateral edge of OHS cat. # A1039 512.001; b) bright polish confined to the edge of the tool from sawing bone/antler viewed at 187.5x magnification on right medial edge of OHS cat. # A1039 515.001; c) dull, greasy meat butchering polish viewed at 187.5x magnification on lateral edge of OHS cat. # A1039 891.001; d) bright, flat polish from engraving stone viewed at 187.5x magnification on lateral edge of OHS cat. #512.008
Figure 7.20 Microwear breakdown of Middle Fort contexts.
present on a few bladelets (Figure 7.2). Cutting was the most common motion employed while scraping, engraving, and sawing were also present on limited numbers of bladelets. None of the bladelets were hafted.

Two of four bladelets from Morgan’s (Morgan and Ellis 1939) excavation of a stone mound in the Middle Fort were utilized (one for cutting soft plant and one for sawing bone/antler). On the terrace east of gateway 18, 10 of 25 bladelets examined were utilized. Bone/antler, meat/fresh hide, stone, and dry hide were the materials worked in order of abundance (Figure 7.20). Cutting, sawing, engraving, scraping, and perforating were motions employed in order of abundance. Eight of 10 bladelets recovered from beneath the embankment wall south of Gateway 58 were utilized. The bladelets were all recovered from levels in which postmolds were identified. Meat/fresh hide, dry hide, bone/antler, and stone were worked by bladelets from this context (Figure 7.20). Cutting was the most common motion employed while scraping, engraving, and perforating were also employed. As illustrated by Figure 7.20, the same tasks were being completed in the two Middle Fort contexts, just in different ratios. Multi item MANs link the excavations on the terrace east of Gateway 18 with the Twin Mounds area. Additionally, Embankment 58 is linked to Gateway 13 through multi item MANs.

**Smith Site**

Overall, 44 of 113 bladelets (38.9%) from the Smith site were utilized. The Smith site bladelets were used for 11 different tasks and three were used for more than one task. Bone/antler was the most common material worked while meat/fresh hide, dry hide, soft plant, and stone working were moderately well represented (Figures 7.21, 7.22). Cutting
Figure 7.21 Examples of microwear traces on bladelets from the Stubbs Earthworks. a) bright, small-pitted polish (187.5x magnification) confined to the broken edge of CMC cat. # A62850 used to engrave bone/antler; b) edge rounding and greasy, large-pitted polish from scraping dry hide viewed at 187.5x magnification on lateral edge of CMC cat. # A62847.014; c) smooth, fluid polish with numerous striations from cutting soft plant viewed at 125x magnification on the left distal edge of CMC cat. # A62847.025; d) bright, flat polish from engraving stone viewed at 62.5x magnification on lateral edge of CMC cat. # A62847.047; e) edge damage and bright, smooth polish confined to the high points of surface topography viewed at 187.5x magnification indicating use to saw wood on CMC cat. # A62847.056; f) dull, greasy meat polish viewed at 187.5x magnification on lateral edge of CMC cat. # A62847.074.
Figure 7.22 Microwear breakdown of Stubbs sites.
and scraping were the most common motions employed while engraving, sawing, and drilling were present on fewer numbers of bladelets. No bladelets showed evidence of hafting but two did exhibit prehension wear caused by dust from bone/antler working trapped under the fingers (Rots 2010).

The vast majority of bladelets examined from the Smith site were recovered in feature 37. Of the bladelets from feature 37 that were examined for wear traces, 41 of 108 (37.9%) were utilized. Only three utilized bladelets were found outside of feature 37 and all were used to work bone/antler. The majority of multi item MANs from the Smith site were contained entirely within feature 37. Several MANs did link the feature with surface finds suggesting that the feature was truncated by plowing. Three multi item MANs linked feature 37 and surface contexts from the Smith site with TU 2 level 2 in 33WA765.

**Circle Overlook site (33WA765)**

Overall, 8 of 23 bladelets (34.8%) from 33WA765 were utilized. The 33WA765 bladelets were used for seven distinct tasks with no bladelets used for more than one task. Bone/antler was the most common material worked while meat/fresh hide, dry hide, soft plant, and stone were also represented (Figure 7.21, 7.22). Motions employed included cutting, engraving, sawing, and scraping. No bladelets were hafted and one showed prehension wear. All bladelets, both recovered and utilized, came from test unit 2 level 2, making 33WA765 unique in the relatively concentrated nature of the bladelet assemblage.
In summary, Hopewell bladelets were used for a wide variety of tasks in every context examined above. However, direct comparison of the number of tasks performed at each location may not directly reflect differences in prehistoric activity. Instead the number of tasks identified in bladelet microwear analysis is highly correlated with the number of utilized bladelets in the assemblage. In other words, the more utilized bladelets in an assemblage the more tasks likely represented. Examination of Figure 7.23 shows that $R^2$ equals 0.88, meaning that the number of tasks is almost entirely a function of sample size. A similarly strong relationship exists between the bladelet sample size (utilized and unutilized) and the number of tasks identified (Figure 7.24).

Results Summary and Comparison

While the above analysis focused on the tasks performed with bladelets, the majority of bladelets were unutilized in most contexts (Figure 7.1). Several factors may be at work to account for this pattern. First, the vast majority of bladelets reported here are actually bladelet fragments. It is certainly possible that the tools broke during use and the utilized portion remains undiscovered. As breakage and recovery are random processes I do not expect this factor to skew the results in any way. As evidence of this, recall that the chi-square test presented in chapter 6 did not detect significant differences between the materials worked between complete, proximal, medial, and distal bladelets. Second, once the core is prepared, blade reduction allows for the production of numerous tools in a relatively short period of time. Perhaps unused bladelets were being saved for later use, or only those bladelets possessing certain attributes were used as tools. Third, as outlined in chapter 3, bladelets served more roles than just tools for processing raw
Figure 7.23 Relationship between number of utilized bladelets and number of identified tasks

![Graph showing the relationship between number of utilized bladelets and number of tasks identified. The graph includes a line with the equation R² = 0.88.]

Figure 7.24 Relationship between number of bladelets examined and number of identified tasks

![Graph showing the relationship between number of bladelets examined and number of tasks identified. The graph includes a line with the equation R² = 0.8346.]

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materials. Bladelets were important elements in symbolic communication, meaning many may have been produced for exchange or display rather than use (see also Hofman 1987; Morrow 1987; Reid 1976; Yerkes 2002, 2003a).

The lone exception to this pattern is the Moorehead Circle. Nearly 90% of the bladelets recovered from this ritual feature were utilized. This pattern reflects the ritual function of the area. Feature data indicate that construction and destruction occurred with careful intentionality. For example, massive posts were set and then removed, a mound of culturally sterile red soil was created, and the floor of the roofed structure within the Moorehead Circle was renewed with successive layers of charcoal and clay (Miller 2014). The pottery placed around the central mound of red soil indicates that careful planning went into bringing artifacts to the feature for specific purposes. Similarly, those visiting the Moorehead Circle would have brought only the number of bladelets necessary to perform the tasks at hand. Bladelets would not have been produced nor would extra bladelets have been stored in the Moorehead Circle as they may have in other localities at Fort Ancient. This process would serve to inflate the proportion of utilized bladelets as debitage and surplus bladelets are largely absent.

A focus on the materials worked with bladelets in different contexts gives insights into the role of each in the Hopewell ritual economy. Meat/fresh hide was the most common material worked in most contexts at Fort Ancient and Stubbs (Figure 7.25). Some of this was certainly related to feasting activities which could have occurred in both domestic and corporate contexts. The relatively high proportion of bladelets used to process meat in the Fort Ancient gateways of the North and Middle Forts as well as in
Figure 7.25 Summary of materials worked in different contexts at Stubbs and Fort Ancient.
Gregory’s Field suggests that feasting was especially prevalent in these contexts. However, the role of bladelets in everyday butchering activities cannot be discounted. This certainly would have been the case for many bladelets from the IHC and Twin Mounds area as there is no reason to assume that every cut of meat consumed at the earthworks was done as part of a feasting event.

There is also the possibility that some bladelets were used on humans in ritual-related human bloodletting ceremonies or in mortuary processing. While protein residue analysis of uncontaminated bladelets would shed more light on this issue, there is no substantial evidence for these practices in current the data. For example, numerous bladelets used to butcher meat/fresh hide also contain isolated bright spots from contact with bone or ligaments. I would not expect bloodletting to produce this pattern of wear. In addition to the common sense based argument that someone wishing to spill some of his or her own blood would not jam a tool so deep into the flesh that it came into contact with bone, ethnographic evidence supports my conclusion. Ethnographic cases of bloodletting, indicate that relatively shallow cuts were made (i.e., Hall 1997:106-107) or that people targeted soft tissue such as the Maya’s use of the tongue, ear, or penis (Sievert 1992:71). Bladelets would, however, come into contact with bones and ligaments if the bladelets were used for mortuary processing of human remains. Since none of the locations analyzed in this study contain evidence of human remains or other mortuary behavior, it is unlikely that bladelets were used in such a manner. Therefore, while I cannot entirely refute the possibility that some bladelets were used on humans, the current evidence does not support such a conclusion.
The amount of dry hide working was fairly consistent throughout all contexts at Fort Ancient and Stubbs (Figure 7.25). In most contexts, dry hide working hovered around 10-15% of the total materials worked. In the Moorehead Circle, 61% of the bladelets used to work dry hide were used to perforate the material. In all other contexts, cutting and scraping dominated the dry hide working tasks. Perforating was identified as a craft production motion (see Chapter 2: Producing Hopewell Crafts) suggesting that leather craft products may have been manufactured in the Moorehead Circle (Miller 2014).

The range for bone/antler working was somewhat larger than dry hide with most contexts falling between 7-17% of the total materials worked (Figure 7.26). Deviations from this general pattern are found at Stubbs, where bone/antler working comprised almost 40% of the total materials worked, as well as Waterline Trench 6 and the Middle Fort at Fort Ancient. Scraping was the most common motion employed in most contexts (Figure 7.26). The Moorehead Circle contained the highest proportion of bladelets used for engraving. Gregory’s Field, the IHC, and the Stubbs contexts were the only other places in which bladelets were used for engraving bone/antler and only the Stubbs sites contained more than one bladelet used for the task. Drilling bone was only present at Stubbs. It should however be noted that a bladelet used to drill bone or wood were recovered from the IHC. The presence of bladelets used to engrave and drill bone/antler at Stubbs as well as the large proportion of bladelets used on bone/antler in general suggests that craft production was most intensive at these sites. The high proportion of bladelets used to engrave bone/antler at the Moorehead Circle suggests that some of these
Figure 7.26 Summary of the motions used on bone/antler in selected contexts.
craft objects were produced there as well.

Wood working was highly variable with most contexts having few to no bladelets used for the task (Figure 7.25). In the three domestic contexts at Fort Ancient (Gregory’s Field, IHC, and Twin Mounds) wood working hovered around 10% of the total materials worked. In those contexts in which woodworking was present, sawing and scraping were the most common motions employed (Figure 7.27). In the Moorehead Circle and the IHC about a quarter of the bladelets used for woodworking were used to engrave wood. Drilling was only present in the IHC. This suggests that wood craft products were manufactured in the Moorehead Circle and the IHC.

While the number of bladelets employed in plant processing was highly variable as well, every context, except for Gateway 84 and Gregory’s Field, contained at least some bladelets used for this task (Figure 7.25). As noted above, plant working was most common in the Twin Mounds area, at least among the three domestic contexts at Fort Ancient. The North Fort Gateways contained similarly high numbers of bladelets used for plant cutting. The Stubbs contexts also contained numerous bladelets used to process plant material.

Plant working may be attributed to either subsistence or crafting activities. The abundance of plant cutting implements in the North Fort Gateways, largely near ponds, is probably related to harvesting seeds. All bladelets recovered from these gateways that were used to process plant were used in a cutting motion (Figure 7.28). However, cutting plant material only signifies harvesting, and not the intended use of the plants. For this it is necessary to look to additional contextual information. McLauchlan (2003:564)
Figure 7.27 Summary of the motions used to work wood in selected contexts.
argues, based on pollen and erosion-rate data from soil cores, that EAC crops “grew abundantly” near the Fort Ancient ponds during the Middle Woodland period. The distribution of bladelets used for plant cutting near gateway ponds is therefore consistent with McLauchlan’s scenario.

On the other hand, some of the bladelets from the Twin Mounds area can be attributed to use in craft activities. Specifically, two bladelets contain definitive evidence of use on plant material in a scraping motion (Figure 7.28). The two bladelets used to scrape plant material were used in fiber production because this motion of use is well documented in fiber processing and scraping would not be an effective means of harvesting plant material (Hurcombe 1998, 2000, 2008a, 2008b). Another line of evidence for fiber craft production is the complete lack of plant cutting activities in Gregory’s Field. If crops continued to be grown and harvested outside of the earthwork then I would expect plant cutting to cross the arbitrary barrier I set up between the Twin Mounds and Gregory’s Field. The identification of tools from the Twin Mounds area definitively used in fiber production suggests that other bladelets with evidence for plant processing were used for this purpose as well. These bladelets could have been used in other stages of fiber processing or may not have been used long enough to develop distinctive indicators of scraping motion. One bladelet from Fort Ancient was used in a scraping motion and found outside of the Twin Mounds area. This bladelet was recovered during Richard Morgan’s excavations to relocate the burials discovered by Moorehead in the South Fort (Figure 7.28e). It is tempting to link this bladelet with
Figure 7.28 Examples of microwear on bladelets used to cut [a) OHS cat. # A1039 564.003; b) OHS cat. # A1039 1850.021] and scrape soft plant [c) OHS cat. # A1039 1102.103; d) OHS cat. # A1039 1134.014; e) OHS cat. # A1039 72.004; f) CMC cat. # A62847.039]. All magnifications are 187.5x.
mortuary related textile production but a lack of definitive contextual information prevents conclusive conclusions.

One bladelet from the Smith Site at Stubbs was used to scrape soft plant material (Figure 7.28f). As in the Twin Mounds area, the identification of plant scraping on one bladelet opens the possibility that others were used for fiber processing as well. As the Stubbs contexts are not located near ponds or other known bodies of water, craft activities probably represent the reason for the high number of bladelets used for plant cutting.

All contexts examined contained evidence of stone working (Figure 7.25). Stone working was most intensive in the IHC. Waterline Trench 6 and Gateway 84 each had stone working constitute relatively large proportions of the total materials worked with bladelets. Stone working was relatively low in Gregory’s Field, the Moorehead Circle, the Twin Mounds area, and the North Fort. Although Waterline Trench 6 and Gateway 84 have relatively high proportions of stone working, they also have the lowest sample size of any contexts in the study area making their relative proportions easily skewed by small changes.

Shell working was the least common wear pattern encountered at Fort Ancient and Stubbs (Figure 7.25). Shell working was only identified on bladelets from Gregory’s Field, the Moorehead Circle, and the Twin Mounds Area. Where identified only one or two bladelets were ever used to work shell. There is no evidence for large scale shell artifact production at Fort Ancient or Stubbs, preventing any conclusive interpretation.
Perhaps shell manufacturing did not occur at these sites or shell working could have been accomplished with tools other than bladelets.
Chapter 8: Addressing Research Questions

In this chapter, I synthesize the results presented in chapter’s six and seven in order to address the research questions presented in chapter one. Additional data is also discussed where necessary. The result is a full picture of craft production at Fort Ancient and Stubbs that will be tied back into the ritual economy framework in the final chapter.

were bladelets produced at Fort Ancient and Stubbs?

Yes, bladelets were produced at Fort Ancient and Stubbs, though the transport of finished bladelets to the sites cannot be ruled out either. The presence of bladelet cores, rejuvenation flakes, and trimming flakes all point to the production of bladelets in many contexts at Fort Ancient and Stubbs. The extent of bladelet manufacture and the organization of bladelet production are not as clear. The evidence points to more ubiquitous bladelet manufacture than others (i.e., Cowan 2006) would argue.

Comparison of data from Fort Ancient and Stubbs with that of the Turner Workshop failed to identify any obvious signatures of a bladelet workshop. For example, more discarded bladelet cores were found at Turner than at Fort Ancient and Stubbs combined, but it is hard to quantify the differences between the contexts. On the other hand, more bladelet core trimming and rejuvenation flakes were found at Fort Ancient and Stubbs than at the Turner Workshop. The production error rates were also significantly lower at
both Fort Ancient and Stubbs than at Turner. It is possible that the patterns reflect bladelet manufacture at the Turner Workshop and subsequent exportation of the best looking products to Fort Ancient and Stubbs. However, the CV* values for various bladelet attributes at Fort Ancient and Stubbs are in line with those at Turner. The ambiguous bladelet data suggests that relatively small and numerous entities, such as individuals or households, produced bladelets for their own needs. If this was the case then the bladelet production data support a model of open production or manufacture of socially valued goods rather than bladelet use for a more restricted production of prestige goods. However, more regional scale data is necessary before this topic can be satisfactorily addressed.

Were bladelets used for craft production tasks at these sites?

Bladelets were used for craft production, in addition to other tasks at both Fort Ancient and Stubbs. Bladelets were used to work materials such as stone, shell, and mica that were often used for Hopewell craft items. They were also used in fine, finishing motions on possible craft materials such as bone/antler, wood, soft plant, and dry hide. However craft production was not their sole purpose. Bladelets were also used for all types of daily household activities, which sometimes included craft production, as well as what almost certainly were ceremonial activities. There is also no reason to believe that bladelets were the only implements used in craft production. For example, other chipped stone tools may have been involved in addition to perishable tools made of bone or wood.
These findings shed light on the larger debate on the place of bladelets in Hopewell technological organization. While a great deal of debate has centered on the generalized versus specialized nature of bladelets in recent years (Byers 2006; Cowan 2006; Miller 2010, 2014; Odell 1994; Pacheco 2010:52; Yerkes 1994), this is an oversimplified view of Middle Woodland blade technology. Certainly early use-wear studies were important in debunking the assumption that bladelets were manufactured for one specific task (e.g., to cut mica). However, my study demonstrates that bladelet use does not reflect the same pattern of undifferentiated, generalized use in all contexts as argued by Yerkes (1990, 1994, 2009) and Miller (2010, 2014). Unlike others (Byers 2006; Odell 1994) I do not attribute the differential use of bladelets to a change in their symbolic meaning in special mound or earthwork contexts. A more parsimonious explanation for the different proportions of tasks performed by bladelets is that different tasks were performed in different contexts. In the case of Fort Ancient, it appears that different groups manufactured different types of artifacts, resulting in different patterns of production.

It is also important to remember that not all crafts would have required the use of bladelets, or any other chipped stone tool, in their production. This was documented in Gregory’s Field with the recovery of the Powell Cache and minor amounts of related obsidian and quartz debitage. The relative paucity of shell wear on bladelets may mean that shell objects were not produced in the localities examined or that other perishable tools were used in their production as described above. Similarly, while distinctive pottery wear has been identified in the literature (van Gijn 1990), no incidences of
bladelet use on pottery were identified at Fort Ancient or Stubbs. The simplest explanation here is that pottery production and decoration did not involve bladelets. Instead other tools were probably used for these tasks. Documenting the nature of production of these and other artifact types are important avenues of research in the quest to fully understand Hopewell craft production.

Finally, the function of bladelets may extend well beyond the productive tasks in which they were employed. For example, Yerkes (2002, 2003a), following Hall (1997:153-157) and Morrow (1986), argues that bladelets were often included in reciprocal gift exchanges among groups at earthworks. Hoffman (1987) and Reid (1976) have made similar arguments about the importance of bladelets in the HIS. Similarly, I have laid out an argument in Chapter 3 on the importance of bladelets for information exchange among groups interacting at earthworks. Clearly, bladelets were more than just practical tools. They were imbued with special meaning or symbolic power. However, the ubiquity of bladelet use and the differences in use in various contexts within the earthworks does not support a dramatic change in bladelet meaning when entering the ceremonial center (sensu Odell 1994) or the restricted use of bladelets by a specific social class (sensu Byers 2006).

Is there evidence for differential production of crafts between contexts within each site?

There is evidence for differential production between some contexts at Fort Ancient. In a 2x6 chi square table comparing domestic contexts to ceremonial contexts at Fort Ancient, the test results showed that the null hypothesis of no difference in the
types of materials worked for the two contexts should not be rejected ($\chi^2=8.08$, $df=5$, $p=0.156$). For purposes of this, and all subsequent chi square tests, stone and shell were combined into a single craft category in order to increase the cell sample size. Put another way, the same types of materials were being worked at both domestic and non-domestic localities. This supports the generalized nature of bladelet function despite changes in context as demonstrated by previous microwear studies (Lemons and Church 1997; Lepper and Yerkes 1997; Miller 2014; Snyder et al. 2008; Yerkes 1990, 1994, 2009).

However, significant differences do exist between certain contexts at Fort Ancient. All domestic contexts contain substantial evidence for craft production. Closer examination of the microwear results indicates that each domestic context appears to have concentrated on a single medium distinct from the others. A 3x6 chi square table comparing the types of materials worked in Gregory’s Field, the Interior Household Cluster, and the Twin Mounds area demonstrates that the materials worked are significantly different between the three contexts ($\chi^2=52.1$, $df=10$, $p<0.001$). For example, stone working is relatively high in the Interior Household Cluster while plant working is high in the Twin Mounds area. Possible ritual craft correlates include mica and slate objects at the IHC and textiles or basketry at the Twin Mounds area.

Based on the microwear data, there is not much evidence for craft production activities in Gregory’s Field structures two and three. Several other lines of evidence suggest that the inhabitants of the structures were involved in craft production of a different sort. For example, a cache of 33 stone tools was discovered by the landowner

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about 20 meters west of the structures (Connolly 1997:267; Essenpreis and Moseley 1984:26). Essenpreis and Mosely (1984:26) state that included in the cache were 17 obsidian bifaces, 11 bifaces of Wyandotte flint, and five crystal quartz bladelets. Connolly (1997:267) cites a personal communication with Eugene Powell, the discoverer of the cache, as evidence that the cache also contained 20 blocky chunks of obsidian. In an earlier paper, Connolly (1991:85) cites a personal communication with Wayne Gregory, the landowner, as evidence that the cache contained “several broken ceramic vessels”. Cowan et al. (2004:110) list the cache inventory as 12 Wyandotte flint bifaces, seven tools of Flint Ridge flint, 15 obsidian bifaces, 1 obsidian blade, five crystal quartz bifaces, five quartz crystals, and 32 pieces of obsidian debitage. Whatever the true content, it is clear that implements crafted from rare stone materials such as obsidian and quartz crystal were deposited in the cache. Within structures two and three “[a] few small flakes of obsidian and crystal quartz were recovered” in addition to obsidian bladelets (Cowan et al. 2004:119). Similarly, Connolly (Connolly and Sullivan 1998:70) conducted a surface survey of a 1,500 m$^2$ area around the cache and recovered “several obsidian and quartz flakes that indicate reworking or final reduction of these materials in the vicinity”. Although the exact location of the flakes is not reported I would surmise that they were probably recovered in the vicinity of structures two and three. One reason is that obsidian and quartz are exceedingly rare at Fort Ancient (Vickery 1996; Vickery and Sunderhaus 2004). A second, perhaps more compelling reason, is that no obsidian or quartz debitage was reported from the original 100 m$^2$ surface survey in the vicinity of the Powell cache which would not have included the area of structures 2 and 3 (Connolly
Obsidian and quartz debitage were only recovered after expanding the survey area to 1,500 m² as described above (Connolly and Sullivan 1998:70). Considering that the production of the obsidian and quartz artifacts would have produced thousands of flakes, the paucity of flakes recovered would indicate that they were knapped elsewhere and simply curated by the inhabitants of structures two and three. However, studies of obsidian from Mound 11 at the Hopewell site indicate that debitage was curated for several generations before deposition (Hatch et al. 1990; Stevenson 1992; but see Hughes 1992). Thus it is also possible that the production debitage was carefully collected and retained after the artifacts were produced. Similarly, a large amount of obsidian and quartz debitage—over 150 kg—was recovered from the Barnyard Site, to the east of the Stubbs Earthworks (Genheimer 2005; Cowan et al. 2005). The vast majority of this material was recovered from the Koenig Cache—a pit feature within the Barnyard site. The large number of small quartz and obsidian flakes suggests to Cowan (2005) quartz and obsidian debitage was carefully collected and buried (see also Romain 2009:174-175). It is certainly possible that this debitage was buried separately at Fort Ancient.

Microwear and other contextual evidence indicates that the domestic groups at Fort Ancient each produced the entire suite of products necessary for subsistence and also made some ritual craft products. The concentration on distinct media by groups at each context fits the expectations of Knight’s (2010) reciprocal exchange model. In Knight’s model, groups exchanged their products or combined them into ceremonial bundles to be used in ritual events. Craft products were not exclusively produced in domestic contexts.
however. Numerous bladelets from the Moorehead Circle were used to perforate dry hide. Several bladelets were also used to engrave bone/antler and wood in the Moorehead Circle. Thus the Moorehead Circle was also a center of craft production involving perishable materials, largely dry hide. In conformity with part of Knight’s model, craft products of dry hide were not produced at other localities within Fort Ancient.

While differentiation characterizes craft production in the Fort Ancient contexts, craft duplication best describes the Stubbs contexts. The most common task at both Smith and Circle Overlook is engraving bone/antler. Whereas at Fort Ancient plant, stone, and obsidian crafts were produced in different contexts there is evidence that at least two, if not all three, were produced at the Smith site. While plant and stone working constitute less of the total materials worked at Smith than at Twin Mounds or the IHC respectively, together they represent over 25% of the total at that locus. Additionally, the existence of two obsidian bladelets in the Smith site feature 37 assemblage leaves open the possibility that obsidian tool manufacture occurred there as well. Add this to the extensive evidence for bone/antler working at Smith and it is clear that the inhabitants of this area truly were practicing multicrafting (Hirth 2009). While the sample size is much smaller, the Circle Overlook site shows a similar pattern with bone/antler engraving represented on the largest number of bladelets while about 25% were used for stone and plant working.

The relatively limited data from Stubbs follows the expectations of Blitz’s (2007b, cited in Thompson 2012) model of duplication and replication. Craft production both inside and outside of domestic spaces suggests that the organization of production at
Stubbs was structured by tribal groups or sodalities. Sunderhaus’ (2005) suggestion—based on variability in the temper composition of ceramics reflecting a mixture of regional ceramic traditions—that the Circle Overlook site housed an inter-regional group supports the assertion that tribal groups gathered at Stubbs for craft production as well as other ceremonial activities. Evidence from Smith suggests that this production occurred outside of domestic contexts as well. The existence of duplication and replication in the craft production activities at each locality suggests that each tribal group or sodality was provisioning for its own rituals that may have required objects made of the same raw materials. These sodalities may be similar to Byers’s (2004, 2006) heterarchical cult sodalities centered on world renewal rituals at Hopewell earthworks or they may be more broadly defined tribal groups (Braun and Plog 1982; Yerkes 2002).

Overall, while there is evidence for differential production of crafts at Fort Ancient, there is no evidence for the specialized production of prestige goods in craft workshops. Instead, the evidence supports a ritual economy model for the production of socially valued goods.

**Does differential production correspond with other differences in material culture?**

Thus far evidence for craft production at Fort Ancient and Stubbs has been documented. This production was often centered at houses or house-like structures at Fort Ancient and areas at Stubbs. Additionally the structure of production at Fort Ancient fits Knight’s (2010) reciprocal exchange model in which different groups specialized in the production of different classes of artifacts while Stubbs conforms to
Blitz’s (2007b, cited in Thompson 2012) model. What remains to be examined are any material advantages that may be associated with these craft producing groups. If discovered, these advantages may have been bestowed upon craft producers for their surplus production or they may have led to the ability to increase production substantially beyond daily subsistence needs. The following discussion will focus on Fort Ancient as it is impossible to determine which structures the Stubbs contexts are connected to.

More than anything this section serves as a stepping off point for future research that will provide a larger regional (i.e., Miami River Valley) database to test against the data compiled here. As no regional settlement data based on excavated sites exists, I must turn to other parts of Ohio and beyond when making comparisons outside the realm of Fort Ancient and Stubbs.

**Structure Size**

One way to intensify production is to increase the size of the household or domestic group in order to add new tasks to the domestic economy. Recently, White (2013) compiled data on prehistoric habitation structure sizes from throughout eastern North America. During the Middle Woodland period, total living space, estimated from post mold patterns forming structure outlines, ranged from 1.9 m$^2$ to 187.7 m$^2$ with an average of 39.1 m$^2$ (SD=36.8, CV=94.2) (White 2013:Supplementary Files). Both the Interior Household Cluster structures (Lazazzera 2004a:90) and structures one and two in Gregory’s Field (Cowan et al. 2004:119) were estimated to be about 7 m on a side thus enclosing 49 m$^2$ and making them slightly larger than the average Middle Woodland house though not significantly ($t=0.9455$, $df=117$, $p=0.3359$). Lazazzera (2009:265)
estimates the structures in the Twin Mounds area at 10 m on a side thus enclosing 100 m² making them significantly larger than the average Middle Woodland house (t=4.6742, df=112, p<0.001). Thus there is evidence, though admittedly preliminary, that structures and maybe households at Fort Ancient were larger than the average for Middle Woodland structures elsewhere.

White (2013) attributes relatively large house size to differential success in subsistence and marriage practices. While this may be true, applying this reasoning to the Fort Ancient data assumes that everyone who stayed in the large structures at Hopewell earthworks were members of the same household. It is equally likely that members of clans or other segments of tribes (representing numerous households) may have used the structures (see also Connolly 1997; Yerkes 2002, 2003a, 2006). Regardless of the exact social composition of the inhabitants of these structures, they could have pooled their labor in order to produce craft items. Thus, the Fort Ancient data highlights the potential for large households or amalgamated domestic groups to increase craft production as well as subsistence production. At this point it is unclear whether increased house and domestic group size is a cause or effect of increased investment in craft production.

*Exotic Artifacts*

If involvement in craft production was a pathway to higher prestige or some form of wealth-based status among Hopewell groups, I would expect domestic groups highly invested in craft production to contain relatively large amounts of exotic prestige goods. In general, Native American groups did not gain prestige by amassing material objects but rather by giving gifts to others (Hall 1997:156). There are, however, numerous
exceptions to this general pattern in that large differences in wealth existed among groups in Cahokia and other Mississippian polities, the Pacific Northwest, the Channel Islands, and the Southwest (e.g., Cobb 1996; Kanter 2010; Milner 2002; Yerkes 1983). Prestige goods are also given away as gifts—gifts with a particular political motivation behind them (Whalen 2013). Therefore the possibility of prestige goods accumulation remains at Hopewell sites.

In and around structures two and three in Gregory’s Field, the recovered HIS artifacts appear to be limited to chipped stone materials. For example, Cowan et al. (2004:119) note that a “few small flakes of obsidian and crystal quartz” were recovered during their excavations. Additionally, all of the obsidian bladelets from Fort Ancient included in this study were recovered from the backdirt associated with structures two and three. Similarly, Connolly (Connolly and Sullivan 1998:70) conducted a surface survey of this same area and recovered “several obsidian and quartz flakes”. About 20 m west of the structures is the location of the Powell Cache that contained 33, mostly obsidian and quartz, tools (Connolly 1997:267; Essenpreis and Moseley 1984:26). No other HIS artifacts, not even mica flakes, were recovered from this area. Other localities within Gregory’s Field produced similar results as the only other HIS materials recovered were some mica fragments from a midden in the Lot 6/9 common drive (Cowan et al. 2004:117). However, due to the nature of the excavations in this area most of the feature fill and backdirt was not screened for artifacts. However, a large enough sample exists to note that HIS items are relatively sparse throughout Gregory’s Field.
Connolly (1997:264) notes the occurrence of “mica flakes” in the lowest occupation levels of the Twin Mounds Area (Connolly’s soil D). Similar “mica flakes” were recovered in the next stratigraphic soil layer (Connolly’s soil C) between two layers of limestone pavements (Connolly 1997:256). Morgan (1946:39) reported that platform pipes, quartz projectile points, gorgets, mica, and various slate artifacts were discovered in the area south of the Twin Mounds stripped of topsoil. In this same area a cache of 59 copper artifacts, 44 pieces of galena, eight fragmented slate pendants, and hundreds of mica sheets was discovered in 1889 (Morgan 1946:39). While some of the artifacts reported by Morgan may have been recovered several hundred meters south of the Twin Mounds, Connolly (1997) argues that the entire area north and south of SR 350 and just outside of the earthwork walls was occupied at the same time and for similar purposes due to the continuous nature of subsurface deposits in the area. However, the excavated domestic contexts reported here containing relatively few HIS items.

Overall, Lazazzera (2009:369) notes that “Hopewell Interaction Sphere raw materials and finished items were present only in small amounts” in the Interior Household Cluster. Overall, Lazazzera (2009:Table 5.6) reports that 15 obsidian flakes, eight quartz flakes, and two pieces of galena as well as several scraps of copper were recovered from the IHC. Structures one, two, three, and seven in the Interior Household Cluster contained “no temporally diagnostic artifacts” such as HIS items (Lazazzera 2009:179). In and around structure 8, “small amounts of copper, galena, mica and obsidian” were recovered. Additionally, Lazazzera (2009:214) notes the occurrence of crystal quartz flakes in the refuse pit associated with structure 8. Lazazzera (2009:186)
notes that the artifact assemblage for structure 5 was similar to structure 8, presumably including copper, galena, mica, and obsidian. One of two processing pits within structure four contained “a large piece of cut mica” (Lazazzera 2004:93). Three shallow basin features in the Water Treatment/Access Road area contained mica (Lazazzera 2009:202). While concentrations of objects do exist, I generally concur with Lazazzera that HIS items are relatively scarce in the IHC.

Overall, domestic contexts contain relatively few HIS items. Even the debris from objects manufactured in seemingly large quantities is seldom encountered in the excavated assemblages. Therefore the groups most invested in craft production did not deposit significant amounts of HIS materials in their structures. If these objects represent durable material wealth, there not seem to be evidence for any raised status from craft production.

*Is there any evidence of variation in the organization of production between earthworks?*

There are important similarities as well as noticeable differences in the microwear results from Fort Ancient and Stubbs. Bladelet function was generalized, representing a wide variety of tasks instead of just one or two, in all contexts examined at both sites. This replicates the finding from numerous other bladelet microwear studies (Lemons and Church 1997; Lepper and Yerkes 1997; Miller 2014; Snyder et al. 2008; Yerkes 1990, 1994, 2009). However, significant differences do exist in bladelet function between contexts. At the broadest level, there are two basic differences between Fort Ancient and Stubbs. First, the Fort Ancient contexts are more heterogeneous in terms of
tasks performed with bladelets. For example, both Stubbs contexts display a similar level of concentration on bone/antler working while significant differences exist both within and between domestic and ceremonial contexts at Fort Ancient. Second, a greater number of tasks were performed at Fort Ancient than at Stubbs. For example, shell and wood working were present at Fort ancient and absent or nearly so at Stubbs while dry hide working was also more diversified at Fort Ancient.

By comparing data from Fort Ancient and Stubbs, I have found evidence for the existence for two different levels of the organization of ritual craft production. At Fort Ancient, craft production was largely organized in domestic spaces by households, larger kin groupings, or tribal segments. Each domestic context examined produced craft objects from a distinct set of raw materials. Bladelets from the Moorehead Circle were also used to produce probable craft items made of a distinct raw material, dry hide. As objects constructed from different types of raw materials are often found deposited together in ceremonial and mortuary contexts (note the caches at Fort Ancient and burials described by Moorehead [1890]), it is logical to assume that these various groups exchanged or pooled their craft products prior to deposition. Since each group only produced a small subset of the objects necessary for ritual performance then the groups were united in reciprocal relationships like those described by Knight (2010), or possibly by having specific responsibilities within segmented tribal societies (see Parkinson 2002).

The situation is quite different at Stubbs as each context participated in the same types of productive activities rather than producing objects from distinct raw material types. In terms of the models outlined above, this pattern closely mirrors the duplication
and replication model of Blitz (2007b, cited in Thompson 2012). Under this model, intergroup interaction is not facilitated by material exchanges but rather through feasting or participation in rituals organized by sodalities or other tribal groups (Thompson 2012:35). It is possible that a different pattern of production existed in the numerous house-like structures excavated at Stubbs (Cowan 2006; Cowan et al. 1999; Sunderhaus et al. 2001), that either mirrored or deviated from the pattern at Fort Ancient. Unfortunately, the sparse artifact assemblages associated with the structures prevent further inquiry into the pattern.

At Stubbs, craft goods were produced in both domestic and ceremonial settings in which numerous different types of crafts were created in conjunction with other activities such as feasting or rituals. This pattern follows the expectations of models which suggest that earthworks functioned as centers of integration for members of dispersed tribes (Hall 1997; Parkinson 2002; Yerkes 2003a, 2005, 2006, 2009). However, the ceremonial areas were not simply specialized craft production locales as illustrated by Baby and Langlois (1979). This is best illustrated by feature 37 at the Smith site, from which most of the analyzed bladelets were recovered. Recall that this pit feature contained three primary levels of fill each with a unique combination of artifacts (Sunderhaus et al. 2001). Bladelets were only recovered in the upper level. This level also included FCR and heat fractured bifacial tools. The most conspicuous aspect of the middle level was the recovery of thousands of pieces of mica, however, the fill also contained pottery sherds from at least 20 vessels, FCR, and burnt bone. This artifact assemblage is more likely related to numerous types of ceremonial activities—including feasting, adoption, and
gift-giving that may have included the intentional destruction of pottery and stone tools—rather than simply craft production.

**Is there any evidence for variation in the organization of production through time?**

In the following section I present radiometric and stratigraphic data relating to the chronology and temporal relationships of the various contexts examined in this dissertation. While I did have the opportunity to run several new dates, I was fortunate enough to rely greatly on the efforts (and expenditures) of other researchers for much of the data presented. Radiocarbon assays from Fort Ancient are taken from Connolly (2004b:Table 15.1), Riordan (2011:Table 4), and my own AMS results (UGAMS# 13478 and 13479). Radiocarbon assays from Stubbs are taken from Cowan et al. (2003), Cowan and Sunderhaus (2001), and my own AMS results (UGAMS# 13480 and 13481). All radiocarbon calibrations presented here were made using IntCal 9.14 (Reimer et al. 2009). A detailed discussion of previously unpublished radiocarbon assays, dated contexts, and age range calculations is presented in Appendix A. Figure 8.1 does not include ten dates from Fort Ancient with error ranges greater than 100 years (Connolly 2004b:Table 15.1) or two Late Prehistoric dates obtained from the South Fort (Harper 2004:132). Dozens of radiocarbon dates from Fort Ancient reveal that the earthwork was occupied most intensively from about 100 cal. BC to as late as cal. AD 600 (Figure 8.1). The area’s actual occupation, however, may span a much longer time frame as calibrated two sigma date ranges overlap from about 1,000 cal. BC to cal. AD 800 (Figure 8.1). The area was abandoned for 200 to 400 years before Late Prehistoric groups inhabited the South Fort between about cal. AD 1,000 and cal AD 1,600 (Harper 2004:131).
Figure 8.1 Calibrated 2-sigma age ranges for radiocarbon assays from Fort Ancient
Over two dozen radiocarbon dates from Stubbs show two distinct occupation episodes for the area. The earliest occupation is represented by a circular structure, rebuilt at least once, located about 250 m south of the former earthwork walls (Cowan and Sunderhaus 2001). Two dates from the structure suggest it was occupied sometime between 1,400 cal. BC and 900 cal. BC (Figure 8.2). The major occupation of the area spans at least 650 years, from 50 cal. BC to cal. AD 600 (Figure 8.2).

The limited number of contexts examined from Stubbs prevents an examination of changes in the organization of production through time there. Therefore the discussion of temporal changes must be restricted to Fort Ancient.

Moorehead (1890), Essenpreis (Essenpreis and Mosely 1984), and Connolly (1996) all argue that the South Fort represents the earliest earthen construction at Fort Ancient. The only chronometric dates from the South Fort are from radiocarbon assays run on charcoal recovered in soil cores taken from a pond associated with gateway 53 of the South Fort (McLauchlan 2003:Table 1). The South Fort dates, however, are not significantly older than dates associated with other parts of Fort Ancient (Connolly 2004a:Table 15.1). This is because material accumulated in the South Fort ponds throughout the use of Fort Ancient, meaning that these dates do not signal the initial construction of the earthwork. Despite this discrepancy, I am still inclined to agree with other Fort Ancient scholars that the South Fort represents the earliest earthwork construction episode due to the adherence to earthwork grammar rules (Connolly 1996a). However, this needs to be confirmed with additional absolute dates.
Figure 8.2 Calibrated 2-sigma date ranges for radiocarbon assays from Stubbs
The earliest dates from Fort Ancient are associated with a postmold (B-139451) and a hearth (B-139452) excavated in lots 17 and 18 in Gregory’s Field (Cowan et al. 2004:120). The calibrated pooled mean of these two dates puts the early occupation of this area between 794 cal. BC and 508 cal. BC (Figure 8.3). This Early Woodland occupation occurred before bladelets were made and used, thus making it impossible to describe the nature of the occupation based on the current analysis. What these early dates show is that “this place on the landscape may have been ‘special’ for a very long time” (Cowan et al. 2004:120). Hopefully future analysis will reveal the nature of changes, or continuities, in occupation of the Fort Ancient area through time.

Beginning at about 100 cal. BC and continuing until about cal. AD 300 Fort Ancient was a major gathering place for Hopewell groups, as evidenced by numerous overlapping radiocarbon date ranges representing many events and occupations (Figure 8.1 and 8.3).

After removing dates with large error ranges [Gateway 7 (B-740750 and feature 144 in Gregory’s Field (B-139450)] a break does appear in the calibrated date ranges that place Gateway 84, Gateway 18, and possibly the later stages of the Twin Mounds pavement in the late Middle Woodland/Late Woodland period (Figure 8.3). Thus it is possible, based on radiocarbon dates, to distinguish three basic temporal periods at Fort Ancient: Early Woodland 800 cal. BC – 400 cal. BC), Middle Woodland (100 cal. BC – cal. AD 250), and late Middle Woodland/Late Woodland (cal. AD 250 – cal. AD 600?).

In terms of comparing the organization of production through time, nothing can be said about the Early Woodland occupation using bladelet microwear as mentioned
Figure 8.3 Averaged dates from contexts examined at Fort Ancient
above. No bladelets were recovered from features with Early Woodland dates. I doubt other lines of evidence would be any more helpful in this regard as Cowan et al. (2004:120) note that the only temporally diagnostic artifacts of the Early Woodland period recovered in this area were a few ceramic sherds. During the Middle Woodland period the production of craft goods reaches its peak. The items were largely manufactured in domestic contexts although there is substantial evidence for craft production in the Moorehead Circle during this time as well. Each context (Gregory’s Field structures 2 and 3, Twin Mounds, IHC, and the Moorehead Circle) produced objects from distinctive raw materials. Single and averaged radiocarbon dates indicate that all of these localities were contemporaneous (Figure 8.3).

Radiocarbon dates indicate that the Gregory’s Field structures two and three area and the Twin Mounds area may have been occupied into the late Middle Woodland/Late Woodland. The IHC and the Moorehead Circle, on the other hand, appear to have been abandoned by this point. Interestingly, evidence for stone working on bladelets is abundant in Gateways 18 and 84, both of which date to the period immediately after the abandonment of the IHC (an area also high in stone working). While it may be tempting to argue that production of stone objects shifted from domestic to gateway contexts through time the possibility of undiscovered habitation contexts contemporaneous with Gateway 18 and 84 prevents any definitive conclusions (see Cowan et al. 2004:Figure 8.2 and Vickery and Sunderhaus 2004: Figure 12.1 for surface indications of possible domestic contexts). Examining contexts without domestic structures gives an idea of the changing nature of special purpose areas through time. While all of the domestic areas
Figure 8.4 Individual (GW 13, GW 7, GW 18) and averaged (MC, 52/96, GW 84) radiocarbon assays from non-domestic contexts at Fort Ancient
produced overlapping radiocarbon dates, the ranges of calibrated dates from areas without habitation structures usually do not overlap (Figure 8.4). Removing the large date range associated with Gateway 7 produces a temporal progression from Gateway 13 to the Moorehead Circle to Feature 52/96 and finally Gateways 84 and 18. The specific details of the microwear analysis from each context have been presented in Chapter 7 so I will not rehash the results here. Instead I will point out trends in the changing tasks performed with bladelets in these contexts through time.

First, meat/fresh hide butchering remains high throughout time as is the case for all contexts examined at Fort Ancient (Figure 8.5). However, beginning with feature 52/96 in Waterline Trench 6, meat/fresh hide butchering is equaled or surpassed in abundance by bone/antler and stone working. Second, plant cutting is most abundant in the Middle Woodland as evidenced by the results from Gateway 13. Plant cutting then declines with the use of the Moorehead Circle and Feature 52/96 until it is absent in the late Middle Woodland contexts of Gateways 84 and 18. Third, with the decline in plant cutting there is a subsequent rise in stone working beginning with feature 52/96. Fourth and finally, a less well defined pattern shows dry hide working peaking early and declining late with bone/antler working increasing in abundance through time.

The association of plant cutting with early occupations of Fort Ancient suggests that McLauchlan’s (2003) finding of extensive stands of weedy plants within Fort Ancient may be restricted to initial construction phases of the site, when most of the earthwork building and landscape disturbance occurred. On the other hand, the lack of interior pond associations with the later contexts may explain the low occurrence of plant
Figure 8.5 Microwear summary of contexts displayed in Figure 8.4.
cutting as most of the weedy plants would have been found near the ponds (McLauchlan 2003:564). The rise in stone working through time indicates increased craft production activities in these contexts. Perhaps the early use of Fort Ancient was concentrated on provisioning or feasting while later occupations focused on craft production. Ultimately further evidence is needed to substantiate these findings.

Multi item MANs can be used as an additional line of evidence for temporal relationships between contexts at Fort Ancient. I assume that contexts in which bladelets from the same core were recovered were contemporaneous. Of course it is possible that bladelets were collected from previous occupations. Thus the MAN data must be interpreted in light of other lines of evidence when examining temporal relationships.

A single multi item MAN links the Gateway 84 pavement with the activities conducted on the Gateway 18 terrace just outside of the Middle Fort. Radiocarbon dates place both of these contexts relatively late in the occupation of Fort Ancient, suggesting that the connection between the two contexts is legitimate. The Gateway 84 pavement is also linked to structure 8 in the IHC by way of a multi item MAN. Radiocarbon assays from the refuse pit associated with structure 8 (B-111468 1750±60) and the Gateway 84 pavement in unit 18/95 (B-113503 1770±50) are nearly identical, thus strengthening the temporal relationship between the two contexts. Lazazzera (2004a, 2009) argues that most of the structures in the Interior Household Cluster were contemporaneous based on the lack of overlapping features and common orientations. Her argument is bolstered by the observation that nearly all other areas containing evidence for structures at both Fort Ancient and Stubbs show numerous overlapping features and structure walls (Connolly
Thus while Yerkes (2006:61) is correct to argue that non-overlapping features do not prove contemporaneity or sedentism, the marked differences between the IHC and other structure clusters at Fort Ancient and Stubbs strongly suggests a different, less dense settlement pattern. If this is the case then the Gateway 84 pavement was being utilized while groups were living in the IHC.

The IHC is also linked to other contexts through multi item MANs. These contexts include Waterline Trench 6, Gateway 12, and the Moorehead Circle. A bladelet from the backdirt of the Waterline Trench 6 excavation came from the same core as a bladelet from a post associated with structure 1. Additionally, a bladelet from an excavation unit inside of Gateway 12 was produced from the same core as a bladelet from unit 8/96 in the Access Road area of the IHC. The radiocarbon dates from all of these contexts overlap, adding further support for their contemporaneity.

Numerous multi item MANs link units in the Moorehead Circle with those in the Twin Mounds area and structure 8 in the IHC. All all three contexts date to the Middle Woodland occupation of Fort Ancient, suggesting that the shared MANs resulted from people moving in between contemporary structures.

Numerous multi-item MANs link the Gateway 13 area with the Twin Mounds area. The date range from the Twin Mounds largely overlaps with that from Gateway 13, making their association unproblematic. In summary, the MAN data does not contradict the temporal relationships defined by chronometric dates.
The pattern of the shifting use of space and concurrent variations in the organization of production is reminiscent of Lazazzera’s (2009) argument that settlement at Fort Ancient followed a cyclical pattern of aggregation and dispersal tied to the political influence of the earthwork’s inhabitants. However, it is my contention that these shifts were due to tribal cycling in the integrative mechanisms of dispersed tribal groups (Parkinson 2002). A similar type of shifting settlement pattern probably occurred at Stubbs based on the long sequence of radiocarbon dates and extensive evidence for overlapping wooden structures (Cowan 2006; Cowan and Sunderhaus 2001; Cowan et al. 1999, 2003; Sunderhaus et al. 2001). Similar cyclical patterns of settlement nucleation and consolidation are typical of tribal groups worldwide (Fowles 2002; Parkinson 2002).

Lazazzera (2009) argues that the structures in the Interior Household Cluster were occupied, at least partially, by individuals under the position of ritual specialist. Lazazzera (2009:369) does find it curious that “Hopewell Interaction Sphere raw materials and finished items were present only in small amounts” in comparison with other Hopewell households as well as contexts within Fort Ancient. She suggests that individual households on the periphery of the earthworks were able to acquire HIS raw materials and/or produce socially valued goods to a greater extent than those in the Interior Household Cluster (Lazazzera 2009:369). Additionally, Lazazzera (2009:374) suggests that, as ritual specialists, the occupants of the Interior Household Cluster would have had little tangible wealth similar to Mide, and other historic Native American, shamans. Instead ritual specialists redistribute the payments received for their services to other members of their kin group, which at Fort Ancient also lived in the IHC (Lazazzera
Lazazzera’s (2004a:104-105; 2009) contention that high ranking individuals or groups occupied the IHC is also based on the assumption that the IHC structures represent the only domestic structures within the walls of Fort Ancient. In this case they would represent a relatively short period of time in which social stratification increased and only influential ritual specialists were permitted to live within the walls.

On the other hand, there is no evidence for a differential influx of HIS goods into the IHC. Similarly, the ceramic, lithic, floral, and faunal assemblages of the IHC look similar to those in other contexts at Fort Ancient, arguing against the practice of giving gifts to the ritual specialist (Sieg and Sunderhaus 2004; Lazazzera 2004b, 2009; Yokel 2004). In addition, evidence suggests that domestic structures may be much more common within the North Fort than Lazazzera’s scenario suggests (see discussion in Chapter 3 as well as Cowan et al. 2004:Figure 8.2 and Vickery and Sunderhaus 2004: Figure 12.1 for surface indications of possible domestic contexts). Therefore, based on the identification of craft production elsewhere at Fort Ancient, the lack of evidence for payments in turn for ritual services in the IHC, and the identification of other domestic areas within the earthworks, there is no evidence that political factors such as the control of resources or labor drew people to Fort Ancient at the time the IHC was occupied.

Burial data from Fort Ancient also reinforce the existence and maintenance of a corporate, egalitarian ethos through mortuary ritual. Nearly all (95%) of the identified individuals from Fort Ancient were interred in two communal ossuaries outside of the South Fort (Coon 2009:66-67; Moorehead 1890). These burials contained very few grave goods (Moorehead 1890). The mass interments coupled with a lack of grave goods
and burial features, led Moorehead (1890:41) to conclude that the burials were the result of great battles fought at the site after which casualties were quickly buried. Of course, there is little support for Moorehead’s scenario as evidence for interpersonal violence and warfare is exceedingly rare during the Middle Woodland (Hall 1997; Milner 2002). A more likely scenario involves numerous individuals being interred at once during large-scale communal mortuary rituals similar to the Feast of the Dead (Carr 2005b).

Changes in the demographic composition of Fort Ancient and Stubbs were more likely tied to changes in the ritual cycle. Thus the temporal patterns of production and consumption fit models of ritual reciprocity rather than politically motivated redistribution.
Chapter 9: The Organization of Production at Hopewell Earthworks

In this dissertation, I used a ritual economy framework to interpret the material correlates of the organization of production at two Hopewell earthworks. This study is largely about craft production but this process has important implications for the application of a ritual economy framework to the study of small scale societies in general.

Raw materials from far distant, and not so distant, places were imported into Fort Ancient and Stubbs and were subsequently made into finished craft or ritual objects. Numerous craft objects have been recovered from both sites (Cowan 2005; Cowan et al. 2004; Genheimer 2005; Essenpreis and Mosely 1984; Moorehead 1890) suggesting that at least some of these objects were exchanged and discarded locally. This particular postulation has been made before. For example, Braun (1986:121) argues that while raw materials were obtained across long distances, the movement of finished objects was restricted to reciprocal exchange at the earthwork centers. In fact, numerous scholars characterize Hopewell exchange as reciprocal. Hall (1980) argues that ethnographically known dispersed groups exchanged goods reciprocally as a means to create social ties. Hall (1980:433) illustrates this process with an example from the Teton Dakota, horse-riding hunter-gatherers from the Plains. Unable to accumulate wealth due to their mobile lifestyle, the Teton Dakota staged large ritually-mediated reciprocal exchanges of goods to create social relationships in order to buffer against future food shortages. Both Braun

(1986) and Hall (1980)—to varying extents—attribute the upswing in reciprocal exchange during the Middle Woodland period to reliance on horticulture, decreased mobility, and population pressure (see also Seeman 1992). Later, Hall (1997:156) noted that the Hopewell Interaction Sphere was as part of an organizational solution to problems of life in populations subsisting on wild foods with limited gardening.

Exchanges at earthworks were necessary to integrate the dispersed members of complex Hopewell tribes (Yerkes 2002, 2006; see also Parkinson 2002). At least partial reliance on cultivated plants coupled with a dispersed settlement contributed to a conflict between the desire of dispersed households to remain independent and the need to maintain social buffers in times of scarcity. This closely mirrors the ritual of economy scenario outlined in chapter 2 and based in Watanabe’s (2007:304) conflict between “autarkic production and necessary interdependence”. However, this interdependence extends beyond subsistence to other aspects of household reproduction such as the need to attract mates.

The argument that Hopewell social ties created through reciprocal exchange were created and maintained not just for subsistence but also for other social needs has been put forward by Hall (1997) and echoed by Yerkes (2002, 2003a, 2005, 2006, 2009). Hall’s and Yerkes’s arguments, based on ethnographic and ethnohistoric data, receive additional support from biodistance, isotopic, and genetic studies (outlined in chapter 3) that demonstrate a great deal of biological interaction across large geographic areas during the Middle Woodland (Beehr 2011; Bolnick and Smith 2007; Mills 2003; Pennefather-O’Brien 2006). Thus the ritual of economy periodically brought normally dispersed Hopewell groups to earthwork centers to engage in reciprocal exchange for the creation
and maintenance of the social ties necessary for household reproduction. These social ties were based on both biological and fictive kinship as created and reinforced through the ceremonial events (Hall 1997). These exchanges were mediated by participation in ritual to ensure fairness and reciprocation of gifts in a manner directly predicted by the processes outlined in the *ritual of economy*. Individuals and groups were, therefore, not just interacting but integrating into meaningful tribal social units (Parkinson 2002).

The Hopewell *ritual of economy* was a long term process played out at earthworks involving the exchange of socially valued goods—among other items—between interconnected households and kin groups. The materials, time, and labor necessary to participate in these ritualized exchanges illustrate the importance of the *economics of ritual* in Hopewell interactions. Documenting the material correlates of this production has been the main focus of my dissertation. Microwear analysis demonstrated that the production of craft goods occurred in many different contexts at both earthworks. Thus these ceremonials centers were major hubs in the organization of production (i.e., Spielmann 1998, 2002, 2007). Several of these contexts have been defined as domestic space, at both Fort Ancient and Stubbs, although numerous ceremonial activities occurred in and around the earthworks as well. This suggests that domestic groups were tied up in the *ritual of economy* as evidenced by production for the *economics of ritual*.

An important implication highlighted here is that, aside from Gregory’s Field structures 2 and 3, the patterns of production identified would not have been possible without the use of microwear analysis. In other words, there was nothing to suggest that the inhabitants of the IHC were involved in stone working, the inhabitants of the Twin
Mounds area were processing lots of plant material, or the inhabitants of the Stubbs contexts were working bone/antler, stone, and plant materials. All of these contexts had been analyzed and reported by others but these productive activities were never recognized because stone, plant, or bone/antler remains did not occur in inordinate amounts.

The *economics of ritual* certainly included other productive activities not directly addressed here such as monumental construction, feasting, and mortuary activities (Hall 1980, 1997; Seeman 1979; Smith 1992; Spielmann 2002; Yerkes 2005). However, these topics, especially mound construction and mortuary rituals, have received considerably more research attention than the organization of socially valued goods production. Recent comments by Spielmann (2008) and Smith (2006) lamenting the lack of research in this area support this assertion. Now that there is evidence for the organization of craft production, it is possible to compare all aspects of the *economics of ritual* at Hopewell earthworks.

The relatively large numbers of contexts with extensive evidence for craft production suggest that more people were involved in craft production than previously argued by others such as Baby and Langlois (1979). Spielmann’s (2008; 2009) discussions of the various scales of craft production in small scale societies are useful for understanding the patterns of production outlined here. First of all, Spielmann (2008:66) argues, based on ethnographic evidence, that nearly all members of the society were likely involved in some form of ritual production in their lifetime. The ubiquity of craft production evidence in contexts at Fort Ancient and Stubbs may serve as evidence for
this process which also would have included earthwork construction. Additionally, bladelets involved in craft activities were evenly dispersed within domestic contexts at Fort Ancient—especially the IHC and Twin Mounds area—indicating that production was not limited to certain structures, and presumably a limited number of individuals. Spielmann (2008:64) describes this ubiquitous craft production as evidence of groups gearing up for participation in communal ceremonies. Spielmann (2009:185) suggests that relatively large numbers of people could have been involved in producing simple crafts such as mica cutouts or more technically demanding tasks such as copper earspool or textile production. In contrast, Spielmann argues that crafts requiring high levels of skill, such as obsidian bifaces and stone effigy pipes, would have been restricted to those having the advanced knowledge and resources to produce these objects. Evidence for mica and textile craft production has been documented in the IHC and Twin Mounds area respectively while similar items were also produced at Stubbs. Obsidian and crystal quartz tool production was identified in the structures 2 and 3 area of Gregory’s Field and is also evident at the Barnyard site and possibly Smith at Stubbs (Genheimer 2005). Thus, there were numerous types of socially valued goods being produced at various locations throughout the earthworks. Therefore lots of labor, consisting of many different skill sets, was necessary for the communal ceremonial gearing up that occurred at the earthworks (Spielmann 2008:66). In a similar vein, Bernardini (2004) argues that the creation and materialization of meaning associated with Hopewell earthworks occurred through their communal construction—experiential meaning—rather than by reference to their completed, final form—referential meaning. Thus, Bernardini’s argument for the
importance of experiential meaning in Hopewell ceremonialism may extend beyond earthwork construction to craft production as well [see also Swenson and Warner (2012) for a similar argument outside of Hopewell context]. In other words, experiencing Hopewell ceremonialism involved building earthworks and making socially valued goods by most or all of the individuals gathered at earthworks, not just ritual specialists or aspiring aggrandizers. It is possible to extend this argument to include mortuary behavior as well considering the large-scale, communal nature of most burials at Fort Ancient (Moorehead 1890).

Therefore, the production of, or more accurately the experience of producing, socially valued goods may have been more important for the ritual of economy than the finished goods themselves. In other words, because production occurred at the earthworks with, or at least within sight of, other members of tribal groups the process of production may have served to form social ties and integrate the members of these dispersed societies as much as the exchanges did. If this is the case, the model of the ritual of economy, outlined in Chapter 2 and based largely on Watanabe’s (2007) discussion, may need to be amended to include investments of labor and materials as catalysts toward integration and interdependence in addition to exchange.

The scenario outlined for Fort Ancient and Stubbs highlights the interconnection between the ritual of economy and the economics of ritual. Independent households were drawn to the earthworks in order to create trustworthy social ties through participation in communal ritual and reciprocal exchange. These exchanges were fueled by intensified
production of socially valued goods organized and orchestrated by these independent groups’ ritual participation. Ultimately, the *economics of ritual* documented at Fort Ancient and Stubbs—and probably at work in numerous small scale societies throughout time—were probably more about the creation of relationships than the creation of objects. Ritual economy’s focus on the materialization of these relationships allows archaeologists to reconstruct complex social processes by tracing economic processes recorded in materials recovered in archaeological assemblages.

**Future Research**

Rather than being the final word on Hopewell ritual craft production I hope this dissertation serves as a platform for future studies. As the prominent physicist John Archibald Wheeler observed, “As our island of knowledge grows, so does the shore of our ignorance”. My dissertation has created several new shores of ignorance that I outline below as necessitating further exploration.

First and foremost, studies of this nature are needed at other Hopewell earthwork and mound centers. The days of viewing Hopewell remains as part of one homogenous entity distributed across all of the Eastern Woodlands are long gone. Just as there are regional variations in material remains there may well be variations in the organization of production. Of course there may even be variation within regions. For example, there is no reason to assume that the patterns identified in the Little Miami Valley are typical of the organization of production in the Scioto River Valley of central Ohio. Thus, a great deal of work remains to be done before a full picture of Middle Woodland craft production emerges. I do not necessarily advocate the undertaking of large-scale
microwear projects at all Hopewell earthworks. Ultimately a research strategy should be implemented that maximizes the data extraction from the available assemblages. However, this study highlights the difficulty of trying to describe Hopewell craft production based solely on artifact or feature distributions. For example, no previous lines of evidence the IHC as a center for stone working or the Twin Mounds area as a plant processing locus. As Yerkes (2003a:19) remarked, “[t]he Hopewell do not reveal their secrets easily” and multiple lines of evidence must be examined before making conclusions.

One way to bolster the interpretation of plant based craft production in the Twin Mounds area and elsewhere in the Hopewell universe would be through residue studies. For example, starch grain analysis could be performed on tools or pottery and phytoliths could be identified from soil samples. Identification of the types of plants processed, either from samples from tools or features, would provide more detailed interpretations of plant processing activities. The identification of families, genera, or species of plants through these analyses would provide a nice compliment to studies identifying macrobotanical remains or the fibers used in textiles. Similar studies of protein residues from stone tools have the potential to differentiate between their use for everyday subsistence and for the preparation of feasts. All of these analyses would require newly excavated samples that have not been contaminated by human contact or washed clean of all residues.

Another area in need of additional research is the settlement pattern in the Little Miami Valley. The Dispersed Sedentary Community model of Hopewell settlement
patterns argues that habitations were located outside of but near earthworks (Dancey and Pacheco 1997; Pacheco and Dancey 2006). Earthworks were gathering places for people living in their immediate vicinity. Thus, earthwork gatherings would have been relatively brief and people would not have required substantial domestic architecture. Most of the known archaeological remains from Hopewell earthworks, especially in central Ohio (see chapters in Lynott 2009), fit this pattern. Throughout Ohio, wooden structures within earthworks are almost exclusively limited to large charnel houses (but see Baby and Langlois 1979; Lepper and Yerkes 1997).

The major exception to this rule occurs in the Little Miami Valley, specifically at Fort Ancient and Stubbs. At these two earthworks dozens of structures have been excavated within, or just outside of, the earthen walls. Many of these structures are argued to be habitations in the same category as the typical Hopewell hamlet described in the Dispersed Sedentary Community model. The excavators of these sites have used these data to challenge the applicability of the Dispersed Sedentary Community model in the region (Connolly 1997; Cowan 2006; Sunderhaus et al. 2001).

It is difficult to envision exactly how these structures relate to other settlements in the valley because other excavated settlements are exceedingly rare. The closest excavated structure is from the Twin Mounds site at the confluence of the Great Miami and Ohio Rivers (Dancey and Pacheco 1997:Table 1.1). In other words, outside of Fort Ancient and Stubbs, there are no other excavated non-mortuary structures in the entire Little Miami River Valley. This oversight needs to be remedied in order to provide comparative data with which to interpret the structures at these earthworks.
It is my hope that this dissertation spurs more research into the processes outlined herein.
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Appendix A: Radiocarbon Determinations and Chronological Sequencing

In this section I present my methods of evaluation and aggregation of radiocarbon assays from various contexts at Fort Ancient and Stubbs. Contexts with single radiocarbon dates presented elsewhere (i.e., Gateway 7, Gateway 18, and feature 144 in Gregory’s Field) are not discussed as the single date is seen as representative of the context. Additionally, dated contexts without associated bladelets examined in this study are not discussed.

I will begin by presenting the four new AMS dates that I ran on carbonized nutshell from three different contexts. Two previous radiocarbon assays for feature 52/96 in Waterline Trench 6 within Fort Ancient returned essentially modern dates (Lazazzera 2009:198). In order a temporal fix on this important feature two samples of carbonized nutshell were subjected to AMS dating (Table A.1). The sample from level 12 (UGAMS# 13478) returned a two sigma calibrated range of cal. AD 117 – AD 242 (93.4%). The sample from level 4 (UGAMS# 13479) returned a two sigma calibrated range of cal. AD 134 – AD 325 (100%). The two dates are statistically identical although, conveniently, the date from the lower level is slightly older. The pooled mean for the two dates is 1810 ±19 putting the accumulation of feature 52/96 between cal. AD 133 and 248.
Table A.1: AMS results from Fort Ancient And Stubbs

<table>
<thead>
<tr>
<th>UGAMS#</th>
<th>Context</th>
<th>Material</th>
<th>$^{14}$C age, years BP*</th>
<th>±</th>
<th>Cal 2-sigma</th>
</tr>
</thead>
<tbody>
<tr>
<td>13478</td>
<td>33WA2 Fea. 52/96 level 12</td>
<td>carbonized nutshell</td>
<td>1840</td>
<td>30</td>
<td>AD 117-AD 242 (93%), AD 85-AD 110 (7%)</td>
</tr>
<tr>
<td>13479</td>
<td>33WA2 Fea. 52/96 level 4</td>
<td>carbonized nutshell</td>
<td>1790</td>
<td>25</td>
<td>AD 134-AD 260 (80%), AD 281-AD325 (20%)</td>
</tr>
<tr>
<td>13480</td>
<td>33WA765 TU 1 Level 2</td>
<td>carbonized nutshell</td>
<td>1750</td>
<td>30</td>
<td>AD 219-AD 388</td>
</tr>
<tr>
<td>13481</td>
<td>33WA362 Fea 37</td>
<td>carbonized nutshell</td>
<td>1750</td>
<td>25</td>
<td>AD 231- AD 359 (97%), AD 365-AD381 (3%)</td>
</tr>
</tbody>
</table>

*all dates corrected for isotopic fractionation
Previous radiocarbon assays from the Smith site (33WA362) yielded disparate results (Cowan et al. 2003). Feature 37, the large pit at the northern end of the site from which most of the analyzed bladelets were recovered, yielded ranges of cal. AD 57 – AD 383 (100%) on wood charcoal (ISGS-5440) and cal. AD 529 – AD 720 (90.8%) on carbonized nutshell (ISGS-5441) (Cowan et al. 2003:Table 1). As the two dates from the feature do not overlap at two sigma and the nutshell date is post-Hopewell a third date was run to clarify the age of the pit. An AMS assay (UGAMS# 13481) on carbonized hickory nutshell from the feature returned a two sigma calibrated date range of cal. AD 231 – AD 359 (96.7%). This date is in line with the latter portion of the wood charcoal range and still outside of the two sigma range of the previous nutshell date. The disparate dates from the two nutshell fragments are hard to reconcile. As the wood charcoal and my AMS nutshell date possess a great deal of overlap at two sigma, I am inclined to argue that the later nutshell date (ISGS-5441) is the result of later reuse or contamination.

No dates had previously been run for 33WA765. As no suitable organic material was recovered from the unit that contained all of the bladelets (TU 2 level 2), an AMS assay (UGAMS# 13480) was run on carbonized nutshell from an adjoining unit (TU 1 level 2). The date was basically identical to the AMS date from feature 37 at the Smith site with a calibrated two sigma range of cal. AD 219 – AD 388 (100%).

In the Gateway 13 Area, five radiocarbon assays have been processed (Figure A.1). While one date (B-56269) is slightly older than the others, the pooled mean range still overlaps all dates in this area. Thus cal. BC 118 – cal. AD 75 is a good estimate for the activities in Gateway 13.
Figure A.1 Calibrated radiocarbon date ranges for Gateway 13.
Two separate contexts within the Twin Mounds Area have been directly dated. The possible drainage trench just north of the northern most of the Twin Mounds yielded a date with a two sigma range of 394 cal. BC to cal. AD 428 (B-15161). This date is useful in that it puts the feature in a Woodland period context but it is essentially useless for intrasite comparison due to the large error range. Three dates are available for the excavation block that uncovered structures and limestone pavements east of the Twin Mounds. The earlier dates, associated with stratigraphically lower contexts, are squarely within the Middle Woodland period. The later date, associated with the upper pavement falls within the Late Woodland. Combining all three dates to create a pooled mean is not practical as the average date range falls in a gap between the three original dates (Figure A.2). The sum probabilities distribution more closely represents the original date ranges (Figure A.3). Based on this calculation, the earlier occupation likely occurred between 58 cal. BC and AD 255 (66%). Because it is only based on one date, the Late Woodland occupation sum probabilities range is essentially the same as the original calibrated date (B-117904). Stratigraphic data in this area shows extensive evidence of rebuilding, both of structures and pavements. Combining the chronometric and stratigraphic data for the Twin Mounds Area demonstrates that the area was utilized throughout most of the, if not the entire, Middle Woodland occupation of Fort Ancient.

In the IHC, six radiocarbon assays were run on samples taken from features in the Museum and Garden Exhibit areas. These dates all overlap at one sigma and the plot in Figure A.4 demonstrates that the pooled mean provides a good representation of these dates. This average date places the occupation of the IHC between 124 and 245 cal. AD
Figure A.2 Calibrated radiocarbon date ranges for the Twin Mounds area.
Figure A.3 Calibrated radiocarbon date ranges for the Twin Mounds Area
(98.5%). While the distinction is relatively arbitrary the Water Treatment/Access Road area evidence of stratigraphically earlier occupations than the IHC. Thus it is not surprising that the six dates from features in this area have a wider range than those in the Museum and Garden areas (Figure A.5). A pooled mean of the dates from the Water Treatment/Access Road area returned a slightly earlier date range of 1 cal. BC – cal. AD 89 (91.7%). As later structure forms in this area mimic those found in the rest of the IHC it is likely that the Water Treatment/Access Road area was used for an extended period of time. Therefore the sum probabilities of the carbon dates may be a better indication of the duration of this occupation. The sum probabilities places the occupation of this area from 382 cal. BC – cal. AD 260 (96.9%).

As of the end of 2009, Riordan (2011: Table 4) had run 13 radiocarbon assays from various contexts within the Moorehead Circle. The majority of the dates fall squarely within the Middle Woodland period (Figure A.6). The radiocarbon dates indicate a possible Late Woodland reoccupation of the area between cal. AD 400 and AD 600 based on dates from a postmold (B-225389) and pit feature (B-225390). As the Late Woodland occupation once again would not have involved bladelet use, those two dates were removed during the calculation of the pooled mean. The pooled mean for the remaining 11 dates places the use of the Moorehead Circle between cal. AD 74 and AD 131. The pooled mean range overlaps the two sigma range of 10 of the 11 dates, therefore making it a good estimate of the Moorehead Circle use-life.
Figure A.4 Calibrated radiocarbon date ranges for the Museum and Garden Exhibit areas of the IHC
Figure A.5 Calibrated radiocarbon date ranges for the Water Treatment/Access Road area of the IHC.
Figure A.6 Calibrated radiocarbon date ranges for the Moorehead Circle
Seven radiocarbon assays have been run on charcoal recovered from the excavations in Gateway 84 (Figure A.7). Four of these (samples I-3378 through I-3381) returned error ranges well in excess of 100 years, and are therefore not included here due to the existence of a separate round of more reliable dates. While Gateway 84 shows evidence of sequential construction over time, the three remaining date ranges all overlap suggesting—along with the lack of accumulated A-horizon soils between the embankment wall forms—relatively continuous modification of the walls. This in turn makes the pooled mean an accurate measure of the chronological placement of the area.
Figure A.7 Calibrated radiocarbon date ranges for Gateway 84.
Appendix B: Examples of Microwear Traces on Experimental and Archaeological Bladelets

All of the following photographs were taken with an Olympus digital camera affixed to an Olympus model BHM incident light metalurgical microscope. The replica bladelets used in the experiments were knapped by Bill Pickard of the Ohio Historical Society using Wyandotte and Flint Ridge flints.
Figure B. 1 A) edge of unutilized replica bladelet made from Wyandotte flint viewed at 125x magnification; B) generic weak polish on lateral edge of replica bladelet used to engrave mica for 5 minutes (magnification 125x); C) generic weak polish on distal bladelet segment (OHS cat. # 2405.230) from Gateway 84 (magnification 187.5x); D) meat polish from experimental flake used to butcher white tailed deer (magnification 187.5x); E) meat/fresh hide polish on medial bladelet segment (OHS cat. # A1039 703.01) from the Twin Mounds Area (magnification 187.5x); F) meat/fresh hide polish on proximal bladelet segment (OHS cat. # A1039 1102.40) from the Twin Mounds Area.
Figure B.2 A) Experimental bladelet used to scrape dry hide for 30 minutes; B) Medial bladelet segment (OHS cat #. A1039 703.04) recovered in the Twin Mounds Area displaying edge rounding and pitted polish characteristic of scraping dry hide; C) Medial bladelet segment (OHS cat. # A1039 2325.60) from Gateway 84 used to cut dry hide; D) Proximal bladelet fragment (OHS cat. # A1039 2325.115) recovered in Gateway 84 used to scrape dry hide; E) Distal bladelet segment (OHS cat. # A1039 2893.23) from feature 316 in the IHC displaying characteristic dry hide scraping microwear; F) Medial bladelet fragment (CMC cat. # A62847.14) from feature 37 at the Smith Site with dry hide scraping microwear. All magnifications 187.5x.
Figure B. 3 A) Experimental bladelet used to engrave wet bone for 15 minutes; B) Polish and edge damage from scraping bone/antler on medial bladelet segment (OHS cat. # A1039 533.02) from the Twin Mounds Ditch; C) Polish from scraping bone/antler on a complete bladelet (OHS cat. # A1039 2453.02) recovered from a post hole in the IHC; D) Microwear from engraving bone/antler on proximal bladelet segment (CMC cat. # A62847.34) from feature 37 at Smith; E) Polish and edge damage from drilling bone/antler on medial bladelet segment (CMC cat. # A62847.104) from feature 37 at Smith; F) Bone/antler polish from engraving on proximal bladelet segment (CMC cat. # A62850) recovered in feature 81 at Smith. All magnifications 187.5x except E 250x.
Figure B. 4 A) Experimental bladelet used to saw green Willow branch for 15 minutes; B) Polish from scraping wood on distal bladelet segment (OHS cat. # A1039 674.06) recovered in the Twin Mounds Area; C) Polish from cutting soft wood on medial bladelet segment (OHS cat. # A1039 2250.09) from a pit in the IHC; D) Microwear from scraping wood on distal bladelet segment (OHS cat. # A1039 2869.21) from the IHC; E) Polish from sawing wood on distal bladelet segment (OHS cat. # A1039 2893.22) from feature 316 in the IHC; F) Microwear from engraving wood on proximal bladelet segment (OHS cat. # A1039 3724.01) recovered in an ash filled pit in the IHC. All magnifications 187.5x except F 250x.
Figure B. 5 A) Experimental bladelet used to cut wild grass for 30 minutes; B) Plant cutting microwear on medial bladelet segment (OHS cat. # A1039 1102.03) from the Twin Mounds Area; C) Polish from scraping plant material on distal bladelet segment (OHS cat. # A1039 1134.14) from Twin Mounds; D) Polish from cutting soft plant on medial bladelet segment (OHS cat. # A1039 564.03) recovered in the Twin Mounds Ditch; E) Polish from cutting soft plant on proximal bladelet segment (OHS cat. # A1039 2832.31) from the IHC; F) Polish from cutting soft plant on proximal bladelet segment (CMC cat. # A62847.33) from feature 37 at Smith. All magnifications 187.5x.
Figure B. 6 A) Experimental bladelet used to engrave mica for 15 minutes; B) Proximal bladelet fragment (OHS cat. # A1039 2198.16) from a posthole in the IHC used to engrave stone; C) Distal bladelet segment (OHS cat. # A1039 2882.03) from the IHC used to engrave stone; D) Distal bladelet segment (OHS cat. # A1039 2899.07) from feature 316 in the IHC used to engrave stone; E) Proximal bladelet segment (OHS cat. # A1039 3345.03) from Waterline Trench 6 used to engrave stone; F) Medial bladelet segment (CMC cat. # A62847.103) from feature 37 at Smith used to engrave stone. All magnifications 187.5x.
Figure B. 7 A) Experimental bladelet used to engrave shell for 15 minutes. Magnification 187.5x; B) Same as A but magnification is 250x; C) Medial bladelet segment (CMC cat. # A42418.25) from Gregory’s Field surface used to engrave shell. Magnification 187.5x; D) Same as C but magnification is 250x; E) Hafting bright spot on proximal bladelet segment (OHS cat. A1039 1467.39) from Twin Mounds. Magnification 187.5x; F) Hafting striations on complete bladelet (OHS cat. # 1238.62) from Twin Mounds. Magnification 125x.