Maize and Mississippian Beginnings

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The adoption and intensification of maize (*Zea mays*) farming has long been a topic of interest in Mississippian archaeology. At various times throughout the development and definition of "Mississippian" as a cultural tradition, maize has been cast as a central feature of Mississippian adaptation, alongside a suite of other traits that include long-distance exchange, platform mound building, and the development of ranked social systems (see Wilson and Sullivan, this volume). In (re)considering the topic of Mississippian beginnings, we continue to interrogate the nature of the relationship between maize farming and Mississippian origins. An archaeological review of regional patterns of plant production (archaeobotanical results) and plant consumption (isotopic results) reveals that Mississippians throughout southeastern and midwestern North America produced and consumed maize but varied significantly in their levels of production and consumption (see also Scarry 1993a). Nearly 40 years of research on maize adoption and intensification in the Greater Southeast/Midwest has revealed a significant amount of variability with regard to the timing of maize adoption and intensification, the level of maize reliance (in terms of maize abundance and ubiquity, and also in relation to other significant plant foods), the varieties of maize grown, and the cultivation strategies employed in any given region. Moreover, archaeologists have increasingly realized that maize cultivation practices are best understood within the context of broader plant-food production strategies, including the cultivation of indigenous starchy seed crops (e.g., Fritz and Lopinot 2003; Johannessen 1984, 1993; Lopinot 1992; Scarry 2008).

In this chapter we synthesize the extensive archaeobotanical and isotopic research in the Eastern Woodlands in order to consider the numerous ways in which diverse early Mississippian groups used plant foods (including maize)

to negotiate their social, political, and economic relationships, in a time of heightened long-distance interactions between disparate peoples, intensified ritual practices, and the creation of new communities, social identities, and leadership positions. Our goal is to explore how plant use may have fueled interactions across various regions in the Eastern Woodlands during the Mississippian emergence; thus, we present both general and regional findings. More than 20 years have passed since Scarry (1993a) explored regional variability in the timing of both maize intensification and the development of early Mississippian sociopolitical complexity. Regional archaeologies have been fleshed out in greater detail since then, and we now have archaeobotanical data from some regions about which we could only speculate at the time of Scarry's original analysis. Ultimately in this review, we highlight a great deal of variability in plant food production and procurement strategies across the early Mississippian Southeast and Midwest. We draw attention to the importance of situating local processes and sociopolitical histories when considering the role of maize in Mississippian beginnings.

Theorizing Intensive Food Production

An updated picture emerges from the past few decades of archaeobotanical and isotopic research when considering the role(s) of plants in the development of Mississippian societies. Plant cultivation, including intensive maize cultivation, played variable roles in early Mississippian societies, some of which were not necessarily related to hierarchy or aggrandizement. Certainly, evidence from several Mississippian regions has revealed a correlation between the presence of a hierarchical regional polity and evidence for maize intensification at some point during the polity's developmental history (Kidder and Fritz 1993; Lopinot 1992, 1994, 1997; Raymer and Bonhage-Freund 2000; Scarry 1993a, 1993b). Some of the explanations explored for maize intensification include the development of a tributary economy, competitive feasting by aspiring elites, population pressure, and labor trade-offs related to harvesting maize versus starchy seeds (Fritz 2000; Holt et al. 2010; Jackson et al. 2016; Lopinot 1992, 1994; Nassaney 1987; Scarry 1986, 1993a, 1993b; Smith and Cowan 2003; VanDerwarker et al. 2013; Welch and Scarry 1995). Most models for the development of sociopolitical hierarchies in early Mississippian polities rely on emerging elites' ability to control and distribute agricultural surplus (e.g., Welch 1991). However, in the cases of the three largest Mississippian polities that we discuss in this chapter (Cahokia, Moundville, Etowah), intensive plant food production (whether maize or indigenous grains) preceded the forma-

tion of regional hierarchies. In certain cases, plant food production appears to have been intensified around the same time as the establishment of local and regional political hierarchies (which varied in scale, e.g., the Central Illinois River Valley and the Central Mississippi Valley), and in other cases, political complexity emerged in the context of wild food procurement (e.g., the Lower Mississippi Valley). That these various scenarios could occur throughout the Eastern Woodlands within the same general time frame indicates that complex forms of social organization are not prerequisites for the intensification of food production (*sensu* Ford 1985a:14; see also Buikstra and Milner 1991; Gremillion 2003).

As noted by Scarry (1993a:88; see also Johannessen 1993; Lopinot 1992), rather than having a causal role in the emergence of social hierarchies, changes in plant food cultivation likely were embedded in the changing social relations that eventually led to the development of those hierarchies. In situations where the intensification of plant food production preceded regional political consolidation, aspiring groups appear to have been able to leverage surplus food for political gain, investing in ceremonial feasts and crafting (e.g., at Moundville, see Scarry 1993a:88). However, it is important to emphasize the role of preexisting local kinship systems in relation to subsistence labor and resource allocation, which would have put a ceiling on the ability of any group to mobilize a surplus for purely political purposes (see Cobb 1993:47). At large centers like Cahokia, Moundville, and Etowah, plant food intensification may not have been orchestrated by those aspiring to *create* political hierarchies; rather, it likely occurred in the contexts of larger social/religious negotiations. The political dimensions of intensified food production that occurred in the Early Mississippian period were probably pursued alongside traditionally acceptable parameters (including ritual events) but ultimately reached an exaggerated scale, resulting in unintended consequences for the participants involved (see Pauketat 2000a, 2000b).

Food surpluses (made possible through intensive cultivation) are often used to support larger social and ritual events, in addition to funding large building/monument constructions and feeding larger, more sedentary populations. Many scholars emphasize the political and economic roles of prominent types of ritual negotiation—feasts—in creating and reinforcing power and status differences (e.g., Blitz 1993; Dietler 2001; Phillips and Sebastian 2004; Pollock 2003; VanDerwarker 1999; Wiessner and Schiefenhövel 1998; Welch and Scarry 1995). While some early Mississippian peoples certainly engaged in hierarchical negotiations involving foodways (including large-scale feasting events) to emphasize power or status differences, others likely participated in commen-

sal events that reinforced shared group identities and traditions (see Maxham 2000, 2004; Pollock 2012; Potter 2000; Potter and Ortman 2004; Scarry et al. 2016; Wilson et al., this volume). Neither scenario is mutually exclusive; attempts at increasing solidarity within communities and emphasizing differences among their members through commensal activities likely happened simultaneously in the formation of early Mississippian societies (see VanDerwarker et al. 2016 for recent review of plant foods and commensal politics in the paleoethnobotanical literature).

The myriad ways in which people produced and used plants (including maize) during the early Mississippian period indicate a complex relationship among people, plants, power, status, economy, ritual, tradition making, and community formation that is best understood within a region's particular sociopolitical history. There are several key details that should be examined with respect to understanding the diverse roles of plant cultivation in Mississippian beginnings. Thus, in the remainder of this chapter, we consider several issues, including: the timing of adoption and intensification of maize in the greater Southeast and Midwest; how regional patterns of adoption and intensification have been interpreted; variability in the abundance and ubiquity of maize (both within and between regions); and cultivation strategies. Following this overview, we present a region-by-region discussion that places the role of plant cultivation within the region's broader sociopolitical context. While we would like to consider all of the regions included as case studies in this volume, we are necessarily limited to those regions that have produced a good record of archaeobotanical and/or isotopic data. In addition, due to constraints on space, we have not incorporated a review of the Mississippian polities that emerged in Florida (e.g., Fort Walton) or the Tennessee/Kentucky Cumberland region into our broader discussion. Nor do we address similar developments in the Caddo or Fort Ancient regions, although these areas share broad similarities with contemporaneous Mississippian societies and are presented as cases in this volume (see Cook and Price 2015; Cook, this volume; Du Vernay and White, this volume; Reigner, this volume).

It is important to keep in mind that while Mississippian groups all grew maize to some extent, maize itself is not a necessary and sufficient criterion for identifying Mississippian as a cultural category. Maize production and consumption in southeastern and midwestern North America were not restricted to Mississippian societies, as there is clear evidence of adjacent culture groups (e.g., Caddo, Fort Ancient) adopting and intensifying maize alongside their Mississippian neighbors, along with more distant peoples (e.g., Puebloan, Algonquian) throughout the continental United States. Moreover, wild plant

foraging and hunting continued to remain important subsistence strategies alongside plant cultivation throughout the Southeast and Midwest. However, the introduction and intensification of maize in combination with other native cultigens had profound implications for early Mississippian groups, resulting in major changes in labor and scheduling (largely tied to the growing season), ties to/organization of the landscape, gender roles, and more (Scarry 2008; Simon 2014).

Situating Maize in the Eastern Woodlands

Recent microbotanical research has documented the presence of maize phytoliths in New York State as early as 300 BC, and even earlier in Michigan, between 400–350 BC (Hart et al. 2012; Raviele 2010).[1] Recent findings from Quebec have returned similar dates (circa 400–200 BC) for maize phytoliths (St-Pierre and Thompson 2015). Until recently, the earliest directly dated *macro* maize remains (170 BC.–AD. 60) were thought to come from the Middle Woodland Holding site in the American Bottom region of western Illinois (Riley et al. 1994). However, this purported maize kernel recovered from Holding has recently been stripped of its taxonomic status as maize; recent carbon isotope analysis has returned a $\delta^{13}C$ value inconsistent with typical maize values (Simon 2017, personal communication). Given the new status on the Holding "maize" specimen, the earliest macro maize remains now appear to come from several sites in Tennessee (Jernigan II, Ewell III, and Icehouse Bottom), dating between 200 BC and AD 200 (Crites 1978; Chapman and Crites 1987; see also Riley et al. 1990). There is a general consensus that maize was imported into the Eastern Woodlands from the American Southwest (Ford 1981, 1985a, 1985b; Fritz 2000; Hart 1999; but see Riley 1987 and Riley et al. 1990 for a contrasting view), making its way across the Plains and into the Midwest via native exchange networks (Ford 1981, 1985b). This process of maize introduction must have occurred many times (Ford 1981; Hart 1999; see also Lusteck 2006). A small handful of seeds from a single southwestern maize population would not contain a representative sample of the founding population's genetic diversity, resulting in a founder effect in the introduced sample (Hart 1999: 149–150). According to Hart (1999:152–153), this phenomenon, coupled with new environmental/growing conditions, would have resulted in a high rate of failure among founding maize populations because of inbreeding depression, which leads to significant decreases in yields. Based on this population genetics perspective, Hart (1999) argues that maize would have had to have been introduced repeatedly to overcome bottlenecks that limited the range of genetic diversity

with each introduction (see also Simon 2014). Thus, it should be expected that maize would be represented across the Eastern Woodlands by multiple lineages and varieties (Hart 1999). Indeed, a recent pilot study by Lusteck (2006) of maize phytoliths sampled from artifacts recovered throughout the Southeast has identified a minimum of two different maize lineages, with the implication that more will likely be recognized once a larger sample is analyzed. There is also abundant macrobotanical evidence of at least two different varieties grown during the Mississippian period (see below).

Most researchers argue that maize was added as a dietary supplement to existing subsistence regimes (e.g., Parker and Scott 2003; Reber and Evershed 2004), a conclusion supported by the significant lag between maize's introduction into the Eastern Woodlands (circa 400 BC to AD 200) and its elevation to staple status (post–AD 900 [see Fritz 1992]). A variety of explanations have been offered to account for why native southeastern groups initially adopted maize, and for why there was a 600–700-year period following its introduction during which it remained relatively marginal in the diet. Ford (1981, 1985a) originally proposed that maize entered the broader region as simply another garden crop added to the existing starchy seed complex that served as additional insurance against the failure of seasonal nut mast and periodic hunts. Fritz (2000:231) reiterates this perspective by characterizing maize's adoption as part of a risk reduction strategy that included food production as a means to increase contributions to seasonal food storage.

However, a recent study by Mary Simon (2014) involving direct dating of maize remains from pre-Mississippian contexts throughout the American Bottom and the Illinois Valley has revealed that, with very few exceptions, these macro maize fragments are much more recent than originally presumed, postdating AD 900. These findings strongly suggest that maize use prior to AD 900 was minimal, confined to less than a handful of sites in the broader Midwest and Southeast, and was not "part of any Late Woodland subsistence economies in [the Midwestern] region" (Simon 2014:119; see also Smith 1989). One of the outcomes of Simon's study is the finding that maize was not gradually incorporated into the diet over a long period of time; rather, it was rapidly adopted into early midwestern Mississippian economies, where it quickly became a dietary staple.

The lag between maize's initial introduction (based on the phytolith data) and its intensification is less well understood. Fritz (1992:29) argues that maize would have required a gradual period of adaptation to local growing conditions before producing sufficient yields to warrant intensification, and that it is this period of adjustment that accounts for the lag between when maize was initially adopted and when it was later intensified. Hart's (1999) discussion of

repeated introductions of maize to overcome genetic bottlenecks (see above) dovetails well with Fritz's argument. Another interpretation for this lag has been offered by Scarry (1993a:90), who suggests that early maize was a sacred food, and thus its limited spread and abundance in some archaeological contexts for hundreds of years may reflect the intentional restriction of its usage (but see Lopinot 1997). Scarry (1993a:90) argues that most Eastern Woodlands contexts in which early maize remains are found are associated with exotic/ritual objects or in areas of ceremonial importance, such as mounds or plazas (see also Johannessen 1993). There is no reason to think that these two explanations (time needed for maize to reach a productive threshold in a given environment and maize as ritually significant) are incompatible. Certainly there were biological and environmental constraints related to early maize production, and undoubtedly maize also acquired complex and varied cultural meanings within the regions into which it was adopted. Simon (2014) suggests that it may be problematic to attribute ritual significance to maize until well after it became a major dietary staple, at least in the lower Midwest; she argues that "Late Woodland people, without a long tradition of growing and relying on [maize], would not have viewed maize as the 'corn-mother,' unless that concept arrived with the plant" (Simon 2014:121). Nevertheless, it is possible that maize's very *newness* may have contributed to its early ritual status.

Regardless of the timing of *initial maize adoption,* it is clear that maize started to become a *significant component* of regional subsistence economies in the lower Midwest and the Southeast sometime after AD 900, corresponding with the development of Mississippian societies. As discussed above, the growing body of research focused on maize and Mississippian societies has made it increasingly clear that explanations for the presence and intensification of maize in areas of political development cannot be generalized for all cases and instead must be evaluated on a region-by-region basis. In addition to the timing of adoption and intensification, other factors relating to maize production (e.g., varieties grown and cultivation strategies) also varied by region. Scarry and Scarry's (2005; see also Scarry 1993b) review of southeastern ethnohistory as it pertains to native farming reveals that most groups grew at least three different varieties of maize with different maturation rates (Fritz 1990, 1992; Scarry 1994)—farmers grew both flour and flint varieties, which were used for different purposes (e.g., eaten green, dried and stored, ground into flour, processed into hominy). Cultivation strategies also varied by village and region in terms of scale/organization of production. Ethnohistoric evidence (Hann 1986; Hudson 1976; Swanton 1946) and biomechanical skeletal markers of (possible) hoeing and pounding (Bridges 1991) indicate that women were the primary

food producers, in terms of both farming and food preparation (see Scarry and Scarry 2005 for summary). At contact, southeastern farmers practiced poly-cultivation of maize, beans, and squash using an extensive shifting field strategy that varied in scale, including some rather expansive farming systems (Scarry 2008:396; Scarry and Scarry 2005:206). Native cultigens (e.g., starchy and oily seeds) were most likely planted in dense, pure stands or in discrete zones within fields or gardens, depending on the scale of production (Scarry 2008:398). Farmers practiced a dual strategy of production/storage for both the household and the community, but the implementation of this strategy varied from group to group; for example, some groups might have cultivated family fields and communal fields while others may have simply cultivated a single set of fields and set aside a portion of the produce for storage in community larders (Scarry 2008:396; Scarry and Scarry 2005:263–264).

Although ethnohistoric documents provide interpretive richness not available to us archaeologically, it is important to remember that the observations recorded therein were made hundreds of years after maize became a primary staple in the diets of native southeastern groups. We must be cautious not to simply ascribe contact period production strategies to early Mississippians. Archaeologically, we can document regional variation in the abundance and ubiquity of maize (using standard density and ubiquity measures) as well as the overall dietary importance (using stable carbon isotopes and comparative ratios of maize relative to other plants). Although we are limited to these particular lines of reconstruction during the late prehistoric period, the ethnohistoric evidence reminds us that these archaeological signatures reflect broader cultural and economic patterns regarding the organization of production in both fields and villages. With these issues in mind, we shift our focus to the regional level, beginning with the Mississippi Valley, then moving south and east. Our goal is to explore regional variation in maize production in order to identify commonalities and dissimilarities that allow us to better understand connections between the intensification of food production and the shifts to sociopolitical complexity documented throughout the early Mississippian world.

Regional Patterns of Maize Adoption and Intensification

In synthesizing current information on regional patterns of maize use from the Eastern Woodlands, we focus primarily on archaeobotanical and isotopic data, as well as on the interpretations researchers have drawn from these data. Besides highlighting variation between regions of the greater Midwest and Southeast (see Figure 1.1), we call attention to the significant intraregional

variation that has been observed by scholars. We document current understanding for: (1) when maize was adopted; (2) if and when maize was intensified; and (3) the overall contribution of maize to the diet, situating maize use within each region's specific social, economic, environmental and/or political circumstances. It is important to keep in mind that some regions have been investigated more thoroughly than others, resulting in a patchy coverage of these issues in some cases.

The American Bottom

We begin our survey in the American Bottom region of southwestern Illinois, the area with the earliest manifestations of Mississippian culture and agricultural intensification. The American Bottom is also home to Cahokia, the largest and most complex Mississippian polity in terms of population size, areal coverage, and sociopolitical organization, whose ritualism, religion, and sociopolitical milieu had a deep impact on surrounding groups. The American Bottom witnessed periods of rapid social transformation in the two and a half centuries between AD 800 and AD 1050, as small-scale and relatively mobile horticultural groups transitioned to life in sedentary villages committed to plant cultivation (Kelly 1990a, 1990b). An influx of locals and nonlocal immigrants from villages and hamlets into mound centers during the ninth and tenth centuries, combined with a greater investment in plant cultivation, appears to have contributed to a regional population increase (Pauketat 1998, 2004:58–59). Indeed, recent strontium isotope analyses confirm the presence of a large number of immigrants from multiple locations who moved into the greater Cahokian area (Slater et al. 2014). By the latter half of the Terminal Late Woodland period (AD 800–1050), a few villages had as many as 200 residents living in groups of small, flexed-pole structures arranged around courtyards (Kelly 1990a, 1990b). The Mississippian political order that emerged in the greater Cahokian area during the eleventh century entailed a number of sweeping organizational changes (Pauketat 1994:171–74). Social life, political organization, and religious beliefs were radically transformed as Terminal Late Woodland villages were abandoned throughout the region and large population centers were founded during the Lohmann phase (AD 1050–1100) (Pauketat 1997:31–32). These centers were home to chiefly leaders and ritual specialists who wielded considerable decision-making authority in the new regional hierarchy. Conservative estimates suggest a more than sevenfold population increase at Cahokia during the Terminal Late Woodland to the Early Mississippian transition, from nearly 1,500 to more than 10,000 people (Pauketat and Lopinot 1997:118). Consider-

ing the many other multi-mound and single-mound sites, besides villages and farmsteads occupied at this time, the total early Mississippian population size must have been staggering.

This region has been subject to a significant amount of archaeological research, including archaeobotanical and isotopic analyses, making it one of the best-documented Mississippian societies in the Eastern Woodlands. Indeed, Simon and Parker (2006) published a synthesis of archaeobotanical evidence from the American Bottom that includes data from more than 100 sites, a sample size that far outstrips any other region in the broader Mississippian world. As mentioned above, Simon's (2017) recent direct dating of early maize has demonstrated that most purported early specimens actually postdate AD 900. Even more recently, isotopic analysis of the earliest purported macro maize kernel in the region, from the Middle Woodland Holding site, has revealed that this specimen is not actually maize (Simon 2016, personal communication). Previously, researchers used the Holding "maize" kernel to suggest maize's introduction into the region between 179 cal BC and 62 cal AD (Riley et al. 1994; Stuiver and Reimer 1993;see also Fritz and Lopinot 2003; Simon 2000). Prior to Simon's (2014) dating study, the scholarly consensus was that the region witnessed a significant increase in maize abundance and ubiquity during the end of the Late Woodland period (AD 750–900) (Fritz 2000; Fritz and Lopinot 2003; Johannessen 1993; Lopinot 1994; Myers 2006; Simon and Parker 2006). Maize was thought to be a common element in the Late Woodland diet, although scholars argued that maize did not replace or eclipse the existing pattern of starchy seed consumption—rather, it was thought to have been adopted, grown and eaten alongside native starchy and oily seeds (Fritz and Lopinot 2003; Johannessen 1993; Lopinot 1994; Parker and Scott 2003; Reber and Evershed 2004; Scarry 1993a; Simon and Parker 2006).

Based on Simon's (2014) meticulous analysis and dating of presumably Late Woodland maize, we now know that maize did not become a common dietary element until the Terminal Late Woodland period (AD 900–1050), when regional farmers intensified agricultural production of starchy seeds and added maize as a significant staple crop (see also Parker and Scott 2003; Simon and Parker 2006). Macrobotanical data suggest that starchy seeds were more important to the diet than was maize, at least initially (Galloy et al. 2000; Johannessen 1993; Lopinot 1992). Indeed, the importance of nut mast declined significantly as the cultivation of starchy seeds increased toward the end of the Late Woodland period (Galloy et al. 2000; Holt et al. 2011; Lopinot 1994:135; Scarry 2003c; but see Parker and Scott 2003). Nevertheless, stable isotope data do indicate a significant shift toward maize consumption during this time (Buikstra

and Milner 1991). It bears noting that maize use appears to have changed very little during the Mississippian transition in this region (Buikstra and Milner 1991; Simon and Parker 2006), suggesting that the intensification of maize preceded the development of the Cahokia polity (see also Lopinot 1992; Johannessen 1993; Scarry 1993a). Farmers, however, continued to intensify their production of starchy seeds during the emergence and consolidation of the Cahokia polity around AD 1050, which is particularly apparent at the site of Cahokia proper (Lopinot 1992, 1994).

American Bottom farmers likely produced several crops per year in a staggered fashion, a practice referred to as multi-cropping (see Lopinot 1994:135). The starchy seed complex includes species that have both spring (maygrass [*Phalaris caroliniana*] and little barley [*Hordeum pusillum*]) and fall harvests (chenopod or goosefoot [*Chenopodium berlandieri* ssp. *jonesianum*] and erect knotweed [*Polygonum erectum*]). In addition to starchy seeds, farmers were growing two or more varieties of maize (Fritz 1992; Simon and Parker 2006), which probably had different rates of maturation, resulting in both summer and fall harvests. Lopinot (1994:135) argues convincingly for intensive field cultivation of starchy seeds, on par with the scale of maize cultivation observed at contact. The average abundance of starchy seeds at early Mississippian Lohmann phase (AD 1050–1100) sites is approximately 75 percent of the recovered macro-seeds (see Simon and Parker 2006: Table 12). Given that starchy seeds compose three-quarters of the typical plant assemblage, it is unlikely that they were grown in small house gardens. Indeed, a consideration of the plants' growing requirements, modern methods of cultivation, and the archaeological data suggests that starchy seeds were broadcast by hand in dense stands (Scarry 2008:397). The American Bottom case differs significantly from the other regional cases in terms of the scale and diversity of its agricultural regime. Although there are regions in which farmers cultivated native grains alongside maize (Lower Illinois Valley, Lower Mississippi Valley, and northwestern Georgia), it is only in the American Bottom that farmers emphasized starchy seeds over maize. Given the population estimates for the Cahokia site and the broader American Bottom region (see Pauketat and Lopinot 1997), the number and size of agricultural fields under cultivation during an annual growing season must have been impressive.

The predominance of starchy seeds in typical early Mississippian assemblages has led Fritz and Lopinot (2003:91; see also Lopinot 1997) to question what they refer to as a "zeacentric bias" within studies of early Mississippian agriculture. Indeed, the first wave of agricultural intensification in the American Bottom was based on increases in starchy seed production, which oc-

curred prior to regional political consolidation. If agricultural surplus was the basis for underwriting Cahokia's emergent economy, then it was a surplus of *starchy seeds*, not maize, that was the source of funds. When maize was intensified, it was after Cahokia had become a regional polity, and it was intensified alongside the native crops (Fritz and Lopinot 2003). It was not until that point in the polity's history that cultivation strategies would have changed, resulting in adjustments in labor and scheduling as planting strategies shifted from broadcast sowing to hilling, and the timing of planting and harvesting changed (Scarry 2008:397). Cooking strategies would have changed with intensification of maize as well, as maize was most likely roasted or boiled for hominy production (Briggs 2016; King 1987; Myers 2006:514). Indeed, it has been observed that macro-maize assemblages from the broader Mississippian region are often composed of a substantial proportion of complete kernels lacking their germs, which is indicative of hominy production (Dezendorf 2013; Goette et al. 1994; King 1987, 1994).

Maize does not appear to have been imbued with ritual or ceremonial significance as some scholars have speculated (e.g., Scarry 1993a), at least not in the American Bottom. Evidence from sub-Mound 51 at the Cahokia site, which has been convincingly argued to represent the remains of feasting (see Pauketat et al. 2002), indicates that starchy seeds and fleshy fruits were more integral to elite-sponsored ritual events than was maize (Fritz and Lopinot 2003:105). Moreover, stable isotope data from the American Bottom and neighboring regions indicate that maize was less important at Cahokia than in the Illinois River Valley during the period immediately preceding Cahokia's Lohmann phase consolidation (Bender et al. 1981; Buikstra and Milner 1991). In addition, at the site of Cahokia proper, a comparison of elite and non-elite individuals from the Mound 72 burial population dating to the Lohmann phase (AD 1050–1100) revealed that elites consumed less maize than non-elites (Ambrose et al. 2003). Together, these lines of evidence strongly suggest that maize was not held in particular esteem as a high-status or ritually important food in the greater American Bottom region.

Thus, while maize-based agriculture is often considered a hallmark of Mississippian societies, we can question the role of maize in Mississippian *beginnings*—maize does not appear to have been a significant resource in the American Bottom until after the period of political consolidation. Ultimately, maize was incorporated into a longer history of social and religious negotiations involving plant foods (including fleshy fruits and starchy seeds) in which surplus production aided in the support of craftspeople and the fueling of community events that simultaneously reinforced status differences and community cohesion.

Illinois River Valley

We now turn to the Illinois River Valley, a fairly broad region that includes several areas of occupation inhabited by distinct cultural groups, including the Central Illinois River Valley (CIRV) and the Lower Illinois River Valley (LIRV). The Central and Lower Illinois valleys are contiguous and extend from the northern limits of the American Bottom northward to present-day Hennepin, Illinois (see Figure 1.1). The modern town of Meredosia marks the boundary between the Lower Valley to the south and the Central Valley to the north. Political development occurred on a much smaller scale in the Illinois Valley than in the American Bottom; there were no regionally consolidated polities, and different settlement areas appear to have been politically autonomous, perhaps organized as several small, competing polities (see Conrad 1991).

In the Central Illinois River Valley, in the Terminal Late Woodland period, most people lived in small, dispersed settlements in portions of the valley and western uplands (Esarey 2000:398; Green and Nolan 2000:362). However, the presence of village-sized settlements on natural levees and floodplain ridges indicates an emerging focus on the valley's riverine environment (Esarey 2000:392). Mississippian groups from the American Bottom began interacting with Terminal Late Woodland groups in the CIRV around AD 1050 (Conrad 1989, 1991; Harn 1991; McConaughy et al. 1993). Recent research in the Illinois Valley has demonstrated that small groups of Cahokians made contact with Late Woodland (AD 1000–1100) and Early Mississippian (AD 1100–1150) groups, bringing with them the trappings of Cahokia-inspired ritual practices, including Mississippian ceremonial buildings, mounds, and mortuary practices, as well as finely crafted Cahokia-style artifacts, including Ramey Incised pots and copper ornaments (Bardolph 2014; Conrad 1989, 1991; Harn 1991; Wilson et al., this volume). The purpose and extent of this contact is still unclear, but the result was the rapid Mississippianization of local Late Woodland groups during the subsequent Early Mississippian period (AD 1100–1200). Early Mississippian settlement patterns consist of dispersed villages and small nodal ceremonial sites (Conrad 1989:100, 1991:131; Harn 1991:141). Based on the uneven distribution of elaborate artifacts interred with early Mississippian burials, Conrad (1991:130) has argued for the development of hierarchical social organization at this time. Social ranking appears not to have resulted in regional political consolidation, but rather in the emergence of two or more localized settlement hierarchies.

In the Lower Illinois River Valley, Terminal Late Woodland settlements were located along the Illinois River floodplains and its tributaries, with some

small occupations in the uplands (Cross and Bittinger 1996; Studenmund 2000; Studenmund et al. 1995). The Mississippian transition is marked by a shift toward larger villages, of which two have been identified (Audrey and Whiteside), paired with cemeteries (Delaney-Rivera 2000, 2004; see also Wilson et al., this volume). In addition to these two villages were more than 30 smaller farmsteads. Although we lack a clear understanding of sociopolitical organization in the LIRV, it is clear that the population size and scale of complexity were much reduced here in comparison to the neighboring American Bottom. Indeed, any emerging political hierarchies likely did not surpass the village level.

Late Woodland residents of both the CIRV and LIRV were engaged in the cultivation of starchy seeds prior to the introduction of maize, but at very difference scales. Whereas starchy-seed densities at Late Woodland CIRV sites are low to moderate (Simon 2000; VanDerwarker et al. 2013), data from the LIRV are more comparable to the American Bottom (Simon 2000). Indeed, Late Woodland residents of the LIRV may have practiced intensive starchy seed cultivation, an inference suggested by the several large seed masses recovered from sites in this region—some of which have seeds numbering in the thousands to tens of thousands from individual features (Asch and Asch 1978; Simon 2000). Thus, maize was added to two very different food production/procurement strategies, an existing system of intensive cultivation in the LIRV versus a more mixed system of foraging/gardening in the CIRV.

Prior to Simon's (2014) intensive program of direct-dating early maize, Illinois Valley scholars had documented the presence of maize in various Late Woodland contexts dating between AD 300 and 800.[2] The results of Simon's (2014) research have revealed that only two sites in west-central Illinois (Elledge and Edward Hoerner) with purported Late Woodland maize actually returned dates of that age (pre–AD 900); all other maize fragments from Late Woodland sites returned more recent dates (post–AD 900) (Simon 2014: 111). As in the American Bottom, it appears that maize use in the Illinois Valley was spotty and rare during the Late Woodland period, becoming more widespread after AD 900 during the end of the period (see also Esarey et al. 2000; Green 1987; McConaughy et al. 1993; Schroeder 2000). Thus, our understanding of maize's entry into this region has changed significantly.

Our evidence for Early Mississippian maize in the Illinois Valley is much more limited than what we have for the American Bottom. Data from the LIRV suggest that a program of intensive maize cultivation was already under way by AD 1000, with maize added to an existing system of intensive production, similar to that of the American Bottom (Asch and Asch 1985:183, 187; King

1993; see also Simon 2000). In the CIRV, maize was fairly unimportant until around AD 1050, when maize densities increased dramatically, signaling a shift toward intensive production. Unlike in the American Bottom and the LIRV, however, this increase in maize *occurred at the expense* of starchy seeds (VanDerwarker et al. 2013; see also Kuehn and Blewitt 2013). Indeed, it is difficult to be certain whether people in the Early Mississippian CIRV cultivated starchy seeds or simply managed wild stands. The most abundant starchy seed species are chenopods and knotweeds, but none of the knotweeds are consistent with domesticated erect knotweed, and the few chenopods that retained their seed coats do not exhibit the truncated margins consistent with domesticated varieties (VanDerwarker et al. 2013). And while the presence of maygrass and little barley alongside the knotweed and chenopod seeds suggests the possibility that these seeds were cultivated, this inference is by no means certain. Despite the apparent decrease in starchy seeds, the only statistical changes in the archaeobotanical record of the CIRV between the Late Woodland and Early Mississippian periods are an increase in maize and a corresponding decrease in nuts (VanDerwarker et al. 2013). Thus, the intensification of maize in the CIRV occurred *during* the Early Mississippian period, in contrast to the American Bottom and LIRV where it occurred earlier, during the preceding Terminal Late Woodland period. Similar to the American Bottom, however, is a significant decline in nuts.

The available stable isotope data from the Illinois Valley lend support to the inferences drawn from the archaeobotanical data. Based on skeletal data from Dickson Mounds, Buikstra and Milner (1991) demonstrate an increase in maize consumption from Late Woodland to Early Mississippian times. Combined, the archaeobotanical and isotopic data indicate that maize was a significant component of the diets of Mississippians living in the Illinois Valley. Indeed, Illinois Valley farmers may have produced and consumed as much as or more maize than their American Bottom neighbors to the south (Bardolph 2012; Buikstra and Milner 1991). Regardless of whether or not Illinois Valley groups grew and ate more maize than farmers residing in the American Bottom, it is clear that American Bottom farmers (and possibly LIRV farmers) had a more complicated production system than groups living in the Central Illinois Valley, as evidenced by the many different starchy crops they grew (maize, chenopod, erect knotweed, maygrass, little barley).

While explanations for maize intensification occurring in the Illinois Valley are still being developed, it is clear that maize was intensified in the absence of a well-developed political hierarchy or a regionally consolidated polity (VanDerwarker et al. 2013; see also Emerson et al. 2005). In addition, regional

population levels remained fairly low throughout the Mississippian period, hindering arguments that might invoke population pressure. Maize intensification appears to have occurred earlier in the Lower Valley than in the Central Valley, which Simon (2000:54) attributes to its proximity to the American Bottom. If proximity to the American Bottom is indeed a factor in explaining the timing of maize intensification in the LIRV, then it is interesting that maize was intensified in the CIRV at the same time that Cahokians entered this region. Indeed, it is plausible that maize cultivation intensified as a result of Cahokian contact, perhaps within the context of competitive generosity (VanDerwarker et al. 2013). The fact that intensification of maize in the Illinois Valley occurred in the context of cultural exchange with the American Bottom (where it had already been intensified) suggests that intensive maize production may have been incorporated into societies involved in Mississippian culture contact as part of a complete Mississippian "package"—a suite of objects, ideas, and ideologies that had been previously negotiated at Cahokia and in the American Bottom as part of the process of Mississippianization that was later spread throughout the Southeast and Midwest. Ongoing research programs in the Illinois Valley will further refine our understanding of Mississippian development in this Cahokian hinterland.

Central Mississippi Valley

The Central Mississippi Valley is the region situated to the immediate south and west of the American Bottom that includes the Mississippi River alluvial valley and the eastern Ozarks of southern Missouri and Northern Arkansas (see Figure 1.1). This region has been conceptualized as the "heartland" of Mississippian emergence (Pauketat 2000b:21; see Smith 1984); however, the tempo and extent of social change during the Late Woodland/Mississippian transition is still debated. As with the Illinois Valley, the Central Mississippi Valley encompasses several subregions, and research within and among these areas has been patchy (O'Brien and Wood 1998; see also McNutt 1996). In general, the transition from the Late Woodland to the Early Mississippian period was marked by settlement shifts from small, dispersed seasonal household occupations to larger, nucleated, permanent settlements, as diverse, small-scale communities were forged into larger unified political communities (Dunnell and Feathers 1991; Morse and Morse 1983; O'Brien and Wood 1998:277–278; Pauketat 2000b). After AD 900, more than a dozen large villages were settled throughout southeastern Missouri, some with palisades and mounds (O'Brien and Wood 1998:288). Many of these large sites were likely political centers ad-

ministering a series of connected villages and farmsteads (O'Brien and Wood 1998:288).

Archaeobotanical data from the Late Woodland Central Mississippi Valley have been summarized by Simon (2000). Data from southern Missouri and northern Arkansas indicate a Late Woodland adaptation of a mixed farming and foraging economy—the entire spectrum of starchy seeds appears to be present at most sites, in addition to fruits and nuts, the latter forming a significant component of the regional diet (Simon 2000; see also Lopinot 1995; Voigt 1989). Maize was absent from the region's cultivation repertoire until Mississippian times, although it has been identified at a site in central Missouri (23Co156) whose radiocarbon dates indicate an occupation dating as early as cal AD 441–603 (Hoard 2000). However, this site also has later occupations, and the maize remains were not directly dated, making it possible that these maize remains date as late as AD 1200 (see also Simon 2014). Other more tightly dated sites indicate the possible presence of maize by AD 700 in the Maramec Springs area (Reeder 2000:196–199) and after AD 900 in northeastern Missouri (Herndon et al. 2014:61). While maize could have been introduced to the region sometime within the AD 400–700 range, without directly dated specimens it seems better to err on the side of caution as advised by Simon (2014). Regardless of when it was introduced, maize does not appear to have been a significant component of the diet before AD 1000 (Martin and Parks 1994). After this time (AD 1050–1200), subsistence appears to have focused on maize and nuts, at least in the lower Missouri River Valley (Wright 2007), similar to the CIRV pattern during the Early Mississippian period.

The importance of starchy seeds during the Early Mississippian, however, seems to vary within the broader Central Mississippi Valley region. In the lower Missouri River Valley along the western periphery of the region, starchy seeds were relatively unimportant in the diet, and their representation declines throughout the occupational sequence (Martin and Parks 1994). Similar to Wright's (2007) observations, starchy seed representation seems to be rather sparse at sites in southeastern Missouri; squash and beans were also generally lacking, suggesting a farming strategy focused primarily around maize cultivation (Martin and Parks 1994). In contrast, Fritz's (1994) analysis of desiccated plant remains from several rockshelters in the Ozarks of southwestern Missouri and northwestern Arkansas reveals a greater emphasis on starchy seeds than documented by Wright (2007) or Martin and Parks (1994). In addition to documenting the persistence of starchy seeds in the diet until AD 1200, she also identified other crop plants, including domesticated sunflower, sumpweed, pale-seeded amaranth, and mixta squash (Fritz 1994). The evidence for

domesticated amaranth is especially significant, as amaranth seeds are rarely cited as more than a source of wild weedy greens in the southeastern and midwestern literature (Fritz 1994, 2007b). Fritz (1994:123) argues that starchy-seed cultivation was important as a means of offsetting the risk associated with years of low nut mast, thus highlighting a trade-off between starchy seeds and nuts. The notion of starchy seeds and acorn nuts as cognates for nutritional sources of carbohydrates is relatively common in the literature (see Scarry 2003c). Indeed, in areas where starchy seeds became a significant component of the diet, acorn nuts tend to decline in abundance (e.g., American Bottom); alternately, in areas where starchy seeds are of minimal importance, acorn nuts are identified in great abundance (e.g., Central Illinois River Valley).

Isotopic analysis of human skeletons dating between 3200 BC and AD 1880 reveals that the region's inhabitants consumed virtually no maize prior to AD 1000; if maize was present in the diet prior to this time, then its consumption was limited (Lynott et al. 1986:61). After AD 1000, there was a rapid shift toward maize consumption and, by extension, production (Lynott et al. 1986:61). The reasons for this sudden and significant increase in maize use after AD 1000 have not been fully explored. Lynott and colleagues (1986:62) correlate this shift to maize reliance with regional changes in settlement patterns from dispersed hamlets and small villages to civic-ceremonial centers tied to villages and farmsteads. The implication is that maize was intensified around the same time as the establishment of local and regional political hierarchies, a pattern that differs from the American Bottom region to the northeast. Thus, it is possible in some areas of the Central Mississippi Valley that maize intensification occurred either just prior to regional political development, perhaps in the context of competitive generosity (e.g., King 1985, 1988; Nassaney 1987; Scarry 1993a) or in relation to large-scale community events involving intensified ceremonialism and feasting that would have served to reinforce new shared Mississippian affiliations and identities (e.g., at the Toltec site, where maize was recovered among the feasting debris encountered at the bases of platform mounds [Fritz 2000:238; Rolingson 1998]). Even members of dispersed farmsteads were integrated into commensal events during the process of Mississippianization—Smith (1995:243) observes that members of outlying communities "participated in various village-centered ceremonies, feasts, and other scheduled activities of social integration throughout the annual cycle." Villagers likely continued this level of community participation as they transitioned toward acceptance of a "collective order" (Pauketat 2000b:24), with events presumably articulated by large Mississippian centers. These possibilities, however, require testing with additional data.

Lower Mississippi Valley

The Lower Mississippi Valley (LMV) encompasses southern Arkansas, eastern Louisiana, and western Mississippi (see Figure 1.1; Rees and Livingood 2007). Subregions within the LMV include the Tensas and Yazoo basins, the Natchez Bluffs, and the lower Ouachita and Red River valleys (Rees and Livingood 2007:1). The general trajectory includes a cultural tradition called Coles Creek (AD 750–1200) that spans the Late Woodland and Early Mississippian periods. Plaquemine, the regional variant of Mississippian culture, follows on the heels of Coles Creek and begins later than observed in the American Bottom and adjacent regions to the north, around AD 1200. It was during the latter part of the Coles Creek period that some local groups began adding Mississippian elements (e.g., shell-tempered pottery) to their material culture, although there is a great deal of regional variation regarding the timing of the adoption of Mississippian traits or the intrusion of Mississippian groups. Settlement changes occurred during this time, with a shift toward population aggregation, leading to fewer and larger mound sites by the end of the Coles Creek period (Kidder 1992; Rees and Livingood 2007). It was at this time that scholars argue for the emergence of hereditary social ranking and political centralization in some of the region's emerging polities (Rees and Livingood 2007:14; see also Barker 1999; Kidder 1992, 2002; Steponaitis 1986).

In comparison to the aforementioned regions, the LMV presents a unique pattern of maize adoption and intensification with respect to the timing of Mississippian beginnings. Maize remains are present but exceptionally rare in Early Coles Creek contexts (AD 750–900) in Arkansas (Fritz 1990; Fritz and Kidder 1993; Kidder 1992; see also Scarry 1993a); in the southern portion of the LMV (in Louisiana and Mississippi), maize has not been documented until after AD 900/1000, during the late Coles Creek (AD 1000–1200) at the Bird's Creek, Jolly, Osceola, St. Gabriel, and Rock Levee sites (Fritz 1990, 2007a; Kidder 1992:22; 1993; Lee et al. 1997; Scarry 1995; Woodiel 1993:53–54). In both areas, maize did not achieve dietary importance until after AD 1100/1200, during the Coles Creek/Mississippian transition, well after the expansion of platform mound-building activities, and likely also postdating the initial development of chiefly hierarchies (Fritz 1992, 2007a; Fritz and Kidder 1993; Kidder 1992; Kidder and Fritz 1993; Listi 2011, 2013; Rose et al. 1991; see also Scarry 1993a).

Archaeobotanical evidence indicates that maize was introduced into a subsistence system that was based on the intensive management of wild plants (especially acorns and hickory) and the cultivation of native seed crops, although

the scale of starchy-seed cultivation was minimal in comparison to that documented in the American Bottom region to the north (Fritz 2007a; Kassabaum 2014; Kidder and Fritz 1993; Williams 2008). Rose et al. (1991) hypothesize that early uses of maize were restricted to ceremonial and high-status contexts (e.g., Scarry 1993a), arguing that low population levels coupled with high local plant density made widespread cultivation of maize largely unnecessary. Maize grown for religious ceremonies and social events may have been eaten only by certain designated individuals (Rose et al. 1991:20) and perhaps only in some portions of the Lower Valley, whereas the majority of LMV residents were actively engaged in tree management of oak, hickory, pecan, and persimmon trees (Fritz 2007a). Evidence for small-scale cultivation of starchy seeds to complement the reliance on tree resources comes from the Coles Creek mound site at Feltus in the Natchez Bluffs, where domesticated forms of chenopod are found alongside a rich assemblage of wild plant foods (Kassabaum 2014). It is possible that wild plant foods, made more abundant through direct human management, provided a solid economic base for funding community projects such as mound construction (Kassabaum 2014; Williams 2008). Indeed, it was not until after the Coles Creek period, hundreds of years after the appearance of communal mound centers, that maize cultivation became a significant subsistence activity (Fritz 1992, 2007a; Kidder 1992; Kidder and Fritz 1993).

Bioarchaeological evidence provides additional support to the inferences drawn from the archaeobotanical data (Listi 2011, 2013; Rose et al. 1991). Changes in dental health reveal a shift toward a slightly greater consumption of starchy foods with the shift to Coles Creek after AD 750, which Listi (2011:37–38; see also Rose et al. 1991) argues to reflect greater use of starchy seeds in the diet. This interpretation is supported by stable isotope analysis, which indicates a clear lack of maize in the Coles Creek diet, as seen at the Lake George site in the Yazoo Basin of western Mississippi (Listi 2013:120–121). Despite the lack of a C_4 signature, the Lake George skeletal population revealed clear dental evidence for a diet high in starchy foods (Listi 2013:121), likely represented by the consumption of acorns or plants from the native starchy seed complex. This inference is also supported by paleopathology studies of Coles Creek skeletons that found very limited evidence for porotic hyperostosis, a condition commonly associated with maize-dependent diets (Rose et al. 1991:14–15).

While the timing of the adoption and intensification of maize has been fairly well documented in the Lower Mississippi Valley, our understanding of the social and political contexts of these dietary shifts is less developed than in other regions. The shift to maize dependence has been characterized by Fritz (2007a:205) as accompanying "the opening up of previously inward-looking

societies, more interactions than before with increasingly powerful Mississippian polities to the east, and a radical shift in settlement patterning with larger Plaquemine mound centers surrounded by smaller farmsteads." This statement suggests that the shift to maize dependence was correlated with the ramping up of incipient political complexity in the region, possibly stimulated by extraregional interaction with other Mississippian groups (e.g., Moundville in west-central Alabama). Yet others (Rose et al. 1991:20) argue that the shift to maize dependence resulted from regional population pressure, in which Coles Creek groups expanded beyond the limits of the wild food resource base; this argument, however, is difficult to evaluate, as we have virtually no data from non-mound contexts at Coles Creek sites. Ongoing and future archaeological projects in this region will allow us to more critically assess these different causal interpretations for maize intensification in the Lower Mississippi River Valley.

Black Warrior Valley

This region includes Moundville and its broader hinterland in west-central Alabama, but we also refer to data from the Bottle Creek site, located in southern Alabama along the Mobile Delta (see Figure 1.1). The Moundville polity emerged from a Terminal Late Woodland period occupation known as the West Jefferson phase (AD 1020–1120). The West Jefferson settlement system consisted of small villages ranging from .2 to .5 ha in size scattered along the floodplain terraces and adjacent uplands of the Black Warrior River Valley (Bozeman 1982; Welch 1990:211). There is little evidence of social inequality at this time; however, a significant increase in the manufacture of marine shell beads has been interpreted as evidence of factional competition among kin-based residential groups through the production and exchange of exotic wealth items (Knight and Steponaitis 1998:11; Pope 1989).

The early Moundville I phase (AD 1120–1200) marks the emergence of Mississippian culture in the Black Warrior River Valley. In the first decades of the twelfth century AD, a suite of highly visible and sudden changes in settlement patterns, community organization, and material culture occurred. Small-scale village life in the region was abandoned for a settlement system consisting primarily of dispersed farmsteads and small ceremonial centers with earthen platform mounds (Ensor 1993; Knight and Steponaitis 1998:12–13; Michals 1998; Mistovich 1988). Several autonomous hierarchical political groups may have existed in the region at this time.

The late Moundville I phase (AD 1200–1260) marks the establishment of

Moundville as a regionally consolidated Mississippian polity (Knight and Steponaitis 1998:14–17). The dynamics of regional consolidation transformed socioeconomic relationships throughout the Black Warrior River Valley. A regional administrative center was established at the Moundville site, where an estimated 1,050–1,680 residents settled to form a nucleated community (Steponaitis 1998:42; Wilson 2008). The Moundville ceremonial precinct was constructed during this era, which involved the erection of at least 29 mounds arranged around a rectangular plaza (Knight 1992, 1998).

Maize was adopted into a Late Woodland subsistence system based primarily on the collection of nuts and other wild plants—starchy-seed cultivation was relatively unimportant in this region, likely limited to small garden plots (Scarry 1986, 1993a, 1993b). Scarry's analysis of plant remains from Moundville and surrounding sites has revealed that the initial intensification of maize occurred prior to the establishment of the Moundville polity, during the transition from the early to late West Jefferson phase (AD 900–1050) [Scarry 1986, 1993a, 1993b]. After its initial increase during the Late West Jefferson phase, maize production remained fairly stable during the Moundville I phase (AD 1050–1250), a time marked by both significant mound construction at the site of Moundville and regional political consolidation (Scarry 1993a, 1993b). Although the Moundville I phase did not witness an increase in maize *cultivation*, people may have changed the way they prepared maize for consumption, shifting toward hominy production (Briggs 2016).

Although maize production stabilized after its initial intensification during the Late West Jefferson phase, abundances of both hickory and acorn shells decreased statistically during the Moundville I phase (Scarry 1993b:166–167). Scarry and Steponaitis (1997; see also Jackson et al. 2016) interpret this pattern as reflecting the possible provisioning of Moundville's residential population with shelled nutmeats. These nuts may have been processed by residents of rural hamlets, after which they were transported to Moundville; another possibility is that Moundville's residents had cut down their local nut groves to clear fields for maize cultivation, requiring them to travel further for nut collection and conduct initial shelling at collection sites in order to reduce transport costs (Jackson et al. 2016).

Stable isotope evidence reveals that a second wave of maize intensification occurred between the Moundville I and II phases, during a time when the political system had already become entrenched (Schoeninger and Schurr 1998). It is during this time (circa AD 1250) that the site of Bottle Creek was settled in southern Alabama; a small Middle Mississippian multi-mound site, Bottle Creek shares features with Moundville to the north and Fort Walton to the

southeast. Comparison of the Moundville and Bottle Creek plant assemblages reveals little difference between these sites; as with Moundville, maize is ubiquitous and abundant at Bottle Creek, while starchy and oily seeds are present but not abundant (Scarry 2003a, 2003b).

Archaeobotanical research in the Black Warrior Valley has clearly demonstrated that initial maize intensification occurred *prior* to regional political development (Scarry 1986, 1993b). Scarry (1993a:88) interprets this pattern to reflect the "prestige-building activities" of competing social groups. She envisions kin groups as increasing production to create surpluses that could then be invested into ceremonial feasts and the support of craftspeople; ultimately, the wealthiest group boasting the most indebted followers emerged as Moundville's leadership at the beginning of the Moundville I phase. Welch and Scarry's (1995) regional comparison of plant remains from Moundville I phase contexts (primary center [Moundville], secondary center [Hog Pen], and farmsteads [Big Sandy and Oliver]) reveals elevated levels of maize processing at sites outlying the Moundville capital. The addition of data from more recent excavations confirm this spatial pattern of differential levels of plant processing debris at different levels of the regional site hierarchy (Jackson et al. 2016). Jackson, Scarry, and Scott (2016:207) argue that this pattern reflects the mobilization of maize along kinship or lineage lines between "hinterland farmers and their kinfolk living in neighborhoods at Moundville as well as their clan leaders residing atop newly constructed mounds" (see also Welch and Scarry 1995). Thus, the Black Warrior Valley presents a situation in which maize was intensified by competing kin groups who were able to command a portion of the food produced by lineage members living at a distance from the capital.

Northern Georgia

This region covers northern Georgia, as it abuts North Carolina at its northern boundary and Tennessee at its western boundary (see Figure 1.1). Specifically, we discuss two subregions, the Etowah and Brasstown River valleys; the Brasstown Valley is situated north of the Etowah Valley along the border with North Carolina. The Late Woodland to Mississippian transition in northern Georgia is similar to that described for other southeastern and midwestern areas. The latter portion of the Late Woodland period (AD 800–1000, referred to as the Woodstock phase) was marked by the appearance of large, permanent settlements located along major rivers and their tributaries (Cobb and Garrow 1996; King 2003; Markin 2007). Settlements from this period span a range

of sizes, but evidence of regional settlement hierarchies is lacking (Hally and Rudolph 1986; Markin 2007). The subsequent Early Mississippian period (AD 1000–1250, referred to as the early Etowah phase) witnessed the erection of platform mounds at major settlements such as the Etowah site, which itself is a multi-mound center. In addition to platform mound building, this period is also argued to mark increasing political centralization, the appearance of social ranking, and the establishment of a regional settlement hierarchy (Hally and Langford 1988; King 2003).

We consider the Brasstown Valley (in addition to the Etowah Valley) because it has produced much more archaeobotanical data as a result of targeted CRM projects, which provide a more solid picture of changing plant subsistence from the Late Woodland to Mississippian periods than is available from the Etowah settlement system. To better understand subsistence shifts related to plant cultivation, we begin with patterns documented in the Brasstown Valley during the Middle Woodland Cartersville phase (AD 1–600). At this time, approximately 60 percent of Brasstown plant assemblages were composed of starchy seeds, including maygrass, chenopod, and erect knotweed (Raymer and Bonhage-Freund 2000). Not only are the chenopod seeds clearly domesticated, but the maygrass seeds occur in deposits 60 miles north of the plant's natural range, which indicates that people were intentionally sowing these seeds (Raymer and Bonhage-Freund 2000). By the Late Woodland period (AD 600–900), starchy seeds composed 75 percent of the seeds in the Brasstown assemblages (Raymer and Bonhage-Freund 2000). While this pattern of starchy-seed reliance seems comparable to the contemporaneous American Bottom assemblages and suggests that pre-Mississippian groups in northern Georgia may have been involved in intensive cultivation of native starchy grains, the absolute numbers of starchy seeds in the Brasstown assemblages do not come close to approaching those reported for the American Bottom. Nevertheless, this pattern of increasing proportions of starchy seeds prior to the Mississippian transition suggests that locals were putting more effort into cultivation. During the same period (AD 600–900), maize remains are relatively sparse, but occur in higher ubiquities than in previous periods (Raymer and Bonhage-Freund 2000). Data from the corresponding period at the Woodstock site in the Etowah Valley demonstrate a similar increase in starchy seeds just prior to the Mississippian period (Markin 2007; Tickner 2007). Moreover, Markin (2007) argues that even though maize was not a staple food in Woodstock-phase diets, it was nevertheless a consistent dietary element.

It was not until the beginning of the Mississippian period, during the early Etowah phase (AD 1000–1200), that maize became a significant staple in the

Brasstown Valley diet (Raymer and Bonhage-Freund 2000). Raymer and Bonhage-Freund's (2000) synthesis of archaeobotanical data from this valley documents a consistent increase in maize abundance and ubiquity during this time. At the Woodstock site in the Etowah Valley, this transition to the Etowah phase was marked by a decline in nuts (Markin 2007), a pattern we have noted for other regions as well (e.g., CIRV).

These archaeobotanical patterns are supported by isotopic data obtained from human skeletal remains in this region, which indicate that people consumed negligible amounts of maize prior to AD 1000 at both inland and coastal locations (Hutchinson et al. 1998). These same data demonstrate a trend of increasing maize consumption between AD 1000 and 1600 (Hutchinson et al. 1998). Similar to the Central Illinois River Valley, the elevation of maize to staple status occurred simultaneously with the transition to the Mississippian period in northern Georgia. However, the Georgia case differs in that its Mississippian manifestation included the development of a regional hierarchy and the establishment of a political center at the site of Etowah. It is premature to speculate regarding the causal relationship between incipient political complexity and maize reliance as seen at Etowah. The Etowah phase is represented by a 300-year block of time; the lack of a tight chronological framework with corresponding macrobotanical samples makes it difficult to assess the timing of maize increases relative to sociopolitical developments at the site. Moreover, very little archaeobotanical analysis has been conducted thus far at the site of Etowah, and no maize remains have been directly dated. Thus, it is difficult to pin down whether maize intensification occurred during the early, middle, or latter part of the Etowah phase, or whether maize intensification occurred as one or more waves of production increase. Determining the timing of maize intensification in this region is key to understanding how maize use was tied to sociopolitical developments—was maize incorporated into existing hierarchical negotiations involving foodways (including feasts) whose antecedents involved starchy seeds? Was surplus maize produced in the context of competitive generosities? Did maize form the basis of newly emerging political economies in the Etowah region? This region is clearly ripe for a targeted study combining archaeobotanical analysis with a program of direct dating.

Summary and Conclusion

What can we say about maize and Mississippian beginnings? In this chapter we have synthesized the most up-to-date picture of maize use throughout the broader Southeast and Midwest, exploring how the timing of its adoption and

intensification corresponds to Mississippian developments on a regional basis. We have been able to add new regions to our synthesis of Early Mississippian maize (Central Illinois River Valley, northern Georgia) and incorporate new data and interpretations. Mary Simon's (2014) recent program of AMS dating of purportedly early maize in the American Bottom and Illinois Valley represents perhaps the most dramatic revision of how we understand maize's entry into midwestern subsistence economies. We now know that the vast majority of Late Woodland groups living in the lower Midwest did not adopt maize until after AD 900, and that maize was elevated to a primary food resource much more quickly than originally hypothesized (Simon 2014). This AD 900 horizon that marks the widespread adoption of maize corresponds to the appearance of emerging Mississippian elements in some areas of the Midwest and Southeast; in other areas, it predates the adoption of Mississippian practices.

The synthesis we have presented in this paper supports Scarry's (1993a) original findings that the relationship between maize adoption/intensification and Mississippian development is highly variable from region to region. Maize had many different meanings in early Mississippian societies, in areas that evinced varying levels of sociopolitical hierarchy and attempts of aggrandizement by emerging leaders. Our review in this chapter reveals that maize use was tied to each region's unique social and political history—thus, while we can document a lot of variation in the relative importance of and intensification of maize in a particular polity's history, we can also consider how maize may have been related to the actual processes of Mississippianization in a particular region. These processes included hierarchies negotiated through competitive generosities (and the creation of new political economies underwritten by surplus foods); participation in large-scale ritual events that drew on antecedent traditions (simultaneously reinforcing new Mississippian identities while drawing attention to emerging status differences); as well as possible adoptions of a Mississippian "package" that included intensive maize production as a result of culture contact and interaction.

At Moundville, intensive maize production appears to have underwritten the polity's formation, perhaps within the context of competitive generosity. As Scarry's (1993b; Jackson et al. 2016) primary research has demonstrated, maize intensification in the Black Warrior Valley preceded political consolidation, which strongly suggests that aspiring groups were able to leverage surplus food for political gain. In the American Bottom and particularly at Cahokia, Mississippianization was the result of complex negotiations of statuses, hierarchies, identities, rituals, gender roles, etc., as people came together from diverse regions and quickly witnessed dramatic social change. Maize intensification did

not occur until well after Cahokia's political consolidation and may represent a production increase aimed at securing surplus tribute (Lopinot 1994). However, while *maize* intensification happened late in Cahokia's political development, the region's inhabitants had nevertheless intensified agricultural production both before and during political consolidation, in the form of *starchy seed* cultivation. In considering Cahokia, as well as Moundville (which represent the two largest Mississippian polities in the broader Southeast), it is clear that plant cultivation was intensified (probably for the purpose of surplus production) in both cases prior to the florescence of hierarchical sociopolitical institutions and relationships. At Cahokia maize was incorporated into an existing regime of starchy seed cultivation, which appears to have intensified within traditionally accepted parameters of preexisting kin networks. In addition to surplus production that funded monumental construction, plant foods also fueled community events, including feasting rituals—given the evidence that starchy seeds were deeply embedded within the region's ritual economy. Moreevoer, the correspondence between starchy-seed intensification and Cahokia's regional consolidation lends support to recent ideas regarding the religious nature of Cahokia's political development (see Fritz 2014; Pauketat 2000a, 2000b). Eventually, maize appears to have been folded into a longer history of commensal activities (that had already included starchy seeds and fleshy fruits) that solidified community identities through ritual negotiations.

In some respects, the archaeobotanical data relevant to the Etowah complex are similar to findings in the American Bottom. Starchy-seed cultivation was emphasized in the periods immediately preceding Etowah's political consolidation (Raymer and Bonhage-Freund 2000). Corresponding to the period of regional consolidation, starchy seed abundance dropped, and maize production increased substantially (Hutchinson et al. 1998; Raymer and Bonhage-Freund 2000). However, the lack of a tight chronological framework with corresponding macrobotanical data makes it difficult to assess the timing of maize increases relative to relevant sociopolitical developments in the region.

In the Central Illinois Valley to the east of Cahokia, maize was intensified early in the Mississippian period, but this episode of increased production occurred in an area in which political development was relatively weak and lacked regional coherence during the Mississippian period. Rather, the establishment of political hierarchies and accompanying systems of social ranking appears to have been highly localized and restricted to the site level in the CIRV. From these findings, it is clear that political complexity at a regional level is not a necessary factor in maize intensification (see also Bush 2004; Gremillion 2003; Wagner 1983, 1986). In the broader Illinois Valley, an area that was impacted by

Cahokian contact (whether direct or indirect, see Wilson et al., this volume), intensified maize cultivation may have arrived as part of the Mississippian "package"—that is, the practices of producing and consuming large amounts of maize may have been accepted along with Mississippian-style ceramics, lithics, architecture, and other religious items that were adopted and negotiated as a result of culture contact and interaction between Cahokians and local Late Woodland groups. In this case, maize does not appear to have been directly correlated with the establishment of political hierarchies. Evidence from the Lower Mississippi Valley demonstrates that agricultural intensification is not a necessary causal factor in spurring political development either (Fritz and Kidder 1993; Kassabaum 2014; Kidder and Fritz 1993). Here, public works projects like mound building were funded by surplus food *collection*, not *production*, indicating that early social complexity emerged in the context of wild-food procurement. Maize clearly had a different meaning for Lower Mississippi Valley residents when it was later adopted, and similar to the CIRV case, it was not necessarily tied to hierarchy and aggrandizement.

It is clear from this broader regional comparison that maize intensification cannot be directly linked to political development in any of the cases, excepting Moundville. However, if we consider the role of intensive cultivation more generally, a clear pattern emerges. At Cahokia, Moundville, and Etowah—the three largest Mississippian polities—there was a clear increase in plant-food production prior to the consolidation of a regional political hierarchy. While the Lower Mississippi Valley case demonstrates that agriculture was not necessary to spur increasing social complexity, we speculate that systems of agricultural production likely played a role in the development of larger political institutions in the Mississippian world. Larger food surpluses (made possible through intensive cultivation) can support larger social and ritual events, in addition to funding larger buildings and monument constructions.

We began this chapter with the intention of synthesizing patterns of early Mississippian plant use in the broader Midwest and Southeast in order to better understand the relationship between maize and Mississippian beginnings. Our review of the literature, however, leads us to reframe the issue. By focusing on maize, we can highlight a great deal of variability and draw attention to local process. By widening our lens beyond maize to encompass plant cultivation writ large and its intensification, we are able to highlight a common trend shared by the three largest Mississippian polities—an increase in food production followed by regional political development. Clearly, food production increases are not sufficient causes in and of themselves to account for the emergence of regional political institutions (the CIRV is a case in point).

Surplus production does not determine political complexity, but it certainly appears to be an element that when combined with other variables (e.g., ambitious kin groups, community religious/ritual events, and other antecedent traditions that defined group identities and solidarities), can potentially transform the social and political history of a region.

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Notes

1. Radiocarbon dates throughout this chapter are reported as they are represented by the researchers cited; no attempt has been made at calibration or standardization.

2. Sites at which maize was identified include the Rench site (McConaughy 1991; McConaughy et al. 1993) and the Elledge site (Schroeder 1994; Stafford 1994) in the CIRV, and the Edward Hoerner site (Schroeder and Studenmund 1998) in the LIRV (see also Asch and Asch 1985; Rose 2008).

References Cited

Ambrose, Stanley H., Jane Buikstra, and Harold W. Krueger

2003 Status and Gender Differences in Diet at Mound 72, Cahokia, Revealed by Isotopic Analysis of Bone. *Journal of Anthropological Archaeology* 22(3): 217–226.

Asch, David L., and Asch, Nancy B.

1985 Prehistoric Plant Cultivation in West-Central Illinois. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 149–203. Anthropological Papers 75. University of Michigan, Museum of Anthropology, Ann Arbor.

Asch, Nancy B., and David L. Asch

1978 The Economic Potential of *Iva annua* and Its Prehistoric Importance in the Lower Illinois Valley. In *The Nature and Status of Ethnobotany*, edited by Richard I. Ford, pp. 301–341. Anthropological Papers No. 67. Museum of Anthropology, University of Michigan, Ann Arbor.

Bardolph, Dana N.

2012 Community, Cuisine, and Cahokian Contact: Changes in Mississippian Plant Foodways in the Central Illinois River Valley. Paper presented at the 35th Annual Meeting of the Society of Ethnobiology, Denver.

2014 Evaluating Cahokian Contact and Mississippian Identity Politics in the Late Prehistoric Central Illinois River Valley. *American Antiquity* 79(1):69–89.

Barker, Alex W.

1999 Chiefdoms and the Economics of Perversity. Unpublished Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

Bender, Margaret M., David A. Baerreis, and Raymond L. Steventon

1981 Further Light on Carbon Isotopes and Hopewell Agriculture. *American Antiquity* 46(2):346–353.

Blitz, John

1993 Big Pots for Big Shots: Feasting and Storage in a Mississippian Community. *American Antiquity* 58(1):80–96.

Bozeman, Tandy Key

1982 Moundville Phase Communities in the Black Warrior River Valley, Alabama. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Santa Barbara.

Bridges, Patricia S.

1991 Degenerative Joint Disease in Hunter-Gatherers and Agriculturalists from the Southeastern United States. *American Journal of Physical Anthropology* 85(4):379–391.

Briggs, Rachel V.

2016 The Civil Cooking Pot: Hominy and the Mississippian Standard Jar in the Black Warrior Valley, Alabama. *American Antiquity* 81(2):316–332.

Buikstra, Jane E., and George R. Milner

1991 Isotopic and Archaeological Interpretations of Diet in the Central Mississippi Valley. *Journal of Archaeological Science* 18(3):319–329.

Bush, Leslie L.

2004 *Boundary Conditions: Macrobotanical Remains and the Oliver Phase of Central Indiana, A.D. 1200–1450.* University of Alabama Press, Tuscaloosa.

Chapman, Jefferson, and Gary D. Crites

1987 Evidence for Early Maize (*Zea mays*) from the Icehouse Bottom Site, Tennessee. *American Antiquity* 52(2):352–354.

Cobb, Charles R.

1993 Archaeological Approaches to the Political Economy of Nonstratified Societies. In *Archaeological Method and Theory,* Volume 5, edited by M. B. Schiffer, pp. 43–100. University of Arizona Press, Tucson.

Cobb, Charles R., and Patrick H. Garrow

1996 Woodstock Culture and the Question of Mississippian Emergence. *American Antiquity* 61(1):21–37.

Conrad, Lawrence A.

1989 The Southeastern Ceremonial Complex on the Northern Middle Mississippian Frontier: Late Prehistoric Politico-Religious Systems in the Central Illinois River Valley.

In *The Southeastern Ceremonial Complex: Artifacts and Analysis*, edited by Patricia Galloway, pp. 93–113. University of Nebraska Press, Lincoln.

1991 The Middle Mississippian Cultures of the Central Illinois Valley. In *Cahokia and the Hinterlands: Middle Mississippian Cultures of the Midwest*, edited by Thomas E. Emerson and R. Barry Lewis, pp. 119–63. University of Illinois Press, Urbana.

Cook, Robert A., and T. Douglas Price

2015 Maize, Mounds, and the Movement of People: Isotope Analysis of a Mississippian/Fort Ancient Region. *Journal of Archaeological Science* 61:112–128.

Crites, Gary D.

1978 Paleoethnobotany of the Normandy Reservoir in the Upper Duck River Valley, Tennessee. Unpublished master's thesis, University of Tennessee, Knoxville.

Cross, Paula, and Melissa Bittinger

1996 "The Old Road." Phase I Historic Properties Investigations for the FAP 310 Project. Report of Investigations No. 224B. Contract Archaeology Program, Center for American Archaeology, Kampsville, Illinois.

Delaney-Rivera, Colleen

2000 Mississippian and Late Woodland Cultural Interaction and Regional Dynamics: A View from the Lower Illinois River Valley. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

2004 From Edge to Frontier: Early Mississippian Occupation of the Lower Illinois River Valley. *Southeastern Archaeology* 23(1):41–56.

Dezendorf, Caroline

2013 The Effects of Food Processing on the Archaeological Visibility of Maize: An Experimental Study of Carbonization of Lime-Treated Maize Kernels. *Ethnobiology Letters* 4:12–20.

Dietler, Michael

2001 Theorizing the Feast: Rituals of Consumption, Commensal Politics, and Power in African Contexts. In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*, edited by Michael Dietler and Brian Hayden, pp. 65–114. Smithsonian Series in Archaeological Inquiry, Washington, D.C.

Dunnell, Robert C., and James K. Feathers

1991 Late Woodland Manifestations of the Malden Plain, Southeast Missouri. In *Stability, Transformation, and Variation: The Late Woodland Southeast*, edited by Michael S. Nassaney and Charles R. Cobb, pp. 21–45. Plenum, New York.

Emerson, Thomas E., Kristen M. Hedman, and Mary L. Simon

2005 Marginal Horticulturalists or Maize Agriculturalists? Archaeobotanical, Paleopathological, and Isotopic Evidence Relating to Langford Tradition Maize Consumption. *Midcontinental Journal of Archaeology* 30(1):67–118.

Ensor, H. Blaine

1993 Big Sandy Farms: A Prehistoric Agricultural Community near Moundville, Black Warrior River Floodplain, Tuscaloosa County, Alabama. Report of Investigations 68. Division of Archaeology, Alabama Museum of Natural History, University of Alabama, Tuscaloosa.

Esarey, Duane

2000 The Late Woodland Maples Mills and the Mossville Phase Sequence in the Central Illinois River Valley. In *Late Woodland Societies: Tradition and Transformation across*

the Midcontinent, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 387–412. University of Nebraska Press, Lincoln.

Esarey, Duane, Michael D. Wiant, Dawn Ellen Harn, Terrance J. Martin, Marjorie B. Schroeder, and Robert E. Warren

2000 The Liverpool Lake Site: A Late Woodland Village on the Chautauqua Unit of the Illinois River National Wildlife Refuges, Mason County, Illinois. Illinois State Museum, Quaternary Studies Program, Technical Report No. 00-767-5.

Ford, Richard I.

1981 Gardening and Farming before AD 1000: Patterns of Prehistoric Cultivation North of Mexico. *Journal of Ethnobiology* 1(1):6–27.

1985a The Processes of Plant Food Production in Prehistoric North America. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 1–18. Anthropological Papers 75. University of Michigan, Museum of Anthropology, Ann Arbor.

1985b Patterns of Prehistoric Food Production in North America. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 341–364. Anthropological Papers 75. University of Michigan, Museum of Anthropology, Ann Arbor

Fritz, Gayle J.

1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory* 4(4):387–435.

1992 Newer, "Better" Maize and the Mississippian Emergence: A Critique of Prime Mover Explanations. In *Late Prehistoric Agriculture: Observations from the Midwest*, edited by William I. Woods, pp. 19–43. Illinois Historic Preservation Agency, Springfield.

1994 In Color and in Time: Prehistoric Ozark Agriculture. *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 105–126. Office of the State Archaeologist Report 19. University of Iowa, Iowa City.

2000 Native Farming Systems and Ecosystems in the Mississippi River Valley. In *Imperfect Balance: Landscape Transformations in the Pre-Columbian Americas*, edited by David Lentz, pp. 225–250. Columbia University Press, New York.

2007a Keepers of Louisiana's Levees: Early Mound Builders and Forest Managers. In *Rethinking Agriculture: Archaeological and Ethnoarchaeological Perspectives*, edited by Timothy Denham, José Iriarte, and Luc Vrydaghs, pp. 189–209. Left Coast Press, Walnut Creek.

2007b Pigweeds for the Ancestors: Cultural Identities and Archaeobotanical Identification Methods. In *The Archaeology of Food and Identity*, edited by Katheryn Twiss, pp. 288–307. Center for Archaeological Investigations, Occasional Paper No. 34. Southern Illinois University, Carbondale.

2014 Maygrass (*Phalaris caroliniana* Walt.): Its Role and Significance in Native Eastern North American Agriculture. In *New Lives for Ancient and Extinct Crops*, edited by Paul E. Minnis, pp. 13–43. University of Arizona Press, Tucson.

Fritz, Gayle J., and Tristram R. Kidder

1993 Recent Investigations into Prehistoric Agriculture in the Lower Mississippi Valley. *Southeastern Archaeology* 12(1):1–14.

Fritz, Gayle J., and Neal H. Lopinot

2003 Native Crops at Early Cahokia: Comparing Domestic and Ceremonial Contexts. In *People, Plants, and Animals: Archaeological Studies of Human-Environment Interactions in the Midcontinent*, edited by Robert Warren. *Illinois Archaeology* 15/16:90–111.

Galloy, Joseph M., Kathryn E. Parker, and Nathan J. Babcook
2000 The Bivouac Site (11MS1665): An Emergent Mississippian Camp in the American Bottom Uplands. *Illinois Archaeology* 12:218–243.

Goette, Susan, Michelle Williams, Sissel Johannessen, and Christine A. Hastorf
1994 Towards Reconstructing Ancient Maize: Experiments in Processing and Charring. *Journal of Ethnobiology* 14(1):1–21.

Green, William
1987 Between Hopewell and Mississippian: Late Woodland in the Prairie Peninsula as viewed from the Western Illinois Uplands. Unpublished Ph.D. dissertation, Department of Anthropology, University of Wisconsin, Madison.

Green, William, and David J. Nolan
2000 Late Woodland Peoples in West-Central Illinois. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 345–386. University of Nebraska Press, Lincoln.

Gremillion, Kristen
2003 Eastern Woodlands Overview. In *People and Plants in Eastern North America*, edited by Paul Minnis, pp. 17–49. Smithsonian Institution Press, Washington, D.C.

Hally, David, and James B. Langford Jr.
1988 *Mississippi Period Archaeology of the Georgia Valley and Ridge Province.* Laboratory of Archaeology Series, Report No. 25. University of Georgia, Athens.

Hally, David, and James Rudolph
1986 *Mississippi Period Archaeology of the Georgia Piedmont.* Laboratory of Archaeology Series, Report No. 24. University of Georgia, Athens.

Hann, John H.
1986 Translation of Alonso de Leturiondo's Memorial to the King of Spain. *Florida Archaeology* 2:165–225.

Harn, Alan D.
1991 The Eveland Site: Inroad to Spoon River Mississippian Society. In *New Perspectives on Cahokia: Views from the Periphery*, edited by James B. Stoltman, pp. 129–53. Prehistory Press, Madison.

Hart, John P.
1999 Maize Agriculture Evolution in the Eastern Woodlands of North America: A Darwinian Perspective. *Journal of Archaeological Method and Theory* 6(2):137–180.

Hart, John P., William A. Lovis, Robert J. Jeske, and John D. Richards
2012 The Potential of Bulk $\delta^{13}C$ on Encrusted Cooking Residues as Independent Evidence for Regional Maize Histories. *American Antiquity* 77(2):315–325.

Herndon, Richard L., Andrew P. Bradbury, Neal H. Lopinot, Brian G. DelCastello, and Gina S. Powell
2014 The Artesian Branch Site: Late Woodland Occupations in the Mississippi Floodplain of Northeastern Missouri. *Illinois Archaeology* 26:56–84.

Hoard, Robert J.
2000 Late Woodland in Central Missouri, the Boone Phase. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, Andrew C. Fortier, pp. 211–239. University of Nebraska Press, Lincoln.

Holt, Julie Zimmerman, Toshia Evans, Marge Schroeder, Shannon L. Moore, and Cassandra Buskohl

2010 Late Woodland–Emergent Mississippian Occupation and Plant Use at the AE Harmon Site (11MS136). *Midcontinental Journal of Archaeology* 35(1):57–90.

Holt, Julie Zimmerman, Miranda Yancey, and Erin Marks Guntren

2011 Anthropogenic Change at the D. Hitchens Site (11MSS1124). *Illinois Archaeology* 23:173–205.

Hudson, Charles

1976 *The Southeastern Indians*. University of Tennessee Press, Knoxville.

Hutchinson, Dale L., Clark S. Larsen, Margaret J. Schoeninger, and Lynette Norr

1998 Regional Variation in the Pattern of Maize Adoption and Use in Florida and Georgia. *American Antiquity* 63(3):397–416.

Jackson, H. Edwin, C. Margaret Scarry, and Susan Scott

2016 Domestic and Ritual Meals in the Moundville Chiefdom. In *Rethinking Moundville and Its Hinterland*, edited by Vincas P. Steponaitis and C. Margaret Scarry, pp. 187–233. University Press of Florida, Gainesville.

Johannessen, Sissel

1984 Paleoethnobotany. In *American Bottom Archaeology*, edited by Charles J. Bareis and James W. Porter, pp. 197–214. University of Illinois Press, Urbana.

1993 Farmers of the Late Woodland. In *Foraging and Farming in the Eastern Woodlands*, edited by C. Margaret Scarry, pp. 57–77. University Press of Florida, Gainesville.

Kassabaum, Megan C.

2014 Communal Feasting, Ritual Activity, and Mound Building at the Feltus Site, Jefferson County, Mississippi. Unpublished Ph.D. dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.

Kelly, John E.

1990a The Emergence of Mississippian Culture in the American Bottom Region. In *The Mississippian Emergence*, edited by Bruce D. Smith, pp. 113–52. Smithsonian Institution Press, Washington, D.C.

1990b Range Site Community Patterns and the Mississippian Emergence. In *The Mississippian Emergence*, edited by Bruce D. Smith, pp. 67–112. Smithsonian Institution Press, Washington, D.C.

Kidder, Tristram R.

1992 Timing and Consequences of the Introduction of Maize Agriculture in the Lower Mississippi Valley. *North American Archaeologist* 13(1):15–41.

1993 *1992 Archaeological Test Excavations in Tensas Parish, Louisiana*. Center for Archaeology, Archaeological Report 3. Tulane University, New Orleans.

2002 Woodland Period Archaeology of the Lower Mississippi Valley. In *The Woodland Southeast*, edited by David G. Anderson and Robert C. Mainfort Jr., pp. 66–90. University of Alabama Press, Tuscaloosa.

Kidder, Tristram R., and Gayle J. Fritz

1993 Subsistence and Social Change in the Lower Mississippi Valley: The Reno Brake and Osceola Sites, Louisiana. *Journal of Field Archaeology* 20(3):281–297.

King, Adam

2003 *Etowah: The Political History of a Chiefdom Capital*. University of Alabama Press, Tuscaloosa.

King, Frances B.
1985 Presettlement Vegetation and Plant Remains. In *The Alexander Site, Conway County, Arkansas*, edited by E. Thomas Hemmings and John House, pp. 47–57. Research Series 24. Arkansas Archeological Survey, Fayetteville.
1987 Prehistoric Maize in Eastern North America: An Evolutionary Evaluation. Unpublished Ph.D. dissertation, Department of Agronomy, University of Illinois, Urbana.
1988 Presettlement Vegetation and Plant Remains. In *Results of Final Testing for Significance at the Ink Bayou Site (3PU252), Pulaski County, Arkansas*, by David Waddell, John. House, Frances King, M. L. Colburn, and M. K. Marks, pp. 235–249. Report to the Sponsored Research Program, Arkansas Archeological Survey, to the Arkansas Highway and Transportation Department.
1993 Floral Remains. In *Rench: A Stratified Site in the Central Illinois River Valley*, edited by Mark A. McConaughy, pp. 121–124. Reports of Investigations No. 49. Illinois State Museum, Springfield.
1994 Variability in Cob and Kernel Characteristics of North American Maize Cultivars. In *Corn and Culture in the Prehistoric New World*, edited by Sissel Johannessen and Christine A. Hastorf, pp. 35–54. Westview, Boulder.

Knight, Vernon J., Jr.
1992 Preliminary Report on Excavations at Mound Q, Moundville. Paper presented at the 49th Annual Southeastern Archaeological Conference, Little Rock, Arkansas.
1998 Moundville as a Diagrammatic Ceremonial Center. In *Archaeology of the Moundville Chiefdom*, edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 44–62. Smithsonian Institution Press, Washington, D.C.

Knight, Vernon J., Jr., and Vincas P. Steponaitis
1998 A New History of Moundville. In *Archaeology of the Moundville Chiefdom*, edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 1–25. Smithsonian Institution Press, Washington, D.C.

Kuehn, Steven R., and Rosemarie Blewitt
2013 Mississippian Faunal and Botanical Remains from the Tree Row (11F53) and Baker-Preston (11F20) Sites, Fulton County, Illinois. *Illinois Archaeology* 25:27–62.

Lee, Aubra L., Rhonda L. Smith, Jill-Karen Yakubik, Tristram R. Kidder, Ruben Saenz II, Benjamin Maygarden, Gayle J. Fritz, and Roger T. Saucier
1997 *Archaeological Data Recovery at the Birds Creek Site (16CT416), Catahoula Parish, Louisiana*. Earth Search, New Orleans.

Listi, Ginessa A.
2011 Bioarchaeological Analysis of Diet during the Coles Creek Period in the Southern Lower Mississippi Valley. *American Journal of Physical Anthropology* 144(1):30–40.
2013 Bioarchaeological Analysis of Subsistence and Health at the Lake George Site, Mississippi (22YZ557). *Southeastern Archaeology* 32(1):111–128.

Lopinot, Neal H.
1992 Spatial and Temporal Variability in Mississippian Subsistence: The Archaeobotanical Record. In *Late Prehistoric Agriculture: Observations from the Midwest*, edited by William I. Woods, pp. 44–94. Illinois Historic Preservation Agency, Springfield.
1994 A New Crop of Data on the Cahokian Polity. *Agricultural Origins and Development in the Midcontinent*, edited by William Green, pp. 127–153. Office of the State Archaeologist Report 19. University of Iowa, Iowa City.

1995 Archaeobotanical Remains. In *Woodland and Mississippian Occupations at the Hayti Bypass Site (23PM572), Pemiscot County, Missouri*, edited by Michael D. Conner, pp. 221–262. Special Publication No. 1. Center for Archaeological Research, Southwest Missouri State University, Springfield.

1997 Cahokian Food Production Reconsidered. In *Cahokia: Domination and Ideology in the Mississippian World*, edited by Timothy R. Pauketat and Thomas E. Emerson, pp. 52–68. University of Nebraska Press, Lincoln.

Lusteck, Robert

2006 The Migrations of Maize into the Southeastern United States. In *The Histories of Maize: Multidisciplinary Approaches to the Prehistory, Linguistics, Biogeography, Domestication, and Evolution of Maize*, edited by John Staller, Robert Tykot, and Bruce Benz, pp. 521–528. Academic, Burlington.

Lynott, Mark J., Thomas W. Boutton, James E. Price, and Dwight E. Nelson

1986 Stable Carbon Isotopic Evidence for Maize Agriculture in Southeast Missouri and Northeast Arkansas. *American Antiquity* 51(1):51–65.

Markin, Julie G.

2007 Woodstock: The Rise of Political Complexity in North Georgia. Unpublished Ph.D. dissertation, Department of Anthropology, University of Georgia, Athens.

Martin, William W., and LuElla M. Parks

1994 Early Middle Mississippian-Period Land-Use and Settlement-Subsistence Practices, Site 23S0132, Stoddard County, Missouri. *Missouri Archaeologist* 55:47–76.

Maxham, Mintcy D.

2000 Rural Communities in the Black Warrior Valley, Alabama: The Role of Commoners in the Creation of the Moundville I Landscape. *American Antiquity* 65(2):337–354.

2004 Native Constructions of Landscapes in the Black Warrior Valley, Alabama, AD 1020–1520. Unpublished Ph.D. dissertation, Department of Anthropology, University of North Carolina, Chapel Hill.

McConaughy, Mark A.

1991 The Rench Site Late Woodland/Mississippian Farming Hamlet from the Central Illinois River Valley: Food for Thought. In *New Perspectives on Cahokia: Views from the Periphery*, edited by James B. Stoltman, pp. 101–128. Monographs in World Archaeology 2. Prehistory Press, Madison.

McConaughy, Mark A., Terrance J. Martin, and Frances B. King

1993 Late Woodland/Mississippian Period Component. In *Rench: A Stratified Site in the Central Illinois River Valley*, edited by Mark A. McConaughy, pp. 76–128. Reports of Investigations No. 49. Illinois State Museum, Springfield.

McNutt, Charles H.

1996 The Central Mississippi Valley: A Summary. In *Prehistory of the Central Mississippi Valley*, edited by Charles H. McNutt, pp. 187–257. University of Alabama Press, Tuscaloosa.

Michals, Lauren M.

1998 The Oliver Site and Early Moundville I Phase Economic Organization. In *Archaeology of the Moundville Chiefdom*, edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 167–182. Smithsonian Institution Press, Washington, D.C.

Mistovich, Tim S.

1988 Early Mississippian in the Black Warrior River Valley: The Pace of Transition. *Southeastern Archaeology* 7(1):21–38.

Morse, Dan F., and Phyllis A. Morse
1983 *Archaeology of the Central Mississippi Valley.* Academic, San Diego.

Myers, Thomas P.
2006 Hominy Technology and the Emergence of Mississippian Societies. In *The Histories of Maize: Multidisciplinary Approaches to the Prehistory, Linguistics, Biogeography, Domestication, and Evolution of Maize,* edited by John Staller, Robert Tykot, and Bruce Benz, pp. 511–520. Academic, Burlington.

Nassaney, Michael S.
1987 On the Causes and Consequences of Subsistence Intensification in the Mississippi Alluvial Valley. In *Emergent Horticultural Economies of the Eastern Woodlands,* edited by William F. Keegan, pp. 129–151. Center for Archaeological Investigations, Occasional Paper 7. Southern Illinois University, Carbondale.

O'Brien, Michael J., and W. Raymond Wood
1998 *The Prehistory of Missouri.* University of Missouri Press, Columbia.

Parker, Kathryn E., and Elizabeth M. Scott
2003 Prehistoric Plant and Animal Use in the Interior Uplands of Silver Creek, Southwestern Illinois. *Illinois Archaeology* 15/16:58–89.

Pauketat, Timothy R.
1994 *The Ascent of Chiefs: Cahokia and Mississippian Politics in Native North America.* University of Alabama Press, Tuscaloosa.
1997 Cahokian Political Economy. In *Cahokia: Domination and Ideology in the Mississippian World,* edited by Timothy R. Pauketat and Thomas E. Emerson, pp. 30–51. University of Nebraska Press, Lincoln.
1998 *The Archaeology of Downtown Cahokia: The Tract-15A and Dunham Tract Excavations.* Studies in Archaeology No. 1. Illinois Transportation Archaeological Research Program, University of Illinois, Urbana-Champaign.
2000a The Tragedy of the Commoners. In *Agency in Archaeology,* edited by Marcia-Anne Dobres and John E. Robb, pp. 113–129. Routledge, London.
2000b Politicization and Community in the Pre-Columbian Mississippi Valley. In The *Archaeology of Communities: A New World Perspective,* edited by Marcello-Andrea Canuto and Jason Yaeger, pp. 16–43. Routledge, London.
2004 *Ancient Cahokia and the Mississippians.* Cambridge University Press, Cambridge.

Pauketat, Timothy R., Lucretia S. Kelly, Gayle J. Fritz, Neal H. Lopinot, Scott Elias, and Eve Hargrave
2002 The Residues of Feasting and Public Ritual at Early Cahokia. *American Antiquity* 67(2):257–279.

Pauketat, Timothy R., and Neal H. Lopinot
1997 Cahokian Population Dynamics. In *Cahokia: Domination and Ideology in the Mississippian World,* edited by Timothy R. Pauketat and Thomas E. Emerson, pp. 103–123. University of Nebraska Press, Lincoln.

Phillips, David A. Jr., and Lynne Sebastian
2004 Large-scale Feasting and Politics: An Essay on Power in Precontact Southwestern Societies. In *Identity, Feasting, and the Archaeology of the Greater Southwest,* edited by Barbara J. Mills, pp. 233–260. University of Colorado Press, Boulder.

Pollock, Susan
2003 Feasts, Funerals, and Fast Food in Early Mesopotamian States. *The Archaeology and*

Politics of Food and Feasting in Early States and Empires, edited by Tamara L. Bray, pp. 17–38. Springer, New York.

2012 Towards an Archaeology of Commensal Spaces: An Introduction. *eTopoi Journal for Ancient Studies* special vol. 2:1–20.

Pope, Melody K.

1989 Microtools from the Black Warrior Valley: Technology, Use, and Context. Unpublished Master's thesis, Department of Anthropology, State University of New York, Binghamton.

Potter, James M.

2000 Pots, Parties, and Politics: Communal Feasting in the American Southwest. *American Antiquity* 65(3):471–492.

Potter, James M., and Scott G. Ortman

2004 Community and Cuisine in the Prehispanic American Southwest. In *Identity, Feasting, and the Archaeology of the Greater Southwest*, edited by Barbara J. Mills, pp. 173–191. University of Colorado Press, Boulder.

Raviele, Maria E.

2010 Assessing Carbonized Archaeological Cooking Residues: Evaluation of Maize Phytolith Taxonomy and Density through Experimental Residue Analysis. Unpublished Ph.D. dissertation, Department of Anthropology, Michigan State University, East Lansing.

Raymer, Leslie R., and Mary T. Bonhage-Freund

2000 Archaeobotanical Analysis. *Early Georgia* 28(2):74–91.

Reber, Eleanora A., and Richard P. Evershed

2004 How Did Mississippians Prepare Maize? The Application of Compound-Specific Carbon Isotope Analysis to Absorbed Pottery Residues from Several Mississippi Valley Sites. *Archaeometry* 46(1):19–33.

Reeder, Robert L.

2000 The Meramec Spring Phase. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 187–210. University of Nebraska Press, Lincoln.

Rees, Mark A., and Patrick C. Livingood

2007 Introduction and Historical Overview. In *Plaquemine Archaeology*, edited by Mark A. Rees and Patrick C. Livingood, pp. 1–19. University of Alabama Press, Tuscaloosa.

Riley, Thomas J.

1987 Ridged-Field Agriculture and the Mississippian Economic Pattern. *Emergent Horticultural Economies of the Eastern Woodlands*, 295–304. Center for Archaeological Investigations, Occasional Paper 7. Southern Illinois University, Carbondale.

Riley, Thomas J., Richard Edging, and Jack Rossen

1990 Cultigens in Prehistoric Eastern North America: Changing Paradigms. *Current Anthropology* 31(5):525–541.

Riley, Thomas J., Gregory R. Walz, Charles J. Bareis, Andrew C. Fortier, and Kathryn E. Parker

1994 Accelerator Mass Spectrometry (AMS) Dates Confirm Early *Zea mays* in the Mississippi River Valley. *American Antiquity* 59(3):490–498.

Rolingson, Martha A.

1998 *Toltec Mounds and Plum Bayou Culture: Mound D Excavations*. Research Series No. 54. Arkansas Archaeological Survey, Fayetteville.

Rose, Fionnuala

2008 Intra-Community Variation in Diet during the Adoption of a New Staple Crop in the Eastern Woodlands. *American Antiquity* 73(3):413–439.

Rose, Jerome C., Murray K. Marks, and Larry L. Tieszen

1991 Bioarchaeology and Subsistence in the Central and Lower Portions of the Mississippi Valley. In *What Mean These Bones? Studies in Southeastern Bioarchaeology*, edited by Mary Lucas Powell, Patricia S. Bridges, Ann Marie W. Mires, pp. 7–21. University of Alabama Press, Tuscaloosa.

Scarry, C. Margaret

1986 Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Unpublished Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

1993a Variability in Mississippian Crop Production Strategies. In *Foraging and Farming in the Eastern Woodlands*, edited by C. Margaret Scarry, pp. 78–90. University Press of Florida, Gainesville.

1993b Agricultural Risk and the Development of the Moundville Chiefdom. In *Foraging and Farming in the Eastern Woodlands*, edited by C. Margaret Scarry, pp. 157–181. University Press of Florida, Gainesville.

1994 Variability in Late Prehistoric Corn from the Lower Southeast. In *Corn and Culture in the Prehistoric New World*, edited by Sissel Johannessen and C. A. Hastorf, pp. 347–367. Westview, Boulder.

1995 Plant Remains. In *The Rock Levee Site: Late Marksville through Late Mississippi Settlement, Bolivar County, Mississippi*, edited by Richard Weinstein, Richard Fuller, Susan Scott, C. Margaret Scarry, and Sylvia Duay, pp. 263–286. The Beulah Levee Project: Archaeology and History, Vol. 3. Coastal Environments, Baton Rouge.

2003a Food Plant Remains from Excavations in Mounds A, B, C, D, and L at Bottle Creek. In *Bottle Creek: A Pensacola Culture Site in South Alabama*, edited by Ian W. Brown, pp. 103–113. University of Alabama Press, Tuscaloosa.

2003b Use of Plants in Mound-Related Activities at Bottle Creek and Moundville. In *Bottle Creek: A Pensacola Culture Site in South Alabama*, edited by Ian W. Brown, pp. 114–129. University of Alabama Press, Tuscaloosa.

2003c Patterns of Wild Plant Utilization in the Prehistoric Eastern Woodlands. In *People and Plants in Ancient Eastern North America*, edited by Paul E. Minnis, pp. 50–104. Smithsonian Books, Washington, D.C.

2008 Crop Husbandry Practices in North America's Eastern Woodlands. In *Case Studies in Environmental Archaeology*, 2nd ed., edited by Elizabeth Reitz, C. Margaret Scarry, and Sylvia J. Scudder, pp. 391–404. Springer, New York.

Scarry, C. Margaret, and John F. Scarry

2005 Native American 'Garden Agriculture' in Southeastern North America. *World Archaeology* 37(2):259–274.

Scarry, C. Margaret, and Vincas P. Steponaitis

1997 Between Farmstead and Center: The Natural and Social Landscape of Moundville. In *People, Plants, and Landscapes: Studies in Paleoethnobotany*, edited by Kristen Gremillion, pp. 107–122. University of Alabama Press, Tuscaloosa.

Scarry, John F., H. Edwin Jackson, and Mintcy D. Maxham
2016 Late Prehistoric Social Practice in the Rural Black Warrior River Valley. In *Rethinking Moundville and Its Hinterland,* edited by Vincas P. Steponaitis and C. Margaret Scarry, pp. 162–186. University Press of Florida, Gainesville.

Schoeninger, Margaret J., and Mark R. Schurr
1998 Human Subsistence at Moundville: The Stable-Isotope Data. In *Archaeology of the Moundville Chiefdom,* edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 120–132. Smithsonian Institution Press, Washington, D.C.

Schroeder, Marjorie B.
1994 Archaeobotany. In *Central Illinois Expressway Archeology: Upland Occupations of the Illinois Valley Crossing,* edited by B. Stafford, pp. 105–120. Kampsville Archeological Center, Technical Report, Volume 5. Center for American Archeology, Kampsville.
2000 Archaeobotanical Sampling. In *Ancient Life on the Illinois River: Excavations at the Liverpool Landing Site (11F2713), West Central Illinois.* Technical Report No. 97-1076-2. Quaternary Studies Program, Illinois State Museum, Springfield.

Schroeder, Marjorie B., and Sarah J. Studenmund
1998 *Archaeobotanical Analysis of Select Bluff-Component Sites in the Lower Illinois River Valley.* Manuscript on file, Center for American Archaeology, Kampsville.

Simon, Mary L.
2000 Regional Variations in Plant Use Strategies in the Midwest during the Late Woodland. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent,* edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 37–76. University of Nebraska Press, Lincoln.
2014 Re-evaluating the Introduction of Maize into the American Bottom and Western Illinois. *Midcontinental Journal of Archaeology Occasional Papers* 1, edited by Maria E. Raviele and William A. Lovis, pp. 97–134. Illinois State Archaeological Survey, Urbana.
2017 Reevaluating the Evidence for Middle Woodland Maize from the Holding Site. *American Antiquity* 82(1):140–150.

Simon, Mary L., and Kathryn E. Parker
2006 Prehistoric Plant Use in the American Bottom: New Thoughts and Interpretations. *Southeastern Archaeology* 25(2):212–257.

Slater, Philip A., Kristin M. Hedman, and Thomas E. Emerson
2014 Immigrants at the Mississippian Polity of Cahokia: Strontium Isotope Evidence for Population Movement. *Journal of Archaeological Science* 44(1):117–127.

Smith, Bruce D.
1984 Mississippian Expansion: Tracing the Historical Development of an Explanatory Model. *Southeastern Archaeology* 3:13–32.
1989 Origins of Agriculture in Eastern North America. *Science* 246(4397):1566–1571.
1995 The Analysis of Single-Household Mississippian Sites. In *Mississippian Communities and Households,* edited by J. Daniel Rogers and Bruce D. Smith, pp. 224–49. University of Tuscaloosa Press, Alabama.

Smith, Bruce D., and Cowan, C. Wesley
2003 Domesticated Crop Plants and the Evolution of Food Production Economies in Eastern North America. In *People and Plants in Ancient Eastern North America,* edited by Paul E. Minnis, pp. 105–125. Smithsonian Books, Washington, D.C.

St-Pierre, Christian Gates, and Robert G. Thompson
2015 Phytolith Evidence for the Early Presence of Maize in Southern Quebec. *American Antiquity* 80(2):408–415.

Stafford, Barbara
1994 *Central Illinois Expressway Archaeology: Upland Occupations of the Illinois Valley Crossing.* Technical Report 5. Center for American Archaeology, Kampsville.

Steponaitis, Vincas P.
1986 Prehistoric Archaeology in the Southeastern United States, 1970–1985. *Annual Review of Anthropology* 15:363–404.
1998 Population Trends at Moundville. In *Archaeology of the Moundville Chiefdom*, edited by Vernon J. Knight Jr. and Vincas P. Steponaitis, pp. 26–43. Smithsonian Institution Press, Washington, D.C.

Studenmund, Sarah J.
2000 Late Woodland Occupations in the Lower Illinois Valley: Research Questions and Data Sets. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier, pp. 301–344. University of Nebraska Press, Lincoln.

Studenmund, Sarah J., Marjorie B. Schroeder, and Karli White
1995 Late Woodland Settlement Patterns at the Confluence of the Illinois and Mississippi Rivers: A Comparison of Upland and Lowland Sites. *Illinois Archaeology* 7:148–201.

Stuiver, Minze, and Paula J. Reimer
1993 Extended ^{14}C Data Base and Revised CALIB 3.0 ^{14}C Age Calibration Program. *Radiocarbon* 35(1):215–230.

Swanton, John R.
1946 *The Indians of the Southeastern United States.* Bulletin 137, Bureau of American Ethnology, Washington, D.C.

Tickner, Amanda
2007 Appendix B: Botanical Report for 9MU103 and 9CK9. In Woodstock: The Rise of Political Complexity in North Georgia, by Julie Markin, pp. 266–279. Unpublished Ph.D. dissertation, Department of Anthropology, University of Georgia, Athens.

VanDerwarker, Amber M.
1999 Feasting and Status at the Toqua site. *Southeastern Archaeology* 18(1):24–34.

VanDerwarker, Amber M., Gregory D. Wilson, and Dana N. Bardolph
2013 Maize Adoption and Intensification in the Central Illinois River Valley: An Analysis of Archaeobotanical Data from the Late Woodland through Early Mississippian Periods (AD 600–1200). *Southeastern Archaeology* 32(2):147–168.

VanDerwarker, Amber M., Dana N. Bardolph, Kristin M. Hoppa, Heather B. Thakar, Lana S. Martin, Allison L. Jaqua, Matthew E. Biwer, and Kristina M. Gill
2016 New World Paleoethnobotany in the New Millennium (2000–2013). *Journal of Archaeological Research* 24(2):125–177.

Voigt, Eric E.
1989 Late Woodland and Emergent Mississippian Plant Use. In *New World Paleoethnobotany*, edited by Eric E. Voigt and Deborah M. Pearsall. *Missouri Archaeologist* 47:197–232.

Wagner, Gail E.
1983 Fort Ancient Subsistence: The Botanical Record. *West Virginia Archaeologist* 35:27–39.

1986 The Corn and Cultivated Beans of the Fort Ancient Indians. *Missouri Archaeologist* 47:107–135.

Welch, Paul D.

1990 Mississippian Emergence in West Central Alabama. In *The Mississippian Emergence,* edited by Bruce D. Smith, pp. 197–225. Smithsonian Institution Press, Washington, D.C.

1991 *Moundville's Economy.* University of Alabama Press, Tuscaloosa.

Welch, Paul D., and C. Margaret Scarry

1995 Status-Related Variation in Foodways in the Moundville Chiefdom. *American Antiquity* 60(3):397–419.

Wiessner, Pauline W., and Wulf Schiefenhövel (editors)

1998 *Food and the Status Quest: An Interdisciplinary Perspective.* Berghahn Books, New York.

Williams, Leah

2008 *The Paleoethnobotany of the Feltus Mounds Site.* Senior honor's thesis, Department of Anthropology, University of North Carolina, Chapel Hill.

Wilson, Gregory D.

2008 *The Archaeology of Everyday Life at Early Moundville.* University of Alabama Press, Tuscaloosa.

Woodiel, Deborah Kay

1993 The St. Gabriel Site: Prehistoric Life on the Mississippi. *Louisiana Archaeology* 20:1–136.

Wright, Patty J.

2007 Early Mississippian Plant Use along the Lower Missouri River. *Missouri Archaeologist* 68:119–133.