VARIABILITY IN MISSISSIPPIAN CROP PRODUCTION STRATEGIES

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On a general level our understanding of Mississippian subsistence strategies has changed little in the past 50 years. Contact-era explorers told of passing through leagues of fields planted in maize, beans, and squash (e.g., Smith 1968; Varner and Varner 1951). Their reports, combined with the frequent recovery of cobs from sites containing Mississippian artifacts, led to the early recognition that these late prehistoric societies were based on maize agriculture (e.g., Thruston 1890). If we asked the archaeobotanists here today to describe Mississippian subsistence strategies in a single phrase, I think most would answer "maize agriculture", though we might be hard-pressed to restrain ourselves to a single phrase.

Of course, over the years we have added detail to this picture, refined our understanding of when maize agriculture became important, and repeatedly changed our explanations of the relationship between increased dependence on maize agriculture and the development of complex social relations. Most people here today are probably aware that maize becomes frequent in contexts dating after AD 800 to 900, but that archaeobotanical analyses and carbon isotope studies indicate maize was not a major dietary element until after AD 1000 (see for example, Bender et al. 1981; Lynott et al. 1986; Rose et al. 1986; van der Merwe and Vogel 1978; Yarnell and Black 1985). Most here today are probably also aware that the trinity of maize, beans, and squash did not enter the Eastern Woodlands as a unit (Ford 1985; Yarnell 1976). Beans are not found in the Midwest and Southeast until after the Mississippian polities had developed (Yarnell and Black 1985). Indeed, it appears that Cahokia was able to thrive without the aid of the common bean (Johannessen 1984). Finally, many here today may be aware that Mississippian farmers raised the native starchy seed crops that formed the basis of earlier plant husbandry systems (Johannessen 1984, Lopinot 1988).

What may not be as widely recognized, however, is that our summary descriptions of Mississippian subsistence economies mask considerable variability in plant production strategies. Moreover, even those of us who are aware of this variability have not fully taken it into account in our discussions of Mississippian social and economic relations. For myself, preparing this paper has been something of a revelation. I knew that patterns of plant use differed somewhat amongst the Mississippian polities. But it was only when I directly compared quantified plant data from flotation contexts that I realized the extent of the variability.

Beginning about AD 700, mound and plaza complexes were built in the Central and Lower Mississippi River Valley. These civic/ceremonial centers suggest the presence of hierarchical social relations of the type found in chiefdoms (Steponaitis 1986). It has been assumed that these polities were based on maize agriculture (Hemmings and House 1985; Williams and Brain 1983). Recent archaeobotanical and human skeletal analyses, however, cast doubt on this assumption.

Excavations by Martha Rolingson at the Toltec site indicate construction of mounds and a fortification ditch during the Plum Bayou phase, from AD. 700 to 900, (Rolingson 1982). Analysis of plant remains from the site reveals the substantial presence of starchy seeds (Fritz 1988). Almost 6000 starchy seeds were recovered,

including an as yet unidentified grass that is probably a domesticate. In contrast, maize is represented by a grand total of three cupules that may be intrusive from a later occupation. Plant remains have also been analyzed from two small sites in the Arkansas River Lowlands (King 1985; in press). At the Alexander site, samples from Plum Bayou contexts contain starchy seeds but no maize. Samples from Mississippian contexts, which post-date AD 1100, contain abundant maize remains. At the Ink Bayou site, samples which date to about AD 900, the end of the Plum Bayou phase, have produced both starchy seeds and maize. The maize, however, may be intrusive (Fritz, personal communication 1988).

The plant data are consistent with patterns observed in human skeletal remains from southern Missouri and Arkansas (Lynott et al. 1986; Rose et al. 1985; Rose et al. 1986). About 700 AD there is a sharp jump in dental caries rates. Individuals from contexts dating to AD 700 or later have high dental caries rates indicating diets rich in processed starch. But carbon isotope ratios and the lack of symptoms caused by iron deficiency anemia indicate that maize was not important in the diet until after AD 1200 (Rose et al. 1986).

The individual strands of evidence are limited, but woven together they form an intriguing picture. In the Arkansas River Lowlands complex social relations appear to have been supported for several hundred years by a subsistence economy based on the production of native starchy seed crops. The available data indicate that maize production was relatively unimportant until after AD 1100 when the polities took on the material trappings of Mississippian chiefdoms.

In the American Bottom, we find different patterns of crop production associated with changing social relations. As Johannessen has ably demonstrated (this symposium), before AD 800 Late Woodland farmers in the this area raised starchy seed crops. During the Emergent Mississippian period from AD 800 to 1000 settlement patterns, material culture, and subsistence strategies went through a succession of changes. The shifts in community organization seem to indicate increasing local and supra-local integration (Kelly et al. 1984). Maize makes a "sudden" appearance about AD 800. Maize remains are frequent and comparatively abundant throughout the Emergent Mississippian era. Maize production, however, seems to be added on to pre-existing cropping strategies. The American Bottom farmers continued to produce starchy seeds in quantity. In fact, a recent study by Lopinot (1988) indicates that production of maize and starchy seeds was intensified by Emergent Mississippian farmers.

The period from AD 1000 to 1150 witnessed the clear emergence and rapid growth of complex social and political relations (Milner et al. 1984; Lopinot and Woods 1988). Mounds centers were established in various parts of the American Bottom, and Cahokia was the site of massive public construction activities. The changes in social relations were accompanied by further changes in crop production. Maize production continued to increase, while production of starchy seeds leveled off (Johannessen 1984; Lopinot 1988). The production strategy might best be described as maize dominated, mixed-crop agriculture (Lopinot 1988).

After AD 1150 the level of social and political activity seems to drop-off and Cahokia's dominance wanes. The decrease in the intensity of supra-local integration is paralleled by a decrease in the intensity of crop production (Lopinot 1988). Maize and starchy seed crops continued to be important, but they were not produced on as large a scale. At the same time there seems to have been an increased reliance on wild resources, particularly nuts.

In sum, for the American Bottom we have evidence for intensification of crop production in the period preceding the establishment of complex polities. Initially, both starchy seed and maize production was intensified. After AD 1000, however, maize saw a further increase whereas production of starchy seeds stabilized.

Throughout the Emergent Mississippian and Mississippian eras, the farmers in the American Bottom seem to have practiced a mixed-crop agricultural strategy.

The Black Warrior Valley of west central Alabama was home to Moundville, one of the largest and best known chiefdoms outside of the Mississippi Valley. Here we find yet another pattern of changes in production strategies associated with the emergence of a Mississippian polity.

In the Emergent Mississippian, West Jefferson phase, AD 900 to 1050, the valley's population was distributed in small villages. These appear to have been egalitarian communities. There were no mounds and we have no other evidence of ranking (Welch 1985).

At the beginning of the West Jefferson phase, people seem to have relied heavily on wild resources, especially nuts. Crops were produced on a much smaller scale than in the regions I have already discussed. Starchy seeds are present, but in very small quantities. To give an appreciation of the differences in scale of production of native seeds, I compared seed to nut ratios using count data. Emergent Mississippian contexts from the American Bottom have a ratio of starchy seeds to nuts that is one hundred times greater than the ratio for Emergent Mississippian contexts in the Black Warrior Valley. There are 2.6 starchy seeds for every nutshell fragment in the American Bottom (data taken from Johannessen 1984), while there are .02 starchy seeds per nutshell fragment in the Black Warrior (data taken from Scarry 1986). (Incidentally, these figures exclude features from the American Bottom that have high seed concentrations.) Clearly production of starchy seeds was less important in the Black Warrior Valley than in the American Bottom. Moreover, in the Black Warrior Valley there is no evidence for an increase in the importance starchy seeds over time. In contrast, maize is ubiquitous in Emergent Mississippian contexts from the Black Warrior Valley, and there is good evidence for a significant increase in maize production during the West Jefferson phase (Scarry 1986).

About AD 1050, the beginning of the Moundville I phase, dramatic changes in social relations were manifest in the Black Warrior Valley (Bozeman 1982; Peebles 1982; Steponaitis 1983; Welch 1985). Mounds were built at four sites and the population dispersed to farmsteads and hamlets. The communities in the valley were apparently organized into several simple chiefdoms. By AD 1250, the end of the Moundville I phase, the valley's population had been integrated into a single, complex chiefdom controlled from the paramount center at Moundville.

The plant data suggest that a shift to field production of maize began prior to the construction of the mound centers and was complete by early Moundville I times (Scarry 1986). Thereafter, crop production strategies show little variation. Maize is by far the dominant crop. To be sure, starchy seeds crops were produced but at levels no higher than those found in Early West Jefferson contexts.

The development of the Moundville agricultural strategy follows a very different trajectory than that seen in the American Bottom. The populations in the Black Warrior Valley circa AD 900 appear to be forager/gardeners or small-scale horticulturalists. During the next century or so, maize production rises dramatically, but starchy seed crops play at most minor role in the emerging agricultural strategy. After AD 1050, the production strategy of the Moundville polity appears to fit our long-held image of Mississippian economies focused on maize agriculture.

Elsewhere in the Lower Southeast, late prehistoric production strategies seem to follow trajectories similar to that I have outlined for Moundville. Data from the Tombigbee Valley, also in west central Alabama, show a parallel pattern of increasing maize production from the Emergent Mississippian into the early Mississippian period (Caddell 1981, 1983). Starchy seeds, however, are even less visible in the archaeological record than they are in the Black Warrior. Plant data from late prehistoric sites in Georgia and Florida are sketchy, but reports of maize remains

are common, whereas starchy seeds are notably infrequent (e.g., Alexander 1984; Moore 1985).

I am less certain about production strategies in the Midsouth outside the Mississippi Valley. In Tennessee there is an increase in maize production from emergent Mississippian to early Mississippian times (Chapman and Shea 1981; Crites 1978). It is my impression that starchy seeds do not show a similar increase though they may be more important than in areas further south (Chapman and Shea 1981; Crites 1978; Kline and Crites 1979 Gremillion and Yarnell 1986). Unfortunately, plant data from the critical period between AD 800 to 1000 are scarce, and differences in the way data are quantified and reported make direct comparisons to other regions difficult.

My review of Mississippian production strategies has been brief and selective. I have focused on crops to the virtual exclusion of other resources. Clearly, hunting and foraging for nuts and fruit were important, though the intensity of these pursuits undoubtedly varied.

Even without considering wild resources, it is evident that regional and temporal differences in Mississippian subsistence strategies are considerable. There are differences in the timing of maize intensification. In the Arkansas River Lowlands maize becomes important after the development of rank organization, whereas in the American Bottom and the Black Warrior Valley intensified maize production precedes the emergence of chiefly societies. There are also differences in the relative importance of maize and starchy seeds. After AD 1000 to 1100, maize appears to be the dominant crop everywhere, but in the American Bottom, and perhaps the Arkansas River Lowlands, continued production of starchy seeds produces a much more mixed-crop agricultural strategy than that found in the Black Warrior Valley. Most intriguing of all, the Mississippian-era agricultural strategies seem to have developed from quite different Late Woodland subsistence systems. In the Mississippi Valley, and perhaps elsewhere in the Midwest and Midsouth, maize production is added to extant farming systems of reasonably large scale. In the Lower Southeast, however, the evidence suggests that prior to the intensification of maize production, the populations were dependent on foraging and small-scale crop production. It is my suspicion that the abundant acorn masts of the Lower Southeast may have played the dietary role that starchy seeds did farther north and west. But that is the topic of another paper.

The relationship between intensive maize agriculture and complex organization is a topic of long-standing interest to Mississippian scholars. Given the spatial and temporal variability in production strategies that I have just outlined, it is tempting to retreat to regional parochialism and suggest that any attempt at a general explanation is futile. There are, however, common features to the observed changes in production strategies. Initially the common element is intensified crop production. Subsequently, the common element is the dominance of maize in the production strategies. I believe that to address the issue of the relationship between the subsistence and organizational changes, we need to reformulate our questions. First, we need to ask why <u>crop</u> production was increased, and second, why did maize become the dominant crop.

Frequently, the increase in crop production during the Emergent Mississippian period is attributed to subsistence stress (e.g, Ford 1974; Kelly et al. 1984; Scarry 1981; Steponaitis 1986; Welch 1985). There are many variations on this theme. Basically climatic fluctuations and/or population growth are said to create population/resource imbalances. Intensified crop production is seen as a response to the resultant nutritional stress.

In its turn, the increase in crop production is often cast as a causal variable in the emergence of hierarchical social relations. The development of permanent decision-making offices, that is chiefs, is attributed, in part or in whole, to the

managerial requirements of dependence on agriculture (Brown 1974; Chmurny 1973; Ford 1974).

There are several problems with such explanations. Increased crop production occurs over a very large and diverse geographic region. It is difficult to argue that climatic fluctuations would have deleterious effects on existing subsistence strategies throughout the Midwest and Southeast. Similarly, it is difficult to argue that populations reached critical mass throughout the region. Moreover, even if population/resource imbalances did result in increased dependence on crops, such a change would not necessarily require a higher level administrator. For example, analyses of plant data from Fort Ancient sites suggests dependence on intensive maize production (Wagner 1987, 1988), yet the Fort Ancient societies were not hierarchically organized.

Recently, several people have suggested that rather than having a causal role in the emergence of social hierarchies, the changes in crop production are part of the changing social relations that eventually led to the development of those hierarchies (Nassaney 1987; Rose et al. 1986; Scarry 1986; Johannessen 1988). In many tribal societies, competitive feasting and gift-giving are avenues for increasing prestige within and between social groups and for creating social bonds (Dalton 1977). Throughout the Midwest and Southeast, the Emergent Mississippian era seems to have been a time of social change. It is possible that competition between groups led to intensified production of crops to support prestige building activities (Brumfiel and Earle 1987). Surplus foods could be used directly for ceremonial feasts. Surplus foods could also be used to support craftsmen who produced socially valued goods for distribution. Initially, intensified crop production might have been a strategy employed by one, or perhaps a few, aspiring descent groups. Surpluses generated through the combined efforts of the kin group could be used in prestige building activities. As a group's prestige increased, their success would encourage distant kin or non-kin to activate social bonds that would enable them to benefit from alliance with the core group. Expectations of reciprocity might place the followers in a position of continual obligation to the original group. If these obligations are not met, permanent status differences might arise.

The scenario I have just described, presents a speculative answer to the question "why intensify crop production?". It does not explain "why maize?" became the dominant crop. The mundane answer to why maize is that as a crop it may have had a greater capacity for increased yields than did the native starchy seeds (Smith 1986). If so, then undoubtedly the emphasis on maize was at least partly due to this potential.

It is conceivable, however, that there are also cosmological reasons why maize was chosen. In short, the emerging elite may have co-opted the "food of the gods". Before AD 800, maize is rare in the archaeological record. When it is found it seems to occur in contexts that have ritual or ceremonial importance. The sample is admittedly very small and the associations may be purely coincidental. Nevertheless, it may be that maize entered the Eastern Woodlands not as a food crop but as a sacred plant. Emerging elite often adopt symbols that denote their connections to earthly or supernatural powers (Brumfiel and Earle 1987; Helms 1988). That is, they signify their associations with powerful individuals in other societies or with the gods. If maize had symbolic importance, then by increasing production of maize in preference to starchy seeds the aspiring groups may have been staking a claim on sanctified authority.

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