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EVIDENCE FOR MEDICINAL PLANTS IN THE PALEOETHNOBOTANICAL RECORD OF THE EASTERN UNITED STATES DURING THE LATE WOODLAND THROUGH MISSISSIPPIAN PERIODS

by

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ABSTRACT

This dissertation research examines two interrelated topics regarding the Late Woodland through Mississippian period paleoethnobotanical record from the eastern United States: (1) is there evidence for prehistoric medicinal plants in this body of data; and (2) if medicinal plants are present, did pharmacopoeias change through time to meet the shifting cultural and biological needs of prehistoric people? To support discussion of these two issues, research on traditional ethnobotanical and ethnomedical systems, paleopathological evidence for prehistoric health, and the archaeological record for three study areas (American Bottom, Moundville, and Central Tombigbee regions) was conducted and is summarized in this dissertation. The paleoethnobotanical data that served as the basis of this dissertation were derived from previously published or completed reports. Taxa in those reports were compared with the ethnographic, ethnobotanical, and ethnopharmacological literature to provide support for the archaeological plants being part of prehistoric medical systems. This process resulted in the identification of 68 potential medicinal taxa with a total count of seeds, seed fragments, and/or wood fragments of nearly 5,000 individuals. After the initial selection of potential medicinal plants, trends in the paleoethnobotanical record as they relate to medicinal plants were analyzed. Four categories of medicinal plants based on their relative medical versus subsistence importance were developed to facilitate analysis. These categories were used in the analysis of data for potential medicines through time and space. The results of this analysis did not strongly support my hypothesis that the differing health needs of Mississippian people necessitated an increase in frequency and types of medicines, and that this process would be archaeologically visible as an increase in the number and diversity of medicinal plant remains from the Late Woodland to Mississippian periods. Potential medicinal plants were found to span the ethnobotanical spectrum from medicine to food to ritual. The research, however, has added new taxa to the group of plants that should be considered as potentially culturally significant when found in paleoethnobotanical samples from

the three study regions, and potentially when such taxa are identified from other assemblages in the eastern United States.

CHAPTER 1: INTRODUCTION

Concepts to be Evaluated

Investigations into the cultural importance of charred plant remains in eastern North America have concentrated primarily on the use of plants as subsistence items, and secondarily on plants as sources of technological materials or firewood (Asch and Asch 1985; Chapman and Shea 1981; Cutler and Blake 1973; Ford 1981; Fritz 1986; Gremillion 1997; Johannessen 1984; Lopinot 1992; Scarry 1993; Smith 1992; Watson 1976, 1985, 1989; Yarnell 1989, and others). The rather narrow, but recently broadening (e.g. Fritz 1997), focus of this research is not completely consistent with the ethnobotanical records from historic Native American groups that reveals the role of plants in many contexts, including their use as medicines. Due to the importance of medicinal plants in traditional cultures, I hypothesize that medicinal plants had a long history in North America that has not been previously evaluated, because relatively few medicinal remains would be identified from any given site or site component. The tendency by some archaeologists and paleoethnobotanists has been to dismiss such rare seed types and seeds from plants with no apparent food value in the paleoethnobotanical record as seed rain or agricultural debris. These specimens, however, could provide relevant information on human-plant interaction, especially if they are identified as ethnographically important medicines. This dissertation represents one of the first attempts to identify, quantify, and interpret the presence of these possible medicinal plants, or archaeomedicines as defined in this dissertation, in the archaeological record for eastern North America.

The issue of medicinal plants possibly occurring in the paleoethnobotanical record for the Eastern Woodlands is particularly relevant, because there is evidence for differences in health status between the Late Woodland (ca. A.D. 300 - 1000) and Mississippian (A.D. 1000-1400) period peoples. If the analyses of skeletal remains, settlement patterns, and demographic models are correct, then the shift between the Late Woodland and Mississippian period co-occurred with an increase in the frequency of some health issues including rates of caries, probable birth complications, tuberculosis, yaws, and other communicable diseases such as colds (Buikstra and Williams 1988; Conner 1990; Fenner 1980; Garner 1991; Goodman and Armelagos, eds. 1985; Kent 1992; Lallo et al. 1977; Lallo and Rose 1979; Ortner and Putscher 1985; Palkovick 1987; Roberts and Manchester 1995; Rothschild and Martin 1993; Shurr 1992; Steinbock 1976; Stuart-Macadam 1985, 1989, 1992). If health problems did alter in frequency or duration during the Mississippian period, then the affected populations would be expected to respond with attempts to better their health through culturally mediated means, including the use of medicinal plants. The array of medicinal plants therefore, would be expected to change in order to meet the modified health needs of the Mississippian people (Brown 1985; Logan and Dixon 1994). Changes in the paleoethnobotanical record for rarely occurring potential archaeomedicines could reflect such culturally mediated changes in the medicines used through time. It is this two-fold issue that I address in this dissertation: (1) is there evidence for prehistoric medicinal plants preserved in the paleoethnobotanical record for the eastern United States?, and (2) did these pharmacopoeias change through time to meet the shifting cultural and biological needs of prehistoric people?

Methods and Results

To identify the possible archaeomedicines, I completed an intensive examination of paleoethnobotanical records from the American Bottom, Moundville, and Central Tombigbee regions to reveal trends in the remains that can be associated with ethnographically important medicinal plants. Previously published and unpublished paleoethnobotanical reports were compiled to develop a database large enough to follow trends in rarely preserved plants. The completion of this database allowed comparison of plant remains within a given region and, to a limited extent, between regions. This reanalysis of the paleoethnobotanical record was combined with traditional ethnobotanical and ethnomedicinal documentation for Native American groups from the Eastern Woodlands.

American Bottom, Moundville, and Central Tombigbee regions were defined as follows. The American Bottom region includes the Mississippi floodplain and surrounding uplands located between the cities of Alton and Chester, Illinois, in addition to the closely neighboring areas to the south (lower Kaskaskia River valley) and west (uplands and smaller valleys in the area St. Louis). The Moundville region was more narrowly defined as the central to lower Black Warrior River valley in Alabama. The Central Tombigbee region overlaps with the Moundville region to some degree (Welch 1990: Figure 71, p. 197), but sites discussed in this text tend to cluster in the central to lower Tombigbee River valley in Alabama.

These three archaeological regions were used in this project for several reasons. First, all three areas have been locales of extensive archaeological and paleoethnobotanical research in the past 30 years. As a result, there is an abundance of well-documented and accessible information on the variety of plants present in Late Woodland and Mississippian contexts. Secondly, paleopathological research has taken place in all three regions and in closely neighboring areas providing us with an estimation of health changes that took place during the transition from Late Woodland to Mississippian periods. Thirdly, archaeological research in the American Bottom, Moundville, and Central Tombigbee regions has revealed some overarching similarities in the ways that these three areas developed into "Mississippian" societies. These similarities facilitate comparisons among the regions, if only broadly. Finally, recent discussions of the medical and ritual life of the people living prehistorically in these regions make an investigation into the role of plants in healing rituals quite timely. Summaries of the archaeological and paleoethnobotanical research completed within the three study area are provided in Chapter 4.

The breadth and depth of paleoethnobotanical data from these regions is quite impressive. Potential medicinal plant remains from the Late Woodland period were present in all three regions. Late Woodland data were derived from 29 sites in the American Bottom region, eight sites in the Moundville region, and five sites in the Central Tombigbee region. The Late Woodland raw count of possible archaeomedicinal remains also was notable: 865 seeds from the

American Bottom region, 380 seeds from the Moundville region, and 28 seeds from the Central Tombigbee region. [The "seeds" category is defined throughout this dissertation as seeds, seed-like structures, seed fragments, and, in the case of redcedar, wood fragments that have been recovered from archaeological contexts.]

The Emergent Mississippian period was represented only in the American Bottom region. Fifteen sites with Emergent Mississippian components contained archaeomedicinal remains. A total of 759 archaeomedicinal seeds were associated with these sites.

The archaeomedicinal remains from the Mississippian period were the most numerous. The American Bottom region had 29 Mississippian sites the features of which contained a total of 2,597 potential archaeomedicinal seeds. The Moundville region had 11 Mississippian period sites, including five areas within the site of Moundville. The Moundville region sites had a total of 655 possible archaeomedicinal seeds. Finally, five sites in the Central Tombigbee region had 66 possible archaeomedicinal seeds.

In order to evaluate which plants present in the paleoethnobotanical record may have been used for medicinal purposes, one needs an understanding of how traditional societies select plants for medicinal use. Background research on the plants used in traditional ethnomedicine, summarized in Chapter 2, indicates that medicinal plants are not randomly selected from the natural environment, rather they have specific characteristics that make them more culturally salient than plants without such attributes. In addition, medicinal plants tend to be used in multiple cultural contexts, a reality that renders the assignment of archaeological occurrences of potential medicinal plants to exclusively medicinal practices nearly impossible. This same research, however, suggests that those plants with multiple roles in a society are more likely to be preserved in the archaeological record. This means that the presence of a given taxon in the archaeological record may not represent its use as a medicine, but it can indicate a society's recognition of that plant, and the potential that a given taxon might have been a medical resource, especially if the plant also had a record of use by traditional healers.

Diseases present in late prehistoric eastern North American, the effects these diseases might have on individuals and populations, and a summary of the paleopathological research in the three study regions is presented in Chapter 3. Diseases, stresses, and more generalized health issues that faced Late Woodland and Mississippian populations in the eastern United States are discussed to familiarize the reader with the various facets of prehistoric health. Information on health problems that are not directly recognizable from the paleopathological record are emphasized in an attempt to provide a more complete picture of prehistoric health as experienced by the residents of eastern North America. In addition, the chapter provides summaries of information available on prehistoric health and paleopathologies in the Moundville, Central Tombigbee, and American Bottom regions. An understanding of the health problems facing these prehistoric populations is necessary if we are to interpret, and perhaps predict, what medicinal plants might have been a part of prehistoric pharmacopoeias.

The analysis of data took place in two major stages. First, under the broader rubric of "archaeomedicinal plants," four categories were developed, based on their relative medical versus subsistence importance in eastern North American Indian ethnobotany. Plants such as spurges (Euphorbiaceae), St. John's-wort (*Hypericum* sp.), and bedstraw (*Galium aparine*) used primarily as medicines by historical Native Americans in the eastern United States are as "Medicinal" or "Category 1" plants. The second group of plants, for example mints (Lamiaceae), sumac (*Rhus* sp.), and black nightshade (*Solanum ptycanthum*), are those with ethnobotanical uses equally (or nearly so) distributed between subsistence and medicinal categories; these I call "Medicine/Food" or "Category 2" plants. Plants such as purslane (*Portulaca oleracea*), strawberries (*Fragaria* sp.), and maypops (*Passiflora incarnata*) are those whose primary use was as a food with secondary medicinal uses; these are "Food" or "Category 3" plants. Finally, plants such as morning glories (Convolvulaceae), redcedar (*Juniperus virginiana*), and tobacco (*Nicotiana* sp.) used in rituals with secondary and/or interlaced medicinal uses are "Ritual" or "Category 4" plants.

The next step in analysis involved the quantification of these plants. Three methods of initial quantification were used: Taxon Frequency, Feature Ubiquity, and Site Ubiquity (as outlined in Chapter 5 and presented in Chapter 6). Secondly, the broader trends between and among the groupings, based on temporal (e.g., Late Woodland compared to Mississippian) and geographical boundaries (e.g., American Bottom region compared with Moundville region) were examined. Finally, in order to clarify the broader trends in the data, I compared the four archaeomedicinal categories to one another, as outlined in Chapter 5 and presented in Chapter 7.

CHAPTER 2: ETHNOBOTANY AND ETHNOMEDICINE

Introduction

Ethnobotanical and ethnomedicinal research has illuminated the vital importance of medicinal plants in traditional societies, and coherence in uses of such medicines across cultural boundaries (e.g., Moerman 1989). Due to these commonalties, the historic, ethnographic, and ethnobotanical record of Native Americans who resided in eastern North America can be used as a source of information on potential medicinal plants that prehistoric residents of the same regions may have used. Background (both ethnographic and historical) on the ethnobotanical record for eastern North America, how that record is used by paleoethnobotanists and other archaeologists, congruities in ethnomedical systems and in the selection of medicines, are all discussed in this chapter. There has also been some broad research on cultural and biological factors that would affect prehistoric medical systems; this information is provided at the end of the chapter.

The Ethnobotanical Record as a Tool for Archaeologists

Many of the interpretations regarding the cultural significance of plant remains in paleoethnobotanical reports are based on analogies with ethnographic/ethnohistoric records or through experimental archaeology (Pearsall 1989:230). While the role of analogy in the interpretation of the archaeological record maybe somewhat controversial, it is the only source of information from which testable hypotheses may be drawn (Conklin 1982; Cordell and Plog 1979; Cordell et al. 1987; French 1981; Gould and Watson 1982; Pearsall 1989; Stahl 1993; Watson 1979, 1982, 1986; Watson et al. 1984; Wylie 1982, 1985, 1989; Wobst 1978).

Ethnographic/ethnohistoric records have been used to interpret evidence of plant-related activities such as storage and processing of crops. Research in Europe and South America related to these topics reveals the value of ethnographic analogies in the interpretation of paleoethnobotanical remains (Dennell 1972, 1975; Hastorf 1988; Hillman 1973, 1981, 1984; Hubbard 1976; Johannessen and Hastorf 1989, 1994; Jones 1984; Lennstrom and Hastorf 1992; Sikkink 1988). Such work emphasizes the strength of information preserved in the archaeological record, and how it can be associated with culturally significant patterns of human behavior.

In North America, early ethnographic studies of native people are often a paleoethnobotanist's source of alternative hypotheses due to the social and physical traumas inflicted upon many traditional American Indian societies by Western society (briefly discussed below). Works such as *Buffalo Bird Woman's Garden* (Wilson 1987), *Uses of Plants by the Indians of the Missouri River Region* (Gilmore 1977) and *Uses of Plants by the Chippewa Indians* (Dennsmore 1928) take on special significance due to their level of detail on how crops and wild plants were traditionally managed. There are also several important summary volumes, such as Erichsen-Brown (1979), King (1984), Moerman (1986, 1998), Swanton (1946), Yanovsky (1936), and Yarnell (1964, 1989), that combine disparate information from numerous sources about North American Indian plant use. These texts are often cited in paleoethnobotanical reports to support hypotheses about the connection between the ethnographic use of plants and the archaeological record.

Some information is available and used by archaeologists on how plants were prepared as foods (Dennell 1976; Fritz 1994; Johannessen and Hastorf 1994; Munson, editor 1984). Food choices are culturally constructed and involve more than considerations of calories and fat (Arnason et al. 1981; Berlin 1981; Bisset 1991; Bye 1979, 1981; Etkin 1986, 1994a, 1994b; Johannessen and Hastorf 1988; Johns 1994; Sikkink 1988; Wetterstrom 1978), an issue only rarely addressed. An additional use of the ethnographic record is for the interpretation of possible <u>meanings</u> of plants (Etkin 1986, 1993; Etkin and Ross 1982, 1983, 1991; Ford 1994; Johannessen 1993). Unfortunately, the cultural importance of plants is rarely discussed in paleoethnobotanical reports beyond a subsistence level.

The Ethnobotanical Record for the Eastern Woodlands and Southeastern United States

Native American medicinal plants have been the focus of research for explorers, physicians, botanists, anthropologists, linguists, and ethnobotanists for several centuries. Emphasis on medicinal plants has resulted in a wealth of knowledge related to the specific plants utilized by certain groups. Early researchers often provided only a laundry list of species they saw being used by Native American specialists, resulting in numerous gaps in the recorded information (for discussions see Asch 1994, 1995; Kindscher and Hurlburt 1998; King 1994). These problems must be acknowledged when using these documents to develop relational analogies testable in the paleoethnobotanical record. The most powerful ethnobotanical works are those using the multidisciplinary approach developed more recently (e.g., Bruhn and Helmstedt 1981) wherein botanists, anthropologists, and medical specialists work together, such as Arnason et al. (1981), Kuhnlein and Turner (1991), Logan and Dixon (1994), and Turner (1980). Few of these studies have focused on Eastern tribal groups however (see Herrick [1995] for one exception). The development of Native American ethnobotany, especially as it relates to archaeological interpretation, is discussed below.

The tribal groups that produced the archaeological evidence in this report were no longer in the same regions, and/or they had modified social dynamics by the time the first Europeans came to the interior of North America. Numerous works on the disruptive effects of colonization on Native American lifeways have been written (e.g., Axtell 1985, 1988, 1992; Calloway 1997; Fitzhugh 1985; Milanich and Hudson 1993; Salisbury 1982). Current interpretations of the historic record view this period as extremely dynamic, with Europeans and Native Americans interacting on many levels. The end result, however, was the loss of pre-Contact lifeways for the Europeans and, more dramatically, the Native Americans. Despite this break in the late prehistoric to early historic record, archaeologists have attempted to identify the historical groups that may have been descendants of the residents at Moundville and Cahokia. Ethnohistorians such as Calloway (1997), however, note the fluid nature of Native American tribal organization during the Contact period and warn against direct correlations between prehistoric, Contact, and historic tribal affiliations.

Peebles (1986:32-33) suggests that the Alabama River phase people of the Black Warrior valley may be the Napochies tribe mentioned by Tristan de Luna's army in 1560. If this is so, then the Black Warrior population can be linked to historic Choctaw speakers. It, therefore, is possible that early historic animosities between the Choctaw of the Black Warrior River valley and the Creeks of the Coosa, Tallapossa, and Chattahoochee rivers may have been present during prehistory. Historic continuity may then be represented by the apparent lack of prehistoric exchange between the Moundville phase people and those residing in historically Creek areas. "If their several threads of anthropological and historical knowledge are joined, then the descendants of the Moundville phase stand out in even sharper relief: they are, either in whole or part, the 'burial urn cultures' of central and western Alabama" (Peebles 1986:33).

For the American Bottom region, Hall (1991:18) suggests that "ceramic evidence indicates that midwestern Indians were engaging increasingly across the prairie in an interaction that may conveniently be called Oneota ... Not only the Winnebago, Chiwere Sioux (Oto, Ioway, and Missouri), and some Dhegiha Sioux (Kansa and probably Osage) were involved to some extent, but perhaps also the Algonquian, Miami, and Illinois." He indicates that some American Bottom populations may have moved south and integrated with Muskogean or Siouan groups located in the lower Mississippi Valley "or remained within the Midwest and survived among or as some historically known Siouan or Algonquian residents of the Prairie Peninsula" (Hall 1991:18).

Historical documentation of the Native Americans living in the interior of the eastern United States came first from expeditions led by Europeans such as Hernado de Soto (1534-1543) in the Southeast and Jaques Cartier (1534-1536) in the Northeast. Contact between Native Americans and Europeans occurred for 50 to 100 years before the establishment of permanent settlements (Calloway 1997: xvii; Fitzhugh 1985:102). The Europeans involved in these early contacts were not ethnobotanists or cultural anthropologists.

> The earliest explorers of North America were not interested in trade of any sort ... they were understandably preoccupied with charting its waters and cataloguing its floral, faunal, and mineral assets to interest investors and crowned heads in future extractive expeditions. They tended to see in the natives only slaves, future interpreters and guides, pawns in the imperial partition of the New World, or walking souvenirs (Axtell 1988:148).

Each side of the cultural equation had needs and expectations as contact continued; this period represents a complex mixture of collaborations, trade, coexistence, and conflict (Axtell 1985, 1988, 1992; Calloway 1997; Fitzhugh, editor 1985; Milanich and Hudson 1993; Swanton 1946). In addition, some of the reports from the earliest missions were recorded and published long after the expeditions were completed, and subsequent translations into English were sometimes less than accurate (Milanich and Hudson 1993:8). Questions, therefore, exist about the accuracy of the descriptions and the validity of correlating these descriptions with the late prehistoric record (Brasser 1978; Calloway 1997:24-46; Fitzhugh 1985:5; Milanich and Hudson 1993:6; Stahl 1993).

Despite these issues with early historic documents, discussions of medicinal plants are sometimes present, and these represent an important resource in our understanding of medicine in Native American society. Information from the sixteenth through nineteenth centuries is well summarized by Calloway (1997:24-41, 202-203), Swanton (1946:782-798), and Vogel (1970), among others. Documents on medicinal plants from this 300-400 years of Native American and European interactions illustrate the exchange of medicinal plant information between the two cultures (Kidwell 1997; Vogel 1970). Native American remedies such as sassafras (*Sassafras albidum*) and tobacco (*Nicotiana rustica)* were exported and added to European pharmacopoeia (Axtell 1988:174; Vogel 1970:7). Similarly, European remedies such as mullein (*Verbascum thapsus*), dandelion (*Taraxacum officinale*), and ginseng (*Panax quinquefolius* – a taxon more often used in traditional Asian medicine) were adopted by Native American healers (Lewis and Elvin-Lewis 1977:373). The flow of medical information went in both directions. For genera native to both continents, such as sweet flag (*Acorus americanus* in North America and *A. calamus* in Europe), it is difficult to identify the medical tradition that first recognized the importance of the plant.

The late nineteenth and early twentieth centuries saw a shift in the types of interactions between Native American groups and Euro-Americans. Many of the tribal groups were relocated to reservations or integrated into broader Euro-American society, and anthropologists began an academic study of the tribes before they "became extinct". Anthropologists and botanists such as Frances Densmore (1974), Melvin Gilmore (1977), Huron Smith (1923, 1928, 1932, 1933; Kindscher and Hurlburt 1998), Linda Taylor (1940), and Elias Yansovsky (1936) stand out as exemplary examples of researchers who approached the subject of Native American medical and subsistence plants with intellect and relative cultural sensitivity. Emphasis was placed on recording traditional lifeways, especially rituals, magic, and medicines. A significant body of data on these anthropological subjects was collected during this period.

The nineteenth and early twentieth century ethnobotanical studies have many problems by modern anthropological standards. The information contained in the publications was collected after the tribes had undergone several centuries of acculturation, subjugation, and geographical displacement. The ethnobotanical information was collected from a limited number of key informants. These informants were often specialists and almost always men, interviewed by men; the cultural gender gap was usually too large for male interviewers to approach female healers, if such individuals were even recognized. The reports were collected only during certain times of the year, especially during the summer when visitation to tribal groups was easiest. As a result, medicines and illnesses limited to the winter were rarely recorded. The problems inherent in this work does not negate its usefulness for the types of plants and medicines used by historic Native Americans; rather it emphasizes the importance of testing hypotheses based on such information.

Much of the information from Native American ethnobotanies has been summarized by Moerman (1998) in his work *Medicinal Plants of Native America* and *Native American Ethnobotany*. Table 2-1 comprises a summary of the ethnobotanies with information relevant to this research project from Moerman's (1998) work. Moerman compiles information from over 100 Native American groups of which 44 are from my study region. This text (Moerman 1998) was used almost exclusively in this study for the identification of plants that had been used as medicines by Native Americans, but the primary sources cited in Moerman were also consulted to clarify and supplement his work.

In summary, there are two major historical foci of ethnobotanical research from eastern North America. First, documents from the late sixteenth to early nineteenth centuries provide ethnobotanical information especially about rituals and medicines used by Southeastern tribes during the early historic period. A second body of data comes from botanists, ethnographers, anthropologists, and interested amateurs (including Euro-American medical doctors), who collected information about Native American medicine in the late nineteenth and early twentieth centuries. The resulting publications tended to be rather poorly constructed by modern anthropological standards, but they are a significant source of the general types of plants that were used. These two data sources can be combined with information from recent ethnobotanical research in the United States, and the world, to illuminate more fully the species selected for use by traditional cultures.

Congruities in Traditional Pharmacopoeias

In order to predict how prehistoric medical systems may have functioned, I investigated commonalties among traditional medicine systems, especially practices based in herbal treatments. Similarities in how herbal medicines were selected and used provide avenues for the development of hypotheses about similar processes in prehistory. The functions of plants in traditional medical systems, commonalties in the types of plants selected as medicines, and how medicinal plants relate to other plants in traditional ethnobotanies are discussed, especially where these topics involve Native Americans in the eastern and southeastern United States.

Traditional Plant-Based Medical Systems. Plant-based medicines have been used by nearly every human group to varying degrees. Basic medical treatment is done on a familial level for common aches, pains, and illnesses or symptoms (Allured 1992; Etkin 1981; Finerman 1989). Such simple disorders are first addressed by mothers, grandmothers, or other care givers within the extended family (Finerman 1989; Nordstrom 1989). The plants may be gathered as needed,

Table 2-1: Ethnobotanies of Eastern and Southeastern Native Americans
(summarized from Moerman 1998:619-623)

Tribal Group	Published Ethnobotanies
Abnaki	Rousseau, J. (1947) Ethnobotanique et Ethnozoologie Gaspesiennes. *Archives de Folklore* 11:145-182.
Alabama	Swanton, J.R. (1928) Religious Beliefs and Medicinal Practices of the Creek Indians. *Bureau of American Ethnology Annual Report* 42:473-672. Smithsonian Institution, Washington, D.C.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
Algonquin	Bradley, W.T. (1936) Medical Practices of the New England Aborigines. *Journal of the American Pharmaceutical Association* 25(2):138-147.
Algonquin, Quebec	Black, M.J. (1980) *Algonquin Ethnobotany*. National Museum of Canada, Mercury Series No. 65. Ottawa.
Algonquin, Tete-de-Boule	Raymond, M. (1945) Notes Ethnobotaniques sur les Tete-de-Boule de Manouan. *Contributionde l'Institut Bontanique de l'Universite' de Montreal* 55:11-134.
Anticosti	Rousseau, J. (1946) Notes Sur l'Ethnobotanique d'Anticosti. *Archives de Folklore* 1:60-71.
Apalachee	Hann, J.H. (1986) The Use and Processing of Plants by Indians of Spanish Florida. *Southeastern Archaeology* 5(2):1-102.
Catawba	Speck, F.G. (1941) Catawba Medicines and Curative Practices. *Publications of the Philadelphia Anthropological Society* 1:179-197.
Catawba	Taylor, L.A. (1940) *Plants Used as Curatives by Certain Southeastern Tribes*. Botanical Museum of Harvard University, Cambridge.
Cherokee	Hamel, P.B., and M.U. Chiltoskey (1975) *Cherokee Plants and Their Uses*. Herald Publishing, Sylva, North Carolina.
	Perry, M.J. (1975) Food Use of "Wild" Plants by Cherokee Indians. M.S. Thesis, University of Tennessee, Knoxville.
	Sturtevant, W. C. (1955) *The Mikasuki Seminole: Medical Beliefs and Practices*. Ph.D. Thesis, Yale University. University Microfilms, Ann Arbor.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
	Witthoft, H. (1977) Cherokee Indian Use of Potherbs. *Journal of Cherokee Studies* 2(2):250-255.
	Witthoft, J. (1947) An Early Cherokee Ethnobotanical Note. *Journal of the Washington Academy of Sciences* 37(3): 73-75.
Chickasaw	Campbell, T.N. (1951) Medicinal Plants Used by Choctaw, Chickasaw, and Creek Indians in the Early Nineteenth Century. *Journal of the Washington Academy of Sciences* 41(9):285-290.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
Chippewa	Densmore, F. (1913) *Chippewa Music II.* Bureau of American Ethnology Bulletin, No. 53. Smithsonian Institution, Washington, D.C.
	Densmore, F. (1928) Uses of Plants by the Chippewa Indians. *Bureau of American Ethnology Annual Report* 44:273-379. Smithsonian Institution, Washington, D.C.
	Gilmore, M.R. (1933) *Some Chippewa Uses of Plants*. University of Michigan Press, Ann Arbor.
Choctaw	Bushnell, D.I. (1909) The Choctaw of Bayou Lacomb, St. Tammany Parish, Louisiana. *Bureau of American Ethnology Bulletin*, No. 48. Smithsonian Institution, Washington, D.C.
	Campbell, T.N. (1951) Medicinal Plants Used by Choctaw, Chickasaw, and Creek Indians in the Early Nineteenth Century. *Journal of the Washington Academy of Sciences* 41(9):285-290.
	Speck, F.G. (1941) A List of Plant Curatives Obtained from the Houma Indians of Louisiana. *Primitive Man* 14:49-75.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
Creek	Campbell, T.N. (1951) Medicinal Plants Used by Choctaw, Chickasaw, and Creek Indians in the Early Nineteenth Century. *Journal of the Washington Academy of Sciences* 41(9):285-290
	Sturtevant, W.C. (1955) *The Mikasuki Seminole*. Ph.D. Dissertation, Yale University, New Haven. University Microfilms, Ann Arbor.
	Swanton, J.R. (1928) Religious Beliefs and Medicinal Practices of the Creek Indians. *Bureau of American Ethnology Annual Report* 42:473-672. Smithsonian Institution, Washington, D.C.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
	Witthoft, J. (1947) An Early Cherokee Ethnobotanical Note. *Journal of the Washington Academy of Sciences* 37(3): 73-75.
Delaware	Tantaquidgeon, G. (1972) *Folk Medicine of the Delaware and Related Algonkian Indians*. Pennsylvania Historical Commission Anthropological Paper No. 3. Harrisburg.
Delaware, Oklahoma	Tantaquidgeon, G. (1942) *A Study of Delaware Indian Medicine Practice and Folk Beliefs*. Pennsylvania Historical Commission, Harrisburg.
Delaware, Ontario	Tantaquidgeon, G. (1972) *A Study of Delaware Indian Medicine Practice and Folk Beliefs*. Pennsylvania Historical Commission, Harrisburg.

Table 2-1: Ethnobotanies of Eastern and Southeastern Native Americans

(summarized from Moerman 1998:619-623)

Tribal Group	Published Ethnobotanies
Houma	Speck, F.G. (1941) A List of Plant Curatives Obtained from the Houma Indians of Louisiana. *Primitive Man* 14:49-75.
Huron	Aller, W.F (1954) Aboriginal Good Utilization of Vegetation by the Indians of the Great Lake Region as Recorded in the Jesuit Relations. *Wisconsin Archaeologist* 35:59-73.
Iroquois	Herrick, J.W. (1977) Iroquois Medical Botany. Ph.D. Thesis, State University of New York, Albany.
	Parker, A.C. (1910) *Iroquois Uses of Maize and Other Food Plants*. University of the State of New York, Albany, New York.
	Rousseau, J. (1945) Le Folklore Botanique de Cauhnawaga. *Contributions de l'Institut Botanique de l'Universite de Montreal* 55:7-72.
	Rousseau, J. (1945) Le Folklore Botanique de l'Ile aux Coudres. *Contributions de l'Institut Botanique de l'Universite de Montreal* 55:75-111.
	Waugh, F.W. (1916) *Iroquois Foods and Food Preparation*. Canada Department of Mines, Ottawa.
Kansa	Gilmore, M.R. (1913) A Study in the Ethnobotany of the Omaha Indians. *Nebraska State Historical Society* 17:358-370.
Kiowa	Blankinship, J.W. (1905) *Native Economic Plants of Montana*. Montana Agricultural College Experimental Station Bulletin No. 56. Bozeman, Montana.
	Vestal, P.A., and R.E. Schultes (1939) The Economic Botany of the Kiowa Indians. Botanical Museum of Harvard, Cambridge..
Koasati	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
Menominee	Densmore, F. (1932) *Menominee Music*. Bureau of American Ethnology Bulletin, No. 102. Smithsonian Institution, Washington, D.C.
Menominee	Smith, H.H. (1923) Ethnobotany of the Menomini Indians. *Bulletin of the Milwaukee Public Museum* 4:1-174.
Meskwaki	Smith, H.H. (1923) Ethnobotany of the Menomini Indians. *Bulletin of the Milwaukee Pubic Museum* 4:1-174.
Micmac	Chandler, R.F., L. Freeman, and S.N. Hooper (1979) Herbal Remedies of the Maritime Indians. *Journal of Ethnopharmacology* 1:49-68.
	Mechling, W.H. (1959) The Malecite Indians with Notes on the Micmacs. *Anthropologia* 8:239-263.
	Rousseau, J. (1948) Ethnobotanique et Ethnozoologie Gaspesiennes. *Archives de Folklore* 3:51-64.
	Speck, F.G. (1917) Medicine Practices of the Northeastern Algonquians. *Proceeding of the 19th International Congress of Americanists*. pp. 303-321.
	Speck, F.G., and R.W. Dexter (1951) Utilization of Animals and Plants by the Micmac Indians of New Brunswick. *Journal of the Washington Academy of Sciences* 41:250-259.
	Wallis, W.D. (1922) Medicines Used by the Micmac Indians. *American Anthropologist* 24:24-30.
Mohegan	Carr K.G., and C. Westey (1945) Surviving Folktales and Herbal Lore among the Shinnecock Indians. *Journal of American Folklore* 58:113-123.
	Tantaquidgeon, G. (1928) Mohegan Medicinal Practices, Weather-Lore and Superstitions. *Bureau of American Ethnology Annual Report* 43:264-270. Smithsonian Institution, Washington, D.C.
	Tantaquidgeon, G. (1928) *Folk Medicine of the Delaware and Related Algonkian Indians*. Pennsylvania Historical Commission, Harrisburg.
Montagnais	Burgesse, J.A. (1944) The Woman and the Child among the Lac-St.-Jean Montagnais. *Primative Man* 17:1-18.
	Speck, F.G. (1917) Medicine Practices of the Northeastern Algonquians. *Proceedings of the 19th International Congress of Americanists*. pp. 303-321.
	Tantaquidgeon, G. (1928) Mohegan Medicinal Practices, Weather-Lore and Superstitions. *Bureau of American Ethnology Annual Report* 43:264-270. Smithsonian Institution, Washington, D.C.
Montauk	Carr K.G., and C. Westey (1945) Surviving Folktales and Herbal Lore among the Shinnecock Indians. *Journal of American Folklore* 58:113-123.
Nanticoke	Tantaquidgeon, G. (1928) Mohegan Medicinal Practices, Weather-Lore and Superstitions. *Bureau of American Ethnology Annual Report* 43:264-270. Smithsonian Institution, Washington, D.C.
	Tantaquidgeon, G. (1942) *A Study of Delaware Indian Medicine Practice and Folk Beliefs*. Pennsylvania Historical Commission, Harrisburg.
Narraganset	Swanton, J.R. (1928) Religious Beliefs and Medicinal Practices of the Creek Indians. *Bureau of American Ethnology Annual Report* 42:473-672. Smithsonian Institution, Washington, D.C.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.
Natchez	Swanton, J.R. (1928) Religious Beliefs and Medicinal Practices of the Creek Indians. *Bureau of American Ethnology Annual Report* 42:473-672. Smithsonian Institution, Washington, D.C.
	Taylor, L.A. (1940) Plants Used as Curatives by Certain Southeastern Tribes. Botanical Museum of Harvard University, Cambridge.

Table 2-1: Ethnobotanies of Eastern and Southeastern Native Americans
(summarized from Moerman 1998:619-623)

Tribal Group	Published Ethnobotanies
Ojibwa	Arnason, T., R.J. Heba, and T. Johns (1981) Use of Plants for Food and Medicine by Native Peoples of Eastern Canada. *Canadian Journal of Botany* 58(11):2189-2325.
	Jenness, D. (1935) *The Ojibwa Indians of Parry Island*. National Museums of Canada Bulletin No. 78, Anthropological Series No. 17.
	Reagan, A.B. (1928) Plants Used by the Bois Fort Chippewa (Ojibwa) Indians of Minnesota. *Wisconsin Archeologist* 7(4):230-248.
	Smith, H.H. (1932) Ethnobotany of the Ojibwe Indians. *Bulletin of the Milwaukee Public Museum* 4:327-525.
Ojibwa, South	Hoffman, W.J. (1891) The Midewiwin or "Grand Medicine Society" of the Ojibwa. *Bureau of American Ethnology Annual Report* No. 7. Smithsonian Institution, Washington, D.C.
Omaha	Fletcher, A.C., and F. la Flesche (1911) The Omaha Tribe. *Bureau of American Ethnology Annual Report* No. 27. Smithsonian Institution, Washington, D.C.
	Gilmore, M.R. (1913) A Study in the Ethnobotany of the Omaha Indians. *Nebraska State Historical Society* 17:358-370.
	Gilmore, M.R. (1933) *Some Chippewa Uses of Plants*. University of Michigan Press, Ann Arbor.
Oto	Gilmore, M.R. (1933) *Some Chippewa Uses of Plants*. University of Michigan Press, Ann Arbor.
Penobscot	Speck, F.G. (1917) Medicine Practices of the Northeastern Algonquians. *Proceedings of the 19th International Congress of Americanists*, pp. 303-321.
	Tantaquidgeon, G. (1928) Mohegan Medicinal Practices, Weather-Lore and Superstitions. *Bureau of American Ethnology Annual Report* 43:264-270. Smithsonian Institution, Washington, D.C.
Potawatomi	Smith, H.H. (1933) Ethnobotany of the Forest Potawatomi Indians. *Bulletin of the Milwaukee Public Museum* 7:1-230.
Rappahannock	Carr K.G., and C. Westey (1945) Surviving Folktales and Herbal Lore among the Shinnecock Indians. *Journal of American Folklore* 58:113-123.
	Speck, F.G., R.B. Hassrick, and E.S. Carpenter (1942) Rappahannock Herbals, Folk-Lore and Science of Cures. *Proceedings of the Delaware County Institute of Science* 10:7-55.
Seminole	Sturtevant, W.C. (1955) The Mikasuki Seminole. Ph.D. Dissertation, Yale University, New Haven. University Microfilms, Ann Arbor.
Shinnecock	Carr K.G. and C. Westey (1945) Surviving Folktales and Herbal Lore among the Shinnecock Indians. *Journal of American Folklore* 58:113-123.
Sioux	Blankinship, J.W. (1905) *Native Economic Plants of Montana*. Montana Agricultural College Experimental Station Bulletin No. 56. Bozeman, Montana.
	Densmore, Frances (1918) Teton Sioux Music. *Bureau of American Ethnology Bulletin*, No. 61. Smithsonian Insitution.
	Hart, Jeff (1992) *Montana Native Plant and Early Peoples*. Montana Historical Society Press, Helena.
Winnebago	Gilmore, M.R. (1933) *Some Chippewa Uses of Plants*. University of Michigan Press, Ann Arbor.
	Radin, Paul (1923) *The Winnebago Tribe*. *Bureau of American Ethnology Annual Report* No. 37. Smithsonian Institution, Washington, D.C.

collected on a seasonal basis, or obtained from others who trade or sell herbs. This familial level of ethnomedicine appears to be the least studied from my readings of the medical anthropology literature despite its importance in community health.

When a medical condition is not resolved within the household, healing specialists may be contacted. Ethnographic accounts abound with shamans, medicine men and women, and other health and religious specialists (Vogel 1970). The level of a specialist's herbal knowledge varies from encyclopedic to a very specific understanding of a handful of plants. It is difficult to find generalities for this class of specialists due to the range of medical and spiritual tasks they perform.

Another role of plants in medicine is based on health maintenance, wherein medicines are taken routinely to maintain a constant level of health (e.g., blood tonic) or at certain times to prevent health problems (e.g., spring tonics) (Etkin 1994b:5; Lewis and Elvin-Lewis 1977:372-376). Such "tonics" are used by people to provide a constant level of health. Sweet flag (*Acorus americanus*) and ginseng (*Panax quinquefolius*) are examples of tonics used by some Eastern Woodland Indians (Moerman 1998:46-48, 376). It is important to acknowledge the role of tonics, because they can be a source of daily exposure to chemicals found in plants (Etkin 1994a; Etkin and Ross 1982, 1983, 1991). Such steady doses in the form of casually sipped beverages or condiments could have significant health implications over time.

Medicinal plants also tend not to be used exclusively as medicines (Asch 1994; Dixon 1990; Etkin 1994a, 1994b; Etkin and Ross 1991; Kindscher 1987, 1992; Moerman 1994). A medicinal plant may also be an important food, condiment, or beverage source. Categories such as medicine or food tend to be artifacts of the researcher's own need to classify rather than true cultural phenomena. Such multiple uses do not lessen the role of the plant in medicines. Indeed, repeated exposure to the plants probably increases the level of active chemicals in the body at any given time (Etkin 1994a:68, 72).

There are several reasons why the overlap between food and medicine is essential to our understanding of prehistoric plant use. Western biomedicine makes a strong distinction between items used for nutritional purposes and those used to cure disease (although many facets of our diet are not so distinct, such as the use of orange juice by pregnant women to supply folic acid to fetuses in early development). Differing perceptions of medicine versus food have been noted in ethnobotanical studies of traditional cultures, wherein the same plants may be exploited for their nutritional as well as medical value (Dixon 1990; Etkin 1994a; Etkin and Ross 1991; Kindscher 1987, 1992; Moerman 1994).

These dual (or probably multiple, if use as cosmetic, spice, beverage, etc. are included) purposes have important implications for paleoethnobotany. If plants are used multimodally, then the chances for preservation and cultural significance are greatly increased. The fact that medicinal plants have multiple roles does not diminish the importance of these plants or the effectiveness of the chemicals to those prehistoric, or historic, societies, but it does confound the research of archaeologists and anthropologists.

One of the most significant findings in the research on foods as medicines has been the increased availability of active chemicals to humans. When medicinal plants are consumed as food, the sheer volume of plants ingested is greater than in medicinal applications (Etkin 1994a; Etkin and Ross 1982, 1994). The therapeutic potential is thereby increased when that same plant is later administered as a medicine. This additive effect does not necessarily imply more effectiveness as recognized by patient or society, but the possibility of increased biochemical action should be recognized by researchers (Etkin 1986:4-5). The effect of combining plants should also be noted when multiple plants make up a given medicine. The effectiveness of such additional species could be positively or negatively influenced by the dietary components.

Another potential effect of the overlap between food and medicines is the accessibility of food-medicines to household-level healers. If plants are part of the diet and can be used as medicines, they would be more likely to be cultivated, encouraged in household gardens, or recognized in the wild. The use of subsistence/medicinal plants could also put more emphasis on the importance of household healers than on specialists. These dual-purpose plants would be more likely to be preserved in the paleoethnobotanical record, because they are used more on the household level where paleoethnobotanical sampling often occurs, rather than in the rarer ritual locations where specialists may have stored or prepared medicines.

Finally, efficacy, as it relates to medicinal plants in traditional cultures, has distinct implications for this project, because it could be argued that effective medicines would be more likely to have been retained through prehistory than ineffective medicines. I think that efficacy is less important in traditional medicine than logic might dictate, because biomedical (etic) effectiveness does not always overlap with an individual's expectations (emic) in traditional, or even Western, societies. One of the most important factors in emic efficacy (broadly defined as indigenous perception) is the role of culture in determining how an effective cure will act (Etkin 1986, 1988). Western concepts of curing are sometimes in direct opposition to such emic views. For example, the Hausa of northern Nigeria believe that the egress of bodily fluids though vomiting or bowel movements is evidence that gastrointestinal distress is being relieved (Etkin 1988:307). From a biomedical perspective, these bodily functions would only worsen the condition of a patient suffering from severe diarrhea. Relief of symptoms and pain is part of every healing process, but the relationship need not be biomedically direct.

The biomedical perspective on herbal medicines is generally based on whether a given plant contains the chemical necessary to remove a given disease completely from the patient's body. Many of the plants in traditional pharmacopoeias fail these one-to-one evaluations. One aspect of emic healing is the attempt to heal individual symptoms ensconced within a larger disease as recognized by biomedicine (Etkin 1988). The multiple symptoms of a disease may then be treated with separate medical combinations. If a biomedical evaluation of such disease were to be made, all of the plants used on each symptom would have to be examined as a compounded cure.

<u>Commonalties of Medicinal Plants.</u> Plants that are culturally significant are more likely to be preserved in the archaeological record, because the more often a plant is used, the more likely an occasional seed will be lost in a fire and preserved. Therefore species that occupy multiple

ethnobotanical realms, such as food and medicine, are more likely to be found in paleoethnobotanical samples than those species with only one use in society.

Medicinal plants are not randomly chosen from the plant world, as that world is recognized by individuals and societies (Balick 1990; Banerjee and Sen 1980; Croom 1983; Delaveau 1981; Farnsworth 1990; Rodriquez and Cavin 1982). Certain salient characteristics are observed by users or consumers, and these characteristics are a guide to species that might result in the desired physiological effects. These characteristics go beyond a "Doctrine of Signatures" to include an understanding of how certain smells or botanical family characteristics might suggest possible chemical features (Dixon 1990; Moerman 1979, 1986, 1998, 1989, 1994). This process of recognition within a cultural framework is defined in this research as cultural salience or cultural significance.

Turner's (1988:275) "Index of Cultural Significance" was developed as a "composite of a wide variety of potential applications of a plant, ranked according to the contribution of each separate application to the survival of traditional cultures, together with estimates of intensity and exclusivity of use for each" (Turner 1988:275). As part of her project, Turner (1988) provides guidelines of how to identify which plants are most likely to be culturally significant to a given modern tribal group. In general, the more a plant is used (and hence the more likely it is to be present in the paleoethnobotanical record), the more likely it is to be identified as significant to the culture. The first factor contributing to cultural salience of a plant is the ecological salience of a taxon (Turner 1988:276-277). This is an estimation of how frequently a plant is encountered, and therefore available for recognition within short and long time frames. Those species that are locally available on a regular basis are the most likely to be recognized. The second factor that contributes to potential cultural significance of a plant is its overall perceptual salience (Turner 1988:277). This category has to do with uniqueness or distinctiveness of a plant based on physical or cultural characteristics such as prickles, odor, or even inclusion in well-known myths. The third factor contributing to a plant's cultural salience is the potential utility of that plant (Turner 1988:277). The quality (e.g., is it the best plant for the job?), intensity (e.g., is it the plant needed everyday for a common purpose?), and exclusivity (e.g., is it the only plant that can be used?) all contribute to the cultural perception of a plant's significance.

An additional indicator of a plant's cultural significance as developed by Stoffle et al. (1990:424) is whether the plant is stored. The issue of storage is especially important to the archaeological record because storage contexts are among the most frequently sampled for paleoethnobotanical remains. A problem with storage as an indicator of cultural significance is that medicines do not tend to be stored in sufficient amounts to be above the threshold of archaeological visibility. Certain medicinal plants are undoubtedly harvested and stored for use when the plant was otherwise unavailable or perceived as less effective. The amounts of such stored medicines would be significantly less than the necessary amounts of grains or other subsistence items.

Stoffle et al. (1990:423) also suggest that management of a given plant by the tribal group is a good indicator of its cultural significance. This factor is evident in those plants that are major components of the subsistence system. For example, maize was intensively managed by many Mississippian cultures and is a common component of late prehistoric paleoethnobotanical assemblages. Asch (1994:196-202) found that some of the medicinal plants from eastern North American were managed (i.e., seeds or root tops replanted as part of the harvesting process) by historic Native Americans, and that cultivation of medicinal plants near settlements probably is a historical development made necessary by the reduction of access to wild habitats (Asch 1994:200). Halmo (1987:148, 157) points out that medicinal plants may be cultivated in the kitchen gardens and dooryards of the Mazatec Indians, but that these same plants might be considered weeds in maize fields and subsequently removed. Halmo (1987:157-158) even suggests that there are probably very few "wild" areas near the settlements due to the constant manipulation of the vegetation by the villagers. Unfortunately, management of an otherwise wild plant is nearly impossible to identify in the archaeological record, although extension of range has been used in the case of maygrass (*Phalaris caroliniana*) (Cowan 1978) and possibly yaupon (*Ilex vomitoria*) (Asch 1995:162-168; Hudson 1979). Management of wild plants through weeding, tending, and transplanting is an early, but probably not recognizable, step in the domestication process (Ford 1985; Harris 1989). The importance of collecting "wild" plants (i.e., plants that were collected rather than cultivated) as an integral part of the healing process may have been a cultural limitation to the inclusion of medicinal plants in the agricultural system (Asch 1994:177).

Daniel Moerman and Anna Dixon are among a group of researchers who are interested in the process by which medicinal plants are selected from the realm of culturally available plants. Their research, as discussed below, included attempts to prove that medicinal plants were not randomly selected. Their work reveals that there are certain limited congruities for the types of plants that are generally used as medicines.

Dixon (1990) found that of the 15 fertility-related medicinal plants in her study, 70% fit into one or more of the five criteria that she believed indicated a possible perceptual salience. The criteria were: "1) Wild vs. 'controlled' plant; 2) insecticidal, piscisidal, vermifuge or other poisonous properties; 3) irritant properties; 4) aromatic smell/characteristic taste properties; 5) unusual or significant physical characteristics" (Dixon 1990:26-27). She found that most of the species were in the "controlled" category rather than wild, and that many of the fertility-related plants were from plants such as seasonings that had secondary roles in the subsistence system. Medicinal plants, in Dixon's study, tended to have medical qualities that were "directly related to the same chemicals which give these plants their characteristic odor and taste" (Dixon 1990:186). Other important properties of the species included their relative hairiness, their small habits (shrubs or herbs), and other non-caloric uses within the culture (Dixon 1990:202). In general, medicinal plants have characteristics that make them physically distinct from non-medicinal taxa.

Moerman (1979) also was interested in the commonalties of medicinal plants, and he performed regression analyses on the number of species within North American plant families as compared to the number of species used medicinally within these same families. He reasoned that if the regression revealed a close correspondence between the number of species and the number of medicinal taxa within a family, then it would follow that medicines were randomly selected from all available families (Moerman 1979:113). He found that about half of the medical plants approximated a random distribution, and therefore could be related to the random distribution of medicinal plants within plant families. More interestingly, the residuals of this analysis revealed that certain families (e.g., Asteraceae, Rosaceae, and Ranunculaceae) had significantly higher values than those predicted by regression analysis. He used this information to support his conclusion that factors above and beyond availability were acting in the selection of medicinal plants for use by Native American groups. These conclusions were further elaborated and tested by Moerman (1989) after the publication of a larger database (1986).

Moerman's more recent work (1994) has been focused on an attempt to understand the relationship between plants used as food and/or medicine. In his analysis, he compared a food-use database with his updated medicinal-use database and found a considerable overlap between the two groups. Families such as Rosaceae, Liliaceae, Lamiaceae, and Solanaceae were used to an higher degree for both foods and medicines than other families.

Moerman (1994) also used this body of data to investigate whether certain lifeforms of plants were used more often for food and medicine. He found that perennial forms, especially trees, shrubs, and vines, were most likely to be selected for use as food and medicine. The medicinal use of these woody plants, he reasoned, would relate to the concentration of active chemicals within the plant to protect them from predation over their longer life span. These chemicals are the same chemicals that would produce physiological effects on humans.

Moerman (1996) examined which parts of plants were used as foods and medicines to clarify the overlap between the two groups. "While there is a substantial overlap of food and drug species, there is not necessarily as substantial an overlap of food and drugs" (Moerman 1996:13), that is to say that the portion of plants used as medicines (e.g., bark) rarely overlapped with food-use portions (e.g., fruits). Over one-half of the food uses were from the fruits of plants, while only 8% of the medicinal uses came from fruits (Moerman 1996:13). Medicines tended to come from roots and plant-top (a category defined as all above ground portions of the plant except fruits).

In summary, medicinal plants do not appear to be randomly selected from the natural world by traditional healers (Moerman 1979); specific characteristics tend to reoccur in medicinal taxa (see Table 2-2 for summary of these features). Medicinal plants tend to be physically distinctive with unusual forms, odors, irritants, and/or flavors. These distinctive characteristics also may be related to the use of medicinal plants in numerous cultural contexts, especially as flavorings, beverages, or secondary food sources. The portions of plants used as food and medicine tend to differ; foods are often derived from ripe fruits, whereas medicines are more often made from the more chemically active portions of plants such as leaves, bark, and roots. The phytoactive nature of these plant parts is probably why fresh plant parts are preferred by traditional healers; the chemicals may rapidly degrade after harvest. Another intriguing cluster of characteristics is the preference for biannual or perennial plants over annuals. Biologically active compounds may develop or concentrate in the portions of a plant with secondary growth. Therefore, a composite image of a traditional medicinal plant might be a perennial plant with aromatic or irritant qualities that is encouraged near settlements because of its medicinal values and its importance as a supplementary subsistence resource. The effectiveness of this hypothesized taxon may not be apparent according to biomedical standards, but its significance is evident within cultural frameworks.

Prehistoric Medical Systems

Medicinal plants undoubtedly had cultural significance in every prehistoric (and historic) Native American society, yet investigations into medical plants, or even medicines, are surprisingly rare in discussions of prehistoric health. Investigations in the North American archaeological record for evidence of medicinal plants have been based mainly on pollen and macrobotanical evidence from paleofeces. Several studies of pollen from western and southwestern American paleofeces have included information on medicinal plants (Bryant 1997; Fry 1976; Hill 1968; Kilks 1975; Reinhard et al. 1985, 1991; Shafer et al. 1989; Trigg et al. 1994). Fewer of these studies have been done in the Eastern Woodlands, due in part to poor preservation of paleofeces at open sites. The paleofeces from the Mammoth Cave system, however, did contain some possible medicinal plant remains and pollen (Riley 1993;

Table 2-2: Possible Unifying Characteristics of Plant-based Medicines

Characteristics	References
Tend not to be stored in large quantities	Asch 1994
Tend to be derived from perennial or biennial species	Asch 1994; Moerman 1994, 1996
Plants are often used in multiple cultural contexts (e.g., as food or spice in addition to medicine)	Moerman 1994, 1996; Turner 1988
Often from plants that are "maintained" or "controlled," but not domesticated	Asch 1994; Dixon 1990
Plants tend to have observable irritant effects on humans and other animals	Dixon 1990; Logan & Dixon 1994
Distinguishing characteristics such as aromatic smell, taste, or other unusual physical properties	Dixon 1990; Logan & Dixon 1994; Turner 1988
Medicinal preparations are based on plant parts different from those used for food (e.g., foods tend to be derived from fruits/seeds, medicines tend to be derived from roots/bark/sap)	Etkin & Ross 1982, 1983; Moerman 1996

Schoenwetter 1997a, 1997b; Stewart 1997; Yarnell 1969, 1997a, 1997b). Reports related to macrobotanical evidence of medicinal plant remains in the East include discussions of *Nicotiana rustica* (tobacco) (Wagner 1991) and *Arisaema triphyllum* (jack-in-the-pulpit) or *Arisaema dracontium* (green dragon) (Powell 1996).

A more general interest in human selection of medicinal plants led Logan and Dixon (1994) to suggest that the development of agricultural societies during prehistory allowed for an increase in medicinal plant knowledge when compared with hunter-gatherer societies. They developed three reasons to explain why such a change in medicinal knowledge would occur. First, the adoption of an agricultural economy allowed people to have a more intimate knowledge of species within the habitats that they (especially women) created and maintained. A second factor in this increasing knowledge was the development of professional healers as part of the specialization within agricultural communities. Such specialists were able to devote greater portions of their time to exploring and developing new plant-based medicines. Finally, and perhaps most interesting as it relates to my research, was the need for medicines to care for the novel health problems experienced by agricultural societies, a concept supported by the research of Brown (1985) and Johns (1990:285). "In response to the increased incidence of disease with the development of agriculture, it seems plausible that people would be highly motivated to exploit broadly those biological organisms in their environments, especially plants, that may have medicinal value" (Brown 1985:50). Logan and Dixon (1994:29) and Johns (1990:259) note that medical discoveries are often driven by the need for new or novel approaches to previously insignificant or unknown health risks, an event that probably occurred during the transition from Late Woodland horticultural economies to Mississippian agricultural economies. This trend in increasing medical needs was especially true for women who would have known the plants most intimately and needed medicines for problems associated with increased childbearing demands. "The concern for maternal health undoubtedly led to an increased focus on plants that could affect human reproduction: contraceptives, parturients, galactagogues, emmenagogues, and abortifacients" (Logan and Dixon 1994:29).

Especially interesting for my research was the suggestion that the development of complex agricultural societies allowed for full-time healers who had greater knowledge of plants. Increasing social complexity has been noted in the archaeological record of Late Woodland to Mississippian cultures in the American Bottom and Moundville regions. It is possible that one category in this increasingly complex society was a group of healing specialists, associated with priestly authorities, who developed and explored new medicines on a full-time basis. Johns (1990:259) indicates that "increased sophistication of medical practices likely arose along the same exponential road as other aspects of material culture." If Brown (1985) is correct in his assessment that more intensely agricultural people have less diverse biological lexicons, then medical specialists might be necessary to maintain the health of certain members of society. Family level healing, however, would still be necessary at the farmsteads.

It also is possible that increasing population density during the transition from the Late Woodland to Mississippian period circumscribed medicinal-plant-collecting ranges available to family-level and specialist healers. Wild plants might have become scarcer in their natural habitats necessitating the encouragement, or even cultivation, of important medicinal plants near habitations. The cultivation or encouragement of wild medicinal plants might result in an increased number of seeds that paleoethnobotanists often regard as incidental weeds present in paleoethnobotanical samples from habitation and/or ritual contexts. Medicinal taxa were cultivated during the historical period, and Asch (1994:196-202) suggests that this post-Contact process occurred because culturally important medicines were scarce where populations were constrained within tribally controlled lands, reservations, or allotments.

This background on traditional health systems and how such plant-based systems might have functioned during prehistory is a basis upon which the health of prehistoric people can be evaluated. The chapter that follows provides summaries of health issues faced by prehistoric residents of the study regions. Medicinal plants used by historic tribal groups, as discussed in this chapter, will be noted whenever possible in the following chapter.

CHAPTER 3: PREHISTORIC HEALTH

Introduction

A significant amount of research has been conducted in the Midwest and Southeast on health issues implicated in the shift from the Late Woodland to the Mississippian periods (Buikstra and Williams 1991; Conner 1990; Fenner 1980; Garner 1991; Goodman and Armelagos, eds. 1985; Kent 1992; Lallo et al. 1977; Lallo and Rose 1979; Ortner and Putscher 1985; Palkovick 1987; Roberts and Manchester 1995; Rothschild and Martin 1993; Shurr 1992; Steinbock 1976; Stuart-Macadam 1985, 1989, 1992). In general, adoption of Mississippian lifeways appears to have resulted in a new set of health-related problems. The combined stresses of decreased birth spacing, increased population density, size of some communities, dependence on maize, social conflict and differentiation, all compounded the chances of poor health for Mississippian populations, as is the case for modern groups undergoing comparable social transformations (Cook 1976). The Mississippian reliance on maize, however, is no longer considered the "health culprit" it once was (e.g., El-Najjar 1976); maize was just one part of a more complex subsistence and social system (e.g., Stuart-Macadam 1992).

Many of the ills experienced by prehistoric populations did not leave markers on the skeletal remains. There are, however, several paleopathological conditions that have been associated with general (and specific) stresses, ill health, and known pathogens. It is important to note that most of these skeletal conditions cannot be directly linked with a single pathogen or illness; rather, conditions are interpreted in several ways, especially as general indicators of stress and resulting ill health. The specific causes of such stress are not usually identifiable, but cultural factors such as contact with other groups, or denser settlement patterns are often suggested (Powell 1988). Major skeletal indicators of ill-health, as expressed in the skeletal record, include enamel hypoplasias, infectious lesions (especially periostitis and osteomyelitis), porotic hyperostosis, trauma, dental caries, degenerative joint disease (osteoarthritis), changes in stature measurements, and possibly Harris lines. Ortner and Putscher (1985), Roberts and Manchester (1995), and Steinbock (1976) present detailed summaries of the archaeological manifestation of these health problems. Additional evidence of illness during the Mississippian period includes skeletal markers of tuberculosis and treponematosis (in the form of a yaws-like disease and/or non-venereal syphilis) (Buikstra, ed. 1981; Buikstra and Williams 1991; Powell 1991a, 1992). It should be noted, however, that "the ultimate measure of adaptation is mortality" (Armelagos and Hill 1990:23), lending support to studies of population demographics as a reasonable measure of societal health.

This chapter serves a two-fold purpose. First, the diseases, stresses, and more generalized health issues that faced prehistoric Late Woodland and Mississippian populations in the eastern United States are discussed to familiarize the reader with the various facets of prehistoric health. Information on health problems not directly recognizable from the paleopathological record are emphasized to provide a more complete picture of prehistoric health as experienced by the residents of eastern North America. Secondly, the chapter provides summaries of data available on prehistoric health and paleopathology in the Moundville, Central Tombigbee, and American Bottom regions. An understanding of the health problems facing these prehistoric populations is necessary if we are to interpret, and predict their pharmacopoeia.

Diseases Identified in the Paleopathological Record

Relatively few of the abnormalities found in the paleopathological record can be attributed to a single pathogen or disease; there are usually several possible causes for similar deformities. The diseases that have been identified in the paleopathological record for North America, such as tuberculosis, treponematosis, tooth decay, and osteomyelitis, are most robustly identified in large skeletal populations. This limited group of diseases is important to a more comprehensive interpretation of the paleopathological record, because they can serve as indicators of broader health issues (e.g., an increase in caries rates has been associated with consumption of starchy foods). For this reason descriptions of the diseases, their effects on living populations, their appearance in the paleopathological record, and trends in their occurrence are discussed below.

Tuberculosis. Tuberculosis as it is diagnosed by biomedicine, is a communicable, debilitating, and sometimes deadly disease (Aufderheide and Rodriquez-Martin 1998; Buikstra, editor 1981; Buikstra and Williams 1991; Cockburn 1967; Rothschild and Martin 1993; Steinbock 1976). It is characterized by an initial infection of the lungs and hilar lymph nodes by gram-negative bacteria of the taxa *Mycobacterium* cf. *tuberculosis*. It is generally contracted during childhood, but fewer than 50% of the exposed individuals develop a clinical level of the disease. If an individual survives the initial infection the bacteria can be encapsulated in calcified tissue, often in the lungs. These calcified bacteria can rupture and spread the infection throughout the body and into the bony tissues. The spinal column, hip joints, knee joints, ribs, and sternum are the most common sites for osteolytic and occasionally osteoblastic responses (Aufderheide and Rodriquez-Martin 1998; Buikstra, ed. 1981; Powell 1991a: Table 1). Extensive vertebral destruction is the most commonly recognized manifestation of this disease in the paleopathological record in North America. There has been some success with isolating the bacteria from mummified human tissues from South America (Buikstra and Williams 1991).

Identification of this disease in North American prehistoric human remains has been a long and sometimes difficult process summarized by Buikstra and Williams (1991) and authors in the volume edited by Buikstra (1981), such as Buikstra and Cook (1981), Shadomy (1981), and Widmer and Perzigian (1981). These reviews emphasize the presence of sufficient evidence from skeletal and mummified pre-Columbian remains to support the theory that a tuberculosis-like disease may have existed in the New World prior to European contact. It now appears that a tuberculosis-like disease was not only present during late prehistory, but also may have been present at an epidemic level in some populations, wherein the bony tissue representation was at 5-7%. With this rate of bony tissue infection, nearly every person in these populations would have been exposed to the mycobacteria (Buikstra and Williams 1991:163). It must be emphasized, however, that pulmonary tuberculosis is the most common cause of death in modern tuberculosis victims; the disfiguring and excruciating pain of skeletal tuberculosis is indicative of a person who has survived the difficult pulmonary stage of the disease for a number of years. The possibility also exists that the strain of tuberculosis present during prehistory was less virulent and manifested in a less debilitating manner than modern tuberculosis.

Native American remedies for tuberculosis often overlap with remedies for more generalized respiratory or pulmonary distress. Relevant archaeomedicinal plants include anemone (*Ranunculus* sp.), jimsonweed (*Datura stramonium*), redcedar (*Juniperus virginiana*), cherry (*Prunus* spp.), sumac (*Rhus* sp.), mullein (*Verbascum* sp.), and viburnum (*Viburnum* sp.).

Treponematosis. Powell (1988:159-175) provides an excellent summary of the evidence for treponematosis in the form of a yaws-like or non-venereal syphilis-like disease at Moundville. She also provides evidence for pre-Columbian syphilis in the New and Old Worlds. She concurs with other researchers such as Cook (1976), that venereal syphilis with its deadly effects, was probably not experienced by prehistoric Native Americans, but a form of treponematosis was present in the late prehistoric Americas. A more recent summary of world-wide distribution of treponematosis is presented in Aufderheide and Rodriquez-Martin (1998:154-171).

Yaws-like treponematosis is characterized in modern populations by an infection of the mucus-bearing skin surfaces during casual childhood contact. Nearly 100% of the individuals exposed during epidemics contract the disease, but the mortality rate is very low. A small group of the individuals who contract the disease will have skeletal response with osteoblastic and occasionally osteolytic manifestations in the tibia, fibula, humerus, radius, clavicle, cranial vault, and nasopalatal region. These infections can last and/or reoccur for five to ten years (Powell 1991a: Table 1). Symptoms of these infections include gummatous ulcers and deep bone "burn," characterized by painful, burning sensations within the long bones.

Yaws-like illnesses probably would have been experienced by the younger people within an afflicted population, because the disease is transmitted by casual, skin-to-skin contact. These children would have experienced initial skin discoloration followed by ulcerative skin changes (Aufderheide and Rodriguez-Martin 1998:155). These ulcers would have been disfiguring and probably painful. Archaeomedicinal plants used on skin ailments or as a disinfectant include plum and cherry (*Prunus* spp.) and elderberry (*Sambucus canadensis*). "Between 1 and 5% of the cases develop skeletal involvement some years after the primary stage" (Aufderheide and Rodriguez-Martin 1998:156). The skeletal changes are usually associated with painful, burning sensations in the involved areas. Advanced cases of skeletal involvement could have hampered an individual's ability to function within society, but such cases would have been rare.

Tooth Decay. Caries, which are one result of tooth decay, are most common among children and young adults. Tooth decay is caused by a complex chain of events leading to the breakdown of the tooth enamel, followed by pulp infection, and even possible abscess formation within the jaw (Aufderheide and Rodriguez-Martin 1998:400-405; Lewis and Elvin-Lewis 1977:226-228; Ortner and Putschar 1985:438-443). One of the conditions that encourages this tooth decay is the presence of sugars, which often are derived from carbohydrates. While cavities are initially painless, the infection of the pulp, and later the jaw, can be excruciatingly painful and even dangerous, if the infection spreads throughout the body.

Older adults most often experience root caries. This process is associated with periodontitis and its subsequent reduction of alveolar bone and soft tissue height (Aufderheide and Rodriguez-Martin 1998:400-405). The combined process of root caries and periodontitis causes extensive tooth loss in older adults.

Many traditional societies, including some Native American groups, have some form of preventative dental care such as chewing sticks for plaque removal; these methods are somewhat effective by modern dental standards (Lewis and Elvin-Lewis 1977:230-244). Archaeomedicinal plants used as for oral health include persimmon (*Diospyros virginiana*), strawberry (*Fragaria virginiana*), redcedar, sumac, grape (*Vitis* sp.), and other plants that contain large amounts of tannins, which help inhibit bacterial growth. Removal of the carious teeth is the most common remedy for severe tooth decay in peoples without modern dentistry techniques. If infection spreads to the jaw, the resulting abscess would be dangerous and difficult to treat.

Increased incidence of caries in the archaeological record has been used by some researchers as a marker of the adoption of a starch-based subsistence (Aufderheide and Rodriguez-Martin 1998:404; Larsen 1987:376; Milner 1982:74-78; Powell 1988; Ortner and Putscher 1985:439-442). For example, the ratio of cavities within a dental arch increased through time from the Archaic to Mississippian period in the American Bottom region (Milner 1984). This difference in caries rates has been attributed to the increasing importance of grain, especially maize, in the diet of American Bottom residents. The rate of cavity formation has also been linked to differences in sexes and food preparation techniques, but the relationship between starch and cavities is not perfect (Aufderheide and Rodriguez-Martin 1998; Larsen 1987).

Infectious Lesions. Two major types of pus-forming infectious bone lesions are recognized in the paleopathological record: osteomyelitis and periostitis (Rothschild and Martin 1993:63; Steinbock 1976:60-85). The specific etiology of general bony infections is difficult to identify with the exception of diseases such as tuberculosis, treponemal diseases, and leprosy, which are each characterized by specific patterns of osteomyelitis (Aufderheide and Rodriguez-Martin 1998; Kelly 1989: Table 1; Ortner and Putscher 1985; Shipman et al. 1985; Steinbock 1976). The bacteria that are most commonly responsible for more general infections are staphylococci, streptococci, pneumococci, and sometimes typhoid bacteria (Roberts and Manchester 1995:126). Infections of the bony tissues represent chronic infections of the bone and surrounding tissues, because short-term infections would not be preserved in the bone (Larsen 1987:380). Plants present in the archaeobotanical record that were used by Native Americans for non-specific infections include cherry, plum, and elderberry, although the number of species used for skin aliments is much greater.

An association between the frequency of non-specific infectious lesions within a skeletal population and their subsistence system or social economy has been proposed by some researchers (Aufderheide and Rodriguez-Martin 1998:179-181; Cohen and Armelagos 1984; Larsen 1987:381-382; Kelley 1989). "These studies provide strong support for the general epidemiological model that an increase in population size and density during later prehistoric times was conducive to the maintenance and spread of infectious disease" (Larsen 1987:382). This general burden of pathogens is reflected in a higher incidence of bony infections during late prehistory.

Trauma. Prehistoric evidence of trauma is most commonly associated with healed or unhealed fractures. Paleopathologists include a number of other injuries under the heading of trauma including "crushing injuries, bone wounds caused by sharp instruments, and dislocation" (Steinbock 1976:17). Additional categories of trauma include injuries to the bone on the microscopic level and culturally mediated damage to the skeleton (e.g., binding of feet or cranium).

The process of fracture or trauma healing differs according to the site and extent of injury, but the biological activities are similar (Merbs 1989; Shipman et al. 1985). The time frame for complete healing is dependent upon a number of factors, including the age of the individual (e.g., well-nourished children tend to heal rapidly) and how well and/or how quickly the bone was set (e.g., poorly set bones may never regain full functional strength). Initial formation of bone callus is complete within two weeks, but complete callus production requires over a month to form. The remodeling of bone to pre-fracture condition can take years in adults.

The effect of trauma on individuals and their social groups can be significant. Most accidental traumas require several weeks to months to heal completely. The individual would be limited in his or her activities during this period if the trauma were to mend correctly. Poorly aligned or infected traumas could incapacitate an individual for a longer period of time, or even for life. The healing procedure might necessitate archaeomedicinal agents such as analgesics (e.g., St. John's-wort [*Hypericum* sp.] or pokeweed [*Phytolacca americana*]), antihemorrhagics (e.g., bedstraw [*Galium aparine*] or dock [*Rumex* sp.]), and orthopedic aids (e.g., redcedar or sumac). The effect of more purposeful traumas such as projectile wounds, scalping, or surgical procedures reflect the broader societal patterns in which the an individual was interacting. All of these surgical or conflict-related traumas were undoubtedly associated with extensive soft-tissue injuries and their related health problems.

Indicators of Stress in the Paleopathological Record

Many of the skeletal pathologies identified in the archaeological record are the result of dietary, health-related, and/or physical stress (Powell 1988). These stresses affect the development and remodeling of living bone resulting in recognizable manifestations such as osteoarthritis, porotic hyperostosis, enamel hypoplasia, Harris lines, and even stature of individuals within a population. Unlike more specific diseases these skeletal pathologies cannot be related to a single pathogen or illnesses; they serve as indicators of the overall health of the individual, especially during the period of growth and development.

Osteoarthritis. "Osteoarthritis is the commonest joint disease in both modern and ancient populations" (Rogers and Waldron 1995:32). The relationship between activity and osteoarthritis is not a straightforward one: age, systemic factors, and genetic predisposition all contribute to the possibility of osteoarthritis. These factors are in turn influenced by the severity of joint use, especially if the joint has been misaligned or damaged by other causes (Roger and Waldron 1995:34).

Osteoarthritis is recognized clinically when the patient complains of joint pains that become severe as the joint degrades and the bones begin to eburnate. Osteoarthritis is a progressive disease, and it is possible that the age of most sufferers would have prevented them from labor-intensive activities for social reasons. Modern biomedicine has little help for the ravages of osteoarthritis. The swelling can be addressed, but only surgery can remove the osteophytes or replace the arthritic joint. Traditional healing techniques tend to focus on the recurring pain with external poultices, or herbal teas taken internally (Lewis and Elvin-Lewis 1977:167). Archaeomedicinal agents include St. John's-wort, redcedar, pokeweed, sumac, brambles (*Rubus* sp.), elderberry, and grape.

Rates and sites of osteoarthritis have been used by paleopathologists to identify changes in activity patterns, especially as it relates to shifts in subsistence strategies (reviewed in Cohen and Armelagos [1984:591] and Larsen [1987:388-394]). Overall, it appears that farming was less biodynamically stressful than hunting and gathering and a subsequent decrease in the osteoarthritis has been identified in the paleopathological record (e.g., Larsen 1984, Rose et al. 1984). As maize agriculture was adopted there appear to have been increasing rates of osteoarthritis in females due to more intensive cultivation techniques and an earlier entry of women into the workforce, although there are exceptions to this generalized scheme (e.g., Cassidy 1984). It is important that comparisons of skeletal material be limited temporally and geographically because numerous factors leading to osteoarthritis prevent a simple comparison of stressful activities to stressed joints (Rogers and Waldron 1995:105-107), although such analogies are commonly made (Kennedy 1989:129).

Porotic Hyperostosis and Cribra Orbitalia. The pathological conditions seen in archaeological skeletal populations known as porotic hyperostosis and cribra orbitalia are the result of acute anemia. The prevalence of anemia in late prehistoric Native American skeletal remains was initially linked to these groups dependence on iron-poor corn (e.g., El-Najjar 1976). Current research provides two interlaced explanations for prehistoric anemia: lack of dietary iron and increased pathogen load. Each of these is discussed in more detail below (summarized in Aufderheide and Rodriguez-Martin [1998] and a volume edited by Stuart-Macadam and Kent [1992]).

Children appear to have difficulties procuring enough iron, protein, and other nutrients, especially during weaning and adolescence. Children at weaning age are often fed foods with low nutritional value such as gruels; this diet is insufficient for the growing child's caloric and overall dietary needs. Similar nutritional strain is experienced during the rapid growth period associated with young adults, and this is the same period when children often enter the larger workforce. These dietary-based anemia problems are easily expressed in the skeletons of children because their bones are filled with red blood marrow, whereas adults have red blood marrow only in the long bones. In addition, the mineralization process is not complete in children, allowing for easier destruction of the bone structure, especially in areas such as the skull, where the bones are very thin.

The next hypothesized cause of anemia as expressed by porotic hyperostosis in archaeological populations is an increased pathogen load (e.g., Stuart-Macadam 1992). The aggregated and sedentary lifestyle associated with agricultural economies "is implicated as a major factor in producing increased bacterial and parasitic diseases leading to anemia" (Kent 1992:13). Stuart-Macadam (1992:159) even goes so far as to say, "porotic hyperostosis is related to the total pathogen load of a population." This correlation exists because pathogens, whether through direct blood absorption (e.g., hookworm), destruction of red blood cells (e.g., malaria), or related infections (e.g., chronic mycotic infections), disrupt the balance of red blood cells and dependent iron ratios within the body. Kent (1986) emphasizes the role of chronic gastrointestinal tract infections, especially for young children, as the cause of childhood anemic and porotic hyperostosis. She suggests that children with chronic gastrointestinal illnesses would be anemic even with marginally adequate diets. There also is some indication that anemia in some children may be the result of neonatal anemia experienced by the mothers (Palkovich 1987). The effect of these childhood illnesses, and resulting anemias, should not be under-estimated. Care of the sick children would have been a heavy societal burden, especially on the female caregivers.

Enamel Hypoplasia. Enamel hypoplasias are fine horizontal bands of dental enamel which can be found on any of the teeth with the possible exception of third molars. These bands are the result of disrupted growth. The band is formed during the first growth spurt when bodily functions return to normal after a physiological trauma. Severe illnesses and nutritional stresses are believed to cause the arrest in proper tooth formation. Aufderheide and Rodriguez-Martin (1998:405-407), Milner (1982:67-69), and Rose et al. (1985) present good summaries of research on enamel hypoplasia. Interestingly, the timing of these health crises can be estimated by comparing the tooth eruption sequence with the location of the hypoplasia. Unlike many other skeletal indicators of physiological stress, the dental enamel is not remodeled during the life of the individual, hence, it can serve as a permanent record of childhood stresses in an adult's teeth (Rose et al. 1985).

There appears to be a correlation between the number of enamel hypoplasias identified in a population and the subsistence regime that the population practices (Lallo and Rose 1979; Larsen 1987:365-374; Rose et al. 1985). Modern populations show an inverse correlation between number of hypoplasia and socio-economic status. Better diet and health care for the children of higher status has been used to explain these differences. When prehistoric populations of hunter-gatherers, horticulturists, and agriculturists were compared, the number of hypoplasias rose with increasing dependence on agricultural crops. This change was not directly due to the change in diet, but rather the sedentary and aggregated societies of late North American prehistory experienced increased chances for childhood illnesses and stress. These stresses may be reflected in the greater number of dental hypoplasias of the agricultural populations.

Harris Lines. Harris lines, also known as growth arrest lines and skeletal radiopaque transverse lines, are transverse lines of more-mineralized bone, especially long bones such as the femur, tibia, and radius. These lines are visible when affected bones are radiographed. It appears from experimental studies on animals that these lines are the result of "a slowing of the rate of cartilage cell division in the growth plate....but with continuing mineralization, producing a segment of increased mineralization" (Aufderheide and Rodriquez-Martin 1998:442). The lines are formed during the first growth after a period of stress.

These Harris lines have been used to document periods of nutritional stress and possibly illnesses that were experienced by the individual during infancy, childhood, and/or adolescence, but there are problems with how accurately Harris lines record these stresses. For example, as bone remodels itself, the Harris lines formed during late pre-adulthood tend to be lost. A second problem has to do with attempts to correlate growth rates with the placement of lines in order to estimate the age when the Harris line was formed: lines do not form during all stressful periods. Finally, the causes of Harris lines are poorly understood: "a huge variety of conditions have been believed to be the cause of Harris line production including influenza, measles, surgery, starvation, vitamin deficiencies, emotional stress, and others" (Aufderheide and Rodriquez-Martin 1998:423).

Stature. While discussions of stature are not included in some paleopathological summaries, it is an additional measure of the overall health of a given population because "nutritional status, genetic make-up, environment and disease will all affect the attainment of final stature" (Roberts and Manchester 1995:26). The calculation of stature for prehistoric individuals and populations is generally done by measuring long bones, including femur, humerus, tibia, fibia, ulna, and/or radius, and applying formulae developed by Trotter and Gleser (1952, 1958) as noted in Bass (1987:221-222).

Differences in calculations of stature have been used by some researchers to reveal the overall health of prehistoric populations as summarized in Cohen and Armelagos (1984:588), Milner (1982:70-74), and Larsen (1987:249-250). These summaries tend to indicate that poor nutrition, especially when associated with agricultural lifeways, negatively affects the final stature of adults in such societies. Interestingly, adult males of higher status in some societies (e.g., Moundville) are larger than non-elite males, albeit not statistically significant (Powell 1988). These stature differences may relate to access to limited resources, especially meat, during periods of nutritional stress such as weaning or adolescence. The assignment of a single cause to a phenomenon as complex as adult stature can be misleading, however, given the variety of biological and social factors contributing to this measurement. Like many other measures of general "stress," caution must be taken to compare appropriate datasets and interpret the results within the larger cultural system.

Diseases Not Identifiable in the Paleopathological Record

Many afflictions that would have affected the populations around Moundville, Lubbub Creek, and Cahokia are predictable from studies in modern developing nations despite their absence or near absence from the paleopathological record. These problems included gastro-intestinal disorders, skin abrasions and rashes, colds and/or flu, endoparasites, birth-related traumas, and various other problems that would have been part of daily existence in a Late Woodland or Mississippian village. Additional infectious and congenital diseases that would have been present in the New World have been discussed in paleopathological texts such as those written by Aufderheide and Rodriguez-Martin (1998), Merbs (1992), Ortner and Putschar (1985), and others.

Gastrointestinal Disease. One health issue that would have plagued prehistoric residents of Eastern North American is gastrointestinal (G-I) disease; the implications of which Milner (1982:39-41) provides a good summary. This illness is brought on by a number of microbial, viral, or parasitic agents. It tends to be persistent problem for very young, old, or immune-compromised individuals in tribal groups. G-I disease is a leading cause of death for children in developing equatorial nations. Many environmental parameters contribute to the persistence and ferocity of G-I illness. Etkin and Ross (1982:1559) list a number of factors contributing to the level of G-I disease in the Hausa village they studied including:

1. High temperature
2. High humidity
3. Use of unboiled water
4. Use of hands for eating
5. Lack of refrigeration
6. Communal cooking and eating vessels
7. Earthen floors in structures
8. High population density
9. Minimal or no foot covering
10. Exposure to human excreta
11. No physical isolation of sick people

These factors fall into two categories as they apply to prehistoric G-I illness: those factors that relate to environmental or technological limitations such as temperature and lack or refrigeration, and those that are culturally determined such as communal cooking vessels, and care of the sick.

The presence of these environmental and technological factors can be derived from the archaeological record. For example, the residents of the Central Mississippi Region appear to have had dirt-floored structures, to judge from the living surfaces excavated in those locations. Other factors contributing to G-I illness are based on cultural preference, and these factors are less readily identified in the archaeological record. On a similar note, it appears from the size of ceramic vessels that communal cooking and eating pots were used by many prehistoric populations in the Eastern Woodlands, but perishable vessels may also have been used (Johannessen 1993). Factors such as isolation of the sick are even less predictable from the archaeological record. The ethnographic and ethnohistoric record for Native American groups, however, can serve as a model for investigating prehistoric healing methods. Vogel (1970) summarizes such information and indicates that isolation of the sick was not a common practice in Native American societies.

All of these factors contribute to the hypothesis that prehistoric Native Americans in many larger settlements probably suffered from G-I illnesses. As the density of population increased toward the Mississippian period, it is very likely that G-I illnesses became more troublesome, especially within the larger villages. An unfortunate aspect of G-I illness is that it spreads quite rapidly within the susceptible portion of the population, probably reaching epidemic proportions on a nearly seasonal basis. Archaeomedicinal agents used for gastrointestinal illness are quite numerous and include tick trefoil (*Desmodium* sp.), persimmon, holly (*Ilex* sp.), morning glory (Convolvulaceae family, including *Convolvulus* sp. and *Ipomoea* sp.), tobacco (*Nicotiana* sp.), cherry, sumac, brambles, elderberry, blueberry (*Vaccinium* sp.), viburnum, and grape.

Endoparasites. A variety of human endoparasites has been identified from paleofecal or mummified human remains in the New World (Reinhard et al. 1985). Six of the eleven endoparasites that have been found in the New World could have infected populations in the Eastern Woodlands: whipworm (*Trichuris trichuira*), giant intestinal roundworm (*Ascaris lumbriocoides*), pinworm (*Enterobius vermicularis*), tapeworms (most likely hymenolepids [cestodes]), threadworm (*Strongyloides* spp.), and hairworm (*Trichostongylus* spp.).

Eggs from giant intestinal worms were found in the human paleofeces from Early Woodland (500 B.C.) deposits in Salts Cave in Kentucky (Fry 1997:61). Adult worms live in the human intestine, and the eggs are discharged into the soil after having been laid in the intestinal tract; the eggs are then reingested by humans. During their larval and immature stages, they cause coughing and allergic responses (Aufderheide and Rodriguez-Martin 1998:238). Fry

(1997:61) noted that giant intestinal roundworm infestations can result in generally poor digestion, nervousness, diarrhea, and bowel inflammation. Complications arise when adult worms become so numerous that they block the intestinal passage; a condition that could have been lethal in prehistory (Aufderheide and Rodriguez-Martin 1998:238). The giant intestinal worm's fecal transmission route is shared with whipworm, and probably illnesses such as amebic dysentery (Reinhard 1992:238). The presence of the first is often used to implicate problems with the other two.

Pinworms are the most common human helminth parasite (Reinhard 1992:238). The presence of this parasite in a population is not particularly harmful, but itching and secondary infections of the anus may result (Fry 1977:21). Unfortunately, pinworms harbor *Rickettsia prowazekii* which is the agent of endemic typhus (Aufderheide and Rodriguez-Martin 1998:246). Typhus causes fevers with associated skin rashes and enlargement of the spleen or liver.

Remains of tapeworms have been identified in paleofeces from several areas in North America (Aufderheide and Rodriguez-Martin 1998:241; Fry 1977:21). It does not appear that humans in prehistoric North America served as hosts for the tapeworms found in the paleofeces. Ingestion of the ova or larvae was probably accidental and related to the consumption of infected grain beetles.

The final two species of roundworms, hairworms and threadworms, are less commonly discussed in texts on paleoparasitology than the other species in this section (Aufderheide and Rodriguez-Martin 1998; Reinhard 1992), but it should be noted that threadworms can cause severe intestinal damage. Remains of threadworm have tentatively been identified from Upper Salts Cave in Kentucky (Dusseau and Porter 1997:59) and Dust Cave in Utah (Reinhard et al. 1985). Reinhard and colleagues (1985) suggest that the presence of hairworms in the Dust Cave paleofeces may be the result of consuming rabbit intestines rather than as human endoparasites.

It is difficult to estimate the impact of these worms on the health of a given individual within the prehistoric population as a whole. Importantly, agricultural populations are associated with an increased risk of parasites associated with human feces, stored grain, and contact with moist soil (Reinhard 1992:240-241). None of the endoparasites associated with prehistoric eastern North America were particularly deadly in and of themselves. Rather, the stress of high parasite loads would have worsened other conditions (e.g., anemia, infections, etc.), especially for immune-disadvantaged individuals such as small children or the elderly. Parasite loads probably would have increased during the Mississippian period in regions, because population density increased and the possibility of food, water, and soil contamination from human wastes grew.

The use of plants to treat helminth infestations is one of the more common uses of medicinal plants throughout the world (Lewis and Elvin-Lewis 1977:290). The most effective drugs are those administered orally, and they should be effective in a single dose. Such treatments are often followed by a purgative to remove any of the remaining food source and starve persistent helminths. There has been discussion in the archaeological literature about *Chenopodium* spp. serving as prehistoric antihelmintics (Reinhard et al. 1985; Riley 1993); although the species in use today (*C. ambrosioides*) is not thought to be native to the eastern United States. Additional archaeomedicinal antihelmintics include redcedar, tobacco, purslane (*Portulaca oleracea*), cherry, plum, sumac, bramble, black nightshade (*Solanum ptycanthum*), mullein, and viburnum.

Skin Diseases. Skin diseases would have troubled the prehistoric residents of the Eastern Woodlands, but evidence for these problems has been preserved only in mummified materials from throughout the world (Aufderheide and Rodriquez-Martin 1998). Insect bites, scratches, cuts, burns, occasional frost bite, and other mechanical injuries would have been a consistent source of irritation and possible infections. Such infections could spread if not cleaned and kept sanitary. Rashes, acne, hives, and other skin aliments would have ranged from simply uncomfortable to a source of secondary infections. These open wounds would also be an area where more serious diseases such as treponematosis could enter the body. The care and curing of such irritations and injuries are difficult even with modern biomedicine. The extent and seriousness of skin ailments to prehistoric peoples is impossible to estimate, but the presence of numerous cures in the ethnobotanical record (Moerman 1998), and presence in the archaeological record of the same taxa (e.g., spurges [Euphorbiaceae family], geranium [*Geranium* sp.], purslane, cherry, bramble, elderberry, black nightshade, and maypops [*Passiflora incarnata*]), suggest that this group of ailments was commonly treated.

Colds and Influenzas. Colds and viral influenzas would have been present prehistorically, and increasing population densities in some regions during the Mississippian period would have intensified the spread of these communicable diseases. Such communicable respiratory illnesses tend to "run their course" in approximately a week (Aufderheide and Rodriquez-Martin 1998:211-212), but individuals whose immune systems are otherwise compromised can develop further life-threatening illnesses such as one of the many types of pneumonia (Aufderheide and Rodriquez-Martin 1998:181-190). The rates of prehistoric death from pneumonia are predicted to be similar to modern rates of untreated pneumonia, i.e., approximately 30% (Aufderheide and Rodriquez-Martin 1998:186). Colds and influenzas would probably have been treated on a symptomatic basis, with fevers (archaeomedicinal treatments include jimsonweed, pokeweed, and redcedar), coughs (archaeomedicinal treatments include spurges, St. John's-wort, cherry, and mullein), and nausea (archaeomedicinal treatments include plantain [*Plantago* sp.], sumac, and blueberry), each receiving separate diagnosis. Biomedicine treats these illnesses with similar methods today.

Birth-related Complications. Discussions of birth-related traumas are not common in paleopathological texts, because such difficulties are rarely preserved in the skeletal remains. Nevertheless, Aufderheide and Rodriguez-Martin (1998:293-296) and Ortner and Putschar (1985:100-103) provide good summaries of modern birthing conditions that might have plagued prehistoric peoples. Historically, approximately 10% of deaths of women in childbearing years are the result of birthing complications, but these statistics probably do not correspond completely with prehistoric rates; some are undoubtedly too low (e.g., deaths from obstruction), while other are too high (e.g., ectopic pregnancy). The effect of these life-threatening complications can be seen through the rise of female mortality during childbirthing years in the American Bottom (Milner 1982). Complications common in traditional societies including obstructed labor, ectopic pregnancy, postpartum issues, and abortion complications were probably also present during prehistory.

Obstructed births are due to a number of common causes including placenta previa, abnormal pelvic structure, and incorrect fetus positioning; many times obstructed births kill the mother and/or child. Hemorrhaging and extended recovery periods would be the least traumatic results of these problems. In modern obstetrics such problems can be circumvented with cesarean sections. The outcomes for prehistoric presentations of pelvic structure problems would have depended on the skill of birth attendants to manipulate the fetus and birth canal, a skill at which midwives are often quite adept.

Ectopic pregnancies are the result of a fertilized ovum implanting on the fallopian tube or ovary rather than the uterine wall. Approximately one ectopic pregnancy occurs in modern America for every 80 normally implanted pregnancies; 10-15% of ectopic pregnancies resulted in the death of the mother during the early twentieth century. It is likely that rates of ectopic pregnancy were lower prehistorically, because modern cases are often linked to pelvic inflammatory disease caused by sexually transmitted diseases, issues not apparent in prehistoric eastern North America.

Postpartum complications include infection, prolapsed uterus, and incorrect placental separation. Infections often arise from the contamination of the uterus with feces during birth. Gas gangrene or childbed fever is the deadly result of this contamination. The separation of the placenta from the uterine wall must occur completely, or hemorrhaging and contamination of the blood stream with amniotic fluid can result. Hemorrhaging from these, and other causes, occurs in 5% of modern normal deliveries.

Abortions, spontaneous or induced, were probably quite common prehistorically as they have been throughout historic periods. If natural abortions occur early, the fetus may be passed with no more bleeding than is associated with normal menses. Induced abortions later in the pregnancy could result in severe hemorrhaging and even death. Abortions induced by rupturing the amniotic sac could have been accompanied by complications from infections and excessive bleeding.

There was undoubtedly an arsenal of herbal plants used by prehistoric women, midwives, and mothers to control fertility and assist in child birthing (Lewis and Elvin-Lewis 1977:316-324; Vogel 1970). Plants used to induce uterine cramping or reduce hemorrhaging would have been particularly helpful. The connection between the regulation of menstrual cycles and early abortion would have been useful to many women needing to limit the size of their families. Archaeomedicinal gynecological aids include hackberry (*Celtis* sp.), strawberry, St. John's-wort, mint (Lamiaceae family), pokeweed, blue-eyed grass (*Sisyrinchium* sp.), and grape, to name but a few.

Prehistoric Health in the Moundville, Central Tombigbee, and American Bottom Regions

The following section is a summary of paleopathological information from the Moundville, Central Tombigbee, and American Bottom regions. Interpretation of the health of people living in these regions during the Late Woodland through Mississippian periods is difficult, because Late Woodland skeletal populations from the American Bottom and Moundville regions are poorly preserved or even lacking. Estimations of Late Woodland health for these two regions, therefore, have been made by examining paleopathological data from neighboring populations. West Central Illinois datasets are used to predict Late Woodland health in the American Bottom region, and Central Tombigbee data are used for the Moundville region, as discussed below. Strengths, weaknesses, and general conclusions about Late Woodland to Mississippian health patterns in the Moundville, Central Tombigbee, and American Bottom regions are provided. A fuller discussion of the archaeological contexts related to the three study regions is provided in Chapter 4.

Late Woodland and Early Mississippian Period Health in the Central Tombigbee Region.

Information about the health of Late Woodland residents in the Moundville region, unfortunately, is not currently available (Powell 1999, personal communication; Welch 1990:212). As a result, data from the large-scale projects in the Central Tombigbee region are often used to supplement the scant excavation information on Late Woodland sites in the Black Warrior drainage. Welch (1990:212), however, warns that "because the post-Woodland developments in the Moundville area were significantly different from those along the Tombigbee, such an analogy may be misleading." With these issues of comparability in mind, I have drawn information on health during the Late Woodland period in west-central Alabama from work in the Central Tombigbee region. In addition, information on early Mississippian period health is available for the Central Tombigbee region, and these data are discussed below.

Research on Late Woodland (Catfish Bend through Gainesville subphases of Miller III phase, ca. A.D. 900-1100) health in the Central Tombigbee region is based on work at Lubbub Creek (Powell 1983) and 1Pi61 (Cole et al. 1982). The research from these two areas has been summarized and integrated into broader regional patterns by Welch (1990).

The early Late Woodland Catfish Bend subphase of the Miller III phase is represented by three burial clusters totaling 45 burials at 1Pi61. Two of these burials were young women in the seated position, and these individuals represent the only "indication of status differentiation other than by age and gender" (Welch 1990:205) in this cemetery. If the three burial clusters from 1Pi61 are combined, an overall indication of community health during this subphase is evident. Infection (n=16; 35.6%), severe dental pathologies (n=14; 31.1%), cribra orbitalia/ porotic hyperostosis (n=12; 26.7%), and degenerative pathologies (n=12; 26.7%) were present in surprising frequencies. In addition, both accidental (n=9; 20%) and nonaccidental traumas (n=6; 13.3%), presumably the result of interpersonal violence, were fairly common. Evidence for possible tuberculosis was noted on only two individuals, representing 4.4% of the total population. Cole et al. (1982:243) conclude that "for the Catfish Bend subphase severe social stresses are indicated by the high incidence of trauma, especially of nonaccidental trauma, and the relatively high incidence of unusual Catfish Bend interments."

Health during the subsequent late Late Woodland Gainesville subphase (Cofferdam-Gainesville as designated by Welch 1990) continued to decline (Cole et al. 1982:243; Welch

1990:205). Two Gainesville subphase cemeteries were excavated at 1Pi61; a total of 33 burials was analyzed (Cole et al. 1990:206-211). The worsening health of the Gainesville population is evident as a higher proportion of identified infections (n=22; 66.7%), severe dental pathologies (n=14; 21.2%), cribra orbitalia/ porotic hyperostosis (n=14; 42.4%), and degenerative pathologies (n=10; 30.3%). The overall rate of trauma increased (n=12; 36.4%), but the rate of nonaccidental trauma (n=2; 6.1%) showed a significant decline, while the accidental trauma rate increased (n=10; 30.3%). There were no instances of possible tuberculosis noted in the Gainesville population. Welch (1990:206) summarizes "altogether, the Late Woodland survey and excavation data from the Gainesville Reservoir consistently indicated increasing economic stress preceding the appearance of Mississippian culture." This conclusion is wholly supported by Cole et al. (1982:240), who note that indicators of nutritional stress (e.g., porotic hyperostosis/cribra orbitalia and severe dental pathologies), high rates of infection, and a bimodal mortality rate indicate that poor health was affecting the reproductive success of Gainesville subphase populations.

The health of Late Woodland Central Tombigbee populations contrasts with the health of subsequent Mississippian Summerville I (A.D. 1000/1100-1200) populations (Cole et al. 1982:211-217; Welch 1990:206-209). A mortuary population of 19 individuals was present in the Summerville I component of 1Pi33 in the Lubbub Creek Archaeological Locale (Cole et al. 1982), and an additional 14 interments from other areas within the Locale (Powell 1983). The patterning of burials and their associated burial goods suggest that "Summerville I society was ranked, though not strongly nor necessarily ascriptively" (Welch 1990:208). All health indicators, with the exception of dental pathologies (n=6; 31.6%), decreased in severity when compared with Catfish Bend and Gainesville subphase populations: infections (n=5; 26.3%), cribra orbitalia/porotic hyperostosis (n=2; 10.5%), and degenerative pathologies (n=4; 21.0%). There were three individuals with evidence of trauma; only one of these appeared to be of nonaccidental origin. In addition, there was one individual with a developmental pathology. The increased rate of dental pathologies during the Summerville I was probably related to their reliance on a maize-based diet, which had replaced the broader subsistence base utilized by Late Woodland residents of the region (Cole et al. 1982:242; Welch 1990:207). The Summerville I mortality curve is unimodal with the death rate peaking at 35 years of age.

It should be noted that the 19 interments discussed by Cole et al. (1982) appear to represent an elite burial area due to the presence of high status burial good, including Southern Cult motif items associated with one individual. Cole et al. (1982:242-243) suggest that the high level of health present in this population may be the result of advantages experienced by the elite including access to better nutrition. Interestingly, the 14 burials analyzed by Powell (1983) also appear to be very healthy, thereby supporting Welch's (1990:209) general conclusion that "the Mississippian emergence along the central Tombigbee was a successful response to the increasing subsistence stress of the Late Woodland period."

Mississippian Period Health in Moundville Region. Mary Powell's dissertation (Powell 1985; summarized in Powell 1988) regarding the Moundville skeletal series provides an interesting account of health and status at a Mississippian mound center in late prehistory. Part of her work was focused on the effect of social ranking on health given the known social dimension of stress, and its effect on health. She hypothesized that social ranking "could produce status-mediated variations in growth, development, and infectious disease experience [due to] the connecting link ... between ranked social organization and physical health [which] is nutrition" (Powell 1988:33). She found, however, "given its [Moundville's] optimal setting, stature-mediated differential access to nutritionally desirable foods [animal products in particular] may have exerted a minimal influence upon the actual levels of health" (Powell 1988:58). Patterns were present in the skeletal series, and they probably represent true differences in health across status and sex dimensions.

Powell selected 564 individuals at the onset of her analysis from a larger body of less complete remains; then she further divided them into subcategories. The Moundville burials excavated prior to 1929 were no longer available for examination, resulting in a loss of several high status individuals who may have represented the upper tier of the social order (Powell 1988:12-13). Powell initially combined the materials from several subphases into a general

"Moundville" phase category spanning 500 years of Mississippian period occupation in order to improve the robusticity of her sample. Results from a later "diachronic" analysis (Powell 1998) of the Moundville skeletal remains are noted below when appropriate. The remains were divided into elite (n=81), subelite (n=190), and residual (n=293) categories based on their associated grave goods, or lack of grave goods in the case of the residual category. The next step revealed that the proportions of adult females (n=212) and adult males (n=173), with 39 adults not assigned to a sex category, were in favor of the female remains, but not to an unexpected degree (Powell 1988:89). The division of individuals into their respective age categories revealed an average life expectancy at birth of 28 years; although there were significantly more men in the 35-45 age of death range than women (Powell 1988:89-102).

The overall stature of supraordinate (high status) individuals was predicted to exceed that of subordinates (Powell 1988:105-108). Powell found, however, that there were no significant patterns in the record for female skeletal remains. The supraordinate males were slightly larger than the subordinate males, but not to a statistically significant degree. There appears to have been a slight increase in overall stature through time (Powell 1998:113).

The relative mortality rates of residents of Moundville also did not appear to vary by status. "Sex may have been the most important predictor of the demographic trajectory of an individual life spent within that community. Males apparently enjoyed a generally longer life than did females, once both had survived the stresses of childhood" (Powell 1988:102). It also was significant that the expected bias toward elder males in elite burials, "given the probable age-accumulative nature of status marking" (Powell 1988:102), was not borne out.

Dental health as revealed through enamel hypoplasia, dental wear, caries, and antemortem tooth loss, was predicted to reveal a generally better health for supraordinate than subordinate individuals. No significant differences, however, were found among the subgroups (Powell 1988:108-135). Dental hypoplasias tended to be of mild intensity and affected 54% of canines and incisor units in the total population (Powell 1988: Table 16). There was a peak in the development of hypoplasias between the ages of 2.5 and 3.5 (Powell 1988: Figure 12), but no apparent variation through the Moundville period (Powell 1998:113, 115). Dental wear was more advanced in the lower jaw than the upper, especially for males of all ranking units. It appears this trend was related to the presence of more older males than females; the wear was a factor of aging, not necessarily cultural differences. Powell hypothesized that caries and antemortem tooth loss would be less common in supraordinate individuals than subordinate individuals due to a more meat-based diet for the former. This hypothesis was not supported in the paleopathological remains from Moundville, because there were no significant differences in caries rates between the groups. The only significant variations within the skeletal population's caries rates were associated with differences in the location and severity of cavities in association with age profiles (Powell 1988:126, 130-134). Powell (1998:115) later noted that "carious activity increased in younger adults from Moundville I to Moundville II, an expected result of the increase in maize consumption."

In regards to skeletal pathologies present in the Moundville human remains, Powell (1988: Table 41) expected the remains to reveal a healthier, less stressful life for the supraordinate individuals than for the subordinate individuals. The predicted exception to this trend was the presence of more warfare-related injuries in the supraordinate individuals due to their roles as warriors. These trends were present, but to a lesser extent than had been expected.

While no individuals displayed evidence of porotic hyperostosis, cribra orbitalia was present in several adults and subadults (Powell 1988:147-148). Fifteen cases of cribra orbitalia were recorded. Most of these were subelite or residual individuals and younger than 4.9 years of age. It appears that anemias decreased through time at Moundville, possibly the result of the dispersal of populations after the Moundville I phase (Powell 1998:116).

The distribution of traumatic injuries revealed some interesting trends (Powell 1988:144-145). None of the subadult individuals had traumatic injuries. In adults, the vast majority of injuries were fractures with deep cutting wounds and a single piercing wound representing less than 10% of the recorded injuries. Fractured bones were twice as common in males as females.

Distribution of the fractures between status segments was difficult to interpret due to sampling problems within the subcategories. It appears, however, that the elite segments tended to have fewer fractions than did the subelite and residual individuals.

Analysis of osteoblastic lesions, which are inflammations of the bone due to stress, injury, or trauma, showed significant differences in the distribution of adult and subadult lesions. Comparisons of lesions between sex and status groups revealed no significant differences (Powell 1988:139, 141). Focal resorptive lesions of the cranial vault and spinal region were concentrated and evenly distributed in the adult population (94.7%) (Powell 1988:136). The cause of resorptive lesions is generally very difficult to pinpoint given the variety of pathogens that can cause similar bone reaction. Nonetheless, Powell identified three specific diseases that appear to have been a part of the disease load experienced by prehistoric residents of Moundville: hematogenous osteomyelitis, tuberculosis, and endemic treponematosis.

"Five adults displayed extensive pathological involvement characteristic of hematogenous osteomyelitis" (Powell 1988:149). All five of the individuals experienced extensive osteomyelitis, but survived to full adulthood (Powell 1988:151). This suggests that the individuals probably lived with the effects of this disease from their young adulthood. Re-infection had been a problem for several of the individuals (Powell 1988:151-152).

Resorptive lesions were noted in several Moundville individuals and linked to endemic treponemal disease (tuberculosis) by Powell (1988:159-174), although "no characteristic lesions of the cranium, hip, or knee were observed. Vertebral lesions of infectious etiology are rare in the sample, affecting only three adult cases" (Powell 1988:155). Two of the cases were from subelite females who survived into their thirties. The third individual was an elite male who died in his mid- to late-20s; this individual also was the most severely infected. The young elite male is the only individual who displays the extensive destruction of multiple vertebrae associated with tuberculosis. Chronic pulmonary tuberculosis may be represented in the Moundville series by one infant, one child, and eight adults who all had characteristic rib lesions (Powell 1988:158). The two subadult individuals probably died from their tubercular infections. An additional case of tuberculosis was discovered during reanalysis of the Moundville human remains (Powell 1998:117).

Evidence for endemic treponematosis (probably a yaws-like disease) was present at Moundville in the form of several lesion types (Powell 1988:169-175). Fiber bone periostitis peaks in late adolescence, while sclerotic periostitis was more common in adults, especially the lower limbs of adults (Powell 1988: Table 39), but; there were no notable differences in distribution among Moundville sex or status groups. "Twenty-three individuals (21 adults and 2 subadults) displayed oval or circular depressed lesions on the ectocranial aspect of the frontal squama and the superior parietals" (Powell 1988:169). Several skulls had classically stellate scars or cratered lytic lesions although not to the extent of the clear examples of venereal syphilis noted by Powell (1988:172). Later reanalysis of the skeletal population revealed three additional cases of treponematosis (Powell 1998:117).

Powell concludes her analysis by stating that age and sex had the strongest influence on the experience of physiological stress as reflected in the dental and skeletal pathologies of the Moundville residents. Despite her expectation that status would be a determining factor in the stress experienced by individuals, she found that "ranked status seems to have played a minor role in the determination of health at Moundville" (Powell 1988:182). The residents of Moundville appeared to be in relatively good health, especially in comparison with Mississippian populations at sites such as Chucalissa, Dallas/Hixon, King, and Etowah (Powell 1991b: Table 3-16, 1992: Table 5.2). The health of nonelite Moundville residents tended to be closer to Moundville elite than others at contemporary sites.

Late Woodland Period Health in West-Central Illinois. Excavations of Late Woodland period sites in the American Bottom region have yielded insufficient collections of human remains to present a picture of health during that time frame (Kelly 1990b 6; Milner 1982:241, 242), although declining health through time has often been assumed (e.g., Garner 1991:180).

> Very little information is currently available concerning Patrick phase mortuary programs. The lack of rural populations represents a serious gap in the archaeological record, both in terms of addressing the question of status differentiation within Patrick

phase societies, and in providing a database for broad-based bioarchaeological analysis (Kelly 1990b:122, 124).

Milner even suggests that "given the nature of existing skeletal collections, it is not possible to determine whether fluctuations in health status, which elsewhere appear correlated with the adoption of agriculturally based subsistence economies, also took place in the American Bottom" (Milner 1982:242). Due to the limitations of the American Bottom skeletal materials, information from nearby sites/regions such as Dickson Mounds (Goodman and Armelagos 1985; Goodman et al. 1984; Lallo and Rose 1979; Lallo et al. 1978) and the west-central Illinois/ Lower Illinois River valley area (Buikstra 1984; Buikstra et al. 1986; Buikstra et al. 1987; Conner 1990; Cook 1984; Garner 1991) are presented as a framework for Late Woodland health in the central Illinois region. Work in the former two regions has been summarized by Buikstra (1992), Garner (1991), and Milner (1992).

The paleopathological record for the Late Woodland period in the Lower Illinois Valley and West-Central Illinois region is quite extensive and represents the efforts of numerous researchers (Buikstra 1984; Buikstra et al. 1986; Buikstra et al. 1987; Conner 1990; Cook 1976, 1984; Garner 1991). Although no single site or skeletal series provides a complete picture of health during the Late Woodland, two researchers summarize information from this period: Cook (1976, 1984), and Garner (1991).

Paleopathological data from early Late Woodland populations from Koster Mounds and the Joe Gray site, and late Late Woodland remains from the Ledders, Schild, and Helton sites were compared with the Mississippian materials from Schild by Cook (1976; 1984). Cook (1984) concludes that the late Late Woodland populations in the lower Illinois valley had less healthy, more highly stressed children, as indicated by decreased stature, increased cribra orbitalia, and higher caries rates as compared to earlier populations. The Mississippian populations in Cook's (1984) study do not appear to continue on the downward health spiral that began in the late Late Woodland period. Indeed, social conditions that began during the late Late Woodland period resulted in an increased population size and density by Mississippian times, a finding supported by Buikstra et al. (1986). This increased population density was not without problems, because there was a corresponding increase in density-dependent diseases such as tuberculosis (Cook 1976, 1984; Buikstra and Cook 1981; Buikstra, ed. 1981), and the continued presence of endemic treponematosis that had been noted in Late Woodland populations (Cook 1976, 1984). Cook (1984:261) concludes that:

> Woodland food production seems to have allowed an increase in longevity and some buffering against seasonal stress. The introduction of maize in late Late Woodland times is attended by a variety of evidence for worsening health in childhood, and this transitional population appears to be at a relative disadvantage when compared with both earlier and later populations.

In an effort to clarify the effect that intensified maize cultivation had on Late Woodland population health, Garner (1991) compared bioarchaeological data from the Joe Gray site (A.D. 800) and Ledders site (A.D. 1000) (both of which had been analyzed by Cook [1976]), and added data from the Kuhlman site (A.D. 600-700). This series of sites was selected by Garner (1991:182-183) to test whether the changes in health were gradual throughout the Late Woodland period or isolated in the late Late Woodland period when maize cultivation was rapidly intensified. Garner (1991:206-207) concludes that "three of the four measures (e.g. demography, enamel hypoplasia, and porotic hyperostosis) used to compare the health status of three sites ... do not change significantly over time.... However, the rate of infection, as measured by periosteal lesions on the tibia, does increase over time." The increasing rates of periosteal lesions are interpreted as being related to the increase in treponematosis in the Lower Illinois Valley toward the end of the Late Woodland period. The higher rates of treponematosis did not adversely affect the mortality of the late Late Woodland populations, however (Garner 1991:205).

While the Dickson Mounds skeletal series may not have been excavated with the same archaeological rigor as the remains from the lower Illinois valley, it serves as a unique study case for prehistoric health in Illinois. Human remains from two major phases have been discussed: Mississippian Acculturated Late Woodland (A.D. 1050-1200), and Middle Mississippian of the Spoon River Focus (A.D. 1200-1300). "Of the 12 burial units (mounds) excavated [at Dickson

Mounds], 8 were assigned to the Mississippian Acculturated Late Woodland..., and 4 to the Middle Mississippian" (Lallo and Rose 1979:236). A total of 351 Mississippian Acculturated Late Woodland and 221 Middle Mississippian period burials were analyzed from the Dickson Mound site. Images of the Mississippian Acculturated Late Woodland populations as hunter-gatherer people who cultivated a limited amount of corn and resided in nuclear settlements reflecting their adoption of "Mississippian socio-political organization" (Lallo and Rose 1979:237) have been revised in recent interpretations of the archaeological record (see Conrad [1991] for an example).

There were changes in health between these two populations residing at Dickson Mounds. In general, the health of the Middle Mississippian people was significantly worse (Goodman and Armelagos 1985; Goodman et al. 1984; Lallo, Armelagos, and Rose 1978; Lallo and Rose 1979), as indicated by:

> (1) decreased age-specific attained long bone length and circumference, (2) increased frequency of enamel hypoplasias, (3) increased frequency of Wilson bands, (4) increased frequency of porotic hyperostosis, (5) increased frequency of infectious lesions, (6) increased frequency of degenerative lesions, (7) increased frequency of traumatic lesions, and (8) increased cumulative mortality (Goodman et al. 1984:297).

Indeed, the Middle Mississippian populations had a higher probability of dying, in all age classes, than had the Mississippian Acculturated Late Woodland people (Lallo and Rose 1979:333). These differences were present across all age and sex classes (Lallo et al. 1978:23). Stress related to an increased reliance on maize, rising population density, and poor weaning health, was seen as the cause for poor health of Middle Mississippian residents of Dickson Mounds (Goodman and Armelagos 1985; Goodman et al. 1984; Lallo et al. 1977; Lallo, Armelagos, and Rose 1978; Lallo and Rose 1979).

It should be noted, however, that excavations and research in the Central Illinois Valley during the past 10 years have resulted in the reinterpretation of the phases and their related cultural manifestations. The time frame from the Mississippian Acculturated Late Woodland to Middle Mississippian phases (A.D. 1050-1300) are now included in the Mississippian period within the Eveland (ca. A.D. 1050-1150) and Larson (A.D. 1150-1300) phases. The influence of

Cahokia immigrations into these societies is still considered significant, but the primary influx of populations is thought to have been limited to the Stirling phase (A.D. 1050-1150) (Conrad 1991:119). The importance of maize as part of a broader horticultural system for the Spoon River focus people is now more fully understood as a result of data from both flotation samples (Conrad 1991) and isotopic analysis (Buikstra and Milner 1991), emphasizing the importance of maize during both Eveland and Larson phases. Therefore, discussions of Cahokian invaders bringing maize, and related Mississippian trappings, to the hunter-gather populations in the Central Illinois valley are not supported by current research.

Mississippian Period Health in the American Bottom Region. George Milner's dissertation research (1982) focused on the analysis of human remains from several sites in the American Bottom region. "Most of the skeletons examined in this study, those from the Kane Mounds, Cahokia Tract 15B, Signal Hill, Krueger, and De Frenne sites, were obtained from nonelite cemeteries. All but Cahokia Tract 15B skeletons were from peripherally located cemeteries. Only Wilson Mound skeletal collection includes the remains of members of an elite social stratum" (Milner 1982:101). All the sites in Milner's dissertation are late Mississippian Moorehead phase, and the overwhelming majority of the human remains are from the Kane site. In general, statements about American Bottom health and paleopathology are based on the Kane skeletal remains with other sites serving as supporting or supplementary cases. The dominance of Kane skeletal assemblage is especially relevant given recent reevaluations of cultural pattern displayed in these burials (Emerson and Hargrave 2000). Milner's (1982:2) dissertation interests were threefold: 1) to develop a model of health based on the interaction of cultural and environmental factors; 2) to provide detailed descriptions of the skeletal collections from the American Bottom; and 3) to relate the information on American Bottom health to other late prehistoric societies in the eastern United States.

Demographic data on American Bottom Mississippian period residents were based on the Kane skeletal collection (Milner 1982:125-149), which contained 34 males (45.9%) and 40 females (54.1%); 80% of the adults were complete enough to be assigned a sex. The mortality curve of this collection echoes curves for similar groups in the Eastern Woodlands. In general, children under one year of age experienced a high rate of mortality. This mortality rate reached a plateau during the second and third years of life, and fell off during the fourth and fifth years. An additional peak in mortality was experienced by women during the third decade of life, probably related to childbirthing complications. Life expectancy at birth was 23 years, but if the childhood stresses were survived, life expectancy at 20 was approximately 17 additional years.

A total of 727 teeth from the Kane collection was examined for evidence of dental caries (Milner 1982:206-226). The moderate caries rates in these individuals, especially adults, derive from a complex combination of factors. Caries in children tended to be on the tooth crowns. As the crown surface was worn down with age, caries were formed on the occlusal surfaces. Cervical caries rates also increased with age, especially on the interproximal surfaces where food residues lodge. The progressive worsening of dental health is typified by the observation that "only 21.7% of the individuals over 20 years of age who have 10 or more observable teeth have caries-free dentitions" (Milner 1982:220). There did not appear to be a difference in caries rates by sex. The American Bottom caries rates are intermediate when compared with caries rates from similar sites in the Eastern Woodlands.

Enamel hypoplasias are an additional indicator of stress that appeared in the Kane series. "Of the 18 permanent maxillary dentitions that represent separate skeletons, 88.9% display the enamel hypoplasia on one or more teeth; 91.7% of the mandibular dentitions are similarly affected" (Milner 1982:194). Tooth development during the first year of life revealed little disturbance. At one year of age, dental hypoplasias begin and this trend continued for the next six years.

Traumas, in the form of poorly aligned or unhealed fractures, were the most common paleopathological condition identified in the American Bottom collections (Milner 1982:166-173). Traumas were present in 15.1% of the skeletons (Milner 1982:172). Most of the fractures occurred in the tubular bones (e.g., ribs, radius, clavicle, and/or femur) of the post-cranial skeleton. Three cranial injuries were also noted, one of which was a large open oval perforation of the frontal lobe. The injuries were evenly distributed between men and women, but the frequency of traumas increased with age.

Cribra orbitalia and porotic hyperostosis were observed in relatively low frequencies in the American Bottom skeletal remains, suggesting good overall childhood health (Milner 1982:175). Only six skulls out of 98 displayed any degree of cribra orbitalia or porotic hyperostosis. These occurrences were distributed unevenly through the age groups: 23% of the 0-3 year olds, 4.3% of the 3-20 year olds, and 3.2% of the over 20 year olds were affected.

Harris lines were located by radiographing the femora, tibiae, and radii of the adults from the Kane skeletal series (Milner 1982:181-192). The radiographs from 23 distal tibiae revealed five individuals with no Harris lines, six with more than three lines, and one with ten visible lines. The first period of growth arrest was estimated at one year of age, but additional prominent lines were formed between the sixth and eighteenth years. Males had more Harris lines, especially in their distal tibiae, than did females. In general, there did not appear to be yearly cycles of stress revealed in the Harris lines, as had been noted in other skeletal series from the eastern United States. Stressful periods were rare or widely spaced in the American Bottom (Milner 1982:192).

Several forms of infectious diseases were manifested in the American Bottom skeletal material. Periosteal bony involvement afflicted 42 individuals in the Kane series. Only one individual had a resorptive lesion on the tibia. Two individuals appear to have had proliferative and resorptive components to their skeletal pathologies, this form of osteomyelitis being most commonly associated with staph infections (Milner 1982:154).

Periosteal proliferative bony responses are sometimes associated with treponemal diseases, while granulomatous bony responses have been associated with tuberculosis. Neither of these associations is absolute, but Milner suggests that both diseases were present during the Mississippian period in the American Bottom. Indeed, "the periosteal inflammatory diseases and the granulomatous infections would have had a noticeable impact on the Kane population" (Milner 1982:159). Approximately 15% of the 10 to 20 year olds were affected, and over 25% of the adults were affected. There were no differences in male and female rates (Milner 1982:159).

There were also two individuals who suffered from granulomatous infections of the spinal column. Such infections are often associated with tuberculosis. Another individual appeared to have a "penetrating, erosive innominate lesion" (Milner 1982:158). This lesion was similar in appearance to illustrations of "tubercular involvement of the sacro-iliac joint by Buikstra and Cook (1981) and Steinbock (1976)" (Milner 1982:158). Approximately 3% of the individuals over 10 years of age from the Kane series were afflicted with these granulomatous infections (Milner 1982:159). This rate of infection is below modern rates of skeletal involvement for tuberculosis, but there appears to be under representation of important skeletal elements in the Kane collection that could explain the differences.

Neoplasms are relatively rare in the Kane skeletal series (Milner 1982:163-166). Benign bony tumors, or button osteomas, are present on five skulls and one tibia. Only one skeleton displayed a malignant neoplastic growth. Two adults had lytic lesions probably associated with neoplastic growth of overlying soft tissues. All of the afflicted individuals were over the age of 50.

Milner summarizes his findings on the health of American Bottom residents to illuminate the cultural component to their health (Milner 1982:231-235). The period between birth and the first birthday was relatively free of stress, but these children still had a high mortality rate. Between one and three years of age, children experienced significant stress as represented by enamel hypoplasias, Harris lines, porotic hyperostosis or cribra orbitalia, and high mortality rates, caused by unsanitary living conditions and the lack of nutritious weaning foods (Milner 1982:233). This stressful period was followed by occasional but less frequent indicators of stress and a lowered mortality rate into adolescence. Adulthood was a period of generally good health; life expectancy at 20 was an additional 17.3 years. Rates of traumas and localized periosteal bony infections increased during adulthood, but probably were not life threatening. A disproportionate number of women died during young adulthood, probably related to problems experienced during childbirth. The elderly experienced poor dental health and occasional bony neoplasms. The frequency of these infections increased with age as would be expected for this progressive disease.

Milner's work with the FAI-270 highway project allowed him to examine human remains from an additional twelve sites in the American Bottom (Milner 1984:233). Sites with human remains from this project include: Range, Lohmann, Turner, Julien, Mund, Florence Street, East St. Louis Stone Quarry, Dohack, George Reeves, Holdener, BBB Motor, and Palmer Creek Terrace. Isolated burials or human elements were the most commonly identified remains. A diversity of interment methods was identified in Late Woodland phase features at Range, Dohack, Mund, and Holdener sites. Nonmortuary Emergent Mississippian features at BBB Motor, Range, and George Reeves included isolated human bones. Mississippian burials trended to be within discrete areas at sites such as Range, East St. Louis Stone Quarry, and Florence Street. Isolated human interments or even skeletal elements were identified in some of the Mississippian features at BBB Motor, Lohmann, Julian, and Range sites. Only Kane Mounds, which Milner analyzed for his 1982 dissertation, and East St. Louis Stone Quarry, both late Mississippian sites in the American Bottom, contained human remains sufficient for detailed analysis and comparison within the region (Milner 1984:236,238). The mortality curves of the Kane and East St. Louis Stone Quarry sites are quite similar, although the mortality rate for females during their twenties is less at East St. Louis Stone Quarry. Milner (1984:236, 238) attributes the differences to social changes that arose during the 100 years that separates the sites. Indicators of stress, especially in children, and infectious diseases and traumas in adult portions of the populations, compare quite favorably between the two sites.

Milner (1982:241-251; 1991; 1992) contrasts the health of late Mississippian period American Bottom residents with populations at Hardin Village, Dickson Mounds, and Norris Farms In general, the health of the American Bottom residents was significantly better than at the other sites. Milner suggests that the crowded and confined living conditions at Dickson Mounds and Hardin Village contributed to the poorer health of their residents. Violent deaths, anemia, and proliferative bony responses (Milner 1992a:105107) were all significantly more common in the Illinois River valley collections than in the American Bottom remains. The Oneota collections from Norris Farms in the Illinois River valley do have an extremely high rate of violence and illness when compared with most prehistoric populations. Paleopathologies are indicated in the American Bottom skeletal remains, as is evidence for tuberculosis, but at much lower rates. The circumscribed villages at Dickson Mounds and Hardin Village might have had contaminated food, soil, and water resulting in the rapid spread of infectious diseases, especially to children. The relatively dispersed settlement pattern present in the American Bottom, with the exception of Cahokia, would have lessened the chances of these "crowd" illnesses.

Conclusions

Overall, it appears that certain limited aspects of community health may have worsened (Table 3-1) during the transition between the Late Woodland and the Mississippian periods in the American Bottom, Moundville, and Central Tombigbee region, although suggestions of severely declining health during the Mississippian period are often based on very late or poorly understood skeletal populations. Rates of tuberculosis, yaws, and other communicable diseases, however, may have increased by the Mississippian period. The mortality rate of Mississippians did not greatly increase under this new disease burden at least during the initial portion of the period. Indeed, the Mississippian period in these three regions appears to be a time of better health when compared with neighboring Late Woodland and late Mississippian populations. It is then possible that the adoption of Mississippian lifeways was a favorable adaptation within certain regions, leveling out the strains associated with increased population density (e.g., higher rates of communicable diseases) through culturally bound methods.

I predicted that one of the cultural responses to the increasing frequency of diseases would be the addition of new medicines, and possibly specialists, to combat the symptoms of such illnesses. Because medicine is a culturally mediated phenomenon, medicinal techniques, such as the use of medicinal plants, are expected to be associated with cultural groups such as the "Mississippians." Health specialists associated with the elite power structures during the Mississippian period (Knight 1986) might also have had an influence on Mississippian health care. If healing specialists/priests were part of the institutional organization of some Mississippian societies, then it is possible that there would be a shift from household-level healing to cult specialists, especially in larger settlements. This change to healing specialists would be represented in the archaeological record, in part, by the concentration of medicinal plant remains into non-domestic locations within a given site. In those regions (i.e., Moundville [Powell 1988, 1991b]) where there appear to be few ill effects to the Mississippianization of the culture, the better-than-expected health may be related in part to the addition of more skilled healing professionals in conjunction with the other benefits of chiefly rule.

A fuller explanation of archaeological contexts in which health-related phenomena took place is provided in Chapter 4. Archaeological frameworks are the foundations upon which paleopathological and archaeobotanical data are based. Health, population patterns, subsistence, and even medicine all relate to one another within the archaeological record. Although the relationships among diverse topics such as tuberculosis and lithic procurement patterns are not always straightforward, all aspects should be evaluated in our hopes to understand prehistoric lifeways.

Table 3-1. Estimated Trends in Selected Measures of Health through Time for Study Regions

	Infection	**Dental Pathologies** (including cavities & hypoplasia)	**Cribra Orbitalia/ Porotic Hyperostosis**	**Traumas**	**Tuberculosis**	**Treponematosis**
Middle Late Woodland	less than 33%	less than 33%	less than 25%	less than 20%	less than 5%	not discussed in study regions
Late Late Woodland	increased	increased	increased	same	slight increase	increased
Early Mississippian	same	increased	same	same	slight increase	slight increase
Late Mississippian	slight increase	increased	increased	increased	slight increase	slight increase

CHAPTER 4:
ARCHAEOLOGY OF THE LATE WOODLAND THROUGH MISSISSIPPIAN PHASES IN THE AMERICAN BOTTOM, MOUNDVILLE, AND CENTRAL TOMBIGBEE

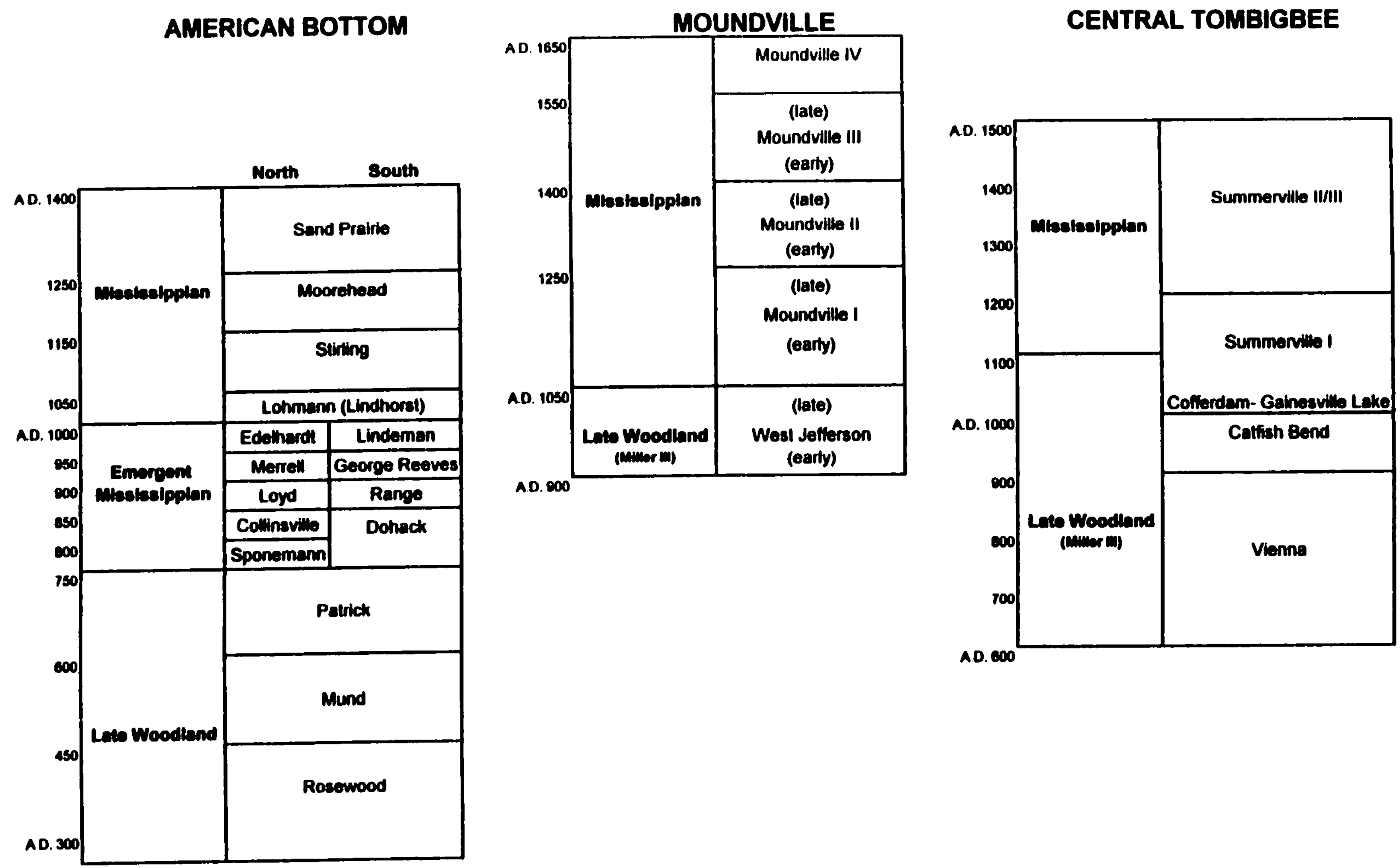
Introduction

This chapter is an introduction to the archaeology and cultural prehistory of the American Bottom, Moundville, and Central Tombigbee regions. Paleoethnobotanical and site pattern information from phases during the Late Woodland to Mississippian sequence is emphasized. This information is presented for two major reasons. First, it will orient the reader to the archaeology and culture history of the three study regions. Secondly, the social, political, and cultural trends present in the late prehistoric archaeological record allows me to suggest in later chapters how cultures and medicines would have changed through time. The bulk consists will be of descriptions of Late Woodland to Mississippian phases, and how phases relate to one another within a region. Milner's (1998:17) chronology was used for the American Bottom region, Knight and Steponaitis' (1998:8) chronology was used for the Moundville region, and Blitz's (1993) chronology was used for the Central Tombigbee region (Figure 4-1). All dates used are uncalibrated.

Background on Late Woodland to Mississippian Periods in the Central Mississippi River Region

The Late Woodland period (approximately A.D. 300-750/1100) in the central Mississippi River region is characterized by sedentary to semi-sedentary horticultural populations. Small native seeds, squash, tobacco, and possibly maize were grown in many areas, and wild resources such as nuts, fruits, and numerous wild animals were used. The increasing population probably lived in small settlements, consisting of several extended families, scattered throughout the mid-Mississippi valley region. Important technological changes during this period include the introduction of the bow and arrow (Kelly et al. 1984a; Smith 1986).

Figure 4-1: Noncalibrated Chronologies for American Bottom, Moundville, and Central Tombigbee Regions
(Milner 1998, Knight and Steponaitis 1998, Blitz 1993)



Although not all areas in the eastern United States have an "Emergent Mississippian" period, as defined for the American Bottom region, "the short 250-year span from A.D. 750 to 1000 was a time of unequaled cultural change and innovation ... in technology, subsistence, settlement patterns, sociopolitical integration, and ideology" (Smith 1986:53). Maize use continued to intensify in some regions of the Southeast at this time. Several technological innovations include stone hoes and the introduction of limestone- and shell-tempering for ceramics, an event that allowed for a greater variety of durable vessel types and may be related to the addition or intensification of maize agriculture (Smith 1986). "Planned communities, the demarcation of public space and public structures, the possible control of agricultural surplus, and evidence for organized communal labor projects all point to the likely presence of community-level positions of sociopolitical control and marked differential status" (Smith 1986:56). An emerging Mississippian-like society is perhaps best illustrated in the American Bottom region (Kelly 1990b), and specifically at the Range site (Kelly 1990a), although important social and technological changes were happening throughout the Mississippi River valley (Smith ed. 1990). It must be noted that the emergence of Mississippian societies was quite abrupt in some regions, such as Moundville (Welch 1990), although this may be an artifact of information available for that region.

The change from horticultural and/or hunter-gatherer economy practiced during the Late Woodland, and to some extent, Emergent Mississippian periods to a more intensely maize-based agriculture economy noted during the Mississippian period took place in many areas of the eastern United States at approximately A.D. 1000-1100. Mississippian societies have been classified in a variety of ways by as many archaeologists (see Smith 1978, 1986 and Griffin 1985, 1990 for discussions). Mississippian groups are generally classified as those "prehistoric human populations existing in the eastern deciduous woodlands during the time period A.D. 800-1500 that had a ranked form of social organization, and had developed a specific complex adaptation to linear, environmentally circumscribed floodplain habitat zones" (Smith 1978:486). Smith (1978, 1986) emphasizes the importance of riverine environments for wild game resources (i.e., fish, migratory waterfowl, and "terrestrial trinity" of white-tailed deer, raccoon, and turkey) and agricultural soils to support the relatively dense populations of Mississippian societies. Griffin (1990) includes the importance of hierarchically arranged settlement systems, shell-tempered pottery, and agriculture based on maize production in his classification of Mississippian societies. Muller and Stephens (1991:304) add that "Mississippian was based on a kind of redistribution of goods and information and characterized by a social security or risk management." This system relied on the elite superstructure to help alleviate irregularities in domestic production at the farmstead level. The collapses of Mississippian social groupings approximately 250-400 years later "are not restricted to the American Bottom but are quite widespread" (Kelly 1992:184) across the Midwest. The proposed causes of these "collapses" are numerous, but environmental degradation (Lopinot and Woods 1993), social pressures (Pauketat 1992, 1994, 1997), and loss of trade partners (Peebles 1986) are suggested.

American Bottom Region

The term American Bottom was coined "presumably because the Mississippi River once divided the western territories of the infant United States from Spanish (later, French) land holdings west of the Mississippi" (Hall 1991). The term is now used to describe a broad floodplain of the Mississippi valley and the surrounding uplands located between the cities of Alton and Chester, Illinois, across the river from the modern city of St. Louis, Missouri. A few sites (e.g., Bridgeton and Little Hills) near the modern city of St. Louis have been included in discussions of American Bottom plant remains, because it is very likely that these people were participating in the cultural phenomena related to the rise and fall of Cahokia. Similarly, paleoethnobotanical data from selected sites (e.g., 24A1-29) from slightly south and southwest of the "true" American Bottom are included in discussions of prehistoric plant use in the American Bottom region.

The American Bottom region now is probably one of the most studied and best understood archeological regions in the world due in part to interest in the Cahokia site, and in part to excavations related to the construction of highway I-255 (Bareis and Porter, eds. 1984; Emerson and Lewis, eds. 1991; Fowler 1978; Kelly 1990a, 1990b; Mehrer 1995; Milner 1998;

Pauketat 1992, 1994, 1997; Stoltman, ed. 1991). Hall (1991), Fowler (1969, 1978), and Milner (1998) all provide summaries of the history of the Cahokia site and the American Bottom region, the archaeologists who have labored there, and the theories that they developed. "It is Moorehead, the first archaeologist to conduct a sustained program of excavation at Cahokia, beginning in 1921, who must be credited with generating the official recognition of the monumental character of Cahokia as the work of prehistoric Indians" (Hall 1991:4). Prior to Moorehead's work, many geologists had argued that the mounds were of natural, if somewhat modified, origin. The area that would later become Cahokia Mounds State Historic Site was first purchased in 1925, with more land acquisitions occurring after 1963. Surveys characterized the research at the site during the 1950s, 1960s, and early 1970s (Fowler 1978). The Cahokia ceramic Conference held in 1971 resulted in the development of a ceramics-based chronology for Cahokia and the American Bottom in general (Fowler and Hall 1972). This chronology was later refined with work on the FAI-270 projects (Bareis and Porter 1984) and the Interpretive Center Tract (ICT) investigations at Cahokia (Collins 1990, 1997; Holley 1989). Investigations in the American Bottom uplands have been summarized by Woods and Holley (1991). Continued work at the East St. Louis site (Kelly 1997) and the region in general, point to the important information that is still buried in this broad Mississippian floodplain.

Late Woodland Period in the American Bottom

The Late Woodland period (A.D. 300-750) in the American bottom region has been divided into three phases: Rosewood (A.D. 300-450), Mund (A.D. 450-600), and Patrick (A.D. 600-750) (see Milner 1998:16-24 for discussion of calibrated radiocarbon dates for this region). The Late Woodland sites included in this study are listed in Table 4-1. The American Bottom Late Woodland period summaries are based on work by Kelly et al. (1984a:104-127) and Kelly (1990b), unless otherwise noted.

Late Woodland Phase Summaries. The Rosewood phase (A.D. 300-450) sites are characterized by numerous pits and low numbers of identifiable structures. Most of the pits are

Table 4-1: Late Woodland Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Dillinger	Petitt	11AX253	Webb, P. A. (1981) *The Petitt site (11-AX-253), Alexander County, Illinois*. Center For Archaeological Investigations Research Paper No. 58. Southern Illinois University, Carbondale.	Lopinot, N.H. (1981) Archaeobotany. pp. 156-194
Rosewood	Alpha 1	11S632	Benz, C. (1988) Rosewood Occupation at the Alpha 1 Site. In *Late Woodland Sites in the American Bottom Uplands*, by C.Bentz, D.L. McElrath, F.A. Finney, and R.B. Lacampagne, pp. 107-140. American Bottom Archaeology FAI-270 Site Reports Vol.18	Johannessen, Sissel and L.A. Whalley (1988) Floral Analysis. pp. 265-288
	Carbon Dioxide	11MO594	Finney, F.A. (1985) *The Carbon Dioxide Site*. American Bottom Archaeology FAI-270 Site Reports Vol. 11.	Johannessen (1985) Plant Remains. pp. 97-106
	George Reeves	11S650	McElrath, D.L. and F.A. Finney (1987) *The George Reeves Site*. American Bottom Archaeology FAI-270 Reports Vol. 15	Johannessen, Sissel (1985) Plant Remains. pp. 349-356
	Leingang	11MO722	Benz, C. (1988) Rosewood Phase Occupation at the Leingang Site. In *Late Woodland Sites in the American Bottom Uplands*, by C. Bentzet al., pp. 17-73. American Bottom Archaeology FAI-270 Reports Vol. 18	Johannessen, Sissel and L.A. Whalley (1988) Floral Analysis. pp. 265-288
	Steinberg	11S653	R.B. Lacampagne and C. Benz (1988) Rosewood Occupation at the Steinberg Site. In *Late Woodland Sites in the American Bottom Uplands*, by C.Bentz et al., pp. 175-106. American Bottom Archaeology FAI-270 Reports Vol. 18	Johannessen, Sissel and L.A. Whalley (1988) Floral Analysis. pp. 265-288
Mund	Columbia Quarry	11S629	Finney, F.A. and C. Benz. (1988) Mund Phase Occupation at the Columbia Quarry Site. In *Late Woodland Sites in the American Bottom Uplands*, by C.Bentz et al., pp. 141-168. American Bottom Archaeology FAI-270 Reports Vol. 18	Johannessen, Sissel and L.A. Whalley (1988) Floral Analysis. pp. 265-288
	Hayden	23SL36	Harl, Joseph L. (1995) *Data Recovery Investigations at the Hayden Site (23 SL36) and the Rabanus Site (23SL859)*. Prepared for the Hayden Company and U.S. Army Corps of Engineers. Prepared by Archaeological Services of Dept. of Anthropology at UMO	Wright, Patti (1995) Paleoethnobotanical Analysis. pp. 150-157
	Mund	11S435	Fortier, A.C., F.A. Finney, R.B. Lacampagne (1983) *The Mund Site*. American Bottom Archaeology FAI-270 Reports No. 5.	Johannessen, Sissel (1983) Plant Remains from the Mund Phase. pp. 299-318
Patrick	Alpha 3	11S634	McElrath, D.L. (1988) Patrick Phase Occupation at the Alpha 3 Site. In *Late Woodland Sites in the American Bottom Uplands*, by C.Bentz et al., pp. 169-186. American Bottom Archaeology FAI-270 Reports Vol. 18	Johannessen, Sissel and L.A. Whalley (1988) Floral Analysis. pp. 265-288
	Bridgeton	23SL442	Wright, P.J. (1986) Analysis of Plant Remains from the Bridgeton Archaeological Site (23SL442). Unpublished M.A. Thesis in Anthropology. Washington University, St. Louis.	SAME
	Dohack	11S642	Stahl, A.B. (1985) *The Dohack Site*. American Bottom Archaeology FAI-270 Site Reports No. 12.	Johannessen, Sissel (1985) Plant Remains. pp. 249-268
	Fish Lake	11MO608	Fortier, A.C., R.B. Lacampagne, F.A. Finney (1984) *The Fish Lake Site*. American Bottom Archaeology FAI-270 Reports Vol. 8	Johannessen, S. (1984) Plant Remains. pp. 189-189
	Holdener	11S685	Wittry, W.L., J.C. Arnold, C.O. Wittry, and T.R. Pauketat (1994) *The Holdener Site*. American Bottom Archaeology FAI-270 Reports Vol. 26	Simon, M. (1994) Floral Remains [Patrick phase]. pp. 71-97
	Julien	11S63	Milner, G.R. (1984) *The Julien Site*. American Bottom Archaeology FAI-270 Reports Vol. 7.	Johannessen, Sissel (1984) Plant Remains from the Julien Site. pp. 244-273

Table 4-1: Late Woodland Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Patrick (contin.)	Little Hills	23SC572	Lopinot, N.H. (1991) *Archaeology of the Little Hills Expressway Site (23SC572), St. Charles County, Missouri*. Report prepared by Contract Archaeology Program, Southern Illinois University, Edwardsville.	SAME
	Range	11S47	Kelly, J.E., A.C. Fortier, S.J. Ozuk, J.A. Williams (1987) *The Range Site: Archaic through Late Woodland Occupations*. American Bottom Archaeology FAI-270 Reports Vol. 16	Johannessen, Sissel (1987) Patrick Phase Plant Remains pp. 404-416
	Reach B	11S1148	Kelly, J.E. (1997) *Metro East Emergency Project*. ITARP Archaeological Research Report No. 53	Parker, K.E. (1997) Macrobotanical Remains from Archaeological Testing at the Reach B Site. pp. 155-162
	Vaughn Branch	11MS1437	Jackson, D.K., P.G. Millhouse, M.L. Simon, and T.E. Berres (1996) *The Vaughn Branch Site*. ITARP Transportation Archaeological Research Reports No. 42.	Simon, M.L. (1996) Archaeobotanical Remains pp. 137-158 AND 335-363
Late Woodland	24A1-29	24A1-29	Penny, J.S. (1982) *Archaeological Investigations in the Turkey Bluffs Fish and Wildlife Area*. Center for Archaeological Investigations Research Paper 35. Carbondale.	Lopinot, N.L. (1982) Flotation Sample Analysis for the Turkey Bluffs Project. pp. 98-111
	24A2-256	24A2-256	Penny, J.S. (1982) *Archaeological Investigations in the Turkey Bluffs Fish and Wildlife Area*. Center for Archaeological Investigations Research Paper 35. Carbondale.	Lopinot, N.L. (1982) Flotation Sample Analysis for the Turkey Bluffs Project. pp. 98-111
	Bridges	11-MR-11	Hargrave, M.L. et.al. (1983) *The Bridges Site*. Center for Archaeological Investigations Research Paper No. 38. Carbondale.	Lopinot, N.H. (1983) Archaeobotany of the Bridges Site. pp. 248-276
	Kingfish	SUIC21C1-208	Lopinot, N.H., M.D. Hutto, D.P. Braun (1982) *Archaeological Investigations at the Kingfish Site*. Center for Archaeological Investigations Research Paper No. 25. Carbondale	Lopinot, N.H. (1982) Analysis of Floral Remains. pp. 145-166
	Kruse Bluffbase #3	11MO507	Neusius, P.D. (1985) *Archaeological Excavations at the Krus Bluffbase #3 Site*. Center for Archaeological Investigations Research Paper No. 51. Carbondale.	Ruppe, P.A. (1985) Flotation Sample Analysis, pp. 57-64
	Old Goat Farm	11SY4	Lopinot, N.H., J.L. Harl, P.J. Wright, J.M. Nixon (1986) *Cultural Resource Testing and Assessements: The 1985 Season at Lake Shelbyville, Shelby, and Moultrie Counties, Illinois*. U.S. Army Corps of Engineers, St. Louis District CRM Report No. 30.	Lopinot, N.H. (1986) Flotation Sample Analysis. pp. 100-109

relatively shallow (i.e., less than 50 cm), and they tend to be arranged in distinctive groups or clusters.

Mund phase (A.D. 450-600) sites are similar to those in the Rosewood phase, but there are important distinctions. It appears that relatively large, up to 6 m by 6 m, square, single-post structures were associated with a variety of pit types. These deep storage pits were often larger than Rosewood phase pits; Mund phase circular pits average 55 cm in depth.

Patrick phase (A.D. 600-750) villages contain many of the elements that develop into multi-tiered communities during the late Emergent Mississippian and Mississippian periods (Mehrer 1995:137). The Patrick phase settlement pattern appears to have changed from that seen in the two preceding periods; Patrick phase sites are often in the floodplain or clustered at the bluff edge. Complex community patterns are noted for this phase. For example, the Range site contained nine Patrick phase communities with at least 22 structures and a total of 1,872 features (Kelly 1990a:79-87; Kelly et al. 1987). The overall variability of Patrick phase settlements may indicate the instability of community control, and there may be the formative indications of social inequalities that further developed during the Emergent Mississippian period.

Late Woodland Paleoethnobotany. The Late Woodland paleoethnobotanical record in the American Bottom is quite similar to the record for the Middle Woodland period. Information is drawn from both periods to illuminate the resources being used during the Late Woodland. The Middle Woodland is the first period in this region when a complex of small, cultivated, native seeds becomes dominant in the paleoethnobotanical record, although many of these plants have been recovered from earlier contexts in the eastern United States. "This complex is composed of three seed types: maygrass (*Phalaris caroliniana*), erect knotweed (*Polygonum erectum*), and goosefoot (*Chenopodium* sp. probably *C. bushianum* [*berlandieri*])" (Johannessen 1984:201). Domesticated marsh elder (*Iva annua* var. *marcrocarpa*), sunflower (*Helianthus annuus*, if domesticated var. *macrocarpus*), and little barley (*Hordeum pusillum*, identified as Grass Type 20/21 in early American Bottom reports) also were part of this preserved complex, but to a lesser degree. The three main seeds continue to be used into the Late Woodland period where they comprise an average of 76% of the identifiable seeds in a given assemblage (Johannessen 1984:202). These cultivated seeds were sometimes preserved in charred masses within deep pits, an occurrence that has been used to support their cultivated status.

Additional cultivated plants appear during this period in the American Bottom: tobacco (*Nicotiana* sp.) and squash (*Cucurbita* sp.). It is difficult to determine which species of squash is represented at any specific site in the American Bottom. At least three taxa of squash were probably known to the late prehistoric residents of the area: *Cucurbita pepo* ssp. *ovifera* (including egg gourds, pattypan, and acorn squashes), which was domesticated in the Eastern United States, *C. pepo* ssp. *pepo* (including pumpkins), and *Cucurbita argyrosperma* ssp. *argyrosperma* (including Cushaw squash), both of which came to the region via the Southwest (Decker-Walters et al. 1993; Fritz 1994). Prehistoric tobacco from the Midwest has traditionally been identified by paleoethnobotanists as *Nicotiana rustica*, which was domesticated in the Andes (Johannessen 1984). More recent scanning electron microscope work on tobacco seeds from Cahokia suggests that alternative candidates for the prehistoric tobacco are *N. multivalvis* or *N. quadrivalvis*, both of which are native to western North America (Asch 1994:46-47; Fritz 1997).

Wild food resources included thick-shelled hickories, acorns, black walnuts, black nightshade, wild beans, American lotus, grapes, brambles, and persimmons (Johannessen 1984:202). While thick-shelled hickories are the most commonly encountered of these wild plants, the overall proportion of nutshell to charcoal in Late Woodland features is less than in previous periods. The trend of declining nut use continues through the subsequent periods (Johannessen 1988:151). The shift away from nut resources was an important step toward dependence on cultivated crops, a step which Rindos and Johannessen (1991) argue was not the most economically sound.

The trend of declining use of firewood from floodplain species and increasing use of upland hickories and oaks, first noted during the Middle Woodland period, continued into the Late Woodland period. "This [trend in firewood use] may reflect a process in which the previously important and protected oaks and hickories (the major nut-bearing trees) are expended to make room and light for increasingly necessary cultivated plants" (Johannessen 1988:161). This process of change and compromise is the result of the differing needs of sedentary horticulturists in contrast to earlier hunter-gatherer groups. Johannessen (1984:203) summarized the period as follows: "although variation exists in the Late Woodland components analyzed from the American Bottom area, they demonstrate the existence of a well-developed horticultural complex." It must be emphasized that maize is almost non-existent for this period in the American Bottom.

Emergent Mississippian Period in the American Bottom

The Emergent Mississippian period (A.D. 750-1000) in the American Bottom region includes northern and southern traditions (Kelly et al. 1984b:128-157; Kelly 1990b). The two traditions "may represent the delineation of social boundaries and hence distinct sociopolitical territories, although there is clear evidence for interaction between the various participants" (Kelly 1992:175). The northern tradition is limited to the area of the American Bottom north of Prairie du Pont Creek near the Cahokia site. This tradition has been divided into five phases: Sponemann, Collinsville, Loyd, Merrell, and Edelhardt. The southern tradition is located on the narrower floodplain near Dupo, Illinois. Four phases also have been identified for the southern Emergent Mississippian period: Dohack, Range, George Reeves, and Lindeman. The Emergent Mississippian sites included in this dissertation are presented in Table 4-2. The American Bottom Emergent Mississippian phases are following Kelly et al. (1984b) and Kelly (1990b), unless otherwise noted.

The Emergent Mississippian period in the American Bottom is a time period of approximately 250 years during which there was an economic and cultural shift from a horticultural economy to one based on maize field agriculture. Evidence for the increased importance of maize has been identified through several avenues: increased raw numbers of maize remains (Johannessen 1984), changes in the carbon isotope ratios (Ambrose 1987; Bender et al. 1981; Buikstra and Milner 1991; Lynott et al. 1986; van der Merwe and Vogel 1978), and the presence of more earth ovens and deep pits, which seems to be related to maize storage

Table 4-2: Emergent Mississippian Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Period	Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Southern Tradition	Dohack	Dohack	11S642	Stahl, A.B. (1985) *The Dohack Site*. American Bottom Archaeology FAI-270 Reports Vol. 12.	Johannessen, Sissel (1985) Plant Remains. pp. 249-268
		George Reeves	11S650	McElrath, D.L. and F.A. Finney (1987) *The George Reeves Site*. American Bottom Archaeology FAI-270 Reports Vol. 15.	Johannessen, Sissel (1987) Plant Remains. pp. 349-356
		Range	11S47	Kelly, J.E., A.C. Fortier, S.J. Ozuk, and J.A. Williams (1990) *The Range Site: The Emergent Mississippian Dohack and Range Phase Occupations*. American Bottom Archaeology FAI-270 Reports Vol. 20.	Whalley (1990) Dohack Phase Floral Remains. pp. 269-280
	Range	Range	11S47	Kelly, J.E., A.C. Fortier, S.J. Ozuk, J.A. Williams (1990) *The Range Site: The Emergent Mississippian Dohack and Range Phase Occupations*. American Bottom Archaeology FAI-270 Reports Vol. 20.	Whalley (1990) Range Phase Floral Remains. pp. 515-530
	George Reeves	George Reeves	11S650	McElrath, D.L. and F.A. Finney (1987) *The George Reeves Site*. American Bottom Archaeology FAI-270 Reports Vol. 15.	Johannessen, Sissel (1987) Plant Remains. pp. 349-356
	Lindeman	George Reeves	11S650	McElrath, D.L. and F.A. Finney (1987) *The George Reeves Site*. American Bottom Archaeology FAI-270 Reports Vol. 15.	Johannessen, Sissel (1987) Plant Remains. pp. 349-356
		Marcus	11S631	Emerson, T.E., and D.L. Jackson (1987) *Emergent Mississippian and Early Mississippian Homesteads at the Marcus Site*. American Bottom Archaeology FAI-270 Reports Vol. 17.	Johannessen, Sissel (1987) Plant Remains. pp. 351-353.
Northern Tradition	Sponemann	Sponemann	11MS5173	Fortier, A.C., T.O. Maher, J.A. Williams (1991) *The Sponemann Site*. American Bottom Archaeology FAI-270 Reports Vol. 23.	Parker, K.E. (1991) Sponeman Phase Archaeobotany. pp. 377-419.
	Loyd	Robert Schneider	11MS117	Fortier, A.C. (1985) *The Robert Schneider Site*. American Bottom Archaeology FAI-270 Reports Vol. 11. Pages 171-313.	Johannessen, S. (1985) Emergent Mississippian Plant Remains. pp. 284-288
		Samson Bluff	11MS1186	Do not have reference for the whole report	Parker, K.E. (n.d.) Archaeobotany. In Samson Bluff Report
	Merrell	Radic	11MS584	McElrath, D.L., J.A. Williams, T.O. Maher, M.C. Mainkoth (1987) *Emergent Mississippian and Mississippian Communities at the Radic Site*. American Bottom Archaeology FAI-270 Reports Vol. 17.	Parker, KE. (1987) Plant Remains. pp. 221-245.
		Robinson's Lake	11MS582	Milner, G.R. (1985) *The Robinson's Lake Site*. American Bottom Archaeology FAI-270 Reports Vol. 10.	Johannessen, S. (1985) Plant Remains pp. 124-132
	Edelhardt	BBB Motor	11MS595	Emerson, T.E. and D.K. Jackson (1984) *The BBB Motor Site*. American Bottom Archaeology FAI-270 Reports Vol. 6.	Johannessen, Sissel (1984) Plant Remains from the Edelhardt Phase. pp. 169-189
Emergent Mississippian		Bridgeton	23SL442	Wright, P.J. (1986) Analysis of Plant Remains from the Bridgeton Archaeological Site (23SL442). Unpublished M.A. Thesis in Anthropology. Washington University, St. Louis.	SAME
		Goshen	11MS1273	Holley, G.R. and A.J. Brown (1989) *Archaeological Investigations Relating to the Glen Carbon Interceptor Sewer Line, Divisions 3 through 7, Madison County, Illinois*. Southern Illinois University Archaeology Program Research Report No. 1. Edwardsville	Lopinot, N.H. (1989) Archaeobotany. pp. 99-111

and preparation (Kelly et al. 1984b). This single change in the subsistence system did not cause the resulting shift from Late Woodland to Emergent Mississippian cultures, but it does serve as an intriguing marker for the Emergent Mississippian period. "It appears that with increased population density, there was increased competition for local resources including suitable agricultural land. With increased demand on both habitable and usable lands, the adaptation apparently was toward smaller but more densely occupied communities along with smaller dispersed settlements or farmsteads" (Kelly et al. 1984b:157). The increased populations may have been in part the result of decreased birth spacing (Buikstra et al. 1986); an event that may have been possible because weaning-age children were fed corn- or native-grain-based gruels rather than having extended breast-feeding periods.

The resulting increase in populations that had begun during the Late Woodland period, caused competition for scarce resources that, in turn, may have supported the lineage-based hierarchies that arose by the end of the Emergent Mississippian period. Resources such as higher quality cherts (e.g., Burlington cherts), salt, Mill Creek hoes, and lithic resources from the Ozarks may have been controlled by these emerging elite. Other signs of intra-regional trade is evidenced by north-south exchange of ceramics, and whatever materials were originally held in these vessels. Inter-regional trade is present, to a lesser degree, in the form of shell-tempered ceramics from south of the American Bottom moving into the American Bottom.

Emergent Mississippian Phase Summaries. The southern tradition of the Emergent Mississippian in the American Bottom is first represented by the Dohack phase (A.D. 750-850). This phase is marked by the intensification of the agricultural system, but the ceramic evidence does not indicate that the communal eating patterns noted during the Patrick phase also intensified (Johannessen 1993:188-190). Dohack phase settlements continue to reflect the variety of community patterns noted in the Patrick phase, but larger settlements reveal an even more tightly organized community patterns with central pits, a posts, and/or a specialized structures.

The southern Range phase (A.D. 850-900) has been identified only at the Range site, but is characterized by an increase in community planning and community oriented activities (Kelly et al. 1984b:134-142; Kelly 1990b:126-130). Range phase community patterns are generally based on the clustering of small square structures around a central square; a pattern present during the preceding Patrick and Dohack phases. Subsistence during the Range phase was similar to that of the Dohack phase, but one substantial difference is the presence of maize in nearly 80% of the analyzed features.

The southern George Reeves phase (A.D. 900-950) settlement system includes of a variety of village types (Kelly et al. 1984b:144), but structures tend to be larger with deeper basins than those found during the preceding phases. Chert tools from the George Reeves site reflect a shift in resource utilization, because higher-quality Burlington cherts from Missouri were exploited to a greater degree than in previous periods.

The Lindeman phase (A.D. 950-1000) is represented at several sites in the southern American Bottom. Settlement patterns of Lindeman phase sites are varied, but the large complex village present at the Range site is particularly intriguing where at least 100 Lindeman phase structures have been identified. These structures are clustered around numerous courtyards, many of which contain centralized features (Kelly 1990b:134).

Lindeman phase trade is evidenced by the presence of shell-tempered and grog-tempered ceramic vessels that probably came from south of the American Bottom region and Madison County shale and Merrell Red Filmed vessels from the northern American Bottom region. The distinctive Monks Mound Red seed jars were produced for the first time during the Lindeman phase.

The Sponemann phase (A.D. 750-800) has been tentatively identified in the northern portion of the American Bottom at the Sponemann site. At least four community areas were noted at Sponemann, each consisting of structures and associated pits. Three of the communities are arranged in semi-circles around courtyard areas, and the other is linear in arrangement. Some researchers consider the Sponemann phase to be part of the Late Woodland period (Kelly 1992), but recently published chronologies place it in the Emergent Mississippian period (Fortier 1996; Milner 1998).

Sponemann phase ceramics resemble other Late Woodland assemblages from north of the American Bottom, but there are some similarities with Patrick phase materials (Fortier et al. 1992:450; Kelly 1992:174). Unusual ceramics at the Sponemann site have led to the interpretation that the site is "a rare archaeological example of a cross-regional assimilation or acculturation process" (Fortier et al. 1992:451), and these incoming groups may have been responsible for introducing maize into the American Bottom. Maize was found in 30% of the Sponemann site features, which is an unusually large quantity of maize for a Late Woodland site, but at the lower range for a Emergent Mississippian site.

There have been few published summaries of information relating to the northern Collinsville phase (A.D. 800-850) (see Kelly 1990b:126-130 for brief summary within broader discussion). Four sites (Kane Village, Kampmeyer, Samson Borrow Pit, and Willaredt) from this phase are noted by Kelly (1990b: Table 11), but none of these sites has available paleoethnobotanical reports. All of these sites are limited to the bluffs surrounding the floodplain.

Loyd phase (A.D. 850-900) materials have been identified at several northern sites (Kelly 1990a:126-130). The Loyd phase sites were distributed in the upland drainages and in the floodplain proper, and two areas of occupation have been identified at the Cahokia site. While most of these settlements appear to be rather small, the habitation at the Merrell Tract at Cahokia may represent part of a larger village.

During the northern Merrell phase (A.D. 900-950) it appears that Cahokia was more intensely involved in exchange networks than were sites in the southern American Bottom (Kelly 1991a:76). Community structure at Merrell phase sites differs somewhat from the corresponding structure of George Reeves phase sites, because Merrell phase "structures were semisubterranean, constructed with rectangular basins and walls composed of pits set individually into the basin floor" (Kelly et al. 1984b:151). In addition, no Merrell phase settlements have been found that are as large as the George Reeves phase settlement at the Range site.

Edelhardt phase (A.D. 950-1000) components have been identified at northern sites such Cahokia and BBB Motor (Kelly 1990b:130-136; Kelly et al. 1984b:153-154). Site structure during the Edelhardt phase was similar to the preceding Merrell phase, and similar construction techniques were also used. Cahokia at this time was a large nucleated village similar to the contemporaneous occupation at the Range site (Johannessen 1993:192-195; Mehrer 1995:156-157), and ceramics from as far away as the lower Mississippi have been recovered at the site (Kelly 1991a).

Emergent Mississippian Paleoethnobotany. Emergent Mississippian plant-based subsistence bears many resemblances to that noted during the Late Woodland period with the significant addition of maize. Goosefoot, maygrass, knotweed, and to lesser degrees domesticated marsh elder, squash, sunflower, and tobacco all appear to have been grown. The three major native seeds still "make up at least 90% of all the identifiable seeds from all Emergent Mississippian components analyzed " (Johannessen 1984:203). Maize makes a dramatic entry into the subsistence system, appearing in 50% to 70% of all analyzed Emergent Mississippian features; there is not a gradual adoption of this crop as had been noted with native domesticates. It is important to remember, however, that maize may have been the only addition at this time to an established farming economy (Rindos and Johannessen 1991).

The mixed farming economy was supplemented by a variety of wild resources. Nuts are still present in Emergent Mississippian features, but they continue to contribute to a lower percentage of the total charcoal than in Archaic and Early Woodland features. Thick-shelled hickories and acorn are the most numerous wild plant remains. Grasses, wild beans, fleshy fruits (e.g., sumac, persimmon, and grape), and black nightshade are additional wild resources used by the Emergent Mississippian residents of the American Bottom. The Emergent Mississippian pattern of wood use echoes that present during the Late Woodland period, because upland hickories and oaks dominate the assemblage.

Mississippian Period in the American Bottom

The Mississippian period in the American Bottom spans the time frame from approximately A.D. 1000 to A.D. 1400. Within this 400 year period two subregional phases [Lohmann (northern) and Lindhorst (southern) (A.D. 1000-1050)] and three panregional phases [Stirling (A.D. 1050-1150), Moorehead (A.D. 1150-1250), and Sand Prairie (A.D. 1250-1400)] have been identified. The Mississippian sites included in my research are listed in Table 4-3, and the phase summaries which follow are based on work by Milner et al. (1984).

The American Bottom has been associated with four significant technological and cultural changes: 1) well-developed maize field agriculture, 2) evidence of intraregional trade increases, 3) increasing complexity of sociopolitical units, 4) emerging social differentiation (Kelly 1990b:117). The Mississippian period represents the most complex social mechanisms in the American Bottom, as dramatically evidenced by the rise of the Cahokia site (Pauketat and Emerson 1997). Indeed:

> If the size of Cahokia and other Mississippian towns-and-mounds complexes, the many mounds within such sites, and the amount and variety of cultural debris scattered over many of the area's bottomland ridges are any indication, the American Bottom once must have supported one of the most socially complex cultural systems in prehistoric North America (Milner et al. 1984:158).

Mississippian Phase Summaries. The Lohmann and Lindhorst phases (A.D. 1000-1050) represent a continuation of the northern and southern cultural trajectories observed during the Emergent Mississippian period (Emerson 1997a, Kelly 1990b, Milner et al. 1984), but older publications still use the Lohmann phase designation for both areas. These phases are significant because the first stages of Monks Mound at Cahokia were completed at this time, and this event has been interpreted by researchers as the activities of elite power structures that arose at the beginning of the Mississippian period (Pauketat 1994). In addition, nucleated villages disappear and populations live in either small farmsteads or the growing mound centers (Mehrer 1995; Pauketat and Lopinot 1997) that were characterized by increasing stability and reuse of habitation areas. Changes in architectural styles include the shift to larger wall-trench structures, a movement toward internal storage pits used for food storage.

Table 4-3: Mississippian Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Lohmann	Cahokia/ ICT-II	ICT-II	Lopinot, N.H. (1991) Archaeobotanical Remains. In *The Archaeology of the Cahokia Mounds ICT-II: Biological Remains*, pp. 1-268. Illinois Cultural Resources Study No. 13. Illinois Historic Preservation Agency, Springfield.	SAME
	Carbon Dioxide	11MO594	Finney, F.A. (1985) *The Carbon Dioxide Site*. American Bottom Archaeology FAI-270 Reports Vol. 11.	Johannessen, S. (1985) Plant Remains. pp. 97-106.
	Lohmann	11S49	Esarey, D. and T.R. Pauketat (1992) *The Lohamann Site*. American Bottom Archaeology FAI-270 Reports Vol. 25.	Johannessen, S. (1992) Plant Remains. pp. 139-144
	Olszewski	11S465	Hanenberger, N.H. (1990) The Olszewski Site. In *Selected Early Mississippian Household Sites in the American Bottom*, D.K. Jackson and N.H. Hanenberger, pp. 257-423. American Bottom Archaeology FAI-270 Reports Vol. 22.	Dunnavan, S.L. (1990) Floral Remains. pp. 389-403
	Range	11S47	Hanenberger, N.H. and M. Mehrer (n.d.) *The Range Site 3: Mississippian and Oneota Occupations*. Ms. on file at ITARP	Parker, K.E. (1999) Archaeobotany
Stirling	BBB Motor	11MS595	Emerson, T.E. and D.K. Jackson (1984) *The BBB Motor Site*. American Bottom Archaeology FAI-270 Reports Vol. 6	Whalley, L.A. (1984) Plant Remains from the Stirling Phase. pp. 321-334.
	Cahokia/ ICT-II	ICT-II	Lopinot, N.H. (1991) Archaeobotanical Remains. In *The Archaeology of the Cahokia Mounds ICT-II: Biological Remains*, pp. 1-268. Illinois Cultural Resources Study No. 13. Illinois Historic Preservation Agency, Springfield.	SAME
	Fingers	11S33S	Kelly, J.E. (1995) *The Fingers and Curtiss Steinberg Road Sites*. ITARP Report No. 1.	Parker, K.E. (1995) Plant Remains pp. 53-62.
	Julien	11S63	Milner, G.R. (1984) *The Julien Site*. American Bottom Archaeology FAI-270 Reports Vol. 7.	Johannessen, Sissel (1984) Plant Remains from the Julien Site. pp. 244-273
	Lohmann	11S49	Esarey, D. and T.R. Pauketat (1992) *The Lohamann Site*. American Bottom Archaeology FAI-270 Reports Vol. 25.	Johannessen, Sissel (1992) Plant Remains. pp. 139-144
	Range	11S47	Hanenberger, N.H. and M. Mehrer (n.d.) *The Range Site 3: Mississippian and Oneota Occupations*. Ms. on file at ITARP	Parker, K.E. (1999) Archaeobotany
	Robert Schneider	11MS117	Fortier, A.C. (1985) *The Robert Schneider Site*. American Bottom Archaeology FAI-270 Reports Vol. 11. Pages 171-313.	Johannessen, S. (1985) Mississippian Plant Remains. pp. 259-263
	Turner	11S50	Milner, G.R. (1983) *The Turner and DeMange Site*. American Bottom Archaeology FAI-270 Reports Vol. 4.	Whalley, L.A. (1983) Plant Remains from the Turner Site. pp. 213-233.
	Vaughn Branch	11MS1437	Jackson, D.K., P.G. Millhouse, M.L. Simon, and T.E. Berres (1996) *The Vaughn Branch Site*. ITARP Transportation Archaeological Research Reports No. 42.	Simon, M.L. (1996) Archaeobotanical Remains pp. 137-158, E38335-363.

Table 4-3: Mississippian Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Stirling/ Moorehead	Cahokia/ South Palisade	Cahokia/ South Palisade	Holley, G.R., N.H. Lopinot, R.A. Dalan, W.I. Woods (1990) *Archaeology of the Cahokia Palisade: South Palisade Investigations*. Illinois Cultural Resources Study No. 14. Illinois Historic Preservation Agency, Springfield, Illinois.	Lopinot, N.H. (1990) Analysis of Flotation Samples. pp. 106-115.
Moorehead	Cahokia/ ICT-II	ICT-II	Lopinot, N.H. (1991) Archaeobotanical Remains. In *The Archaeology of the Cahokia Mounds ICT-II: Biological Remains*, pp. 1-268. Illinois Cultural Resources Study No. 13. Illinois Historic Preservation Agency, Springfield.	SAME
	Cahokia/ Septic System	11MS593	Kelly, J.E. (1993) *Recent Investigations in the Area of the Southeastern Palisade, Cahokia*. Office of Contract Archaeology, Southern Illinois University-Edwardsville.	Parker, K.E. (1993) Plant Remains from 1989 Archaeological Testing at the Cahokia Mounds State Historic Site: Southeast Wall, Central Stockade Area.
	Cahokia/ South Palisade	Cahokia/ South Palisade	Holley, G.R., N.H. Lopinot, R.A. Dalan, W.I. Woods (1990) *Archaeology of the Cahokia Palisade: South Palisade Investigations*. Illinois Cultural Resources Study No. 14. Illinois Historic Preservation Agency, Springfield, Illinois.	Lopinot, N.H. (1990) Analysis of Flotation Samples. pp. 106-115.
	GCS#1	11MS1380	Craig, J. and J.M. Galloy (1994) *Phase III Archaeological Investigations at Site GCS#1 (11-MS-1380)*. Prepared by Hanson Engineers. Submitted to National Steel Corporation.	Parker, K.E. (1994) Paleoethnobotanical Analysis. pp. 8-1 to 8-19.
	Julien	11S63	Milner, G.R. (1984) *The Julien Site*. American Bottom Archaeology FAI-270 Reports Vol. 7.	Johannessen, Sissel (1984) Plant Remains from the Julien Site. pp. 244-273
Moorehead/ Sand Prairie	GCS#1	11MS1380	Craig, J. and J.M. Galloy (1994) *Phase III Archaeological Investigations at Site GCS#1 (11-MS-1380)*. Prepared by Hanson Engineers. Submitted to National Steel Corporation.	Parker, K.E. (1994) Paleoethnobotanical Analysis. pp. 8-1 to 8-19.
	Radic	11MS584	McElrath, D.L., J.A. Williams, T.O. Maher, M.C. Mainkoth (1987) *Emergent Mississippian and Mississippian Communities at the Radic Site*. American Bottom Archaeology FAI-270 Reports Vol. 17.	Parker, KE. (1987) Plant Remains. pp. 221-245.
Sand Prairie	Florence Street	11S458	Emerson, T.E., G.R. Milner, D.K. Jackson (1983) *The Florence Street Site (11-S-458)*. American Bottom Archaeology FAI-270 Reports Vol. 2	Johannessen, Sissel (1983) Mississippian Plant Remains pp. 200-203.
	Julien	11S63	Milner, G.R. (1984) *The Julien Site*. American Bottom Archaeology FAI-270 Reports Vol. 7.	Johannessen, Sissel (1984) Plant Remains from the Julien Site. pp. 244-273

Table 4-3: Mississippian Sites in the American Bottom Region with Archaeomedicinal Plant Remains

Phase	Site	Site #	Site Report	Paleoethnobotanical Chapter or Report
Mississippian	Bluff Shadow	Mo-562	Hargrave, M.L. (1982) *Archaeological Investigations at the Bluff Shadow Site, Monroe County, Illinois*. Center for Archaeological Investiations Research Paper No. 31. Southern Illinois University, Carbondale.	Lopinot, N.H. (1982) Archaeobotanical Remains from Mo-562. pp. 53-61.
	Bridges	11-MR-11	Hargrave, M.L. et.al. (1983) *The Bridges Site*. Center for Archaeological Investigations Research Paper No. 38. Southern Illinois University, Carbondale.	Lopinot, N.H. (1983) Archaeobotany of the Bridges Site. pp. 246-276.
	Cahokia/ Septic System	11MS593	Kelly, J.E. (1993) *Recent Investigations in the Area of the Southeastern Palisade, Cahokia*. Office of Contract Archaeology, Southern Illinois University, Edwardsville.	Parker, K.E. (1993) Plant Remains from 1989 Archaeological Testing at the Cahokia Mounds State Historic Site: Southeast Wall, Central Stockade Area
	Cahokia/ South Palisade	Cahokia /South Palisade	Holley, G.R., N.H. Lopinot, R.A. Dalan, W.I. Woods (1990) *Archaeology of the Cahokia Palisade: South Palisade Investigations*. Illinois Cultural Resources Study No. 14. Illinois Historic Preservation Agency, Springfield.	Lopinot, N.H. (1990) Analysis of Flotation Samples. pp. 106-115.
	Esterlein	11MS598	Jackson, D.K. (1990) The Esterlein Site. In *Selected Early Mississippian Household Sites in the American Bottom*, D.K. Jackson and N.H. Hanenberger, pp. 91-216. American Bottom Archaeology FAI-270 Reports Vol. 22.	Dunavan, S. (199) Plant Remains. pp. 189-194
	Kruse Bluffbase #3	11MO507	Neusius, P.D. (1985) *Archaeological Excavations at the Krus Bluffbase #3 Site*. Center for Archaeological Investigations Research Paper No. 51. Southern Illinois University, Carbondale.	Ruppe, P.A. (1985) Flotation Sample Analysis, pp. 57-64.
	Lohmann	11S49	Esarey, D. and T.R. Pauketal (1992) *The Lohamann Site*. American Bottom Archaeology FAI-270 Reports Vol. 25.	Johannessen, Sissel (1992) Plant Remains. pp. 139-144
	Olszewski	11S465	Hanenberger, N.H. (1990) The Olszewski Site. In *Selected Early Mississippian Household Sites in the American Bottom*, D.K. Jackson and N.H. Hanenberger, pp. 257-423. American Bottom Archaeology FAI-270 Reports Vol. 22.	Dunnavan, S.L. (1990) Floral Remains. pp. 389-403
	WalMart	11MS1369	Do not have reference for the whole report	Parker, K.E. (1992) Plant Remains from Archaeological Excavations at the Walmart Site (11MS1369). Submitted to Charles L. Rohrbaugh, Archaeological Consultants, 320 Robert Drive, Normal, Illinois 61761

Emerson (1997a) argues that the Lohmann phase is associated with a variety of ritual and ceremonial activities at Cahokia and the surrounding countryside. The construction and use of Mound 72 with its elaborate burials is evidence for the power of Cahokian elite (Emerson 1997a, 1997b, 1997c; Fowler 1992; Mehrer 1995). Rural sociopolitical organization is indicated by specialized structures at Julien (Structure 267), Range (Structures 19, 32, 33, 51, 361), and BBB Motor (Ritual complex) sites (Emerson 1997a:87-88). It is my understanding, however, that the Range site with its Lindhorst phase occupation may have been more closely related to mound building activities at Lunsford-Pulcher site rather than to Cahokia proper.

Stirling phase (A.D. 1050-1150) materials are the most commonly encountered Mississippian period remains in the American Bottom region. Cahokia was at its zenith with approximately 120 mounds and 688 ha. of residential and agricultural lands (Emerson 1991:199; Fowler 1978, 1991), but the social gap between Cahokia and rural communities appears to be growing at the same time (Pauketat 1992:37, 1994). Three types of mound centers have been identified from the Stirling phase: Cahokia assumes the dominant position, sites such as East St. Louis (see discussion in J. Kelly 1997) with numerous mounds are the next level, and single mound centers such as Lohmann represent the smallest mound sites. Milner (1991b:31) and Emerson(1997a, 1997b) offer contrasting views on the influence of these mound centers on rural political structures.

Stirling phase community structure is more complex and diverse than previous periods, a situation that probably results from the 110%-plus increase in population inhabiting the American Bottom when compared to the Lohmann phase (Mehrer 1995), although the timing of this population increase is a matter of discussion (Pauketat 1994). The arrangement of households at nodal and non-nodal sites follows a characteristic pattern of discrete clusters consisting of a structure, or structures, with their accompanying pits arranged along the ridges of the American Bottom bottomlands (Emerson 1991). Structures increased in size and this may be related to increasing family size or the need for more interior room as pits were moved from exterior to interior locations (Johannessen 1993:197-201).

The Stirling phase is characterized by some unique artifact assemblages. Ramey Incised Jars are present, and they are the focus of much discussion in regard to the ritual importance of this ceramic type (Emerson 1997a; Kelly 1991b; Pauketat 1992, 1994, 1997; Pauketat and Emerson 1991). Pauketat (1992, 1994, 1997) argues that these pots, and other symbols of the elite authority, were used to help ease social tensions that arose during the development of "Mississippianized" American Bottom society. Exotic lithic materials were present during the Stirling phase, and such items reflect the increasing inter-/intra-regional trade during this phase (Milner et al. 1984:170). Bauxite, now identified as Missouri fireclay, was used to make ritually significant figurines including two recovered from the BBB Motor site (i.e., the Birger and Keller figurines) and a highly fragmented female figurine from the Sponemann site.

Moorehead phase (A.D. 1150-1250) is when the centralized power structure of the American Bottom weakens (Lopinot and Woods 1993:209), but exotic materials, once associated with elite power structures, ranging from copper to bauxite to marine shell, are still noted in Moorehead contexts (Milner 1991b:38). Structures continue to be rectangular to nearly square and semi-subterranean with wall posts set into trenches, but variation between sites is quite pronounced. In addition to these household units, it appears that some specialized structures were present (Mehrer 1995; Milner et al. 1984:177). One important factor in site distribution was an increased population in the bluffs surrounding the American Bottom (Woods and Holley 1991).

Opinions about the causes from Cahokia's fall during the Moorehead phase are as numerous and interesting as the discussions of its rise. Hall (1991) suggests that the combination of better varieties of maize, the addition of cultivated beans to the subsistence system (a suggestion that belies the lack of cultivated beans from paleoethnobotanical samples), and the availability of maize all contributed to the decline of Cahokia because of "a frontier effect bringing about the devolution or breaking down of social organization in the face of abundance and diminished need for interdependence" (Hall 1991:26). Rindos and Johannessen (1991:43-45) suggest that the denser populations in the Mississippian American Bottom were unable to continue producing sufficient maize once the water table began to rise and inundate fields during the Moorehead and Sand Prairie phases. The native grains, had they retained their dominant role in the economy, might have been able to support the increased population density, but too much dependence had been placed on maize. In contrast, Pauketat (1992:36) argues that the collapse of Cahokia was not the result of "any abnormal or changed techno-environmental factors at all," but rather the process of increased local autonomy and alienation of elite sub-groups that led to the fall.

The Sand Prairie phase (A.D. 1250-1400) is a period of "accelerating regional decline in population and settlement system" (Mehrer 1995:153). There was very little elite activity at Cahokia during this period, although there may have been some secular occupation of the previously ceremonial precincts of the site (Milner 1991b). Populations appear to be leaving the bottomlands and moving to the upland drainages. Sand Prairie site structure has several differences from previous Mississippian periods, including a lack of well-defined specialized structures (Emerson 1997a; Milner et al. 1984). The nearly square wall-trench structures tended to be larger than those from earlier periods. In addition, large internal storage pits are noted.

Mississippian Paleoethnobotany. Interestingly, "there is no evidence that changes in plant-related subsistence practices accompanied the shifts in community patterning, technology, and centralization...that mark the onset of the Mississippian period" (Johannessen 1984:203; also discussed by Lopinot 1997). Cultivated maygrass, knotweed, and goosefoot continue to comprise the majority of the identifiable seeds. Maize now is present in an average of 78% of analyzed features (Johannessen 1984:205). Additional cultivated plants include squash, marsh elder, tobacco, and sunflower. Importantly, domesticated beans are absent from Cahokian assemblages. Hickory, and increasingly, acorn continue to be important supplements to the subsistence system, although to a lesser degree than in previous periods. Other plant remains common in Mississippian paleoethnobotanical samples are "grasses, small legumes (especially wild bean), black nightshade, American lotus, grape, persimmon, sumac, morning glory, and prickly mallow" (Johannessen 1984:205). Images within the minds of many archaeologists are of Cahokian fields of maize dotted with pumpkins and twining beans, but these are inaccurate. A more likely scenario is that of Mississippian fields with young maize interspersed with ovifera-type squash vines, mature maygrass, emerging knotweed and goosefoot and a host of "weeds" such as wild beans, black nightshade, and grasses.

The wood charcoal composition was similar to the two previous periods, during which hickory and oak were most commonly recognized woods. Bottomland species such as willow and cottonwood become more numerous as construction timbers. In addition, redcedar remains are found in ritual locales at sites such as BBB Motor, where it probably had special ceremonial significance. Lopinot and Woods (1993:230) note that the local timber surrounding Cahokia, and perhaps much of the American Bottom in general, would have been quickly depleted by construction, fuel, and land clearing activities that intensified during the Emergent Mississippian and Mississippian periods. This may have resulted in general environmental degradation and more severe flooding in the floodplain as well as necessitating the importation of wood. Upland and other non-local woods (e.g., conifers) comprise 60% of the Lohmann phase wood remains and 53% of the early Stirling phase wood remains. By the late Stirling phase, local woods are once again the main resources, a pattern that becomes even more pronounced during the Moorehead phase. "It is suggested that extensive use of nonlocal woods during early Mississippian times relates partly to a shortage of wood in local environs of Cahokia and partly to the authoritarian power of the ruling elite, who could obtain wood that simultaneously offset this shortage and symbolized the wealth and sacredness of Cahokia itself" (Lopinot and Woods 1993:229).

The apparent increase in agricultural output may be linked to intensification of rituals within the subsistence regime because "intensified production may be a means of gaining prestige, strengthening kin ties, or supporting ceremonies or public works" (Johannessen 1984:214). Maize has been identified as a more intensifiable crop than the native seeds, although Lopinot (1992:55) argues that "having reviewed some of the basic attributes of, and differences between, starch seeds and maize, there would appear to be no obvious economic explanation for the eventual dominance of maize in Mississippian subsistence systems." A single grain of maize is, by weight, equivalent to over 100 of the small native seeds, and maize may have been an easier commodity to store (Lopinot 1992:75-77). Rindos and Johannessen (1991) emphasize, however, that maize is a less stable crop than the small native seeds: "any change in growing conditions would have had a greater impact on the Mississippian maize-based agricultural systems than it would have had on earlier subsistence systems" (Rindos and Johannessen 1991:43). Whatever the reasons, intensification of the Mississippian subsistence system is reflected in increasing numbers of excavation tools (e.g., Mill Creek hoes), large internal pits, and community granaries.

Moundville Region

The Moundville region has a long and diverse history of archaeological investigations spanning more than 140 years (see summaries of these investigations in Peebles [1981], Steponaitis [1978, 1983], Knight [1996], and volume edited by Knight and Steponaitis [1998]). Nineteenth century investigations of Moundville included work by local landowner Thomas Maxwell in 1840, and two researchers funded by the Smithsonian, Nathaniel Lupton in 1869, and James Middleton in 1883. The twentieth century at Moundville was ushered in with excavations into most of the major mounds and other high status areas by C.B. Moore in 1905 and 1906 (Knight 1996). Moore's excavations are still the only professional excavations at the major mounds at Moundville. Excavations at Moundville began again in the late 1920's under the direction of Dr. Walter Jones of the Alabama Museum of Natural History and his assistant David DeJarnette. DeJarnette instituted modern excavation techniques that he learned at a 1932 University of Chicago field school directed by Fay-Cooper Cole, an activity that greatly improved the quality of excavations at the site (Welch 1990:209-210).

Work on existing Moundville collections by Peebles (1978, 1986, 1987; Peebles and Black 1987; Peebles and Kus 1977) and Steponaitis (1978, 1983, 1991) led to a new era of research at Moundville focused on specific research issues and the intensive recovery of plant and animal remains. Excavations under this rubric, were led in 1978 and 1979 by Margaret

Scarry from the University of Michigan (Scarry 1981a). This new flurry of research resulted in a crop of intriguing scholarly publications on various interrelated topics, including the health of Mississippian Moundville residents (Powell 1985, 1988, 1991b, 1992, 1998), West Jefferson and Mississippian plant-based subsistence studies (Scarry 1981a, 1981b, 1986, 1993a, 1995; Welch and Scarry 1995), settlement patterns of the Black Warrior basin (Bozeman 1982; Peebles 1987; Steponaitis 1983, 1991, 1998; Welch 1990, 1991, 1998), the chiefly economy of the Moundville area (Welch 1986, 1991, 1990), and indications of ritual life in the Moundville region (Knight 1986, 1997, 1998). Discussions of chiefdoms, symbolism, power, and elite structures have all blossomed from this work at Moundville in the past 30 years, and applications have been made to wider endeavors (Knight 1986, 1997; Knight and Steponaitis, ed. 1998; Peebles and Kus 1977; Steponaitis 1978, 1991; Welch 1990, 1991).

Late Woodland Period in the Moundville Region

The Late Woodland period in the Moundville region of the Black Warrior valley is limited to the West Jefferson phase which began at approximately A.D. 900 and ended at A.D. 1050 with the beginning of the Moundville I phase. Information on this phase is based on several test excavations and survey work done in the Black Warrior valley, "but the lack of extensive excavation severely limits our understanding of community organization" (Welch 1990:221). Archaeomedical remains have been identified in paleoethnobotanical samples from 1HA8, 1HA11, 1HA39, 1JE31, 1JE32, 1JE33, 1TU44/45, and 1TU570 (Table 4-4).

Late Woodland Phase Summary. Site structure during the West Jefferson phase appears to be a pattern of small sites reoccupied in favorable locations, resulting in relatively large midden scatters (ca. 10 ha). There also appear to be larger villages in the uplands, but Bozeman's (1982) survey research focused on the floodplain sites, so little is known about the distribution of these sites (Welch 1990:211). There is no evidence of social stratification in these small campsites, and the population of the Black Warrior valley would have been rather low, 0.9 to 4.75 persons per square kilometer (Welch 1990:212).

Table 4-4: Late Woodland and Mississippian Sites in the Moundville Region with Archaeomedicinal Plant Remains

Late Woodland

Period	Site #	Paleoethnobotanical Report
West Jefferson	1HA8	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1HA11	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1HA39	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1JE31	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1JE32	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1JE33	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1TU44/45	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	1TU570	Data received from Dr. C.M. Scarry

Mississippian

Period	Site #	Paleoethnobotanical Report
Moundville	1HA8	Data received from Dr. C.M. Scarry
	1TU56	Data received from Dr. C.M. Scarry
	1TU66	Data received from Dr. C.M. Scarry
	1TU459	Data received from Dr. C.M. Scarry
	1TU552	Scarry, C.M. (1993) Plant Remains from the Big Sandy Farms Site (1TU552), Tuscaloosa County, Alabama. In Big Sandy Farms, by H.B. Ensor, pp. 207-233. University of Alabama Museums, Office of Archaeological Services, Report of Investigations 68.
	1TU768	Data received from Dr. C.M. Scarry
	Moundville-Area ECB	Scarry, C.M. (1995) Plant Remains from the Riverbank Excavations. In Excavations on the Northwest Riverbank at Moundville, by C.M. Scarry, pp. 217-232. University of Alabama Museums, Office of Archaeological Services, Report of Investigations 72.
	Moundville-Area NR	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	Moundville-Area PA	Scarry, C.M. (1995) Plant Remains from the Riverbank Excavations. In Excavations on the Northwest Riverbank at Moundville, by C.M. Scarry, pp. 217-232. University of Alabama Museums, Office of Archaeological Services, Report of Investigations 72.
	Moundville-Area SCB	Scarry, C.M. (1986) Change in Plant Procurement and Production during the Emergence of the Moundville Chiefdom. Ph.D. Dissertation, Anthropology Department, University of Michigan, Ann Arbor.
	Moundville-Area WR	Data received from Dr. C.M. Scarry

It appears that these floodplain sites were seasonally occupied, because many are below the flood level. Populations probably dispersed into the uplands during the rainy late winter and early spring. If this is true, then the settlement pattern in the Moundville region appears to have a number of similarities with "the 'cold season' aspect of the Cofferdam-Gainesville phase along the Tombigbee River" (Welch 1990:221). This similarity is important because if analogies can be made with prehistoric societies in the Central Tombigbee region, then data from this region could be used to help illuminate the less well understood Late Woodland period in the Black Warrior area. Differences in Mississippian developments in these two regions, however, make correlations between Late Woodland phases in the areas tenuous.

Late Woodland Paleoethnobotany. The West Jefferson subsistence system has received some attention from Scarry (1981b, 1986). It appears that wild food resources such as hickory nuts and acorns comprised the majority of the plant remains. Maize was present, but only in small quantities (Scarry 1981b, 1986). Wild fruits such as persimmons, grapes, sumac, and pokeweed supplemented the subsistence system. Small native seeds such as goosefoot and maygrass were present in the West Jefferson features, as they had been in the Late Woodland features from the American Bottom, but their domesticated status is unclear.

Mississippian Period in Moundville Region

"The transition from forager/gardeners producing grog-tempered pottery to field agriculturists using shell-tempered ceramics occurred rapidly in Moundville" (Welch 1990:212). The Moundville I phase began at approximately A.D. 1050 (Knight and Steponaitis 1998). The Moundville II phase is ushered in 250 years later at A.D. 1250. The Moundville III phase (A.D. 1400-1550) entails both the peak and fall of Moundville. Studies of the Moundville settlement system (Peebles 1978; Steponaitis 1978) tend to combine all three of these Moundville temporal phases into a unified "Moundville phase" for discussion purposes. Mississippian sites from the Moundville region with archaeomedicinal remains include 1HA8, 1TU56, 1TU66, 1TU459, 1TU552, 1TU768, and five areas within the site boundaries of Moundville proper (Table 4-4).

Peebles (1978) examined the Moundville settlement system in an attempt to understand how the settlements were placed upon the landscape. He found that most settlements were located in very "energy efficient" locations with good access to the upland and riverine natural resources, as well as within easy walking distance (0.6 mile catchments) of prime agricultural lands. Those settlements closest to Moundville, however, had a weaker relationship to good agricultural soils, a fact that may be related to the benefits the residents of these areas received by being close to Moundville.

Steponaitis (1978) argues that the irregular spacing of secondary centers in relation to Moundville is very spatially efficient locations when the riverine or terrestrial transport of tribute are taken into consideration. Second order mound centers did, however, tend to cluster toward Moundville in order to move tribute more efficiently to Moundville. The drain of tribute on local economies may have limited the size of mounds that the secondary center could erect: the mounds closest to Moundville, and therefore likely to have the greatest burden of tribute, are smaller than the mounds found at distant secondary centers within the system.

Mississippian Phase Descriptions. The settlement pattern during the Moundville I (A.D. 1050-1250) phase is characterized by a series of four mound centers with populations scattered in nearby hamlets and farmsteads (Peebles 1986:27). There is no evidence of nucleated villages at this time (Bozeman 1982), and Welch (1998) provides good summaries of the outlying sites. It appears that these four mound centers shared dominance in the Black Warrior valley. Moundville began to gain power and assert dominance over the other centers toward the end of Moundville I. It also appears that social inequalities were rising during this phase with approximately 1% of the population having elite status (Peebles 1986).

The Moundville II phase (A.D. 1250-1400) was a period when the evenly distributed power and authority of the mound centers along the Black Warrior river valley was fully transferred to Moundville. For the first time populations began to aggregate in villages surrounding the temple centers, but this event may not have been changed the structure of the farmsteads and hamlets that supported this burgeoning elite populace (Welch 1998).

The shift in population to large centers (see Steponaitis 1998 for discussion of population trends at Moundville) is revealed in a four-fold increase in burial activity during Moundville II. This event was concurrent with increasingly elaborate elite activities, such as mound building and burial goods that included imported marine shell, copper axes and gorgets, stone paint palettes, and feline effigy pipes (Peebles 1978:371, 1986:28). Two levels of elite individuals were buried at Moundville: those individuals who appear to have had ascriptive status and were buried in the truncated mounds with copper axes or sometimes with human "sacrifices"; and those subordinate individuals who had attained status during the course of their lives and were often buried with stone paint palettes (Peebles 1978).

Moundville III phase (A.D. 1400-1550) saw both the peak and collapse of the Moundville site within its 150 year span. Mound construction was completed at Moundville during this phase; "sixteen mounds were constructed, and the whole site was enclosed by a palisade" (Peebles 1986:29). A more recent summary of Moundville's population trends suggests that the resident population of Moundville was rather small during this period, and limited to an elite subsection of the general population (Steponaitis 1998).

Construction at the subsidiary mound centers continued with addition of five in the Black Warrior valley during Moundville III. Most of the population continued to be dispersed in small hamlets, but large nucleated villages appeared during this phase, and this may reflect the weakening control at Moundville (Bozeman 1982:307). At about A.D. 1450, the frequency with which burials were provided imported goods dropped by 75%. Whatever the reason, this drastic reduction in trade items forewarns the collapse of the Moundville cultural system, which began by A.D. 1500 and was complete by A.D. 1550.

Mississippian Paleoethnobotany. Our understanding of Moundville I subsistence was formerly limited to work on features from the Moundville site (Scarry 1981b, 1986, 1995), but features from two farmstead sites, Big Sandy Farms and Oliver (Scarry 1993a), have since been added. Maize was the most important cultivated crop during this phase, and it appears that several cultivars of maize were being produced. Wild foods such as nuts were still eaten, but the proportion of hickory nuts to acorns shifted with a dramatic rise in acorn use. Wild fruits continued to be used, but there was a slight increase in fruit species that may have invaded old fields such as persimmon and plum. Small grain (e.g., maygrass) and oily crops (e.g., sunflower) that had been used during the West Jefferson phase continued to be grown during the Moundville I phase. These plants made up a smaller proportion of the diet during the later period as maize became more prevalent. Work at the Oliver and Big Sandy Farms sites has indicated that "residents of the farmsteads relied on the same resources that were used by their West Jefferson predecessors and by their elite contemporaries at Moundville" (Scarry 1993a:230).

Central Tombigbee Region

Archaeology in the Central Tombigbee region is dominated by projects in the Gainesville Reservoir (summarized by Jenkins [1982]) and the Lubbub Creek Archaeological Locality (volumes edited by Peebles [1983]), although many other surveys and excavations have taken place in the past 30 years in the region (see brief summary by Welch [1990:199-200]). These research efforts provide us with a relatively complete local developmental sequence from Woodland to Protohistoric periods. Locally, the Late Woodland period is known as the Miller III phase, and Early Vienna, Late Vienna, Catfish Bend, and Cofferdam/Gainesville are the subphases. In general, it appears that the Central Tombigbee region was home to the indigenous development of a stratified Mississippian chiefdom. This chiefdom, however, does not appear to have been as elaborate as those present in the Moundville or American Bottom regions. The Mississippian period is composed of Summerville I and Summerville II/III subphases. Each of these phases and subphases is discussed below.

Late Woodland Period in the Central Tombigbee Region

The Late Woodland period in the Central Tombigbee Region spans the time frame from A.D. 600-1100 (see summaries of these phases in Blitz [1993], Jenkins [1982], Jenkins and Krause [1986], Peebles [1983], and Welch [1990, 1991]). The period is regionally known as the

Miller III phase and/or culture. Early Vienna and Late Vienna subphases comprise the initial 300 years of Miller III occupation in the region. The Catfish Bend subphase follows, and the range of dates assigned to this subphase is ca. A.D. 900-1000. Cofferdam and Gainesville (ca. A.D. 1000-1100) have been considered as coexisting subphases (Jenkins 1982), and more recently, as seasonal occupations by the same cultural group (Welch 1990). The difficulties in distinguishing the subsequent Gainesville from Catfish Bend subphases based on ceramic assemblages, are noted by Jenkins (1982:102): "There are only slight ceramic differences between the Gainesville subphase and the preceding Catfish Bend subphase, the grog tempered ceramics and their percentages are practically identical." The Miller III sites with archaeomedical remains include 1GR1X1, 1GR2, 1Pi61, 1Pi33, and Lubbub Creek (Table 4-5).

Late Woodland Phase Summary. Miller III lithic assemblages have several unique characteristics in comparison with the earlier phases (summarized in Jenkins [1982:103-104] and Jenkins and Krause [1986:75-76]). The appearance of small triangular projectile points, an event that signals the adoption of bow and arrow technology, occurs early in this phase. High temperature heat-treating of lithic materials appears to be linked to this development. This new heat-treating technique resulted in large amounts of firecracked chert and dark red thermally-spalled flakes, which were used to produce the smaller projectile points. The relatively small size of these spalled flakes appears to have limited the maximum overall size of chert tools, resulting in generally smaller lithics than found in earlier phases.

During the Miller III period there was a dramatic increase in population density along the Tombigbee floodplain (Jenkins 1982). This increasing population was more sedentary than previous groups as evidenced by denser midden scatters at the large base camps. The total number of base camps increases five-fold in comparison with Miller II base camps. A second settlement type, classified as "transitory camps" (Jenkins 1982:110), has been recognized. These smaller camps probably represent the seasonal disbursement of populations from the larger base camps. These base camps were located within the main Tombigbee valley, and to the east and west of the valley (Welch 1990:203).

Table 4-5: Late Woodland and Mississippiand Sites in the Central Tombigbee Region with Archaeomedicinal Plant Remains

Late Woodland

Period	Site #	Paleoethnobotanical Report
Early and Middle Miller III	1GR1X1	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Early and Middle Miller III	1GR2	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Early, Late, and General Miller III	1Pi61	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Late Miller III	1Pi33	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Miller III	Lubbub Creek	Caddell, C.M. (1983) Floral Remains from the Lubbub Creek Archaeological Locality. In *Studies of Material Remains from the Lubbub Creek Archaeological Locality*, ed. by C. S. Peebles, pp. 274-281.

Mississippian

Period	Site #	Paleoethnobotanical Report
Late Mississippian	1GR2	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Late Mississippian and General Mississippian	1Pi33	Caddell, G.M. (1982) *Plant Resources Archaeological Plant Remains, and Prehistoric Plant-Use Patterns in the Central Tombigbee River Valley*. Bulletin Alabama Museum of Natural History, Tuscaloosa, Alabama.
Summerville I and II/III, General Mississippian	Lubbub Creek	Caddell, C.M. (1983) Floral Remains from the Lubbub Creek Archaeological Locality. In *Studies of Material Remains from the Lubbub Creek Archaeological Locality*, ed. by C. S. Peebles, pp. 274-281.

While excavations of a number of Miller III sites have taken place, no complete community patterns have been revealed (Jenkins 1981, 1982; Peebles 1983; Welch 1990:203). A single semi-subterranean Catfish Bend structure was excavated at 1Pi61. Jenkins (1982:109) suggests that this was not a typical Catfish Bend structure, but notes that no other complete Catfish Bend structures have been excavated. The Gainesville subphase is characterized by a dramatic change in construction methods: dwellings are now rectangular. Four rectangular semisubterranean structures were excavated at 1Pi61 (Jenkins 1982:109). Walls were made with a combination of singly set posts and wall trenches, techniques that overlapped in at least one structure. Three of these structures had internal hearths.

Late Woodland Paleoethnobotany. Jenkins (1982:110) suggests that "Miller III environmental adaptation can best be characterized as a culmination of floodplain forest efficiency." The floodplains were used for their natural abundance of wild plants and game, and later in the period as naturally renewing fields for maize agriculture. Subsistence studies of Miller III materials were completed by Caddell (1982, 1983) and Woodrick (1981: as summarized in Jenkins [1982]). "The botanical and faunal data present clear evidence of a downward shift in the size of food items in Miller III times. Typically we would expect such a shift towards energetically costlier 'second-line' resources to accompany human population increase" (Welch 1990:204), thereby supporting evidence from settlement patterns. Caddell's studies of the plant remains reveal a subsistence system dominated by hickory nuts and acorns. Goosefoot, grasses, wild fruits, and other wild plant remains are also present in these features, but Caddell (1982:34) stops short of suggesting that such species were cultivated. Early Miller III features rarely contain maize, but by the Cofferdam subphase maize is present in over 30% of the features.

Mississippian Period in the Central Tombigbee Region

The Mississippian period in the Central Tombigbee Region spans the time frame from A.D. 1000/1100-1500 (see summaries of these phases in Blitz [1993], Jenkins [1982], Jenkins and Krause [1986], Peebles [1983], and Welch [1990]). The period is regionally known as the

Summerville phase and/or culture. Summerville I subphase (A.D. 1000/1100-1200) contains evidence for dependence on maize agriculture and the development of social ranking (Welch 1990). The Summerville II/III subphase (A.D. 1200-1500) follows and tends to continue many cultural traditions began during the Summerville I subphase. Certain characteristics of the Summerville phase are here discussed as a whole, but sufficient differences have been noted in ceramic typologies and settlement structure to warrant separate discussion of the two subphases. Mississippian period sites from the Central Tombigbee region that contained possible archaeomedicinal plants were 1GR2, 1Pi33, and Lubbub Creek (Table 4-5).

Mississippian Phase Summaries. Data on Summerville I site structure come almost exclusively from excavations at the Lubbub Creek Archaeological Locality (Blitz 1983, 1993; Peebles 1983), although small farmsteads or camps are known for the area (Jenkins 1982:129). Excavations at this locale revealed a mound-village complex surrounded by a palisade. The village was separated from the mound by a second palisade. Within the village, three oval structures were identified; two of these structures had internal hearths. These structures formed a semi-circle around the mound with a well-defined plaza area left unoccupied. Mound construction was predated by a series of six structures, each of which was carefully dismantled prior to the construction of subsequent buildings. When the final house was dismantled, mound construction began.

Summerville I burials present at Lubbub Creek Archaeological Locality, as discussed in more detail in Chapter 3, provide important information about social structure. The burials located in the formal cemetery probably represent a select, possibly elite, subset of the general population (Powell 1983). These individuals appear to have been in very good health, and were accompanied by exotic goods. The village burials (Cole et al. 1982) tended to have relatively few grave goods, and those that were present were of local origin. Differences between these two populations, their respective grave goods, and the initial stages of mound construction have been interpreted by researchers (Blitz 1993; Jenkins 1982; Pebbles 1983; Welch 1990) to indicate a fundamental change in social order to a ranked system.

Excavations at several sites such as Kellogg Village (Atkinson et al. 1980), Tibbee Creek (O'Hear et al. 1981), and Lubbub Creek Archaeological Locality have revealed Summerville II/III components (summarized in Jenkins [1982] and Peebles [1983]). Summerville II/III structures were organized into nucleated settlements and farmsteads. The nucleated settlement at Lubbub Creek Archaeological Locale was associated with the mound. This settlement was more tightly organized than during Summerville I, and there were no palisades surrounding the village. Village life still focused on the mound: "diagnostic Summerville II and III ceramics found in the remnants of the mound show that it was being used ... [and] the lack of daub and other living debris southeast of the mound suggest that a 'plaza' was still being used" (Blitz and Peebles 1983:279-308).

Mississippian Paleoethnobotany. Extensive analyses of Mississippian period plant (Caddell 1983) remains have taken place. This work reveals a dramatic shift in subsistence practices with cultivated crops, dominated by maize, replacing the apparent hunter-gatherer subsistence system of the Miller III phase. Two types of maize were identified from smudge pits at Lubbub Creek (Caddell 1983). Interestingly, maize was the most abundant food plant remains by count during this time, but hickory nuts continue to be more ubiquitous (Caddell 1983:270). This apparent incongruity is the result of a single maize-filled pit (Pit 26), and "if this feature were eliminated, there would be almost seven times as many nutshell as maize fragments in the Summerville II/III pits" (Caddell 1983:212). Sunflowers, beans, and squash were additional components in the Summerville diet.

Conclusions

The similarities, differences, and possible interactions between the American Bottom, Moundville, and/or Central Tombigbee regions during the Late Woodland through Mississippian periods have been the topic of much scholarly discussion (Blitz 1993; Knight 1997; Welch 1990). It appears that all three regions were part of a greater Southeastern trend toward complex, socially stratified societies practicing maize agriculture that began to appear at approximately

A.D. 900-1050. The timing and sequence of events leading up to, and away from, this Mississippianization of the Southeast is a matter of some interest. This process of cultural transformation from the Late Woodland period to the Mississippian period is summarized, especially as it relates to community health and healing, in the following paragraphs.

First, it should be acknowledged that there appears to have been little direct or indirect contact between the people living in the American Bottom and those living in central Alabama: "so, for all practical purposes, the developmental history of Cahokia may be treated as independent from that of Moundville" (Knight 1997:235). Interactions between the Central Tombigbee and Moundville regions probably took place, but apparently on a rather casual level allowing for the independent development of chiefdoms in both areas (Blitz 1993; Welch 1990). The independence of these developmental sequences is especially intriguing given the apparent similarities in the trajectories taken toward Mississippianization.

The first period in this summary is the Late Woodland. The initial stages of this period in all three regions are characterized by relatively small communities composed of a few extended families reliant upon native horticultural crops and gathered wild plant and animal resources. There is little evidence for social stratification during early Late Woodland period. Population density increased, and these populations were settled in permanent hamlets by the early to middle Late Woodland period. These changes in population dynamics apparently had significant health consequences such as increased evidence of stress (e.g., increased rates of porotic hyperostosis) and communicable diseases (e.g., tuberculosis).

The middle to late Late Woodland period in the Central Tombigbee and Moundville regions compares with the cultural events occurring during the late Late Woodland and early Emergent Mississippian periods in the American Bottom region. During this time, additional cultural changes were underway. It appears that the first coalescence of hamlets into larger, formally arranged villages occurred during this period: "it is evident at this time that the socioeconomic foundation was being established for the eventual shift to Mississippian culture" (Kelly et al. 1984b:127). This process co-occurs with an increasing dependence on maize agriculture, although native crops and wild plants are still used in all three regions. The decline in health recorded during the earlier Late Woodland time continues, and communicable diseases such as tuberculosis are more frequent. More daily interpersonal contacts, increased social stresses, and poor sanitation in these larger villages may have been responsible for the worsened health of these people. In addition, more individuals were accessing the wild plant resources (and perhaps medicinal plants?) in the catchment of these villages. Shortages may have resulted.

At the cusp of the Mississippian period, some of these population centers appear to have developed into small independent chiefdoms. Mound construction began in all three regions at this time, and the American Bottom and Moundville regions witnessed mound centers simultaneously arising in several locales. The period of independent chiefdoms was relatively short-lived. Within 50-100 years political power is firmly based in regional centers such as Moundville and Cahokia (Knight 1997:237). Populations shifted to these regional centers, where non-local goods such as marine shell, minerals, and pottery were amassed.

There is not sufficient resolution in the paleopathological record for these regions to record changes in health associated with initial coalescences of small chiefdoms. Information on Moundville I health, however, appears to indicate that the different social strata at that mound center were of relatively good health. Similarly, the Summerville I period was a time of marked improvement in overall health. Both of these skeletal populations, unfortunately, are from the apparent epicenters of their respective societies, and the health of "commoners" may not have been so high.

Knight (1997) notes that another rapid shift in social organization occurred within 100 years, when populations appear to have abandoned the large mound centers and the majority of people moved into smaller villages or farmsteads. The people who then resided in the mound centers were probably of elite status. Along with the movement of populations from the centers, it appears that non-local goods once restricted to the centers were available in the outlying regions. Some researchers, as discussed in this chapter, suggest that the central authorities still controlled these items, but it is equally possible that alternative procurement routes had arisen. Construction of additional corporate structures at the regional centers continued, highlighting the power of the central authority. This Moundville II/Stirling phase process is the beginning of "the end" of central control within the Moundville and American Bottom regions. This process is not so well understood for the Central Tombigbee region, but changes in the use of the mound center occur through time.

The next stage is one of continued dissolution of centralized political power during the Moundville III and Moorehead-Sand Prairie time frame (Knight 1997). Populations disperse to surrounding uplands and secondary valleys. The health of these people, however, appears to be relatively good, at least in the American Bottom region. Tuberculosis, yaws, broken bones, and dental caries are present, but to a lesser degree than in some other Late Mississippian societies.

This introduction to the archaeology, paleopathology, and paleoethnobotanical data from the three study regions is a foundation for my analysis and discussion of archaeomedicinal remains. This background information is significant, because shifts in population density were tied to changes in health status that in turn were be related to the medicines that people used. In the chapters that follow, I use this framework to support my research on potential archaeomedicinal plants in the paleoethnobotanical record for the three study regions.

CHAPTER 5: METHODS OF RESEARCH AND ANALYSIS

The preceding chapters provide the necessary background research to serve as theoretical support for my research. The methods, results, and interpretation of these research results comprise the chapters that follow.

Collection and analysis of data on charred remains of potential medicinal plants took place in three major steps: (1) published or completed paleoethnobotanical reports and summary of data were complied; (2) identification of significant medicinal plants in ethnographic, ethnobotanical, and pharmacological literature to provide support for the archaeological plants as part of the prehistoric medical systems of the Late Woodland through Mississippian periods; and (3) analysis of trends in paleoethnobotanical remains as they relate to medicinal plants. When the final selection of medicinal plants was complete, many of the plants and their seeds were photographed and/or micrographed.

Collection of Reports

The collection of paleoethnobotanical reports, including published literature and unpublished Cultural Resource Management (CRM) reports, on Mississippian through Late Woodland period sites in the greater Mississippi valley (with a concentration due to the wealth of paleoethnobotanical and related archaeological data, on American Bottom, Moundville, and Central Tombigbee regions) was done by contacting or visiting appropriate facilities with relevant paleoethnobotanical researchers and/or collections. Travel to these facilities was vital in order to gather unpublished CRM reports, which often are often unavailable except to the contracting or contracted firms. This collection process took place intermittently over six months, with up to five days spent at each of four locales. Facilities that were visited include Illinois State Museum, University of Illinois (Champaign-Urbana), Southwest Missouri State University, and the Alabama

Museum of Natural History at Moundville Archaeological Park. While at the facilities, I made photocopies of the relevant paleoethnobotanical and archaeological reports. Numerous reports from lesser known sites were discovered during research at these facilities, and special attempts were made to collect this information. In addition, some researchers were contacted, and they generously provided raw data and reports that were not available from other sources. Over the course of this collection process, I examined more than 100 Late Woodland, Emergent Mississippian, and Mississippian paleoethnobotanical reports from the American Bottom, Moundville, and Central Tombigbee regions. As discussed below, a subset of these reports were used in the final analysis: 63 American Bottom reports, two Central Tombigbee reports, and three Moundville reports in addition to unpublished data from Dr. Scarry.

Not all of these reports were included in the final database for several reasons. First, reports that were not complete, did not include raw data (or enough information to allow the calculation of estimated raw numbers), or were of questionable quality were eliminated. Second, only reports based on remains collected by flotation were used to ensure standardization of analytical results. Finally, paleoethnobotanical reports without corresponding archaeological reports were not usually included. The paleoethnobotanical report from the Walmart site in the American Bottom region is one exception to this rule. The Walmart site was included due to the wealth of plant materials found at that site, and because the overall quality of Katie Parker's paleoethnobotanical work in the American Bottom region is so high. Archaeological information about the paleoethnobotanical samples generally was necessary in order to understand how the remains were distributed across time and space.

Given this selection process, each region, and sometimes each report, presented challenges to integrating these data into a uniform body of information. For example, the published information from the general Central Tombigbee region (Caddell 1982, 1983) was presented in various summarized forms. Only the seed <u>totals</u>, including both waterscreened and flotation-derived materials from each period in the Lubbub Creek Archaeological Locality project are presented. Because the individual seeds were not associated with specific features, I could not to calculate feature ubiquity at this site. Similarly, weights of wood, nutshell, unknowns, and maize were presented as percentages of total weight rather than as raw weights or counts from the Central Tombigbee project. I included the completely sorted 1/4 inch waterscreened materials in my calculated seed totals, and I calculated the estimated weights of the wood, nutshell, and maize from the Central Tombigbee project. This was done to make the Central Tombigbee and Lubbub Creek Archaeological Locale projects comparable with each other and with the other sites in this investigation. The addition of waterscreened materials to the totals for this region may amplify the importance of wood, nutshell, and/or maize in comparison with the American Bottom or Moundville regions, but not to a degree that would invalidate general comparisons.

Dr. C. Margaret Scarry graciously provided the complete raw data from her various research projects in the Moundville region. The availability of this raw data greatly facilitated the integration of Moundville plant remains into my research project. Dr. Scarry's sorting technique, however, differs somewhat from that generally employed in the Central Tombigbee and American Bottom regions. She completely sorted all materials (including wood and hickory nutshell) to the 1.4 mm sieve size, as opposed to the 2.0 mm sieve size. As a result, her counts and weights for items such as wood and nutshell will be inflated in comparison with these other regions. It was decided that this inflation would not be so severe as to render general comparisons between the studied regions invalid.

The paleoethnobotanical data from American Bottom sites, despite the great number of sites included in this database, tended to be quite uniformly collected, analyzed, and presented. The uniformity of these data sets is due to the efforts of Sissel Johannessen, who supervised paleoethnobotanical research associated with the FAI-270 projects, and her assistants Sandra Dunavan, Katie Parker, Mary Simon, and Lucy Whalley. The influence of this huge archaeological project encouraged the use of uniform methods in paleoethnobotanical projects, including more recent work in the American Bottom region by Sandra Dunavan, Neal Lopinot, Kathyn Parker, and Mary Simon.

Selection of Archaeomedicinal Plants

Possible medicinal plants were selected from these paleoethnobotanical reports by comparing the species or genera present in publications by Lewis and Elvin-Lewis (1977), Moerman (1998), and other ethnobotanies. Potential medicinal plants were defined as any species used by two or more eastern Native American tribal groups as summarized by Moerman (1998). As discussed in Chapter 2, Moerman (1998) compiled ethnobotanical information from 44 Native American groups who historically resided in the Eastern Woodlands and Eastern Plains. This collection of ethnobotanies in no way was assumed to represent the complete width and breadth of medicinal plant use during history or prehistory. *Native American Ethnobotany* (Moerman 1998), instead, served as a guide to those medicinal plants used by a range of historic Native people that could be compared with the paleoethnobotanical record. Indeed, some species such as spurges and morning glories have significant biochemical qualities not recognized (or possibly recorded) by (or for) tribal groups in the Eastern Woodlands. Data from additional ethnobotanical, ethnopharmacological, and phytochemical publications (Bisset 1994; Blumenthal 1998; Bruneton 1995; Kindscher 1992; Lewis and Elvin-Lewis 1977) were used to support the inclusion of such taxa in the archaeomedicinal database.

Certain taxa were not included in the database if they were known to be domesticated and/or cultivated during prehistory, with the exception of tobacco. For example, maize has many medicinal uses, but it would be impossible to separate the more important use of the plant as a grain from its occasional use as a medicine. The decision not to include various knotweeds (*Polygonum* sp.) and members of the grass (Poaceae) family also was based on the prevalence of subsistence and technological uses of these plants over any medicinal uses. Similarly, there are many wood- and tree bark-based medicines, but the use of wood for fires, shelter, and numerous other purposes would make it impossible to tell the difference between use of wood for fire or for tea. An exception was made for redcedar (*Juniperus virginiana*), because this species has already been identified by many archaeologists and ethnobotanists as an important ritual plant.

Certain guidelines were followed in recording information on the archaeomedicinal plants from reports. When an instance of a plant was qualified with "?", "possible", or "cf.", it was assumed, for the purposes of this research, that the plant was positively identified. Therefore, the counts of medicinal plant remains may be slightly higher than would have been indicated by using only the secure classifications. This approach was used because some researchers are more conservative than others in their identifications. In addition, no attempt was made to specify species or genus for plant remains if this information was not provided by the original authors. Many of the plants are identified only to genus or even family level as a result. In such cases, all native members of the genus or family were investigated for possible medicinal uses.

Within the broader rubric of "archaeomedicinal plants," four categories, based on their relative medical versus subsistence importance, were recognized. First, there is the group of plants that had been used predominantly as medicines by historical Native Americans in the eastern United States. Those plants were grouped as "Medicinal" or "Category 1" plants. The second group of plants consists of those that had ethnobotanical uses equally (or nearly so) distributed between subsistence and medicinal categories. These are "Medicine/Food" or "Category 2" plants. Thirdly, plants were identified whose primary use was as a food with secondary uses as a source of medicines. These are "Food" or "Category 3" plants. Finally, plants used in rituals with secondary and/or interlaced use as a medicine are discussed as "Ritual" or "Category 4" plants.

It is important to differentiate these four categories, because the presence of a given taxon in the paleoethnobotanical record should be evaluated as to the probability that it represents the use of that plant as a healing agent. This evaluation should be tempered with the fact that very few medical uses of plants are derived from plant parts, such as seeds, that are readily preserved and recognizable in the paleoethnobotanical record. Most medicines are based on roots, bark, leaves, sap, and other non-durable or difficult to identify plant parts. Therefore, the presence of seeds at a site is more likely to represent the plant as a source of calories than as medicine. The use of a plant, or specific parts of a plant, for food does not de facto exclude that taxon from medical usage. Indeed, plants that are used for flavorings, teas, and secondary foods may be more likely to be culturally salient and accessed as medicines (Asch 1994; Dixon 1991; Etkin 1994; Etkin and Ross 1991; Moerman 1994). Therefore, I argue that the presence in the paleoethnobotanical record of edible plants with secondary uses as medicines is indirect evidence for the cultural availability, and possible use, of that same plant as a medicine.

Summary of Data

After the data collection and selection of medicinal plant processes were complete, the next stage of this project (i.e. data analysis) took place. Summaries of the subsistence and non-subsistence plant remains from the sites under investigation with their respective contextual information were entered into an Access database. Data such as count and weight of botanical remains, and the site-specific contextual information relating to the botanical samples were included in this database.

As discussed previously, there was some variation among the paleoethnobotanical researchers in these reports. In an attempt to standardize the array of reports, data were summarized in the same manner for all reports. Although these details were recorded for all available reports, some information such as wood weight was not used in later analyses. Certain standard terms were developed and applied as follows:

1. "Count of Plant Remains": This category was defined as the count of greater than 2.00 mm wood and nutshell, plus all maize remains and squash rind (which was often removed from less than 2.00 mm fractions). Bark, monocot stem, seeds (even those larger than 2.00 mm), unknown materials, and other botanical substances greater than 2.00 mm were excluded from this category.

2. "Number of Analyzed Features" : This category was defined as the total number of Late Woodland, Emergent Mississippian, and Mississippian features with corresponding paleoethnobotanical samples that had been analyzed. Each feature was included in this summary only once even if several samples had been taken from various zones or lenses within the feature. None of the features in this analysis were recognized as having been used in more than one temporal phase or period.

3. "Number of Seeds": This category was defined as the number of seeds and fragments of redcedar, not including maize or nuts, within a temporal frame for a given archaeological region. Aggregates of cultivated seeds greater than 400 individuals from the American Bottom region, and pine seeds from the Central Tombigbee region were removed from the total to prevent undue significance being given to features with these masses.

4. "Component": Several sites in my project had occupations through multiple periods or even phases. Each defined temporal unit (e.g., Sponemann phase) was considered a separate component, resulting in some sites having multiple components.

5. "Feature Number": The feature numbers that were assigned by the excavators were combined with a two or three letter/number identification code (e.g., feature 10 from the Boschert site was recorded as 10BO) to prevent data from two different sites with the same feature number from becoming mixed. In addition, if a site had multiple occupations, a code was added to the feature/site code to identify the phase associated with the feature (e.g., feature 20 from BBB Motor Stirling phase occupation was recorded as 20BM-ST). All paleoethnobotanical data from a given feature were summarized, even if several zones or areas within the feature had been sampled separately.

6. "Type of Feature" : This category was defined as a simple single word or very short phrase description of the feature (e.g., "pit" instead of bell-shaped pit) to act as a convenient sorting tool enabling grouping of similar feature types.

Quantitative Procedures

The analysis of data took place in two major stages after the plants had been placed into one of the four archaeomedicinal categories. First, the plants within these categories were subjected to three types of quantification: Taxon Frequency, Feature Ubiquity, and Site Ubiquity. Discussion of these data, by category, is presented in Chapter 6. Secondly, the broader trends between and among the groupings, based on temporal (e.g., Late Woodland compared to Mississippian) and geographical boundaries (e.g., American Bottom region compared with Moundville region) were examined. In order to clarify the trends in these data, I compared the four archaeomedicinal categories to one another. The results of this second set of analyses are presented in Chapter 7. The methods used in both these chapters are discussed below.

"Taxon Frequency" for each of the potential archaeomedicinal plants was derived by dividing the number of seeds of that taxon found in a given cultural period by the total number of seeds from that same cultural period. In order to make the Taxon Frequency easier to envision, the total number of seeds was divided by 1000; if the seed total had not been divided, most of the resulting ratios would have been less than 0.001. These calculations were performed for Late Woodland, Emergent Mississippian, and Mississippian periods in the American Bottom region and Late Woodland and Mississippian periods in the Central Tombigbee and Moundville regions.

As an example, two tick trefoil (*Desmodium* sp.) seeds were found in Late Woodland contexts from the Central Tombigbee region. Late Woodland contexts from the Central Tombigbee yielded a total of 249 seeds, not including pine seeds. This total number of Late Woodland seeds was divided by 1000, as noted above. Therefore, the Taxon Frequency for Late Woodland tick trefoil in the Central Tombigbee region is $2 \div (249 \div 1000) = 8.03$.

In contrast, a total of 14 tick trefoil seeds were found in Late Woodland contexts in the American Bottom region. These same contexts yielded a total of 23,870 seeds, after seed masses with more than 400 seeds per feature were removed. This total also was divided by 1000 during the calculation of Taxon Frequency. Therefore, the Taxon Frequency for tick trefoil in the American Bottom is $14 \div (23870 \div 1000) = 0.58$. It should not necessarily be assumed that tick trefoil provided a smaller contribution to the total seed count in the American Bottom than the Central Tombigbee, because direct comparisons between regions are so difficult.

The overall percent presence (ubiquity) of a plant within temporal, contextual, and/or geographic units also was calculated. One measure of ubiquity, "Feature Ubiquity," was calculated by dividing the number of features within a regional period containing a specific taxon by the total number of features analyzed during that period in the same region. This measure was used to investigate the distribution of a taxon through time. For example, a total of 464 features was analyzed from Late Woodland contexts in the American Bottom region. Four of these 464 features contained tick trefoil remains, and the resulting Feature Ubiquity was 0.86%, because $[4 \div 464] \times 100 = 0.86\%$. This "Feature Ubiquity" calculation could not be made for the Central Tombigbee materials, because the information on seeds had been summarized for the Lubbub Creek site rather than presented feature by feature.

Unfortunately, patterns in rare plants were not always apparent with Feature Ubiquity, so a second ubiquity calculation was performed: Site Ubiquity. To calculate Site Ubiquity, I assigned a ranking of 1 to the presence of any archaeomedicinal plant within a site component, then the total count of sites at which the taxon was present was divided by the total number of site components during that temporal frame. Using the tick trefoil in Late Woodland American Bottom sites as an example again, each of the four tick trefoil remains was recovered from a different site. The Site Ubiquity for Late Woodland tick trefoil in the American Bottom, therefore, was 13.79%, because [4÷29] X 100 = 13.79%. The relatively small number of sites in the Moundville and Central Tombigbee regions with analyzed paleoethnobotanical assemblages inflated the Site Ubiquity measure from these regions when compared with the same calculation for the American Bottom region.

To examine broader trends in the plants with possible uses as medicines from the American Bottom, Central Tombigbee, and Moundville regions, I performed an additional set of calculations. Very few of the individual taxa were common enough through time and space to allow for comparisons among time periods and regions. A ratio of the total seed count in each of the four categories to the total number of possible archaeomedicinal seeds, called Category Percentage, was developed. For example, there was a total of 135 seeds from the medicinal plants category (Category 1) at Mississippian contexts in the American Bottom region. The total number of seeds in all four categories from the same time and region, with seed masses removed, was 2290. The Medicine Category Percentage was 6%, because [135÷2290] X 100 = 6%. The Category Percentages in this way could be compared by time period within the same region, and major changes in the composition of archaeomedicines through time and space identified. Because the Category Percentages were simple percentage calculations, raw seed numbers could be used rather than Taxon Frequencies. The use of Taxon Frequencies would have resulted in the same percentages if they had been substituted, because this calculation is based on the ratio of categories to one another.

Category Ubiquities were developed for the American Bottom and Moundville assemblages to complement data derived from the Category Percentages. This measure of ubiquity by category was calculated by summing the number of features with a given category of plant by period and region. The resulting sum then was divided by the total number of analyzed features for the corresponding period and region. For example, a total of 4 Late Woodland features from the Moundville region contained Category 1 taxa, and 24 Late Woodland features were analyzed in the Moundville region. The resulting calculation [(4÷24) x 100 = 16.67%] provides the Category Ubiquity.

In conclusion, I would like to highlight a couple of methods of analysis that I attempted, but proved to be less informative, or not as broadly applicable, than those methods presented in this dissertation. When this project was initially conceived, I envisioned flotation sample soil volume as the standardizing element rather than seed count (Williams 1998), because volume had been used for many of the American Bottom projects (Johannessen 1984). The reports from several paleoethnobotanical reports from the American Bottom and the Central Tombigbee regions did not, however, include volumes of floated soil, so soil as a standardizing factor could not be used uniformly across all three study regions. I also attempted to organize the archaeomedicinal plants by specific category of medicinal use in order to illustrate changes in the types of illnesses that were prominent during prehistory (Williams 1999). The paleoethnobotanical data on plants used for gastrointestinal concerns were compared with the data on plants used for respiratory problems, for example. Unfortunately, I found that many, if not most, of the taxa in the paleoethnobotanical record crossed between such health-based categories. This overlap made meaningful comparisons among the groups difficult because several taxa would be present in all the health categories that I was attempting to compare. The failure of these methods, while time consuming, strengthened my understanding of my data set and final results.

Images of Plants and Seeds

Photographs of the archaeomedicinal plants took place in two phases. First, photographs of traditional medicinal plants in the field have been taken during growing seasons since 1992. Within the past year, I concentrated on photographing those taxa most relevant to my research. These plants were photographed with 35 mm slide film when encountered, using standard and macro lenses. Slides were then scanned into gray-scale digital files for inclusion in Chapter 6.

Secondly, seeds from selected taxa were photographed using the scanning electron microscope at Washington University. Attempts at photographing the seeds using basic 35 mm cameras and magnifying lens resulted in less satisfying images, and, therefore, these images are not usually included in Chapter 6. It is vital to document these medicinal plants to ensure that other researchers have access to images of proper quality (i.e. high resolution to illuminate surface details) so that the same plant can be correctly identified in other archaeobotanical assemblages. Similar photographic works (e.g., Advanced Paleoethnobotany Seminar 1995; Davis 1993; Delorit and Gunn 1986; Martin and Barkley 1961; Montgomery 1977; Schoch et al. 1988) are some of the most valuable tools for the identification of unknown seeds.

CHAPTER 6:
DISTRIBUTION OF ARCHAEOMEDICINAL PLANTS IN THE AMERICAN BOTTOM, MOUNDVILLE, AND CENTRAL TOMBIGBEE REGIONS

Introduction

This chapter contains the summation of data related to archaeomedicinal plants in the three study regions. Analysis of the trends among this data are presented in Chapter 7. Within the broader rubric of "medical plants," four categories, based on their relative medical versus subsistence importance, were recognized. The first category included those plants that were used only for medical purposes; no major food or technological uses for them have been recorded in eastern North America. The second group of plants were those that were used by Historic Native Americans as medicines, foods, beverages, and occasionally technological items. The number of subsistence and medicinal uses of these medicine/foods plant tends to be comparable with nearly equal numbers of uses as a food or a medicine. A third group of plants were those that are used predominantly for subsistence purposes, but that had a lesser role as a source of medicine. Finally, there are species whose primary role in traditional Native American ethnobotanies was as ritual plants. These plants were included in the discussion about medicinal plants, because many of the rituals involving them had a healing component. With a continuum from medicine to food to ritual in mind, I discuss the four categories of plants identified in archeobotanical samples from the American Bottom (Table 6-1a), Moundville (Table 6-1b), and Central Tombigbee (Table 6-1c) regions.

Category 1: Plants Used Primarily as Medicines

The first group of plants consists of those whose dominant use by Eastern and Southeastern historic Native Americans was as medicine, although other traditional people may have used these plants for additional non-medicinal purposes. As predicted, these plants were very rarely identified in the paleoethnobotanical record. Most of them were identified fewer than five times (by count) from the American Bottom, Moundville, and/or Central Tombigbee regions.

Table 6-1a: Summary of Medicinal Plant Information from American Bottom Region

	Taxa	LW Seed Ct	E MS Seed Ct	MS Seed Ct	LW Taxon Frequency*	E MS Taxon Frequency*	MS Taxon Frequency*	# of LW Features with Taxon	# of E MS Features with Taxon	# of MS Features with Taxon	LW Feature Ubiquity	E MS Feature Ubiquity	MS Feature Ubiquity	# of LW Sites with Taxon	# of E MS Sites with Taxon	# of MS Sites with Taxon	LW Site Ubiquity	E MS Site Ubiquity	MS Site Ubiquity
Medicinal Plants	*Anemone* sp	1			0.04			1			0.22%			1			3.45%		
	Bidens spp	1		1	0.04		0.04	1		1	0.22%		0.15%	1		1	3.45%		3.45%
	Desmodium sp	8	8	24	0.34	0.28	1.06	4	2	11	0.86%	0.24%	1.68%	4	2	3	13.79%	13.33%	10.34%
	Chamaesyce maculata		1	18		0.03	0.79		1	12		0.12%	1.83%		1	1		6.67%	3.45%
	Chamaesyce cf. *nutans*			2			0.09			1			0.15%			1			3.45%
	Chamaesyce sp	12	44	36	0.50	1.52	1.59	9	16	16	1.94%	1.92%	2.44%	6	6	10	20.69%	40.00%	34.48%
	Spurge totals	12	45	56	0.50	1.55	2.47	9	17	29	1.94%	2.04%	4.43%	6	7	11	20.69%	46.67%	37.93%
	Galactia spp			1			0.04			1			0.15%			1			3.45%
	Galium aparine	55	26	19	2.30	0.90	0.84	24	10	13	5.17%	1.20%	1.98%	8	5	6	27.59%	33.33%	20.69%
	Geranium sp		1	1		0.03	0.04		1	1		0.12%	0.15%		1	1		6.67%	3.45%
	Hypericum sp			14			0.62			4			0.61%			1			3.45%
	Lespedeza sp.	7	4	5	0.29	0.14	0.22	4	2	3	0.86%	0.24%	0.46%	4	2	3	13.79%	13.33%	10.34%
	Lindera sp		1			0.03			1			0.12%			1			6.67%	
	Plantago sp			1			0.04			1			0.15%			1			3.45%
	Polygonatum/Smilacina			1			0.04			1			0.15%			1			3.45%
	Ranunculus sp.		1			0.03			1			0.12%			1			6.67%	
	Rhamnus sp.	1			0.04			1			0.22%			1			3.45%		
	Rumex sp.	3		1	0.13		0.04	2		1	0.43%		0.15%	2		1	6.90%		3.45%
	Silene sp.	1		1	0.04		0.04	1		1	0.22%		0.15%	1		1	3.45%		3.45%
	Sisyrinchium spp		3	4		0.10	0.18		1	2		0.12%	0.31%		1	1		6.67%	3.45%
	Verbascum sp.	1		1	0.04		0.04	1		1	0.22%		0.15%	1		1	3.45%		3.45%
	Verbena sp.	2	2	4	0.08	0.07	0.18	2	2	3	0.43%	0.24%	0.46%	2	2	2	6.90%	13.33%	6.90%
	Viola sp		1	1		0.03	0.04		1	1		0.12%	0.15%		1	1		6.67%	3.45%
Medicinal/ Food Plants	*Asclepias* sp		1	1		0.03	0.04		1	1		0.12%	0.15%		1	1		6.67%	3.45%
	Brassicaceae	2		4	0.08		0.18	1		2	0.22%		0.31%	1		1	3.45%		3.45%
	Celtis sp.	1			0.04			1			0.22%			1			3.45%		
	Gymnocladus dioca			2			0.09			2			0.31%			1			3.45%
	Lactuca sp			3			0.13			2			0.31%			2			6.90%
	Lamiaceae	6	5	10	0.25	0.17	0.44	4	3	7	0.86%	0.36%	1.07%	3	3	4	10.34%	20.00%	13.79%
	Lepidium sp.	1	10		0.04	0.34		1	2		0.22%	0.24%		1	2		3.45%	13.33%	
	Oxalis sp	3	1	5	0.13	0.03	0.22	2	1	3	0.43%	0.12%	0.46%	2	1	2	6.90%	6.67%	6.90%
	Phytolacca americana	10	1	34	0.42	0.03	1.50	3	1	9	0.65%	0.12%	1.37%	2	1	3	6.90%	6.67%	10.34%
	Rhus sp	37	23	45	1.55	0.79	1.98	11	9	23	2.37%	1.08%	3.51%	9	5	5	31.03%	33.33%	17.24%
	Rudbeckia sp		1	3		0.03	0.13		1	3		0.12%	0.46%		1	3		6.67%	10.34%
	Toxicodendron radicans	2			0.08			2			0.43%			2			6.90%		
	Sambucus canadensis	51	2	4	2.14	0.07	0.18	14	2	2	3.02%	0.24%	0.31%	5	2	2	17.24%	13.33%	6.90%
	Solanaceae	16	16	18	0.67	0.55	0.79	4	11	3	0.86%	1.32%	0.46%	4	5	2	13.79%	33.33%	6.90%
	Solanum ptycanthum	86	150	698	3.60	5.17	30.77	31	31	94	6.68%	3.72%	14.35%	12	10	15	41.38%	66.67%	51.72%
	Viburnum sp.		1	2		0.03	0.09		1	1		0.12%	0.15%		1	1		6.67%	3.45%

Table 6-1a: Summary of Medicinal Plant Information from American Bottom Region

	Taxa	LW Seed Ct	E MS Seed Ct	MS Seed Ct	LW Taxon Frequency*	E MS Taxon Frequency*	MS Taxon Frequency*	# of LW Features with Taxon	# of E MS Features with Taxon	# of MS Features with Taxon	LW Feature Ubiquity	E MS Feature Ubiquity	MS Feature Ubiquity	# of LW Sites with Taxon	# of E MS Sites with Taxon	# of MS Sites with Taxon	LW Site Ubiquity	E MS Site Ubiquity	MS Site Ubiquity
Food Plants	*Crataegus* sp		3			0.10			1			0.12%			1			6.67%	
	Diospyros virginiana	29	28	111	1.21	0.97	4.89	11	4	50	2.37%	0.48%	7.63%	8	3	10	27.59%	20.00%	34.48%
	Fragaria virginiana	18		3	0.75		0.13	1		3	0.22%		0.46%	1		1	3.45%		3.45%
	Morus rubra	1			0.04			1			0.22%			1			3.45%		
	Rubus sp	18	5	5	0.75	0.17	0.22	13	4	4	2.80%	0.48%	0.61%	8	4	3	27.59%	26.67%	10.34%
	Physalis sp			2			0.09			2			0.31%			1			3.45%
	Portulaca oleracea	64	24	359	2.68	0.83	15.82	19	6	34	4.09%	0.72%	5.19%	7	6	11	24.14%	40.00%	37.93%
	Prunus sp (cherry-size)			3			0.13			3			0.46%			3			10.34%
	Prunus sp (plum-size)	6	1	14	0.25	0.03	0.62	2	1	7	0.43%	0.12%	1.07%	1	1	2	3.45%	6.67%	6.90%
	Prunus spp. (indeterm.)	7	2	4	0.29	0.07	0.18	3	1	2	0.65%	0.12%	0.31%	3	1	1	10.34%	6.67%	3.45%
	Vitaceae			3			0.13			3			0.46%			2			6.90%
	Vitis sp	50	70	44	2.09	2.41	1.94	24	9	31	5.17%	1.08%	4.73%	13	6	8	44.83%	40.00%	27.59%
	Grape totals	50	70	47	2.09	2.41	2.07	24	9	34	5.17%	1.08%	5.19%	13	6	10	44.83%	40.00%	34.48%
Ritual Plants	Convolvulaceae		2	4		0.07	0.18		2	3		0.24%	0.46%		2	1		13.33%	3.45%
	Convolvulus sp		1			0.03			1			0.12%			1			6.67%	
	Ipomoea sp		8	197		0.28	8.68		4	12		0.48%	1.83%		4	5		26.67%	17.24%
	Morning glory totals		11	201		0.38	8.86		7	15		0.84%	2.29%		7	5		46.67%	17.24%
	Datura stramonium			5			0.22			4			0.61%			2			6.90%
	Juniperus (wood)	15	50	528	0.63	1.72	23.27	7	13	65	1.51%	1.56%	9.92%	2	7	14	6.90%	46.67%	48.28%
	Nicotiana sp	288	136	44	12.07	4.69	1.94	23	19	21	4.98%	2.28%	3.21%	6	8	7	20.69%	53.33%	24.14%

* Calculated as: Total count of a taxon in a period divided by (total seed count of a period/1000)

Table 6-1b: Summary of Medicinal Plant Information from Moundville Region

	Taxa	LW Seed Ct.	MS Seed Ct.	LW Taxon Frequency*	MS Taxon Frequency*	# of LW Feature with Taxon	# of MS Feature with Taxon	LW Feature Ubiquity	MS Feature Ubiquity	# of LW Sites with Taxon	# of MS Sites with Taxon **	LW Site Ubiquity	MS Site Ubiquity
Medicinal Plants	*Centaurea* sp.		1		0.37		1		0.59%		1		9.09%
	Chamaesyce sp.	1		0.84		1		4.17%		1		11.11%	
	Euphorbiaceae		5		1.87		5		2.96%		3		27.27%
	Galium aparine	2	16	1.68	6.00	1	9	4.17%	5.33%	1	3	11.11%	27.27%
	Ilex sp.	1	10	0.84	3.75	1	7	4.17%	4.14%	1	4	11.11%	36.36%
	Lathyrus sp.		29		10.87		1		0.59%		1		9.09%
	Lathyrus/Vicia		8		3.00		1		0.59%		1		9.09%
	Vicia sp.	1	15	0.84	5.62	1	2	4.17%	1.18%	1	2	11.11%	18.18%
	Magnolia grandiflora	1		0.84		1		4.17%		1		11.11%	
Medicinal/ Food Plants ***	*Celtis* sp.		2		0.75		1		0.59%		1		9.09%
	Gleditsia triacanthos	1		0.84		1		4.17%		1		11.11%	
	Malvaceae	3		2.53		1		4.17%		1		11.11%	
	Oeothera sp.		3		1.12		1		0.59%		1		9.09%
	Oxalis sp.		3		1.12		3		1.78%		2		18.18%
	Passiflora incarnata	2	42	1.68	15.75	2	17	8.33%	10.06%	2	8	22.22%	72.73%
	Phytolacca americana	3	244	2.53	91.49	2	11	8.33%	6.51%	2	5	22.22%	45.45%
	Rhus sp.	317	3	266.84	1.12	6	3	25.00%	1.78%	4	2	44.44%	18.18%
	Sabal minor	2		1.68		1		4.17%		1		11.11%	
	Sambucus sp.	3	15	2.53	5.62	1	4	4.17%	2.37%	1	1	11.11%	9.09%
Food Plants	*Portulaca* sp.	8	130	6.73	48.74	6	11	25.00%	6.51%	4	5	44.44%	45.45%
	Prunus americana	15	3	12.63	1.12	3	2	12.50%	1.18%	3	1	33.33%	9.09%
	Prunus sp.	8		6.73		4		16.67%		3	0	33.33%	0.00%
	Rubus sp.	1	9	0.84	3.37	1	7	4.17%	4.14%	1	3	11.11%	27.27%
	Vaccinium sp.		20		7.50		11		6.51%		5		45.45%
	Vitis sp.	8	39	6.73	14.62	4	15	16.67%	8.88%	3	6	33.33%	54.55%
Ritual Plants	*Ilex* cf. *vomitoria*		2		0.75		1		0.59%		1		9.09%
	Ipomoea/Convolvulus		33		12.37		17		10.06%		3		27.27%
	Juniperus sp.	3	24	2.53	9.00	2	6	8.33%	3.55%	2	1	22.22%	9.09%

* Calculated as: Total count of a taxon in a period divided by (total seed count of a period/1000).
** Each area within Moundville counted separately
*** Persimmon remains not included as discussed in chapter

Table 6-1c: Summary of Medicinal Plant Information from Central Tombigbee Region

	Taxa	LW Seed Ct.	MS Seed Ct.	LW Taxon Frequency*	MS Taxon Frequency*	# of LW Sites with Taxon	# of MS Sites with Taxon	LW Site Ubiquity	MS Site Ubiquity
Medicinal Plants	*Desmodium* sp.	2		8.00		1		20%	
	Galium aparine	1		4.00		1		20%	
Medicinal/Food Plants	*Gleditsia triacanthos*	2		8.00		1		20%	
	Lamiaceae/ *Salvia* sp.	3	1	12.00	1.35	1	1	20%	33%
	Passiflora incarnata	1	9	4.00	12.16	1	2	20%	66%
	Rhus sp.	1		4.00		1		20%	
Food Plants	*Crataegus* sp.	2		8.00		1		20%	
	Diospyros virginiana	6	33	24.00	44.59	4	2	80%	66%
	Prunus americana		16		21.62		1		33%
	Rubus sp.	1		4.00		1		20%	
	Vitis sp.	8	7	32.00	9.46	4	2	80%	66%
Ritual Plants	Convolvulaceae	1		4.00		1		20%	

Note that sample ubiquity could not be calculated for this region

* Calculated as: Total count of a taxon in a period divided by (total seed count of a period/1000).
The count of pine seeds was not included in the seed total.

It is interesting that many of these plants have weedy habits, flourishing along the edges of habitations and cultivated fields, but they tend not to be aggressive agricultural weeds. Their presence, while still possibly of accidental origin, could represent their purposeful use by humans rather than the result of inclusion of agricultural weeds. Those plants most commonly identified are discussed.

Tick trefoil. A total of 40 tick trefoil (*Desmodium* sp.) seeds was found in the American Bottom features (Table 6-2; Figure 6-1). The eight Late Woodland tick trefoil seeds from the American Bottom have a Taxon Frequency of 0.34. The eight Emergent Mississippian seeds have a Taxon Frequency of 0.28, and the 24 Mississippian seeds have a Taxon Frequency of 1.06. Tick trefoil seeds were present in nine components from seven sites. A total of four Late Woodland, two Emergent Mississippian, and 11 Mississippian period features contained these seeds, resulting in Feature Ubiquities of 0.86%, 0.24%, and 1.68%, respectively.

Tick trefoil seeds were also present in 20% of the Late Woodland sites from the Central Tombigbee region. The two seeds, with a Taxon Frequency of 8.00, were found at site 1GR1X1. No tick trefoil remains were identified in the Moundville region features.

Tick trefoil is a weedy plant often seen along wooded pathways and openings. The "sticktight" nature of the seeds is often used to explain the seed's presence in the paleoethnobotanical record, as is the case with bedstraw. The plant, usually its roots, has a limited number of medical uses (Moerman 1998:198-199). The most common use of the root is as an analgesic, specifically for relieving cramps. Tick trefoil is included in Category 1, because it was not used by tribal groups in the Eastern Woodlands for purposes other than medicinal. This is not to suggest that accidental inclusion of the remains in the paleoethnobotanical record is not also probable. In addition, tick trefoil pods and seeds are edible, but this use has not been recorded for Eastern tribal groups.

Spurges. Spurge (*Euphorbia* sp., *Euphorbia maculata*, and/or *Euphorbia* cf. *supina*, now *Chamaesyce* sp. [spurge], *Chamaesyce maculata* [milk spurge], and/or probably *Chamaesyce* cf. *nutans* [nodding spurge]) remains were found in 24 site components in the American Bottom

Table 6-2: Tick Trefoil (*Desmodium* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	5
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	1
			Fea. Ct.	1
	Old Goat Farm	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				8
Late Woodland Fea. Ct.				4
Taxon Frequency				0.34
Feature Ubiquity				0.86%
Site Ubiquity				13.79
Emergent Mississippian	Bridgeton	Pit	Seed Ct.	2
			Fea. Ct.	1
	Petitt	Pit	Seed Ct.	6
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				8
Emergent Mississippian Fea. Ct.				2
Taxon Frequency				0.28
Feature Ubiquity				0.24%
Site Ubiquity				13.33%
Mississippian	Bridges	Summary of all pit features	Seed Ct.	6
			Fea. Ct.	1
		Smudge pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	10
			Fea. Ct.	5
		Structure	Seed Ct.	3
			Fea. Ct.	2
	WalMart	Unknown	Seed Ct.	3
			Fea. Ct.	1
Mississippian Seed Ct.				24
Mississippian Fea. Ct.				11
Taxon Frequency				1.06
Feature Ubiquity				1.68%
Site Ubiquity				10.34%
Total Seed Ct.				40
Total Fea. Ct.				17
CENTRAL TOMBIGBEE				
Mississippian	1GR1X1		Seed Ct.	2
			Fea. Ct.	2
Total Seed Ct.				2
Total Fea. Ct.				2
Taxon Frequency				8.00
Site Ubiquity				20%

Figure 6-1: Ticktrefoil

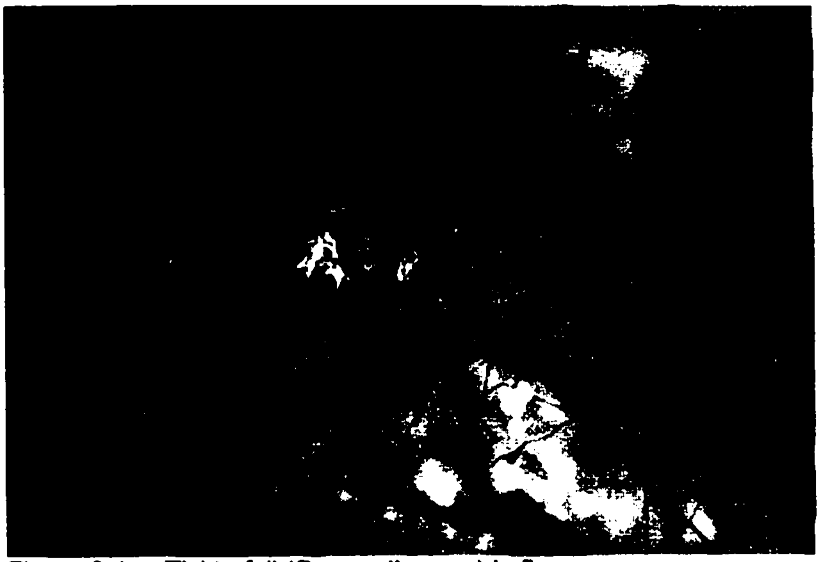


Figure 6-1a: Ticktrefoil (*Desmodium* sp.) in flower

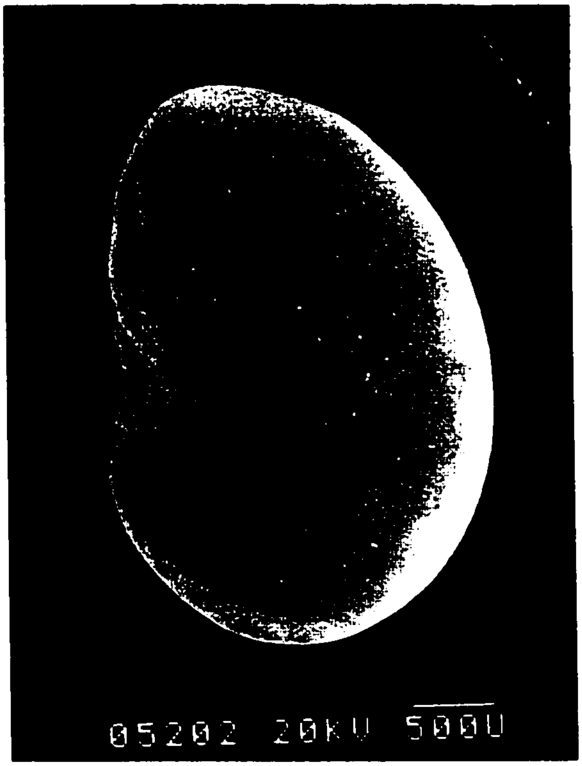


Figure 6-1b: Ticktrefoil (*Desmodium illinoense*) seed at 25X

region (Table 6-3; Figure 6-2), for a total of 113 seeds. Spurges were found in nine (1.94% Feature Ubiquity) Late Woodland, 17 (2.04% Feature Ubiquity) Emergent Mississippian, and 29 (4.43% Feature Ubiquity) Mississippian period features. The Mississippian period contexts contained the most spurge remains (n= 56 seeds; Taxon Frequency = 2.47), while Emergent Mississippian (n=45 seeds; Taxon Frequency = 1.55) and Late Woodland (n=12 seeds; Taxon Frequency = 0.50) contexts contained fewer seeds. It should be noted that many, if not all, of the *Euphorbia* sp. remains from American Bottom context are probably *Chamaesyce maculata* (K. Parker, personal communication 1999), but the presence of other species cannot be eliminated without the examination of each specimen.

Spurge (*Chamaesyce* sp. and Euphorbiaceae) remains were identified in the Moundville region, as well. A total of one Late Woodland and five Mississippian period spurge family seeds was found. The majority of seeds (n=4 seeds) were from Moundville site contexts. The single seed was found in a Late Woodland context from Site 1JE33.

Members of the spurge or euphorb family (Euphorbiaceae) have been used throughout much of their natural range as oral aids, purgatives, dermatological aids, and cough medicines (Lewis and Elvin-Lewis 1977:163-164). The individual species that have been identified in the American Bottom, *Chamaesyce maculata* and *Chamaesyce nutans*, do not appear to have been used by tribal groups in the eastern United States. *Chamaesyce maculata*, however, has been used as an emetic, for dysentery, as a laxative, and for dermatological issues such as skin eruptions, warts, and wounds by traditional healers elsewhere in the world (Beckstrom-Sternber et al. 1995). I suggest that the presence of several active chemical compounds such as cyanogenic glycosides (found in manioc [*Manihot esculenta*]) (Bruneton 1995:171-172), ricin (found in castor [*Ricinus communis*]) (Bruneton 1995:190), lignins (found in spurges in southern India such as *Phyllanthus* sp.) (Bruneton 1995:251-252), and toxic diterpenes (found in "*Aleurites, Croton, Euphorbia, Hippomane, Hura,* and *Jatrophia*" [Bruneton 1995:524]) indicates American spurge species could have effects on human physiology. This in turn could indicate that spurges might have been used medicinally by prehistoric residents of the American Bottom region.

Table 6-3: Spurges (Euphorbiaceae)

Period	Site	Context		Milk spurge	Nodding spurge	Spurge	Spurge family	Grand Total
AMERICAN BOTTOM								
Late Woodland	Bridges	Summary of all pit features	Seed Ct.			2		2
			Fea. Ct.			1		1
	Bridgeton	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
	Holdener	Pit	Seed Ct.			3		3
			Fea. Ct.			2		2
	Mund	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
	Range	Structure	Seed Ct.			2		2
			Fea. Ct.			1		1
	Vaughn Branch	Pit	Seed Ct.			3		3
			Fea. Ct.			3		3
Late Woodland Seed Ct.						12		12
Late Woodland Fea. Ct.						9		9
Taxon Frequency						0.50		0.50
Feature Ubiquity						1.94%		1.94%
Site Ubiquity						20.69%		20.69%
Emergent Mississippian	George Reeves	Summary of all features	Seed Ct.			11		11
			Fea. Ct.			1		1
	Goshen	Pit	Seed Ct.	1				1
			Fea. Ct.	1				1
	Petitt	Summary of all pit features	Seed Ct.			12		12
			Fea. Ct.			1		1
	Radic	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
		Structure	Seed Ct.			7		7
			Fea. Ct.			2		2
	Robert Schneider	Structure	Seed Ct.			3		3
			Fea. Ct.			1		1
	Robinson's Lake	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
		Post	Seed Ct.			1		1
			Fea. Ct.			1		1
		Structure	Seed Ct.			1		1
			Fea. Ct.			1		1
	Sponemann	Earth oven	Seed Ct.			4		4
			Fea. Ct.			4		4
		Pit	Seed Ct.			3		3
			Fea. Ct.			3		3
Emergent Mississippian Seed Ct.				1		44		45
Emergent Mississippian Fea. Ct.				1		16		17
Taxon Frequency				0.03		1.52		1.55
Feature Ubiquity				0.12%		1.92%		2.04%
Site Ubiquity				6.67%		40.00%		46.67%

Table 6-3: Spurges (Euphorbiaceae)

Period	Site	Context		Milk spurge	Nodding spurge	Spurge	Spurge family	Grand Total
AMERICAN BOTTOM								
Mississippian	BBB Motor	Pit	Seed Ct.			3		3
			Fea. Ct.			2		2
	Bridges	Summary of all pit features	Seed Ct.			2		2
			Fea. Ct.			1		1
	Cahokia/ICT-II	Pit	Seed Ct.	6	2			8
			Fea. Ct.	6	1			7
		Structure	Seed Ct.	12				12
			Fea. Ct.	6				6
	Esterlein	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
	GCS#1	Midden	Seed Ct.			1		1
			Fea. Ct.			1		1
	Julien	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
	Lohmann	Pit	Seed Ct.			7		7
			Fea. Ct.			1		1
	Radic	Pit	Seed Ct.			3		3
			Fea. Ct.			1		1
	Range	Pit	Seed Ct.			9		9
			Fea. Ct.			2		2
	Vaughn Branch	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
		Post	Seed Ct.			1		1
			Fea. Ct.			1		1
		Structure	Seed Ct.			2		2
			Fea. Ct.			1		1
	WalMart	Unknown	Seed Ct.			5		5
			Fea. Ct.			3		3
Mississippian Seed Ct.				18	2	36		56
Mississippian Fea. Ct.				12	1	16		29
Taxon Frequency				0.79	0.09	1.59		2.47
Feature Ubiquity				1.83%	0.15%	2.44%		4.43%
Site Ubiquity				3.45%	3.45%	34.48%		37.93%
Total Seed Ct.				19	2	92		113
Total Fea. Ct.				13	1	41		55
MOUNDVILLE								
Late Woodland	1JE33	Pit	Seed Ct.			1		1
			Fea. Ct.			1		1
Late Woodland Seed Ct.						1		1
Late Woodland Fea. Ct.						1		1
Taxon Frequency						0.84		0.84
Feature Ubiquity						4.17%		4.17%
Site Ubiquity						11.11%		11.11%
Mississippian	1TU56	Midden	Seed Ct.				1	1
			Fea. Ct.				1	1
	Moundville	Pit	Seed Ct.				3	3
			Fea. Ct.				3	3
		Burned area	Seed Ct.				1	1
			Fea. Ct.				1	1
Mississippian Seed Ct.							5	5
Mississippian Fea. Ct.							5	5
Taxon Frequency							1.87	1.87
Feature Ubiquity							2.96%	2.96%
Site Ubiquity							27.27%	27.27%
Total Seed Ct.						1	5	6
Total Fea. Ct.						1	5	6

Figure 6-2: Spurge

Figure 6-2a: Close-up of spurge (*Chamaesyce maculata*) in flower

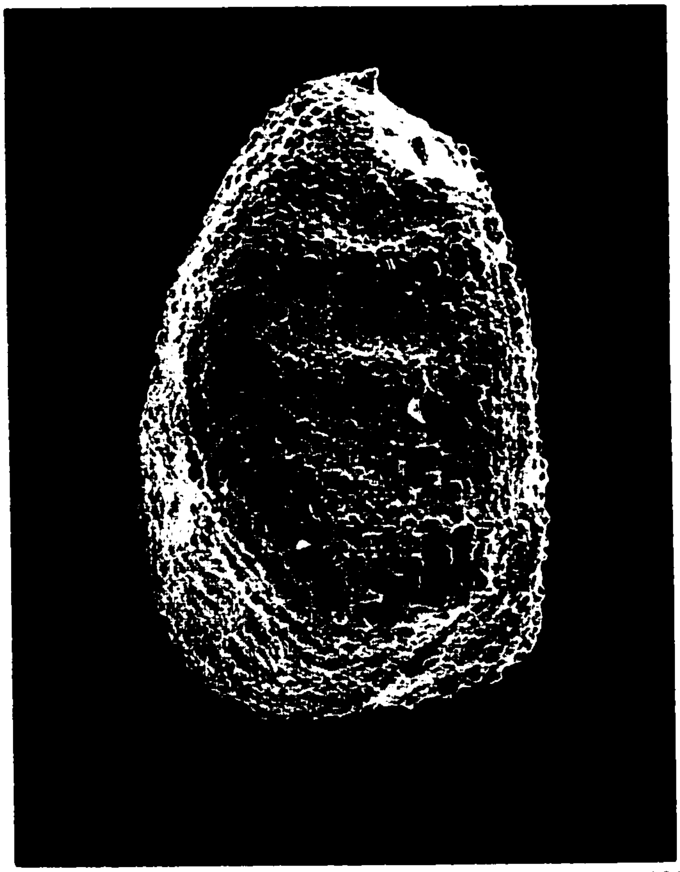


Figure 6-2b: Spurge (*Chamaesyce maculata*) seed at 100X

Bedstraw. Bedstraw (*Galium* sp.) seeds were present in all three archaeological regions in this investigation. One hundred bedstraw seeds were identified in features (Table 6-4; Figure 6-3) at 19 American Bottom sites. A total of 24 Late Woodland, 10 Emergent Mississippian, and 13 Mississippian period features contained bedstraw remains. The Late Woodland Mund site has the highest raw count (n=21) of bedstraw seeds, 21% of the total bedstraw seeds identified in Late Woodland to Mississippian period contexts in the American Bottom region. The dominance of Late Woodland bedstraw remains is illustrated in their Taxon Frequency (2.30) and Feature Ubiquity (5.17%), both of which are higher than the respective Emergent Mississippian (Taxon Frequency = 0.90, Feature Ubiquity = 1.20%) and Mississippian (Taxon Frequency = 0.84, Feature Ubiquity = 1.98%) period figures. Interestingly, bedstraw may have been associated with potential ritual contexts at two American Bottom sites: BBB Motor (Stirling phase Feature 38; n=1 seed) and Mund (Mund phase Feature 131; n=1 seed).

Bedstraw seeds are present in one Late Woodland and nine Mississippian features from the Moundville region, for a total of 18 seeds. The Taxon Frequency for the Late Woodland period is 1.68, and for the Mississippian period is 6.00. The site 1TU56 contained 10 bedstraw seeds, representing 62.5% of the total bedstraw raw seed count from this region. Interestingly, the Feature Ubiquity of bedstraw in the Moundville proveniences increases through time. It was present in 4.17% of Late Woodland features and 5.33% of Mississippian features. The Feature Ubiquity of most Moundville region taxa decreased through time because relatively few very rich Late Woodland features were analyzed.

Only a single bedstraw seed, with a Taxon Frequency of 4.00, was identified in a Late Woodland context from a site (1Pi61) in the Central Tombigbee region.

It appears that most, if not all, of the bedstraw present in these features is morphologically identical to catchstraw bedstraw (*Galium aparine*), as opposed to the other species of bedstraw present in the Eastern Woodlands. Bedstraw is a weedy plant that thrives in a number of habitats including poor forest soils to river banks and other disturbed habitats.

Table 6-4: Bedstraw (*Galium* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Alpha 3	Pit	Seed Ct.	1
			Fea. Ct.	1
	Bridges	Summary of all pit features	Seed Ct.	10
			Fea. Ct.	1
	Dohack	Pit	Seed Ct.	1
			Fea. Ct.	1
	Hayden	Pit	Seed Ct.	2
			Fea. Ct.	2
	Kingfish	Pit	Seed Ct.	4
			Fea. Ct.	3
	Little Hills	Pit	Seed Ct.	6
			Fea. Ct.	4
		Unknown	Seed Ct.	1
			Fea. Ct.	1
	Mund	Pit	Seed Ct.	20
			Fea. Ct.	5
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Range	Earth oven	Seed Ct.	6
			Fea. Ct.	2
		Pit	Seed Ct.	2
			Fea. Ct.	2
		Structure	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				55
Late Woodland Fea. Ct.				24
Taxon Frequency				2.30
Feature Ubiquity				5.17%
Site Ubiquity				27.59%
Emergent Mississippian	George Reeves	Summary of all features	Seed Ct.	3
			Fea. Ct.	1
	Goshen	Pit	Seed Ct.	2
			Fea. Ct.	2
	Petitt	Summary of all pit features	Seed Ct.	6
			Fea. Ct.	1
	Range	Pit	Seed Ct.	12
			Fea. Ct.	3
	Sponemann	Pit	Seed Ct.	2
			Fea. Ct.	2
		Structure	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				26
Emergent Mississippian Fea. Ct.				10
Taxon Frequency				0.90
Feature Ubiquity				1.20%
Site Ubiquity				33.33%

Table 6-4: Bedstraw (*Galium* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian	BBB Motor	Pit	Ct.	1
			Fea. Ct.	1
	Bluff Shadow	Summary of all trench	Seed Ct.	1
			Fea. Ct.	1
	Bridges	Summary of all pit features	Seed Ct.	5
			Fea. Ct.	1
		Smudge pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	3
			Fea. Ct.	3
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Carbon Dioxide	Pit	Seed Ct.	3
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	2
			Fea. Ct.	2
Mississippian Seed Ct.				19
Mississippian Fea. Ct.				13
Taxon Frequency				0.84
Feature Ubiquity				1.98%
Site Ubiquity				20.69%
Total Seed Ct.				100
Total Fea. Ct.				47
MOUNDVILLE				
Late Woodland	1TU44/45	Pit	Seed Ct.	2
			Fea. Ct.	1
Late Woodland Seed Ct.				2
Late Woodland Fea. Ct.				1
Taxon Frequency				1.68
Feature Ubiquity				4.17%
Site Ubiquity				1.11%
Mississippian	1HA8	Floor	Seed Ct.	1
			Fea. Ct.	1
	1TU56	Midden	Seed Ct.	10
			Fea. Ct.	4
	Moundville	Pit	Seed Ct.	4
			Fea. Ct.	3
		Floor	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				16
Mississippian Fea. Ct.				9
Taxon Frequency				6.00
Feature Ubiquity				5.33%
Site Ubiquity				27.27%
Total Seed Ct.				18
Total Fea. Ct.				10
CENTRAL TOMBIGBEE				
Late Woodland	1Pi61		Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				1
Late Woodland Fea. Ct.				1
Taxon Frequency				4.00
Site Ubiquity				20%

Figure 6-3: Bedstraw

Figure 6-3a: Bedstraw (*Galium* sp.) with fruits

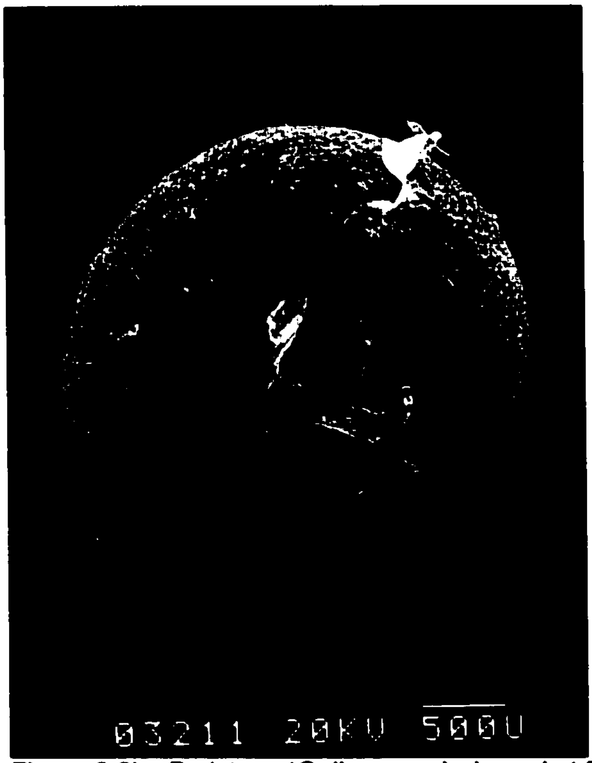


Figure 6-3b: Bedstraw (*Galium aparine*) seed at 25X

Many paleoethnobotanists assume that the seeds of this plant are accidental inclusions in the archeological record, because the small fruits are covered with prickles that adhere to clothing and fur. There has also been discussion of the plant having been used as a cushioning material. The seeds, therefore, could have been brought to the settlement and disposed of via this accidental method. Bedstraw also has several medical uses, however. Most commonly the plant was used as a dermatological aid and for kidney or general urinary tract complaints. Bedstraw was also used as a laxative, an emetic, and to help people who were spitting blood (Moerman 1998:241-242). Bedstraw is a common ingredient in traditional European herbal medicines, where it is used as a diaphoretic, spasmolytic, and for healing external wounds (Bisset 1994:225-227; Blumenthal 1998:378)

St. John's-wort. St. John's-wort (*Hypericum* sp.) seeds (n=14; Taxon Frequency = 0.62) were found in only one site, Cahokia ICT-II tract (Table 6-5; Figure 6-4). The seeds were identified in a total of four features for a Feature Ubiquity of 0.61%. No St. John's-wort remains were recovered from the Moundville or Central Tombigbee regions.

St. John's-wort is generally a medium to large shrubby plant. These perennials, with their bright yellow flowers, prefer open sites with well-drained to slightly moist substrate. Several species (including *H. drummondii, H. mutilum, H. punctatum, H. sphaerocarpum*) grow in the American Bottom region. Lopinot (1991) suggests that the St. John's-wort seeds from ICT-II most closely resemble common St. John's-wort (*H. perforatum*), although this species is not native to North America.

St. John's-wort does not appear to have any traditional Native American uses other than as a medicinal plant. St. John's-wort was used as a febrifuge, cough medicine, and for a suite of reproductive and gynecological problems by Native Americans (Moerman 1998:272-273). The varied Native American uses for St. John's-wort appear to have little overlap with the European uses of the same genus, with the possible exception of the plant resins being used on skin abrasions. St. John's-wort currently is used internally in Western alternative medicine as a mild antidepressant, and externally as a salve for minor skin abrasions, bruises, and burns (Bisset

Table 6-5: St. John's-wort (*Hypericum* sp.)

Period	Site	Fea.		
AMERICAN BOTTOM				
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.	11
			Fea. Ct.	2
		Structure	Seed Ct.	3
			Fea. Ct.	2
Mississippian Seed Ct.				14
Mississippian Fea. Ct.				4
Taxon Frequency				0.62
Feature Ubiquity				0.61%
Site Ubiquity				3.45%

Figure 6-4: St. John's-Wort

Figure 6-4a: St. John's -wort (*Hypericum* sp.) flower

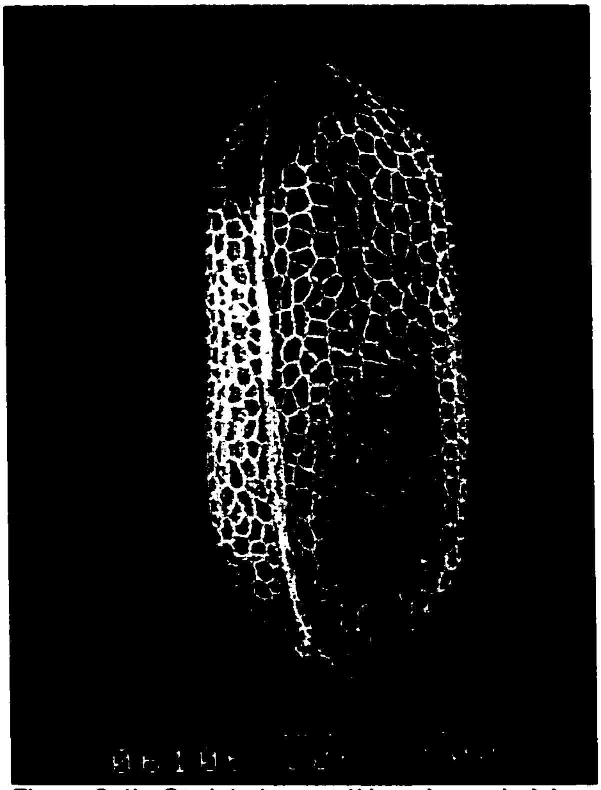


Figure 6-4b: St. John's-wort (*Hypericum virginicum*) seed at 75X

1994:273-275; Blumenthal 1998:214-215). The use of this plant as an antidepressant and anti-anxiety drug has a long history in Europe, and its use for these problems may represent culturally bound syndromes not recognized by historical Native American groups.

Holly. Holly (*Ilex* sp.) seeds were present in both Late Woodland (n=1 seed) and Mississippian (n=10 seeds) contexts within the Moundville region (Table 6-6; Figure 6-5). The Late Woodland and Mississippian Taxon Frequencies were 0.84 and 3.75. Site 1HA8 contained five seeds within four flotation samples, thereby representing 50% of the total Mississippian period holly remains.

No holly seeds were present in the features from the American Bottom or Central Tombigbee regions.

Hollies tend to be evergreen shrubs with simple alternate leaves. The male and female holly flowers are borne on separate plants, the resulting berry-like fruits containing four to six hard seeds. Several species of holly are present in the Moundville region, including Carolina holly (*I. ambigua*), possum-haw (*I. decidua*), American holly (*I. opaca*), and winterberry (*I. verticillata*). Hollies tend to grow in moist to swampy conditions (e.g., winterberry), but some prefer well-drained soils along ridgetops (e.g., possum-haw). Due to the importance of yaupon in historic Southeastern Native American spiritual life, it is discussed the section on ritual plants within this chapter.

Hollies have been used for at least twelve medical purposes by Native American tribes living in the eastern United States (Moerman 1998:273). Holly has been used as a dermatological aid by Catawba and Koasati tribal groups; decoctions of the bark and/or leaves were used for eye drops by the Alabama and Choctaw. The effect of holly on the gastrointestinal tract is evident in its use as a antidiarrheal, cathartic, emetic, and general aid. These effects are supported by the strong purgative action of holly berries (Lewis and Elvin-Lewis 1977:34).

Bush Clover. A total of 16 bush clover (*Lespedeza* sp.) seeds was found in American Bottom features (Table 6-7; Figure 6-6). Bush clover seeds were found at nine sites; four from the Late Woodland, two from the Emergent Mississippian, and three from Mississippian periods.

Table 6-6: Holly (*Ilex* sp.)

Period	Site	Context		
MOUNDVILLE				
Late Woodland	1HA39	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				1
Late Woodland Fea. Ct.				1
Taxon Frequency				0.84
Feature Ubiquity				4.17%
Site Ubiquity				11.11%
Mississippian	1HA8	Floor	Seed Ct.	2
			Fea. Ct.	2
		Midden	Seed Ct.	3
			Fea. Ct.	2
	Moundville	Pit	Seed Ct.	5
			Fea. Ct.	3
Mississippian Seed Ct.				10
Mississippian Fea. Ct.				7
Taxon Frequency				3.75
Feature Ubiquity				4.14%
Site Ubiquity				36.36%
Total Seed Ct.				11
Total Fea. Ct.				8

Figure 6-5: Holly

Figure 6-5a: American holly (*Ilex opaca*) plant with fruits

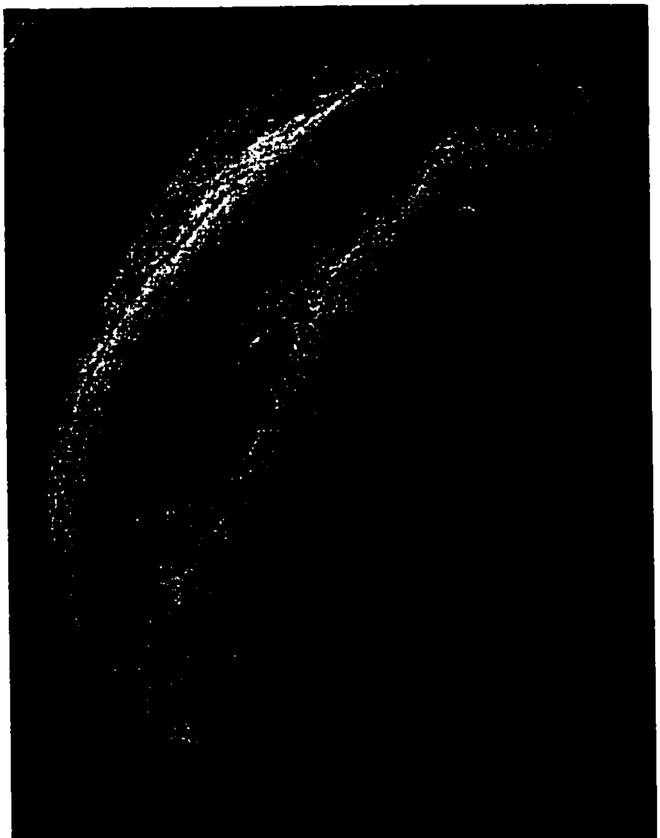


Figure 6-5b: American holly (Ilex opaca) seed at 20X

Table 6-7: Bush Clover (*Lespedeza* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	24A1-29	Pit	Seed Ct.	2
			Fea. Ct.	1
	Fish Lake	Pit	Seed Ct.	3
			Fea. Ct.	1
	George Reeves	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
	Mund	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				7
Late Woodland Fea. Ct.				4
Taxon Frequency				0.29
Feature Ubiquity				0.86%
Site Ubiquity				13.79%
Emergent Mississippian	Dohack	Pit	Seed Ct.	1
			Fea. Ct.	1
	Sponemann	Pit	Seed Ct.	3
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				4
Emergent Mississippian Fea. Ct.				2
Taxon Frequency				0.14
Feature Ubiquity				0.24%
Site Ubiquity				13.33%
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.	1
			Fea. Ct.	1
	Julien	Structure	Seed Ct.	3
			Fea. Ct.	1
	Range	Pit	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				5
Mississippian Fea. Ct.				3
Taxon Frequency				0.22
Feature Ubiquity				0.46%
Site Ubiquity				10.34%
Total Seed Ct.				16
Total Fea. Ct.				9

Figure 6-6: Bush Clover


Figure 6-6a: Bush Clover (*Lespedeza virginica*) flowers

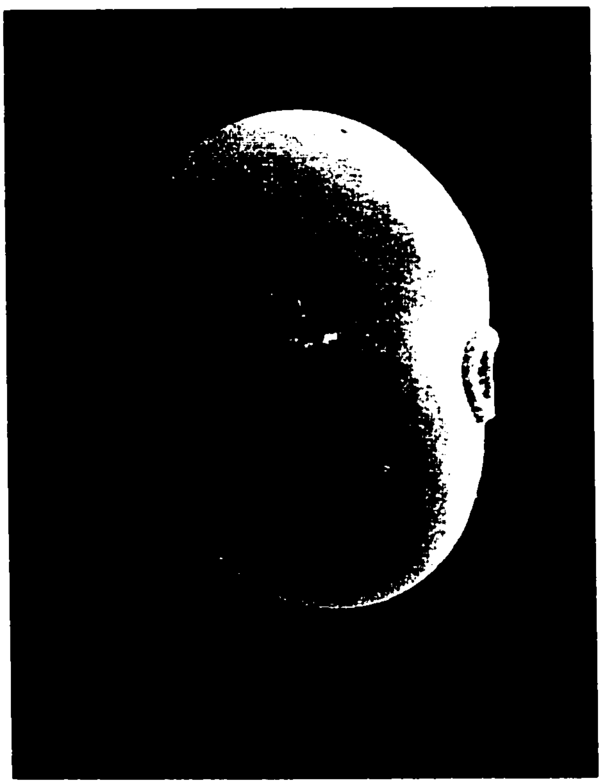


Figure 6-6b: Bush Clover (*Lespedeza procumbens*) seed at 35X

Each of these nine sites had only one feature with bush clover remains. Bush clover seeds were fairly evenly distributed through the periods in this investigation with seven seeds in Late Woodland (Taxon Frequency = 0.29), four in Emergent Mississippian (Taxon Frequency = 0.14), and five in Mississippian (Taxon Frequency = 0.22) period contexts. Interestingly, 75% of the bush clover seeds were identified in samples taken from pits. Plant remains identified as bush clover were not found in the Moundville and Central Tombigbee paleoethnobotanical reports.

Bush clovers tend to occur in dry woods, thickets, and openings. Their habits range from upright to spreading. In mid to late summer, small white to purple flowers rise above the three-parted leaves of bush clover.

Bush clover was used by eastern Native Americans as an antidote for poison (Smith 1928:229), and as a cure for neuralgia or rheumatism (Gilmore 1977:45). Interestingly, the neuralgia and rheumatism cures were administered in the form of a moxa, a treatment which involves the burning of the stems and applying the burning end to the patient's skin. This method of administration would present a good chance of seed preservation, if the mature fruit cases were not removed from the stem.

Bush clover plants are known to poison cattle (Lewis and Elvin-Lewis 1977:39), and have been studied as a possible source of chemotheraputic agents to combat Walker-256 carcinosarcoma (Foster and Duke 1990:74; Lewis and Elvin-Lewis 1977:39). Bush clover has been used in modern herbal medicine to reduce the nitrogen in urine as it relates to kidney disease (Foster and Duke 1990:74). Kindscher (1992:257-258) provides a brief but thorough summary of modern studies of bush clover's medical effectiveness.

Blue-eyed Grass. Blue-eyed grass (*Sisyrinchium* sp.) seeds were found in three American Bottom features for a total of seven seeds (Table 6-8; Figure 6-7). Blue-eyed grass seeds were found at the Emergent Mississippian site of Pettit (n=3 seeds; Taxon Frequency = 0.10) and the Mississippian site of Walmart (n=4 seeds; Taxon Frequency = 0.18). No blue-eyed grass remains were found in the Moundville or Central Tombigbee features.

Table 6-8: Blue-eyed Grass (*Sisyrinchium* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Emergent Mississippian	Petitt	Summary of all pit features	Seed Ct. Fea. Ct.	3 1
Emergent Mississippian Seed Ct.				3
Emergent Mississippian Fea. Ct.				1
Taxon Frequency				0.10
Feature Ubiquity				0.12%
Site Ubiquity				6.67%
Mississippian	WalMart	Unknown	Seed Ct. Fea. Ct.	4 2
Mississippian Seed Ct.				4
Mississippian Fea. Ct.				2
Taxon Frequency				0.18
Feature Ubiquity				0.31%
Site Ubiquity				3.45%
Total Seed Ct.				7
Total Fea. Ct.				3

Figure 6-7: Blue-eyed Grass

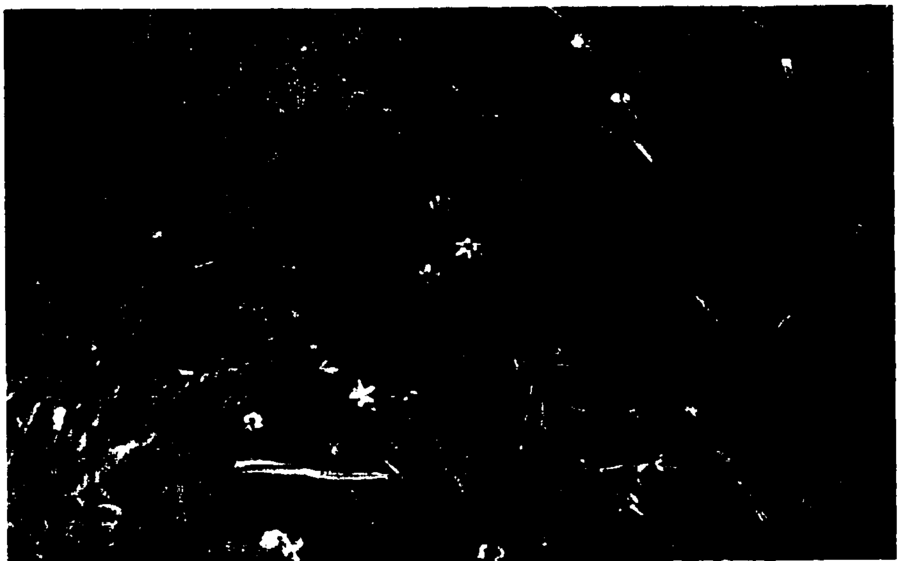


Figure 6-7a: Blue-eyed grass (*Sisyrinchium* sp.) flowers

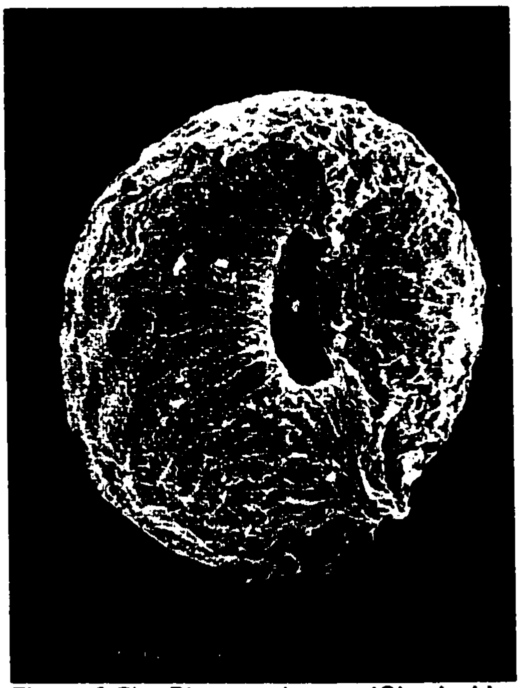


Figure 6-7b: Blue-eyed grass (*Sisyrinchium campestre*) seeds at 60X

Blue-eyed grasses, which are related to irises, occur through out the eastern United States. All species of blue-eyed grasses have narrow, grass-like leaves and two-edged stems. The small, blue to violet flowers of blue-eyed grasses are borne in small clusters at the top of slender stalks. The flowers appear in early spring to early summer.

Blue-eyed grass was used by Native Americans for a wide variety of purposes: 13 separate usages are noted by Moerman (1988:532-533). Most of the medical uses are limited to a single species of blue-eyed grass being used by a single tribal group (e.g., use of root as an antidiarrheal by the Cherokee, or use of root and stalks as a laxative by Iroquois). Both Menominee and Meskwaki tribes, however, used the plant for birthing-related problems. In addition, the plant was used as an analgesic by both Seminole and Meskwaki healers. There appear to be no widespread uses of this plant in modern European herbal medicine.

Vervain. Vervain (*Verbena* sp.) seeds, a total of eight, were identified in the American Bottom features (Table 6-9; Figure 6-8), but not in the other two regions. This plant is represented at six American Bottom sites. The two Late Woodland, and two Emergent Mississippian period sites each contained a single vervain seed. The Mississippian period has two sites represented: the Bridges site with a single seed, and the Range site with three vervain seeds.

Vervains are rough textured plants that can reach heights up to five feet, especially in the moist conditions that the plant prefers. The coarsely toothed leaves are elliptical in shape. Small purple to blue flowers are borne in clusters at the tips of branches during late summer and early fall.

The most commonly used portion of this plant are the leaves, flowers, and roots (Kindscher 1992:211). This bitter plant was used historically by Euroamericans as a tonic, emetic, sedative, and a palliative for colds (Kindscher 1992:312). Many of these uses overlap with ethnographic uses for eastern Native Americans (Moerman 1998:591-592). Vervain was used for respiratory complaints by the Cherokee, Oklahoma Delaware, and Iroquois. The emetic and tonic qualities were applied by Cherokee healers. The use of vervain for childbirth

Table 6-9: Vervain (*Verbena* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Little Hills	Pit	Seed Ct.	1
			Fea. Ct.	1
	Old Goat Farm	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				2
Late Woodland Fea. Ct.				2
Taxon Frequency				0.08
Feature Ubiquity				0.43%
Site Ubiquity				6.90%
Emergent Mississippian	Dohack	Pit	Seed Ct.	1
			Fea. Ct.	1
	Petitt	Pit	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				2
Emergent Mississippian Fea. Ct.				2
Taxon Frequency				0.07
Feature Ubiquity				0.24%
Site Ubiquity				13.33%
Mississippian	Bridges	Summary of all pit features	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	3
			Fea. Ct.	2
Mississippian Seed Ct.				4
Mississippian Fea. Ct.				3
Taxon Frequency				0.17
Feature Ubiquity				0.46%
Site Ubiquity				6.90%
Total Seed Ct.				8
Total Fea. Ct.				7

Figure 6-8: Vervain

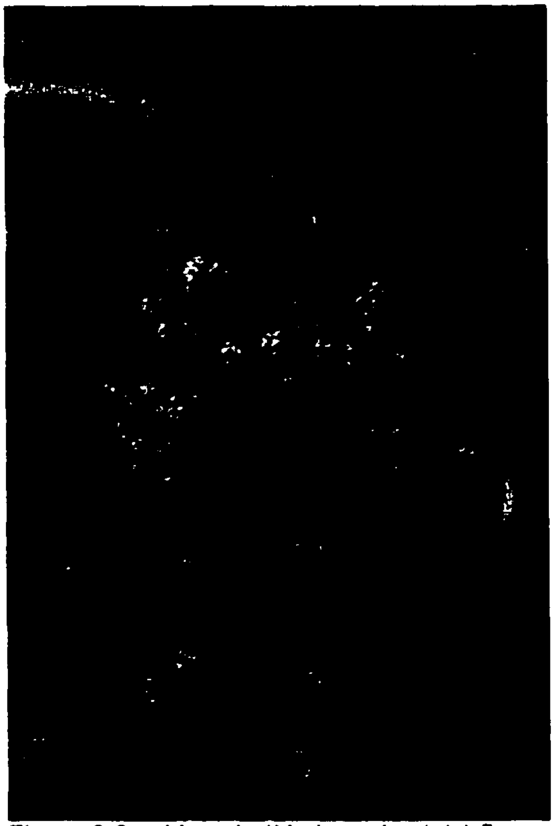


Figure 6-8a: Vervain (*Verbena hastata*) flowers

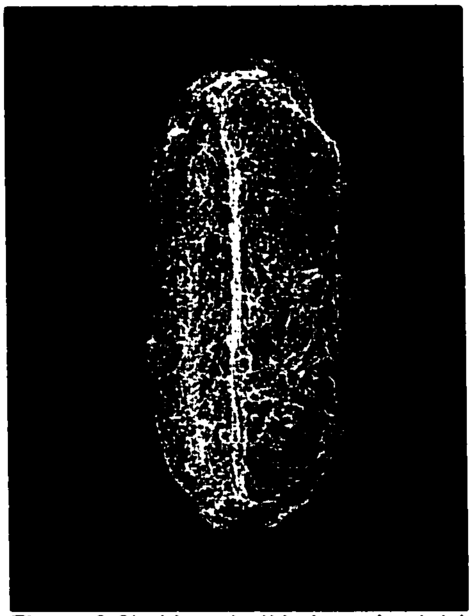


Figure 6-8b: Vervain (*Verbena hastata*) seed at 60X

complications by Cherokee and Meskwaki is especially intriguing given the uterine stimulant, verbenalin, found in this plant (Kindscher 1992:213). Numerous additional uses of the plant have been noted in European herbals (Bisset 1994:520-521; Foster and Duke 1990:156).

Vetch and Vetchling. Vetch (*Vicia* sp.) and vetchling (*Lathyrus* sp.) have very similar, nearly spherical seeds, which tend to be 3-5 mm in diameter. Fragmentary specimens of these seeds, therefore, occasionally are grouped together by paleoethnobotanists, and they are discussed together for that reason. Vetch (*Vicia* sp.) seeds were identified at Late Woodland (n=1 seed; Taxon Frequency = 0.84) and Mississippian (n=15 seeds; Taxon Frequency = 5.62) sites in the Moundville region (Table 6-10; Figure 6-9). The Mississippian vetch remains were present at three sites in the region. A single Mississippian pit at 1TU768 contained a mass of 29 vetchling seeds resulting in a Taxon Frequency of 10.87. Vetch/vetchling seeds (n=8) were recovered from a single Mississippian midden sample at 1TU56. The Taxon Frequency for these seeds is 3.00.

Many of the vetches that are present in the United States are the result of introductions from Europe (e.g., common vetch [*V. sativa*]). Native vetches, such as Carolina vetch (*V. caroliniana*), would have been present prehistorically in the Moundville region. Carolina vetch tends to occur in rich woods or on stream banks. Native species of vetchling (including *Lathyrus venosus*) thrive in open areas, but soil preferences for different species vary from rocky to moist. Both vetches and vetchling have small flowers that bloom in April to June, the pods with their rounded fruits following.

Use of vetches has been recorded for only two tribal groups in the Eastern Woodlands: Iroquois and Rappahannock (Moerman 1998:595-596). Several uses of vetch focused on its use as a reproductive aid, including its use as an abortifacient and love medicine. The ability of vetches to reduce swelling and pain was noted by Iroquois healers. Vetchling species were used for both food, similar in use to fresh garden peas, and medicine by Native Americans (Moerman 1998:298-299). The immature seeds of vetchling were eaten by Ojibwa, Omaha, and Chippewa. Vetchling was used by the Chippewa and Ojibwa for a number of complaints, including stomach

Table 6-10: Vetch (*Vicia* sp.) and Vetchling (*Lathyrus* sp.)

Period	Site	Fea.		Vetch	Vetchling	Vetch/ Vetchling
MOUNDVILLE						
Late Woodland	1TU44/45	Pit	Seed Ct.	1		
			Fea. Ct.	1		
Late Woodland Seed Ct.				1		
Late Woodland Fea. Ct.				1		
Taxon Frequency				0.84		
Feature Ubiquity				4.17%		
Site Ubiquity				11.11%		
Mississippian	1TU59	Midden	Seed Ct.			8
			Fea. Ct.			1
	1TU66	Pit	Seed Ct.	11		
			Fea. Ct.	1		
	1TU768	Pit	Seed Ct.		29	
			Fea. Ct.		1	
	Moundville	Pit	Seed Ct.	4		
			Fea. Ct.	1		
Mississippian Seed Ct.				15	29	8
Mississippian Fea. Ct.				2	1	1
Taxon Frequency				5.62	10.87	3.00
Feature Ubiquity				1.18%	0.59%	0.59%
Site Ubiquity				18.18%	9.09%	9.09%
Total Seed Ct.				16	29	8
Total Fea. Ct.				3	1	1

Figure 6-9: Vetch

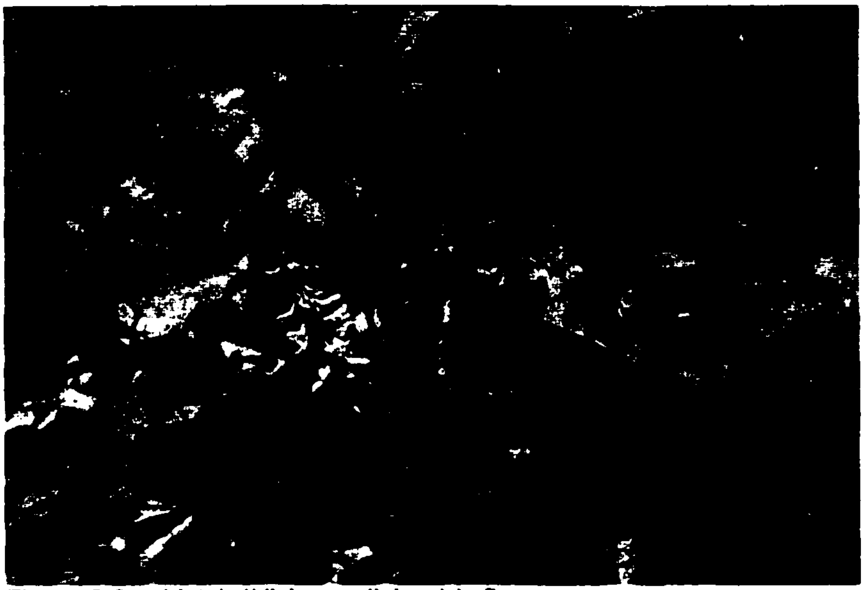


Figure 6-9a: Vetch (*Vicia caroliniana*) in flower

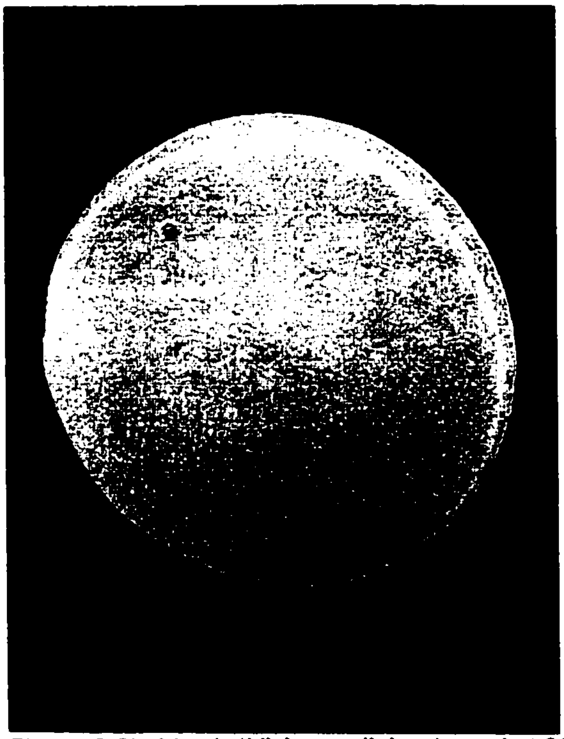


Figure 6-9b: Vetch (*Vicia caroliniana*) seed at 30X

troubles and bleeding wounds. There do not appear to be any comparable uses of vetches or vetchling by European traditional doctors, but vetchling has been known to cause cattle poisoning (Lewis and Elvin-Lewis 1977:44).

Additional Medicinal Species. An additional 13 species of archaeomedicinal plants have been identified in American Bottom features: anemone (*Anemone* sp.), sticktights (*Bidens* spp.), milk pea (*Galactia* spp.), wild geranium (*Geranium* sp.), spicebush (*Lindera* sp.), plantain (*Plantago* sp.), false/true Solomon's seal (*Polygonatum/Smilacina* spp.), buttercup (*Ranunculus* sp.), buckthorn (*Rhamnus* sp.), dock (*Rumex* sp.), catchfly (*Silene* sp.), mullein (*Verbascum* sp.), and violets (*Viola* spp.) (Table 6-11). Two additional species of archaeomedicinal plants have been identified in the Moundville region of the Black Warrior valley: magnolia (*Magnolia grandiflora*) and star thistle (*Centaurea* sp.). Most of these plants were represented at one or two sites, each site with a single seed. The overall low frequency of these from all regions' taxa (Table 6-11) does not distract from their importance in traditional Native American medicine (Moerman 1998), and they serve as additional examples of medical plants that have been preserved in the paleoethnobotanical record.

Category 2: Plants Used as Medicine and Food

The second group of plants are those used more or less equally for food and medicine. It is difficult to estimate whether the presence of such taxa in the paleoethnobotanical record is the result of their subsistence or medicinal use, especially given that the edible parts of some of these plants - leaves, buds, and sap – are not likely to be preserved. For example, the immature portions of milkweed (*Asclepias* sp.), pokeweed (*Phytolacca americana*), and wild lettuce (*Lactuca canadensis*) were consumed by historic Native Americans. Other plants such as sumac (*Rhus* sp.), elderberry (*Sambucus canadensis*), and possibly nightshade (*Solanum ptycanthum*) have all been used for their fleshy fruits, leaves, and/or flowers. It is significant that these three plants, whose fruits were probably consumed, are the most common taxa within this grouping. The medicine/food plants, overall, are more numerous per taxon than were those used for

Table 6-11: Additional Medicinal Taxa

Period	Site	Context		Anemone	Star Thistle	Sticktights	Milk pea	Geranium	Spicebush	Magnolia	Plantain	False/True Soloman's Seal	Buttercup	Buckthorn	Dock	Catchfly	Mullein	Violet	Grand Total
AMERICAN BOTTOM																			
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	1		1								1	1				4
			Fea. Ct.	1		1								1	1				4
	Carbon Dioxide	Pit	Seed Ct.												2				2
			Fea. Ct.												1				1
	Fish Lake	Pit	Seed Ct.														1		1
			Fea. Ct.														1		1
	Hayden	Pit	Seed Ct.													1			1
			Fea. Ct.													1			1
Late Woodland Seed Ct.				1		1								1	3	1	1		8
Late Woodland Fea. Ct.				1		1								1	2	1	1		7
Taxon Frequency				0.04		0.04								0.04	0.13	0.04	0.04		
Feature Ubiquity				0.22%		0.22%								0.22%	0.43%	0.22%	0.22%		
Site Ubiquity				3.45%		3.45%								3.45%	6.90%	3.45%	3.45%		
Emergent Mississippian	Sponemann	Pit	Seed Ct.					1	1				1						3
			Fea. Ct.					1	1				1						3
	Pettit	Pit	Seed Ct.															1	1
			Fea. Ct.															1	1
Emergent Mississippian Seed Ct.								1	1				1					1	4
Emergent Mississippian Fea. Ct.								1	1				1					1	4
Taxon Frequency								0.03	0.03				0.03					0.03	
Feature Ubiquity								0.12%	0.12%				0.12%					0.12%	
Site Ubiquity								6.67%	6.67%				6.67%					6.67%	
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.			1											1		2
			Fea. Ct.			1											1		2
		Structure	Seed Ct.															1	1
			Fea. Ct.															1	1
	Julien	Pit	Seed Ct.												1				1
			Fea. Ct.												1				1
	Olszewski	Structure	Seed Ct.													1			1
			Fea. Ct.													1			1
		Pit	Seed Ct.								1								1
			Fea. Ct.								1								1
	Range	Pit	Seed Ct.					1				1							2
			Fea. Ct.					1				1							2
	WalMart	Unknown	Seed Ct.				1												1
			Fea. Ct.				1												1
Mississippian Seed Ct.						1	1	1			1	1			1	1	1	1	9
Mississippian Fea. Ct.						1	1	1			1	1			1	1	1	1	9
Taxon Frequency						0.04	0.04	0.04			0.04	0.04			0.04	0.04	0.04	0.04	
Feature Ubiquity						0.15%	0.15%	0.15%			0.15%	0.15%			0.15%	0.15%	0.15%	0.15%	
Site Ubiquity						3.45%	3.45%	3.45%			3.45%	3.45%			3.45%	3.45%	3.45%	3.45%	
Total Seed Ct.				1		2	1	2	1		1	1	1	1	4	2	2	2	21
Total Fea. Ct.				1		2	1	2	1		1	1	1	1	3	2	2	2	20

Table 6-11: Additional Medicinal Taxa

Period	Site	Context		Anemone	Star Thistle	Sticktights	Milk pea	Geranium	Spicebush	Magnolia	Plantain	False/True Solomon's Seal	Buttercup	Buckthorn	Dock	Catchfly	Mullein	Violet	Grand Total
MOUNDVILLE																			
Late Woodland	1JE31	Pit	Seed Ct.							1									1
			Fea. Ct.							1									1
Late Woodland Seed Ct.										1									1
Late Woodland Fea. Ct.										1									1
Taxon Frequency										0.84									
Feature Ubiquity										4.17%									
Site Ubiquity										11.11%									
Mississippian	Moundville	Burned area	Seed Ct.		1														1
			Fea. Ct.		1														1
Mississippian Seed Ct.					1														1
Mississippian Fea. Ct.					1														1
Taxon Frequency					0.37														
Feature Ubiquity					0.59%														
Site Ubiquity					9.09%														
Total Seed Ct.					1					1									2
Total Fea. Ct.					1					1									2

medicine alone. This result is predictable, because the more uses that a plant had in a prehistoric ethnobotany, the more likely it is that the seeds will be accidentally preserved. The most numerous plants within this category are discussed in more detail.

Maypops. Maypops (*Passiflora incarnata*) seeds were relatively common in the Moundville region features (Table 6-12; Figure 6-10). Two seeds were identified from Late Woodland contexts, and 42 seeds were present in Mississippian contexts. The Taxon Frequencies for the Late Woodland and Mississippian maypops are 1.68 and 15.75, respectively. Fewer than five seeds were generally identified in any given feature, but FS # H81 from 1TU56 contained 11 seeds.

Maypops seeds also were present in Late Woodland and Mississippian period features from the Central Tombigbee region. Only a single maypops seed, with a Taxon Frequency of 4.00, was found in a Late Woodland context from 1GR1X1. Nine maypops seeds, with a Taxon Frequency of 12.16, were in Mississippian period features from Lubbub Creek (n=8) and 1GR2 (n=1). The Feature Ubiquity and Taxon Frequencies increase through time, which is somewhat unusual for this region.

No maypops remains have been found in the American Bottom region, although it may have grown there during prehistory.

Maypops are perennial vines that thrive in well-drained areas of human disturbance including abandoned fields and cleared woodlands. The purple flowers, which bloom between May and August, are very distinctive because their fringed petals form a "crown". The yellow fruits are the size and shape of chicken eggs, and they have a pleasantly tart flavor.

The presence of maypops seeds in paleoethnobotanical samples is often linked to the use of its fruits. Gremillion (1989) and Asch (1995) argue that maypops were encouraged by historic tribes in the Southeast, possibly resulting in the initial stages of domestication. The Cherokee people made ample use of edible fruit and medicinal roots of maypops (Moerman 1998:379). The soothing nature of the roots was used to help children during weaning, to cure

Table 6-12: Maypops (*Passiflora incamata*)

Period	Site	Fea.		
MOUNDVILLE				
Late Woodland	1JE31	Pit	Seed Ct.	1
			Fea. Ct.	1
	1JE33	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				2
Late Woodland Fea. Ct.				2
Taxon Frequency				1.68
Feature Ubiquity				8.33%
Site Ubiquity				22.22%
Mississippian	1HA8	Floor	Seed Ct.	5
			Fea. Ct.	1
		Midden	Seed Ct.	1
			Fea. Ct.	1
	1TU459	Pit	Seed Ct.	2
			Fea. Ct.	1
	1TU552	Pit	Seed Ct.	1
			Fea. Ct.	1
	1TU56	Midden	Seed Ct.	11
			Fea. Ct.	1
	1TU66	Pit	Seed Ct.	2
			Fea. Ct.	1
	1TU768	Pit	Seed Ct.	2
			Fea. Ct.	1
	Moundville	Pit	Seed Ct.	15
			Fea. Ct.	9
		Midden	Seed Ct.	3
			Fea. Ct.	1
Mississippian Seed Ct.				42
Mississippian Fea. Ct.				17
Taxon Frequency				15.75
Feature Ubiquity				10.06%
Site Ubiquity				72.73%
Total Seed Ct.				45
Total Fea. Ct.				19
CENTRAL TOMBIGBEE				
Late Woodland	1GR1X1		Seed Ct.	1
			Fea. Ct.	1
Total Seed Ct.				1
Total Fea. Ct.				1
Taxon Frequency				4.00
Site Ubiquity				22%
Mississippian	1GR2		Seed Ct.	1
			Fea. Ct.	1
	Lubbub		Seed Ct.	8
			Fea. Ct.	
Mississippian Seed Ct.				9
Mississippian Fea. Ct.				
Taxon Frequency				12.16
Site Ubiquity				66%
Total Seed Ct.				10
Total Fea. Ct.				

Figure 6-10: Maypops

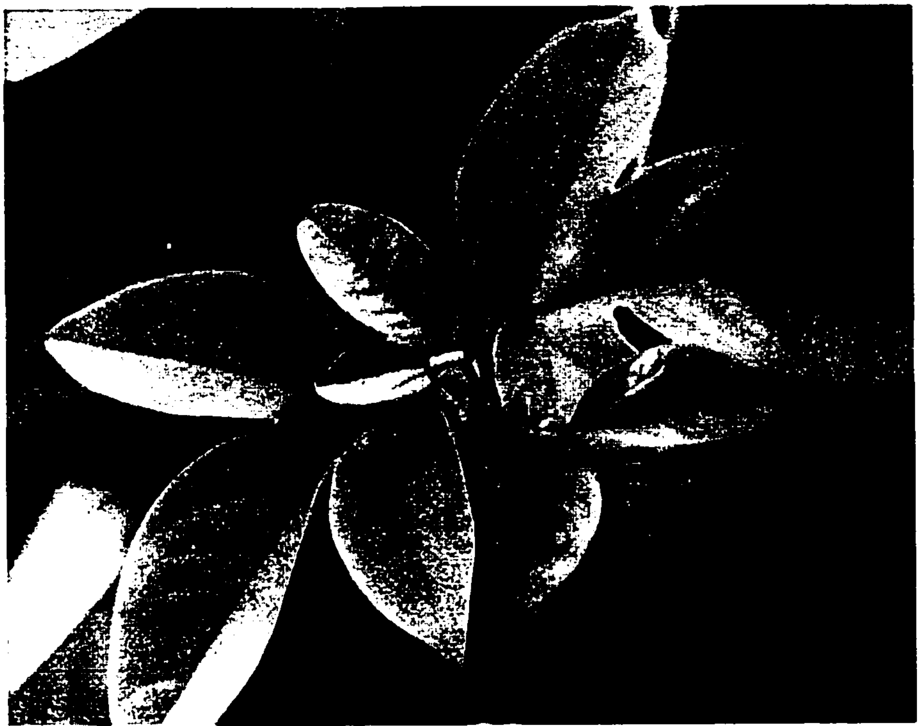


Figure 6-10a: Maypops (*Passiflora incarnata*) plant without flower

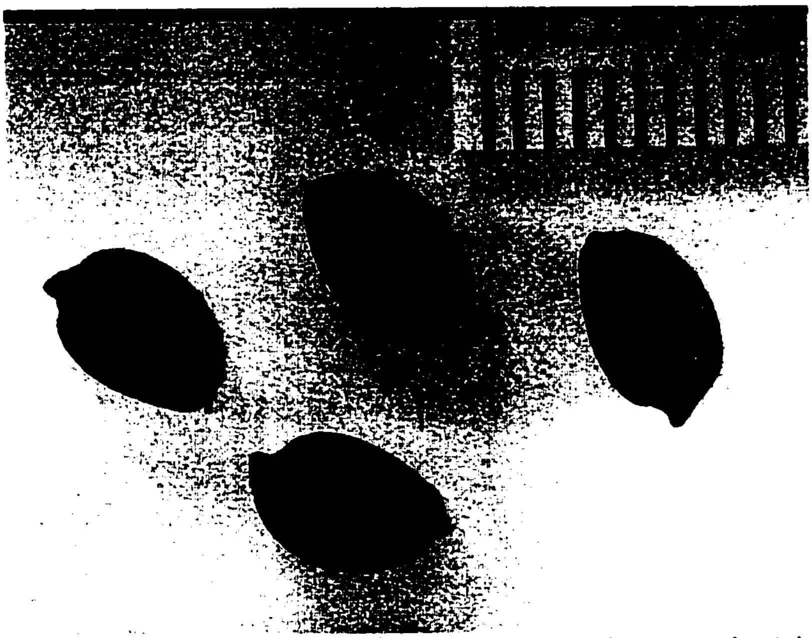


Figure 6-10b: Maypops (*Passiflora incarnata*) seed at approximately 10X

earaches, and even to heal irritations caused by scrapes. The Houma infused maypops roots to use as a blood tonic.

Maypops represent one the major herbs aiding sleeplessness in modern European herbal medicine (Bruneton 1995:284-285; Lewis and Elvin-Lewis 1977:168). It is unknown what active principle of maypops is responsible for its sedative effects (Bruneton 1995:284-285).

Poke. Poke (*Phytolacca americana*) seeds were present in American Bottom (n= 45 seeds) and Moundville (n= 247) regions (Table 6-13; Figure 6-11). This taxon was present in two Late Woodland, one Emergent Mississippian, and three Mississippian period sites from the American Bottom region. Most sites contained fewer than 10 poke seeds. The Mississippian component at the Julien site did not conform to this pattern, because it had a total of 25 pokeweed seeds in four pit features. The Taxon Frequency increases from the Late Woodland figure of 0.42 to the Mississippian figure of 1.50, with an Emergent Mississippian low of 0.03.

A total of 247 poke seeds was identified in the Moundville region. Three of these seeds are from Late Woodland contexts at 1JE33 (n=2 seeds) and 1TU570 (n=1 seed). Of the poke seeds from Mississippian contexts (n=244 seeds), all but 10 were found at the site of Moundville. Two concentrations of poke seeds were found in Mississippian period pits from Moundville: 92 seeds in FS # R2 and 76 seeds in FS # 943+. The increase in raw seed count through time is mirrored in the Taxon Frequency, which increases from 2.53 in the Late Woodland period to 91.49 in the Mississippian period.

Poke is an aggressive invader of disturbed areas, and it is difficult to eradicate once the sturdy perennial taproots have become established. Occurrences of this plant in the paleoethnobotanical record are often associated with its use as a cooked spring green (e.g., poke salad), although the seeds would not have been present on these immature plants. The dark purple berries have been used by Euro- and Native American people as a source of dye or ink (Sauer 1948), and the berries are edible after cooking.

Native American medicinal uses of poke tend to focus on the use of the berries and roots as an internal or external antirheumatic (Moerman 1998:397-398). Applications of root

Table 6-13: Pokeweed (*Phytolacca americana*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	8
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	2
			Fea. Ct.	2
Late Woodland Seed Ct.				10
Late Woodland Fea. Ct.				3
Taxon Frequency				0.42
Feature Ubiquity				0.65%
Site Ubiquity				6.90%
Emergent Missi	Petitt	Pit	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				1
Emergent Mississippian Fea. Ct.				1
Taxon Frequency				0.03
Feature Ubiquity				0.12%
Site Ubiquity				6.67%
Mississippian	Bridges	Summary of all pit features	Seed Ct.	4
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	3
			Fea. Ct.	2
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Julien	Pit	Seed Ct.	25
			Fea. Ct.	4
Mississippian Seed Ct.				34
Mississippian Fea. Ct.				9
Taxon Frequency				1.50
Feature Ubiquity				1.37%
Site Ubiquity				17.24%
Total Seed Ct.				45
Total Fea. Ct.				13
MOUNDVILLE				
Late Woodland	1JE33	Pit	Seed Ct.	2
			Fea. Ct.	1
	1TU570	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				3
Late Woodland Fea. Ct.				2
Taxon Frequency				2.53
Feature Ubiquity				8.33%
Site Ubiquity				22.22%
Mississippian	1HA8	Midden	Seed Ct.	4
			Fea. Ct.	1
	1TU56	Midden	Seed Ct.	6
			Fea. Ct.	2
	Moundville	Ash lense	Seed Ct.	1
			Fea. Ct.	1
		Midden	Seed Ct.	3
			Fea. Ct.	1
		Pit	Seed Ct.	230
			Fea. Ct.	6
Mississippian Seed Ct.				244
Mississippian Fea. Ct.				11
Taxon Frequency				91.49
Feature Ubiquity				6.51%
Site Ubiquity				45.45%
Total Seed Ct.				247
Total Fea. Ct.				13

Figure 6-11: Pokeweed

Figure 6-11a: Pokeweed (*Phytolacca americana*) plant with fruits

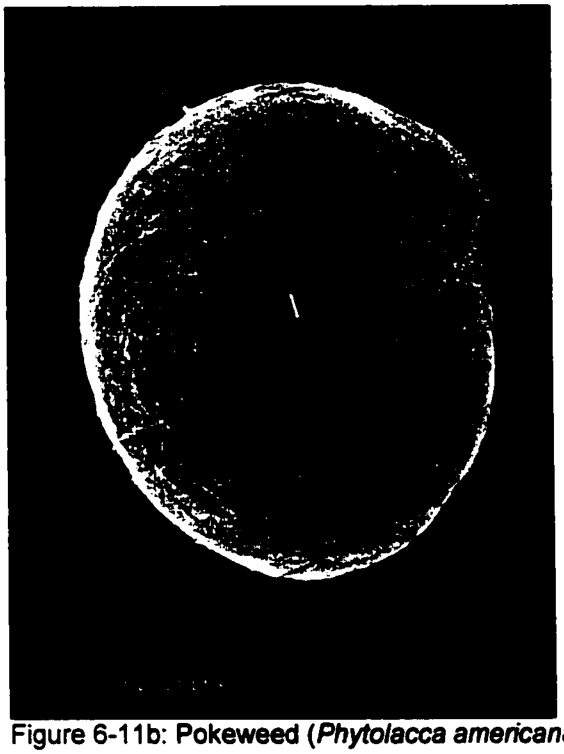


Figure 6-11b: Pokeweed (*Phytolacca americana*) seed at 35X

preparations to ulcers, swellings, bunions, and other skin-related ailments are common. The use of the plant as both an antidiarrheal and cathartic agent is interesting, but different methods of preparation, application, and dosage influence the effect of medicines made from poke.

Biologically active compounds in poke reveal the actions the plant may have on the human body. The saponin glycosides, specifically phytolaccigenin, are the source of bitter taste and irritating qualities associated with the plant. "Ingestion of the (raw) berries produces severe gastrointestinal disturbances accompanied by weakened pulse and respiration" (Lewis and Elvin-Lewis 1977:32). The presence of a mitogen that can be absorbed through skin abrasions probably presents greater long-term health risks than do the glycosides (Lewis and Elvin Lewis 1977:90-91).

Sumac. Sumac (*Rhus* sp.) remains were identified from all three archaeological regions in this investigation (Table 6-14; Figure 6-12). Sumac seeds, a total of 105, were identified in features from the American Bottom region. Sumac seeds were present in a total of 43 American Bottom features: 11 Late Woodland period (Feature Ubiquity = 2.37%), nine Emergent Mississippian period (Feature Ubiquity = 1.08 %), and 23 Mississippian period (Feature Ubiquity = 3.51%). Fewer than 10 sumac seeds were generally identified at any given site, but the Late Woodland period site of Old Goat Farm had 14 seeds, and the Mississippian period ICT-II Tract at Cahokia has 21 seeds. Four sumac seeds were found in a Stirling phase hearth (Feature 139) at Julien within a structure that may have been sweat lodge.

Sumac seeds, a total of 320, were identified in paleoethnobotanical samples from the Moundville region. The seeds tended to be identified less than four times in any given flotation sample, with the important exception of a seed concentration from the Late Woodland site of 1JE33. This site had 309 sumac seeds in FS# N. Even if this seed concentration is removed, the general trend is toward fewer sumac seeds through time in the Moundville region.

A single sumac seed, with a Taxon Frequency of 4.00, was found in a Late Woodland feature from the Central Tombigbee site of 1GR1X1.

Table 6-14: Sumac (*Rhus* spp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	10
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	1
			Fea. Ct.	1
	Carbon Dioxide	Pit	Seed Ct.	1
			Fea. Ct.	1
	Kingfish	Column/Level	Seed Ct.	2
			Fea. Ct.	1
		Pit	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	1
			Fea. Ct.	1
	Mund	Pit	Seed Ct.	2
			Fea. Ct.	1
	Old Goat Farm	Summary of all features	Seed Ct.	14
			Fea. Ct.	1
	Range	Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Steinberg	Pit	Seed Ct.	3
			Fea. Ct.	1
Late Woodland Seed Ct.				37
Late Woodland Fea. Ct.				11
Taxon Frequency				1.55
Feature Ubiquity				2.37%
Site Ubiquity				31.03%
Emergent Mississippian	BBB Motor	Structure	Seed Ct.	1
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	2
			Fea. Ct.	2
	Dohack	Pit	Seed Ct.	1
			Fea. Ct.	1
	Petitt	Summary of all pit features	Seed Ct.	10
			Fea. Ct.	1
	Range	Pit	Seed Ct.	8
			Fea. Ct.	3
		Structure	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				23
Emergent Mississippian Fea. Ct.				9
Taxon Frequency				0.79
Feature Ubiquity				1.08%
Site Ubiquity				33.33%

Table 6-14: Sumac (*Rhus* spp.)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian	Bridges	Summary of all pit features	Seed Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	12
			Fea. Ct.	10
		Structure	Seed Ct.	9
			Fea. Ct.	4
	Julien	Pit	Seed Ct.	5
			Fea. Ct.	2
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	9
			Fea. Ct.	3
	WalMart	Unknown	Seed Ct.	8
			Fea. Ct.	2
Mississippian Seed Ct.				45
Mississippian Fea. Ct.				23
Taxon Frequency				1.98
Feature Ubiquity				3.51%
Site Ubiquity				17.24%
Total Seed Ct.				105
Total Fea. Ct.				43
MOUNDVILLE				
Late Woodland	1JE31	Pit	Seed Ct.	4
			Fea. Ct.	1
	1JE32	Pit	Seed Ct.	1
			Fea. Ct.	1
	11JE33	Pit	Seed Ct.	312
			Fea. Ct.	3
Late Woodland Seed Ct.				317
Late Woodland Fea. Ct.				5
Taxon Frequency				266.84
Feature Ubiquity				25.00%
Site Ubiquity				44.44%
Mississippian	1HA8	Midden	Seed Ct.	1
			Fea. Ct.	1
	Moundville	Daub concen.	Seed Ct.	1
			Fea. Ct.	1
		Pit	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				3
Mississippian Fea. Ct.				3
Taxon Frequency				1.12
Feature Ubiquity				1.78%
Site Ubiquity				18.18%
Total Seed Ct.				320
Total Fea. Ct.				8
CENTRAL TOMBIGBEE				
Late Woodland	1GR1X1		Seed Ct.	1
			Fea. Ct.	1
Total Seed Ct.				1
Total Fea. Ct.				1
Taxon Frequency				4.00
Site Ubiquity				20%

Figure 6-12: Sumac

Figure 6-12a: Winged sumac (*Rhus copallina*) plant with fruits

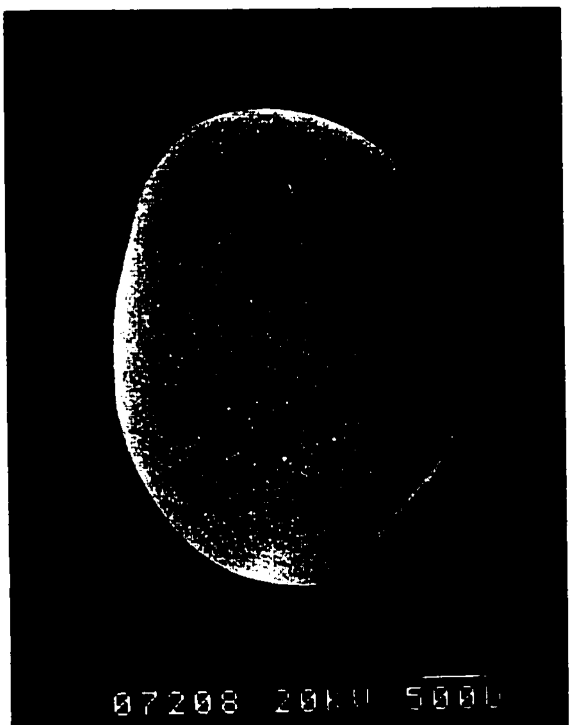


Figure 6-12b: Winged sumac (*Rhus copallina*) seed at 20X

There are several species of sumac native to the southeastern United States (e.g., smooth sumac [*Rhus glabra*], dwarf sumac [*Rhus copallina*], and fragrant sumac [*Rhus aromatica*]). On the basis of seed morphology, these species would be difficult to distinguish (Borojevic 1995:49). The seeds of poison ivy (*Toxicodendron radicans*) have a distinguishable morphology despite its previous inclusion in some older floras with sumacs. One poison ivy seed, with a Taxon Frequency of 0.08, has been identified at each of the Late Woodland period sites of Fish Lake and Little Hills in the American Bottom region. Sumacs thrive in poor soils and are aggressive invaders of abandoned fields. Most sumac species are shrubs to small trees that form colonies in open areas. The habit of poison ivy is quite different: small herbaceous plants grade into large aggressive vines.

Sumacs are another ethnographically multi-use plant (Moerman 1998:471-473). Paleoethnobotanists often focus on the use of the plant for its edible berries that were sometimes made into a cooling lemonade-like beverage by historic Native Americans. The stems, bark, roots, and berries of sumac additionally were used as a source of yellow, orange, red, gray, and black dye. The red fall leaves were gathered, dried, and added to smoking mixtures such as kinnikinnick by several Woodland and Plains tribal groups. Medical uses of the plant were varied, and they reflect its overall importance to Native Americans. Many of the medicines utilize the effectiveness of astringent tannins present in sumac bark, roots, and berries. Sumac was widely used as a dermatological aid and to relieve the symptoms of colds or coughs. Interestingly, *Rhus* spp. twigs "are used as chewing sticks throughout their distributions" from the Ozarks to Tanzania (Lewis and Elvin-Lewis 1977:243), another indication of the active tannins and natural antibiotics present in the plant.

<u>Elderberry</u>. Elderberry (*Sambucus canadensis*) remains were present in American Bottom and Moundville features, but not in the Central Tombigbee (Table 6-15; Figure 6-13). Fifty-seven elderberry seeds were found in the American Bottom region. Late Woodland (n=5; Site Ubiquity = 17.24%), Emergent Mississippian (n=2; Site Ubiquity = 13.33%), and Mississippian (n=2; Site Ubiquity = 6.90%) period components all contained elderberry remains.

Table 6-15: Elderberry (*Sambucus canadensis*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Alpha 1	Pit	Seed Ct.	2
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	9
			Fea. Ct.	2
	Fish Lake	Pit	Seed Ct.	8
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	7
			Fea. Ct.	6
	Vaughn Branch	Pit	Seed Ct.	24
			Fea. Ct.	3
Late Woodland Seed Seed Ct.				51
Late Woodland Fea. Ct.				14
Taxon Frequency				2.14
Feature Ubiquity				3.02%
Site Ubiquity				17.24%
Emergent Mississippian	Bridgeton	Pit	Seed Ct.	1
			Fea. Ct.	1
	Sponemann	Pit	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Seed Ct.				2
Emergent Mississippian Fea. Ct.				2
Taxon Frequency				0.07
Feature Ubiquity				0.24%
Site Ubiquity				13.33%
Mississippian	Vaughn Branch	Structure	Seed Ct.	1
			Fea. Ct.	1
	WalMart	Unknown	Seed Ct.	3
			Fea. Ct.	1
Mississippian Seed Ct.				4
Mississippian Fea. Ct.				2
Taxon Frequency				0.18
Feature Ubiquity				0.31%
Site Ubiquity				6.90%
Total Seed Ct.				57
Total Fea. Ct.				18
MOUNDVILLE				
Late Woodland	1TU44/45	Pit	Seed Ct.	3
			Fea. Ct.	1
Late Woodland Seed Ct.				3
Late Woodland Fea. Ct.				1
Taxon Frequency				2.53
Feature Ubiquity				4.17%
Site Ubiquity				11.11%
Mississippian	Moundville	Pit	Seed Ct.	15
			Fea. Ct.	4
Mississippian Seed Ct.				15
Mississippian Fea. Ct.				4
Taxon Frequency				5.62
Feature Ubiquity				2.37%
Site Ubiquity				9.09%
Total Seed Ct.				18
Total Fea. Ct.				5

Figure 6-13: Elderberry

Figure 6-13a: Elderberry (*Sambucus canadensis*) plant with flowers

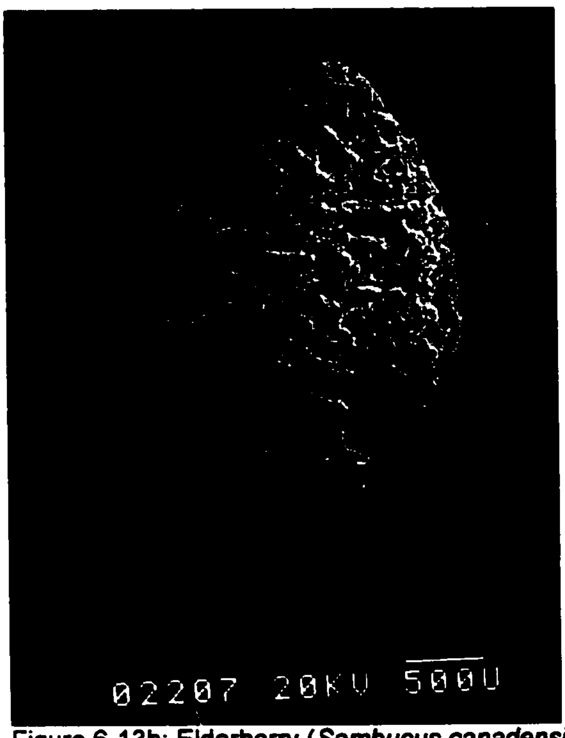


Figure 6-13b: Elderberry (*Sambucus canadensis*) seed at 25X

The seeds were relatively plentiful in the Late Woodland component of the Vaughn Branch site where 24 seeds were found. The vast majority of elderberry remains were found in Late Woodland contexts, both by raw count (n=51; 89.47%) and by number of features represented (n=14; 77.78%).

Elderberry remains were encountered infrequently in Moundville region paleoethnobotanical samples. One Late Woodland site, 1TU44/45, contained three seeds (Taxon Frequency = 2.53) in a single feature. All of the elderberry seeds from the Mississippian period were found at the Moundville site, totaling 15 seeds from four features, with a resulting Taxon Frequency of 5.62.

The tall, shrubby elderberry plant inhabits various soil types, but prefers areas with full sunlight. Both the large masses of white flowers, that are present in June and July, and the mature panicles of blue-black fruits, are edible. The shoots, stems, and unripe berry of the plant contain poisonous alkaloids and cyanide compounds (Lewis and Elvin-Lewis 1977:4).

Despite, or even because of, these poisonous qualities, elderberry species have been used for their medicinal qualities throughout much of their worldwide range (Moerman 1989:58-59). These poisons also present safety concerns for some traditional Native American uses of the wood such as popguns, blowguns, and medicine tubes (Moerman 1998:511-512). The ethnographic record also emphasizes the use of elderberry as an emetic, cathartic, and gastrointestinal aid (Moerman 1998:511-512). An unrelated use is as an aid for skin bruises, scrapes, and swellings. The emetic and cathartic actions on the human body of this plant are well explained by its poisonous qualities, but the use of the plant on skin abrasions is less well understood. European species of elderberry have most often been used to relieve the symptoms of colds (Bisset 1994:446-448).

Nightshades. Black nightshade (*Solanum* cf. *americanum*, now known as *Solanum pytcanthum)* seeds, 934 of them, were identified in American Bottom contexts (Table 6-16; Figure 6-14). The vast majority of black nightshade seeds (n=698; 74.73%) were contained within 94 Mississippian period features at 15 sites. Within this group, the Mississippian components at

Table 6-16: Nightshades

Period	Site	Context		Nightshade Family	Black nightshade	Grand Total
AMERICAN BOTTOM						
Late Woodland	Alpha 1	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Bridges	Summary of all pit features	Seed Ct.		26	26
			Fea. Ct.		1	1
	Bridgeton	Pit	Seed Ct.		5	5
			Fea. Ct.		2	2
	Columbia Quarry	Pit	Seed Ct.	1		1
			Fea. Ct.	1		1
	Fish Lake	Pit	Seed Ct.	11	2	13
			Fea. Ct.	1	1	2
	George Reeves	Summary of all pit features	Seed Ct.		4	4
			Fea. Ct.		1	1
	Holdener	Pit	Seed Ct.	2	1	3
			Fea. Ct.	1	1	2
	Julien	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Little Hills	Pit	Seed Ct.		11	11
			Fea. Ct.		4	4
	Mund	Pit	Seed Ct.		5	5
			Fea. Ct.		4	4
	Range	Earth oven	Seed Ct.		6	6
			Fea. Ct.		4	4
		Pit	Seed Ct.	2	9	11
			Fea. Ct.	1	5	6
		Structure	Seed Ct.		4	4
			Fea. Ct.		2	2
	Steinberg	Pit	Seed Ct.		2	2
			Fea. Ct.		1	1
	Vaughn Branch	Pit	Seed Ct.		9	9
			Fea. Ct.		3	3
Late Woodland Seed Ct.				16	86	102
Late Woodland Fea. Ct.				4	31	35
Taxon Frequency				0.67	3.60	
Feature Ubiquity				0.86%	6.68%	
Site Ubiquity				13.79%	41.38%	

Table 6-16: Nightshades

Period	Site	Context		Nightshade Family	Black nightshade	Grand Total
AMERICAN BOTTOM						
Emergent Mississippian	BBB Motor	Pit	Seed Ct.		5	5
			Fea. Ct.		4	4
	Bridgeton	Pit	Seed Ct.	1	39	40
			Fea. Ct.	1	2	3
	Dohack	Pit	Seed Ct.	6		6
			Fea. Ct.	3		3
		Structure	Seed Ct.	1		1
			Fea. Ct.	1		1
	George Reeves	Summary of all pit features	Seed Ct.	1	4	5
			Fea. Ct.	1	2	3
	Goshen	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Marcus	Pit	Seed Ct.	1		1
			Fea. Ct.	1		1
	Petitt	Summary of all pit features	Seed Ct.		36	36
			Fea. Ct.		1	1
	Radic	Pit	Seed Ct.		3	3
			Fea. Ct.		1	1
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Range	Pit	Seed Ct.		39	39
			Fea. Ct.		7	7
		Structure	Seed Ct.		2	2
			Fea. Ct.		2	2
	Robert Schneider	Pit	Seed Ct.		2	2
			Fea. Ct.		1	1
		Structure	Seed Ct.		8	8
			Fea. Ct.		1	1
	Robinson's Lake	Pit	Seed Ct.	5	2	7
			Fea. Ct.	3	1	4
		Structure	Seed Ct.	1	1	2
			Fea. Ct.	1	1	2
	Sponemann	Earth oven	Seed Ct.		1	1
			Fea. Ct.		1	1
		Pit	Seed Ct.		5	5
			Fea. Ct.		4	4
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
Emergent Mississippian Seed Ct.				16	150	166
Emergent Mississippian Fea. Ct.				11	31	42
Taxon Frequency				0.55	5.17	
Feature Ubiquity				1.32%	3.72%	
Site Ubiquity				33.33%	66.67%	

Table 6-16: Nightshades

Period	Site	Context		Nightshade Family	Black nightshade	Grand Total
AMERICAN BOTTOM						
Mississippian	BBB Motor	Pit	Seed Ct.		16	16
			Fea. Ct.		7	7
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Bridges	Summary of all pit features	Seed Ct.		9	9
			Fea. Ct.		1	1
	Cahokia/ICT-II	Pit	Seed Ct.		325	325
			Fea. Ct.		24	24
		Structure	Seed Ct.		65	65
			Fea. Ct.		6	6
	Cahokia/South Palisade	Bastion	Seed Ct.		2	2
			Fea. Ct.		2	2
		Post	Seed Ct.		1	1
			Fea. Ct.		1	1
	Carbon Dioxide	Pit	Seed Ct.	7	1	8
			Fea. Ct.	1	1	2
	Fingers	Structure	Seed Ct.		2	2
			Fea. Ct.		1	1
	Florence Street	Hearth	Seed Ct.		1	1
			Fea. Ct.		1	1
	GCS#1	Hearth	Seed Ct.		1	1
			Fea. Ct.		1	1
	Julien	Pit	Seed Ct.	1	67	68
			Fea. Ct.	1	7	8
		Structure	Seed Ct.	10	17	27
			Fea. Ct.	1	2	3
	Lohmann	Pit	Seed Ct.		11	11
			Fea. Ct.		5	5
		Structure	Seed Ct.		48	48
			Fea. Ct.		3	3
	Radic	Structure	Seed Ct.		2	2
			Fea. Ct.		1	1
	Range	Pit	Seed Ct.		7	7
			Fea. Ct.		3	3
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Turner	Pit	Seed Ct.		21	21
			Fea. Ct.		4	4
		Smudge pit	Seed Ct.		1	1
			Fea. Ct.		1	1
		Structure	Seed Ct.		4	4
			Fea. Ct.		2	2
	Vaughn Branch	Hearth	Seed Ct.		4	4
			Fea. Ct.		2	2
		Pit	Seed Ct.		9	9
			Fea. Ct.		8	8
		Post	Seed Ct.		2	2
			Fea. Ct.		1	1
		Structure	Seed Ct.		60	60
			Fea. Ct.		3	3
	WalMart	Unknown	Seed Ct.		20	20
			Fea. Ct.		5	5
Mississippian Seed Ct.				18	698	716
Mississippian Fea. Ct.				3	94	97
Taxon Frequency				0.79	30.77	
Feature Ubiquity				0.46%	14.35%	
Site Ubiquity				6.90%	51.72%	
Total Seed Ct.				50	934	984
Total Fea. Ct.				18	156	174

Figure 6-14: Black Nightshade

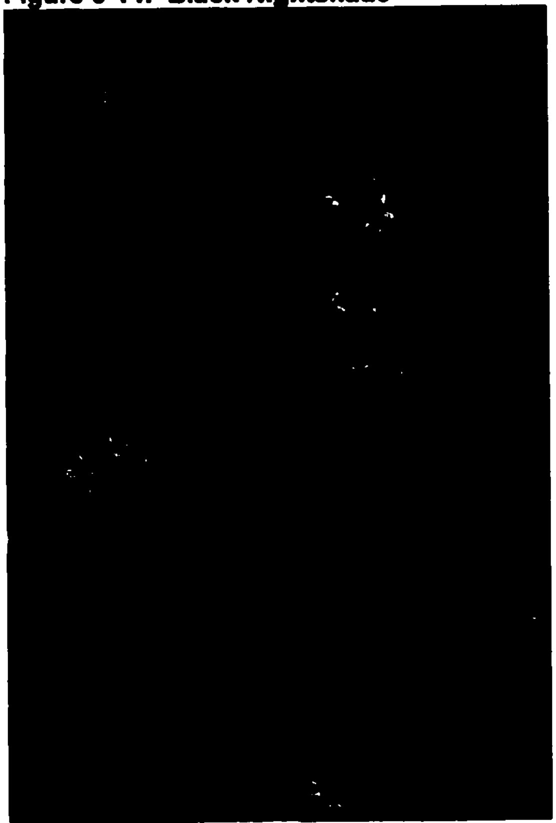


Figure 6-14a: Black nightshade (*Solanum ptycanthum*) plant with flowers and immature fruits

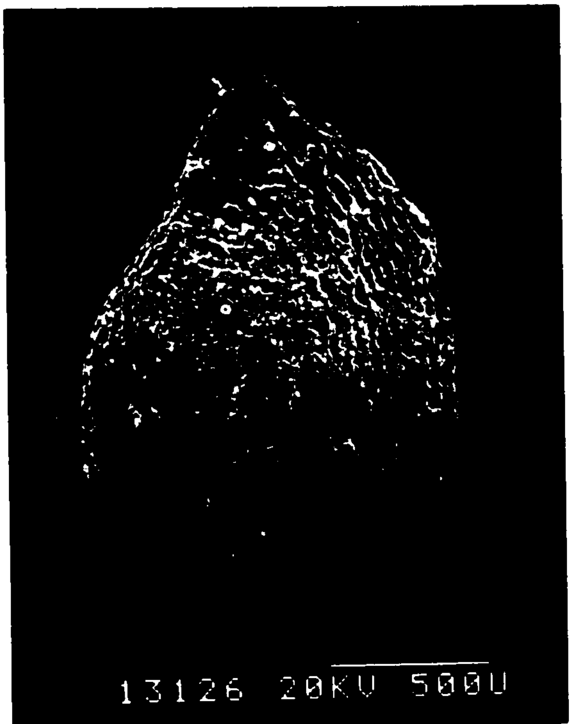


Figure 6-14b: Black nightshade (*Solanum ptycanthum*) seed at 50X

Cahokia/ICT II Tract (n=390 seeds), Julien (n=84 seeds), Lohmann (n=59 seeds), and Vaughn Branch (n=75 seeds) sites all contained more than 50 seeds. Black nightshade seeds also were fairly numerous in the 12 Late Woodland and 10 Emergent Mississippian components of American Bottom sites, especially in comparison with the frequency of other taxa in this study (Tables 6-1a, 6-1b, 6-1c). Black nightshade has been found in contexts with ritual significance at several sites in the American Bottom including: BBB Motor (Stirling phase Features 36, 38, and 71; n=10 seeds total), Range (Range phase Features 95 and 109; n=4 seeds total), Robinson's Lake (Merrell phase Feature 30, although the single seed was only identified to family level), and Vaughn Branch (Stirling phase Features 2 and 62; n=3 seeds total).

Despite the wealth of black nightshade remains identified in the American Bottom region, this taxon is lacking in the Moundville and Central Tombigbee region features.

Black nightshade is a weedy species that grows best in disturbed habitats such as those surrounding human settlements. The white flowers are clustered into umbels; shiny black fruits follow. Black nightshade can grow up to two feet tall, and it tends to be rather bushy.

The ripe fruits of black nightshade are edible, as discussed in Heiser's book (1969) on nightshades, and it is this use that is most often noted by paleoethnobotanists. The edibility of black nightshade fruits was recognized by several California tribal groups, and the Cherokee people used the young leaves as a potherb (Moerman 1998:534-535).

Black nightshade is a member of a pharmacologically very active family, the Solanaceae, which is noted for containing active compounds such as scopolamine and atropine. These chemicals block the autonomic nervous system in humans. The chemical properties of this plant, and its relatives, were well-known to Native Americans in the Eastern Woodlands who used it for a variety of medicinal purposes (Moerman 1998:534-535). Some of these medicines were quite practical in their application, such as using it to get rid of worms in children. Other uses were probably more psychologically satisfying such as relieving loneliness, and for various ceremonial purposes.

The nightshade family (Solanaceae) is a large and diverse groups of plants, most commonly represented in the Eastern archaeobotanical record by black nightshade, tobacco, and ground cherry. It is not known at this time whether the 50 Solanaceae seeds from the American Bottom are characteristic of any of these plants, but it is probable that they are of the ground cherry/black nightshade size range rather than the significantly smaller, and morphologically distinct, tobacco (Kathyn Parker, personal communication 1999).

Additional Medicine/Food Species. There are an additional 10 taxa of plants used for both food and medicine that have been identified in American Bottom features: milkweed (*Asclepias* sp.), mustard family members (Brassicaceae), hackberry (*Celtis* sp.), Kentucky coffee tree (*Gymnocladus dioca)*, wild lettuce (*Lactuca* sp.), mint family members (Lamiaceae) of which one seed came from a the northern ritual area (Fea. 125) at BBB Motor, peppergrass (*Lepidium* sp.), wood-sorrel (*Oxalis* sp.), coneflower (*Rudbeckia* sp.), and viburnum (*Viburnum* sp.) of which one seed came from a hearth (Fea. 2) within a Stirling phase sweat lodge at Vaughn Branch. Moundville features contained six additional taxa that have been used for both food and medicine: hackberry, honey locust (*Gleditsia triacanthos*), mallow family members (Malvaceae), evening primrose (*Oenothera* sp.), wood-sorrel, and dwarf palmetto (*Sabal minor*). Mint family members (including sage [*Salvia* sp.]) and honey locust seeds were identified in Late Woodland and Mississippian period features from the Central Tombigbee region. All of these plants (Table 6-17) were used as supplementary foods and medicines by Native Americans in the Eastern Woodlands (Moerman 1998), and are somewhat more numerous than plants used only as medicines. Many of the plants such as the mints, mustards, wood-sorrel, mallows, and peppergrass, have very distinctive flavors that emphasize the presence of phytoactive chemicals. The usefulness of such plants as spices, as well as medicines, was undoubtedly recognized by prehistoric peoples as it has been by historic people.

Table 6-17: Additional Medicinal/Food Taxa

Period	Site	Context		Milkweed	Mustards	Hack-berry	Honey Locust	Kentucky Coffeetree	Wild Lettuce	Mints	Pepper-grass	Mallows	Evening Primrose	Wood-sorrel	Cone-flower	Dwarf Palmetto	Viburnum	Grand Total
AMERICAN BOTTOM																		
Late Woodland	Bridges	Summary of all pit fea.	Seed Ct.											2				2
			Fea. Ct.											1				1
	Carbon Dioxide	Pit	Seed Ct.								1			1				2
			Fea. Ct.								1			1				2
	Dohack	Pit	Seed Ct.		2													2
			Fea. Ct.		1													1
	Kruse Bluffbase #3	Hearth	Seed Ct.							1								1
			Fea. Ct.							1								1
	Mund	Pit	Seed Ct.			1				4								5
			Fea. Ct.			1				2								3
	Steinberg	Pit	Seed Ct.							1								1
			Fea. Ct.							1								1
Late Woodland Seed Ct.					2	1				6	1			3				13
Late Woodland Fea. Ct					1	1				4	1			2				9
Taxon Frequency					0.08	0.04				0.25	0.04			0.13				
Feature Ubiquity					0.22%	0.22%				0.86%	0.22%			0.43%				
Site Ubiquity					3.45%	3.45%				10.34%	3.45%			6.90%				
Emergent Mississippian	Dohack	Pit	Seed Ct.							3	7							10
			Fea. Ct.							1	1							2
	George Reeves	Summary of all fea.	Seed Ct.								3							3
			Fea. Ct.								1							1
	Goshen	Pit	Seed Ct.	1														1
			Fea. Ct.	1														1
	Petitt	Pit	Seed Ct.											1				1
			Fea. Ct.											1				1
	Robert Schneider	Structure	Seed Ct.														1	1
			Fea. Ct.														1	1
	Robinson's Lake	Pit	Seed Ct.							1								1
			Fea. Ct.							1								1
	Samson Bluff	Unknown	Seed Ct.							1								1
			Fea. Ct.							1								1
	Sponemann	Pit	Seed Ct.												1			1
			Fea. Ct.												1			1
Emergent Mississippian Seed Ct.				1						5	10			1	1		1	19
Emergent Mississippian Fea. Ct.				1						3	2			1	1		1	9
Taxon Frequency				0.03						0.17	0.34			0.03	0.03		0.03	
Feature Ubiquity				0.12%						0.36%	0.24%			0.12%	0.12%		0.12%	
Site Ubiquity				6.67%						20.00%	13.33%			6.67%	6.67%		6.67%	

Table 6-17: Additional Medicinal/Food Taxa

Period	Site	Context		Milkweed	Mustards	Hack-berry	Honey Locust	Kentucky Coffeetree	Wild Lettuce	Mints	Pepper-grass	Mallows	Evening Primrose	Wood-sorrel	Cone-flower	Dwarf Palmetto	Viburnum	Grand Total
AMERICAN BOTTOM																		
Mississippian	BBB Motor	Pit	Seed Ct.							4								4
			Fea. Ct.							2								2
	Bridges	Summary of all pit fea.	Seed Ct.											3				3
			Fea. Ct.											1				1
		Smudge pit	Seed Ct.											1				1
			Fea. Ct.											1				1
	Cahokia/ICT-II	Pit	Seed Ct.	1	4				2									7
			Fea. Ct.	1	2				1									4
	Julien	Pit	Seed Ct.							1								1
			Fea. Ct.							1								1
		Structure	Seed Ct.							1								1
			Fea. Ct.							1								1
	Kruse Bluffbase #3	Pit	Seed Ct.							2								2
			Fea. Ct.							1								1
	Olszewski	Pit	Seed Ct.												1			1
			Fea. Ct.												1			1
	Range	Pit	Seed Ct.					1	1	2					1			5
			Fea. Ct.					1	1	2					1			5
		Structure	Seed Ct.					1										1
			Fea. Ct.					1										1
	Vaughn Branch	Hearth	Seed Ct.														2	2
			Fea. Ct.														1	1
		Pit	Seed Ct.											1				1
			Fea. Ct.											1				1
	WalMart	Unknown	Seed Ct.												1			1
			Fea. Ct.												1			1
Mississippian Seed Ct.				1	4			2	3	10				5	3		2	30
Mississippian Fea. Ct.				1	2			2	2	7				3	3		1	21
Taxon Frequency				0.04	0.18			0.09	0.13	0.44				0.22	0.13		0.09	
Feature Ubiquity				0.15%	0.31%			0.31%	0.31%	1.07%				0.46%	0.46%		0.15%	
Site Ubiquity				3.45%	3.45%			3.45%	6.90%	13.79%				6.90%	10.34%		51.72%	
Total Seed Ct.				2	6	1		2	3	21	11			9	4		3	62
Total Fea. Ct.				2	3	1		2	2	14	3			6	4		2	39

Table 6-17: Additional Medicinal/Food Taxa

Period	Site	Context		Milkweed	Mustards	Hack-berry	Honey Locust	Kentucky Coffeetree	Wild Lettuce	Mints	Pepper-grass	Mallows	Evening Primrose	Wood-sorrel	Cone-flower	Dwarf Palmetto	Viburnum	Grand Total
MOUNDVILLE																		
Late Woodland	1TU44/45	Pit	Seed Ct				1					3						4
			Fea. Ct				1					1						2
	1HA8	Pit	Seed Ct.													2		2
			Fea. Ct.													1		1
Late Woodland Seed Ct.							1					3				2		6
Late Woodland Fea. Ct.							1					1				1		3
Taxon Frequency							0.84					2.53				1.68		
Feature Ubiquity							4.17%					4.17%				4.17%		
Site Ubiquity							11.11%					11.11%				11.11%		
Mississippian	1HA8	Floor	Seed Ct.			2								1				3
			Fea. Ct.			1								1				2
		Midden	Seed Ct.											1				1
			Fea. Ct.											1				1
	1TU56	Midden	Seed Ct.											1				1
			Fea. Ct.											1				1
	Moundville	Floor	Seed Ct.										3					3
			Fea. Ct.										1					1
Mississippian Seed Ct.						2							3	3				8
Mississippian Fea. Ct.						1							1	1				3
Taxon Frequency						0.75							1.12	1.12				
Feature Ubiquity						0.59%							0.59%	1.78%				
Site Ubiquity						9.09%							9.09%	18.18%				
Total Seed Ct.						2	1					3	1	3		2		14
Total Fea. Ct.						1	1					1	1	1		1		6
CENTRAL TOMBIGBEE																		
Late Woodland	1GR2		Seed Ct							3								3
			Fea. Ct.							1								1
	1Pi61		Seed Ct.				2											2
			Fea. Ct.				1											1
Late Woodland Seed Ct.							2			3								5
Late Woodland Fea. Ct.							1			1								2
Taxon Frequency							8.00			12.00								
Site Ubiquity							20%			20%								
Mississippian	Lubbub		Seed Ct							1								1
			Fea. Ct.															
Mississippian Seed Ct.										1								1
Mississippian Fea. Ct										1.35								
Taxon Frequency										33%								
Site Ubiquity																		
Total Seed Ct.							2			4								6
Total Fea. Ct.							1											

Category 3: Plants Used as Foods with Secondary Use as Medicine

The next group of plants along the spectrum from food to medicine consist of those that are most commonly identified as foods, but that have additional uses as a medicine. Again, it must be emphasized that the subsistence uses of these species focus almost exclusively on their fleshy fruits (see purslane for one exception). Medical uses of the same taxa tend to be derived from the roots, barks, sap, and other non-durable parts. As expected, these plants were generally more numerous than those used exclusively as medicines. It is interesting that in Moerman's study of Native American ethnobotanies, common chokecherry (*Prunus virginiana*) was among the top 10 most commonly used medical AND food plants, revealing the multilevel nature of traditional ethnobotanies.

Persimmon. Persimmons (*Diospyros virginiana*) were represented by 168 seeds or seed fragments in the American Bottom region (Table 6-18; Figure 6-16). Persimmon remains were present in 21 site components (eight Late Woodland, three Emergent Mississippian, and 10 Mississippian period). A total of 11 Late Woodland, four Emergent Mississippian, and 50 Mississippian period features contained persimmon seeds or seed fragments. The Mississippian period contained the majority of persimmon seed fragments by raw count (n=111; 66% of total persimmon seed count). The Taxon Frequency of Late Woodland (1.21) to Mississippian (4.89), Feature Ubiquity (2.37%-Late Woodland and 7.63%-Mississippian), and the Site Ubiquity (27.59%-Late Woodland and 34.48%-Mississippian) all increase through time. A single persimmon seed fragment was found within the Moorehead/Stirling phase charnel house at Radic.

Persimmon remains from the Moundville region have not been included due to their overwhelming raw count (269 Late Woodland and 1,798 Mississippian seeds or fragments) and Feature Ubiquity (79% of Late Woodland features and 57% of Mississippian features). It appears that persimmons, at least in the Moundville region, represent a dietary staple in addition to their use as an occasional supplement or medicine. This is in contrast to the more patchy distribution pattern in the American Bottom region. The distribution of persimmon remains in the Central

Table 6-18: Persimmon (*Diospyros virginana*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	14
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	2
			Fea. Ct.	2
	Columbia Quarry	Pit	Seed Ct.	1
			Fea. Ct.	1
	Hayden	Pit	Seed Ct.	4
			Fea. Ct.	2
	Holdener	Pit	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	2
			Fea. Ct.	2
	Mund	Pit	Seed Ct.	4
			Fea. Ct.	1
	Old Goat Farm	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Seed Ct.				29
Late Woodland Fea. Ct.				11
Taxon Frequency				1.21
Feature Ubiquity				2.37%
Site Ubiquity				27.59%
Emergent Mississippian	BBB Motor	Pit	Seed Ct.	1
			Fea. Ct.	1
	Petitt	Summary of all pit features	Seed Ct.	25
			Fea. Ct.	1
	Sponemann	Pit	Seed Ct.	2
			Fea. Ct.	2
Emergent Mississippian Seed Seed Ct.				28
Emergent Mississippian Fea. Ct.				4
Taxon Frequency				0.97
Feature Ubiquity				0.48%
Site Ubiquity				20.00%
Mississippian	BBB Motor	Pit	Seed Ct.	2
			Fea. Ct.	1
	Bridges	Summary of all pit features	Seed Ct.	8
			Fea. Ct.	1
		Smudge pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	3
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	50
			Fea. Ct.	24
		Structure	Seed Ct.	15
			Fea. Ct.	8
	Cahokia/South Palisade	Bastion	Seed Ct.	2
			Fea. Ct.	2

Table 6-18: Persimmon (*Diospyros virginana*)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian (contin.)	Julien	Pit	Seed Ct.	19
			Fea. Ct.	5
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Kruse Bluffbase #3	Pit	Seed Ct.	4
			Fea. Ct.	1
	Lohmann	Structure	Seed Ct.	2
			Fea. Ct.	1
	Radic	Charnel structure	Seed Ct.	1
			Fea. Ct.	1
		Pit	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	1
			Fea. Ct.	1
	WalMart	Unknown	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Seed Ct.				111
Mississippian Fea. Ct.				50
Taxon Frequency				4.89
Feature Ubiquity				7.63%
Site Ubiquity				34.48%
Total Seed Seed Ct.				168
Total Fea. Ct.				65
CENTRAL TOMBIGBEE				
Late Woodland	1Pi33		Seed Ct.	1
			Fea. Ct.	1
	1Pi61		Seed Ct.	3
			Fea. Ct.	3
	1GR1X1		Seed Ct.	1
			Fea. Ct.	1
	Lubbub Creek		Seed Ct.	1
			Fea. Ct.	
Late Woodland Seed Seed Ct.				6
Late Woodland Fea. Ct.				
Taxon Frequency				24.00
Site Ubiquity				80%
Mississippian	Lubbub Creek		Seed Ct.	32
			Fea. Ct.	
	1GR2		Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Seed Ct.				33
Mississippian Fea. Ct.				
Taxon Frequency				44.59
Site Ubiquity				66%
Total Seed Seed Ct.				39
Total Fea. Ct.				

NOTE THAT MOUNDVILLE PERSIMMON REMAINS ARE NOT INCLUDED IN THIS TABLE

Figure 6-15: Persimmon

Figure 6-15a: Persimmon (*Diospyros virginiana*) fruits

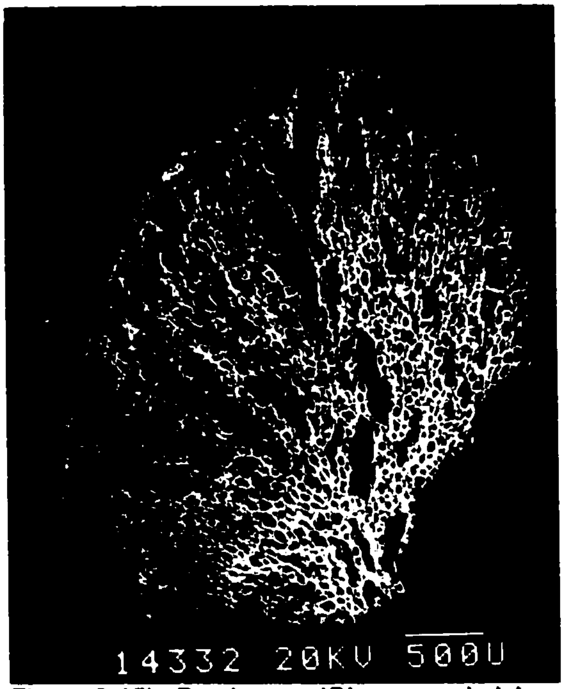


Figure 6-15b: Persimmon (*Diospyros virginiana*) seed cross-section at 25X

Tombigbee appears to be less dense than in the Moundville region. A total of six persimmon seeds or fragments was identified from Late Woodland contexts from sites 1Pi61 (n=3 seeds), 1GR1X1 (n=1 seed), 1Pi33 (n=1 seed), and Lubbub Creek (n=1 seed). Of the 33 Mississippian period persimmon seeds that were found in the Central Tombigbee region all but one came from Lubbub Creek; the remaining seed was identified at 1GR2. The Late Woodland Taxon Frequency is 24.00 and the Mississippian Taxon Frequency is 44.59, nearly doubling through time.

Persimmons tend to be small trees that invade old fields and other open areas. The male and female flowers are borne on separate trees that bloom in May through June. Once fully ripe, the dusty orange fruits are mild and sweet.

Archaeological persimmon remains are most commonly associated with their mature fruits, which Historic Native Americans in the Southeast sieved and dried into loaves for use during the winter (Swanton 1946:363). The astringent qualities of the bark and unripe fruits were used by Cherokee and Rappahannock healers in medical preparations (Moerman 1998:201). Sore throats, toothaches, stomach aches, and diarrhea were all treated with the high tannins and other chemicals contained in this plant. Such alternative uses of important edible resources must be recognized if we are to understand the role of wild plants in prehistoric societies. Many plants that start out as a food or medicine are used experimentally in other realms as well. Such plants are known commodities with physiological properties that can be applied to novel situations.

Wild Strawberry. Wild strawberry (recorded in American Bottom reports as *Fragaria americana*, but more likely to be *Fragaria virginiana* based on modern distribution and availability of taxa) seeds were present only in paleoethnobotanical samples from the American Bottom region (Table 6-19; Figure 6-16). A total of 21 wild strawberry seeds was identified in these features, and a single Late Woodland feature at the Bridges sites contributed 18 of those seeds. Site Ubiquity, however, is identical (3.45%) for the Late Woodland and Mississippian periods.

Wild strawberries grow in fields or open woods throughout much of the eastern United States. The leaves are composed of three elliptical leaflets, and the petioles arise directly from

Table 6-19: Wild Strawberry (*Fragaria virginiana*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	18
			Fea. Ct.	1
Late Woodland Seed Ct.				18
Late Woodland Fea. Ct.				1
Taxon Frequency				0.75
Feature Ubiquity				0.22%
Site Ubiquity				3.45%
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.	3
			Fea. Ct.	3
Mississippian Seed Ct.				3
Mississippian Fea. Ct.				3
Taxon Frequency				0.13
Feature Ubiquity				0.46%
Site Ubiquity				3.45%
Total Seed Ct.				21
Total Fea. Ct.				4

Figure 6-16: Wild Strawberry

Figure 6-16a: Wild strawberry (*Fragaria virginiana*) in flower

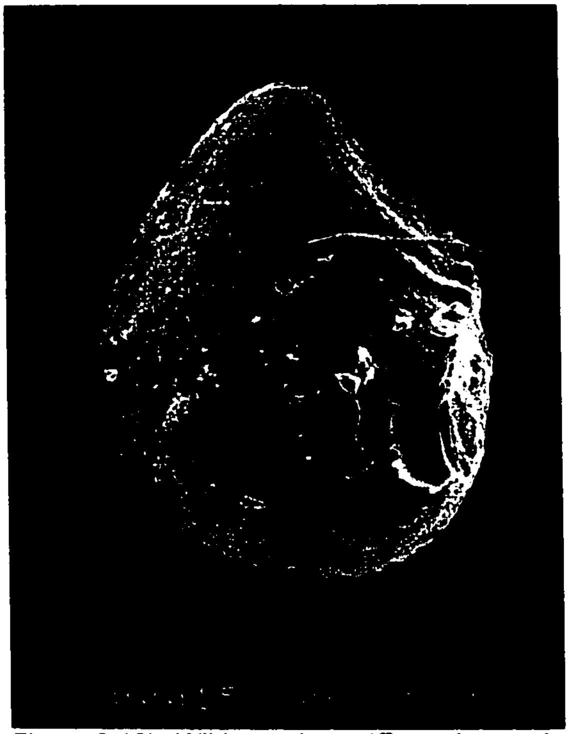


Figure 6-16b: Wild strawberry (*Fragaria americana*) seed at 70X

shortened stems. The white flowers bloom between March and June with the red fruits ripening in mid- to late summer.

Wild strawberries are most commonly recognized by paleoethnobotanists as an edible fruit, and the plant was used as such by many tribal groups (Moerman 1998:234-236). The fresh fruits were even formed into cakes and dried for winter use. The fresh and dried leaves of young plants were brewed and consumed as a tea. Medicinal use of wild strawberries was quite common among the Cherokee, who used the plant for a variety of purposes such as an antidiarrheal and a toothache remedy (Moerman 1998:234-236). The use of strawberries to relieve toothaches has been noted in England as well (Lewis and Elvin-Lewis 1977). Wild strawberries were used by Eastern Native American groups, such as the Chippewa, who used the roots as a cholera remedy, and the Micmac, who used the plant as an abortifacient.

Wild Plum. Plum (*Prunus* sp. - plum-size seeds) (n=21 from the American Bottom region) or more specifically American wild plum (*Prunus americana*) (n=18 from the Moundville region, n=16 from the Central Tombigbee region) remains were identified in all three regions (Table 6-20; Figure 6-20). The increasing importance of plums through time is evidenced in the American Bottom region by the rapid increase in the overall Site Ubiquity (Late Woodland - 3.45%, Emergent Mississippian - 6.67%, and Mississippian - 6.90%) and the Taxon Frequencies (Late Woodland - 0.25, Emergent Mississippian - 0.03, and Mississippian - 0.62).

The majority of Moundville plum remains are from Late Woodland contexts (n=15; Taxon Frequency = 12.63). A dramatic decrease in the number of Mississippian plum remains is reflected in the raw seed count (n=3) as well as the Taxon Frequency (1.12).

Wild plum remains (n=16) were also found during the analysis of Mississippian period paleoethnobotanical samples from Lubbub Creek. The Taxon Frequency of the Lubbub Creek wild plum remains is 21.62.

Native wild plums, including American wild plum, Chickasaw plum (*P. angustifolia*), wild goose plum (*P. musoniana*), and big tree plum (*P. mexicana*) are all native to the woodlands of

Table 6-20: Plums (*Prunus* sp. - plum-sized)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridges	Summary of all pit features	Seed Ct.	6
			Fea. Ct.	2
Late Woodland Seed Ct.				6
Late Woodland Fea. Ct.				2
Taxon Frequency				0.25
Feature Ubiquity				0.43%
Site Ubiquity				3.45%
Emergent Mississippian	Sponemann	Pit	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				1
Emergent Mississippian Fea. Ct.				1
Taxon Frequency				0.03
Feature Ubiquity				0.12%
Site Ubiquity				6.67%
Mississippian	Bridges	Summary of all pit features	Seed Ct.	2
			Fea. Ct.	1
		Smudge pit	Seed Ct.	2
			Fea. Ct.	1
		Structure	Seed Ct.	2
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	8
			Fea. Ct.	4
Mississippian Seed Ct.				14
Mississippian Fea. Ct.				7
Taxon Frequency				0.62
Feature Ubiquity				1.07%
Site Ubiquity				6.90%
Total Seed Ct.				21
Total Fea. Ct.				10

Table 6-20: Plums (*Prunus* sp. - plum-sized)

Period	Site	Context		
MOUNDVILLE				
Late Woodland	1HA39	Pit	Seed Ct.	1
			Fea. Ct.	1
	1TU44/45	Pit	Seed Ct.	12
			Fea. Ct.	1
	1JE31	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				15
Late Woodland Fea. Ct.				3
Taxon Frequency				12.63
Feature Ubiquity				12.50%
Site Ubiquity				33.33%
Mississippian	Moundville	Pit	Seed Ct.	2
			Fea. Ct.	1
		Midden	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				3
Mississippian Fea. Ct.				2
Taxon Frequency				1.12
Feature Ubiquity				1.18%
Site Ubiquity				9.09%
Total Seed Ct.				18
Total Fea. Ct.				5
CENTRAL TOMBIGBEE				
Mississippian	Lubbub Creek		Seed Ct.	16
			Fea. Ct.	
Mississippian Seed Ct.				16
Mississippian Fea. Ct.				
Taxon Frequency				21.62
Site Ubiquity				33%

Figure 6-17: Plum

Figure 6-17a: Decorative plum (*Prunus* sp.) in flower

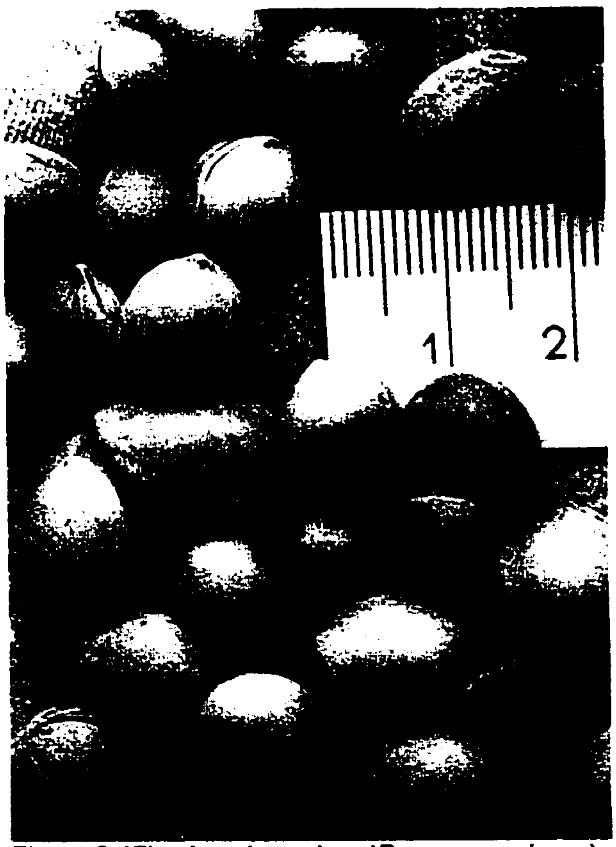


Figure 6-17b: American plum (*Prunus americana*) seeds at 10X

the eastern United States. Native plums tend to be small trees whose white flowers appear in March through April followed by fruits in July through September.

The fruits of plums are edible, and were consumed fresh or dried for winter use by Native American peoples (Moerman 1998:439-442). The branches of plums were gathered and used as brooms by the Winnebago. Dyes, both yellow and red, and mordant were made from the bark and/or roots of the wild plum.

Medical uses of the plums are limited in comparison with the use of the plant as a sweet fruit (Moerman 1998:439-442). The bark and roots were used as an antihelmintic, a cough medicine, a urinary aid, and to help with the healing of cuts or wounds to the skin and mouth.

The seeds, bark, and leaves of plums contain small amounts of cyanide, which is poisonous if consumed in large quantities. Cyanide may in turn be useful if administered correctly in the alleviation of high levels of uric acid (Lewis and Elvin-Lewis 1977:219). The bark and root of plum species also contain an antibiotic, phloretin, that is effective against gram positive and gram negative bacteria.

Purslane. Purslane (*Portulaca oleracea)* was present in the American Bottom and Moundville regions (Table 6-21; Figure 6-18). Purslane was the second most numerous American Bottom taxon, with 447 seeds in 59 features (4.09% of Late Woodland, 0.72% of Emergent Mississippian, and 5.19% of Mississippian features) from 24 site components (24.14% of Late Woodland, 40.00% of Emergent Mississippian, and 37.93% of Mississippian features). As with persimmon, the majority of purslane seeds was found in American Bottom Mississippian contexts: 359 of the 447 seeds (80.3%) were from these features. The Taxon Frequency of purslane supports the dominance of Mississippian materials with Late Woodland and Emergent Mississippian Taxon Frequencies (2.68 and 0.83, respectively) much lower than the Mississippian Taxon Frequency of 15.82. Concentrations of purslane seeds were associated with Mississippian contexts at Cahokia/ICT-II: 58 seeds with Structure FS# 287, and 204 seeds with Pit FS# 209.

Purslane also was relatively common in features from the Moundville region. A total of eight seeds (Taxon Frequency = 6.73) was found in Late Woodland contexts, while 130 seeds

Table 6-21: Purslane (*Portulaca oleracea*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Bridgeton	Pit	Seed Ct.	5
			Fea. Ct.	1
	Columbia Quarry	Pit	Seed Ct.	1
			Fea. Ct.	1
	Fish Lake	Pit	Seed Ct.	11
			Fea. Ct.	1
		Structure	Seed Ct.	3
			Fea. Ct.	2
	Little Hills	Pit	Seed Ct.	3
			Fea. Ct.	2
	Mund	Pit	Seed Ct.	7
			Fea. Ct.	5
	Range	Earth oven	Seed Ct.	8
			Fea. Ct.	3
		Pit	Seed Ct.	2
			Fea. Ct.	2
	Vaughn Branch	Pit	Seed Ct.	24
			Fea. Ct.	2
Late Woodland Seed Ct.				64
Late Woodland Fea. Ct.				19
Taxon Frequency				2.68
Feature Ubiquity				4.09%
Site Ubiquity				24.14%
Emergent Mississippian	Bridgeton	Pit	Seed Ct.	15
			Fea. Ct.	1
	Dohack	Structure	Seed Ct.	2
			Fea. Ct.	1
	Petitt	Pit	Seed Ct.	2
			Fea. Ct.	1
	Range	Pit	Seed Ct.	2
			Fea. Ct.	1
	Robert Schneider	Pit	Seed Ct.	2
			Fea. Ct.	1
	Sponemann	Pit	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				24
Emergent Mississippian Fea. Ct.				6
Taxon Frequency				0.83
Feature Ubiquity				0.72%
Site Ubiquity				40.00%
Mississippian	Bridges	Summary of all pit features	Seed Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	256
			Fea. Ct.	13
		Structure	Seed Ct.	73
			Fea. Ct.	7
	Fingers	Structure	Seed Ct.	1
			Fea. Ct.	1
	Julien	Pit	Seed Ct.	8
			Fea. Ct.	1
	Lohmann	Pit	Seed Ct.	1
			Fea. Ct.	1

Table 6-21: Purslane (*Portulaca oleracea*)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian (contin.)	Olszewski	Structure	Seed Ct.	1
			Fea. Ct.	1
	Radic	Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Robert Schneider	Structure	Seed Ct.	1
			Fea. Ct.	1
	Turner	Pit	Seed Ct.	4
			Fea. Ct.	1
	Vaughn Branch	Structure	Seed Ct.	1
			Fea. Ct.	1
	WalMart	Unknown	Seed Ct.	10
			Fea. Ct.	4
Mississippian Seed Ct.				359
Mississippian Fea. Ct.				34
Taxon Frequency				15.82
Feature Ubiquity				5.19%
Site Ubiquity				37.93%
Total Seed Ct.				447
Total Fea. Ct.				59
MOUNDVILLE				
Late Woodland	1TU44/45	Pit	Seed Ct.	1
			Fea. Ct.	1
	1JE31	Pit	Seed Ct.	1
			Fea. Ct.	1
	1JE32	Pit	Seed Ct.	2
			Fea. Ct.	1
	1JE33	Pit	Seed Ct.	4
			Fea. Ct.	3
Late Woodland Seed Ct.				8
Late Woodland Fea. Ct.				6
Taxon Frequency				6.73
Feature Ubiquity				25.00%
Site Ubiquity				44.44%
Mississippian	1HA8	Floor	Seed Ct.	1
			Fea. Ct.	1
	1TU56	Midden	Seed Ct.	13
			Fea. Ct.	3
	Moundville	Burned area	Seed Ct.	1
			Fea. Ct.	1
		Floor	Seed Ct.	1
			Fea. Ct.	1
		Pit	Seed Ct.	114
			Fea. Ct.	5
Mississippian Seed Ct.				130
Mississippian Fea. Ct.				11
Taxon Frequency				48.74
Feature Ubiquity				6.51%
Site Ubiquity				45.45
Total Seed Ct.				138
Total Fea. Ct.				17

Figure 6-18: Purslane

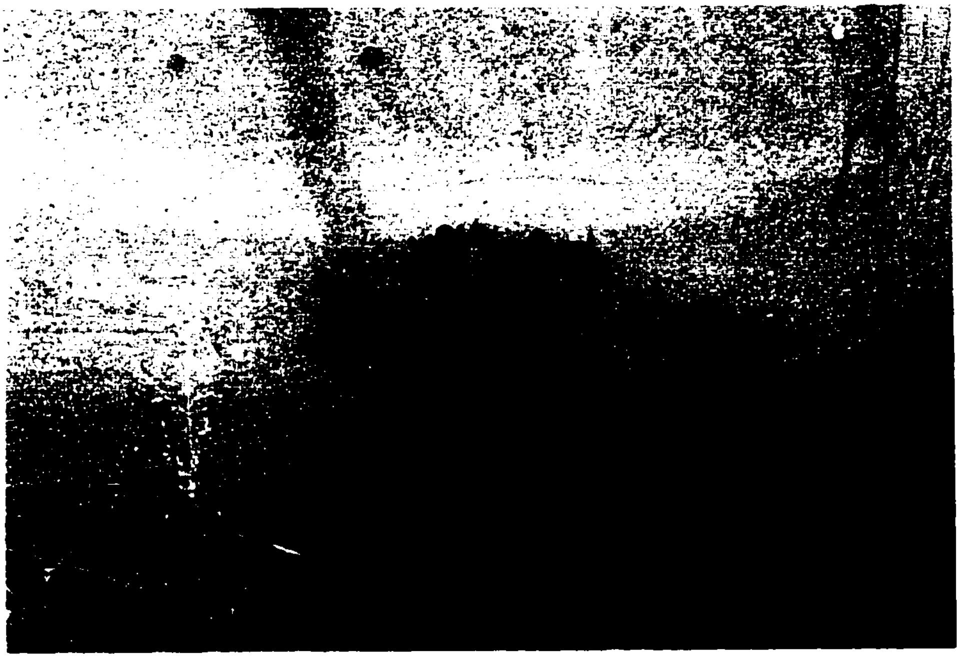


Figure 6-18a: Purslane (*Portulaca oleracea*) plant

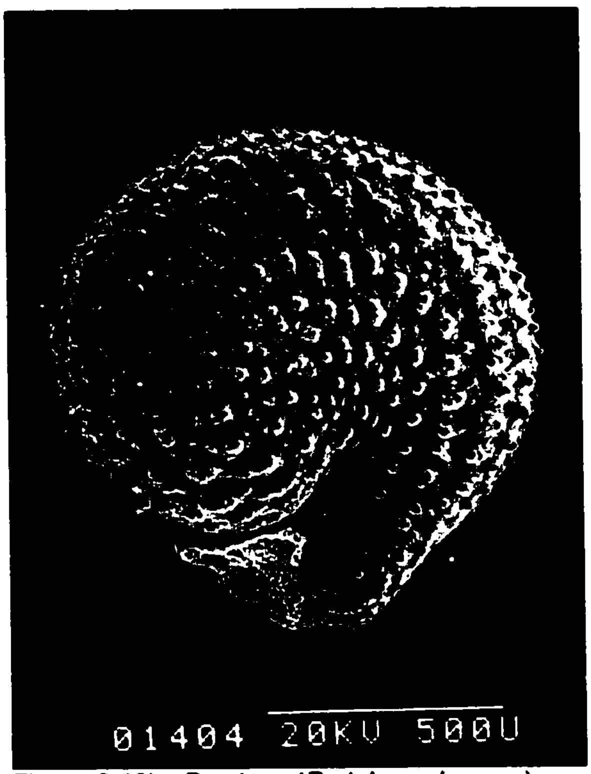


Figure 6-18b: Purslane (*Portulaca oleracea*) seed at 70X

(Taxon Frequency = 48.74) were present in Mississippian contexts from this region. Purslane seeds tended to be identified only once or twice in any given paleoethnobotanical sample from this region. The Moundville pit, FS # R9, however, contained a concentration of 102 purslane seeds.

Purslane is a low growing plant that rapidly invades open waste areas. It is often assumed in archeobotanical reports that the presence of this plant in a feature is the result of its weedy habit and not its use by humans (see Parker 1992:22 and Lopinot 1991:66 for discussion of purslane in paleoethnobotanical samples). This is, of course, a distinct possibility, but there appear to be strong trends in the paleoethnobotanical record that may not be explained by the plant's weedy nature alone, and may indicate intentional use.

The use of purslane in the eastern United States appears to have focused on two major health issues: soothing wounds and quieting gastrointestinal problems (Moerman 1998:434). These uses probably relate to the mucilaginous properties that fresh purslane leaves exhibit. It must also be noted that Native American groups in Western and Southwestern United States consumed the fleshy portions of the plant as a green, and some Native people processed and ate the seeds.

Bramble. Bramble (*Rubus* sp.) remains were associated with all three archaeological regions in this dissertation (Table 6-22; Figure 6-19). A total of 28 bramble seeds was found in the American Bottom features. Bramble seeds tended to occur rather sparsely at any given site. The majority of seeds (n=18; 64%) were associated with the eight Late Woodland site components. Four Emergent Mississippian and three Mississippian site components also were represented. The Taxon Frequency reflects the importance of brambles in the Late Woodland period, with Taxon Frequencies of 0.75, 0.17, and 0.22 calculated for the Late Woodland, Emergent Mississippian, and Mississippian periods, respectively.

Bramble seeds were present in one Late Woodland feature (n=1 seed) and seven Mississippian features (n=9 seeds) from the Moundville region. The Mississippian bramble seeds

Table 6-22: Brambles (*Rubus* spp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Alpha 1	Pit	Seed Ct.	3
			Fea. Ct.	2
	Bridges	Summary of all pit features	Seed Ct.	1
			Fea. Ct.	1
	Bridgeton	Pit	Seed Ct.	1
			Fea. Ct.	1
	Dohack	Pit	Seed Ct.	2
			Fea. Ct.	2
	Holdener	Pit	Seed Ct.	1
			Fea. Ct.	1
	Leingang	Pit	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	3
			Fea. Ct.	3
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Old Goat Farm	Summary of all features	Seed Ct.	5
			Fea. Ct.	1
Late Woodland Seed Ct.				18
Late Woodland Fea. Ct.				13
Taxon Frequency				0.75
Feature Ubiquity				2.80%
Site Ubiquity				27.59%
Emergent Mississippian	Dohack	Structure	Seed Ct.	1
			Fea. Ct.	1
	George Reeve	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
	Petitt	Pit	Seed Ct.	2
			Fea. Ct.	1
	Samson Bluff	Unknown	Seed Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				5
Emergent Mississippian Fea. Ct.				4
Taxon Frequency				0.17
Feature Ubiquity				0.48%
Site Ubiquity				26.67%
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.	2
			Fea. Ct.	1
	Fingers	Pit	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				5
Mississippian Fea. Ct.				4
Taxon Frequency				0.22
Feature Ubiquity				0.61%
Site Ubiquity				10.34%
Total Seed Ct.				28
Total Fea. Ct.				21

Table 6-22: Brambles (*Rubus* spp.)

Period	Site	Context		
MOUNDVILLE				
Late Woodland	1TU570	Pit	Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				1
Late Woodland Fea. Ct.				1
Taxon Frequency				0.84
Feature Ubiquity				4.17%
Site Ubiquity				11.11%
Mississippian	1TU66	Pit	Seed Ct.	2
			Fea. Ct.	1
	1TU768	Pit	Seed Ct.	1
			Fea. Ct.	1
	Moundville	Pit	Seed Ct.	5
			Fea. Ct.	4
		Midden	Seed Ct.	1
			Fea. Ct.	1
Mississippian Seed Ct.				9
Mississippian Fea. Ct.				7
Taxon Frequency				3.37
Feature Ubiquity				4.14%
Site Ubiquity				27.27%
Total Seed Ct.				10
Total Fea. Ct.				8
CENTRAL TOMBIGBEE				
Late Woodland	1GR1X1		Seed Ct.	1
			Fea. Ct.	1
Late Woodland Seed Ct.				1
Late Woodland Fea. Ct.				1
Taxon Frequency				4.00
Site Ubiquity				20%

Figure 6-19: Bramble

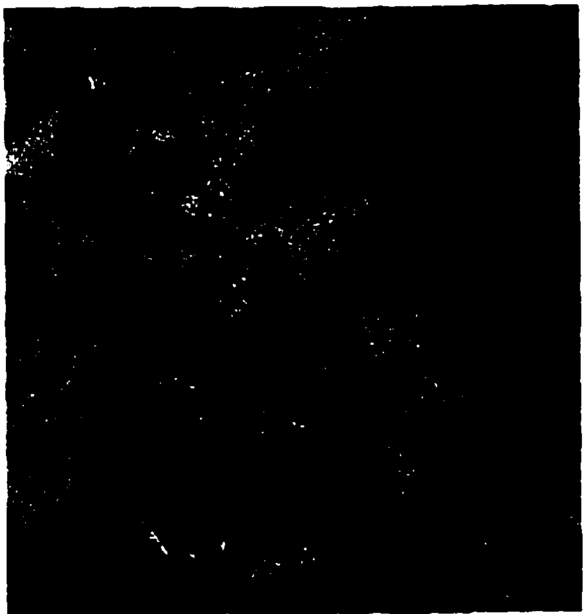


Figure 6-19a: Blackberry (*Rubus* sp.) plant with fruits

Figure 6-19b: Bramble (*Rubus* sp.) seed at 40X

were concentrated in features from Moundville; 60% of the total seeds come from this site. Taxon Frequency for the Late Woodland period is 0.84, and for the Mississippian period is 3.37.

A single bramble seed, with a Taxon Frequency of 4.00, was found in a Late Woodland context from site 1GR1X1, in the Central Tombigbee region. No bramble remains were found in Mississippian contexts from this region.

The various species of brambles, including raspberries, blackberries, and dewberries, are often difficult to distinguish based on vegetative characteristics, and they are considered by paleoethnobotanists to be nearly impossible to identify to species level based on their seed characteristics. Brambles are generally shrubby plants with long, arching, thorned canes. The dark purple to red berries mature between June, and the plants can continue to produce fruit into the late summer.

The highly desirable fruits are most commonly indicated as the reason that the species is represented in the paleoethnobotanical record. Prehistoric people undoubtedly ate the fruits when they were available. Historic Native Americans consumed the fruits fresh and dried them for winter use. The young leaves, canes, and fruits were used in teas and other beverages.

Brambles are also one of the most commonly used medicinal plants in this study with at least 38 usages for Eastern tribal groups (Moerman 1998:486-494). The Cherokee, Chippewa, Iroquois, Delaware, Menominee, and other groups used bramble roots as an antidiarrheal, especially when the ailment affected young children. The plant, usually its roots, was an important component in preparations for colds, coughs, and even tuberculosis as used by the Iroquois, Cherokee, and Chippewa, among others. Brambles also were considered to be useful as a general tonic by tribal groups such as the Cherokee, Rappahannock, and Iroquois. The tannins present in bramble roots and canes may account for the astringent properties accessed in these preparations.

Blueberries. Blueberries (*Vaccinium* sp.), a genus that includes huckleberries, deerberries, and cranberries, were present in several Mississippian period contexts from the Moundville region (Table 6-23; Figure 6-20). A total of 20 seeds was found with a resulting Taxon

Table 6-23: Blueberries (*Vaccinium* spp.)

Period	Site	Context		
MOUNDVILLE				
Mississippian	1TU552	Pit	Seed Ct.	1
			Fea. ct.	1
	1TU56	Midden	Seed Ct.	1
			Fea. Ct.	1
	1TU768	Pit	Seed Ct.	1
			Fea. Ct.	1
	Moundville	Floor	Seed Ct.	1
			Fea. Ct.	1
		Midden	Seed Ct.	2
			Fea. Ct.	2
		Pit	Seed Ct.	14
			Fea. Ct.	5
Mississippian Seed Ct.				20
Mississippian Fea. Ct.				11
Taxon Frequency				7.50
Feature Ubiquity				6.51%
Site Ubiquity				45.45%

Figure 6-20: Blueberry

Figure 6-20a: Farkleberry (*Vaccinium arboreum*) plant with flowers

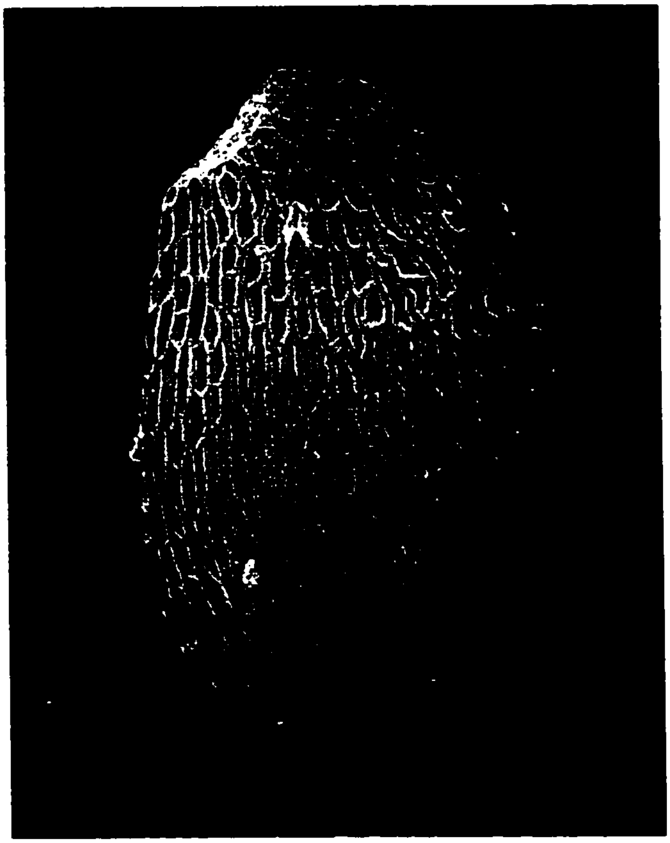


Figure 6-20b: Deerberry (*Vaccinium stamineum*) seed at 50X

Frequency of 7.50. The seeds tended to occur singly within any given feature, but the pit FS # 293+ from the site of Moundville contained eight seeds.

Blueberries are characterized by their generally shrubby habit and by their small, white, tubular- to bell-shaped flowers. These plants bloom in the spring to early summer, and the fruits mature in the late summer to early fall. Many species of blueberries grow in the eastern United States, but taxa common to the Southeast include deerberry (*V. stamineum*), tree huckleberry (*V. arboreum*), low-bush huckleberry (*V. pallidum*), and Elliot's blueberry (*V. elliottii*). It is important to note that none of these species common in the southeastern United States was documented as having been used by Native Americans as a food or medicine (Moerman 1998:582-586).

Other species of blueberries and cranberries were used for more than 18 medicinal remedies developed by tribal groups in the Eastern Woodlands (Moerman 1998:582-586). These uses range from remedies for various gastrointestinal ailments (e.g., Ojibwa use of small cranberry [*V. oxycoccos*] for nausea) to several upper respiratory ailments (e.g., Seminole use of shiny blueberry [*V. myrsinites*] for colds). The most common use of blueberries, especially by northern tribal groups, was for their berries, which were prepared as a food in a myriad of ways.

European uses of blueberries have focused on the action of the anthocyanins present in the berries (Bisset 1994: 348-352; Bruneton 1995:307-309). "Extracts obtained from the fruits ... are ingredients of drugs designed to treat the symptoms of cutaneous capillary fragility" (Bruneton 1994:309). Additional uses include the treatment of mild diarrhea, a treatment based on the high tannin levels in blueberries (Bisset 1994:352; Blumenthal 1998:88; Bruneton 1994:309).

<u>Grapes</u>. Paleoethnobotanical reports from the American Bottom, Moundville, and Central Tombigbee regions tend to list grapes (*Vitis* sp.) rather than grape family (Vitaceae) despite similarities among the seeds of several genera within the family. Due to the probable inclusion of some grapes in the grape family category, the two are discussed together (Table 6-24; Figures 6-21, 6-22).

A total of 164 grape and three grape family seeds was identified from sites in the American Bottom region. Components from 13 (44.83% ubiquity) Late Woodland, six (40.00%

Table 6-24: Grape Family Members (Vitaceae)

Period	Site	Context		Grape family	Grape	Grand Total
AMERICAN BOTTOM						
Late Woodland	24A2-256	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Bridges	Summary of all pit features	Seed Ct.		12	12
			Fea. Ct.		1	1
	Bridgeton	Pit	Seed Ct.		4	4
			Fea. Ct.		2	2
	Columbia Quarry	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Fish Lake	Pit	Seed Ct.		9	9
			Fea. Ct.		4	4
	Hayden	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Holdener	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Kingfish	Column/Level	Seed Ct.		2	2
			Fea. Ct.		2	2
	Little Hills	Hearth	Seed Ct.		1	1
			Fea. Ct.		1	1
		Pit	Seed Ct.		3	3
			Fea. Ct.		3	3
	Mund	Pit	Seed Ct.		7	7
			Fea. Ct.		4	4
	Old Goat Farm	Summary of all features	Seed Ct.		6	6
			Fea. Ct.		1	1
	Range	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Reach B	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
Late Woodland Seed Ct.					50	50
Late Woodland Fea. Ct.					24	24
Taxon Frequency					2.09	2.09
Feature Ubiquity					5.17%	5.17%
Site Ubiquity					44.83%	44.83%
Emergent Mississippian	Bridgeton	Pit	Seed Ct.		4	4
			Fea. Ct.		1	1
	Petitt	Summary of all pit features	Seed Ct.		59	59
			Fea. Ct.		1	1
	Radic	Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Range	Pit	Seed Ct.		2	2
			Fea. Ct.		2	2
	Robert Schneider	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Sponemann	Structure	Seed Ct.		2	2
			Fea. Ct.		2	2
Emergent Mississippian Seed Ct.					70	70
Emergent Mississippian Fea. Ct.					9	9
Taxon Frequency					2.41	2.41
Feature Ubiquity					1.08%	1.08%
Site Ubiquity					40.00%	40.00%

Table 6-24: Grape Family Members (Vitaceae)

Period	Site	Context		Grape family	Grape	Grand Total
AMERICAN BOTTOM						
Mississippian	BBB Motor	Pit	Seed Ct.	1		1
			Fea. Ct.	1		1
	Bridges	Summary of all pit features	Seed Ct.		4	4
			Fea. Ct.		1	1
		Structure	Seed Ct.		2	2
			Fea. Ct.		1	1
	Cahokia/ICT-II	Pit	Seed Ct.		13	13
			Fea. Ct.		10	10
		Structure	Seed Ct.		9	9
			Fea. Ct.		6	6
	Cahokia/South Palisade	Post	Seed Ct.		1	1
			Fea. Ct.		1	1
	GCS#1	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	Julien	Pit	Seed Ct.		2	2
			Fea. Ct.		2	2
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Olszewski	Pit	Seed Ct.		4	4
			Fea. Ct.		1	1
	Radic	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Range	Pit	Seed Ct.		4	4
			Fea. Ct.		4	4
		Structure	Seed Ct.		1	1
			Fea. Ct.		1	1
	Turner	Pit	Seed Ct.	2		2
			Fea. Ct.	2		2
Mississippian Seed Ct.				3	44	47
Mississippian Fea. Ct.				3	31	34
Taxon Frequency				0.13	1.94	2.07
Feature Ubiquity				0.46%	4.73%	5.19%
Site Ubiquity				6.90%	27.59	34.48%
Total Seed Ct.				3	164	167
Total Fea. Ct.				3	64	67

Table 6-24: Grape Family Members (Vitaceae)

Period	Site	Context		Grape family	Grape	Grand Total
MOUNDVILLE						
Late Woodland	1TU44/45	Pit	Seed Ct.		1	1
			Fea. Ct.		1	1
	1HA8	Pit	Seed Ct.		7	7
			Fea. Ct.		3	3
Late Woodland Seed Ct.					8	8
Late Woodland Fea. Ct.					4	4
Taxon Frequency					6.73	6.73
Feature Ubiquity					16.67%	16.67%
Site Ubiquity					33.33%	33.33%
Mississippian	1HA8	Floor	Seed Ct.		2	2
			Fea. Ct.		2	2
	1TU56	Midden	Seed Ct.		13	13
			Fea. Ct.		5	5
	Moundville	Pit	Seed Ct.		24	24
			Fea. Ct.		8	8
Mississippian Seed Ct.					39	39
Mississippian Fea. Ct.					15	15
Taxon Frequency					14.62	14.62
Feature Ubiquity					8.88%	8.88%
Site Ubiquity					54.55%	54.55%
Total Seed Ct.					47	47
Total Fea. Ct.					19	19
CENTRAL TOMBIGBEE						
Late Woodland	1Pi61		Seed Ct.		2	2
			Fea. Ct.		2	2
	1GR1X1		Seed Ct.		2	2
			Fea. Ct.		1	1
	1GR2		Seed Ct.		1	1
			Fea. Ct.		1	1
	1Pi61		Seed Ct.		1	1
			Fea. Ct.		1	1
	Lubbub Creek		Seed Ct.		2	2
			Fea. Ct.			
Late Woodland Seed Ct.					8	8
Late Woodland Fea. Ct.						
Taxon Frequency					32.00	32.00
Site Ubiquity					80%	80%
Mississippian	1GR2		Seed Ct.		1	1
			Fea. Ct.		1	1
	Lubbub Creek		Seed Ct.		6	6
			Fea. Ct.			
Mississippian Seed Ct.					7	7
Mississippian Fea. Ct.						
Taxon Frequency					9.46	9.46
Site Ubiquity					66%	66%
Total Seed Ct.					15	15
Total Fea. Ct.						

Figure 6-21: Grape

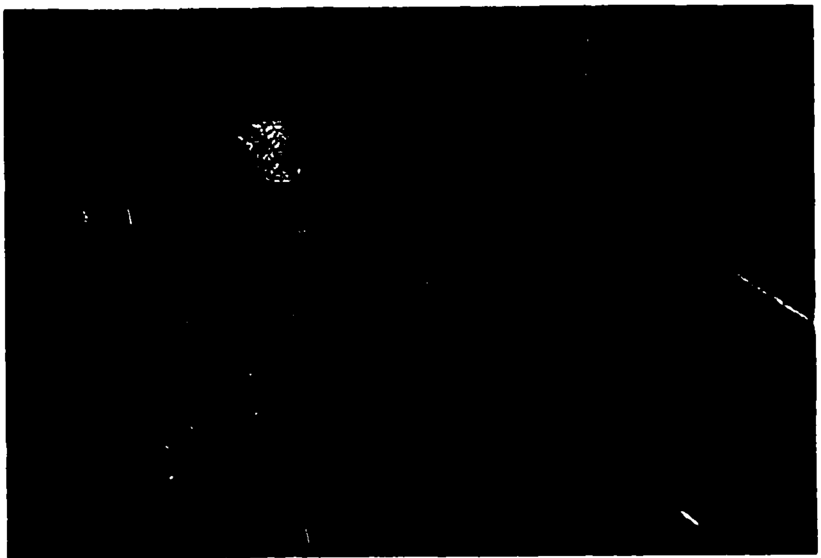


Figure 6-21a: Grape (*Vitis riparia*) plant with flowers

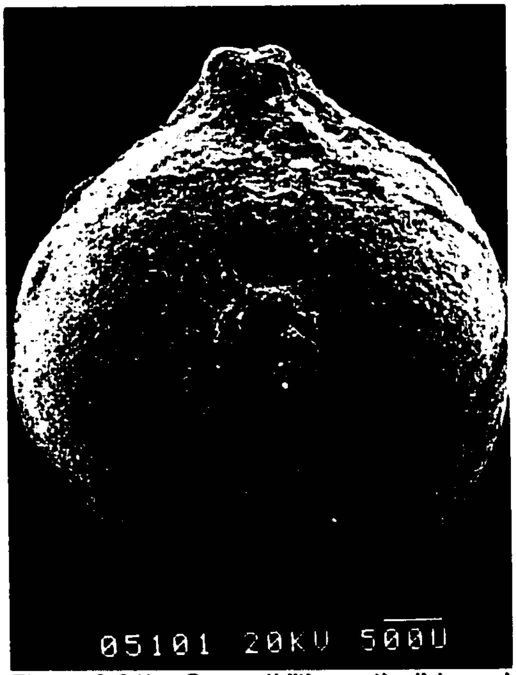


Figure 6-21b: Grape (*Vitis aestivalis*) seed at 20X

Figure 6-22: Virginia Creeper

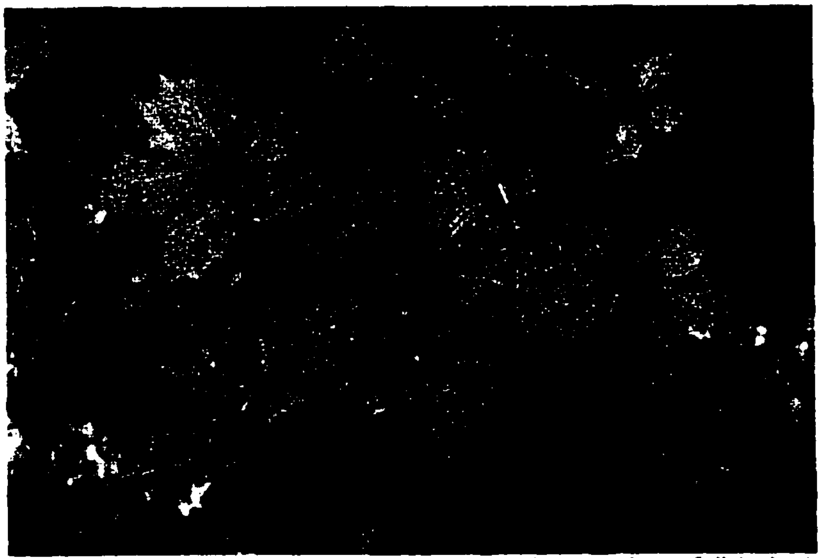


Figure 6-22a: Virginiana creeper (*Parthenocissus quinquefolia*) plant

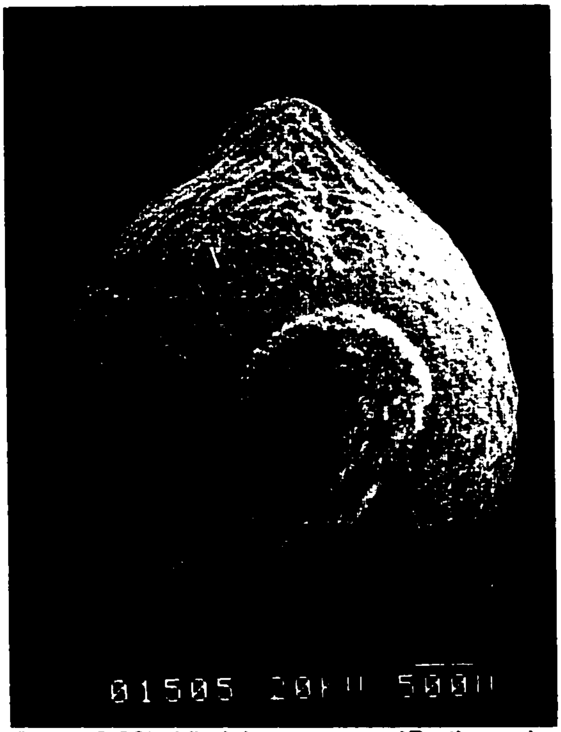


Figure 6-22b: Virginiana creeper (*Parthenocissus quinquefolia*) seed at 20X

ubiquity) Emergent Mississippian, and 10 (34.48% ubiquity) Mississippian period sites contained grape or grape family seeds. Sites with more than 10 seeds included the Late Woodland components at Bridges (n=12 seeds), and the Emergent Mississippian component at Petitt (n=59 seeds), as well as the Mississippian component of Cahokia/ICT-II (n=22 seeds). A single grape seed was found in an unusual limestone-lined pit (Feature 103) dating to the Range phase at the Range site; this pit may have been used for ritual purposes.

Grape seeds were found in four Late Woodland (n=8 seeds; Taxon Frequency = 6.73) and 15 Mississippian (n=39 seeds; Taxon Frequency = 14.62) features in the Moundville region. Twenty-four of the 39 Mississippian grape seeds come from Moundville.

Grape seeds were found in both Late Woodland (n=8 seeds) and Mississippian (n=7 seeds) contexts from the Central Tombigbee region. The Late Woodland and Mississippian Taxon Frequencies are 32.00 and 9.46, respectively. This represents a distinct decrease in grapes through time. Grapes were found at four of the five sites analyzed in this region; only site 1Pi33 did not have these remains.

Most members of the grape family grow along the edges of woodland openings and do not tend to invade actively cultivated fields. The presence of these seeds in paleoethnobotanical samples is generally interpreted as use of the fruits for food. The medical uses of grapes by Native Americans, however, are numerous (Moerman 1998:598-600). The leaves of several grape species were used for their tannic qualities for purposes such as diarrhea, thrush, and kidney troubles. Like the argument presented for persimmon, grape family members may have been sought out for their medical uses in addition to having been used as a food source.

Additional Food Species with Medicinal Uses. Five additional Category 3 taxa were identified in the American Bottom features: hawthorn (*Crataegus* sp.), red mulberry (*Morus rubra*), ground cherry (*Physalis* sp.), cherry (*Prunus* sp. - cherry-size), and cherry/plum (*Prunus* sp. - indeterminate). These species range in frequency from one mulberry seed identified in the Late Woodland component of the Bridges site, to 13 indeterminate cherry/plum seeds distributed among six sites. Two hawthorn seeds, with a Taxon Frequency of 8.00, were identified in Late

Woodland contexts from 1GR2 in the Central Tombigbee region. Cherry/plum (n=8 seeds) remains were present in the Moundville region features as well. These food plants are summarized in Table 6-25.

Category 4: Plants Used for Rituals and Medicines

The final category of possible medical plants consist of those whose dominant role in Native American ethnobotanies is as a ritual plant, with secondary and often commingled use as a medicine. This group of plants is relatively small, but individually numerous, thereby indicating the importance of these taxa in prehistoric life. All of these plants were used historically for religious ceremonies, and their occasional association with archaeological contexts identified as "ritual" strengthens this connection through time. Many of the Historic religious ceremonies in which these plants played a part took place to purify and heal the spirit; altered states of consciousness were part of some of these rituals. Administration of additional healing agents would often occur during the ritual. Because there are a limited number of plants in this category all are discussed.

Jimsonweed. Jimsonweed (*Datura stramonium*) was identified at only two sites in the American Bottom: BBB Motor and Cahokia/CT II Tract, a total of five seeds (Taxon Frequency = 0.22) was found (Table 6-26; Figure 6-23). Both of these sites have been interpreted as ritually significant during the Mississippian period during which the jimsonweed was deposited. The jimsonweed at the BBB Motor site was specifically found within the structure where the Keller figurine was recovered (Emerson 1997a, 1997b; Emerson and Jackson 1984).

Jimsonweed is a striking plant with large, irregularly toothed leaves which invades old fields and waste places. The attractive, white to light purple, trumpet-shaped flowers are present between July and September. The spiny capsules contain numerous seeds, and the pods are persistent throughout much of the late fall.

Jimsonweed use in the Eastern Woodlands (Moerman 1998:194) appears to have focused on the use of the plant as an important aid in curing skin ailments and wounds. It was

Table 6-25: Additional Food Taxa with Medicinal Uses

Period	Site	Context		Hawthorn	Red Mulberry	Ground Cherry	Cherry	Cherry/ Plum	Grand Total
AMERICAN BOTTOM									
Late Woodland	Bridges	Summary of all pit features	Seed Ct.		1			5	6
			Fea. Ct.		1			1	2
	Bridgeton	Pit	Seed Ct.					1	1
			Fea. Ct.					1	1
	Old Goat Farm	Summary of all features	Seed Ct.					1	1
			Fea. Ct.					1	1
Late Woodland Seed Ct.					1			7	8
Late Woodland Fea. Ct.					1			3	4
Taxon Frequency					0.04			0.29	
Feature Ubiquity					0.22%			0.65%	
Site Ubiquity					3.45%			10.34%	
Emergent Mississippian	Bridgeton	Pit	Seed Ct.					2	2
			Fea. Ct.					1	1
	Petitt	Pit	Seed Ct.	3					3
			Fea. Ct.	1					2
Emergent Mississippian Seed Ct.				3				2	5
Emergent Mississippian Fea. Ct.				1				1	2
Taxon Frequency				0.10				0.07	
Feature Ubiquity				0.12%				0.12%	
Site Ubiquity				6.67%				6.67%	
Mississippian	Bluff Shadow	Structure	Seed Ct.			2			2
			Fea. Ct.			2			2
	Bridges	Summary of all pit features	Seed Ct.					2	2
			Fea. Ct.					1	1
		Structure	Seed Ct.				1	2	3
			Fea. Ct.				1	1	2
	Cahokia/ICT-II	Pit	Seed Ct.				1		1
			Fea. Ct.				1		1
	Julien	Pit	Seed Ct.				1		1
			Fea. Ct.				1		1
Mississippian Seed Ct.						2	3	4	9
Mississippian Fea. Ct.						2	3	2	7
Taxon Frequency						0.09	0.13	0.18	
Feature Ubiquity						0.31%	0.46%	0.31%	
Site Ubiquity						3.45%	10.34%	3.45%	
Total Seed Ct.				3	1	2	3	13	22
Total Fea. Ct.				2	1	2	3	6	14

Table 6-25: Additional Food Taxa with Medicinal Uses

Period	Site	Context		Hawthorn	Red Mulberry	Ground Cherry	Cherry	Cherry/ Plum	Grand Total
MOUNDVILLE									
Late Woodland	1JE32	Pit	Seed Ct.					3	3
			Fea. Ct.					2	2
	1TU570	Pit	Seed Ct.					1	1
			Fea. Ct.					1	1
	1JE33	Pit	Seed Ct.					4	4
			Fea. Ct.					1	1
Late Woodland Seed Ct.								8	8
Late Woodland Fea. Ct.								4	4
Taxon Frequency								6.73	
Feature Ubiquity								16.67%	
Site Ubiquity								33.33%	
CENTRAL TOMBIGBEE									
Late Woodland	1GR2		Seed Ct.	2					2
			Fea. Ct.	2					2
Late Woodland Seed Ct.				2					2
Late Woodland Fea. Ct.				2					2
Taxon Frequency				8.00					
Site Ubiquity				20%					

Table 6-26: Jimsonweed (*Datura stramonium*)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian	BBB Motor	Pit	Seed Ct.	2
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Seed Ct.	3
			Fea. Ct.	3
Total Seed Ct.				5
Total Fea. Ct.				4
Taxon Frequency				0.22
Feature Ubiquity				0.61%
Site Ubiquity				6.90%

Figure 6-23: Jimsonweed

Figure 6-23a: Jimsonweed (*Datura stramonium*) plant

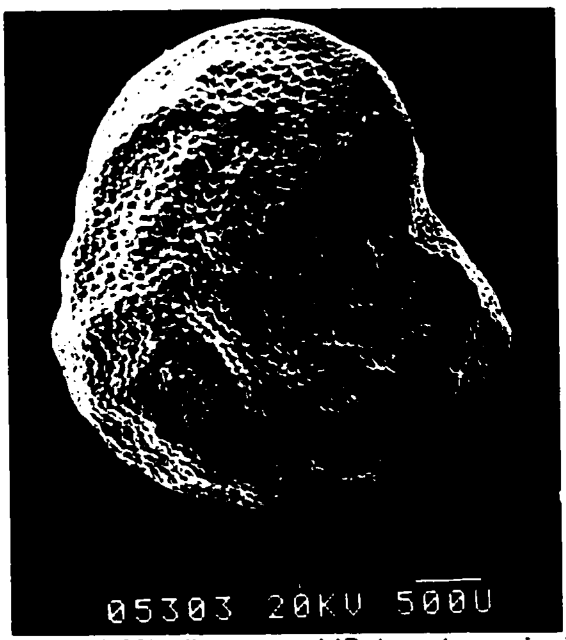


Figure 6-22b: Jimsonweed (*Datura stramonium*) seed at 20X

used for such purposes by the Cherokee, Delaware, Mohegan, and Rappahannock. Both the Cherokee and the Rappahannock used the plant for upper respiratory system congestion. The poisonous qualities of jimsonweed were recognized by the Iroquois and the Rappahannock. Unlike many other plants included in this dissertation, jimsonweed's leaves and seeds, once crushed, were used for their medical qualities as well as the leaves, thereby enhancing its chances of preservation in the paleoethnobotanical record.

Jimsonweed is a chemically bioactive plant with the two most important components being atropine and scopolamine. These compounds have an influence upon the parasympathetic nervous system. Physiological effects of jimsonweed include: "decreasing size of the pupil, promoting copious salivation, reducing the cardiac output (by reducing its volume and stroke rate), promoting blood flow to the viscera, increasing the motility of the stomach and intestines, and so forth" (Lewis and Elvin-Lewis 1977:154).

Jimsonweed was used in Europe to treat a variety of ailments that are now biomedically grouped under the rubric of physiological illness (Lewis and Elvin-Lewis 1977:167). Additional uses included the treatment of asthma by smoking the leaves of jimsonweed, a treatment that might be effective due to the small amount of atropine alkaloids delivered to the lungs and bronchial tissues (Blumenthal 1998:340; Lewis and Elvin-Lewis 1977:297).

Ingestion of the plant can cause a number of less healthy reactions including convulsions and, ultimately, unconsciousness. It is during this transition to unconsciousness that hallucinations may occur (Lewis and Elvin-Lewis 1977:419). Native American groups in the southwestern United States and western South America used jimsonweed to induce such hallucinations during religious ritual and rites of passage (Lewis and Elvin-Lewis 1977:423-425; Moerman 1998:195-196). No Eastern Woodland Native Americans are documented as having used jimsonweed for its hallucinogenic properties, but there is a report of early European settlers experiencing such effects as the result of "accidental" ingestion of jimsonweed leaves (as summarized in Lewis and Elvin-Lewis 1977:424).

Morning Glories. Seed fragments from several members of the morning glory family (Convolvulaceae including *Convolvulus* spp., *Calystegia* spp., and *Ipomoea* spp.) look very similar to one another, and they have been grouped together here for that reason (Table 6-27; Figure 6-24, 6-25). Morning glory remains were identified in all three regions in this investigation.

A total of 212 seeds from these plants was identified in 22 features from 12 sites in the American Bottom region. The sites with the most seeds include the Mississippian components of the Walmart (n=137 seeds), Olszewski (n=35 seeds), Range (n=15 seeds), and Julien (n=10 seeds) sites. The dominance of Mississippian remains is not limited to their raw count; Taxon Frequencies for the Emergent Mississippian (0.38) and Mississippian (8.86) periods support the increasing importance of morning glories during later prehistory. Two concentrations (n=50 and n=58) of morning glory seeds were found in Mississippian contexts at Walmart. As the report from this site has not been published, it is not known whether these Walmart contexts were of ritual nature. In addition, a single Convolvulaceae seed was found in a Stirling phase hearth (Feature 147) at Julien within a potential sweat lodge.

Morning glory/bindweed seeds were present in Moundville region Mississippian contexts from the Moundville site (n=22 seeds) and 1TU56 (n=11 seeds). The Taxon Frequency for morning glory/bindweeds is relatively high at 12.37.

A single Convolvulaceae seed, with a Taxon Frequency of 4.00, was identified in a Late Woodland context from site 1GR1X1 in the Central Tombigbee region.

Morning glories and bindweeds aggressively invade open areas around habitations and fields. The presence of these seeds in paleoethnobotanical samples has been interpreted as weedy inclusions by some researchers (Scarry 1986). More recently, the ritual use or subsistence of morning glory family members has been suggested by paleoethnobotanists (e.g., Parker 1992). Man-of-the-earth morning glory (*Ipomoea pandurata*) is best known for its very large edible root, which was consumed by many tribal groups (Moerman 1998:275). Native American use of morning glory seeds reveals the powerful cathartic qualities these seeds possess. Additional uses of morning glories include their use as tuberculosis remedy by the

Table 6-27: Morning Glory Family Members

Period	Site	Context		Morning Glory Family	Morning Glory	Bindweed	Grand Total
AMERICAN BOTTOM							
Emergent Mississippian	BBB Motor	Pit	Seed Ct.			1	1
			Fea. Ct.			1	1
	Bridgeton	Pit	Seed Ct.	1			1
			Fea. Ct.	1			1
	Dohack	Pit	Seed Ct.			1	1
			Fea. Ct.			1	1
	George Reeves	Summary of all features	Seed Ct.			2	2
			Fea. Ct.			1	1
	Petitt	Pit	Seed Ct.		1		1
			Fea. Ct.		1		1
	Robert Schneider	Pit	Seed Ct.			4	4
			Fea. Ct.			1	1
	Robinson's Lake	Post	Seed Ct.	1			1
			Fea. Ct.	1			1
Emergent Mississippian Seed Ct.				2	1	8	11
Emergent Mississippian Fea. Ct.				2	1	4	7
Taxon Frequency				0.07	0.03	0.28	0.38
Feature Ubiquity				0.24%	0.12%	0.48%	0.84%
Site Ubiquity				13.33%	6.67%	26.67%	46.67%
Mississippian	Julien	Pit	Seed Ct.	4		4	8
			Fea. Ct.	3		1	4
		Structure	Seed Ct.			2	2
			Fea. Ct.			1	1
	Lohmann	Structure	Seed Ct.			4	4
			Fea. Ct.			1	1
	Olszewski	Pit	Seed Ct.			35	35
			Fea. Ct.			1	1
	Range	Pit	Seed Ct.			15	15
			Fea. Ct.			4	4
	WalMart	Unknown	Seed Ct.			137	137
			Fea. Ct.			4	4
Mississippian Seed Ct.				4		197	201
Mississippian Fea. Ct.				3		12	15
Taxon Frequency				0.18		8.68	8.86
Feature Ubiquity				0.46%		1.83%	2.29%
Site Ubiquity				3.45%		17.24%	17.24%
Total Seed Ct.				6	1	205	212
Total Fea. Ct.				5	1	16	22

Table 6-27: Morning Glory Family Members

Period	Site	Context		Morning Glory Family	Morning Glory	Bindweed	Grand Total
MOUNDVILLE							
Mississippian	1TU56	Midden	Seed Ct.	11			11
			Fea. Ct.	3			3
	Moundville	Daub	Seed Ct.	2			2
			Fea. Ct.	1			1
		Midden	Seed Ct.	2			2
			Fea. Ct.	1			1
		Pit	Seed Ct.	18			18
			Fea. Ct.	12			12
Mississippian Seed Ct.				33			33
Mississippian Fea. Ct.				17			17
Taxon Frequency				12.37			12.37
Feature Ubiquity				10.06%			10.06%
Site Ubiquity				27.27%			27.27%
CENTRAL TOMBIGBEE							
Late Woodlan	1GR1X1		Seed Ct.		1		1
			Fea. Ct.		1		1
Late Woodland Seed Ct.					1		1
Late Woodland Fea. Ct.					1		1
Taxon Frequency					4.00		4.00
Site Ubiquity					20%		20%

Figure 6-24: Morning Glory

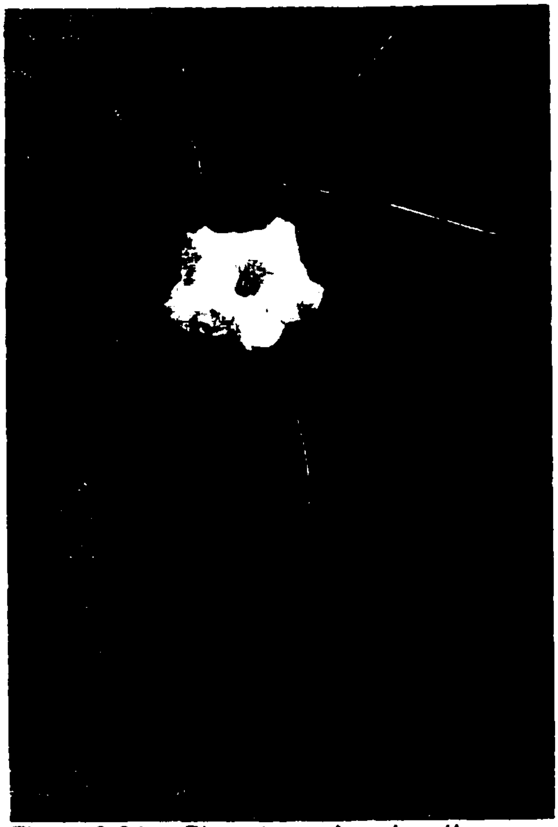


Figure 6-24a: Bigroot morning glory (*Ipomea pandurata*) plant with flower

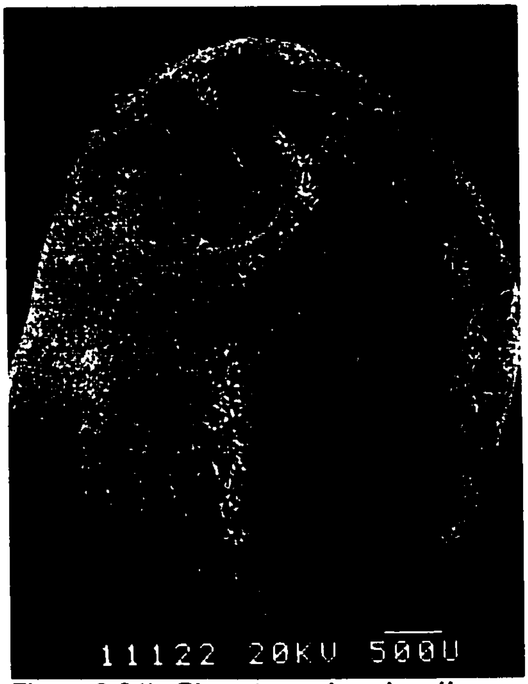


Figure 6-24b: Bigroot morning glory (*Ipomea pandurata*) seed at 20X

Figure 6-25: Bindweed

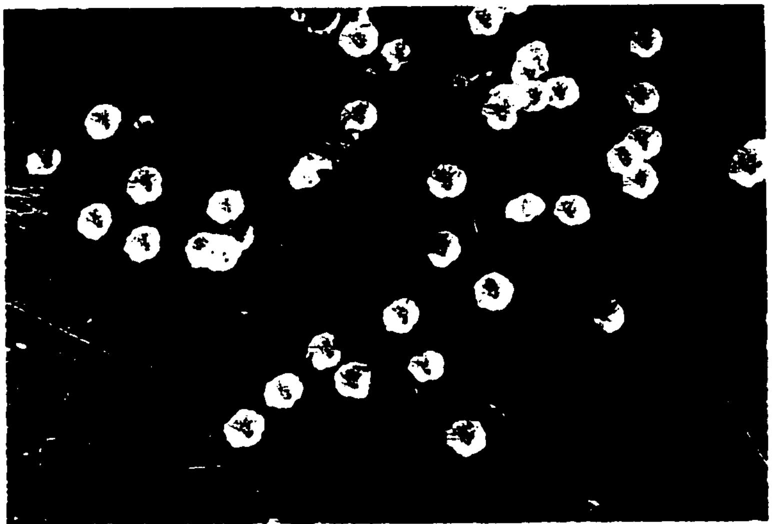


Figure 6-25a: Bindweed (*Convolvulus arvensis*) plant with flowers

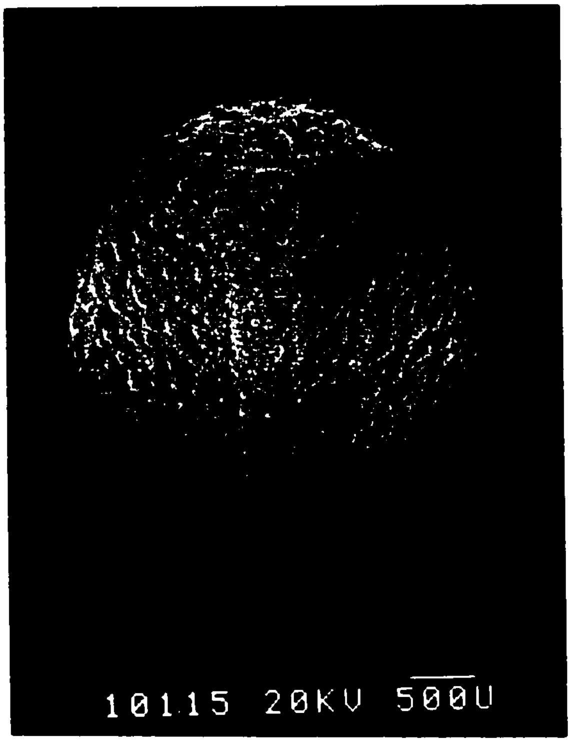


Figure 6-25b: Bindweed (*Convolvulus arvensis*) seed at 20X

Cherokee and Iroquois and as a diuretic by the Creek and Cherokee (Moerman 1998:275). The seeds of some species also contain compounds similar in effect to LSD. The Native American use of morning glory seeds as a hallucinogen has not been recorded in the United States, but the Aztecs used morning glory seeds to induce visions, as noted by early Europeans (Lewis and Elvin Lewis 1977:416).

Yaupon. Yaupon (*Ilex vomitoria*) seeds (n=2 seeds; Taxon Frequency = 0.75) only were found in only one context from the site of Moundville (Table 6-28; Figure 6-26). It is possible that some of the other holly seeds found in Late Woodland and Mississippian contexts from the Moundville region also are yaupon, but they were too degraded to identify securely (Scarry, personal communication 1998).

Yaupon is an evergreen shrub that commonly occurs along the Gulf Coast, although in its southern extent it can be found several hundred miles inland. The shrub is characterized by small, simple leaves, and the mature red fruit contains several nutlets.

Yaupon is best known in the ethnographic and historical literature (see volume edited by Hudson [1979] for review of this literature) as the main component of the "black drink," which was a caffeine-rich beverage used by several Southeastern tribal groups at social and ceremonial events. Black drink was consumed in large quantities, with ritual purging often following. Asch (1995:162-168) suggests that the demand from southeastern groups for this plant was so great that coastal populations exported the leaves to the Creeks and other inland tribes. There is some evidence that it was encouraged or even cultivated by the Creeks (Asch 1995:162-168). All of the medical uses of yaupon are based on its traditional use as a ceremonial emetic and cathartic (Moerman 1998:273).

Redcedar. Redcedar (*Juniperus virginiana)*, with 593 wood fragments, was identified from 85 features at 20 sites in the American Bottom region (Table 6-29; Figure 6-27). While redcedar wood and not seeds were identified in these features, the redcedar Taxon Frequency displays a dramatic jump from the Late Woodland (0.63) and Emergent Mississippian (1.72) periods to the Mississippian (23.27). This increase through time is also reflected in the ubiquity

Table 6-28: Yaupon (*Ilex vomitoria*)

Period	Site	Context		
MOUNDVILLE				
Mississippian	Moundville	Pit	Seed Ct.	2
			Fea. Ct.	1
Total Seed Ct.				2
Total Fea. Ct.				1
Taxon Frequency				0.75
Feature Ubiquity				0.59%
Site Ubiquity				9.09%

Figure 6-26: Yaupon

Figure 6-26a: Yaupon (*Ilex vomitoria*) plant

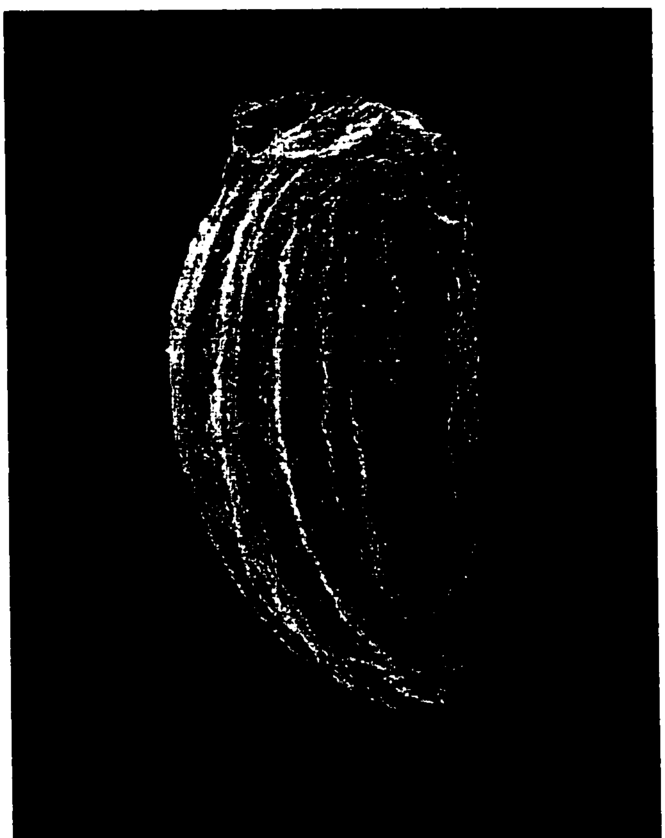


Figure 6-26b: Yaupon (*Ilex vomitoria*) seed at 20X

Table 6-29: Redcedar (*Juniperus virginiana*)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Kingfish	Column/Level	Wood Ct.	2
			Fea. Ct.	2
		Pit	Wood Ct.	5
			Fea. Ct.	4
	Range	Pit	Wood Ct.	8
			Fea. Ct.	1
Late Woodland Seed Ct.				15
Late Woodland Fea. Ct.				7
Taxon Frequency				0.63
Feature Ubiquity				1.51%
Site Ubiquity				6.90%
Emergent Mississippian	Bridgeton	Pit	Wood Ct.	3
			Fea. Ct.	2
	Dohack	Pit	Wood Ct.	8
			Fea. Ct.	1
	Radic	Post	Wood Ct.	6
			Fea. Ct.	1
	Range	Pit	Wood Ct.	4
			Fea. Ct.	3
		Structure	Wood Ct.	3
			Fea. Ct.	1
	Robinson's Lake	Pit	Wood Ct.	2
			Fea. Ct.	1
		Post	Wood Ct.	3
			Fea. Ct.	1
		Structure	Wood Ct.	1
			Fea. Ct.	1
	Samson Bluff	Unknown	Wood Ct.	19
			Fea. Ct.	1
	Sponemann	Pit	Wood Ct.	1
			Fea. Ct.	1
Emergent Mississippian Seed Ct.				50
Emergent Mississippian Fea. Ct.				13
Taxon Frequency				1.72
Feature Ubiquity				1.56%
Site Ubiquity				46.67%
Mississippian	BBB Motor	Pit	Wood Ct.	146
			Fea. Ct.	7
		Post	Wood Ct.	3
			Fea. Ct.	2
		Structure	Wood Ct.	1
			Fea. Ct.	1

Table 6-29: Redcedar (*Juniperus virginiana*)

Period	Site	Context		
AMERICAN BOTTOM				
Mississippian (contin.)	Bluff Shadow	Structure	Wood Ct.	1
			Fea. Ct.	1
	Bridges	Summary of all pit features	Wood Ct.	1
			Fea. Ct.	1
	Cahokia/ICT-II	Pit	Wood Ct.	88
			Fea. Ct.	26
		Structure	Wood Ct.	35
			Fea. Ct.	5
	Cahokia/Septic Sy	Pit	Wood Ct.	4
			Fea. Ct.	1
		Stockade trench	Wood Ct.	4
			Fea. Ct.	2
	Cahokia/South Pal	Stockade trench	Wood Ct.	4
			Fea. Ct.	2
	Julien	Pit	Wood Ct.	1
			Fea. Ct.	1
		Structure	Wood Ct.	134
			Fea. Ct.	2
	Lohmann	Pit	Wood Ct.	1
			Fea. Ct.	1
	Olszewski	Pit	Wood Ct.	2
			Fea. Ct.	1
	Radic	Charnel structure	Wood Ct.	1
			Fea. Ct.	1
		Mortuary pit	Wood Ct.	3
			Fea. Ct.	1
	Range	Pit	Wood Ct.	1
			Fea. Ct.	1
	Robert Schneider	Pit	Wood Ct.	16
			Fea. Ct.	2
		Structure	Wood Ct.	1
			Fea. Ct.	1
	Turner	Structure	Wood Ct.	1
			Fea. Ct.	1
	WalMart	Unknown	Wood Ct.	80
			Fea. Ct.	5
Mississippian Seed Ct.				528
Mississippian Fea. Ct.				65
Taxon Frequency				23.27
Feature Ubiquity				9.92%
Site Ubiquity				48.28%
Total Seed Ct.				593
Total Fea. Ct.				85

Table 6-29: Redcedar (*Juniperus virginiana*)

Period	Site	Context		
MOUNDVILLE				
Late Woodland	1JE31	Pit	Wood Ct.	1
			Fea. Ct.	1
	1JE32	Pit	Wood Ct.	2
			Fea. Ct.	1
Late Woodland Seed Ct.				3
Late Woodland Fea. Ct.				2
Taxon Frequency				2.53
Feature Ubiquity				8.33%
Site Ubiquity				22.22%
Mississippian	Moundville	Pit	Wood Ct.	24
			Fea. Ct.	6
Mississippian Seed Ct.				24
Mississippian Fea. Ct.				6
Taxon Frequency				9.00
Feature Ubiquity				3.55%
Site Ubiquity				9.09%
Total Seed Ct.				27
Total Fea. Ct.				8

Figure 6-27: Redcedar

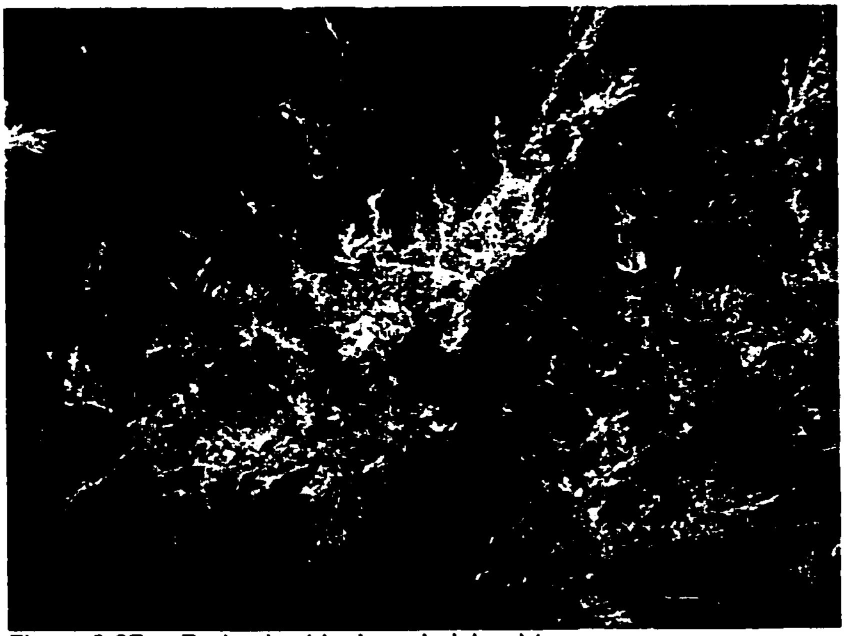


Figure 6-27a: Redcedar (*Juniper virginiana*) tree

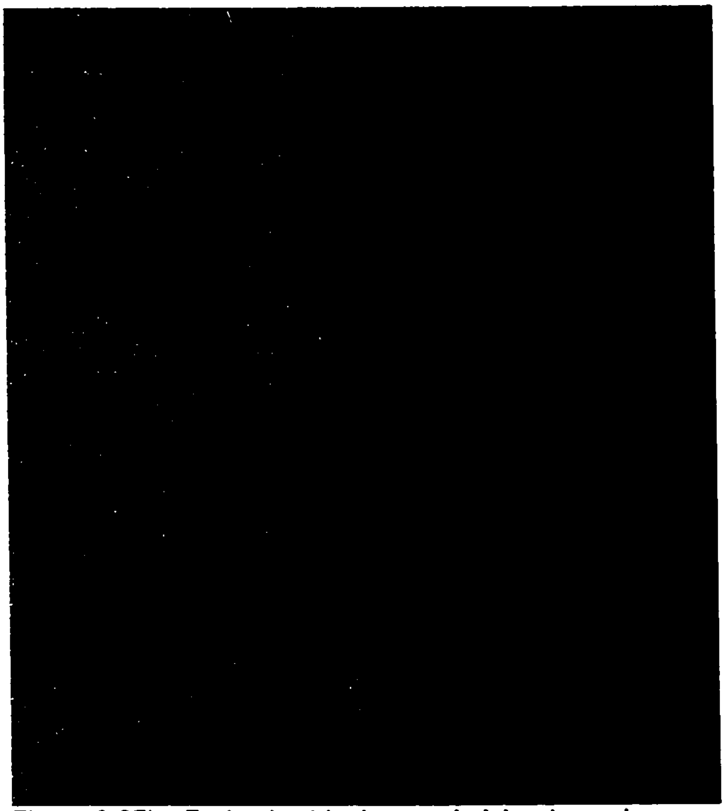


Figure 6-27b: Redcedar (*Juniperus virginiana*) wood

measures: 1.51% to 1.56% to 9.92% for Feature Ubiquity and 6.90% to 46.67% to 48.28% for Site Ubiquity. The sites with the most redcedar - BBB Motor (n=150 fragments; 92 of which came from pit FS# 125), Julien (n=135 fragments; 128 of which came from the northern ceremonial sector of the site), and Cahokia/ICT II Tract (n=123 wood fragments) - are Mississippian, and are believed to have been ritual locales. Other redcedar remains from ritual locales include a mortuary pit (Fea. 189; n=3 wood fragments) and charnel house (Fea. 199; n=1 wood fragment) from the Moorehead component at Radic, and a central pit (Fea. 109; n=2 wood fragments) from Occupation Area R-1 at Range. Archaeologists have noted this connection between redcedar and ritual contexts at several sites in the American Bottom region (Emerson 1997; Lopinot 1991; Parker 1991).

Redcedar also was recovered from the Moundville region. A total of three fragments was present in West Jefferson phase contexts, and 24 fragments were recovered from Moundville I features. All the Mississippian redcedar from the Moundville region was recovered in pits at the site of Moundville.

A pattern of use for redcedar is present in the ethnobotanical record. It is often associated with purification and cleansing in secular and ritualized contexts alike (Moerman 1998:290-291). A secondary use of the plant focuses on its action on respiratory problems, such as coughs and colds. Importantly, many of these uses involve burning the leaves, twigs, and bark, which increase the chances that redcedar would be preserved in the paleoethnobotanical record. Redcedar also has strong diuretic effects, resulting from monoterpenes in the volatile oil (Kindscher 1992:134), as recognized by Western and Native American health professionals. A final note on this intriguing plant is that concentrated redcedar oil causes uterine cramping, an activity useful in both the child birthing and abortion processes.

Tobacco. Tobacco (*Nicotiana* sp.) also has attracted much interest from archaeologists because of its ritual implications (Wagner [1991] provides an excellent summary of tobacco's presence in eastern North American through time and space). Four hundred and sixty-eight tobacco seeds were identified in 63 features from 21 site components in the American Bottom region (Table 6-30; Figure 6-28). The Late Woodland period Fish Lake site (n=193 seeds), all components of the Range site (Late Woodland, n=86 seeds; Emergent Mississippian, n=17 seeds; Mississippian n=20 seeds), and the Emergent Mississippian component of the Sponemann site (n=88 seeds) contained the highest concentrations of tobacco seeds. The Taxon Frequencies (12.07 - Late Woodland; 4.69 - Emergent Mississippian; 1.94 - Mississippian) and Feature Ubiquities (4.96% - Late Woodland; 2.28% - Emergent Mississippian; 3.21% - Mississippian) for tobacco decrease through time. A single tobacco seed has been associated with a potentially ritual context in this study: Feature 83, a mortuary pit from Radic. Numerous tobacco seeds were associated with the deposits at Cahokia's Sub-Mound 51, but the exact counts are not available at this time, so these remains are not included in this summary (Fritz 1997).

It is unclear whether the lack of tobacco remains in the Moundville and Central Tombigbee regions is due to the recovery methods used in those areas, or to a real difference in prehistoric distribution of tobacco within the United States. Projects in Tensas Parish, Louisiana, have yielded tobacco remains, indicating that tobacco was present prehistorically in some areas of the Southeast by A.D. 1000 (Kidder and Fritz 1993).

Tobacco is the only cultivated species included in this study. The other species may have been encouraged or maintained, but do not appear to have been domesticated. All archaeological tobacco in eastern North America has long been assumed to be *Nicotiana rustica* (Wagner 1991), although it was recognized that sufficient work had not been done on the morphology of *Nicotiana* seeds. Recent research on desiccated tobacco seeds from Cahokia reveals their morphological resemblance to *Nicotiana quadrivalvis* or possibly *N. multivalvis*, rather than *N. rustica*, but more research is necessary (Fritz 1997).

The most commonly recognized Native American use of tobacco was for smoking, either by itself or in a mixture with other plants (Moerman 1998:356-357). The act of smoking had many social purposes ranging from relaxation to ritual, wherein the psychotropic effects of tobacco were sometimes used to induce visions. Tobacco leaves also were commonly burned in smudges for

Table 6-30: Tobacco (*Nicotiana* sp.)

Period	Site	Context		
AMERICAN BOTTOM				
Late Woodland	Fish Lake	Pit	Seed Ct.	192
			Fea. Ct.	6
		Structure	Seed Ct.	1
			Fea. Ct.	1
	George Reeves	Summary of all features	Seed Ct.	1
			Fea. Ct.	1
	Leingang	Pit	Seed Ct.	1
			Fea. Ct.	1
	Little Hills	Pit	Seed Ct.	3
			Fea. Ct.	2
	Mund	Pit	Seed Ct.	4
			Fea. Ct.	4
	Range	Earth oven	Seed Ct.	68
			Fea. Ct.	4
		Pit	Seed Ct.	3
			Fea. Ct.	3
		Structure	Seed Ct.	15
			Fea. Ct.	1
Late Woodland Seed Ct.				288
Late Woodland Fea. Ct.				23
Taxon Frequency				12.07
Feature Ubiquity				4.96%
Site Ubiquity				20.69%
Emergent Mississippian	BBB Motor	Pit	Seed Ct.	7
			Fea. Ct.	1
	Dohack	Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	5
			Fea. Ct.	1
	George Reeves	Summary of all features	Seed Ct.	6
			Fea. Ct.	3
	Goshen	Pit	Seed Ct.	3
			Fea. Ct.	2
	Petitt	Summary of all pit features	Seed Ct.	5
			Fea. Ct.	1
	Radic	Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	3
			Fea. Ct.	2
	Range	Pit	Seed Ct.	17
			Fea. Ct.	2
	Sponemann	Earth oven	Seed Ct.	4
			Fea. Ct.	3
		Structure	Seed Ct.	84
			Fea. Ct.	2
Emergent Mississippian Seed Ct.				136
Emergent Mississippian Fea. Ct.				19
Taxon Frequency				4.69
Feature Ubiquity				2.28%
Site Ubiquity				53.33%

Table 6-30: Tobacco (*Nicotiana* sp.)

Period	Site	Context		
Mississippian	Cahokia/ICT-II	Pit	Seed Ct.	12
			Fea. Ct.	9
		Structure	Seed Ct.	3
			Fea. Ct.	3
	Olszewski	Pit	Seed Ct.	2
			Fea. Ct.	1
	Radic	Mortuary pit	Seed Ct.	1
			Fea. Ct.	1
		Pit	Seed Ct.	1
			Fea. Ct.	1
		Structure	Seed Ct.	1
			Fea. Ct.	1
	Range	Pit	Seed Ct.	20
			Fea. Ct.	2
	Robert Schneider	Pit	Seed Ct.	1
			Fea. Ct.	1
	Turner	Pit	Seed Ct.	1
			Fea. Ct.	1
	WalMart	Unknown	Seed Ct.	2
			Fea. Ct.	1
Mississippian Seed Ct.				44
Mississippian Fea. Ct.				21
Taxon Frequency				1.94
Feature Ubiquity				3.21%
Site Ubiquity				24.14%
Total Seed Ct.				468
Total Fea. Ct.				63

Figure 6-28: Tobacco

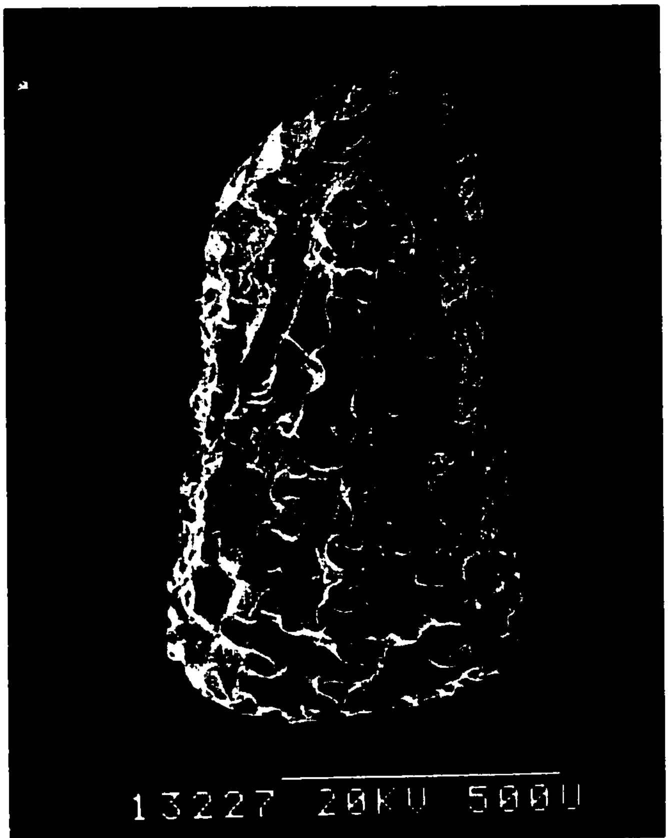


Figure 6-28: Tobacco (*Nicotiana rustica*) seed on edge at 75X

their aroma and the purification qualities that the smoke provided. It is, however, important to recognize the use of tobacco leaves and roots for more mundane medical purposes. Tobacco was a worming agent, an antispasmodic, and a cathartic aid. These uses make biomedical sense given the powerful array of compounds, such as nicotine, found in tobacco. The status of this plant as a medicine is probably one of the easiest to support due to its significance in historic Native American lifeways.

CHAPTER 7: RESULTS AND DISCUSSION

Introduction

Data on potential archaeomedicinal plants from the American Bottom, Moundville, and Central Tombigbee regions were presented in the previous chapter, and this information is summarized in Tables 7-1 and 7-2. The information from these three regions are next examined by period to reveal trends as they relate to changing health needs of the local residents. Within each region, the Late Woodland through Mississippian archaeomedicinal plant remains are compared and contrasted. At least five categories of information are presented in order to compare the distribution of potential archaeomedicinal plants through time within and among regions: 1) summation of raw data on sites that contained potential medicinal plants; 2) discussion of which taxa tended be more numerous within individual features; 3) discussion of which taxa tended to co-occur with one another; 4) Category Percentage (Figure 7-1), a ratio of the total seed count in each of the four categories to the total number of archaeomedicinal seeds, and 5) Category Ubiquity (Figure 7-2), calculated by summing the number of features containing a given category of plant, then dividing by the total number of analyzed features for the corresponding period and region.

American Bottom Region

Late Woodland Results. Late Woodland period plant remains were identified in a total of 29 sites from the American Bottom region. Of these sites, 11 were recognized by the excavators as being multi-component: six also contained Mississippian contexts, two had Emergent Mississippian contexts, and three consisted of Emergent Mississippian, Mississippian, and Late Woodland contexts. The total number of analyzed Late Woodland features is 464. Only 118 contained medicinal plant remains, thus 25% of the analyzed features had archaeomedicinal remains. The number of features analyzed from these sites ranged from a single feature at

Table 7-1. Late Woodland and Mississippian Taxon Frequencies in American Bottom (AB), Moundville (MND), and Central Tombigbee (CTB) Regions

	Taxa	LW Taxon Frequency			MIS Taxon Frequency		
		AB	MND	CTB	AB	MND	CTB
Medicinal Plants	*Anemone* sp.	0.04					
	Bidens spp.	0.04			0.04		
	Centaurea sp.					0.37	
	Chamaesyce cf. *nutans*				0.09		
	Chamaesyce maculata				0.79		
	Chamaesyce sp.	0.50	0.84		1.59		
	Euphorbiaceae					1.87	
	Desmodium sp.	0.34		8.00	1.06		
	Galactia spp.				0.04		
	Galium aparine	2.30	1.68	4.00	0.84	6.00	
	Geranium sp.				0.04		
	Hypericum sp.				0.62		
	Ilex sp.		0.84			3.75	
	Lathyrus sp.					10.87	
	Lathyrus/Vicia					3.00	
	Lespedeza sp.	0.29			0.22		
	Magnolia grandiflora		0.84				
	Plantago sp.				0.04		
	Polygonatum/Smilacina				0.04		
	Rhamnus sp.	0.04					
	Rumex sp.	0.13			0.04		
	Silene sp.	0.04			0.04		
	Sisyrinchium spp.				0.18		
	Verbascum sp.	0.04			0.04		
	Verbena sp.	0.08			0.18		
	Vicia sp.		0.84			5.62	
	Viola sp.				0.04		
Medicinal/ Food Plants	*Asclepias* sp.				0.04		
	Brassicaceae	0.08			0.18		
	Celtis sp.	0.04				0.75	
	Gleditsia triacanthos		0.84	8.00			
	Gymnocladus dioca				0.09	·	
	Lactuca sp.				0.13		
	Lamiaceae	0.25		12.00	0.44		1.35
	Lepidium sp.	0.04					
	Malvaceae		2.53				
	Oeothera sp.					1.12	
	Oxalis sp.	0.13			0.22	1.12	
	Passiflora incarnata		1.68	4.00		15.75	12.16
	Phytolacca americana	0.42	2.53		1.50	91.49	
	Rhus sp.	1.55	266.84	4.00	1.98	1.12	
	Rudbeckia sp.				0.13		
	Sabal minor	1.68					
	Sambucus canadensis	2.14	2.53		0.18	5.62	
	Solanaceae	0.67			0.79		
	Solanum ptycanthum	3.60			30.77		
	Toxicodendron radicans	0.08					
	Viburnum sp.				0.09		
Food Plants	*Crataegus* sp.			8.00			
	Diospyros virginiana	1.21		24.00	4.89		44.59
	Fragaria virginiana	0.75			0.13		
	Morus rubra	0.04					
	Physalis sp.				0.09		
	Portulaca oleracea	2.68	6.73		15.82	48.74	
	Prunus americana		12.63			1.12	21.62
	Prunus sp.		6.73				
	Prunus sp. (cherry-size)				0.13		
	Prunus sp.(plum-size)	0.25			0.62		
	Prunus spp. (indeterm.)	0.29			0.18		
	Rubus sp.	0.75	0.84	4.00	0.22	3.37	
	Vaccinium sp.				7.50		
	Vitaceae				0.13		
	Vitis sp.	2.09	6.73	32.00	1.94	14.62	9.46
Ritual Plants	Convolvulaceae			4.00	0.18		
	Datura stramonium				0.22		
	Ilex cf. *vomitoria*					0.75	
	Ipomoea sp.				8.68		
	Ipomoea/Convolvulus					12.37	
	Juniperus (wood)	0.63	2.53		23.27	9.00	
	Nicotiana sp.	12.07			1.94		

Table 7-2. Late Woodland and Mississippian Site and Feature Ubiquities in the American Bottom (AB), Moundville (MND), and Central Tombigbee (CTB) Regions

		LW Feature Ubiquity		MS Feature Ubiquity		LW Site Ubiquity			MS Site Ubiquity		
	Taxa	AB	MND	AB	MND	AB	MND	CTB	AB	MND	CTB
Medicinal Plants	*Anemone* sp.	0.22%				3.45%					
	Bidens spp.	0.22%		0.15%		3.45%			3.45%		
	Centaurea sp.				0.59%					9.09%	
	Chamaesyce cf. *nutans*			0.15%					3.45%		
	Chamaesyce maculata			1.83%					3.45%		
	Chamaesyce sp.	1.94%	4.17%	2.44%		20.69%	11.11%		34.48%		
	Euphorbiaceae				2.96%					27.27%	
	Desmodium sp.	0.86%		1.68%		13.79%		20%	10.34%		
	Galactia spp.			0.15%					3.45%		
	Galium aparine	5.17%	4.17%	1.98%	5.33%	27.59%	11.11%	20%	20.69%	27.27%	
	Geranium sp.			0.15%					3.45%		
	Hypericum sp.			0.61%					3.45%		
	Ilex sp.		4.17%		4.14%		11.11%			36.36%	
	Lathyrus sp.				0.59%					9.09%	
	Lathyrus/*Vicia*				0.59%					9.09%	
	Lespedeza sp.	0.86%		0.46%		13.79%			10.34%		
	Magnolia grandiflora		4.17%				11.11%				
	Plantago sp.			0.15%					3.45%		
	Polygonatum/Smilacina			0.15%					3.45%		
	Rhamnus sp.	0.22%				3.45%					
	Rumex sp.	0.43%		0.15%		6.90%			3.45%		
	Silene sp.	0.22%		0.15%		3.45%			3.45%		
	Sisyrinchium spp.			0.31%					3.45%		
	Verbascum sp.	0.22%		0.15%		3.45%			3.45%		
	Verbena sp.	0.43%		0.46%		6.90%			6.90%		
	Vicia sp.		4.17%		1.18%		11.11%			18.18%	
	Viola sp.			0.15%					3.45%		
Medicinal/ Food Plants	*Asclepias* sp.			0.15%					3.45%		
	Brassicaceae	0.22%		0.31%		3.45%			3.45%		
	Celtis sp.	0.22%			0.59%	3.45%				9.09%	
	Gleditsia triacanthos		4.17%				11.11%	20%			
	Gymnocladus dioca			0.31%					3.45%		
	Lactuca sp.			0.31%					6.90%		
	Lamiaceae	0.86%		1.07%		10.34%		20%	13.79%		33%
	Lepidium sp.	0.22%				3.45%					
	Malvaceae		4.17%				11.11%				
	Oeothera sp.				0.59%					9.09%	
	Oxalis sp.	0.43%		0.46%	1.78%	6.90%			6.90%	18.18%	
	Passiflora incarnata		8.33%		10.06%		22.22%	20%		72.73%	66%
	Phytolacca americana	0.65%	8.33%	1.37%	6.51%	6.90%	22.22%		10.34%	45.45%	
	Rhus sp.	2.37%	25.00%	3.51%	1.78%	31.03%	44.44%	20%	17.24%	18.18%	
	Rudbeckia sp.			0.46%					10.34%		
	Sabal minor	4.17%				11.11%					
	Sambucus canadensis	3.02%	4.17%	0.31%	2.37%	17.24%	11.11%		6.90%	9.09%	
	Solanaceae	0.86%		0.46%		13.79%			6.90%		
	Solanum ptycanthum	6.68%		14.35%		41.38%			51.72%		
	Toxicodendron radicans	0.43%				6.90%					
	Viburnum sp.			0.15%					3.45%		
Food Plants	*Crataegus* sp.							20%			
	Diospyros virginiana	2.37%		7.63%		27.59%		80%	34.48%		66%
	Fragaria virginiana	0.22%		0.46%		3.45%			3.45%		
	Morus rubra	0.22%				3.45%					
	Physalis sp.			0.31%					3.45%		
	Portulaca oleracea	4.09%	25.00%	5.19%	6.51%	24.14%	44.44%		37.93%	45.45%	
	Prunus americana		12.50%		1.18%		33.33%			9.09%	33%
	Prunus sp.		16.67%				33.33%				
	Prunus sp. (cherry-size)			0.46%					10.34%		
	Prunus sp.(plum-size)	0.43%		1.07%		3.45%			6.90%		
	Prunus spp. (indeterm.)	0.65%		0.31%		10.34%			3.45%		
	Rubus sp.	2.80%	4.17%	0.61%	4.14%	27.59%	11.11%	20%	10.34%	27.27%	
	Vaccinium sp.			6.51%					45.45%		
	Vitaceae			0.46%					6.90%		
	Vitis sp.	5.17%	16.67%	4.73%	8.88%	44.83%	33.33%	80%	27.59%	54.55%	66%
Ritual Plants	Convolvulaceae			0.46%				20%	3.45%		
	Datura stramonium			0.61%					6.90%		
	Ilex cf. *vomitoria*				0.59%					9.09%	
	Ipomoea sp.			1.83%					17.24%		
	Ipomoea/Convolvulus				10.06%					27.27%	
	Juniperus (wood)	1.51%	8.33%	9.92%	3.55%	6.90%	22.22%		48.28%	9.09%	
	Nicotiana sp.	4.96%		3.21%		20.69%			24.14%		

Figure 7-1. Category Percentages of Potential Archaeomedicinal Plants for Three Study Regions

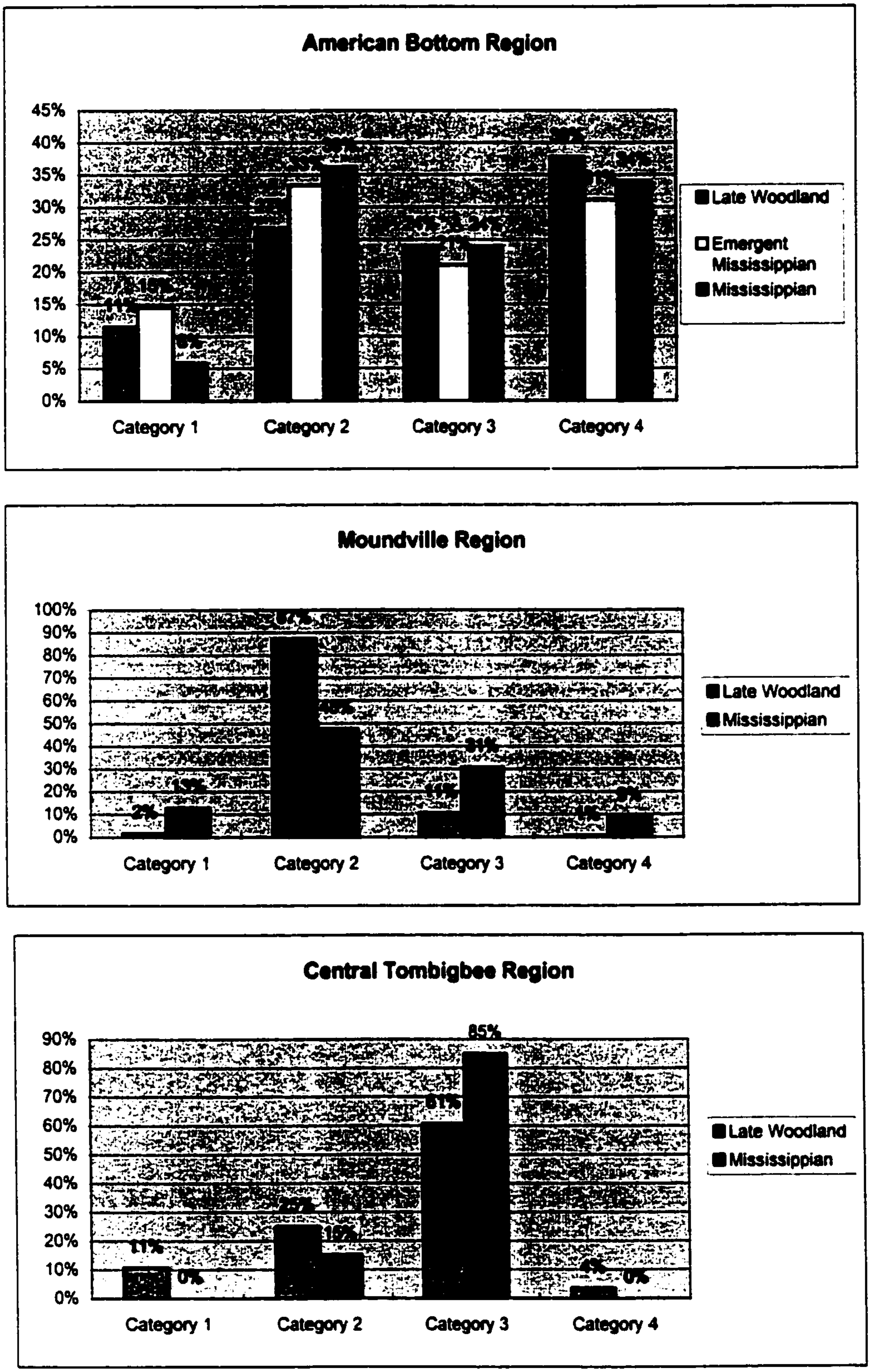
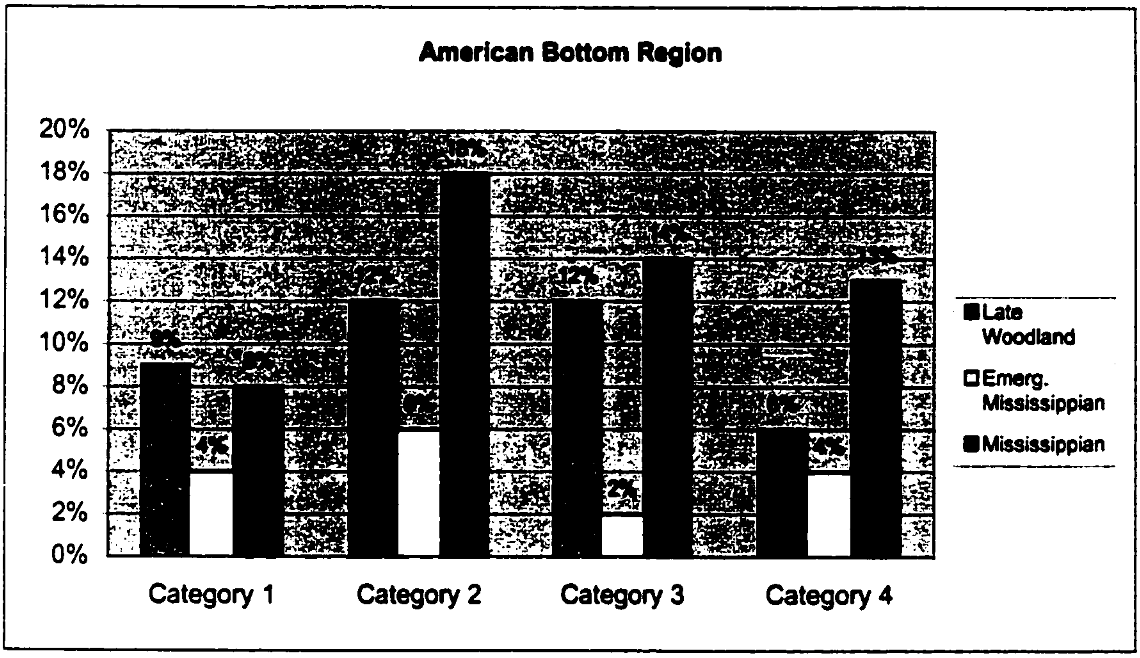
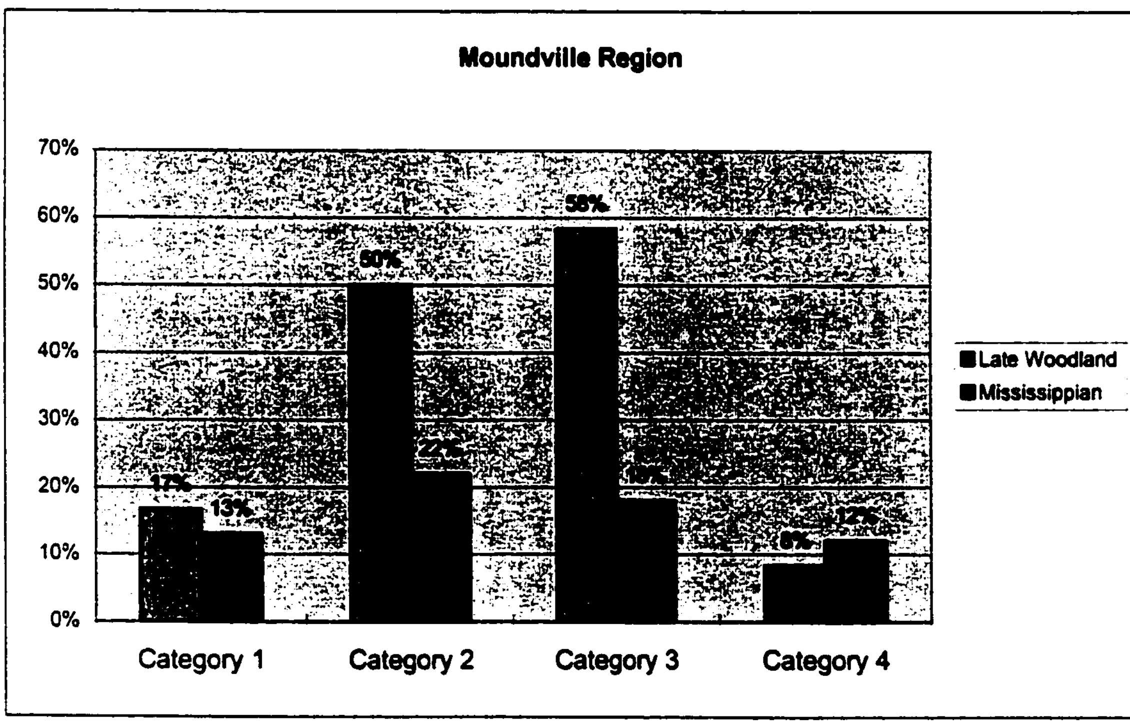


Figure 7-2. Category Ubiquities of Potential Archaeomedicinal Plants in Study Regions





24A2-256 and Kruse Bluffbase, to 46 features at Mund and 47 features at Bridges. Of this group of analyzed features, only two were considered by the excavating archaeologists to have been from ritual contexts: one pit (Feature 12) from the Vaughn Branch site, which contained one spurge and one purslane seed as part of the assemblage, and one structure (Feature 131) from the Mund site, which contained a single bedstraw seed in addition to other plant remains.

As a whole, these American Bottom Late Woodland analyses resulted in the identification of 23,870 seeds, of which 803 were from possible archaeomedicinal plants. The sites with the greatest number of analyzed features also had the greatest number of identified seeds: Mund (n=9,857), Bridges (n=4,174), and Range (n=2,438). Similarly, the sites with the fewest analyzed features often contained the fewest seeds, for example both Cramer #2 and Kruse Bluffbase had only one identified seed apiece.

A total of 32 genera was identified in Late Woodland contexts from the American Bottom region. Of these taxa, 18 occur fewer than ten times throughout all of the analyzed features. Eight additional taxa were identified fewer than 50 times in Late Woodland features. Elderberry (n=51), bedstraw (n=55), purslane (n=64), black nightshade (n=86), grape (n=50), and tobacco (n=288) all had 50 or more seeds identified in the features. These more numerous seeds were not evenly distributed throughout the 118 features: several taxa were repeatedly represented by five or more seeds in a given feature in addition to being represented in solitary form in other features. This clustering or clumping of remains may be a reflection of the cultural importance of such plants. When significantly larger concentrations of native grains such as maygrass and chenopod were identified in the American Bottom region, the presence of these concentrations was used as one form of evidence for the intensive use, storage, and purposeful management of these plants. The presence of such concentrations also supports the use of these plants as food at sites where the seeds were present, even if they were not present in large quantities. The concentrations of archaeomedicinal seeds identified in this dissertation are much less numerous, but medicines were predicted to be only occasionally stored, and when stored, then only in small quantities. Small, rare concentrations, therefore, could be archaeological manifestation of people using a particular species exclusively for medicinal purposes during prehistory. Indeed, those plants that were present in larger numbers might represent taxa that had several uses within the medical, ritual, and/or subsistence spheres.

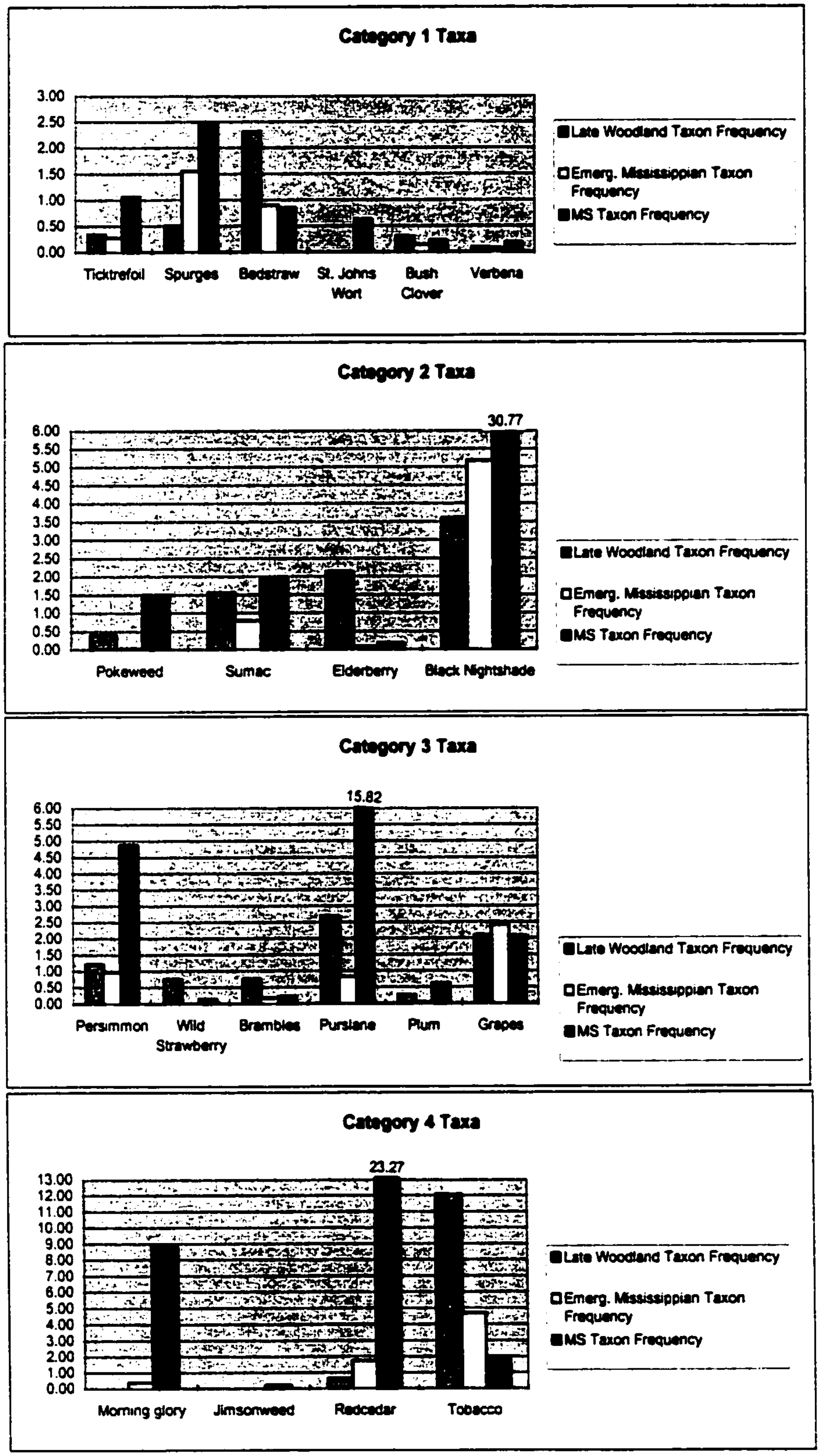
Interestingly, cultivated tobacco had the largest concentrations of seeds of any archaeomedicinal plant in the American Bottom. Of the 288 tobacco seeds from Late Woodland features in the American Bottom region, 256 came from only four non-ritual features: Features 43 and 93 at Fish Lake, and Features 1517 and 5483 at Range. This difference between the one domesticated taxon in this study, and the remaining wild, maintained, or encouraged taxa is intriguing. It suggests that tobacco had a unique place in Late Woodland ethnobotany of the American Bottom, and that it was stored, albeit in small quantities to ensure its constant supply.

For the 118 Late Woodland features that contained archaeomedicinal remains, trends in the distribution of plant remains were investigated. First, the composition of archaeomedicinal taxa within features was done. If certain taxa tended to co-occur, then these plants might have been used together. Sixty-nine features contained only a single archaeomedicinal taxon. Information from three sites - Bridges, Old Goat, and George Reeves - are reported in a combined form, so it was not possible to evaluate how the taxa had clustered within individual features. The remaining 46 Late Woodland features have two or more possible medicinal taxa represented in a single feature. Within these 46 multi-taxa features, a handful of plants are present approximately 25% of the time or more. Elderberry was found in 12 features, and grape in 11 features. Bedstraw and tobacco both were present in 14 of the features. Purslane was common in these multiple taxa features, and it was found in 16 features. Black nightshade was found most frequently in the multiple taxa features: it was found in 50% of them or 23 times. As a result of the frequency of these six plants (it should be noted that these are also among the most numerous by count), two or more of the plants occurred with one another fairly regularly. Clear patterns in the groupings between these plants, however, are not apparent. Those plants that were the most numerous tended to co-occur with one another quite regularly, resulting in the presence of black nightshade, tobacco, bedstraw, elderberry, and grape in many multi-taxa features.

Another way of examining trends in Late Woodland, potentially archaeomedicinal plants is by evaluating the Category Percentages while comparing this calculation with the Taxon Frequencies of the most numerous species (Figures 7-1 and 7-3). Category 1 plants represent 11% of the total archaeomedicinal plants identified in the American Bottom during the Late Woodland period. Bedstraw is the most common of Category 1 taxa with a Taxon Frequency of 2.30. Remaining taxa all had Late Woodland Taxon Frequencies of less than 0.50. Category 2 and 3 plants contribute a greater proportion of the total Late Woodland remains at 27% and 24%, respectively. The Taxon Frequencies of Category 2 and 3 plants are nearly all higher than those in Category 1, with species such as black nightshade (3.60 Taxon Frequency) and purslane (2.68 Taxon Frequency) representing the greatest proportions of their respective Categories. Category 4 plants, however, have a higher Category Percentage of 38%. This unusually high Category Percentage is driven by the presence of 288 tobacco seeds (12.07 Taxon Frequency) in the features. The majority of these tobacco seeds are identified in relatively few contexts, as discussed previously.

Category Ubiquities of the four potential archaeomedicinal categories were calculated to evaluate how the distribution of plants varied over time and space (Figure 7-2). Category 1 plants were found in 9% of the Late Woodland features from the American Bottom region. Category 2 and 3 plants were each identified in 12% of the features. Interestingly, Category 4 plants were found in only 6% of the Late Woodland features; in contrast to the results seen in the Category Percentage. The clumps of tobacco seeds recovered from a few Late Woodland contexts resulted in a reduced ubiquity for this category. In contrast, those Categories with multi-purpose plants (e.g., Categories 2 and 3) are more broadly distributed as a group than would have been predicted based on individual ubiquities. For example, most of the Category 2 plants had individual Feature Ubiquities of less than 3.10%, but the Category Ubiquity for Category 2 was

Figure 7-3. Taxon Frequencies of Major Taxa in Four Categories within American Bottom Region



12%. This suggests that while the use of individual multi-purpose plants was relatively rare, these plants, as a group, made a significant contribution to local ethnobotanies.

Emergent Mississippian Results. Emergent Mississippian period plant remains were identified for a total of 15 sites from the American Bottom region. Of these sites, eight were recognized by the excavators as being multi-component: three also had Late Woodland components, three had Mississippian contexts, and two had both Late Woodland and Mississippian period occupations in addition to their Emergent Mississippian component. The total number of analyzed Emergent Mississippian features is 833. Only 103 of these features (12.36%) contained medicinal plant remains. The number of features analyzed from Emergent Mississippian contexts ranges from fewer than 10 at Bridgeton, Goshen, and Robert Schneider, to 467 at Sponemann. Three pits (Features 95, 103, 109) at the Range site and one structure (Feature 30) at the Robinson's Lake site are considered to be ritual contexts by the excavators The Robinson's Lake structure assemblage contained a single nightshade family seed. Two black nightshade seeds were found in Feature 95 and 109 from the Range site; Feature 109 also contained two fragments of redcedar wood. Feature 103 at the Range site included one grape family member seed. Of these remains from ritual contexts, only redcedar was considered a ritual plant in Category 4.

Analysis of these Emergent Mississippian features resulted in the identification of approximately 29,007 seeds, of which 633 are from archaeomedicinal plants. In contrast to the pattern of more features resulting in more seeds noted for the American Bottom during the Late Woodland period, some sites with relatively few analyzed features had surprisingly high seed counts. For example, eight features from Robert Schneider and Goshen were analyzed, but these features contained 833 and 170 seeds, respectively. The greater number of seeds at these sites may have been due to more intensive occupation of the sites, resulting in more deposition of charred seeds. Alternatively, it could be due to the greater focus on Emergent Mississippian paleoethnobotanical materials: 240 liters of soil from eight features at the Robert Schneider site were processed and analyzed, well over the customary 10 liters per feature level taken from other

American Bottom sites. This intense interest in Emergent Mississippian paleoethnobotany is also reflected in the huge number of samples taken from the Sponemann site (n=467; 5,800 liters of soil). The greater number of features analyzed from the Emergent Mississippian period additionally resonates in average number of seeds per feature, which decreases from 51 during the Late Woodland period to 35 in the Emergent Mississippian period.

A total of 34 archaeomedicinal genera were identified in Emergent Mississippian contexts from the American Bottom region. Of these taxa, 23 had a total count of fewer than 10 seeds per taxon from the summary of all of the analyzed features. Seven additional taxa are represented by fewer than 50 specimens in Emergent Mississippian features. Redcedar (n=50), grape (n=70), tobacco (n=136), and black nightshade (n=150) all had 50 or more seeds, seed fragments, or wood, in the case of redcedar, identified for the period. These more numerous taxa were not distributed evenly throughout the 833 Emergent Mississippian features. Several taxa were repeatedly represented by five or more seeds in a given feature in addition to being represented in solitary form in other features. For example, a concentration of 83 tobacco seeds was identified in a Sponemann phase keyhole structure (Feature #730) at the Sponemann site. Black nightshade was found in several smaller seed clusters, the largest concentration of black nightshade being from a pit at Bridgeton (Feature 43) that contained 38 black nightshade seeds.

The number of features with multiple archaeomedicinal taxa is lower for the Emergent Mississippian period than during the Late Woodland period. A total of 46 of the 464 Late Woodland features (10%) contained multiple archaeomedicinal taxa, while only 19 of the 833 Emergent Mississippian features (3%) had more than one possible medicinal plant represented. Interestingly, many of the plants that had been common in multiple-taxa features during the Late Woodland period also were common during the Emergent Mississippian period. For example, bedstraw (5 features; 26% of multi-taxa features), tobacco (4 features; 21% of multi-taxa features), black nightshade (9 features; 47% of multi-taxa features), and grape (7 features; 37% of multi-taxa features) were all common in multi-taxa features during both time periods. Purslane, however, was relatively uncommon during the Emergent Mississippian period (n=3 features; 16%

of multi-taxa features). Sumac was more common (n=5 features; 26% of multi-taxa features) than in the Late Woodland features.

Trends in Emergent Mississippian archaeomedicinal plants also have been evaluated using Category Percentages (Figure 7-1) in conjunction with Taxon Frequencies (Figure 7-3) and Category Ubiquities (Figure 7-2). For example, 15% of the total archaeomedicinal plants from the Emergent Mississippian period are from Category 1. Spurges (1.55 Taxon Frequency) and bedstraw (0.90 Taxon Frequency) are the most commonly identified taxa within this category. Category 3 plants comprise the next second lowest proportion of the Emergent Mississippian potential archaeomedicinal plants at 21%. The only Category 3 taxon with a Taxon Frequency of greater than 1 is grapes (2.41 Taxon Frequency). The Taxon Frequencies of purslane during the Emergent Mississippian period decrease in comparison with those noted for Late Woodland period. Categories 2 (33% Category Percentage) and 4 (31% Category Percentage) plants each make up approximately one-third of the potential archaeomedicinal remains identified in Emergent Mississippian contexts. Taxon Frequencies of poke, sumac, and elderberry all decrease during the Emergent Mississippian period, but an increasing frequency of black nightshade offsets these decreases in Category 2 plants. Tobacco's Taxon Frequency decreases during this period, and redcedar and morning glory do not increase sufficiently to drive the Category 4 Taxon Percentage upward.

As noted for the ubiquities of individual taxa present in Emergent Mississippian American Bottom features, the Category Ubiquities are strikingly lower than those calculated for Late Woodland or Emergent Mississippian features. The Category Ubiquities for the potential medicines (Category 1) and ritual (Category 4) are the same at 4%. The lowest Category Ubiquity is for Category 3 (2%), while the highest is for Category 2 at 6%. All of these ubiquities are low, and as noted for the individual Emergent Mississippian taxa discussed previously this low ubiquity may relate to the unusually high number of features analyzed from Emergent Mississippian sites in the American Bottom. Differences in political and social structure during the

Emergent Mississippian period also probably account for some of these shifts, a factor not discernible at this time.

Mississippian Results. Mississippian period plant remains were recovered from 29 sites from the American Bottom region. Of these sites, 11 were recognized by the excavators as being multi-component: six also had Late Woodland components, three also had Emergent Mississippian contexts, and two had Late Woodland, Mississippian, and Mississippian period occupations. Twenty-two of the analyzed sites contained possible archaeomedicines. The total number of analyzed Mississippian features was 655. Thirty percent (n=199) of the analyzed features contained plants within at least one of the four Archaeomedicinal Categories; a significant jump over the 25% value calculated for Late Woodland or 12% for Emergent Mississippian features. The number of features analyzed from Mississippian contexts ranged from fewer than 10 features at 11 of the sites to 166 features at the Radic site.

A greater number of features was considered "ceremonial" by excavators than had been suggested during earlier periods as can be seen from feature summaries in Table 7-3. Ceremonial contexts were identified at BBB Motor, Julien, and Radic sites. I also suggest that much of the material from the apparent domestic contexts at Cahokia should be considered as unique in comparison with materials from farmstead sites given the paramount nature of Cahokia during the early to middle Mississippian period. These 242 potentially ceremonial contexts represent 36% of the total number of features analyzed for the Mississippian period in the American Bottom region.

The plant remains from this group of ritual contexts reveal interesting trends in comparison to the greater body of archaeomedicines. One hundred percent of the jimsonweed and St. Johns wort and 98% of the purslane are from ritual contexts. Plants with over 50% of their remains in these contexts include redcedar (52%), ticktrefoil (54%), black nightshade (58%), and sumac (55%). In addition to several plants that were recovered very few times (<5) were recovered only from ritual contexts. This suggests that the distribution of some archaeomedicines, especially those with ritual uses, within the Mississippian assemblage from

Table 7-3. Ceremonial Contexts from Mississippian Sites in the American Bottom Region

Site Name	Fea #	Context	Additional information about feature
BBB Motor	150BM-ST	Pit	Stirling phase rectangular pit with from the northern ceremonial section
BBB Motor	52BM-ST	Structure	Stirling phase single post structure with single interior hearth from northern ceremonial section
BBB Motor	125BM-ST	Pit	Stirling phase rectangular pit from Structure with Keller figurine which is in the northern ceremonial section
BBB Motor	32BM-ST	Post	Stirling phase post/post-pit from northern ceremonial section
BBB Motor	33BM-ST	Pit	Stirling phase circular pit from northern ceremonial section
BBB Motor	34BM-ST	Post	Stirling phase post/post pit from northern ceremonial section
BBB Motor	36BM-ST	Pit	Stirling phase circular pit from northern ceremonial section
BBB Motor	71BM-ST	Pit	Stirling phase oval pit from northern ceremonial section
BBB Motor	38BM-ST	Pit	Stirling phase circular pit from northern ceremonial section; Keller figurine found in this pit
BBB Motor	110BM-ST	Pit	Stirling phase circular pit from Structure F 87 in northern ceremonial section
Cahokia/ICT-II*	159ICT-LO	Pit	Early Lohmann phase external pit
Cahokia/ICT-II*	15ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	17ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	24ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	81ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	209ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	253ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	262ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	274ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	295ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	346ICT-LO	Pit	Lohmann phase external pit
Cahokia/ICT-II*	8ICT-LO	Structure	Lohmann phase structure
Cahokia/ICT-II*	287ICT-LO	Structure	Lohmann phase structure
Cahokia/ICT-II*	338ICT-LO	Structure	Lohmann phase structure
Cahokia/ICT-II*	341ICT-LO	Structure	Lohmann phase structure
Cahokia/ICT-II*	108ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	115ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	209ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	259ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	264ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	284ICT-ST	Pit	Early Stirling external pit feature
Cahokia/ICT-II*	226ICT-ST	Pit	Early Stirling internal pit feature
Cahokia/ICT-II*	271ICT-ST	Pit	Early Stirling internal pit feature
Cahokia/ICT-II*	291ICT-ST	Pit	Early Stirling internal pit feature
Cahokia/ICT-II*	12ICT-ST	Structure	Early Stirling structure
Cahokia/ICT-II*	233ICT-ST	Structure	Early Stirling structure
Cahokia/ICT-II*	13ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	105ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	107ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	112ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	203ICT-ST	Pit	Late Stirling external pit feature

Table 7-3. Ceremonial Contexts from Mississippian Sites in the American Bottom Region

Site Name	Fea #	Context	Additional information about feature
Cahokia/ICT-II*	242ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	313ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	218ICT-ST	Pit	Late Stirling external pit feature
Cahokia/ICT-II*	152ICT-ST	Pit	Late Stirling internal pit feature
Cahokia/ICT-II*	334ICT-ST	Pit	Late Stirling internal pit feature
Cahokia/ICT-II*	354ICT-ST	Pit	Late Stirling internal pit feature
Cahokia/ICT-II*	394ICT-ST	Pit	Late Stirling internal pit feature
Cahokia/ICT-II*	422ICT-ST	Pit	Late Stirling internal pit feature
Cahokia/ICT-II*	92ICT-ST	Structure	Late Stirling phase structure
Cahokia/ICT-II*	324ICT-ST	Structure	Late Stirling phase structure
Cahokia/ICT-II*	199ICT-ST	Structure	Late Stirling structure
Cahokia/ICT-II*	129ICT-MO	Pit	Moorehead phase external pit feature
Cahokia/ICT-II*	167ICT-MO	Pit	Moorehead phase external pit feature
Cahokia/ICT-II*	318ICT-MO	Pit	Moorehead phase external pit feature
Cahokia/ICT-II*	329ICT-MO	Pit	Moorehead phase external pit feature
Cahokia/ICT-II*	373ICT-MO	Pit	Moorehead phase external pit feature
Cahokia/ICT-II*	370ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	371ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	256ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	411ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	415ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	416ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	417ICT-MO	Pit	Moorehead phase internal pit feature
Cahokia/ICT-II*	332ICT-MO	Structure	Moorehead phase structure
Cahokia/Septic System*	3CSS	Stockade trench	Probable Mississippian wall trench or stockade wall
Cahokia/Septic System*	10CSS	Stockade trench	Moorehead phase stockade wall trench
Cahokia/Septic System*	15CSS	Pit	Probable Mississippian wall trench/ pit feature
Cahokia/South Palisade*	5CaSP	Stockade trench	Probable Mississippian period segment of south palisade trench
Cahokia/South Palisade*	7CaSP	Bastion	Stirling to Moorehead period trench segment for a square bastion in south palisade
Cahokia/South Palisade*	8CaSP	Stockade trench	Moorehead phase palisade trench for south palisade
Cahokia/South Palisade*	15CaSP	Bastion	Probable Mississippian postmold for bastion post in south palisade
Cahokia/South Palisade*	16ACaSP	Post	Moorehead phase postmold located at base of bastion trench.
Cahokia/South Palisade*	16BCaSP	Post	Moorehead phase postmold located at base of bastion trench.
Cahokia/South Palisade*	22CaSP	Bastion	Probable Mississippian period postmold for bastion post in southern section of palisade
Julien	147JU-ST	Pit	Stirling phase oval hearth associated with circular post structure/ sweat lodge
Julien	139JU-ST	Pit	Stirling phase oval hearth associated with circular post structure/ sweat lodge
Radic	199RA-MO	Charnel structure	Moorehead/Stirling phase charnel structure
Radic	189RA-MO	Mortuary pit	Moorehead/Sand Prairie phase oval mortuary pit superimposed by Fea 185
Radic	83RA-MO	Mortuary pit	Moorehead/Sand Prairie phase oval mortuary pit

*This inforamtion on Cahokian contexts was included due to the ritual nature of the site rather than specific ritual association with the given feature the American Bottom were not distributed in a random manner, thereby supporting the use of these plants in ceremonies taking place at these specialized locales. It must be noted that the use of plants in ritual contexts is infused with implications that some researchers would not apply to all taxa I identified as potential archaeomedicines.

The analysis of these Mississippian features resulted in the identification of approximately 22,688 seeds, of which 2,290 are from archaeomedicinal taxa. As noted, during the Emergent Mississippian period, the correlation between number of analyzed features and number of identified seeds was less strong than was seen during the Late Woodland period. The Radic site, with 166 analyzed features, had fewer identified seeds (n=263) than did Cahokia ICT-II (n=6,668), which had a total of 61 analyzed features. Interestingly, the number of seeds per feature remained the same between the Emergent Mississippian and Mississippian period at an average of 35 seeds per feature; both still lower than the Late Woodland value of an average of 51 seeds per feature.

The total number of identified archaeomedicinal taxa jumped from 34 during the Emergent Mississippian period and 32 during the Late Woodland period to 46 archaeomedicinal taxa identified in Mississippian contexts from the American Bottom. Of these taxa, 29 had a total count of fewer than 10 throughout all the analyzed Mississippian features. Twelve additional taxa had a total count of fewer than 50 in Mississippian features. An interesting group of plants was represented more than 50 times in the Mississippian contexts. Two ritual plants, morning glory family members (n=197) and redcedar (n=528), were fairly numerous. Category 2 was represented by black nightshade; its 698 seeds make it the most commonly identified archaeomedicine in the American Bottom region for this period. Persimmon (n=111) and purslane (n=359), members of Category 3, were commonly identified, but somewhat less so than might be expected given their status as potential subsistence resources.

Four plants are represented by seed clusters of more than 50 seeds. The importance of Category 4 in this period is emphasized by two seed concentrations of morning glory family members [Fea. # 3 (n=50) and Fea. # 39 (n=58) from the Walmart site], and two concentrations of redcedar wood at Julien (Fea. # 3; n=92) and BBB Motor (Fea. # 125; n=92). Category 3 plants were represented by two concentrations of purslane seeds at Cahokia/ICT-II (Fea. # 287, n=58; Fea. # 209, n=204). Finally, Category 2 black nightshade seed concentrations were found at Cahokia/ICT-II (Fea. # 81, n=51; Fea. # 264, n=233).

The relative contribution of features with multiple archaeomedicinal taxa was greater for the Mississippian period than it had been during the Late Woodland or Emergent Mississippian periods. A total of 89 of the 655 Mississippian features (14%) contained multiple archaeomedicinal taxa, with 10% of the Late Woodland features and 3% of the Emergent Mississippian features had multiple taxa. Taxa that were present in more than 20% of the multi-taxa features were a mixed group of plants, most of which have been discussed as being numerically common. There were some examples of those plants that are not particularly numerically common but are ubiquitous. Persimmon (37 features; 41.57%), the combined group of spurges (23 features; 25.84%), redcedar (45 features; 50.56%), purslane (28 features; 31.46%), sumac (20 features; 22.47%), black nightshade (55 features; 61.80%), and grape family members (25 features; 28.09%) represent the most common plants that co-occurred with other archaeomedicines. Bedstraw and tobacco that had been in this group during the Late Woodland and Emergent Mississippian period were not present in the Mississippian group. Instead redcedar, spurges, and sumac become more dominant, possibly reflecting changes in the components of commonly prepared medicines or other botanically based preparations.

Trends in Mississippian archaeomedicinal plants may be illustrated by evaluating the Category Percentage (Figure 7-1), Category Ubiquity (Figure 7-2), and Taxon Frequencies (Figure 7-3) of the four plant categories. As has been noted with the Emergent Mississippian assemblage, the Category Percentage for Categories 2 and 4 are close to one another at 36% and 34%, respectively. Black nightshade's Taxon Frequency increases dramatically during this period to a high of 30.77. This single species is the largest driving force behind the increase in Category 2 Percentage. Category 4 Percentage is supported by an equally dramatic increase in the redcedar's Taxon Frequency to 23.27 and morning glory family member's Taxon Frequency to 8.86. Removal of redcedar from the Category Percentage calculation, due to problems with its use as a construction and/or firewood material, results in a significant decrease in the contribution of ritual plants to the overall potential archaeomedicine total. The Category Percentage for Category 3 plants again increases from the previous period to 24%. This increase is driven by the rise in Taxon Frequencies of purslane (Taxon Frequency 15.82) and persimmon (Taxon Frequency 4.89), but strawberry, raspberry, and grape Taxon Frequencies all drop from the previous period. Finally, Category 1 plants decrease by over half from the previous periods to a Category Percentage of 6%. Taxon Frequencies of spurges, tick trefoil, and St. John's-wort all increase, but not enough to offset dramatic decreases in other taxa.

Category Ubiquities for the Mississippian period in the American Bottom tend to be high relative to Late Woodland and Emergent Mississippian Category Ubiquities. Category 1 Ubiquity is the lowest for this period at 8%, but it is still higher than may have been expected given the decrease in Category Percentage for Category 1. Categories 3 and 4 have ubiquities of 14% and 13%, respectively. Category 2 has the highest Category Ubiquity at 18%. The high ubiquity of Category 2 was again driven by the high ubiquity (14%) of black nightshade in Mississippian contexts. A general increase in the Category 2 taxa through time supports the interpretation of the trend toward wider distribution of plants potentially used for medicine and with additional uses as food, beverages, or technological materials. The relatively high ubiquity of Category 4 is especially interesting. These ritual plants with medicinal uses increased in distribution during the Mississippian period. Redcedar, again, is the major contributor to this broad distribution, but morning glory family members and tobacco also were fairly ubiquitous within this period and category. It is difficult to estimate whether the increase in ritually-important, potential medicines reflects the distribution of these resources by elite-driven forces or the assumption of these tools by a wide cross-section of the population. Similar discussions have, in fact, been presented for items such as Ramey Incised ceramics (Pauketat and Emerson 1991).

Summary and Discussion. Paleoethnobotanical analyses from the American Bottom region differ from those in the other two regions for at least three reasons. First, the total amount of analyzed material was much greater in the American Bottom region: 73 site components were sampled 1,952 times, and a resulting 75,565 seeds were identified. The huge number of analyzed features resulted in a greater number of taxa identified, because rare plants had a greater chance to be recovered. Secondly, the intensive nature of investigations in the American Bottom region has resulted in a very robust understanding of the cultural artifacts left behind as this society transformed from Late Woodland native seed gardeners in small hamlets to Emergent Mississippian maize and native seed gardeners living in larger villages to Mississippian mixed crop agriculturists with temple mounds and towns surrounded by outlying farmsteads. Finally, a third time period, the Emergent Mississippian, has been identified. The Emergent Mississippian period represents a time of cultural change between the Late Woodland and Mississippian period when the elite-substructure that dominated during the Mississippian period developed, as discussed in Chapter 4. Similar transformation periods are present in the Central Tombigbee and Moundville regions, for example the Moundville I period at the site of Moundville, but currently there is less data for this time of transformation than in the American Bottom region. These three factors contribute to a rich cultural context in which the archaeomedicinal plants of the American Bottom can be discussed, as follows.

Given the unique nature of the American Bottom assemblage, and its large amount of data, how do the archaeomedicines from the three time periods compare? First, similarities and differences can be examined by looking at the taxa that were present in all three time periods. Thirty-two archaeomedicinal taxa were identified in Late Woodland features, 34 in Emergent Mississippian features, and 46 in Mississippian features. Of this group of plants, 20 are present in all three time periods. A surprising number of these "continual use" plants are in the Categories 1 and/or 4: tick trefoil, spurges, bedstraw, bush clover, verbena, redcedar, and tobacco. I suggest that these plants represent an overarching cultural commonality in the American Bottom region that crossed temporal and cultural changes. Plants in Category 2 present in all three periods include mint, sorrel, pokeweed, sumac, elderberry, nightshade family members, and black nightshade. These plants also tend to be the more numerous of the plants within Category 2, highlighting their importance in the American Bottom region through time. Finally, more than half of the archaeomedicines in Category 3 were found in Late Woodland, Emergent Mississippian, and Mississippian sites. Again, this trend may reflect the very nature of foods with medicinal qualities, and the roles they played in prehistoric ethnobotanies of the American Bottom.

When the Category Percentages of the four groups are compared through time, there are some interesting trends as well. Category 1 increases from 11% to 15% between the Late Woodland and Emergent Mississippian period, and then the frequency for this group takes a distinct dip in the Mississippian period losing nine percentage points. The number of taxa in Category 1 changes through time, with 11 taxa present during the Late Woodland period, 10 during the Emergent Mississippian period, and 16 during the Mississippian period. The trend appears to be that while the overall contribution of medicines to the archaeomedicinal total is similar during the Late Woodland through Emergent Mississippian periods, the Mississippian period sees a greater array of more strictly medicinal plants being used less frequently. The wider variety of Category 1 plants present during the Mississippian period may be the result of people trying new plants to address increasing problems with communicable diseases such as childhood diarrheas and colds. These diseases may have been cared for on a household level, resulting in a broader range of plants being accessed by individuals with varying knowledge or experience.

Category 2 was a steadily increasing component of the archaeomedicinal regime of American Bottom residents. The total contribution of medicine/food in the Category Percentage moves from 27% to 33% to 36% through the three time periods represented in the American Bottom region. At the same time, the Late Woodland and Emergent Mississippian periods each had eleven medicine/food taxa present, and the Mississippian period had 13 medicine/food taxa present. Seven of these plants were identified in all three time periods. These plants continued to be used for culturally-defined illnesses, illnesses that demanded a similar suite of plants during the time periods under consideration. For example, poke was used to relieve the symptoms of rheumatism, a health issue that probably did not increase or decrease in frequency through time. An increasing population, however, would have needed a greater quantity through time.

Plants in the food category (Category 3) show less variation through time than do the medicine (Category 1) or medicine/food (Category 2) categories. The Late Woodland high of 24% for the archaeomedicinal total is followed by a drop to 21% in the Emergent Mississippian period and a return to 24% during the Mississippian period. The total number of taxa represented in this category stay fairly uniform, with eight taxa found in the Late Woodland, seven taxa in the Emergent Mississippian, and nine in the Mississippian period assemblage. Seven of these taxa were identified in all three time periods. The Category 3 taxa remain nearly the same through time.

In both the American Bottom and Moundville archaeomedicinal assemblages there are a dramatic rises during the Mississippian period in the number of morning glory family seeds and redcedar wood. Category 4 Percentages remain nearly steady through time in the American Bottom region, with approximately one-third of the potential archaeomedicinal plants falling into Category 4. The major components of this category vary significantly over time, with tobacco decreasing as morning glory and redcedar increase through the periods under consideration. I suggest that these plants may have been used for spiritual healing of long-term ills such as yaws and tuberculosis that were debilitating but not deadly. Ritual medicines also would have been an effective tool in soothing the social ills that probably plagued the American Bottom due to the friction among the various factions of this complex society. The easing of social "ill health" certainly was a historic use of tobacco by Eastern Woodland tribal groups. It must be emphasized, however, that these plants had roles within the larger rituals of the culture beyond healing. The importance of these rituals during the Mississippian period may be more significant for the increasing presence of these plants than their use as medicines.

Owing to problems with Emergent Mississippian ubiquity, changes between the Late Woodland and Mississippian period Category Ubiquities (Figure 7-2) are evaluated in greater detail. It is not well understood at this time how these Emergent Mississippian period ubiquities relate to the earlier and later assemblages.

If the Emergent Mississippian data are dropped, then the Category Ubiquities of Category 1 and 3 plants changed little from the Late Woodland to the Mississippian periods. Category 1 plants shift a single percentage point through time. This measure of ubiquity is in contrast to the Category 1 Percentage, which decreases from 11 to 6 percentage points between the two periods. These measures suggest that while the relative contribution of "single usage" plants (e.g., used only as medicine) decreased through time, the distribution of rarer plants continued at a similar level across the region. Category 3 plants, however, maintain fairly stable Category Ubiquity and Category Percentage through time. This stability indicates that the contribution of plants used for multiple purposes (i.e. medicine and food) continued through time despite changes in the actual species emphasized. For example, use of strawberry and blackberry decrease through time while persimmon and purslane increase.

Ubiquity for Category 2 plants increases from 12% to 18% through time. These multipurpose plants were apparently disposed of in more contexts during the Mississippian than in the Late Woodland period. This increasing disposal (and presumably use) of plants with primary uses as medicine with secondary uses as subsistence items is also reflected in an increasing Category Percentage through time from 27% to 36%. Increases in Category Percentage and in Category Ubiquity were driven in part by increases in the frequency and ubiquity of black nightshade and sumac.

Finally, Category 4 plants reveal a dramatic increase in Category Ubiquity through time from 6% in the Late Woodland to 13% by the Mississippian, whereas the Category Frequency decreases over the same time frame from 38% to 34%. As discussed previously, these seemingly contrasting trends probably reflect differing taxa (tobacco in the Late Woodland, and redcedar and morning glories in the Mississippian) being used for ritual purposes. If it is assumed that ritual use of redcedar included its use in construction and ritual fires, then it is likely that it would be preserved more often than plants used purely for medicine-based rituals. The increase in morning glories has been attributed by some researchers (e.g., Scarry 1986) to the tendency of this plant to be a weedy invader of fields. I argue that potential ritual and medicinal uses may also have affected its increased presence in the paleoethnobotanical record.

Moundville Region

Late Woodland Results. Late Woodland period plant remains were identified in a total of nine sites from the Moundville region. Only one of these sites did not have archaeomedicinal remains in its paleoethnobotanical assemblages. The total number of analyzed Late Woodland features is 24, of these, 18 or 70%, contained archaeomedicines. Relatively few Late Woodland features were analyzed from any site, and those features that were analyzed, as discussed previously, were taken from rich pit contexts. These features yielded 1,188 seeds, 380 of which were from possible archaeomedicinal plants.

A total of 18 archaeomedicinal genera were identified in Late Woodland contexts from the Moundville region. Of these taxa, 16 had a total count of fewer than 10 when the results from all the analyzed features were combined. The two taxa with a total count of more than 10 seeds, sumac (n=317) and wild plum (n=15), are represented by batches of seeds. Three hundred and nine sumac seeds were found in a pit (FS # N at 1JE33), and a single concentration of 12 plum seeds was found at 1TU44/45 (FS # E). This clustering of seeds lends support to the purposeful use of sumac and wild plum, but their exclusive use as medicine is not suggested.

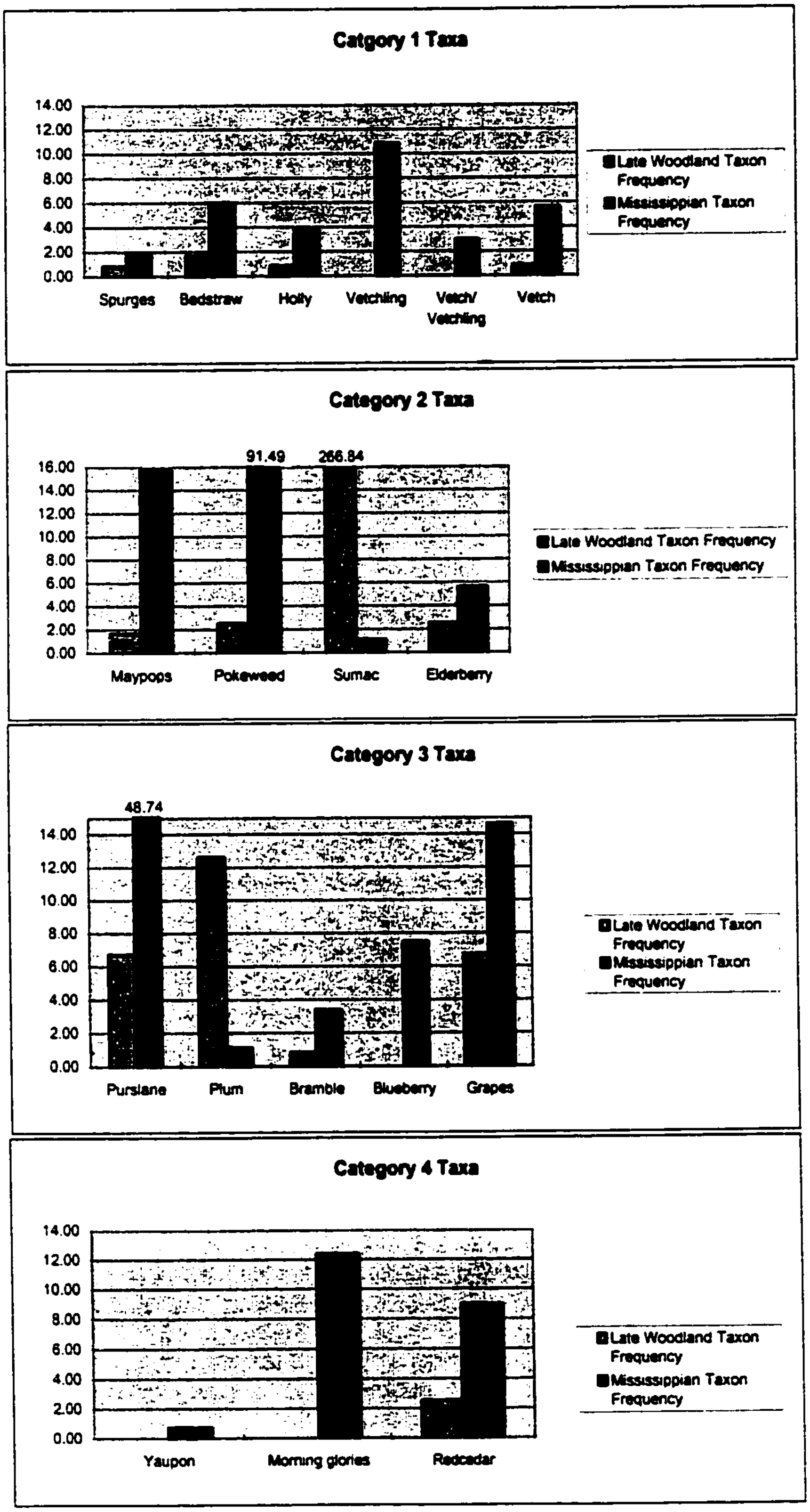
As expected, a prevalence of those plants with multiple uses (e.g., food and medicine) was seen in the Late Woodland features. Five plants were included in Category 1, but all occurred rarely. Twelve plants were in Category 2 or 3, each Category having from one to eight seeds for each taxon (once the noted seed clusters are excluded). If the seed counts from Categories 2 and 3 are combined, then 32 of the 41 (78%) archaeomedicinal remains are included in this commingled group.

Due to the wealth of plant remains in the Late Woodland features from the Moundville region, it is not surprising that the majority of features had multiple medicinal plants. Of the 18 features with archaeomedicines, 12 (66%) contained multiple taxa. Three categories of archaeomedicines were present in Feature E from 1TU44/45; indeed this feature contained seven different archaeomedicines. Feature M from 1JE32 contained scant remains from the Categories 2, 3, and 4. Two other features, Feature H from 1JE31 and Feature P from 1JE33, had remains from Categories 1, 2, and 3. This could indicate that the analyzed Late Woodland features were depositories for remains from a variety of cultural activities.

Category Percentages (Figure 7-1) and Taxon Frequencies (Figure 7-4) help illuminate the trends in Late Woodland archaeomedicinal plants in the Moundville region. The dominant categories in the Category Percentage for the Moundville region are Categories 2 and 3 (Figure 7-5). Medicine/food makes up 87% of the total, and food represents 11% of the total. The overwhelming dominance of Category 2 plants was due to the 317 sumac seeds (Taxon Frequency of 266.84) preserved in the two features, as discussed previously. The relatively high Taxon Frequencies of purslane (6.73 Taxon Frequency), plum (12.63 Taxon Frequency), and grapes (6.73 Taxon Frequency) all bolster the Category 3 Percentage to 11% of the total. These patterns of Category Percentages are somewhat different from those noted for the American Bottom region, but are in line with the data from the Central Tombigbee region. The importance of multi-use foods and medicines is appropriate for this region where the pre-maize horticultural activities may have been less extensive than in the American Bottom region. Medicines represent 2% of the total. It is difficult to estimate the need for specific medicines in the Moundville region, because currently there are no human skeletal remains identified from the Late Woodland period. The total archaeomedicinal assemblage contains only 1% ritual plants. The low frequency of ritual plants is expected because the elaborate ritual activities that arose during the Mississippian period appear to have little precedence in the Late Woodland period in Moundville region.

The influence of sumac and plum seed concentrations is best illustrated in the Category Ubiquities. Category 2 taxa, which makes up 87% of the total archaeomedicines by Percentage, were present in 50% of the features. Category 3 plants represent 11% of the archaeomedicinal

Figure 7-4. Taxon Frequencies of Major Taxa in Four Categories within Moundville Region



plants, but they are present in 58% of the features. Similarly, Categories 1 and 4 are more ubiquitous at 17% and 8% than would have been predicted based on their respective Category Percentages.

Mississippian Results. Mississippian period plant remains were identified at a total of seven sites from the Moundville region. Within the site of Moundville, four separate areas have been studied. The total number of analyzed Mississippian features is 169; of these, 61 (36%), contain archaeomedicines. The Mississippian paleoethnobotanical data set are dominated by materials from the site of Moundville. Of the 169 analyzed features, only 34 are from the non-Moundville sites. The features from Moundville and other sites contained 2,667 seeds, of which 656 are from possible archaeomedicinal plants.

A total of 22 genera were identified in Mississippian contexts from the Moundville region. Seven plants were included in Category 1, and all but star thistle were identified more than once. Bedstraw, holly, vetchling, vetch/vetchling, and vetch are all represented by 10 or more specimens. Seven plants are in Categories 2 and 3. Remains from Category 2 are represented by as few as two and as many as 244 seeds. Five food plants were found, and members of this category were found between three and 130 times. Finally, three members of the ritual category were identified, and two of the three were found at relatively plentiful levels: morning glory family member (n=33), and redcedar (n=24).

Of these 22 taxa, 15 are represented by fewer than 20 seeds throughout all of the analyzed features, although the vetch, vetchling, and vetch/vetchling group are present 15, 29, and eight times, respectively. Of the seven plants with more than 25 seeds in a single feature, pokeweed and purslane are represented by more substantial clusters of seeds. Two Moundville pits (FS # R2 and 943+) contained a total of 168 of the 244 pokeweed seeds found in Mississippian contexts in the Moundville region. Similarly, a sample of midden (FS # R9) from Moundville-"PA" contained 102 of the 130 Mississippian purslane seeds from the Moundville region. All 29 vetchling seeds recovered from Mississippian features in the Moundville region came from a concentration at 1TU768 (FS # NG8). If the presence of seed concentrations can be interpreted as evidence for more intensive use (and disposal), then it is interesting that two plants with multi-contextual uses were found in concentrations at the major ritual center in the Moundville locale.

Morning glory family members (n=33), redcedar (n=25), maypops (n=42), and grape (n=39) are also represented by more than 25 seeds, seed fragments, or (in the case of redcedar) wood fragments. Pokeweed and purslane may have increased during this time due to extra-subsistence activities. The presence of these plants in relatively high quantities at Moundville is a good case for the possible "non-weedy" inclusion of pokeweed and purslane. It has been argued that Mississippian Moundville residents were receiving tribute in the form of maize and other subsistence items (Knight and Steponaitis 1998). If this is true, then one would expect the maize to have been processed prior to presentation. Therefore, the number of crop-related weed remains should be fairly low, especially in comparison with Late Woodland remains from the same region. It is interesting that morning glory and redcedar remains also become common during the Mississippian period, when ritual activities intensified at Moundville. This link may support the use of morning glory and redcedar in prehistoric ritual activities, as is suggested by ethnobotanical records for North America.

Despite a broader approach to sampling Mississippian period features from the Moundville region, there are still a large number of features with multiple taxa. Of the 61 Mississippian features with archaeomedicines, a total of 33 (54%) contained more than one possible medicine. The pattern of particular taxa appearing repeatedly in these features is similar to patterns observed in the American Bottom region. The plants that were the most common numerically also appeared in the greatest percentage of multiple taxa features. For example, bedstraw, maypops, pokeweed, purslane, blueberry, grape, and morning glory family members appear in over 25% of the multiple taxa features. This suggests that these plants may have been part of many facets of Moundville life, including the possible use in various medicines, foods, and rituals.

The Category Percentages of Mississippian plant remains in the Moundville region differs significantly from those seen during the Late Woodland period (Figure 7-1). Changes are reflected in the medicine (now 13% of the total), medicine/food (now 48% of the total), food (now 31% of the total), and ritual (now 9% of the total) categories. I suggest that ritual plants were used at the site of Moundville in cultural and medical ceremonies. In particular, because several of the individuals excavated at Moundville display skeletal indicators of advanced tuberculosis or yaws, these diseases must have been known to the resident elites. These progressive, but rarely fatal diseases would have been impossible to cure at that time. Instead, symptomatic treatments probably took place cloaked in ritual settings. The rise in ritually significant plants such as morning glories and redcedar may have been part of these healing and ritual ceremonies. This hypothesis is supported by the ethnographic use of both morning glory and juniper to as specifics to treat tuberculosis. In addition, plants such as poke, which was present in the form of seed concentrations at Moundville and had a Taxon Frequency of 91.49, has been used to treat old sores, an apt description of yaws as it would appear in adults.

Moundville Mississippian Category Ubiquities (Figure 7-2) for the four categories are surprisingly uniform given the variation in the Moundville Category Percentages and differences seen in the American Bottom region Mississippian Category Ubiquities. Categories 1 and 4 have nearly equal distributions of 13% and 12%, respectively. Category 3 was more widely recovered, having been found in 18% of the features. Finally, Category 2 medicine/food plants were found in 22% of the analyzed Mississippian contexts. These Category Ubiquities follow the trends in the Category Percentages quite well, with similar highs in Categories 2 and 3 and lower values in Categories 1 and 4.

Summary and Discussion. The total number of analyzed features from the Moundville region is less than the number analyzed from the Central Tombigbee or American Bottom regions: 24 Late Woodland and 169 Mississippian features have been examined by C.M. Scarry. The volume of plant remains in these Moundville region features, however, was much greater than the Central Tombigbee features. In addition, the Late Woodland materials from Moundville contained a greater concentration of remains (with 1,118 seeds of which 380 were possible archaeomedicines) than the American Bottom Late Woodland deposits. The possibility that the analysis of additional Late Woodland features from the Moundville region will have similar assemblages cannot be proven or disproven at this time. It must be emphasized that all of the Late Woodland plant remains from the Moundville region were gathered from pits at small habitation sites. There is little or no evidence of social differentiation associated with these Late Woodland sites, a fact that differs from later Moundville materials and late Late Woodland/ Emergent Mississippian sites in the American Bottom.

This is not to suggest, however, that the Mississippian period features from the Moundville region were poor in plant remains, especially archaeomedicinal remains. Indeed, a total of 656 archaeomedicinal seeds from 22 taxa was recovered from Mississippian period collections. The majority of these Mississippian features were at Moundville, which appears to have been the paramount site in a network of villages, temples, and hamlets organized along the Black Warrior River valley. We, therefore, cannot assume that the paleoethnobotanical remains from the site of Moundville represent the ethnobotanical practices of all residents of the Moundville region. This issue is discussed in more detail as it relates to the high number of ritual archaeomedicines from this region.

Of the 18 taxa identified in Late Woodland features and the 22 taxa identified from Mississippian features, 13 are present in both time periods. Five taxa are unique to the Late Woodland period, and nine are present only in the Mississippian period. The taxa found in both time periods tend to be those plants that are fairly numerous in at least one of the periods. For example, poke, sumac, and purslane were all present in the form of seed concentrations, and all three were found in the two time periods in this investigation. This suggests that certain plants continued to be used through time. Equally interesting are those taxa that are limited to a single time period, such as blueberry or morning glory family members, both of which were found only in Mississippian contexts. It may be that social, political, and subsistence changes taking place during the Mississippian period required the addition of new plants to the local ethnobotany, especially at ritually significant sites like Moundville.

Differences in the Category Percentages between the Late Woodland and Mississippian periods in the Moundville region are indications of the cultural changes that took place during these periods as well as differences among the types of sites that were sampled. The Category 1 Percentage increases by 11 percentage points between the two periods. Indeed, the Taxon Frequencies of all major taxa also increased during the Mississippian period. It is possible that medicinal plants were deposited more frequently in the Mississippian site of Moundville due to differences in the way that site was used in comparison with the farmsteads sampled for the Late Woodland period. The scenario for Category 2 and 3 plants is somewhat more complex. The Category Percentages for these two categories are inflated due to several concentrations of specific taxa such as sumac and purslane, as discussed earlier. As a result, the Category 2 Percentage drops 39 percentage points between Late Woodland and Mississippian periods, whereas the Category 3 Percentage rise 20 percentage points. These changes could be attributed to the potential use of tribute food (and perhaps medicines) at the site of Moundville (Peebles 1978, 1986), but it is unclear how such factors can be teased from the information currently available.

Changes in the Category Percentages for the ritual plants may be the result of the unique cultural milieu at the site of Moundville during the Mississippian period. Late Woodland ritual plants make up 1% of the total archaeomedicines, while the same group during the Mississippian period comprises 9% of the total. I suggest that this jump in ritual plants is related to the special nature of the Moundville site, which contributed the majority of Mississippian totals. More ritual plants would be expected at Moundville during the Mississippian period, because the site was a regional center of ritual activity. The significance of these changes may be overstated, however, because only three Category 4 plants were identified in the Moundville region deposits, and Scarry's (1986:306) interpretation of morning glory remains is that they "were tolerated for their tubers, and that the vines and seeds were accidentally harvested when maize was brought in from the fields."

Category Ubiquities were calculated for the Moundville region despite problems with comparing Late Woodland and Mississippian ubiquities due to the low number (and therefore high ubiquity) of Late Woodland features. Nevertheless, Category 1 and 4 Category Ubiquities vary the least, with Category 1 plants decreasing four percentage points through time and Category 4 plants increasing three percentage points. The decrease in ubiquity for Category 1 contrasts with its increases in Category Percentage, and with increases in Taxon Frequencies for all Category 1 species. The difference in these measures, in part, is due to the 29 vetchling seeds, which represent 34% of the total Category 1 seeds. Because the vetchling seeds were all found in a single feature the Category Ubiquity is lowered.

Category 4 plants show an increase in Category Ubiquity from 8% to 12% through time. Ritual plants with potential medicinal uses are represented by only three fragments of redcedar wood during the Late Woodland, while redcedar, yaupon, and morning glory remains are all present in the Mississippian features. The increase in frequency and distribution of Category 4 plants was expected given the presumed increase in ritual activities associated with the development of the Moundville chiefdom during the Mississippian period.

Category 2 plants had a Late Woodland Category Ubiquity of 50%, which dropped to 22% by the Mississippian period. There are problems with Late Woodland ubiquity measures in this region, but the downward trend in Category Ubiquity follows a similar trend in Category Percentage. Both measures reveal high use of Category 2 plants during the Late Woodland which lessened during the Mississippian period. It is possible that increasing dependence on maize during the Mississippian may have lessened the need for multi-purpose taxa like those represented in Category 2, or these resources from weedy plants may not have been part of the formal provisioning process at Moundville.

Category 3 plants also have a very high Late Woodland Category Ubiquity of 58%, and a drop during the Mississippian period to 18%. This measure is in contrast to the Category

Percentage, which shows an increase in Category 3 remains during the Mississippian period. This difference is due to the presence of 102 purslane seeds from a single feature at Moundville (FS # R9).

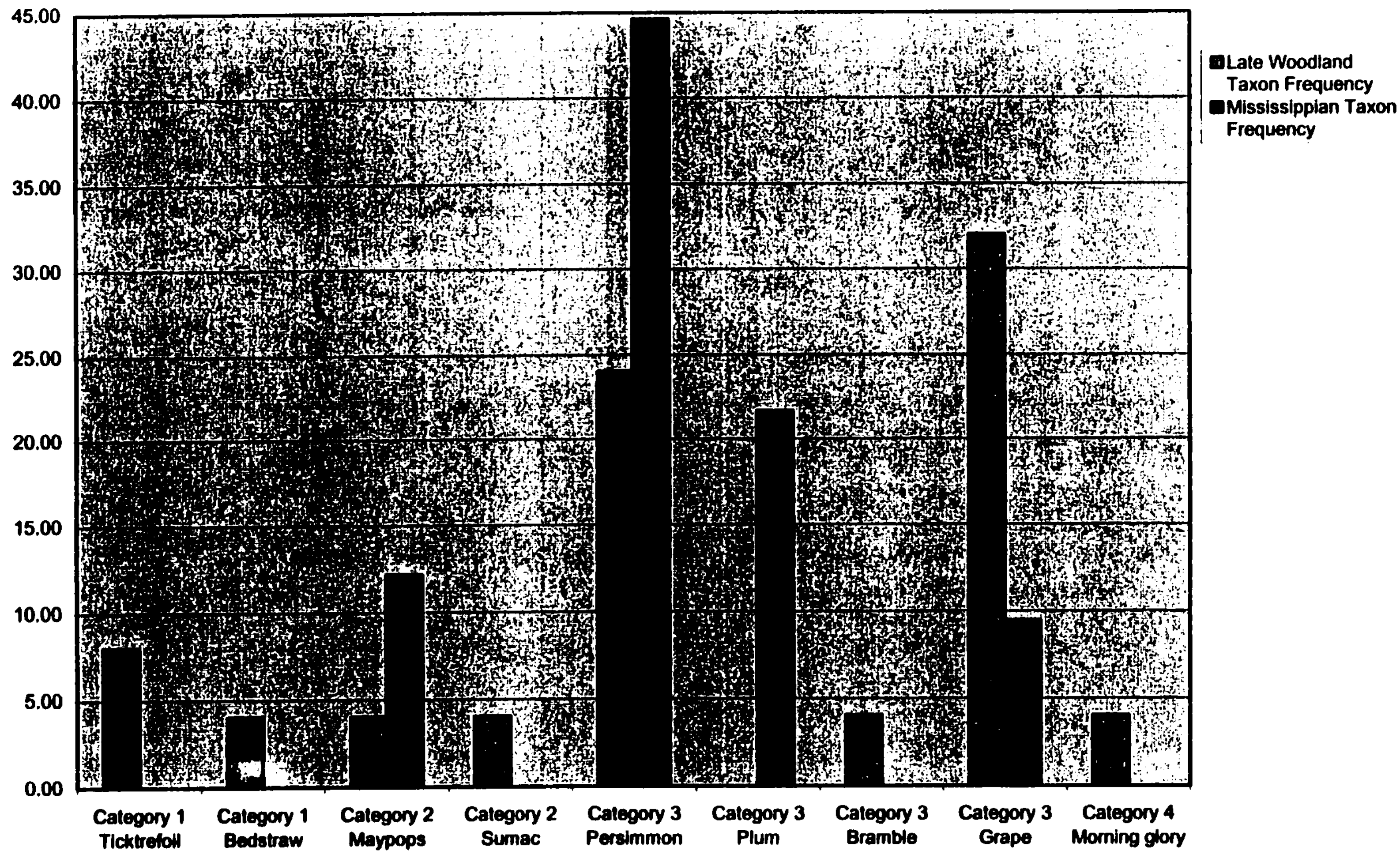
Central Tombigbee Region

Late Woodland Results. Late Woodland period plant remains were identified at all five sites from the Central Tombigbee region. Three of the sites, 1GR2, 1Pi33, and Lubbub Creek, also contained Mississippian materials. The total number of analyzed Late Woodland features is 120, but it is not possible to calculate the total number of features with archaeomedicines because the Lubbub Creek data from 39 features are presented in summarized form. The Central Tombigbee features contained a total of 249 seeds, of which 28 are from possible medicinal taxa.

A total of 11 medicinal genera were identified in Late Woodland contexts from the Central Tombigbee region, and Taxon Frequencies for the most common taxa are summarized in Figure 7-5. None of these taxa are common in the features, all occur fewer than three times in any given feature. Indeed, only persimmon (n=6) and grape (n=8) are represented by more than five specimens in Late Woodland contexts. This relative lack of remains is in direct contrast to the patterns noted for the American Bottom and Moundville regions. It is important that the most common taxa are those used as food with secondary uses as medicines (e.g., grape and persimmon). Interestingly, the region with the strongest evidence for poor Late Woodland health does not have a strong representation of medicinal plants. The significance of this phenomenon may be overstated, however, because the Central Tombigbee features tended to be rather species-poor throughout their temporal span.

The data from the Central Tombigbee region highlight the importance of large bodies of information when analyzing trends in rare plant remains. Archaeomedicinal plants are present in the Late Woodland features, but because the database is relatively small we have only the vaguest notions of how the use of these plants may have changed through time. Due to the low

Figure 7-5. Taxon Frequencies of Major Taxa in Four Categories within Central Tombigbee Region



recovery of potential medicinal plant remains in the Central Tombigbee region, the Category Percentage of Late Woodland and Mississippian remains will be discussed together at the end of this section.

Mississippian Results. Mississippian period plant remains were identified in three sites from the Central Tombigbee region. All three sites, 1GR2, 1Pi33, and Lubbub Creek, also contained Late Woodland materials. The total number of analyzed features was 204, but it is not possible to calculate the total number of features with archaeomedicines, because the Lubbub Creek data from 192 features were presented in summarized form. The Central Tombigbee features contained a total of 740 seeds (2,307 pine seeds are not included in this total), of which 66 were from possible medicinal taxa.

Only five possible medicinal genera were identified in Mississippian contexts from the Central Tombigbee region (Taxon Frequencies are summarized in Figure 7-5). No remains of Category 1 or 4 were identified. The majority of the remains are from food taxa in Category 3 including 33 persimmon seeds or seed fragments, 16 wild plum pits, and seven grape pips. Only one mint family seed and nine maypops seeds were found for Category 2. As noted for the Late Woodland remains from the Central Tombigbee region, the dominance of foods in the archaeomedicine categories is in contrast to the more diverse assemblages from the Moundville and American Bottom regions. A greater number of features were excavated in the Central Tombigbee region than in the Moundville region, but this fact did not result in a higher diversity of plant remains from the Central Tombigbee region.

Summary and Discussion. Although a fairly large number of features from Late Woodland (n=120) and Mississippian (n=204) contexts in the Central Tombigbee region were analyzed, relatively few archaeomedicines were identified. The total number of archaeomedicinal taxa identified in the region is only twelve, and the total archaeomedicinal seed count is 94. The count of archaeomedicinal remains in the Late Woodland period is less than half that of the Mississippian period, but the number of taxa doubled. A narrow range of taxa was present in the Mississippian features, and only Categories 2 and 3 are represented. These two categories make up the majority (combined contribution of 76% of total count) of remains during the Late Woodland as well, but not the 100% represented in the Mississippian period (Figure 7-1).

If we were to examine only the Late Woodland and Mississippian remains from the Central Tombigbee region with no regard for the other regions in this study (see the end of this chapter for tri-regional comparisons), an interesting interpretation could result. The Late Woodland period was considered by researchers to be a time of high health-related stress for the residents of the Central Tombigbee region (Cole et al. 1982:242; Welch 1990:207). Health, across several measures, was worse during the Late Woodland period than it was during the Mississippian period. It could be that the greater diversity of plants present during the Late Woodland period is a reflection of attempts to combat those health problems with a variety of medicines.

Archaeologists working in the Central Tombigbee have suggested that large-scale adoption of maize agriculture during the Mississippian period relieved the stresses present during the Late Woodland period, resulting in better overall health (Cole et al. 1982; Welch 1990). If this is true, then it is possible that the variety of medicines needed by people living in this area decreased, leaving only those plants that had multiple roles in the local ethnobotany. The continued use of this handful of plants (i.e., mint, maypops, persimmon, American plum, and grape) suggests that they continued to be culturally significant in the face of bettering health and changing subsistence practices. Importantly, the dental health of Central Tombigbee populations appears to have worsened as a result of their increased dependence on carbohydrates. Mints, persimmon, American plum, and grape were all used as oral aids and/or toothache remedies by tribal groups living in the Eastern Woodland during Historic times (Moerman 1998). These plants may have been retained for their uses in addressing these on-going health issues as well as their edible qualities. Other taxa such as sumac or bramble that also have high tannin contents would also have made them good oral aids as well as food plants.

Cross-Regional Comparison of Late Woodland Archaeomedicines

It is difficult, and possibly inappropriate, to compare the data from these three regions to one another. The Late Woodland materials from the American Bottom region are extremely numerous, but they are the result of more extensive analysis than was performed in the Moundville and Central Tombigbee regions. The Late Woodland period in the Central Tombigbee area had a significant number of features analyzed, but the features, individually and as a group, tend to have relatively few preserved archaeomedicines. Finally, the Moundville region has the fewest Late Woodland features analyzed, but a greater percentage of these features contained a comparatively wider variety of archaeomedicines than was the case for the other two regions in this investigation.

An additional problem with comparing these three regions is that almost none of the taxa were present in all three regions for a given time period. For example, during the Late Woodland period, only five taxa were found in all three regions: bedstraw, sumac, persimmon, brambles, and grape. Bedstraw was classified as a Category 1 plant, sumac was included in Category 2, and the remaining three taxa were all grouped into Category 3.

There are at least three possible explanations for why there is so little overlap among the regions. First, there is the possibility that certain taxa were not available in all three regions during prehistory. While all three regions are all in the greater Mississippi River drainage basin, there are major ecological differences among them, especially between Illinois and Alabama. Interestingly, only a handful of the taxa found in the Moundville and/or Central Tombigbee regions would have been environmentally excluded from the American Bottom region. Magnolia, palmetto, and most holly species are restricted to areas south of the American Bottom region, and their absence from American Bottom features can be explained due to environmental factors. None of the taxa present only in the American Bottom appear to have been restricted to more northerly regions, and their absence in the Moundville and Central Tombigbee paleoethnobotanical samples could be due to alternative reasons.

A second explanation for divergences in the distribution of archaeomedicinal plants concerns differences in the manners in which the paleoethnobotanical samples were collected, processed, and analyzed. The analytical skill of the paleoethnobotanists involved in these projects was of the highest caliber, lessening the effect of analyst error. A general rule in paleoethnobotany is that the more samples and the greater the volume of these samples, the more likely it is that rare plant remains, such as medicines, will be recovered and identified. This hypothesis appears to hold true for the archaeomedicinal remains, because the greatest number of genera (n=32) were recovered from the American Bottom region where the greatest number of features were analyzed. The comparatively few (and small) features analyzed from the Moundville and Central Tombigbee regions were expected to yield fewer archaeomedicines, as they did. A comparison of the Central Tombigbee and Moundville data reveals that although the Central Tombigbee had significantly more features analyzed (120 analyzed features versus 24 analyzed features in the Moundville region), there are more plant remains and more archaeomedicinal remains, from the Moundville region. It is possible that the Tombigbee samples (whose volume was not recorded in all cases) were small, and hence yielded fewer archaeobotanical remains, or perhaps the features selected from the Moundville region were "richer" than those from the Central Tombigbee region. Nevertheless, at least some of the difference is probably due to variation between the two societies that left the remains, as discussed below.

Another possibility for the difference among archaeomedicines represented in the three Late Woodland assemblages is that there were differences in the ways that people living in the American Bottom, Moundville, and Central Tombigbee regions used their natural resources for food and medicine. Under this assumption, the plants that are commonly used and deposited in archaeological contexts in one region are the result of societally-bound processes that might not be present in another, culturally distinct region. As a result, the lack of tobacco and black nightshade remains in the Central Tombigbee and Moundville regions could reflect a larger cultural division from the American Bottom region. If these plants were used in these two southern cultural areas, then they were disposed of in a very different manner from what was prevailing at the same time period in the American Bottom region. Similarly, the presence of maypops remains in the southern regions could reflect a cultural difference from the American Bottom area. Maypops, while naturally less abundant in the northern American Bottom region, may have been available during prehistory in the southern portions of the area. Maypops have been found in archaeological deposits as far north as Tennessee (Chapman and Shea 1981). These three plants serve as examples of taxa that should have been available to the archaeological groups in this investigation. The differences between the Moundville and American Bottom versus the Central Tombigbee region should be considered carefully. It appears that there was a general lack of plant remains in the Central Tombigbee area, limiting the preservation of plants. Absence of any given taxon from the Central Tombigbee, therefore, probably is not indicative of a true dearth of that plant in the society, but this hypothesis cannot be confirmed at present.

Another way of comparing the data from the three regions, given the lack of overlap of species, is to compare the Category Percentage and Category Ubiquity in each of the four categories. Category Ubiquities could not be calculated for the Central Tombigbee region as noted earlier.

There is little similarity in the Category Percentages among these three regions during the Late Woodland period (Figure 7-1). Category 4 is the greatest contributor to potential archaeomedicinal plants in the American Bottom at 38%. Category 2 plays this role in the Moundville region at 87%, and Category 3 is the greatest contributor in the Central Tombigbee region at 85%. Clusters of seeds from individual taxa tend to push these categories to their dominance (Figures 7-3, 7-4, 7-5).

The Category Ubiquities (Figure 7-2) are similarly difficult to compare because the low number of features analyzed from the Late Woodland Moundville region results in overall inflated Category Ubiquities. Category 2 and 3 plants are the most ubiquitous in the both Moundville and American Bottom regions, with Category 1 and 4 plants being less widespread across the Late

Woodland contexts. The importance of multi-purpose medicinal and subsistence species, however, is clear for both regions.

Cross-Regional Comparison of Mississippian Archaeomedicines

As noted for the Late Woodland period, there are a discrepancies among between the amount of plant material analyzed from the American Bottom, Central Tombigbee, and Moundville regions. Two hundred and four features were analyzed from the Central Tombigbee region, but nearly all of these features are from investigations at the Lubbub Creek site, and this research yielded few medicinal plant remains. The analysis of Moundville region features was also dominated by features from a single site, in this case 135 of the 169 features were from the site of Moundville. The Moundville and Moundville region medicinal plant data, however, were much more numerous and with a greater range of taxa represented. Finally, the total of 655 features analyzed for the American Bottom region is at least three-fold greater than for the Moundville and Central Tombigbee regions. This greater number of analyzed features is probably one reason that a greater number (and diversity) of medicinal plant remains were found in the American Bottom region.

A similar paucity of overlapping taxa among the three regions holds for the Mississippian period, as was the case for the Late Woodland period. For example, during the Mississippian period, only three taxa are common to all three regions: persimmon, American plum, and grape. All three of these plants are classified as food plants according to the groupings used in this dissertation, although persimmon remains are not included in the Moundville database. A broader array of plants overlapping all three regions during the Mississippian period is not present because of the very low diversity of taxa from the Central Tombigbee region during that time. Many more taxa were found in both the American Bottom and Moundville region than in the Central Tombigbee: spurges, bedstraw, sorrel, pokeweed, sumac, elderberry, purslane, brambles, morning glory family members, and juniper. This group of plants found in the American Bottom and Moundville region spans the four categories from medicine to food to ritual, possibly suggesting that these species were used in similar ways in the two geographically separated regions. The reasons for this overlap in taxa (or lack of overlap, as is the case for most of the plants) are discussed in relation to the Late Woodland period. The suite of plants, such as tobacco and black nightshade, that are very numerous in the American Bottom region are missing from the Moundville and Central Tombigbee regions, as they had been during the Late Woodland period. Similarly, maypops continue to be missing from American Bottom features during the Mississippian period.

The Category Percentages (Figure 7-1) and Category Ubiquities (Figure 7-2) in the three study regions are quite different from one another and from those discussed for the Late Woodland period. Over 30% of the potential archaeomedicinal plants identified are from Category 2 (36%) and Category 4 (34%) in the American Bottom region, from Category 2 (48%) and Category 3 (31%) in the Moundville region, and Category 3 (85%) in the Central Tombigbee. It appears that taxa with wider ethnobotanical applications tended to be disposed of more frequently than those with more limited, and perhaps more ritualized, uses.

Category Ubiquities for the American Bottom and Moundville regions during the Mississippian period again are quite different from the Late Woodland ratios (Figure 7-2), but tend to be similar to one another in their general trends across the categories of potential archaeomedicinal plants. Category Ubiquities for Categories 1 and 4 tend to be the lowest in both regions, while Categories 2 and 3 were more ubiquitous, although not so dramatically during the Late Woodland period for the Moundville region.

Conclusions

During the course of this investigation it became apparent that broad trends in the data for possible medicinal plants are present, but that there are few instances of specific changes in the paleoethnobotanical record that could be linked to changes in health between the Late Woodland and Mississippian periods. The most common potential archaeomedicines instead come from a group of plants with a broad array of ethnobotanical applications that included medicinal purposes. These multi-use plants were present in all three study regions, but it does not appear that there were definitive trends in these plants across the three culture areas. For example, multi-use plants did not show similar increases or decreases in ubiquity or frequency through time for all three areas. Even within a single region, my ability to find evidence for trends through time in archaeomedicinal plants that could be linked to specific health issues was, at best, unsatisfactory.

There were many factors limiting my ability to associate single plants definitively with specific diseases. Some of these factors are discussed above and see below for further explanation.

First, and foremost, are limitations based on the nature of the paleoethnobotanical record. It appears that the paleoethnobotanical record may be insufficiently detailed and precise to address issues such as the nature of medicinal plants in prehistory. A very large database, or unusual circumstances, would be necessary, and while the paleoethnobotanical database for the American Bottom region is very large, the record for the Central Tombigbee and Moundville regions are too small to display trends. The Category 1 and 2 plants are rare in all three regions, and concentrations of seeds or unusual contexts skew the data too greatly.

Secondly, there are no instances when plant remains definitively derived from a medicine could be identified. Nearly every "archaeomedicine" found could have entered the paleoethnobotanical record in some other way. Most of the plants had additional uses such as food, ritual items, or technological items, while others are common weeds near human habitations. The presence of such remains, therefore, cannot be used as definitive proof that the plant was used as medicine. While this current lack of definitive proof is disappointing, the possibility remains that our understanding of medicinal plants will improve as has happened with other "weeds" such as *Chenopodium berlandieri*. The economic importance of such tiny seeds was questioned in the recent past, but small starchy and oily seed plants are now recognized as part of an indigenous agricultural system.

Finally, previous research projects focused on subsistence topics, and were limited by time and money. It is possible that rare medicinal taxa from interesting contexts were not identified due to these limitations. I hope that the publication of the images in this dissertation will assist future researchers in their attempts to identify rare taxa, and will reveal the potential significance of these "weedy plants" in prehistoric ethnobotanies.

CHAPTER 8: CONCLUSIONS

Introduction

As conceived, this dissertation was designed to synthesize and analyze paleoethnobotanical data from the Late Woodland through Mississippian periods in the American Bottom, Moundville, and Central Tombigbee regions in hopes of identifying potential medicinal plants. Research efforts were concentrated on those plants used for medical purposes by historic eastern Native American peoples, but whose potential as medicines had not been fully explored from the paleoethnobotanical perspective. My basic assumption was that medicinal plants had an extensive history of use visible in the archaeological record, but that they had not been recognized because the low frequency of medicinal taxa in any given context limited the ability of researchers to isolate patterns in such remains. If identified, these medicines would be an additional component in our understanding of (predominantly) wild plants in prehistoric lifeways. A second topic that this dissertation addresses is whether pharmacopoeias changed through time to meet the shifting cultural and biological needs of prehistoric people. Potential medical plants were identified in the course of this research, and the strength of evidence for their use through time is summarized in the following sections.

Identification of Potential Archaeomedicines

My initial research focus was on existing Late Woodland through Mississippian paleoethnobotanical records for the American Bottom, Moundville, and Central Tombigbee regions to identify those taxa that may have been prehistoric ethnomedicines based on historic records of the same, or closely related, taxa having been used for medicinal purposes by Native Americans from the Eastern Woodlands. The classification of given plants as potential archaeomedicines often was supported by their presence in several features within and/or across regions and temporal frames. An additional requirement for potential archaeomedicines was the medical use of said taxa by more than one eastern tribal group. All told, 68 taxa were found that met or exceeded these basic criteria, placing them in the pool of potential archaeomedicines. The evidence for prehistoric medicinal use of some of these 68 taxa was relatively weak. They had been identified very few times in the archaeological record, thereby lessening my ability to argue that the specific plant was used extensively across time or space. The very nature of plant-based medicines, however, is that they are used occasionally, in small qualities, and are not stored, resulting in relatively few opportunities for the chance preservation of identifiable remains in the archaeobotanical record. Similarly, the presence of a given taxon in the archaeological record may not represent its exclusive use as a medicine, but it could indicate a society's recognition of that plant, and the potential that a given taxon might have been a medical resource. Finally, I argue that while the evidence for a rarely identified plant being used as a medicine may be tenuous, the archaeomedicinal database as a whole strongly supported the presence of medicines in the paleoethnobotanical record.

As part of this investigation into prehistoric ethnomedicines, I conducted research on traditional medicinal plants. Traditional medicinal plants have general characteristics that can be associated with archaeological taxa. For example sumac's astringent berries have a distinct taste, which is one of the characteristics of plants selected as medicines. Mints, with their aromatic oils, conform to a characteristic "smell" criterion. Spurges may represent plants whose anomalous appearance (i.e., the white latex spurges secrete when damaged) makes them unusual within the broader universe of available plants. Such characteristics appear to be valuable in selecting medicines, because they make the plant more culturally salient or visible. In addition, traditional medicinal plants were often used in multiple cultural contexts such as food and medicine. Archaeological examples of such plants include brambles, grapes, elderberry, tobacco, and many others. Some medicinal plants traditionally are cultivated (e.g., tobacco) or encouraged, but it is difficult to demonstrate archaeologically that morphologically wild plants were managed in any manner. Several of the archaeomedicinal plants such as purslane and bedstraw, however, are common near habitations, which could demonstrate a commensal nature. Finally, many medicinal plants are biannuals or perennials, such as persimmon, plum, St. John's-wort, and sumac, all of which were found in the archaeological record. Therefore, I concluded that there are plants in the archaeological record that share basic similarities with the types of plants expected to be used as medicines.

Of the 68 potential archaeomedicines recognized in this study, many appear to be examples of plants whose occasional use as a prehistoric medicine is supported to some extent. I highlight 12 of these plants, not to eliminate other taxa presented more fully in Chapters 6 and 7, but to emphasize that the paleoethnobotanical record did contain enough information to support the use of certain plants from <u>each</u> of the four potential medicinal plant categories. These 12 taxa were selected because they were present in multiple regions and/or temporal frames, and they had a strong case for historic use for ailments that may have afflicted prehistoric people. Each of these 12 taxa is discussed below.

Spurge remains were found in 24 site components in the American Bottom region for a total of 113 seeds. Spurge seeds were identified in the Moundville region, as well, for a total of one Late Woodland and five Mississippian period seeds. Interestingly, the Taxon Frequencies for spurges increase in both areas in the Mississippian period, dramatically so for the American Bottom region. Members of the spurge family have been used throughout much of their natural range as oral aids, purgatives, dermatological aids, and cough medicines (Beckstrom-Sternber et al. 1995). The individual species that have been identified in the American Bottom, *Chamaesyce maculata* and *Chamaesyce* cf. *nutans*, do not appear to have been used by tribal groups in the eastern United States, but these taxa probably share the biologically active properties of other spurges. The white latex characteristic of spurges causes contact dermatitis in sensitive individuals, and this effect may have been recognized for its biological potential during prehistory.

Bedstraw seeds were present in all three archaeological regions in this investigation. One hundred bedstraw seeds were identified in 24 Late Woodland, 10 Emergent Mississippian, and 13 Mississippian period American Bottom features. Bedstraw seeds were present in one

Late Woodland and nine Mississippian features from the Moundville region, for a total of 18 seeds. Only a single bedstraw seed was identified in a Late Woodland context from a site (1Pi61) in the Central Tombigbee region. The Taxon Frequencies of bedstraw increased dramatically through time in the Moundville region, but decreased in the American Bottom region at the same time. The sticky fruits of bedstraw adhere to fur and clothing, and are potentially an accidental inclusion in the archaeological record due to this quality. Ethnobotanical uses of bedstraw are numerous and include cushioning in beds and use in teas. Bedstraw has medical uses as well (Moerman 1998:241-242). Most commonly the plant was a dermatological aid and used for kidney or general urinary tract complaints. While the presence of dermatological and urinary ailments has not been conclusively identified in the paleopathological record for eastern North American, these ailments undoubtedly existed and required the symptomatic relief that bedstraw may have provided.

Poke seeds were present in American Bottom (n= 45) and Moundville (n= 247) regions. The Taxon Frequencies of poke increases in both regions through time, although the increase in the Moundville region is skewed by two concentrations of over 75 seeds. The dark purple berries have been used as a source of dye or ink (Sauer 1948), and the berries and greens are edible after cooking. Native American medical uses of poke tend to focus on the use of the berries and roots as an internal or external antirheumatic (Moerman 1998:397-398). Applications of root preparations to ulcers, swellings, bunions, and other skin-related ailments also are common. The use of the plant as both an antidiarrheal and cathartic agent is interesting, but different methods of preparation, application, and dosage influence the effect of medicines made from poke.

Sumac remains were identified from all three archaeological regions in this investigation. A total of 105 seeds were identified in features from the American Bottom region. Sumac seeds, a total of 320 (309 from a single Late Woodland feature), were identified in paleoethnobotanical samples from the Moundville region. A single sumac seed was found in a Late Woodland feature from the Central Tombigbee site of 1GR1X1. The Taxon Frequency of sumac remained fairly stable through time in the American Bottom region, and, if the seed mass from the Moundville region is removed, the Moundville Taxon Frequencies might also appear stable. Sumac is a exemplary multi-use plant. The berries are edible, the stems, bark, roots, and berries are used as a source of yellow, orange, red, gray, and black dye, and the fall leaves were added to smoking mixtures such as kinnikinnick by several Woodland and Plains tribal groups. Many of the Native American medicines utilize the effectiveness of astringent tannins present in sumac bark, roots, and berries (Moerman 1998:471-473). Sumac was widely used as a dermatological and dental aid and to relieve the symptoms of colds or coughs. All of these health problems are presumed to have been present during late prehistory.

Elderberry remains were present in American Bottom (n=57) and Moundville (n=18) contexts, but not in the Central Tombigbee region. Trends in elderberry Taxon Frequencies through time in American Bottom and Moundville regions are very different, because the American Bottom region has the highest frequency during the Late Woodland period and the Moundville region frequency is highest during the Mississippian period. Elderberry species have been used for their medicinal qualities throughout much of their worldwide range (Moerman 1989:58-59), and the ripe berries are edible. The ethnographic record emphasizes the use of elderberry as an emetic, cathartic, and gastrointestinal aid (Moerman 1998:511-512). These actions are probably founded in the poisonous alkaloids and cyanide compounds that the plant possesses (Lewis and Elvin-Lewis 1977:4). The use of emetics and cathartics as part of traditional healing regimes is widespread, and plants with these qualities may have been part of larger healing rituals that were performed during prehistory.

Black nightshade seeds, 934 of them, were identified in American Bottom contexts. Black nightshade Taxon Frequencies are relatively high throughout the temporal frame of this study, but Taxon Frequency increases dramatically in the Mississippian period. Despite the wealth of black nightshade remains identified in the American Bottom region, this taxon is lacking in the Moundville and Central Tombigbee regions. The edibility of black nightshade fruits was recognized by several California tribal groups, and the Cherokee people used the young leaves as a potherb. Black nightshade is noted for containing active compounds such as scopolamine and atropine that can block the autonomic nervous system in humans. The chemical properties of this plant were well-known to Native Americans in the Eastern Woodlands who used as a antihelmintic and for ceremonial purposes (Moerman 1998:534-535). The high number of black nightshade remains in the American Bottom region suggest purposeful use of the plant probably as a food, but an intimacy with the bioactive nature of black nightshade also may have made it desirable as a medicine.

Bramble remains were associated with all three archaeological regions in this dissertation. A total of 28 bramble seeds was found in the American Bottom features, the majority of them (n=18) in Late Woodland contexts, but Emergent Mississippian (n=5) and Mississippian (n=5) also are represented. Bramble seeds were present in one Late Woodland feature (n=1 seed) and seven Mississippian features (n=9 seeds) from the Moundville region. Finally a single bramble seed was found in a Late Woodland context from site 1GR1X1 in the Central Tombigbee region. People undoubtedly ate the highly desirable bramble fruits when they whenever available. Brambles also are one of the most commonly used medicinal plants in this study, with at least 38 usages for Eastern tribal groups (Moerman 1998:486-494). The plant was used as an antidiarrheal, general tonic, and to relieve the symptoms of colds, coughs, and even tuberculosis. These uses would have addressed common health issues during the Late Woodland to Mississippian periods, adding an additional level to the plant's cultural relevance.

Plum remains were found in the American Bottom (n=21), Moundville (n=18), and Central Tombigbee (n=16) regions. The Taxon Frequency for plums is very high during the Late Woodland period in the Moundville region with a dramatic decline in the Mississippian period. Plum Taxon Frequency remains fairly low throughout time in the American Bottom region, but there is a very slight increase during the Mississippian period. The fruits of plums are edible and were consumed fresh or dried by Native American peoples. The bark and roots of plums also were used as an antihelmintic, a cough medicine, a urinary aid, and to help with the healing of cuts or wounds to the skin and mouth (Moerman 1998:439-442). All of these uses have some basis in the active properties the plant possesses, such as the tannins in plum bark and wood.

Purslane seeds were present in the American Bottom (n=447) and Moundville (n=138) regions. The Taxon Frequencies of purslane increase substantially through time in both regions. The seeds and fleshy leaves/stems were eaten by Native American groups in the Western and Southwestern United States. In the eastern United States, purslane was used to address two categories of health: soothing wounds and quieting gastrointestinal problems (Moerman 1998:434). These uses probably relate to the mucilaginous properties that fresh purslane leaves exhibit. Wounds and gastrointestinal distress probably were common health issues during later prehistory, making plants that relieved these symptoms quite valuable.

Morning glory family remains were identified in all three regions in this investigation. A total of 212 seeds from these plants were found in the American Bottom region. The Taxon Frequencies of morning glories rise from less than one to nearly nine between the Late Woodland Mississippian period in the American Bottom region. Morning glory/bindweed seeds were present in Moundville region Mississippian contexts from the Moundville site (n=22 seeds) and 1TU56 (n=11 seeds). A single Convolvulaceae seed was identified in a Late Woodland context from site 1GR1X1 in the Central Tombigbee region. Morning glory family members are aggressive weeds, but the roots of man-of-the-earth morning glory are edible. The seeds of morning glory family members have been used as a powerful cathartic, diuretic, and tuberculosis remedy (Moerman 1998:275). The seeds of some species also contain compounds similar in effect to LSD, although use of the plant for this purpose has not been recorded in Eastern North America (Lewis and Elvin-Lewis 1977:416). The tenacious vines and the unusual flowers may have made morning glories more likely to be culturally salient and thereby available for potential medical use.

Redcedar, with a total of 593 wood fragments, was identified in 85 features from 20 sites in the American Bottom region. Redcedar also was recovered from the Moundville region: three fragments were present in West Jefferson phase contexts, and 24 fragments were recovered from Moundville I features. Redcedar Taxon Frequencies increase significantly between the Late Woodland and Mississippian periods in both regions. In the ethnobotanical records, redcedar is associated with ritual purification and cleansing activities (Moerman 1998:290-291). A secondary use of the plant focuses on its action on respiratory problems such as coughs and colds. Importantly, many of these uses involve burning the leaves, twigs, and bark, which would the chances that redcedar would be preserved in the paleoethnobotanical record. Redcedar also has strong diuretic effects, resulting from monoterpenes in the volatile oil (Kindscher 1992:134), as recognized by Western and Native American health professionals. A final note on this intriguing plant is that concentrated redcedar oil causes uterine cramping, an effect useful in both the child birthing and abortion processes.

Tobacco, in the form of 468 seeds, was identified in 63 features from 21 site components in the American Bottom region. The Taxon Frequency of tobacco, unlike other Category 4 plants, decreases after the Late Woodland period. No tobacco remains have been found in Moundville and Central Tombigbee regions. The most commonly recognized Native American use of tobacco was for smoking, either by itself or in a mixture with other plants (Moerman 1998:356-357). The act of smoking had many social purposes ranging from relaxation to ritual, wherein the psychotropic effects of tobacco were sometimes used to induce visions. Tobacco leaves also were commonly burned in smudges for their aroma and the purification qualities that the smoke provided. Tobacco leaves and roots also were used as an worming agent, an antispasmodic, and a cathartic aid. These uses are biologically feasible given the powerful compounds, such as nicotine, found in tobacco.

Patterns in the Archaeomedicinal Record

The second portion of my dissertation is focused on identifying changes in archaeomedicines during the Late Woodland to Mississippian time frame. I predicted that modifications in medical systems would occur in response to changing health and social needs. An attempt to improve or maintain health standards despite shifting needs associated with the cultural phenomena that occurred during the Late Woodland to Mississippian period was predicted. These attempts might appear as additions of new taxa to existing pharmacopoeias or shifted concentrations of previously used plants. Prehistoric people would have wanted better health for themselves, their families, and perhaps their communities, and medicinal plants would have been one way for them to control their health.

This research issue was based on the initial assumption that the time period from Late Woodland to Mississippian was an era of overall decreasing health. During the course of study, I recognized that issues surrounding health in the three study regions did not allow for broad, sweeping generalization such as "population health decreased through time." Instead a more complex archaeological picture emerges where certain health issues, especially those related to increasing population density, such as communicable diseases (e.g., yaws, tuberculosis, intestinal parasites, and even mundane colds or diarrhea), became more pronounced when populations were gathered in larger communities and villages. In addition, the social phenomena related to maize-based agriculture intensified health issues associated with decreased child-birth spacing and poor dental health, issues that first arose during the Late Woodland period. The complexities of social organization during this Late Woodland to Mississippian time frame, with populations gathering, dispersing, and reorganizing, do not allow for a straightforward interpretation of the health status of populations, especially given the relatively small paleopathological collections available in the study regions.

It became apparent that the relevant evidence for prehistoric use of plants as medicines, that is the paleopathological, paleoethnobotanical, and contextual information, would have to be examined in much broader terms that had initially been hoped. Thus, I conceptualized health as generally better or worse, and based these classifications within broad time frames such as late Late Woodland and Early Mississippian. Similarly, plant remains that had been carefully collected, sorted, identified, and recorded from an array of contexts were examined within relatively broad categories due to the low counts of individual taxa in any temporal or geographical region.

Four categories were developed to group the archaeomedicinal plants based on their relative medical versus subsistence importance in eastern North American Indian ethnobotanies. Plants such as spurges and bedstraw used predominantly as medicines by historical Native

Americans in the eastern United States were considered as "Medicinal" or "Category 1" plants. The second group of plants, for example sumac and black nightshade, includes those plants with ethnobotanical uses equally (or nearly so) distributed between medicinal and subsistence categories these were grouped as "Medicine/Food" or "Category 2" plants. Thirdly, plants such as purslane and brambles, whose primary use was as food with secondary uses as a source of medicines, are classified as "Food" or "Category 3" plants. Finally, plants, such as morning glories, redcedar, and tobacco, used in rituals with secondary and/or interlaced use as a medicine are discussed as "Ritual" or "Category 4" plants. Discussion and quantification of individual taxa took place within these four categories.

By placing the taxa in these groups, I obtained sufficient frequencies and ubiquities to allow analysis of broader trends between and among the categories, based on time period and geographical region. These were examined by analyzing Taxon Frequencies, Category Ubiquities, and Category Percentages. Unfortunately, the results of this analysis did not strongly confirm my initial expectations that medicines would be seen to change through time. Trends, however, were found with the American Bottom and Moundville regions. The category-level results from these two regions produced more intriguing results than did those from the Central Tombigbee region, due in part to the way in which the Central Tombigbee data are presented.

The analysis of archaeomedicinal categories from the American Bottom produced enticing outcomes for each of the four categories through time, although there appear to be problems with the interpretation of remains from the Emergent Mississippian contexts. Several taxa are found in features from the three time periods. For example, spurges, bedstraw, sumac, elderberry, black nightshade, and tobacco are all fairly numerous and relatively ubiquitous. During the Late Woodland period, archaeomedicines represent 3% of all the identified plants, dropping to 2% during the Emergent Mississippian period, and rising to a total of 10% by the Mississippian period. The Emergent Mississippian Category Ubiquities are unusually low for all four categories, and are not included in discussion of trends in Chapter 7 or in the following summation. Those multi-use medicine/food plants in Category 2 steadily increase in Category

Ubiquity and in their contribution to Category Percentage from Late Woodland to Mississippian periods. Category 3 food plants remain fairly constant in their Category Percentage and Category Ubiquity through time. Category 1 plants, those used predominantly as medicines, remained relatively stable in their contribution to Category Percentage during the Late Woodland and Emergent Mississippian period. The record for Category 1 plants during the Mississippian period reveals a change to a lower percentage of plants being recovered from a larger proportion of the analyzed features. Ritual plants, combined in Category 4, represent a fairly constant contribution to the overall Category Percentage through time. The Category 4 Ubiquity, however, more than triples between the Late Woodland value of 4% and the Mississippian value of 13%.

An overview of medicinal plant use in the American Bottom region, therefore, can be summarized for each category. There was a fairly constant use of plants in Categories 2 and 3. This suggests that the tumultuous social events during the Late Woodland to Emergent Mississippian to Mississippian period did not have an overwhelming impact on the day-to-day ethnobotanical needs of the population. The distribution and frequency of plants in Category 1 shift during the Mississippian period when they contribute to a lower percentage of the total archaeomedicines while maintaining a ubiquity similar to that in the Late Woodland period. It is possible that the relatively broad distribution of medicines during the Mississippian period is related to the analysis of more Mississippian ritual contexts, because more ritual/medical procedures would be expected in such areas. The steady rise in Category Percentage for ritual plants, combined with their increasing Category Ubiquity, could be related to the same social phenomena contributing to the increasing Category Percentage of Category 1 plants. For example, medicinal and ritual plants could have been used for those long term, but nonfatal, health problems such as yaws and tuberculosis, which became pronounced during later prehistory. These diseases could not be cured with botanical medicines, but the social and physical symptoms may have been addressed through healing rituals.

Extremely rich Late Woodland features were sampled in the Moundville region, and a comparatively large percentage of the Mississippian paleoethnobotanical remains consist of potential archaeomedicinal plants. Thirty-two percent of remains are archaeomedicinal during the Late Woodland period, and 25% during the Mississippian period. Both these percentages are significantly higher than the corresponding calculations for the American Bottom region. This unusually high percentage of archaeomedicinal plants could be related to the domination of the Moundville Mississippian assemblage by features from the ritual epicenter of Moundville, although interpretation concerning the exact role of the site in the Black Warrior social system have undergone significant revisions in the past 20 years due to efforts of scholars such as C.M. Scarry, P. Welch, V. Steponaitis, and C. Peebles. No matter whether Moundville represents a large habitation area reserved for the elite, or a focus of rituals occupied by relatively few individuals, the fact that Moundville sediments probably do not represent the results of day to day activities by the general populace remains true. Still, it is interesting that 13 of the archaeomedicines are present during both periods, representing nearly half of all potential medicines. This suggests that plants known to individuals occupying the non-stratified Late Woodland sites were similar to those used by the special segment of the Moundville population during the Mississippian period.

Plants in Categories 2 and 3 dominate assemblages from the Moundville region during the Late Woodland and Mississippian periods. Category 2 plants represent 87% of identified archaeomedicines during the Late Woodland period, and 48% during the Mississippian period. Category 2 plants are also fairly ubiquitous during both periods, with representatives in 50% of the analyzed Late Woodland features and 22% of the Mississippian features. Category 3 plants make up a lesser proportion of the total Category Percentage, 11% and 31% for the Late Woodland and Mississippian periods, respectively. They are relatively ubiquitous being found in 58% of the Late Woodland analyzed features and 18% of the analyzed Mississippian features. Medicinal plants in Category 1 make up a very small portion of the Late Woodland Category Percentage at 2%, as do the ritual plants in Category 4 at 1%. Even the Late Woodland Category Ubiquities for these two categories are relatively low at 17% and 8% for Categories 1 and 4, respectively. During the Mississippian period, the Category Percentages rose to 13% for

Category 1, and 9% for Category 4. Category 1 and 4 Ubiquities remain relatively stable, with Category 1 dropping to 13% of the features and Category 4 rising to 12% of the features.

The distribution of archaeomedicinal remains in the Central Tombigbee region is more difficult to interpret, because the individual plant remains are not associated with specific features. Category Ubiquity, therefore, could not be calculated. In addition, a relatively narrow range of taxa was identified from this region resulting in a weighting towards the more commonly identified taxa from Categories 2 and 3. For example, Category 1 plants make up 11% of the Late Woodland archaeomedicines, but no plants assigned to Category 1 were identified in Mississippian features. Category 4 is similar: this group contains 4% of the Late Woodland archaeomedicinal remains, but no Category 4 plants were recognized from the analysis of Mississippian features. Category 2 was represented by 25% of the Late Woodland, and 15% of the Mississippian potential archaeomedicinal taxa. Category 3 plants contained the majority of potential archaeomedicines recovered from Late Woodland, 61% of total features, and Mississippian, 85% of total features. Due to this dominance of food plants with secondary uses as medicines, very little can be said about the potential medicines used by peoples occupying the Central Tombigbee Region. Multi-purpose plants, however, did dominate the assemblage in this region.

There were few, if any, instances of specific changes in the paleoethnobotanical record that can be linked to changes in broad categories of health between the Late Woodland and Mississippian periods. The most common and ubiquitous plants are those with an array of potential cultural applications. Plants that occupy multiple ethnobotanical niches, indeed, are often selected by traditional healers as medicines. In the end, I argue that the presence of potential archaeomedicines indicates that such plants may have been selected for their medicinal purposes during prehistory.

Conclusions

In conclusion, I found that potential archaeomedicinal plants spanned the cultural spectrum from food to ritual to medicine. Plants such as sumac and brambles had traditional uses as foods, medicines, and as technological items. I assume that the prehistoric residents of the study area used such plants for an equally wide array of purposes, and the presence of these remains in the archaeological record should be used demonstrate the breadth of prehistoric ethnobotanical knowledge. No plants were found in this study that could be identified exclusively as medicines, in part, because traditional uses of plants are so rarely limited. Instead, my research has added new taxa to the set of plants that archaeologists and paleoethnobotanists should now consider as culturally significant, and occupying places on a continuum from subsistence to medicine to ritual.

It is this process of analyzing the ways that prehistoric people may have used wild plants, therefore, which may be the most important contribution of my research. I developed methods of analyzing rarely identified plants within culturally-bound categories. In doing so, future archaeologists and paleoethnobotanists will be able to replicate the results of this dissertation, apply the methods to other existing archaeological materials, and interpret future paleoethnobotanical collections within broader ethnobotanical frameworks. My work has shown that plants such as spurges that tend to be identified in relatively few samples at a single site can still be significant components in region-wide paleoethnobotanical assemblages.

My predictions that the differing health needs of Mississippian people necessitated an increase in frequency and types of medicines, and that this process would be archaeologically visible as an increase in the number and diversity of medicinal plant remains from the Late Woodland to Mississippian time were not strongly supported. This lack of support was unfortunate, but it did not distract from the overall value of this study.

It is the connection between the archaeobotanical record and cultural events that could be an important use of this data set in the future. Such research could include more detailed analyses of contextual information as they relate to the distribution of potential archaeomedicines.

If specific concentrations of medicinal plants were identified, then discussions of how medicine may have been practiced during prehistory would be possible. Issues concerning healing episodes based in family/home contexts contrasted with those taking place in ritual locales by healing specialists would be particularly intriguing. This family versus specialist health-care would be another way of investigating the effect of elite power structures on the daily lives of prehistoric people.

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