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Edited by  
Ray A. Williamson

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## Archaeoastronomy at a Selection of Mississippian Sites in the Southeastern United States

Ann L. Daniel-Hartung

### INTRODUCTION

There have been many pseudoscientific articles concerning the "wonderful secret knowledge our ancestors had that has been lost" (MacKie 1977:7). Such topics as prehistoric computers, ley lines, lost continents, and contact with visitors from space have gained much popular support. This support has resulted in prejudice against reputable work in archaeoastronomy since it has been seen by some as part of pseudoscience. Though archaeoastronomy is hardly pseudoscience, some of its practitioners are doing field work without sufficient knowledge of the culture or cultures that occupied the area. As a result, they have postulated alignments for cultures which may not have had a sophisticated knowledge of astronomy or have had an interest in those particular celestial bodies. In order to remedy this situation, a systematic, logical approach to archaeoastronomy must be developed, with concentration on the evidence and theories that best fit the realities of the specific area and time being considered.

Four major problem areas in archaeoastronomical research have been identified (Reyman 1975a): (1) an inadequate conceptual scheme or theoretical approach; (2) an insufficient control of the relevant ethnohistoric, ethnographic, and/or archaeological data; (3) the failure to formulate specific field problems, hypotheses, and test implications; and (4) the lack of a consistent, systematic procedure for conducting fieldwork, coupled with the possibility of unsuitable field equipment. To avoid these problems I followed a research procedure based on the use of ethnographic, ethnohistoric, and archaeological records; on-site measurements; and accurate mapping, all applied in support of a stated hypothesis. For this particular research, the hypothesis to be tested was as follows: that evidence of Mississippian knowledge of astronomy should appear in architectural alignments found in the remaining structures of this culture, the mounds. This hypothesis is based on possible Mesoamerican-southeastern United States contact; if the contact was made, a transfer of celestial knowledge may have occurred.

In the southeastern United States during the period from approximately A.D. 700 to A.D. 1600, a cultural system, labeled Mississippian because of its apparent geographical origin, spread throughout the region. Here occurred the most complex development of aboriginal sociocultural organization north of the civilizations of Mesoamerica. In fact, this development is often attributed to diffusion from Mesoamerica involving such traits as human sacrifice, mound and plaza construction, iconographs, ceramic complexes, cultigens, games, and

the form of personal ornaments:

There is some evidence that the Mississippian development was stimulated by the introduction of concepts, ceremonial attitudes, and practices from Mexico. It was based on such improved agricultural procedures as the marked use of the flint hoe and probably of improved strains of corn, which resulted in large populations and a more sedentary societal organization [Griffin 1971:248-249].

Those improved strains of corn, specifically the eight-row Eastern Complex corn introduced into the Southeast about A.D. 800, were well adapted to the growing season of the southern United States (Stoltman 1978:724). Corn was popped, made into hominy, or ground to make a bread; "perhaps the most cheering and heartwarming use the Indians made of maize was the production of alcoholic beverages" (Paul Weatherwax, as quoted by Heizer 1973:98). Heizer (1973:30ff) suggested religious ceremonies as the origin of agriculture--seed offerings scattered over a field from which it had been gathered to appease the gods. It is possible that these ceremonies were continued and expanded as intentional cultivation developed. According to this hypothesis, the ceremonies would be transmitted to other culture groups along with the seeds, because they became an integral part of the planting and perhaps the harvesting of the maize. It seems reasonable to suppose that such a process brought Mesoamerican ceremonialism and associated astronomy into the Southeast, along with truncated pyramids, vessels with tripod feet, plumed serpents, monolithic hatchets, seated human figures, sculptured idol heads, spool-shaped ear ornaments, and long ceremonial swords shaped from flint.

To discover if Mesoamerican contact included transmission of celestial knowledge, I analyzed five major ceremonial centers for evidence of astronomical interest. These centers--Cahokia, Illinois; Moundville, Alabama; Etowah, Georgia; Kincaid, Illinois; and Angel, Indiana--were the most influential centers of the Mississippian period (Fig. 10.1). A sixth center, Spiro, Oklahoma, has been destroyed, and insufficient information remains to study this site. What remains of the five extant ceremonial centers is the pattern of earthen man-made mounds. Other man-made structures have been destroyed, either by the elements or by man. Dwellings and ceremonial structures built of wood, cane, and grass are not durable in the climate and soils of the southeastern United States. Evidence of these structures, such as decayed posts remaining in the ground, was not always recorded during early excavations. Often these post molds were not recognized; excavators were more interested in the recovery of artifacts than in reconstructing the culture. For these reasons, it is now impossible to study the remains of structures for evidence of astronomy.

#### BACKGROUND DATA

I have made a thorough search of ethnohistoric, ethnographic, and archaeological documents to provide a cultural background for an interest in astronomy. There are no recognizable written records from this time period; what is available are the narratives of DeSoto's men as they traveled through the Southeast during the mid-sixteenth century, and studies made in the late nineteenth and early twentieth centuries of native peoples remaining in this region. Several chroniclers (the Gentlemen of Elvas 1907; Garcilaso 1951; Bourne 1904) recorded what they saw as they traveled across the Southeast. The French and English explorers unfortunately left few narratives of their



Fig. 10.1 Location of Southeastern Mound Sites:  
1) Cahokia, Illinois; 2) Moundville, Alabama;  
3) Etowah, Georgia; 4) Kincaid, Illinois;  
5) Angel, Indiana

travels in this area, though the French recorded their encounters with the Natchez, who lived along the southern end of the Mississippi River. Early studies of this region indicated that the mound-builders were not the ancestors of the Native Americans visited by the chroniclers. The mound-builders "had been exterminated by the treacherous, ignorant, murderous red-skinned savages who even now were causing so much trouble for the Christian settlers of the New World" (Silverberg 1970:5). Perhaps for this reason, much of the knowledge of the Native Americans encountered by early settlers was not recorded. Records of house construction, food preparation, and clothing can be found, but little is known of such things as calendars or medicine. "Naturally, a tale recorded early in the sixteenth century by superstitious Indians would be dismissed as a mere creation of the undisciplined imagination" (Swanton 1946:755). The Spanish did note the deification of the sun and moon in the Southeast; Swanton (1946:761ff) found this idea still in use. He (1946:767) also recorded the importance of the four quarters of the universe, or the four cardinal directions, in myths and legends; however, there is no mention of the apparent motion of the sun, moon, and stars. Calendrical systems appear to have been based on seasonal changes, rather than on the recognition of the sun as the cause for the changes.

The great ceremony of the year, the busk or "green corn dance," occurred usually in July or August and in any case when the first ears of the flour corn became fit to eat. It was sometimes preceded by three minor feasts or "stomp dances," a month apart. It corresponded to the new year, and was regarded as involving a moral as well as an economic regeneration, typified by the extinction and relighting of fires, a general pardon of all crimes except murder, and preparation of medicines to preserve the general health throughout the year to come [Swanton 1946:775].

Today, among Indian groups in the southeastern United States, the Green Corn, or Busk, ceremony is still carried on, during which a sacred fire identified with the sun and fed with four logs forming a cross and oriented toward the cardinal directions is ritually rekindled on the last day of the ceremony (Howard 1968:19). The Creek, the Yuchi (who call themselves the "offspring of the Sun"), the Chickasaw, the Choctaw, and the Chitimach believed in a sun-deity and have ceremonies based on the sacred fire (Swanton 1928). A quite common motif at these ceremonial centers is the sun symbol, which represented the world, the four directions, and the sun; it is in the form of two concentric circles with a cross in the center which replicates the rim of the sacred fire pit and the four logs across it.

#### FIELDWORK

With the knowledge that the sun, moon, and cardinal directions were important in the Southeast, I visited each site to take sightings on the markers, in this case the mounds. Because of the poor condition of the mounds, a Brunton compass provided sufficient accuracy for the necessary sightings. Erosion and man and animal activities have created indistinct lines to be used for sighting--the sides of the mounds are no longer (if they ever were) straight and level, horizontally or vertically. I made magnetic corrections according to the Federal Aviation Agency sectional aeronautical charts.

Sightings were taken in both forward and reverse directions. For example, if a ramp faced east, I took sightings in a northerly and a southerly

direction along that side of the mound, as well as from the top center of the ramp. The horizon was scanned for prominent peaks which could have been used as foresights for alignments. Possible alignments using the sides of the mounds were not considered because natural and man-made modifications have changed their shapes. The center of each mound and the top center of each existing ramp were used as possible markers. The height of and distance to horizon features were measured during the field work and then included in the analysis.

I then made maps of mound locations from these data, using topographic maps and aerial photographs obtained from the Agricultural Stabilization and Conservation Service of the Department of Agriculture. From these maps I made measurements involving combinations of mounds, taking into consideration topographic obstacles such as intervening mounds and heights of the mounds involved. Possible alignments using the sides of the mounds or the diagonals were not considered because the mounds have been significantly modified so that the sides can no longer be considered original. The center of each mound and the top center of each ramp, if one exists, were used as possible markers.

I calculated azimuths for each of these alignments, and then compared them with the azimuths for the visible planets, stars, and the sun and moon, taken from astronomical tables provided by Aveni (1972a). What became apparent in the analysis is a concern for the cardinal directions, reflected in site orientation and individual mound orientations; other alignments are questionable due to modification of the mounds.

#### CAHOKIA

Cahokia is the largest prehistoric site in North America north of Central Mexico. Monks Mound, the largest mound in the United States, and the third largest prehistoric man-made structure in North America, is here. Near it Wittry (1961) discovered a pattern of post pits during an archaeological salvage project in the 1960s; some of the post pits found in one excavated tract formed three complete circles. Wittry has interpreted the pits found in another tract as forming arcs or parts of four circles (Wittry 1964). One of these proposed circles, number two, has been the focus of astronomical research at Cahokia. The western part of this circle has been destroyed, so the total number of post pits will never be known; however, three post pits on the eastern side mark cardinal directions and two pits may be associated with solstitial alignments. During recent field work Wittry uncovered more pits along the circumference of circle number two, some of which he interpreted as Capella markers and eclipse predictors (Norrish 1978). There are a number of unanswered questions concerning these post pits. Do they indeed form circles? For each post pit there is an uncertainty; for each three pits, determining an arc, there is an uncertainty as to the center of the circle described by the arc. Thus, for each three pits, there is the possibility of many different center positions. Why would four, or more, be built? All that would be necessary for an observatory are the appropriate foresights and a backsight. If these were incorporated in a circle, only one circle would be necessary. Any casualty to the markers could be repaired without constructing another circle. To determine if the post pits do form circles and if there are intentional alignments, more data must be made available--through excavations and publication.

Monks Mound has a long axis running 5° east of north; similar orientations have been found in surrounding mounds, houses, and the eastern stockade (Reed 1977). This may have been magnetic north at the time of its original construction, or the orientation may have been in relation to nearby Cahokia Creek. No evidence of a compass has been recognized here, so this question remains unanswered.

Buildings in one excavated tract were arranged in rows running north and south, with the long axis running east and west; buildings in the other excavated tract were also arranged in north and south directions, but the long axis was neither north-south nor east-west (Benchley 1974:36).

The mounds were not randomly scattered, but were constructed in a pattern which may represent community organization. The majority of mounds cluster along a natural ridge forming an east-west axis for the site; this is also the highest and driest land in the area (Fowler 1978:462). Each of these mound clusters has its own plaza and platform and burial mounds, forming suburban areas within the metropolitan city limits. There also are special mounds, ridgetop in shape, that mark the city limits in three of the cardinal directions (Krupp 1977). The area where the fourth mound may have been has been disturbed. I found no apparent alignments in the buildings or mounds in the settlement planning other than orientation toward the cardinal directions. Intermound and structural alignments are inconclusive at present. Location of structures on the mounds is not well known because of the limited field work and the amount of time required to excavate 100 mounds. The relationship between mounds may be lost as a result of the destruction caused by modern urbanization.

## MOUNDEVILLE

Moundville is considered the second largest ceremonial center of the Mississippian period. There are eighteen mounds surrounding a plaza and the two largest mounds within the plaza (Fig. 10.2). If a north-south line is drawn through Mound A and Mound B, and a series of parallel lines are drawn through this along the axis of the winter solstice sunrise, the mounds along the edge of the plaza alternate between those with large platforms and no burials and those with relatively smaller platforms and rich-accompanied burials (Peebles 1978): Mound C and Mound D have burials; Mound R and Mound E have no burials; Mound Q and Mound F have burials; and so forth (Fig. 10.2). However, a "'fudge factor' of at least 5 degrees is necessary to make the mounds on the edge of the plaza fall into solstice and equinox alignments when viewed from the centrally placed Mound A" (Peebles 1975:69).

The shapes of the mounds have evolved through time; in the last 70 years, one mound has been removed, others altered, and many ramps destroyed. In the intervening years the mounds have been reconstructed or repaired and their original shape may have been altered. For this reason, I found it nearly impossible to determine the original intention of possible alignments; because of the structural modifications, no man-made markers were identified. The site itself appears to have been constructed with an orientation along the cardinal directions. The exception is Mound A but, because of its size and location, it must have had a special meaning. The plaza is oriented along a north-south axis, not in parallel with any geographical phenomenon, and the



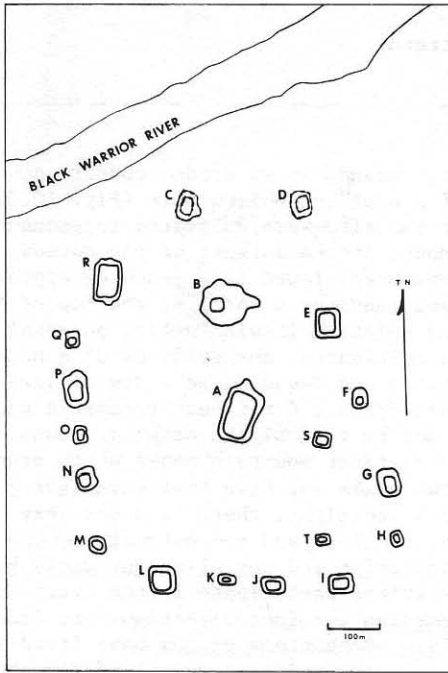


Fig. 10.2 Map of Moundville mounds

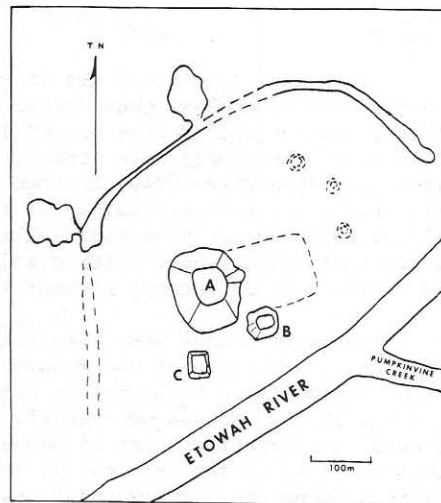


Fig. 10.3 Map of Etowah mounds

mounds around the plaza reflect this pattern.

### ETOWAH

Etowah now consists of two large mounds in an eroded condition, one reconstructed mound, and evidence of a moat and borrow pits (Fig. 10.3). Three small mounds at the eastern end of the site were excavated to ground level some time back and not rebuilt. Mound A, the largest of the mounds, was farmed until recently; the surface has been plowed to a depth of approximately twenty centimeters. A local legend mentions a notch at the top of the ramp on Mound A aligned toward the summer solstice (Lewis Tumlin, personal communication); because the top has been cultivated, any evidence of a notch has been destroyed. Mound B has been tested and found to be a domiciliary mound, perhaps the residence of the leader. Mound C has been excavated and rebuilt, so its present orientation may not be that of the original mound. From the summit of Mound A there are two distinct mountain peaks which stand out on the horizon to the east. These two peaks may have been foresights; if the top center of the ramp of Mound A is a backsight, there is a possible alignment with Castor. With cultivation, erosion, and reconstruction, the center of the ramp is now difficult to determine and any alignment would be suspect. Present day Cherokee and Creek tribes participate in the Green Corn ceremony, including the fire with logs marking the four directions and dancing around a sacred mound (Howard 1968:19). Both these groups have lived in the Etowah area; it is possible that this ceremony is a survival of Etowahn practices. A ramp on the east side of Mound A marks one cardinal direction, the only evidence at Etowah of an interest in astronomy.

### OTHER SITES

The mounds at Kincaid are in such a state of deterioration that their shapes and sizes have been obscured. This region is subject to periodic inundation, and the mounds have provided refuge for man and animals; for this reason, some of the mounds have structures and roads on them. When the site was first excavated there were nineteen mounds; after excavation and extensive farming, only eight mounds remain visible (Fig. 10.4). What may have been the village area has not been thoroughly excavated, so the orientation of structures there is unknown. With the data available today, it is difficult to find evidence of astronomy, or even a knowledge of the cardinal directions.

The Angel mounds have also been altered through cultivation and construction. Only three of the mounds remain for analysis; the other eight are either too small to be useful or are not identifiable now without excavation (Fig. 10.5). Houses were consistently oriented with corners directed to the cardinal directions east of Mound A, while to the west of the mound the house walls faced the cardinal directions (Black 1967:501ff). The semi-subterranean structure under Mound I was oriented toward the cardinal directions, as were the sides of Mound E and Mound D. This concern for the cardinal directions is consistent with other Mississippian ceremonial centers and with the concept the Mississippian people may have had of a quadripartite universe.

The significance of the orientation of Mound A and Mound F of more

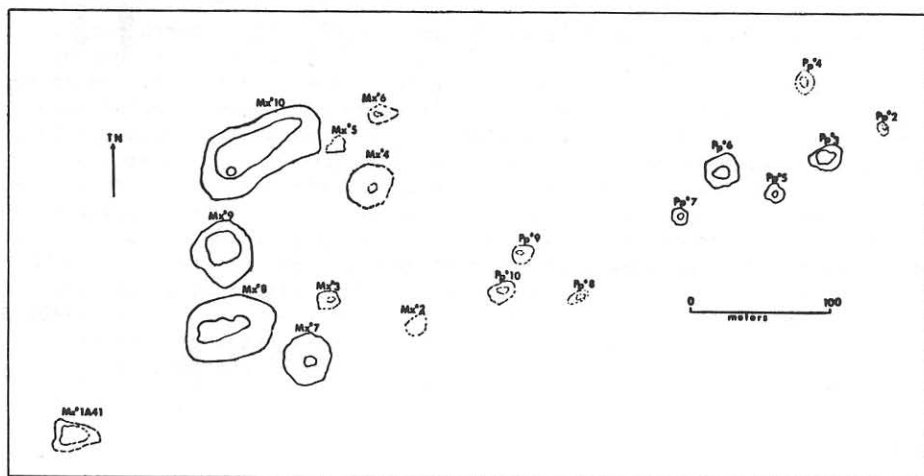


Fig. 10.4 Map of Kincaid mounds. Extinct mounds are indicated by hatched lines.

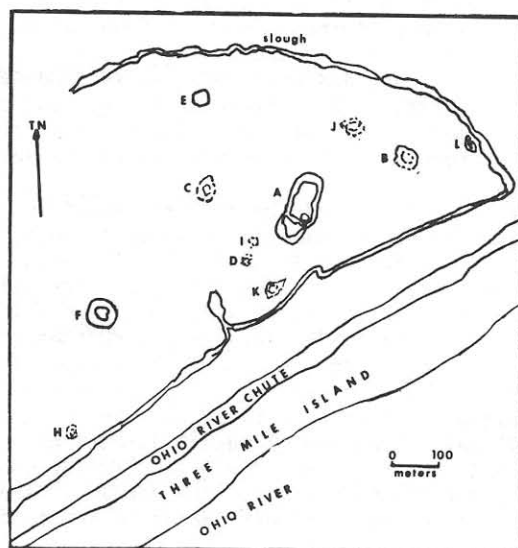


Fig. 10.5 Map of Angel mounds

than 20° east of north is not known. There is no obvious celestial body that might be in alignment, and the river flows in another direction. There are, however, site alignments in Mesoamerica which fall in the 20° to 30° east-of-north range. The majority fall in the 15° to 20° east-of-north range, which suggests the "existence of a 17° 'family' of orientations though no axial trend through time has yet been discerned" (Aveni 1975:166). Is it possible that this 'family' marked some specific celestial body or occurrence? Teotihuacan and ceremonial centers within 100 kilometers of Teotihuacan fall within this 17° east-of-north category (Aveni 1977a:5-7). If there was a continuity of purpose, is Angel a northern outpost of this site orientation? We will not be able to pursue this idea until the reason for this grouping of alignments has been determined; that reason--perhaps alignment to a specific celestial body--could then be looked for at Angel. The orientation of primary Mound F along the same line indicates that this alignment of 20° east-of-north was important. The mound of the chief and the temple mound deliberately constructed with a parallel orientation must have been meaningful to the builders, but that meaning has been lost or is hidden at the present.

### CONCLUSIONS

The ethnographic and ethnohistoric data indicate an emphasis on the sun and moon in the religion of this region, and this interest has been recognized at Mississippian centers. Because agriculture was important in the development of large ceremonial centers, apparent solar motions and the corresponding seasons were significant. An interest in the sun and a quadripartite division of the universe were unifying concepts at these major centers. Astronomical knowledge on a very limited scale was found at each of these sites in varying degrees, depending on the size of each center and the intervening destruction. Knowledge of lunar and solar motions is fundamental and is not necessarily the result of diffusion. Observing the sun and the moon are natural activities, and ones which need not have been introduced from another culture. Therefore, astronomy does not support diffusion into the Southeast.

A quadripartite division of the universe would be a shared trait if based on the same orientation; the Mississippian division is based on the cardinal directions, and the Mesoamerican division is not. These two facts argue for an independent development of astronomy in Mississippian culture. If so, the recognition and observation of stars would be a logical development, but there is no evidence of this. The catastrophe that ended the Mississippian florescence may have occurred in the developmental stage. In the Southwest, historically, only the Zuni recognized Polaris as the north star (Reyman 1971: 123). The Pawnee Indians had four directions but they were not correlated to north; Wedel (1977) calls them semi-cardinal directions. There is evidence of cardinal alignments in Chaco Canyon, New Mexico (Williamson et al. 1977: 203ff), but whether or not the knowledge of the cardinal directions was transmitted to the Southeast from the Southwest cannot be determined.

Cultigens came from Mesoamerica, but burial practices and other traits may have been local developments, based perhaps on Adena-Hopewell antecedents. Although contacts may have occurred, they do not seem to have involved the transmission of celestial knowledge. More research is required to demonstrate the presence of Mesoamerican elements in the astronomical knowledge of the Mississippian people.