Department of Culture, Recreation and Tourism

Louisiana Archaeological Survey and Antiquities Commission

Anthropological Study No. 3

THE ROLE OF SALT IN EASTERN NORTH AMERICAN PREHISTORY

Excavations at Salt Mine Valley, Avery Island, Louisiana.

Ian W. Brown

May 1981

Baton Rouge, Louisiana

Department of Culture, Recreation and Tourism Louisiana
Archaeological Survey and Antiquities Commission
Anthropological Study No. 3

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Editor's Note

Louisiana's cultural heritage dates back to approximately 10,000 B.C. when Paleo-Indian Hunters entered the region in search of the Pleistocene big game. Since that time, many other groups have settled in the area. Each of these groups has left evidence of its presence in the archaeological record. The Anthropological Study series published by the Department of Culture, Recreation and Tourism provides a readable account of various activities of these cultural groups. "The Role of Salt in Eastern North American Prehistory" is the third in the Study series.

Ian W. Brown, author of the present volume, became involved in the study of aboriginal salt mining through his participation in an archaeological program at Avery Island undertaken by the Lower Mississippi Survey, Peabody Museum, Harvard University. In the present volume, Brown investigates salt utilization throughout Eastern North America, while relying on analogies with salt mining in the Old World, to explain some of the materials found in North America. The aboriginal salt utilization activities at Avery Island is the departure point of his study.

We trust that the reader will enjoy this volume.

Kathleen Byrd
State Archaeologist

Department of Culture, Recreation and Tourism Louisiana
Archaeological Survey and Antiquities Commission
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Dedication

This third volume of the Anthropological Study Series of the Department of Culture, Recreation and Tourism and the Louisiana Archaeological Survey and Antiquities Commission is dedication to the late Robert S. Neitzel. A charter member of the Commission in 1974, Neitzel served continuously as a valued and beloved member until 1980, shortly before his death. He was known to his professional colleagues as "Stu" but was better known as "Bob" to his outdoor companions around Marksville.

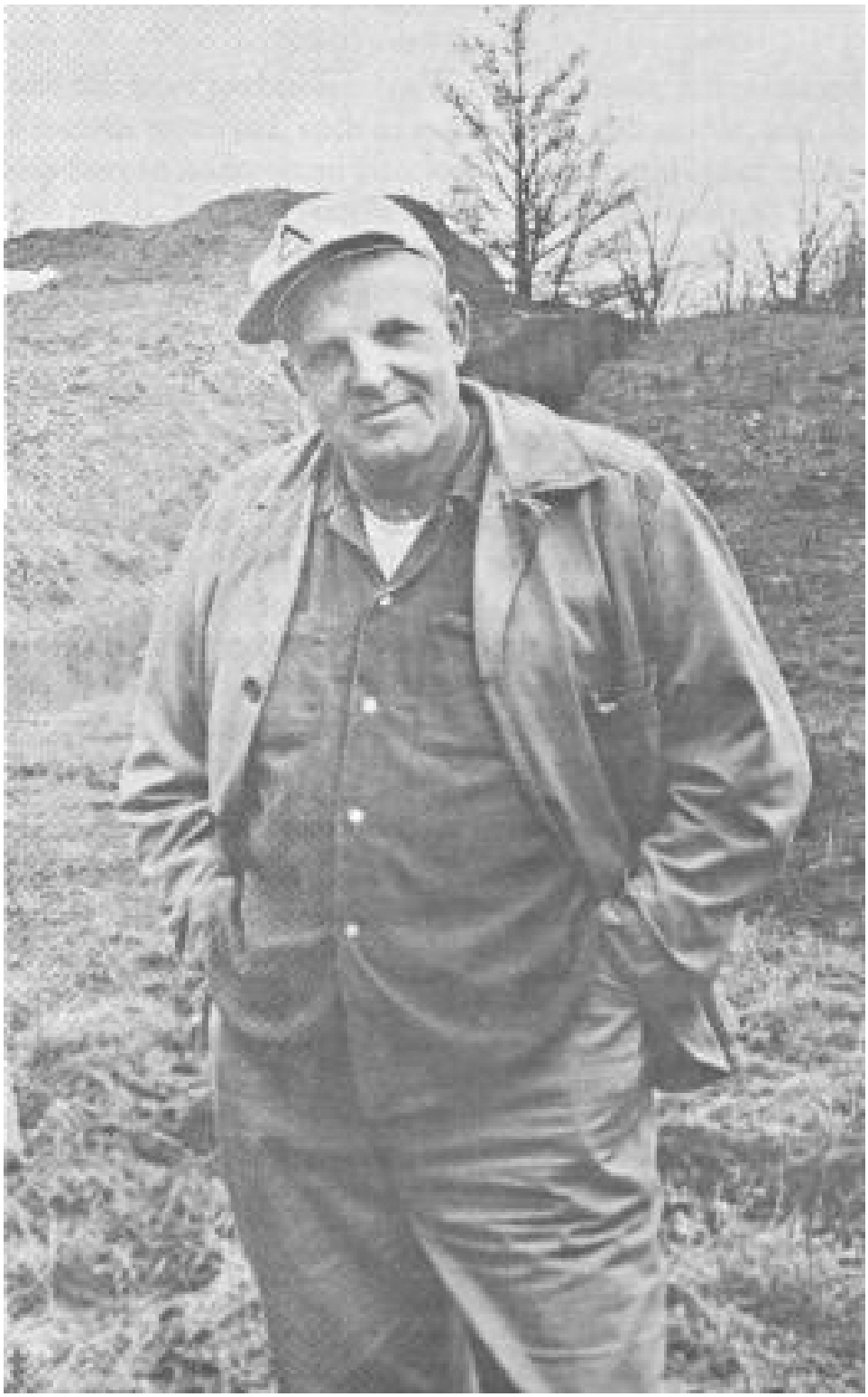
Neitzel was trained in anthropology at his native University of Nebraska and at the University of Chicago. He came to Louisiana in 1938, one of a group of young archaeologists assembled by Drs. Fred Kniffen and James A. Ford, of Louisiana State University, to carry on large-scale archaeological studies during WPA days. Neitzel directed the excavation of some of the Marksville mounds.

With termination of the WPA program, he established his home in Marksville, married Gwen Thomas, a local teacher, helped to design the Marksville State Park Museum and, in 1954, became its first superintendent. Intermittently, he worked in other southeastern states. In 1960 he was engaged by the Mississippi Department of Archives and History, and served a term as curator. Subsequently he spent a decade of work at the Natchez Fatherland site, his best known archaeological accomplishment. He published the results of his excavations and built a model site restoration.

Additionally, Neitzel engaged in studies with Ford, Webb and Haag at the Poverty Point site and in other sites of the culture. Truly, his labors in Louisiana, in the Lower Mississippi Valley and in the entire Southeast have been of inestimable value. He was Louisiana's senior archaeologist.

Stu Neitzel's personal qualities and numerous abilities endeared him to a wide spectrum of Louisiana's citizens. We are pleased to honor him.

Clarence H. Webb, Chairman
Louisiana Archaeological Survey and Antiquities Commission



(Photograph courtesy of the Department of Geography and Anthropology, LSU)

Robert S. Neitzel
(1911-1980)

Department of Culture, Recreation and Tourism Louisiana
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Anthropological Study No. 3

Introduction

When one thinks of prehistoric trade, certain exotic items immediately come to mind. Precious materials, such as gold, silver, and amber, are obvious items, and it is also easy to understand how iron, copper, and other materials became valued trade goods. But few people realize how important salt was and still is in trade throughout the world. Few of us are aware how integral salt is to our own diet, but if the salt shaker was removed from the dinner table, its absence would be noted immediately.

Salt is a biologically necessary mineral. Although estimates vary, the general consensus is that man requires between 2 and 5 grams of salt daily. Obtaining such salt for us involves little effort, as we just go to the local store, but how did prehistoric peoples who lived far from the ocean and from salt springs obtain their salt? Hunting-fishing populations received enough salt from the flesh of freshly-killed game, but if agriculture was the principal form of subsistence, salt had to come from some other means. Prehistoric peoples in the Old World realized this need, and so salt was transported, together with precious metals, along most major trade routes (Bloch 1963).

The Indians of the Eastern United States also were faced with the problem of having to distribute limited salt resources across the landscape. In this volume I will be examining the role of salt among these Indians from an archaeological perspective. Following a discussion of the historic use of salt, I will focus on the prehistoric manufacture and trade of this important substance. Prehistoric salt production was mainly performed by Mississippian peoples living between AD 900 and historic times. In a more detailed monograph on this subject, I proposed three stages of salt production (Brown 1980b). The first two stages involved the use of thick, heavy ceramic containers called salt pans. In the earliest stage the pans had fabric impressions on their exterior surface. Smooth-surfaced pans became more common in the succeeding stage. Brine was poured into these pans and evaporated using fire-heated stones, with the salt crystallizing on the surface of the vessels. By late prehistoric times, the use of salt pans was clearly on the decline. A major change in salt production appears to have occurred at this time. Instead of using heated stones, I have proposed that the third stage of salt production was characterized by placing thin, medium-sized bowls over fires. In this last method, the brine evaporated more efficiently, and without the presumed difficulty of having to create large salt pan vessels.

The last stage described above had not been recognized in the archaeological literature. Recent excavations at a saline on Avery Island, Louisiana have, however, produced material evidence in support of such a technology. Previously it had been assumed that salt production was on the decline in late prehistoric times. This "decline" may merely be a reflection of our limited knowledge, it being more probable that a change occurred in the technology of salt production in Eastern North America. The changing methods may have produced debris which left less of a trace in the ground. To obtain a better idea of what by-products might be found, I examined salt production in other parts of the world. Some interesting parallels have been observed between the material remains of European, African, and Asian salt technology, and objects occasionally found on late prehistoric sites in Eastern North America. But the parallels are not the result of transoceanic contacts. The similarities occur because different peoples, faced with the same problem of having to extract salt from solution, evolved similar salt production technologies.

Historic Importance of Salt

There are a number of ways by which salt can be produced, but in Eastern North America Indians obtained most of their salt from salines located far from the coast. A few groups, such as the Chitimacha Indians of Louisiana, did indeed boil seawater, but this practice was rare in Eastern North America as a whole. The early Spanish explorers frequently observed the production and trade of salt in the East. While in the province of Cofitachequi, Hernando DeSoto was given “an abundance of very good salt” (Ranjel in Bourne 1904, II:99). Similarly, when he was among the Capaha in the Lower Mississippi Valley, he met some Indian merchants who were traveling throughout the various provinces selling salt and other merchandise. These merchants must have had a fairly successful business, because when salt was absent, the effects could be very severe:

> Some of those whose constitutions must have demanded salt more than others died a most unusual death for lack of it. They were seized with a very slow fever, on the third or fourth day of which there was no one at fifty feet could endure the stench of their bodies, it being more offensive than that of the carcasses of dogs or cats. Thus they perished without remedy, for they were ignorant as to what their malady might be or what could be done for them since they had neither physicians nor medicines. And it was believed that they could not have benefited from such had they possessed them because from the moment they first felt the fever, their bodies were already in a state of decomposition. Indeed, from the chest down, their bellies and intestines were as green as grass (Garcilaso de la Vega 1951:421).

The DeSoto expedition observed the actual production of salt in the provinces of Cayas, Chaguate, and Aguacay. The province of Naguatex, another area mentioned by the expedition chroniclers, was located in what is now northwestern Louisiana. The term Naguatex means "place of salt" in the Caddo language (Swanton 1946). The salt springs of western Arkansas and northwestern Louisiana were well-known to the eighteenth century Indians, and many groups frequented these areas to produce and trade salt. This mineral was extremely important in the trade between the French and the various Caddoan groups (Webb and Gregory 1978). Other Lower Mississippi Valley groups heavily involved with the salt trade were the Quapaw, Koroa, Taensa, and Tunica. Jeffrey P. Brain (1977) has argued that the Tunica were the principal middlemen in the movement of salt from the Caddoan peoples to the French.

The Indians of Eastern North America apparently used salt as a condiment. There is no evidence for salt ever having been used historically for preserving meat or fish, as drying game over a low fire was the standard Southeastern method of preservation. The DeSoto expedition observed four ways in which salt was produced. It was made from the ashes of plants, from brine water at salines, and from salt-impregnated sand; and it was also gathered in a free state (rock salt). Elvas provided an excellent description of the process of obtaining salt from sand:

> The salt is made along by a river, which, when the water goes down, leaves it upon the sand. As they cannot gather the salt without a large mixture of sand, it is thrown together into certain baskets they have for the purpose, made large at the mouth and small at the bottom. These are set in the air on a ridge-pole; and water being thrown on, vessels are

> placed under them wherein it may fall; then, being strained and placed on the fire, it is boiled away, leaving salt at the bottom (Elvas in Bourne 1904, I:136)

Although salt was indeed extracted from salt-impregnated sand and from the ashes of certain salt plants, it was most commonly produced at brine springs. The Louisiana Indians certainly had numerous springs at their disposal for obtaining salt. A major rock salt deposit, called the Gulf Coast Basin, lies deeply buried beneath the soils of northwest Louisiana and southwest Arkansas (Figure 1). Prehistorically and historically, rich brine came to the surface in these areas. These salines were particularly common along the Red River and the Ouachita River, being found in the parishes listed in Figure 2. Some of the more important salines, operated by Anglo-Americans during the nineteenth century, were Drake's Salt Works, Price's Lick, Rayburn's Salt Works, and King's Salt Works (Veatch 1902). There was also an excellent saline in the vicinity of Catahoula Lake in LaSalle Parish, and brine springs were quite common along the Sabine River on the Louisiana/Texas border. The most important saline, in terms of the history of the salt industry in the United States, existed on the Avery Island salt dome (Gagliano 1967).

Another extensive salt deposit, called the Salina Basin, underlies the states bordering the Great Lakes. The salines which emerge in Illinois, Missouri, Kentucky, Ohio, New York, West Virginia, Tennessee, and Virginia are located along the margins of this major rock salt deposit (Figures 1 and 3). Some of the most important ones used prehistorically by Indians, and historically by Anglo-Americans, were the famous salines of Ste. Genevieve and Jefferson counties, Missouri, and those at Equality and Shawneetown in Illinois. The Blue Licks and Big Bone Lick in Kentucky, the Big Buffalo Lick in West Virginia, and the French Lick in Tennessee, were other salines of great importance.

Overall, the Indians of the Eastern Woodlands had a goodly number of springs available to obtain their salt, especially if they lived in northwest Louisiana, east-central Missouri, southeast Illinois, eastern Kentucky, or northern Tennessee. But the Mississippian-related cultures of the other Eastern states had to get their salt through trade.

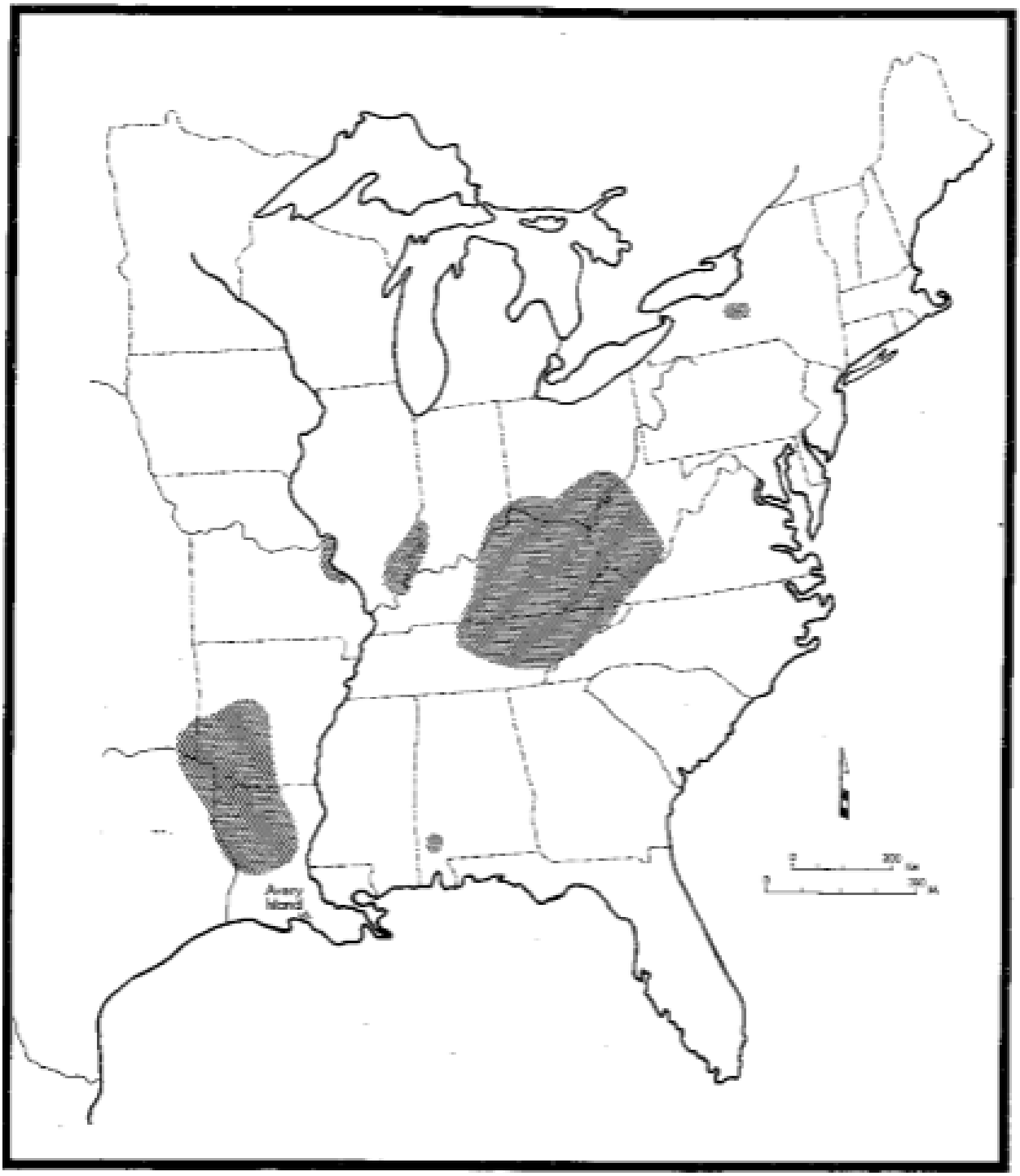

FIGURE 1. Principal Saline Areas in Eastern North America.

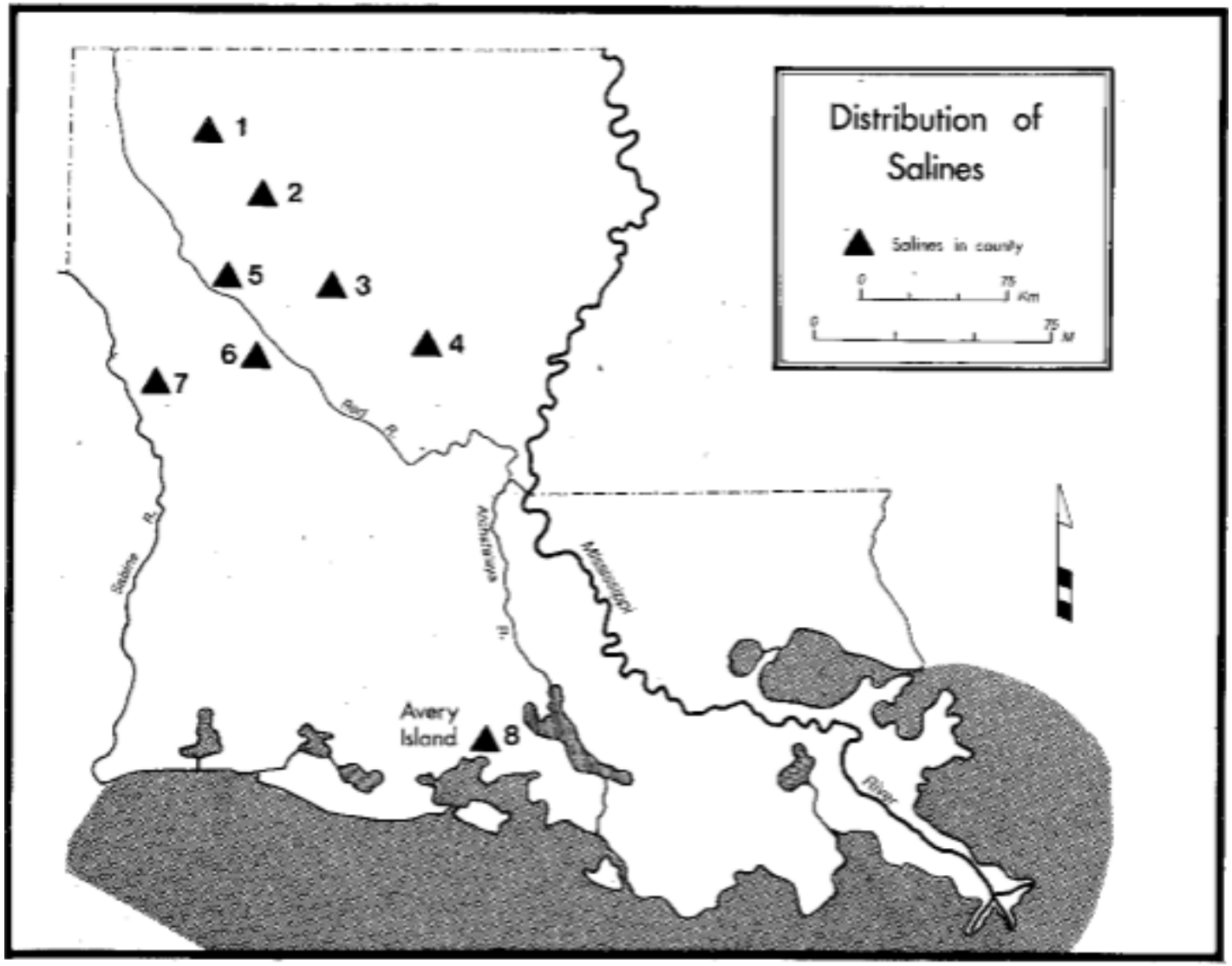

FIGURE 2. Salines in Louisiana, by Parishes: 1, Webster; 2, Bienville; 3, Winn; 4, LaSalle; 5, Red River; 6, Natchitoches; 7, Sabine; 8, Iberia.

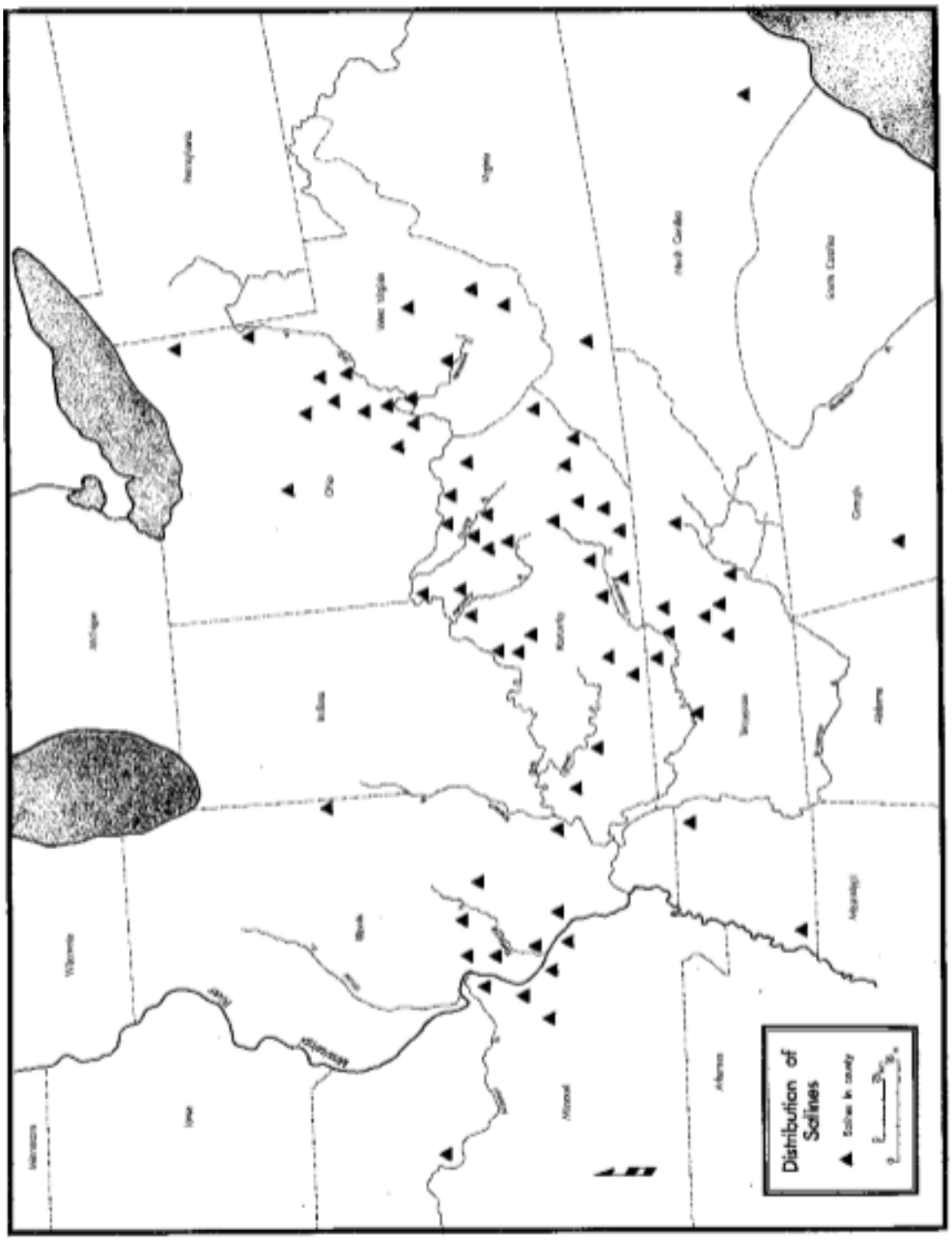

FIGURE 3. Salines in the Midwest.

Prehistoric Evidence for the Salt Industry

The principal artifact identified with the prehistoric salt industry in Eastern North America is the salt pan. Fragments of these shell-tempered vessels have been around at most salines in the Midwest (Figure 4). There are two types of salt pans. The first has fabric impressions adorning its exterior surface, while the second type is smooth-surfaced (Figure 5a-b). The latter sometimes has a red slip also. Both of these vessels are quite large, averaging between 20 and 30 inches in diameter. Curiously, neither of these two salt pan types is commonly found at salines in Louisiana.

Salt pans are believed to have been used as follows. First they are set within depressions in the ground. Brine was carried from the spring and poured into the pans, followed by heated stones from nearby fires. After evaporation of the water, crystalized salt would then be scraped from the

FIGURE 4. Typical Salt Pan Pottery.

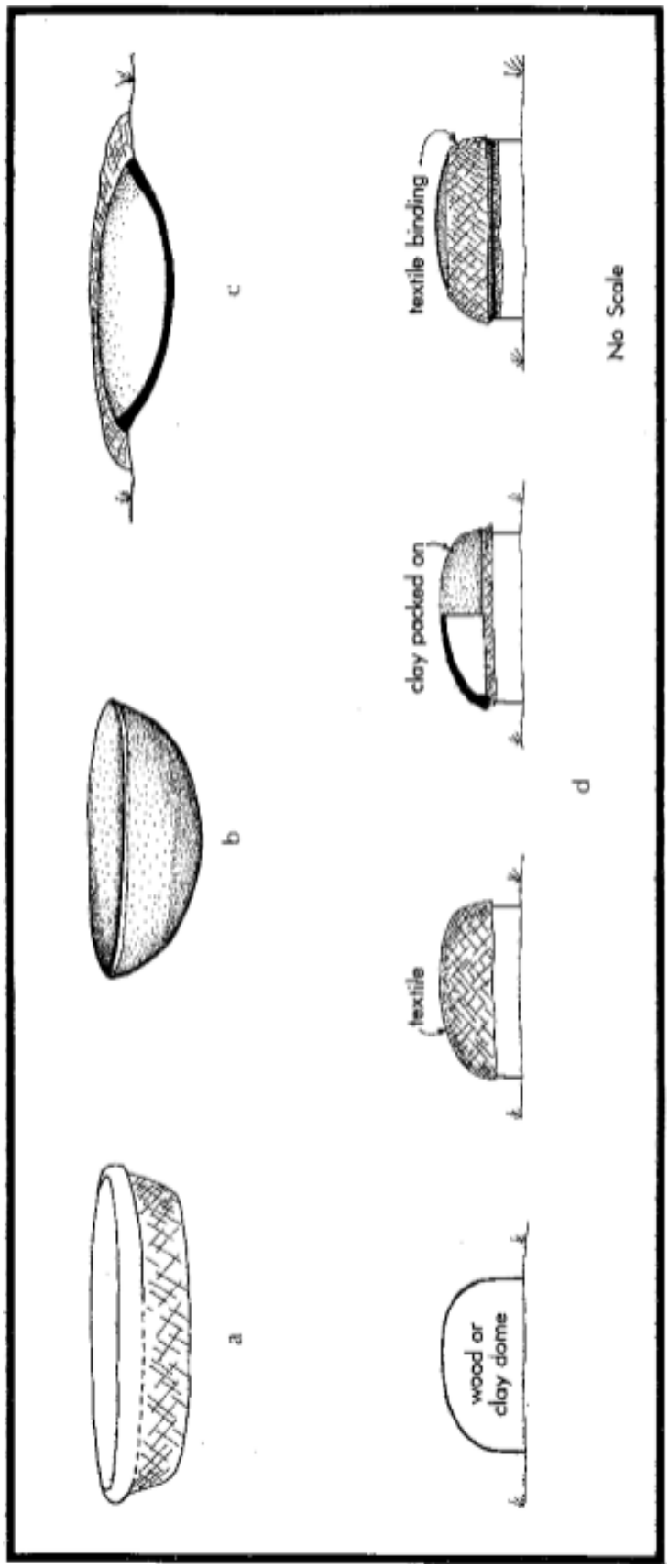

FIGURE 5. Salt Pans and Construction Techniques.

bottom of the containers. There are two theories as to how the fabric-impressed salt pans were constructed. One idea is that the pans were actually made with in basins in the ground, textiles having been used to lift the vessels out of their earthen molds (Figure 5c). The other theory is that the vessels were made upside down on wooden or clay molds (Figure 5d). Such procedures, however, do not explain the construction of the smooth-surfaced vessels. There were probably a number of different ways by which large salt pans could have been formed. Regardless of how they were made, smooth-surfaced pans appear to have been an improvement over the fabric-impressed type because textiles were no longer needed in their construction.

Salt pans themselves have been found throughout a large portion of Eastern North America (Figure 6). Although the two types of pans were used at the same time in some areas, there was an increasing tendency to use the smooth-surfaced pan. The distribution of the two types is depicted in Figure 7, and is broken down into early and late Mississippian times in Figures 8 and 9. It can be seen quite clearly that the fabric-impressed salt pan had a greater distribution early in the Mississippi period, the smooth-surfaced type being common only in east-central Missouri and certain portions of southeast Missouri/northeast Arkansas. By late Mississippian times, the smooth-surfaced pan had succeeded the fabric-impressed type over most of the East, but for some reason it was no longer being made in some of the areas where it originated.

The spread of the various salt pan types is not a reflection of mass migrations. It is probable that the idea of salt pans diffused as the different populations recognized the value of the large vessels and learned the techniques involved in making them. But something happened in southeast Missouri/northeast Arkansas in late Mississippian times. The Malden Plain, the Little River Lowland, and the Western Lowlands were populated, yet for some reason smooth-surfaced salt pans were no longer being produced, at least not in the quantities of earlier times. A similar decline in salt pan use has been noted in the very latest prehistoric occupations of other regions in the East. One interpretation is that salt production was no longer an important endeavor. This reason may indeed be a valid explanation for some areas, but it does not adequately explain why, if the production of salt was declining, it was still of such vital importance in the economies of many historic Indian groups. Another possibility is that new processes were involved in the production of salt, processes which have a low archaeological profile, as compared to the earlier abundant salt pan debris. The by-products may perhaps be of an as yet unrecognized nature. To obtain an idea as to what by-products might have occurred, we must look to archaeological production studies in areas where this subject has attracted considerable attention.

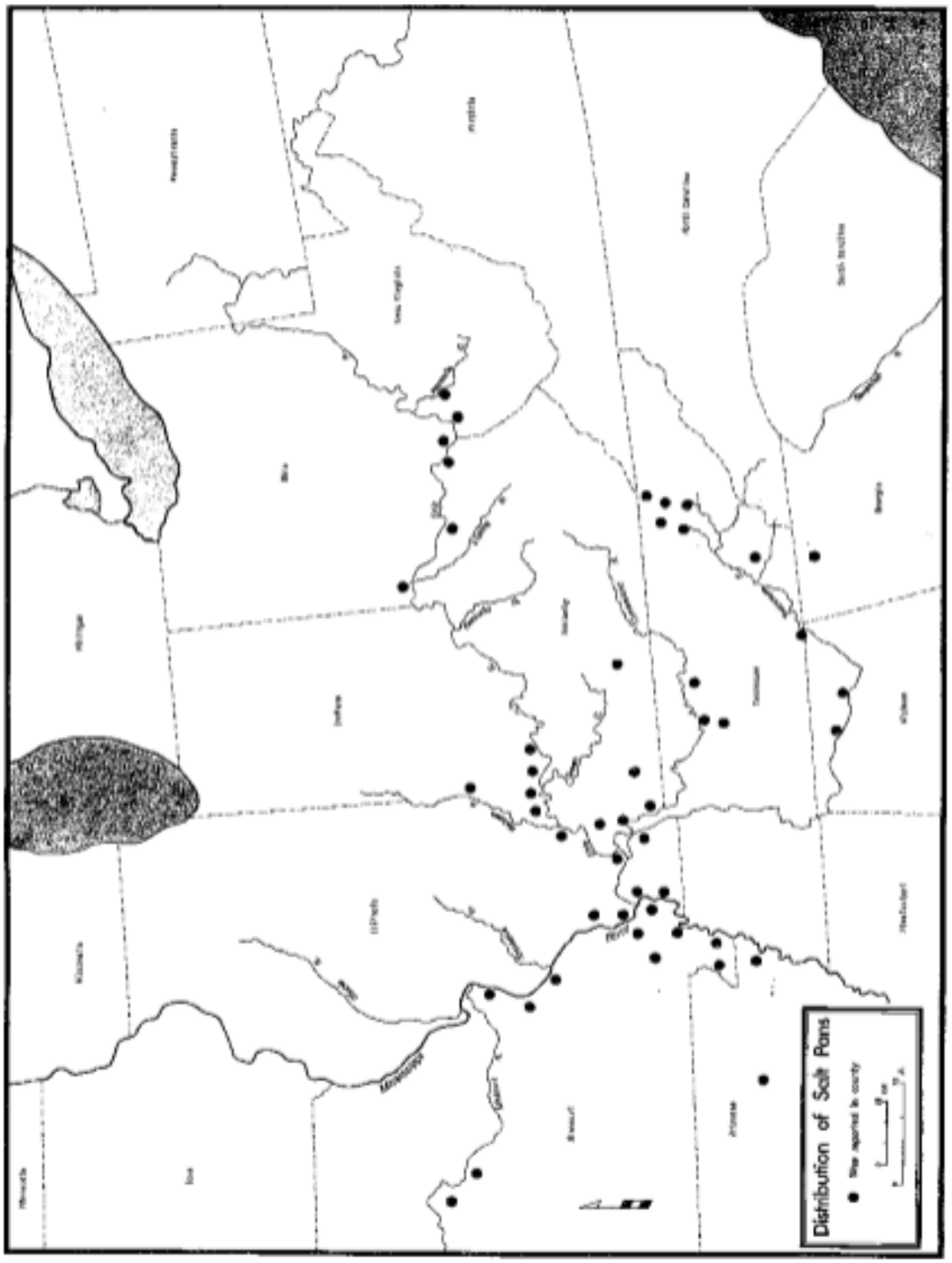

FIGURE 6. Salt Pan Distribution.

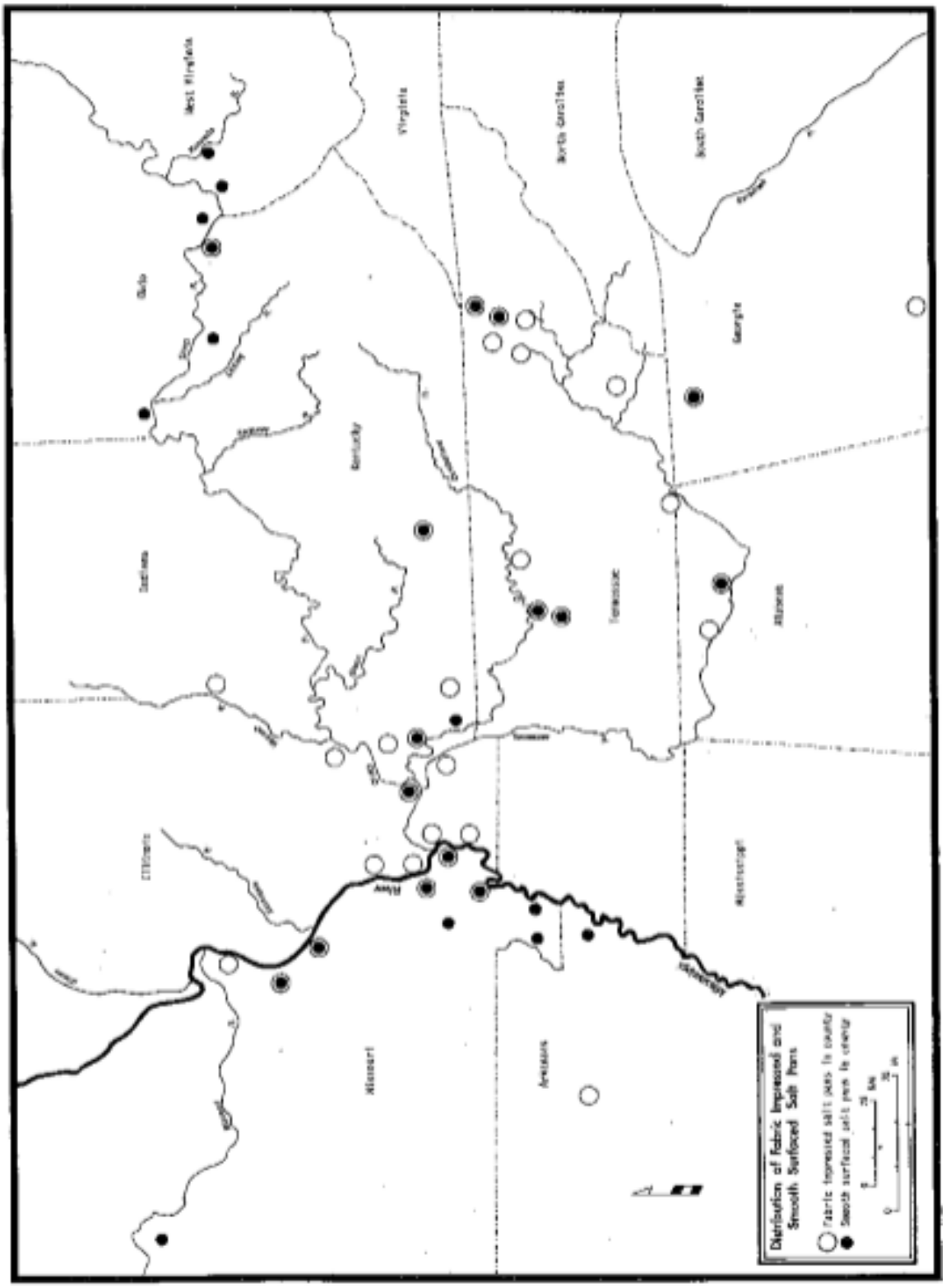

FIGURE 7. Distribution of the Two Salt Pan Types.

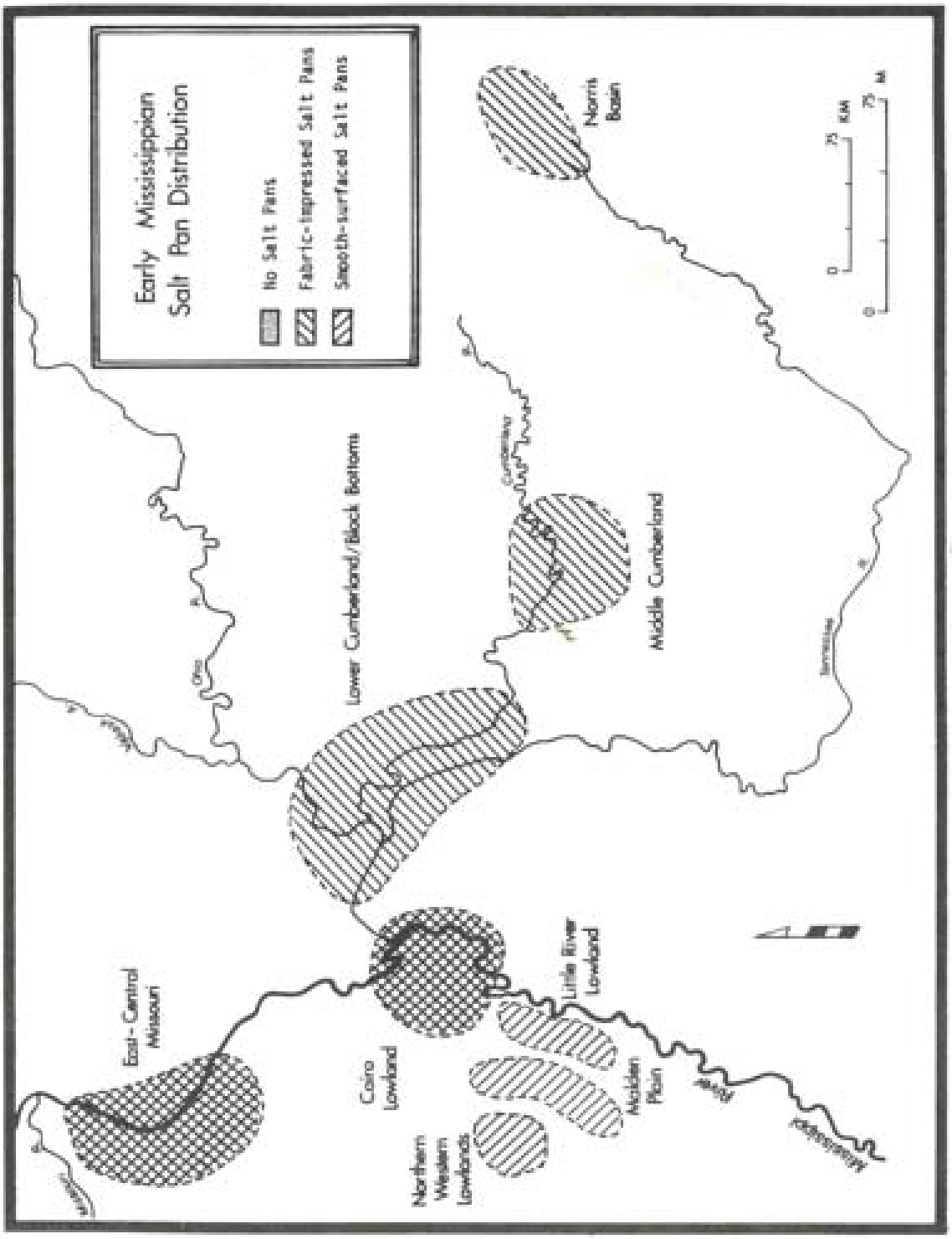

FIGURE 8. Salt Pans in Early Mississippian Times.

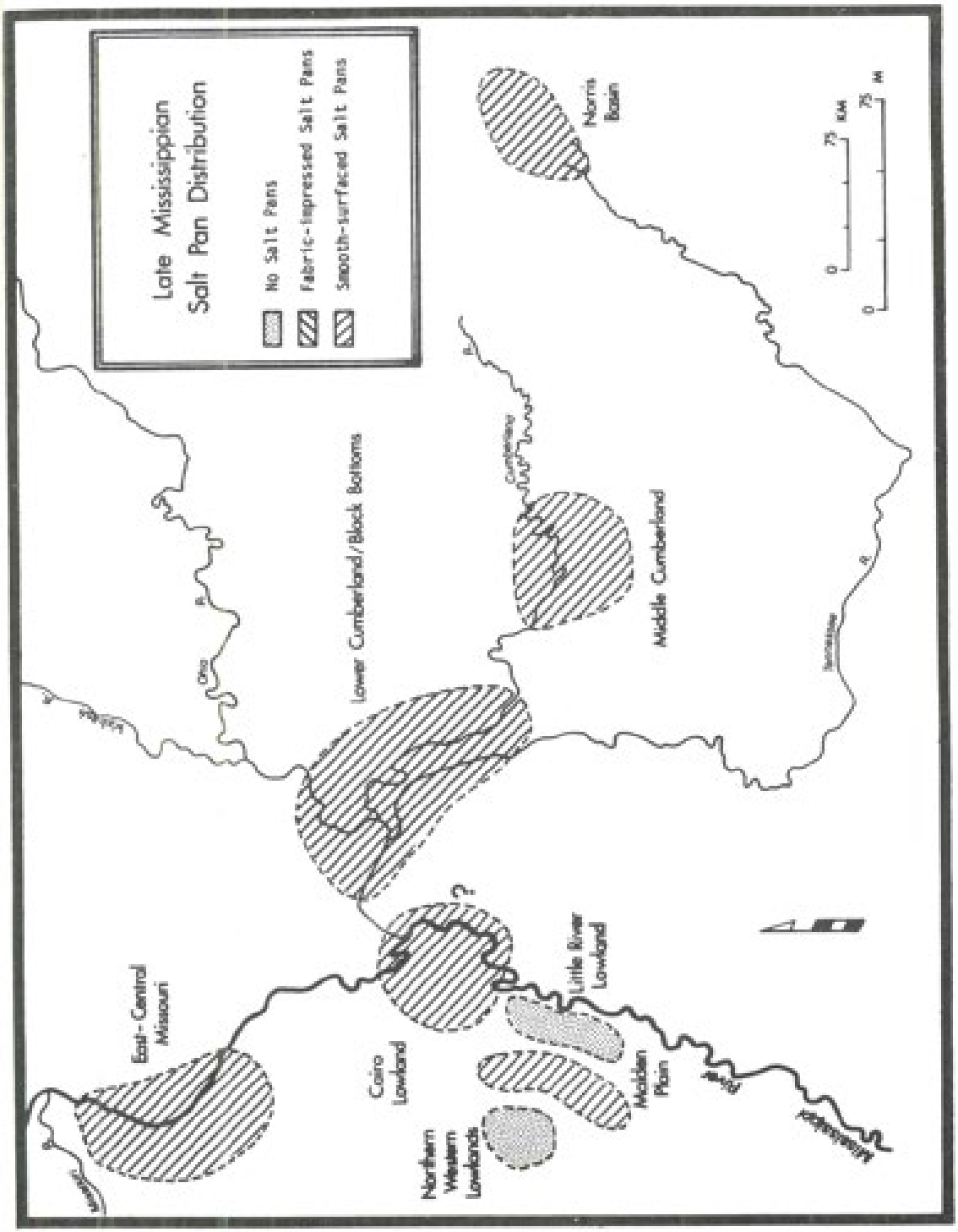

FIGURE 9. Salt Pans in Late Mississippian Times.

Prehistoric Salt Production in the Old World

Primitive techniques of salt production have received a great deal of study in the Old World, especially in Europe. A phenomenon most commonly remarked upon is the similarity of fired clay artifacts occurring at salines, the debris of the salt industry. This material has been called *briquetage,* of which there are three basic forms: large boiling pans, molds for drying and transporting the salt, and small cylindrical pedestals. Very similar forms of *briquetage* have been observed in England, Holland, Belgium, France, Germany, Russia, Thailand, Japan, and Niger.

The basic salt production technique is described by Jacques Nenquin (1961). First, the pedestals were stuck into a prepared clay floor at regular intervals. Flat shallow evaporating pans or ordinary cooking pots were placed on top of the pedestals and filled with brine. A fire was lit between the pedestals to evaporate the water. The crystallized salt was then scraped into small conical beakers called *augets* which, in tum, were put on pedestals over a low fire. The salt would dry and subsequently be transported within these *augets.* At some sites large clay objects, triangular or trapezoidal in shape, have been found. These objects, called firebars, are believed to have served as an additional support between the pedestals and the evaporating pans (Figure l0a). Sometimes the pedestals were not used at all, the firebars being wedged into the side of a trench (Figure 10b).

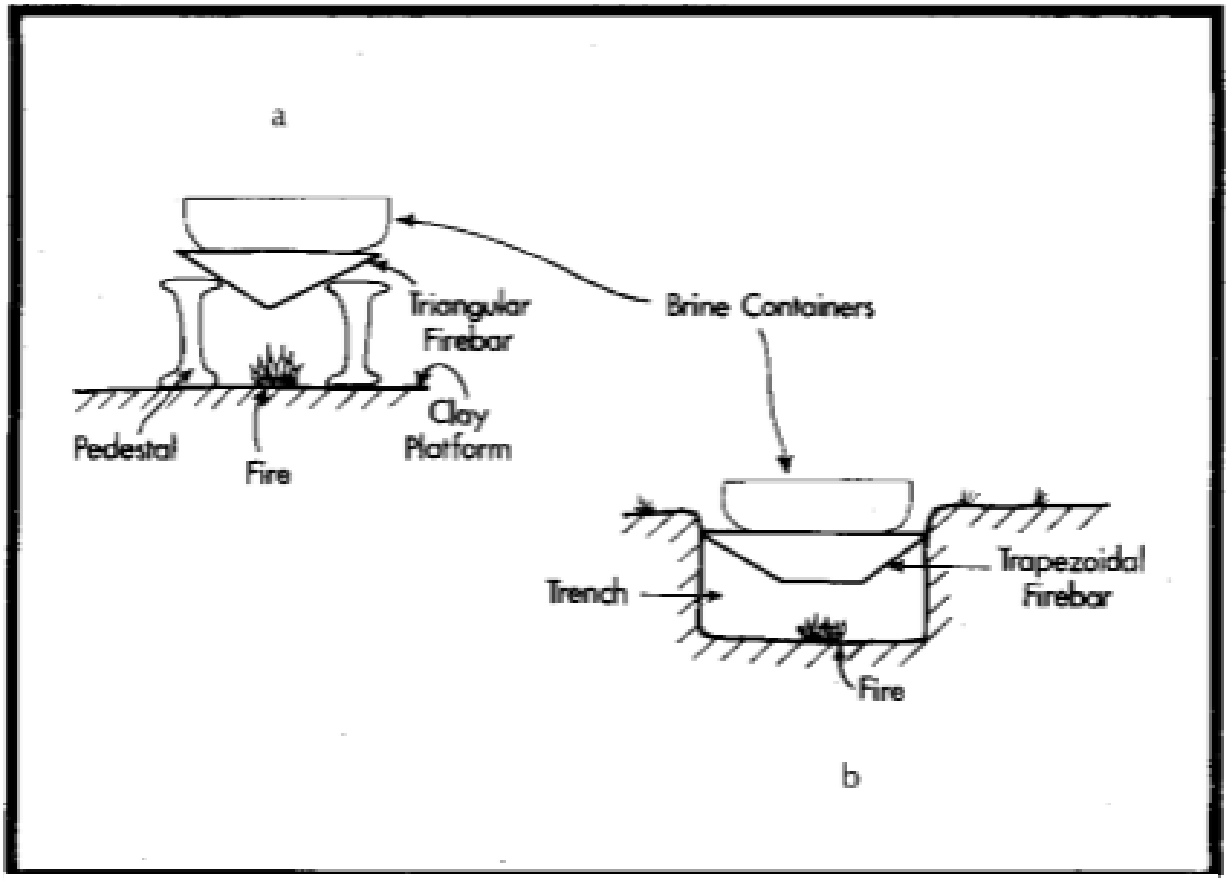

FIGURE 10. Prehistoric Salt Production in England.

The size and shape of the pedestals are rather uniform throughout the Old World (Figure 11 a-e, g), primarily because of their function. The pedestals had to either sit on the ground or stick in the ground, and they had to support other objects. Therefore, their upper ends are either cupped or have two or three horns, and their lower ends are either flat or pointed. Their sizes are similar because, to dry the salt correctly, the pans and molds had to be a certain height above the fire. If the salt is too close to the fire, the water evaporates too quickly and the salt becomes blistered and loose. An oven temperature between 125° and 150°F is ideal for drying salt, and this heat is obtained best when vessels are elevated to a height of between 4 and 7 inches above a low fire (Kleinmann 1975).

Augets are also quite similar in the Old World. An evolution of the *auget* has been observed at Halle in north Germany, revealing the separation of the salt mold from the pedestal through time (Figure 11f). *Augets* are not found in great abundance at salt-producing sites, because they were used to transport the salt to its ultimate destination. They often have standard sizes and shapes, because in some regions they were used as units of currency. In fact, the word salary directly evolved from salt (Latin, *salus*), as Roman soldiers were paid an amount of currency necessary to purchase this mineral.

It can be seen that *briquetage* shares many parallels throughout its distribution. It is sometimes quite difficult to distinguish between the *briquetage* of the various countries. The similarities are not thought to have been the result of worldwide contacts. Using primitive technologies, there were just so many ways to get salt out of solution. To obtain a dry solid mass of salt which, in turn, was easily transportable, the producers had to follow certain procedures.

Having discussed the *briquetage* found in the Old World, we are now in a position to reexamine the Eastern North American data. Although the research is still in its infancy, there is some evidence to support the notion that late prehistoric Indians in portions of the Midwest and Southeast, including Louisiana, evolved techniques of salt production which were in many ways similar to methods developed in the Old World.

New Data on Salt Production in Eastern North America

My investigation of aboriginal salt production in Eastern North America and in the Old World began as a result of archaeological research on Avery Island in southwestern Louisiana (Figure l). Excavations conducted at Salt Mine Valley, the location of a major prehistoric and historic saline, revealed two principal aboriginal components, one occupation by peoples of the early Plaquemine culture (c. AD 1000-1200), and another more intensive utilization by peoples of the late Mississippian cultural tradition (c. AD 1550-1650). The Mississippian material was observed in a deeply buried midden layer (Figures 12 and 13). The layer itself was only about 6 inches thick, but 45,000 artifacts were found within it (Brown 1980a).

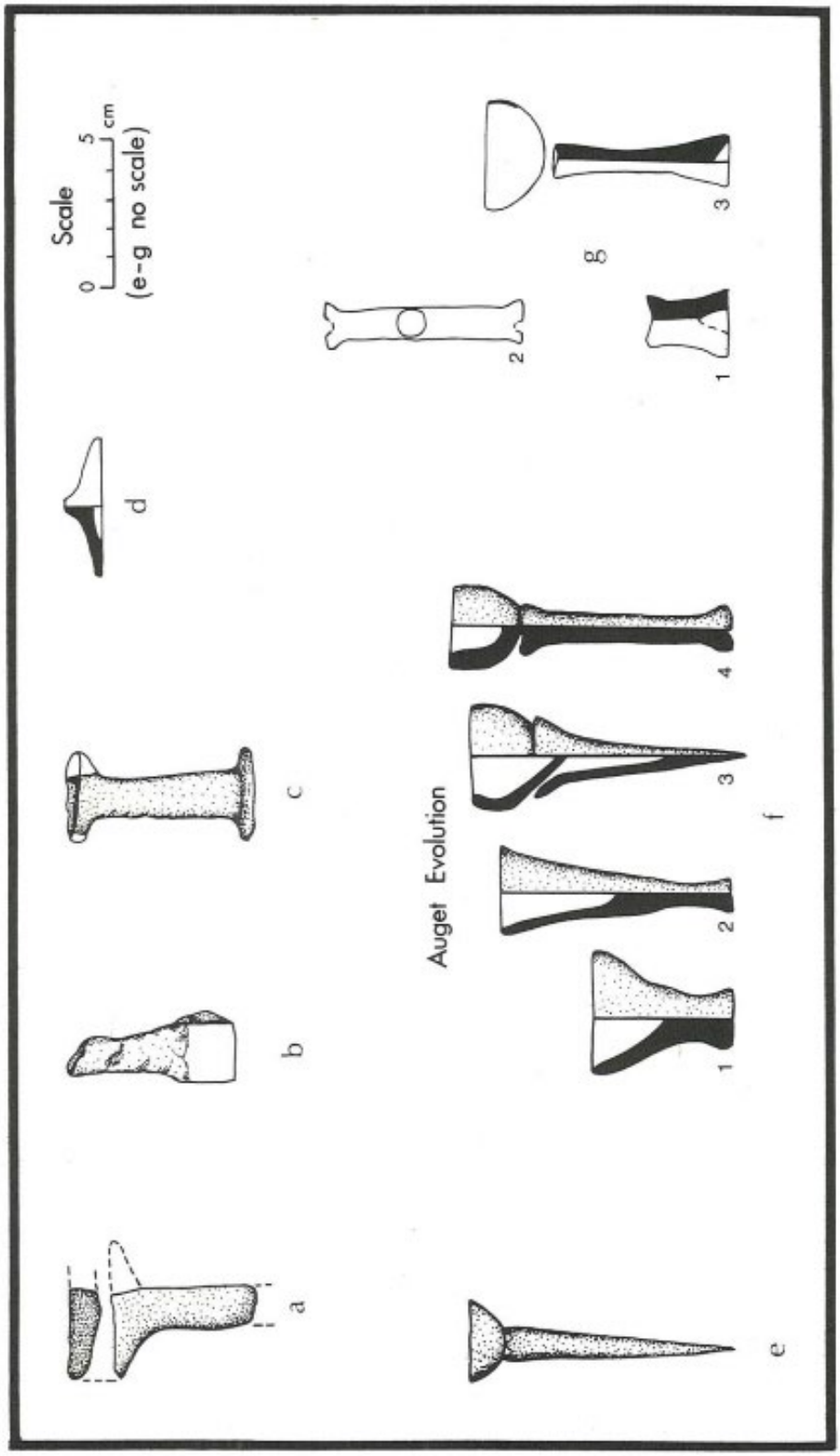

FIGURE 11. Typical Forms of *Briquetage* in the Old World: a-d, England; e, Niger; f, Germany; g, Japan.

A sample of the various pots represented in the Mississippian component at Salt Mine Valley is presented in Figure 14. Although the decorated vessels are extremely important in terms of determining cultural relationships, it should be noted that the bulk of the collection consists of thousands of undecorated, medium-sized, thin-walled bowl fragments (Figure 14i). Curiously absent at Salt Mine Valley are the typical large thick-walled salt pans. The smaller bowls are suggestive of a rather different process of salt production. Fired clay, ashes, and charcoal are abundant at the saline, but other artifacts (besides the ceramic vessels) are scarce. A number of small, poorly-fired clay objects did manage to survive the humid Louisiana environment. The specimen depicted in Figure 15b is a cupped portion of a larger artifact. Three of these objects have turned up in the excavations. The artifact designated "a" (Figure 15) is a complete miniature vessel, the only one of its kind recovered to date from Salt Mine Valley. The problem I faced was how to explain the salt production processes at Avery Island, when the only objects found there had never before been reported in this country as being prehistoric salt-making equipment.

Using the reconstructed methods of salt production in the Old World as a guide, I offer an interpretation of late Mississippian salt technology on Avery Island. I believe that the medium-sized bowls (Figure 14i) were manufactured at or in the vicinity of the saline. To produce the salt, these bowls were supported on ceramic objects above a fire which burned at a relatively low heat. Brine was poured into these vessels and was evaporated. The salt crystallized on the interior walls and bases. The moist salt was then scraped off these bowls and packed into miniature pots, such as the one depicted in Figure 15a. In the process of scraping, numerous bowls were broken. The miniature vessels, which served as molds, were elevated on ceramic pedestals, like the one illustrated in Figure 15b. They too were placed at a certain standard height above a very low fire to prevent rapid drying. The salt was then transported within its containers along established trade routes throughout the Mississippi Valley and the Southeast. Evidence for molds is scanty at Salt Mine Valley, because very few were left behind. The evaporating bowls were used and abandoned at the site, and are thus found in the hundreds. The highly porous, under-fired pedestals were, through time, reduced to abundant fired clay fragments and a number of cylindrically-shaped objects, the latter sometimes having cupped extremities.

The idea is an attractive one, but it cannot be accepted using the Avery Island data alone. Such an advanced technique certainly could not have existed in isolation on the coast of Louisiana. If the thin evaporating pans, pedestals, and salt molds actually were used in late prehistoric times in the Lower Mississippi Valley, the remains of such an industry should have been manifested in the archaeological record by now. The problem is of course in identifying an association between the form of the materials and their function. The evaporating pans found at Salt Mine Valley are, unfortunately, identical to typical late Mississippian bowls found on village sites. In the search for salt production techniques similar to that proposed for Salt Mine Valley, I therefore had to examine the archaeological literature for associations between pedestal-like objects, miniature vessels, and salines. Southeast Missouri/northeast Arkansas was a logical place to start the research because, as suggested earlier, it was in this area that salt pans, and perhaps salt production, were declining in late Mississippian times. Perhaps it was also the area where a more evolved technique of salt production developed.

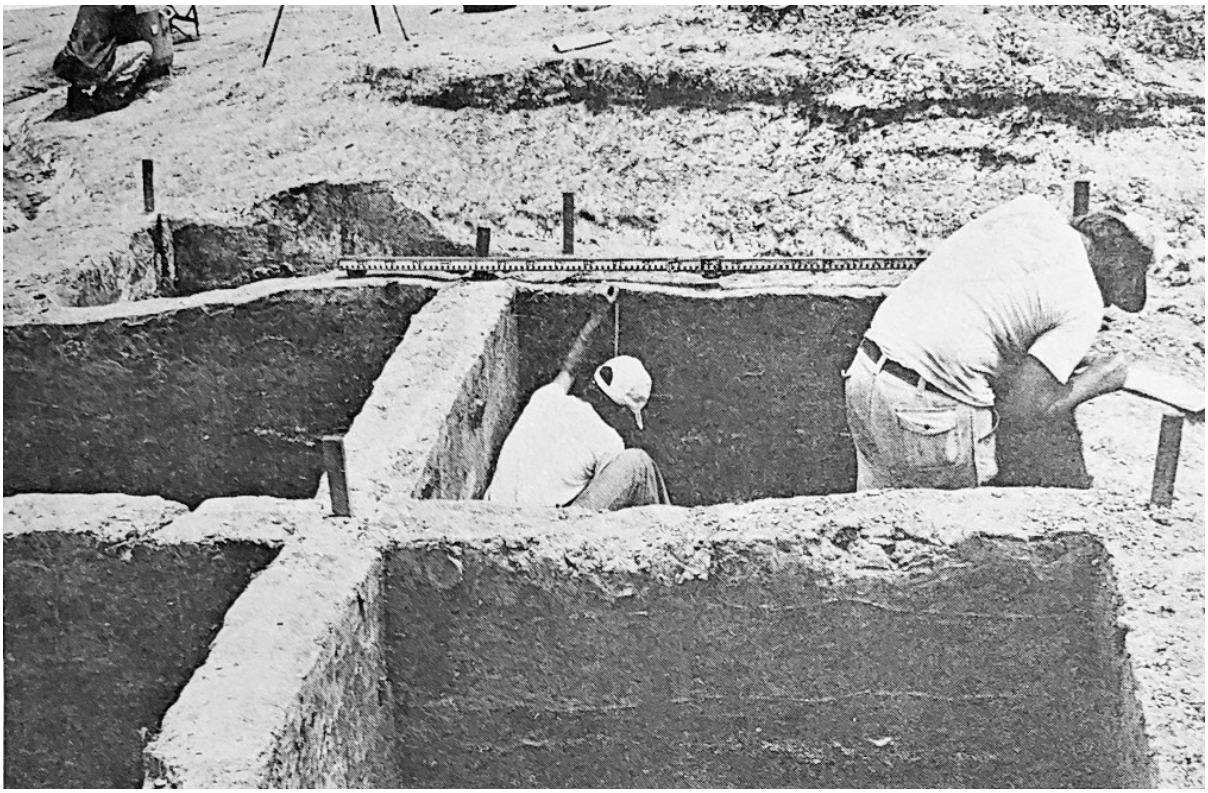

FIGURE 12. Excavations at Salt Mine Valley on Avery Island, Louisiana.

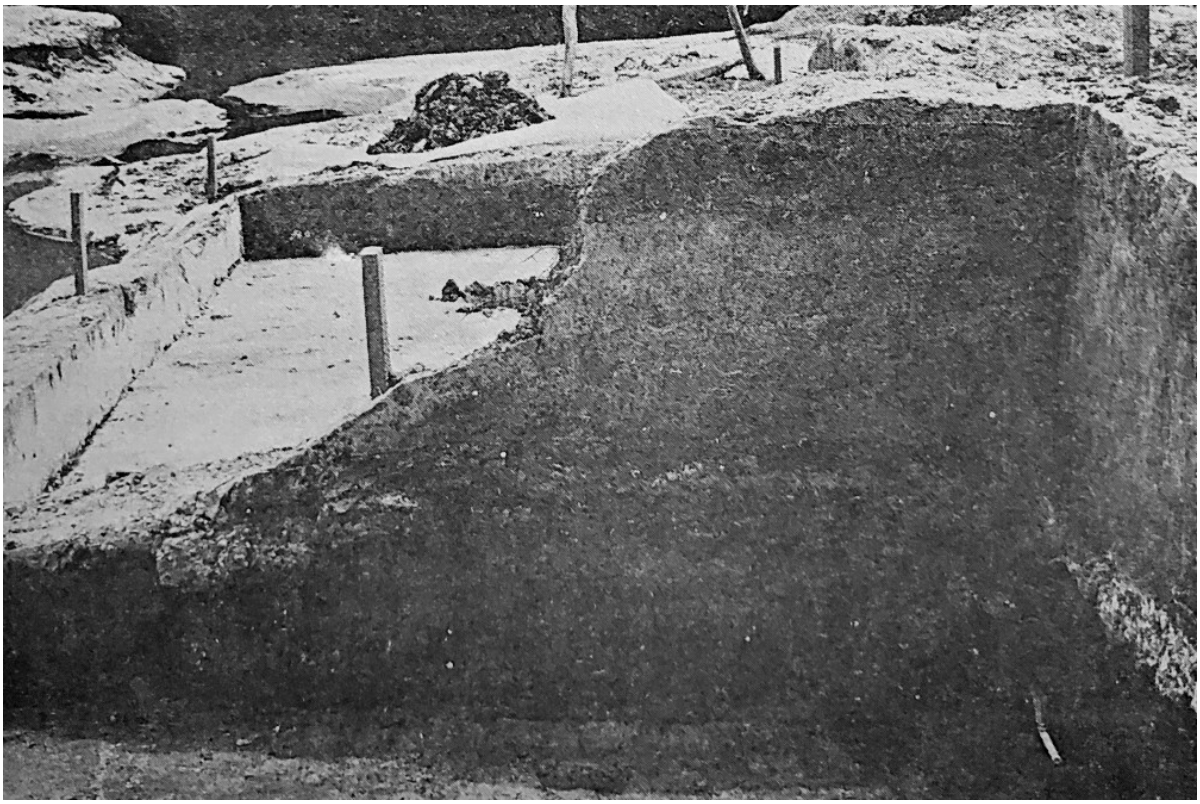

FIGURE 13. The Mississippian Midden Layer at Salt Mine Valley.

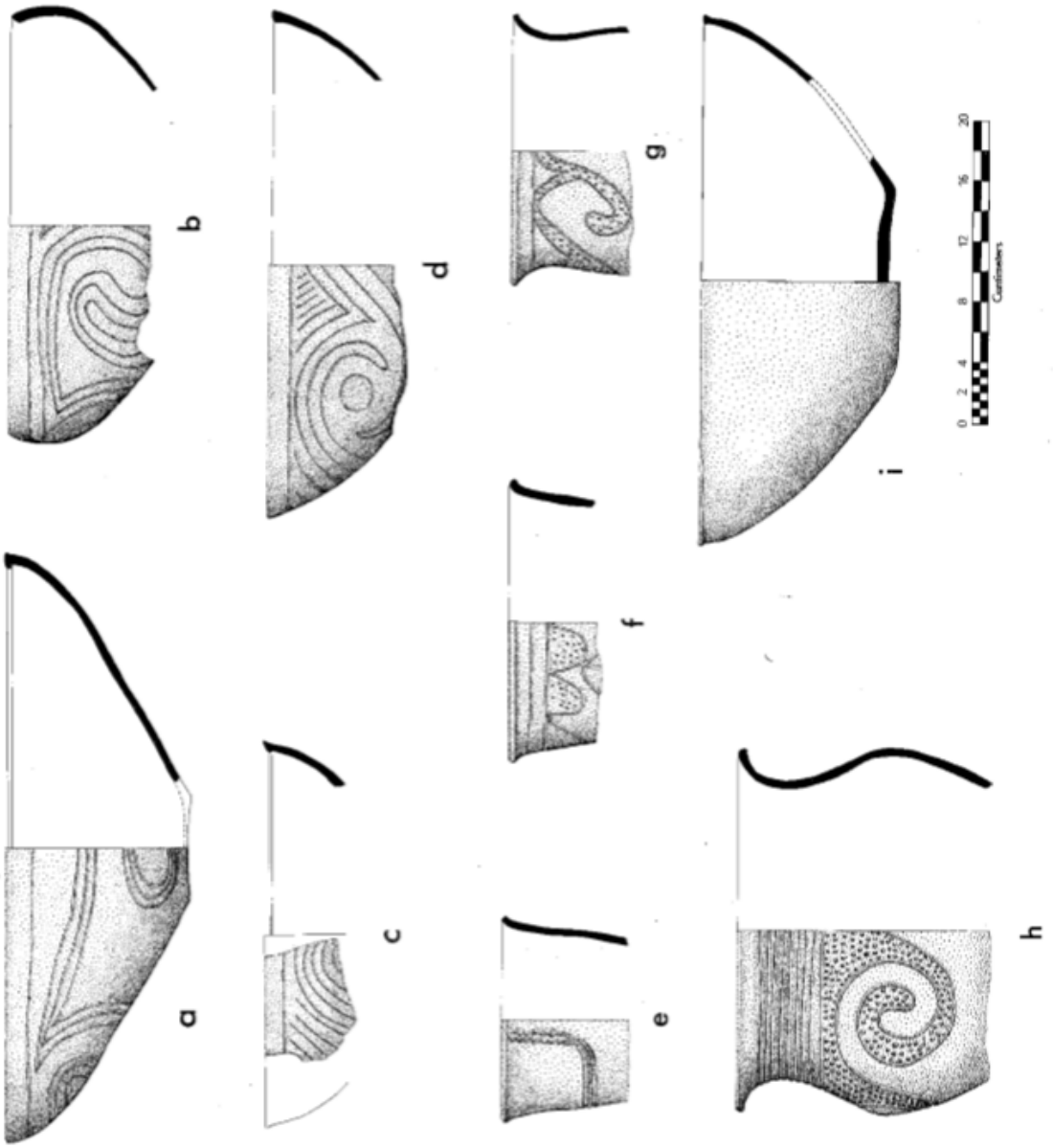

FIGURE 14. Mississippian Pots from Salt Mine Valley.

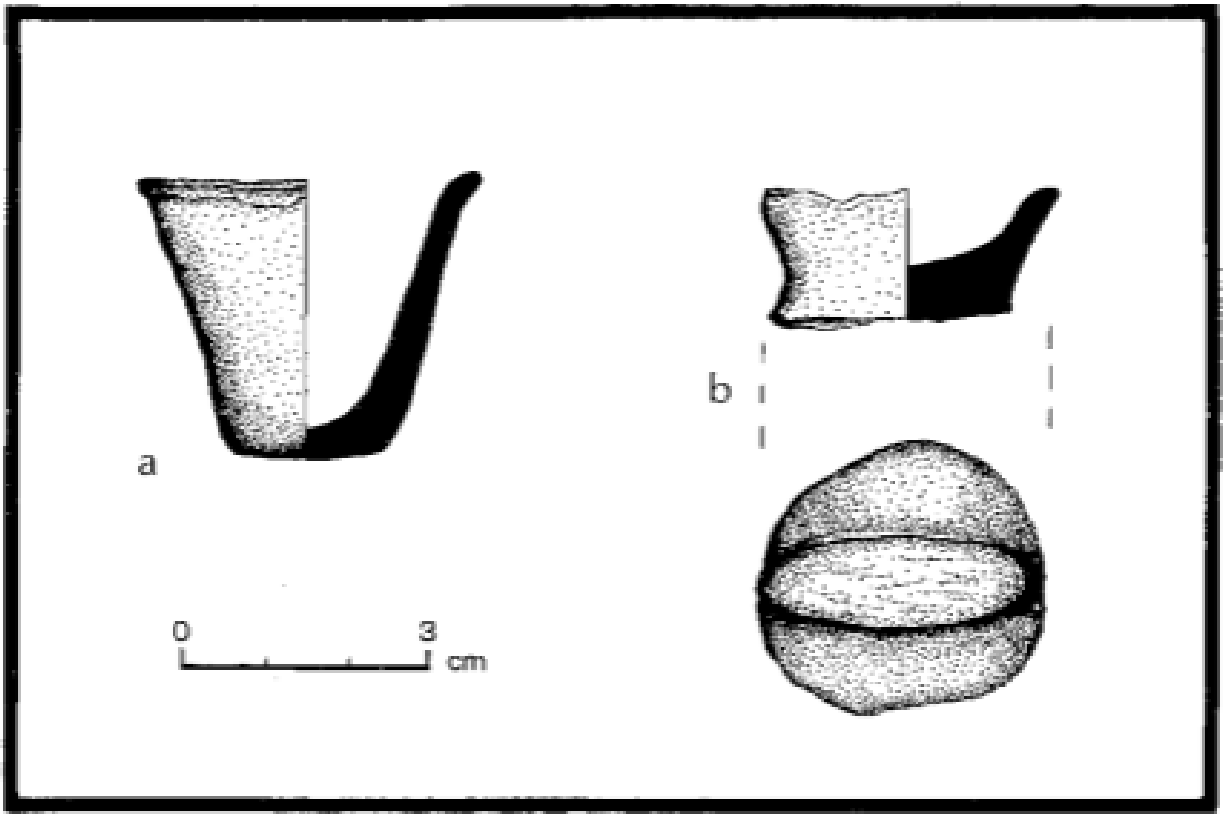

FIGURE 15. *Briquetage* at Salt Mine Valley.

I have been able to isolate only one object in the Cairo Lowlands which could be a form of *briquetage* (Figure 16a). This object, similar to the earliest *auget* form in north Germany (Figure 11f), was found by G. C. Swallow in 1857. Although evidence for *briquetage* is slim in the Cairo Lowlands, there is some evidence for its existence in the Malden Plain region, where the use of thick salt pan ware was declining in Mississippian times. A significant portion of the materials recovered at the Lawhorn site in Craighead County, Arkansas, consists of pedestal-like objects bearing conical shapes. John Moselage (1962) offered no functional explanation for these artifacts, but noted they had some utilitarian purpose, as some were found on house floors. Similar pedestal-like objects have turned up in considerable numbers at the Banks Village site in Crittenden County, Arkansas (Figure 16b-d). These objects, either plain or with nodes, were found with adult burials and in ash pits located within house floors. Gregory Perino (1966) thought these artifacts were "medicine cups," but their common occurrence around the edges of fire basins in houses suggests a utilitarian function.

Also found in the same contexts at Banks Village were large conical clay objects bearing a hole halfway through their middle, quite similar to specimens observed at Lawhorn. Long clay bars, generally cupped on one end and expanded on the other, are also typical of the Banks Village site (Figure 16e). Large kidney-shaped clay forms were commonly found around hearths at the Banks Village site. Perino felt these objects were pottery supports for round bottomed cooking

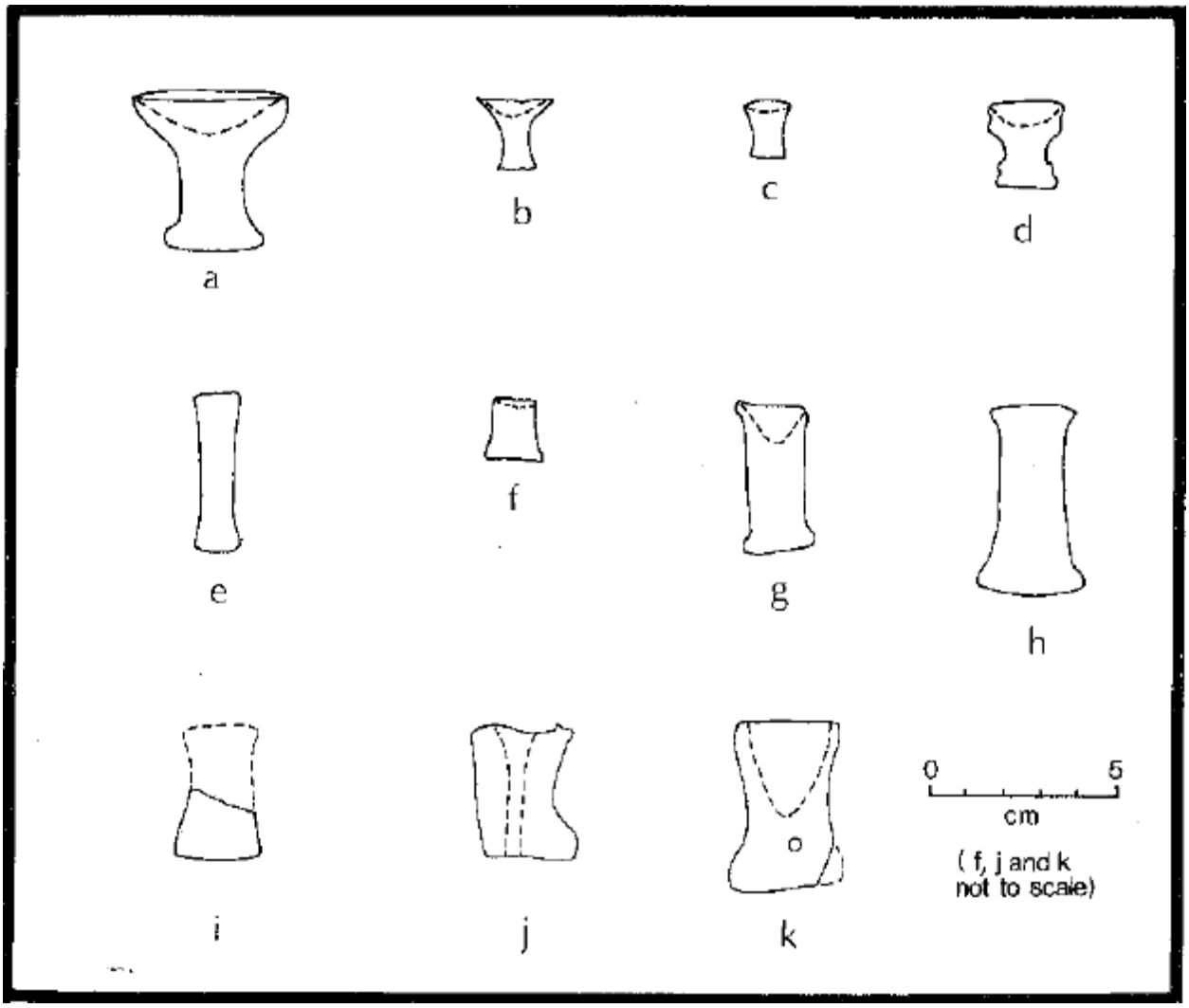

FIGURE 16. Possible *Briquetage* in Eastern North American Sites: a, Lilbourn, Missouri; b-e, Banks Village, Arkansas; f, Williams, Kentucky; g, Hardin, Kentucky; h, Clover, West Virginia; I, Waterworks, Ohio; j-k, Cahokia, Illinois.

jars, and he may be correct. But why the sudden desire to get pottery vessels above the fire, and why at a rather consistent height? Salt production might be another alternative, especially since these strange forms started to appear in southeast Missouri/northeast Arkansas just as the typical salt pans were disappearing.

Evidence for *briquetage* in other portions of the East is scarce, but it does exist. Pedestal-like objects occur in the Lower Cumberland region (Figure 16f), and they also appear at the Kimmswick saline in Jefferson County, Missouri. David I. Bushnell (1907) described a number of pottery objects as "lids" for ceramic vessels but, excepting their rather attenuated stems, these objects are quite similar to pedestals found on European sites. Pedestal-like objects have been found in northeast Kentucky, well within the saline region. A total of 42 pedestal-like objects

were recovered at the Hardin site, a late Fort Ancient settlement occupied between the sixteenth and seventeenth centuries AD (Hanson 1966). These objects have been classified as pottery pestles (Figure 16g), but it should be pointed out that pestles made of coarse pottery are a rather poor substitute for the stone pestles which occur so frequently at Hardin and at other Fort Ancient sites.

Additional pedestal-like objects have turned up in the Upper Ohio Valley, the Clover site in Cabell County, West Virginia, having a couple of specimens (Figure 16h). The Clover phase is believed to date to early historic times. Other pedestal-like objects have appeared in late contexts at the Buffalo Indian Village site in West Virginia and at the Waterworks site in Ohio (Figure 16i). One of the pedestal-like objects at the Hardin site has a small perforation in it, similar to certain artifacts found in the general vicinity of the Cahokia site in the American Bottoms of Illinois (Figure 16j-k). The latter objects, often referred to as "stumpware" or "Cahokia Crud", date to around AD 850-900 (James B. Griffin-personal communication). These artifacts sometimes have small holes at the base of the cone-shaped openings. Similar holes in European *augets* are believed to have served in draining excess liquid as the salt was drying.

Tracing salt molds, or *augets,* is a bit of a problem because, contrary to the prehistoric European economy, there is no evidence that salt ever served as a form of currency in North America. The practice of making standard size vessels for production and trade probably never occurred in the latter area, but the findings at Salt Mine Valley and the presence of pedestal-like objects so widespread in the Mississippian cultural tradition suggest that some miniature vessels were probably used as salt molds. Miniature vessels are quite common on Mississippian sites, but they are usually classified as toys. This identification is reasonable, as the vessels are often found with child burials. But there is some suggestion that very small vessels served a number of other functions. In some cultural traditions whole and broken miniature vessels are frequently recovered in village excavations, thus implying daily use. Often they occur with adult burials. Very small "seed" bowls in adult graves near the Kimmswick saline in Missouri are typical (Adams et al. 1941; Bushnell 1907).

Southeast Missouri is also rich in miniature bowls. Of some interest is the abundance of such vessels at sites on the Malden Plain in the late Mississippi period. At the same time thick salt pans were disappearing, very small bowls were being made in considerable frequency. At a number of sites they were associated with house floors. At Lawhorn, they even were found within the fire basins, in the same contexts as pedestal-like objects. Miniature bowls were also typical at the Banks Village site in Arkansas. Twenty very small bowls were found at this site, either plain or noded, like the so-called "medicine cups".

It cannot, at this point, be proven that the various miniature bowls are indeed *augets.* The fact that they have been found in a number of cases in direct association with pedestal-like objects does, I feel, strengthen the case. Ideally, it would be nice to find *augets,* pedestal-like objects, and evaporating bowls altogether at a saline. But it must be stressed that, with the exception of Salt Mine Valley on Avery Island, a direct association between salines and *briquetage* has not been established as yet. The correlations and interpretations presented above are therefore highly speculative. I do feel, however, that enough formal analogies exist to permit the hypothesis that typical utilitarian bowls were used, along with pedestals and miniature bowls, in salt production

in certain portions of Eastern North America. The Louisiana finds have thus given rise to a rather different and exciting perspective of prehistoric salt industries in this country.

Conclusions

Prehistoric salt research in Eastern North America is still only just beginning. The lack of concern has largely been due to the low archaeological visibility of this very important resource, but the study of salt should play a role in any research involved with late prehistoric trade in the East. Wherever there was a heavy reliance on agricultural products, there was the need for salt. Either the people made it themselves, from the ashes of salt plants, salines, the ocean, etc., or they obtained it through trade from elsewhere. The by-products of the industry and trade do exist in the archaeological record, but the problem has been in their recognition.

Archaeological visibility is considerably stronger in the early development of the salt industry. I have proposed three major developments in the evolution of Eastern Amerindian salt production. The first two stages involved the use of thick heavy salt pans, containers for the evaporation of brine. The fabric impressed salt pan was more widely distributed in the early Mississippi period but, for some reason, smooth-surfaced pans became more common in later years.

At the same time as the idea of smooth-surfaced salt pans was diffusing over a good portion of the East, this pan type was disappearing in southeast Missouri/northeast Arkansas. For some reason, the area which gave rise to this innovative type stopped producing it in the late Mississippi period. I have proposed that another innovation in salt production was occurring in southeast Missouri /northeast Arkansas at this time, a technology which shared many parallels with salt production methods employed in Europe, Africa, and Asia. The by-products of this industry, called *briquetage*, have been found on numerous sites in the Midwest and Southeast, but the complex as a whole has only been observed at the Avery Island saline in southwest Louisiana. The new method involved the artificial evaporation of brine in typical utilitarian bowls over low fires. The bowls are thought to have been supported by short coarse clay pedestals. Once the salt crystallized, it was scraped into miniature bowls (*augets*) for both drying and transporting.

This last technique has an extremely low archaeological visibility. The evaporating bowls look like any other utilitarian cooking or serving containers, the miniature vessels were carried far from the salt sources, and the poorly fired clay supports disintegrated through time. The similarities between the artifacts at the Avery Island saline and typical Old World *briquetage* are remarkable, but the observed parallels between the two hemispheres are not the result of transoceanic contacts. There are a limited number of ways to produce relatively pure salt that is both solid and readily transportable, and the peoples of America, Europe, Africa, and Asia apparently learned the appropriate techniques independently.

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