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Certain Trends in Eastern Woodlands Salt Production Technology

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From the Late Woodland period until the end of the eighteenth century, the American Indians of the Eastern Woodlands produced salt by evaporating brine in ceramic containers. These vessels, often termed *saltpans*, exhibited a range of variability in size, form, and surface treatment. Data from eight salt-making localities discussed here support the idea that in parts of the Deep South bowls and jars were preferred over thicker basin-shaped vessels, but this does not seem to have been the case throughout the rest of the Eastern Woodlands. While there is some evidence to suggest that salt bowls and jars were supported over a fire using clay pedestals and that salt was traded in small cups, or *augets*, very few of these ceramic forms have been identified thus far in eastern North America.

KEYWORDS salt production, saltpans, briquetage

The salt springs of eastern North America were visited by some of the continent's earliest inhabitants. Often referred to as *licks*, these springs attracted game animals and human hunters as early as the Paleoindian period (Adams 1953; Brown 1980a:4, 2010a:395; Harris 1805:181–182; Haynes 1966:209). As populations began to rely more heavily on maize and other plant-based foods, it became necessary for many of these groups to supplement their diets with additional salt (Adshead 1992; Brown 1980a:4; Driver and Massey 1957:249). The uneven distribution of aboveground salt deposits meant that people without salt would need to acquire this resource from people with salt. Some researchers have even argued that the Mississippian salt trade may have served as a mechanism through which chiefs or other elite individuals were able to acquire and maintain political power (Barber and Barfield 2000; Meyers 2002).

In the Eastern Woodlands, salt was usually collected from the surface of salt licks and evaporated in ceramic containers known as *saltpans*. At licks without active brine seeps, salt could often not be harvested without also collecting a substantial quantity of unwanted soil, thus making it necessary to filter out these impurities (Brown 1980a; Eubanks 2015; Keslin 1964:20). This seems to have been

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accomplished by placing salty soil into baskets or cloth and then saturating the mixture with water. The brine would seep out of the baskets and into ceramic containers, leaving the unwanted soil particles behind (Elvas in Bourne 1904:136). The brine was then evaporated using solar energy or heated stones or boiled over a slow-burning fire until a solid salt cake was formed (Eubanks 2015:150–155).

In his 1980 volume on American Indian salt production, Ian W. Brown proposed that, following the Early Mississippian period, large fabric-impressed saltpans were replaced by plain saltpans, which were later replaced by smaller bowls and jars around the time of the protohistoric period (Brown 1980a:87–88). The data from the salt production sites discussed here generally support the idea that salt bowls and jars tend to occur later than large, basin-shaped saltpans (Figure 1). While it is difficult to determine the exact reason for this shift, it seems that technological innovation was not the only factor at play. In addition, the presence or absence of surface treatment on salt production vessels appears to be a valid chronological marker in many parts of the Eastern Woodlands, but in other locations, this attribute may be a product of vessel size or production efficiency.

In Mesoamerica, and throughout much of the Old World, brine was evaporated in ceramic vessels placed on elevating clay supports called *pedestals* over a fire (Brown 1980a:67–76; McKillop 2002; MacKinnon and Kepecs 1989; Reader 1908). In parts of Europe, once the brine had evaporated, the salt that remained in the small ceramic augets, which could be broken open to reveal a solid salt cake (Figure 2), was traded as a type of currency (Kleinmann 1975; Nenquin 1961). Brown (1980a:67–68, 74) adopted the term *briquetage* from the salines of Europe to refer to augets, pedestals, or any other fired-clay materials associated with the salt production process. In eastern North America, pedestal and auget-like briquetage forms have been documented at or near several salines (Brown 1980a, 1999a, 2010a; Dumas 2007:300–302; Kenmotsu 2005:70). Unlike at the salines of Mesoamerica and the Old World, however, examples of these forms have been comparatively rare (e.g., Eubanks 2014a:110). This suggests that if augets and pedestals were used in the Eastern Woodlands, they may have been an exception to the rule of using larger containers, such as bowls, jars, and pans. Nevertheless, it should be kept in mind that the rarity of these artifacts may be expected at least to some

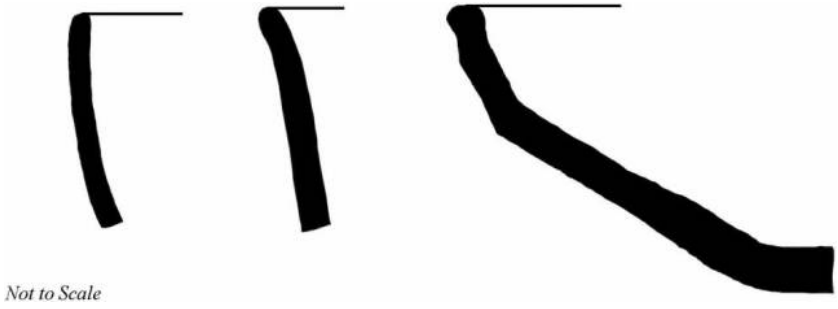

FIGURE 1 Rim profiles of salt-making pottery: (*left to right*) bowl from Drake's Salt Works in northwest Louisiana, jar from Bayou Sel in southwest Arkansas, and pan from Hardman in southwest Arkansas (Early 1993a:Figure 57).

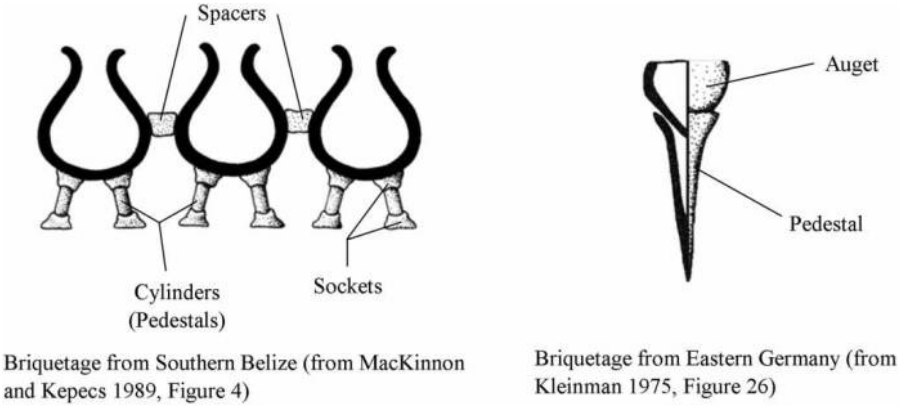

FIGURE 2 Briquetage from Mesoamerica and Europe.

degree, since most of the clay pedestals that have been recovered thus far have been friable and porous and, as a result, unlikely to preserve well in the archaeological record (Brown 1999a:134–135). In addition, a lack of augets at salt production sites may be expected if these vessels were being traded away from the saline.

Salt production localities

Eight salt production localities have been selected for the discussion that follows (Figure 3). These include both single sites and groups of spatially clustered sites. They span the chronological and geographic range of American Indian salt production in the Eastern Woodlands, as it is currently understood. While there are many other salines in this region, the majority of the localities discussed here have been subjected to some degree of investigation beyond surface collection or preliminary test excavation. For the convenience of the reader, a condensed version of this discussion is presented in Table 1.

Salt Mine Valley, southern Louisiana

Salt Mine Valley (16IB23) is located on Avery Island in coastal Louisiana. This island is part of a geological feature known as a salt dome, which spans an area of roughly 20 km^2. During the late nineteenth century, it was featured prominently in discussions regarding the antiquity of humanity in North America, as both stone tools and extinct Pleistocene megafauna were found there in association with one another (e.g., Beyer 1899; Bolton 1888; Leidy 1889). After a hiatus of academic research in the early twentieth century, Avery Island was revisited by Gagliano (1964, 1967) in the 1960s and later in the 1970s by Brown, as part of Harvard University's Lower Mississippi Survey (Brown 1980a, 1980b, 1981a, 1999a, 1999b, 2015).

Salt Mine Valley was utilized for salt making during the Three Bayou phase (A.D. 1000–1300) and the Petite Anse phase sometime between A.D. 1550 and 1650 or perhaps slightly later (Brown 1999a:135). The latter component, which we

A– Salt Mine Valley
B– Potter's Pond, Drake's Salt Works
C– French Lick
D– Beckum Village, Lower Salt Works, Salt Creek, Stimpson
E– Great Salt Spring, Half Moon, Equality
F– Salt Well Slough
G– Hardman, Bayou Sel, Holman Springs
H– Kimmswick, Kreilich, Cole, Fortnight

FIGURE 3 Map of salt production localities discussed in this article.

discuss first, probably did not span the entire date range but was the result of only a few years of activity. It also seems likely that the Petite Anse people were not local to southern Louisiana. While most of the Petite Anse salt production pottery was made using local sandy clays, a few nonutilitarian sherds appear to have been constructed with clay from a different source (Brown 1999a:131–132). Many of the decorated sherds also bear a resemblance to materials found in the lower Yazoo basin of western Mississippi. This, in addition to a lack of permanent Petite Anse settlement on and around Avery Island, led Brown (1999a:122) to argue that the site was visited seasonally or opportunistically by people who may have had ties to the protohistoric Tunica, Koroa, or Taënsa, since these groups were known to have played an active role in the early historic salt trade.

Bowls, followed by flared and incurved jars, appear to have been the vessels of choice for Petite Anse salt makers at Salt Mine Valley. An overwhelming majority of these vessels are tempered with shell, and most range in diameter from 24 to 31 cm (Brown 1999a:122). Over 40,000 sherds were recovered from Brown's excavations, but only 34 worked or utilized lithic objects were found. Faunal materials, while not common, were present in sufficient numbers to indicate that the salt makers were eating on-site. There was also a lack of fire-altered rock, suggesting that direct heating was the preferred cooking technology at Salt Mine Valley.

TABLE 1

A SUMMARY OF SALT PRODUCTION LOCALITIES IN THE EASTERN WOODLANDS

Locality/site	Dates (A.D.)	Duration of salt-making activities	Vessel form, temper, and surface treatment	Potential augets present at or near the site?	Potential pedestals present at or near the site?	Fire-altered stone abundant?
Salt Mine Valley	1000–1300 and 1550–1650/1700	Seasonal or opportunistic	Plain shell-tempered bowls and jars	Yes ($n = 3$)	Yes ($n = 6$)	No
Northwestern Louisiana	1550/1600–1800	Seasonal or opportunistic	Plain shell-tempered bowls	No	No	No
French Lick, central Tennessee	1000–1400	(Nearly) Year-round occupation near the saline	Fabric-impressed shell-tempered pans	No	No	Yes
Southwestern Alabama	800/1100–1550	Extended seasonal	Plain sand-tempered open bowls (Late Woodland) followed by shell-tempered fabric-impressed and plain pans (Early–Middle Mississippian) followed by shell-tempered cane-impressed bowls (Middle–Late Mississippian)	Yes ($n = 1$)	Yes ($n = 1$)	Yes
Great Salt Spring, southern Illinois	750/900–late 1700s	Extended seasonal or (nearly) year-round	Grog-tempered pans or bowls (Late Woodland) followed by shell-tempered plain and fabric-impressed pans and possibly plain shell-tempered bowls	No	No	Yes
Salt Well Slough, eastern Texas	1300–1700	Seasonal or opportunistic	Neck-banded or plain shell-tempered tall jars	No	Yes ($n = 2$)	No
Hardman, southwestern Arkansas	1300/1400–1700	(Nearly) Year-round occupation at the saline	Shell-tempered plain pans	No	No	No
Southeastern Missouri	500/600–historic period	Extended seasonal or (nearly) year-round	Plain and cordmarked pans (Late Woodland) followed by fabric-impressed and plain shell-tempered pans with a possible transition from plain to fabric-impressed and back to plain (Early–Late Mississippian)	Yes ($n = ?$)	Yes ($n = ?$)	Yes

In addition to the tens of thousands of bowl and jar fragments, six cylindrical clay bars were also recovered from this site (Brown 1999a:135). These artifacts were highly porous and very fragile, which makes it likely that many more such objects were once present at the saline but are now unidentifiable due to breakage and poor preservation. Along with these possible pedestals, three small auget-like containers were also found (Brown 1980a:77, Figure 16, 1999a:135) (Figure 4). This

FIGURE 4 (a) Possible auget and (b) pedestal with a broken base from Salt Mine Valley. (c) The top socket part of the broken pedestal is just large enough to accommodate the base of the auget.

led Brown (1980a, 1999a, 2010a) to argue that a salt production industry involving thin-walled containers, pedestals, and augets may have developed at Salt Mine Valley and possibly throughout the rest of the Eastern Woodlands around the time of the protohistoric period.

The earlier Plaquemine component on Avery Island is represented by the Three Bayou phase. The Petite Anse utilization of the site and the island overall is confined almost exclusively to the salt spring; however, Three Bayou materials occur throughout the region, including areas without active salt springs. Additionally, the decorated pottery from this earlier phase is stylistically similar to other materials from coastal Louisiana. Thus, it would seem that the Three Bayou people were local to southern Louisiana and were not interested in Avery Island solely for its salt deposits. Relative to the Petite Anse wares, Three Bayou pottery is slightly thicker, but it is still thinner than most saltpans, which often have wall thicknesses well in excess of 1 cm (e.g., Bushnell 1907; Guidry and McKee 2014:62–66; Keslin 1964:50–56). If the Three Bayou occupants were producing salt, then it was most likely a small-scale operation involving grog-tempered bowls, incurved jars, or flared jars, instead of saltpans, since these were the most common vessel forms used during this phase (Brown 1999a:120).

Northwestern Louisiana

There are three known salines in northwestern Louisiana with evidence of considerable prehistoric and early historic salt production. The first of these is the Potter's

Pond site (16WE76), excavated by the Louisiana Archaeological Society in the 1980s (McCrocklin 1985) and surveyed by Girard (2006) between 2005 and 2006. The other two are the Upper (16WN30) and Little (16NA11) salt licks, excavated by the University of Alabama's Gulf Coast Survey and the United States Forest Service (Eubanks 2013, 2014a, 2014b). The latter two salt licks are separated by less than a kilometer and are part of the Drake's Salt Works site complex. Salt making at the Upper and Little licks, and probably at Potter's Pond as well, seems to have been a seasonal or opportunistic activity as there is little evidence of year-round occupation at or near the salt licks (Eubanks 2014b; Lawhon et al. 2014). The overwhelming majority of the salt production vessels from these three sites are tempered with coarsely ground shell. In northwestern Louisiana, shell temper was not widely used until after A.D. 1600 (Perttula et al. 2011:249–251). Radiocarbon samples taken from the lower portions of the salt-making middens at the Upper and Little licks also support the idea that salt production began at Drake's Salt Works sometime between the sixteenth and seventeenth centuries (320 ± 30 B.P. [Pts-385704; wood charcoal; $\delta^{13}C/^{12}C = -27.1^{o}/oo$]; 310 ± 30 B.P. [Pts-385706; wood charcoal; $\delta^{13}C/^{12}C = -26.1^{o}/oo$]). This activity lasted until the first decade of the nineteenth century, when the saline was taken over by the Americans.

Decorated pottery from these salines is rare, but types typically associated with the late prehistoric and early historic Caddo Indians have been found at Potter's Pond and Upper Lick. At Little Lick, the picture regarding potential cultural affiliation is less clear, as lower Mississippi Valley pottery types have been found alongside a handful of sherds with types traditionally associated with the Caddo (Eubanks 2014b). It is possible that, like the Petite Anse component at Salt Mine Valley, Little Lick was visited by groups from distant regions such as the lower Mississippi Valley. If so, then this raises the possibility that both Caddo and non-Caddo groups were working at the same salt dome at about the same time. It could be the case that the nonlocal salt makers had once been able to acquire enough salt through production or trade but were cut off from their supply sometime around the protohistoric period. In such a scenario, these two groups may have elected to work in such close proximity in an effort to discourage raiding or to guard against territorial encroachment. We know from the historic record that there was at least some raiding occurring at salines located within the traditional Caddo homeland (Swanton 1942:82), so perhaps the local and nonlocal groups at Drake's Salt Works were attempting to find strength in numbers. While this idea is little more than speculation at this point, what is clear is that there would have been many other unoccupied salt licks in northwest Louisiana, aside from those at Drake's Salt Works, which the nonlocal salt makers could have utilized but did not (Eubanks 2014a).

Despite differences in ceramic decoration at Little Lick, salt makers at all three of these salines used thin-walled hemispherical bowls to evaporate brine (Eubanks 2014a:110). No examples of clay pedestals have been found in northwestern Louisiana, but several partial bowls recovered from Little Lick at Drake's Salt Works do contain evidence of soot on the bottom of the vessels. While not formally quantified, if soot accumulations on the bases of salt bowls are common throughout northwestern Louisiana, then this would suggest that salt makers in this region elevated their

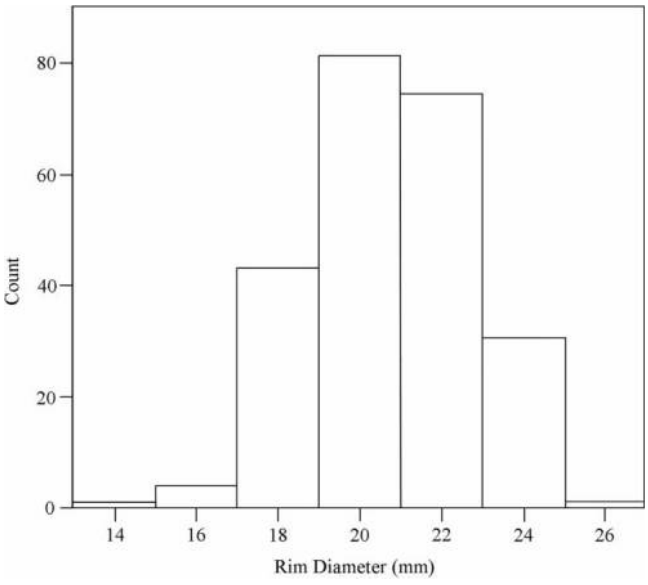

FIGURE 5 Salt bowl rim diameters from the salt production midden at Little Lick.

vessels above a fire, perhaps on stacks of large pottery sherds, since it would be difficult for soot to accumulate on the bases of bowls placed directly in a fire (Hally 1983:10).

At Potter's Pond, the majority of the bowls were roughly 10 cm high with an average rim diameter of approximately 20 cm and an average vessel thickness between 5 and 6 mm (Eubanks 2011:14; Girard 2006:58). The same is also true for Drake's Salt Works, especially at Little Lick, where approximately 85 percent of the salt bowl rim diameters fall between 18 and 22 cm (Figure 5) (Eubanks 2013:Figure 13, 2014b:Figures 17, 18, 2015). The presence of coil breaks and the fact that these vessels exhibit an extremely low range of variability suggest that some sort of mold, such as an inverted bowl, may have been used to help make these containers. It is also possible that standardized bowls were desired because they produced a standardized salt cake, which as a known quantity could be easily traded for different commodities.

French Lick, central Tennessee

French Lick (40DV5), or Sulphur Spring, was excavated in the 1990s by Panamerican Consultants (Walling et al. 2000) and more recently in 2014 by TRC Environmental Corporation (Guidry and McKee 2014). This site is located on the west bank of the Cumberland River just to the north of downtown Nashville. Across the river, on the east bank, is the East Nashville Mounds site (40DV4). These two sites likely comprised a single Mississippian mound and village center. The East Nashville Mounds site contains several burial mounds and a platform mound. From the historic record, we know that there was at least one mound associated with French Lick, but this mound was demolished sometime during the second half of the

nineteenth century (Haywood 1823). These sites are also associated with a stone box cemetery (Haywood 1823; Jones 1876; Walling et al. 2000). Stone box graves were a common form of late prehistoric interment in the east-central United States, and they are often lined with limestone or shale slabs. Broken saltpans were sometimes used to help construct the floors or linings of the graves (Brown 1981b:6–7, 2004a:11–12; Bushnell 1908; Dowd 1969:6–7; Holmes 1903:30–31; Jones 1876:7; Robertson 1878; Thruston 1973:157–159).

French Lick contains both Archaic and Woodland components, but the majority of the materials recovered from this site date to the Early and Middle Mississippian periods (A.D. 1000–1400) (Guidry and McKee 2014; Walling et al. 2000). During this time, the saline was visited by the inhabitants of the East Nashville Mounds site and French Lick, but there is little evidence to suggest that there was a settlement at the salt spring itself (Guidry and McKee 2014:2). The dominant salt-making vessel at French Lick is the shell-tempered fabric-impressed saltpan (Guidry and McKee 2014:62–66). These pans are fairly thick, with body sherds ranging between 12.8 and 40.1 mm and rim sherds ranging between 30.0 and 49.6 mm. The average orifice of these vessels would have fallen somewhere between .6 and 1.0 m. As with the majority of other salines in the Eastern Woodlands, very few examples of decorated pottery have been recovered from this site.

Sherds from thin-walled vessels have been recovered from French Lick, but it is unclear how or if these relate to salt-making activities. It is possible that these vessels were used later in the site's history or in tandem with fabric-impressed saltpans, such that once a partially evaporated salt slurry had formed in the saltpan, it was transferred to a jar or bowl for final reduction (Guidry and McKee 2014:67). If thin vessels were somehow involved in the salt production process, they do not appear to have been accompanied by ceramic pedestals, since these objects have not been documented at the saline. This is not surprising, however, since most of the pedestal-like objects that have been found in the Eastern Woodlands have come from protohistoric or early historic contexts (Brown 1999a:134).

Numerous pieces of limestone, some of which show evidence of burning, are present at French Lick (Guidry and McKee 2014:72). While it is possible that some of this limestone could have been used to help elevate the saltpans over a fire, these stones may have also served as a source of indirect heat. In addition, 31 fired pit features were found at this site (Guidry and McKee 2014:43). If these pits functioned as hearths for the saltpans, salt could have been produced more rapidly than if the salt makers had just used indirect heating (Akridge 2008), but given the thickness of the saltpans and their large surface areas, heated stones, along with solar evaporation, may have been the preferred salt production method.

Southwestern Alabama

The known salines of Alabama are confined to the lower Tombigbee River valley in the southwestern corner of the state. This cluster of salines is roughly 200 km downriver from Moundville and 40 km upriver from the Bottle Creek Mounds site. It seems likely that the Alabama salines were utilized by local populations, as well as groups from Moundville and Bottle Creek (Dumas 2007). Many of these

salines received a fair bit of archaeological attention during the mid-twentieth century (Trickey 1958; Wentowski 1970:22–23; Wimberly 1960), and more recently they have been visited by the Alabama-Tombigbee Regional Commission, the University of South Alabama, and the Alabama Museum of Natural History's Gulf Coast Survey (Brown 2009; Curren 1982; Fuller et al. 1984). In 2004, Dumas (2007) examined several of these salines—including Beckum Village (1CK24), Lower Salt Works (1CK28), Salt Creek or Central Salt Works (1CK222), and Stimpson (1CK29)—as part of her Ph.D. dissertation research at the University of Alabama.

Most of the sites analyzed by Dumas, with the exception of Stimpson, have both chronologically diagnostic ceramic materials dating to the Late/Terminal Woodland period (A.D. 800–1100) and the Mississippian period (A.D. 1100–1550). During the Late/Terminal Woodland period, there are significantly more open sand-tempered bowls at some of these salines compared to nearby domestic sites. This led Dumas (2007:397) to argue that salt making or some other specialized activity may have been occurring at these sites during this time. By the beginning of the Mississippian period, however, there is clear evidence for salt production in the form of fabric-impressed shell-tempered saltpans (Drooker 1993, 2003; Dumas 2007; Spanos 2006; Wimberly 1960). At Beckum Village, this is the primary vessel form involved in salt making. These vessels are slab molded and are often as thin as 5–12 mm, but they almost always have relatively thick rims, ranging between 12 and 18 mm (Dumas 2007:Table 8.1, Figure 8.20; Wimberly 1960:186). With an average vessel diameter of 35 cm (Dumas 2007:Figure 8.25), the salt production vessels at Beckum Village and throughout southwest Alabama in general are considerably smaller than saltpans found elsewhere in the Eastern Woodlands, and if it were not for their thickened rims, they could easily be classified as large bowls.

Like Beckum Village, Lower Salt Works and Salt Creek also contain fragments of fabric-impressed saltpans, but through time, these vessels appear to decline in favor of plain saltpans (Dumas 2007:Figure 7.18). The average plain saltpan rim diameters at Beckum Village and Lower Salt Works are 37.5 and 32.1 cm, respectively (Dumas 2007:Figure 8.26, Table 8.15). As with the earlier fabric-impressed vessels, the plain saltpans are roughly bowl shaped with thickened rims and relatively thin bodies. On average, the exteriors of the plain saltpans tend to show less evidence of wear from use, which led Dumas (2007:420–421) to argue that these saltpans may have been set in earthen basins for solar evaporation. Soot was also found on a small percentage of the Mississippian saltpans from southwest Alabama (Dumas 2007:422). Interestingly, these pans were often found in association with large quantities of burned limestone cobbles. While the function of these cobbles is unclear, they may have served as an indirect heat source or to elevate the vessels above a fire. However, the latter use seems less likely considering the lack of soot observed on the saltpans. Given the amount of historic disturbance at these salines, it may also be the case that the limestone cobbles once composed part of a historic salt kiln.

By the Middle/Late Mississippian period at the Stimpson saline (A.D. 1200/1250–1550), cane-impressed vessels seem to have replaced plain and fabric-impressed

saltpans altogether (Dumas 2007:Figure 7.18; Fuller et al. 1984). Cane-impressed pans were likely made by spreading clay on the interior of a basket or cane mat, and it is possible that this may have been a more efficient method of vessel production compared to earlier techniques (Drooker 2003; Dumas 2007:443). The cane-impressed saltpans are slightly smaller than their plain and fabric-impressed counterparts, with an average rim diameter of 28.8 cm, but they are slightly thicker than the fabric-impressed pans (Dumas 2007:443). In addition to cane-impressed pans, an abundance of plain thin-walled bowls was found, along with a possible shell-tempered pedestal (Dumas 2007:300).

Compared to nearby domestic sites, the salines of southwest Alabama are generally lacking in lithic material and decorated pottery, which has led researchers to the argue that the salt makers were not living at the salines on a full-time basis (Dumas 2007:279, 296). This interpretation seems logical, but it is worth noting that there are considerably more materials unrelated to salt production (e.g., decorated pottery, lithics, and faunal materials) at the southwest Alabama salines compared to other seasonal or opportunistic salt production sites, such as Salt Mine Valley and Little Lick (Brown 1999a:Table 1; Dumas 2007:266–350; Eubanks 2014a: Table 3). This suggests that the salt makers of southwest Alabama were spending at least a portion of their time at the saline doing activities unrelated to making salt. If the salt-making season at these sites lasted only a few days or weeks, then it would be surprising to find non-salt-making materials in any appreciable numbers. In addition, there are also numerous thin-walled bowl and jar sherds found at these salines, but it is unclear if these relate to salt production or domestic occupation. If they are a result of the latter, then this would lend some support to the extended salt-making season argument. Thus, while the salines of southwest Alabama do not seem to have been used on a year-round basis, the duration of the salt-making season at many of these sites may have been longer than that at other temporarily utilized salines.

Great Salt Spring, southern Illinois

Located roughly 80 km from the Angel and Kincaid sites in southern Illinois, Great Salt Spring (11GA6/513), or Ohio Saline, would have been one of the most important Mississippian salt production sites in the lower Ohio River valley. This site was excavated in the 1980s and early 1990s by Jon Muller of Southern Illinois University at Carbondale. The area around Great Salt Spring contains several other major salines, including Half Moon Lick and Equality Saline (Jakle 1967:238–240; Sellers 1877:580), but it is Great Salt Spring that has received the most archaeological attention (Muller 1984, 1992, 1996, 1997). This site was used at least from about A.D. 750/900 in the Late Woodland period through historic times (Muller 1992:41). Six of the site's eight radiocarbon samples date to the thirteenth century A.D. (Muller 1992:Table 10.49; Muller and Renken 1989:Table 1), which suggests that peak use may have occurred during this time.

Great Salt Spring encompasses two major activity areas, one in the floodplain of the Saline River and the other on the nearby river bluff. Both portions of the site contain fire-altered stone, thin "domestic" wares, and numerous plain and

fabric-impressed saltpan sherds. The saltpans are tempered with coarsely ground shell, and most of these vessels appear to have been made using some sort of mold (Haney 2001). For making the fabric-impressed saltpans, clay-lined pits would have sufficed, since they could be lined with cloth and then packed with potting clay (Muller 1984:500). Once a prefired saltpan was dry, the cloth could be used to help remove the vessel from its mold (Brown 1980a:Figure 6; Orr 1951:Figure 4). For saltpans without fabric impressions, it is possible that overturned, already-made saltpans or clay domes were used as molds (Brown 1980a:30–36; Eubanks 2015; Sellers 1877). Conversely, it may be that the plain saltpans were coil built without the use of a mold (e.g., Keslin 1964:53), but there is little evidence in the saltpan breakage patterns at Great Salt Spring to support this idea (Muller 1992:297). There also appears to be a difference in the sizes of fabric-impressed and plain saltpans, with the former having an average rim diameter 10 cm greater than the latter (Muller 1992:295–296; Muller and Renken 1989). This trend has not been observed clearly at other salines (e.g., Dumas 2007:418–420, Figures 8.25, 8.26), but if this difference is regionally applicable, then perhaps both vessel size and surface treatment relate to two distinct production techniques.

In an attempt to determine if the presence or absence of saltpan surface treatment could be used as a temporal marker, Muller and Renken (1989) plotted the chronological distribution of plain and fabric-impressed saltpans using a series of eight radiocarbon dates obtained from various features at the saline. From these data, they argued that both vessels were used simultaneously and that plain saltpans did not replace fabric-impressed saltpans (contra Brown 1980a:87–88). While this may be the case, the use of single radiocarbon samples to date these contexts is somewhat problematic, especially since the mean dates from six of these samples fall within less than a century of each other. The chronology of surface treatment is also difficult to assess stratigraphically. In one floodplain test unit, there was a tendency for plain saltpans to become more popular over time (Muller 1992: Figure 5.10), but this was not the case in at least two other floodplain test units (Muller 1992:Figures 5.8, 5.9). Some of these test units, however, were not excavated to culturally sterile subsoil, so it is possible that the excavators did not pick up on the shift from fabric-impressed to plain saltpans.

The bottomland portion of Great Salt Spring contains few domestic or non-salt-making materials, but there is some evidence of permanent architecture on the river bluffs (Muller 1992, 1996, 1997; Muller and Renken 1989). This portion of the site also yielded fewer saltpan sherds and more thin bowl sherds compared to the floodplain. Although thinner wares would be expected if this was a permanent or semipermanent occupation zone, the lack of lithic debris led Muller to argue that these structures may represent an expansion of the site's salt-making operation associated with its peak use during the thirteenth century (Muller 1992:270–278). There also may have been some sort of secondary-stage evaporation occurring in this area (Muller 1996), or perhaps later in the site's history, the salt makers developed a less fuel-intensive manner of evaporation using bowls and jars (e.g., Brown 1980a:87–88). Since the floodplain contains a Late/Terminal Woodland component, it may be that following this period fuel scarcity became enough of a problem that

the salt makers decided to transport brine to the adjacent river bluffs where, presumably, there would have been more wood (Muller and Renken 1989:155). However, transporting large quantities of brine up these slopes would have been a difficult task, especially considering that it would have been much easier to carry wood from the bluff down to the floodplain.

Salt Well Slough, eastern Texas

The Salt Well Slough site (41RR204) was excavated by the Texas Archaeological Society Field School in 1991 (Kenmotsu 2005). Along with Hardman and Drake's Salt Works, it is one of the best-documented salines in the traditional homeland of the Caddo Indians. This site was utilized by the Caddo sometime between A.D. 1300 and 1700 and contains little to no evidence of permanent occupation. The salt spring and its associated midden deposits are located just south of the Arnold Roitsch/Sam Kaufman mound and village site, and the salt makers who worked at Salt Well Slough probably lived there or in a nearby village. The vessel of choice at Salt Well Slough was a plain or neck-banded shell-tempered jar. There is little difference between these jars and those found at the neighboring Arnold Roitsch/Sam Kaufman site, which suggests that the same vessels, or at least the same vessel forms, used for domestic activities were also used for making salt (Kenmotsu 2005:119).

The jars at Salt Well Slough are generally taller and narrower than the bowls and jars seen later at Salt Mine Valley and Drake's Salt Works. If the Salt Well Slough jars date to the earlier end of the proposed A.D. 1300–1700 date range, then they would represent one of the first uses of non-saltpan containers to evaporate brine in the Caddo homeland. The preference for such vessels over bulkier saltpans at this site has led to the argument that non-saltpan vessels were more common among seasonal or opportunistic salt makers (Kenmotsu 2005:119). Thus, if the salt makers were visiting the saline for relatively brief periods or traveling long distances to reach the saline, using smaller containers may have been preferable, since it would have been more difficult to haul large saltpans to and from the salt licks and wasteful to leave unbroken pans behind.

Two pedestal-like artifacts have been recovered from Salt Well Slough (Kenmotsu 2005:70, Figure 23). These objects bear a loose resemblance to pedestals found in Mesoamerica and the Old World (Brown 1980a:65–76; McKillop 2002; MacKinnon and Kepecs 1989). The fact that these two artifacts were reported suggests that misidentification is likely not to blame for the dearth of this artifact class at this site. If the use of pedestals to support salt-making vessels is a protohistoric or an early historic phenomenon (Brown 1980a:87–88), then perhaps this site was abandoned shortly after this technology appeared or the pedestals were too porous and friable to have been preserved. Another possibility is that the salt-making jars were supported over a fire using stacks of broken pottery sherds (Kenmotsu 2005:120). Support for this idea can be seen near the salt production hearths, where closely clustered potsherds belonging to different vessels were found. While these sherds would have served admirably as vessel supports if stacked on top of each other, such clusters may also be explained by the repeated use of a specific location.

Hardman, southwestern Arkansas

The Hardman site (3CL418), along with Bayou Sel (3CL27) and Holman Springs (3SV29), is one of several late Caddo salines located in southwestern Arkansas. Bayou Sel was visited in 1804 by George Hunter and William Dunbar and, later, in 1883 by Edward Palmer as part of the Smithsonian's Mound Exploration Division (Early 1985:1–2; Jeter 1990:291–312; McDermott 1963; Palmer 1917:393, 416). Philip Phillips and Frank Schambach excavated at Bayou Sel in the 1930s and 1960s, respectively. Between 1985 and 1986, the Arkansas Archeological Society conducted test excavations at Holman Springs, where they uncovered numerous fragments of broken salt-making vessels (Davis 1986). Despite a history of archaeological interest, the materials recovered from Bayou Sel and Holman Springs have yet to be analyzed formally or published. This is not the case for the nearby Hardman saline, as this site has been the subject of extensive excavation and reporting by the Arkansas Archeological Survey (Early, ed. 1993).

Hardman was utilized by the Caddo Indians from A.D. 1400 (or slightly earlier) until approximately A.D. 1700 (Williams 1993a). Maize would have composed a considerable portion of the diets of the Hardman salt makers, but meat, nuts, beans, and squash also seem to have been eaten (Fritz 1993; Styles and White 1993). Given the partial reliance on maize as a dietary staple, it is possible that much of the salt made at this site was produced in order to fulfill a nutritional requirement. Unlike their contemporaries at Salt Well Slough, the Caddo at Hardman appear to have lived at the saline on a permanent or semipermanent basis, as evidenced by several residential structures; a large, partially encircling compound fence; and more than a dozen burials (Early 1993a:233–234). Compared to other contemporaneous Caddo farmsteads, the number of lithic, bone, and shell artifacts relative to potsherds at Hardman is fairly low but not as low as salines without an associated long-term habitation (Eubanks 2013:17–20). In addition to its permanent architecture and burial remains, the presence of numerous artifacts unrelated to salt making at Hardman suggests that its occupants engaged in a range of domestic and farming activities to the extent that these individuals were not considered full- or even part-time salt production specialists (Early 1993b).

The majority of the artifacts at Hardman are coarse shell-tempered saltpans (Early 1993a:97–102). Some fire-altered stone is also present (Williams 1993b:122) but not in the amount that would be expected if stone boiling was the primary method of brine evaporation. The saltpans from this site are basin-shaped and often have widely flaring rims. No complete saltpans have been found at Hardman, but a restored pan from a Caddo saline located just upstream had a rim diameter of 48 cm (Early 1993a:99). If thin-walled vessels were simply better than saltpans for evaporating brine, then it may be expected that this technology would have been adopted at some point at Hardman, especially considering that the Caddo to the south at Drake's Salt Works were using bowls during the latter portion of Hardman's occupation. It is conceivable that such a technology did appear later at Hardman, since among the non-saltpan ceramic assemblage both small globular jars and tall jars were some of the most common vessel forms (Early 1993a:101–105). If a wood shortage or deforestation was a problem at

Hardman (Fritz 1993:162), then perhaps a non-saltpan technology developed in order to make the salt production process more fuel efficient, since heating a thin jar would require less fuel than heating a saltpan (Akridge 2008). It is also possible that jars were used in tandem with pans, such that once the brine had been partially evaporated in a saltpan using solar energy or direct heat, it was transferred to a jar to finish drying. If thin-walled vessels were actually involved in salt making at Hardman, they do not appear to have been supported over a fire using clay pedestals. However, since the bulk of Hardman's occupation occurred before this technology is thought to have developed, this is not too surprising (Brown 1980a:87–88).

Southeastern Missouri

Southeastern Missouri contains several major Woodland, Mississippian, and historic period salines including, among others, the Kimmswick (23JE02), Kreilich (23SG5), Cole (23SG7), and Fortnight sites (23SG113). The Kimmswick saline was visited by David Bushnell Jr. in the first decade of the twentieth century (Bushnell 1907, 1908), and the latter salines were excavated by Keslin (1964) in the 1950s. At Kimmswick, Bushnell excavated roughly 750 m^2 and uncovered 28 fire beds, fire-altered stones, numerous fabric-impressed and plain saltpan fragments, and four complete saltpans. Three of the intact pans were found embedded in a layer of clay with their rims extending 5–10 cm above an apparent working surface. In the central portion of Bushnell's excavation, there was an area largely devoid of features and saltpan sherds. The lack of features and artifacts in this area has led archaeologists to conclude that this portion of the site may have housed a wood-lined platform on which the salt makers could store their salt and work while keeping their feet dry (Brown 2010a:385). Bushnell (1907:Figure 3) also found two ceramic objects, which he believed were a jar and a lid. The jar was 30 cm tall with a rim diameter of 12 cm, and its straight sides tapered to form a narrow, rounded bottom. The "lid," which would have fit nicely on top of the jar, had a knob on top that could be used to lift it off the vessel. Similar artifacts were used elsewhere around the world to dry, store, and transport salt (Brown 1980a:60–76, 2006, 2010a:385–387), so perhaps the jar and lid had a similar function at Kimmswick. Bushnell (1907:4) also reported finding a handful of "pestle-shaped" objects and several poorly fired, temperless bowls less than 5.08 cm in diameter. It is possible that these objects functioned as augets and pedestals, but this assignment of function is tenuous at best. At least one of the pestles was found adjacent to a deposit of crushed mussel shell, meaning that if these objects were used as vessel supports, they were also likely used in the production of shell temper. In addition, many of the small bowls recovered by Bushnell seem to have been found in burial contexts (Bushnell 1908:4). During the historic period in parts of the Eastern Woodlands, it was not uncommon for small containers such as these to be filled with salt and buried with deceased individuals (Mooney and Olbrechts 1932:134). However, if these vessels were used in burial rituals, this does not mean that they may not also have been used to make or trade salt.

During the Late Woodland period, perhaps as early as A.D. 500 or 600, noticeable quantities of salt began to be produced at the Kreilich site in Ste. Genevieve County, Missouri. Shortly thereafter, salt production also started at the nearby Cole site. The vessel of choice for the Late Woodland salt makers at Kreilich and Cole was the grog-tempered basin-shaped saltpan. Many of these saltpans were plain, but some also had a surface treatment, which Keslin believed was cordmarking rather than fabric marking. These vessels had an average thickness between 10 and 11 mm and occurred alongside thinner grog-tempered wares thought to be unrelated to salt production (Keslin 1964:38–42). Between A.D. 800 and 1000, coinciding roughly with the Emergent Mississippian period at Cahokia some 80–90 km to the north, shell became the dominant tempering material for the saltpans of southeastern Missouri. Despite the shift in temper, the shape of the saltpans remained fairly consistent, although there was a tendency for the shell-tempered saltpans to be thicker than their grog-tempered predecessors. Unlike during the Late Woodland period, when cordmarking appears to have been common, the saltpans of the Emergent Mississippian period at Kreilich and Cole are plain. Following A. D. 1000 and until approximately A.D. 1200, fabric-impressed saltpans began to appear and eventually replaced plain saltpans as the vessel of choice. After A.D. 1200, at the Kreilich site, there was an apparent resurgence of plain saltpans, which Keslin (1964) felt lasted until the early historic period. It should be noted, however, that much of this sequence comes from a single test unit (Keslin 1964: Figure 20). If the stratigraphy from this unit is undisturbed, then the transition from plain to fabric-impressed and back to plain would be the only one of its kind so far documented at a salt production site in eastern North America. The absence of this trend at other sites and the fact that Kreilich once housed a sizable Euro-American salt-making operation (Trimble et al. 1991), which likely disturbed much of the surrounding cultural stratigraphy, make additional excavations at this and other nearby salines necessary in order to verify this proposed transition.

Throughout the Woodland and Mississippian periods, an assortment of bowls, jars, bottles, and plates were left at southeast Missouri's salines. At the Fortnight site (A.D. 1150–1600), there is a relative abundance of these domestic wares, along with a burial and numerous pieces of daub (Keslin 1964:95–113). Assuming that the latter artifact class is associated with a structure and not just fired clay, then the case may be made that this site witnessed some form of extended occupation. The same may also be said for the Cole and Kreilich sites, since they are located less than a few hundred meters from a burial site, mound, or village center. The proximity of these salines to more substantial habitation sites may have made it more feasible for the salt makers to use heavier, more durable saltpans as opposed to thinner vessels. As at the Hardman site, it may be that the late prehistoric and early historic salt makers of southeastern Missouri were aware of the bowl and jar technology, as it was being used at other contemporaneous salines elsewhere in the Eastern Woodlands (e.g., eastern Texas, southern Louisiana, and northwestern Louisiana). If so, then these salt makers may have preferred using saltpans since they did not have to carry them long distances to reach the saline. Alternatively, it is possible that many of the thin-walled vessels originally interpreted as domestic wares eventually replaced an earlier saltpan technology.

At the Cole site, Keslin (1964:84–85) found at least five small ceramic vessels ranging about 4–6 cm deep and 6–10 cm in diameter at the rim. They were originally thought to be toys or dippers, but given their small size, it is possible that they could have functioned as augets (Brown 1980a:85). However, several of these are considerably larger than their potential counterparts at Salt Mine Valley, and their relatively wide openings may have made them ill-suited to transport salt.

Discussion

Following his work at Salt Mine Valley on Avery Island in southern Louisiana, Brown (1980a, 1980b, 1981a, 1999a, 1999b, 2004b:39, 2015) proposed that there was a shift during the Mississippian period in the Eastern Woodlands from fabric-impressed saltpans to plain saltpans and then finally to thin-walled bowls and jars. The transition from fabric-impressed to plain saltpans was thought to represent a technological improvement, as fabric-lined molds were no longer needed to help construct saltpans. During the protohistoric period, in places like Salt Mine Valley, bowls and jars were believed to be the primary salt-making vessels (Brown 1980a:87–88). Brown argued that once this technology developed, it was accompanied by specialized briquetage forms, including vessel pedestals and small augets, the latter of which could be loaded into baskets, bags, or other lightweight containers and shipped to their destination (Brown 1999a:134–135).

At several sites and localities, the fabric impressed-to-plain sequence holds up fairly well. In southwestern Alabama, there is a tendency for plain saltpans to appear after fabric-impressed pans, with the former eventually being replaced by cane-impressed vessels. A similar trend involving the fabric impressed-to-plain sequence is also seen at the Kincaid Mounds in southern Illinois (Brown 1980a:52; Cole 1951:139–141, 143; Orr 1951; Wilder 1951). As the pans found at this site were likely made with some purpose other than salt production in mind, including them in a chronological sequence of salt production technology is somewhat problematic. In central Tennessee, there is some evidence that fabric-impressed pans were used prior to plain pans, but this trend is generally confined to non-salines such as at the Gordon and Fewkes sites (Brown 1980a:52, Figure 11; Myer 1928). At French Lick, the use of fabric-impressed pans persists throughout the entire utilization of the saline (A.D. 1000–1400). Plain pans were in use by A.D. 1000 in other parts of the Eastern Woodlands (Griffin 1941:16; Keslin 1964; O'Brien 1972), but the French Lick salt makers never really picked up this technology. This preference may simply be a matter of adhering to tradition, or perhaps plain pans were not adopted at French Lick because the salt makers did not consider that vessel form to be a significant technological achievement over fabric-impressed pans.

Between A.D. 1500 and 1600, medium-sized shell-tempered salt bowls and jars begin to appear in parts of Louisiana, but there has yet to be a clear example at a single saline of jars and bowls actually replacing an earlier saltpan technology. Tall jars were in use in eastern Texas at Salt Well Slough and possibly other nearby salines sometime between A.D. 1300 and 1700. If the salt-making vessels

from southwest Alabama are considered large bowls rather than small pans, then non-saltpans were being used in parts of the Deep South by at least A.D. 1100, if not several centuries earlier.

Compared to saltpans, bowls and jars could have been made and fired more quickly, and if both pans and bowls/jars were heated over a fire, the latter would have consumed significantly less fuel to heat the brine (Akridge 2008). However, the thicker walls of saltpans would have made them much more durable than salt bowls or salt jars. As brine is heated in a ceramic container, it permeates the vessel walls, and as it dries, it begins to crystalize, which in turn causes the vessel's surface to exfoliate or spall (Kenmotsu 2005:121–123; O'Brien 1990). Vessels with thicker walls would have been able to withstand more exfoliation than vessels with thinner walls. Thus, it is possible that salt bowls and jars could be used only once or a few times before needing to be discarded (Eubanks 2015:156). It is also worth noting that many, if not most, of the salines in the Eastern Woodlands that have saltpans also have thin-walled "domestic" wares. While these vessels may have been used for activities unrelated to salt making, it is possible that they were involved in the salt production process, perhaps as part of a secondary evaporation stage (Muller 1996). If fuel scarcity was a serious problem, then solar evaporation may also have been used during this final stage of production (Andrews 1983:108–113; Eubanks 2015), and in some cases, this technique, along with indirect heating, may have been the primary method of brine evaporation (Brown 2004a:11, 2010a:387–389).

For groups who had to travel to reach the saline, such as those at Salt Mine Valley or Little Lick, thin and portable "disposable" bowls and jars may have been preferred even if they were prone to spalling (Kenmotsu 2005:119, 121–123; O'Brien 1990). However, this reasoning does not hold up everywhere, since relatively thin-walled jars were the preferred vessel technology at Salt Well Slough. Nevertheless, since the salt-making season at this site seems to have been episodic or fairly short, it still may not have been feasible for the salt makers to construct large, specialized saltpans when vessels used for everyday domestic activities at the nearby Arnold Roitsch/Sam Kaufman site would have sufficed. For groups with prolonged salt-making seasons or who were living at the saline on a semipermanent or permanent basis (e.g., Hardman), larger, reusable pans may have been favored, since they would not have had to have been hauled away from the saline.

Regardless of whether the pans, bowls, or jars were used to evaporate brine, it is apparent that coarsely ground shell was the preferred tempering agent for most Mississippian salt-making vessels. Compared to sand and grog, this temper material has a greater resistance to thermal shock, which would have made it ideal for use in cooking vessels (Feathers 1989; Steponaitis 2009:37–45). Given that saltpans, bowls, and jars were often used to "cook" brine, this particular attribute was undoubtedly of importance to the prehistoric salt makers. Thus, it is no surprise that in many regions some of the earliest examples of shell-tempered pottery are found at salt production sites (Perttula et al. 2011; Weinstein and Dumas 2008).

Salt bowls and jars are sometimes fairly standardized, especially those at Drake's Salt Works and Potter's Pond in northwestern Louisiana (Eubanks 2011, 2014b). The standard size of these bowls would have yielded a known and portable quantity

of salt, which could then be traded for a known quantity of another item (Eubanks 2014a). Having a standard unit of salt would have proved particularly beneficial during the early to mid-eighteenth century, when the salt makers of northwest Louisiana were trading large quantities of salt to European traders and settlers (Eubanks 2014a, 2015). In short, salt of a standard measure such as this may have been thought of as a type of currency. Additionally, if standardized bowls were being made off-site, then they could easily be stacked and transported to the saline. Transporting already-fired vessels to the salt licks not only would have helped conserve fuel that could otherwise be used for heating brine, but it also meant that the salt makers would not have to spend valuable time at the saline making pots when they could be producing salt (Dumas 2007:419–420). For example, evidence of off-site salt bowl manufacture can be seen in southwest Alabama, where cane-impressed bowls identical to those from nearby salines have been found at non-salt-making sites such as Bottle Creek (Fuller and Brown 1993). While it would have been more time and fuel efficient to make salt bowls and jars away from the salines, there is at least one historical example of on-site pottery production. When visiting a saline in northern Louisiana, the French historian Antoine Simon Le Page du Pratz reported that the salt makers "made earthen pots on the spot" for their salt-making operation (Antoine Simon Le Page du Pratz in Swanton 1998:78). On-site pottery production also appears to have been favored in cases where saltpans were the primary salt-making vessels, since clay-lined molding pits are common occurrences at these salines.

At French Lick, Great Salt Spring, and the salines of southwest Alabama and southeast Missouri, stone cobbles could have been utilized as sources of indirect heat or perhaps as supports to help elevate the salt-making vessels above a fire. At many of these salines, limestone cobbles, in particular, are found in fairly large quantities. Since dense limestone tends to retain heat much better than porous limestone and since many types of limestone lose density when heated (e.g., Saidu 2011:101–103), it may have made sense for the salt makers to acquire "fresh" limestone if this material was being used for indirect heating. If this is correct, then it may explain why this artifact class is often so abundant at salt-making sites.

Briquetage in the Eastern Woodlands

When Brown first published his work at Salt Mine Valley 35 years ago, he noted that there was only scant evidence for the existence of briquetage in the Eastern Woodlands. The same still holds true today. Whether this is due to misidentification, poor preservation, or the absence of such items is still up for debate (Brown 1999a, 2004a, 2010a; Eubanks 2014a). There have been some intriguing pedestal-like objects found in the Eastern Woodlands, but in many cases, a direct connection between these artifacts and salt production sites has yet to be clearly demonstrated. Numerous cylindrical ceramic bars have been found at non-salt-making sites such as Cahokia; Hardin, in Kentucky; Lawhorn and Banks Village, in Arkansas; and Cairo Lowlands, in Illinois (Brown 1980a:80–84). A few of these objects have also been found at the Lilbourn site in Missouri, the Williams site in Kentucky, the Clover site in West Virginia, and the Waterworks site in Ohio (Brown 1980a:81,

Figure 17). These artifacts bear a striking resemblance to the pedestals of Mesoamerica and Europe (see Figure 2), but with a few exceptions, very few pedestal-like objects have been identified from salines in the eastern United States.

As with the clay pedestals, there are very few definite examples of augets from the Eastern Woodlands. While small ceramic vessels do appear in the archaeological record, it is unclear if they were used to trade salt. Perhaps the strongest candidates for augets outside of Salt Mine Valley are Cahokia "crud" pottery and the "Wickliffe Funnel." Examples of Cahokia crud frequently occur in Early Mississippian contexts in the vicinity of southern Illinois, and they often have small holes in their bases that could have been used for draining or filtering (Brown 1980a:84). The same is also true of the Wickliffe Funnel. This vessel has been referred to as Wickliffe Thick by Phillips (1970:171–172) and the Wickliffe form by Reagan (1977). Williams (1954:238) suggested that Wickliffe vessels may have been used to help filter out impurities from brine. If their bases were lined with fabric or plant material, then "funnel" vessels would have served admirably for such a purpose. It is also possible that the larger ends of these vessels were set into the ground in sets of three to serve as a type of tripodal support (Reagan 1977:297–298; Wesler 1998:316). Despite their potential salt-related functions, thus far Wickliffe Funnels have rarely been found at salt production sites.

Summary and conclusions

Throughout the Eastern Woodlands, especially in the Midwest and central Mississippi Valley, thick basin-shaped saltpans were the primary vessel form involved in the salt production process. These vessels were usually plain or fabric impressed, and it is possible that the former replaced the latter at some point during the Middle or Late Mississippian period (A.D. 1200–1500) (Brown 1980a:Figure 11). In parts of the Deep South, especially shortly before and during the protohistoric period, a different salt production technology involving thin-walled bowls and jars was preferred. It is unclear why these vessels were favored over saltpans, but it is possible that some deciding factors included the length of time spent making salt, production efficiency, fuel efficiency, and the desire to produce a standard-sized salt cake (Brown 2010b, 2013; Eubanks 2014a, 2015; Kenmotsu 2005:119; Muller 1992:91). In instances in which groups were traveling long distances to reach the saline, it may have made sense for them to utilize smaller, more portable vessels, even if they could only be used a limited number of times before breaking apart. Since traveling to make salt appears to have been more common in the Deep South, this may be one reason bowls and jars tend to be more common in this region. However, this explanation does not resolve the issue of why salt producers in the Deep South were more likely to travel to make salt in the first place. While we may only venture guesses as to why this was the case, perhaps conflict, competition, or contracting exchange networks played some role.

We have argued here and elsewhere that salt bowls and jars may have also been associated with the adoption of specialized briquetage forms (Brown 1980a, 1981a, 1999a, 2010a, 2015). These forms include small salt-trading augets and

clay pedestals that would have been used to elevate salt production vessels above a slow-burning fire. There have been a handful of augets and pedestal-like objects found at or near some salines in the Eastern Woodlands, but a definitive link between these materials and salt making has yet to be established. If such a link does exist, it is most likely to be found at the salines of Louisiana, Alabama, and Texas, since it is there that salt production technologies involving thin-walled bowls and jars seem to have originated.

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