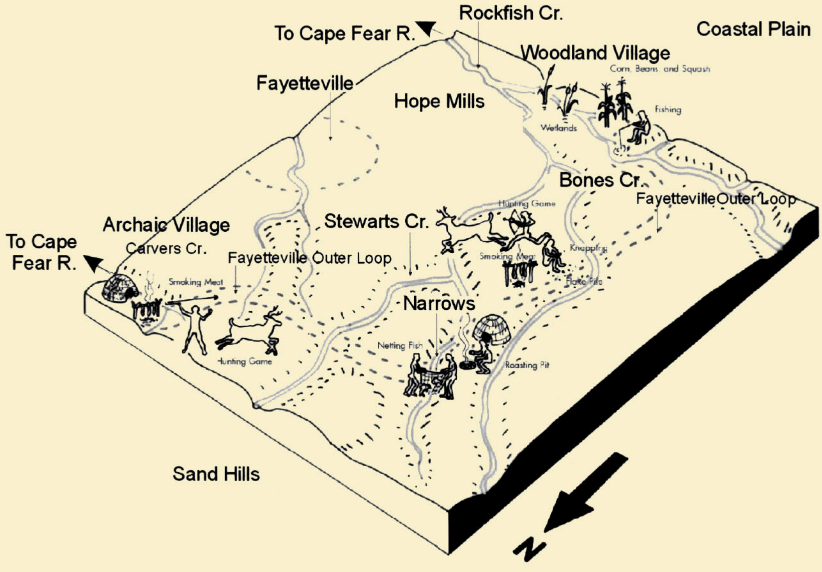
North Carolina Archaeology



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STEEP SHORE, DEADLY ENVIRONMENT: THE CASE FOR A CULTURAL ANVIL ALONG THE UNEMBAYED ATLANTIC COAST

by
Joel D. Gunn

Abstract

In his physiography of Eastern United States, Fenneman divided the Atlantic coast into embayed and sea island (largely unembayed) segments at the Neuse River. The southern North Carolina coast is unembayed because of geologic uplift. To the north (i.e., North Carolina and Virginia) and south (i.e., South Carolina and Georgia), submerged coasts and river systems support some of the world's richest estuaries. Cultural patterns inland from the two kinds of shorelines differ profoundly and reflect a fundamental characteristic of coastlines, shallow and rich or steep and impoverished. The ecological ramifications of these shoreline habitats sum to long-term stability or instability, both near-shore and inland. In pre-modern times, a key variable for human populations was the magnitude of late winter anadromous fish runs. Unstable landscapes such as existed on the southern North Carolina Coastal Plain have been discussed as "cultural anvils." The implications of the cultural anvil model are explored for the region.

Over the last 20 years, a local cultural chronology has emerged in the southern Coastal Plain of North Carolina that differs from surrounding regions in many respects (Herbert 1999; Irwin et al. 1999; Sanborn and Abbott 1999; Ward and Davis 1999:194-228). Rather than being a monolithic, *in situ* developmental sequence, the region appears to evolve as an extremely complex interleaving of indigenous cultures with traits from surrounding cultural complexes. This interleaving is evident in mortuary and ritual contexts, especially mound construction. Ceramics provide a sensitive, multidimensional analysis of the mixing of indigenous and introduced traits (Anderson 1996; Cable 1998; Sanborn and Abbott 1999:15). What are the underlying factors that generated this combustible cultural pattern?

In this article I examine southern North Carolina Coastal Plain cultural patterns in the context of the broader Atlantic Slope. I then frame these cultural patterns in a geologic and climatic perspective that illuminates their landscape context and boundaries. Some of the characteristics of the cultural chronology suggest a cultural process referred to elsewhere as a "cultural anvil," a cultural trap set by environmental circumstances (Fitzhugh 1972; Gunn 1979; Gunn and

Sanborn 2002:64, 67). Landscape models have generally proven to be valuable and productive concepts (see Stine et al. 1997 for discussion and practical examples). The cultural anvil model, like all landscape models, incorporates the elements of geology, climate, and bioculture to understand cultural processes (Crumley 1994; Gunn 1994*a*). The cultural anvil model is especially effective where permanent conditions set by geologic and climatic phenomena beat out a relentless pattern of environmental change. Although archaeology is inherently a regional science (Willey and Phillips 1958)—a science whose spatial unit of analysis is the region—in this article I suggest that regional events and trends only make sense when understood in appropriate geological and climatic contexts.

Cape Fear Culture—What It Is Not and Is

The Coastal Plain within North Carolina (Figure 1) is divided by archaeologists at the Neuse River for a number of reasons (Herbert and Mathis 1966; Phelps 1983; South 1960; Ward and Davis 1999:194–195). Not the least of these reasons is that in historic times it was the boundary between the Iroquoian and Algonkian speakers to the north and probable Siouan-speaking groups to the south (Abbott et al. 1995:25). South of the Neuse River is the Cape Fear River, which parallels the border between North and South Carolina. The Cape Fear River basin is the focus of this study as it contains the characteristics that distinguish the southern Coastal Plain from surrounding regions. For reasons that will be discussed next, the northern South Carolina Coastal Plain shares attributes with its North Carolina sister region (Cable 1998) and should be considered a part of this study.

The prehistoric cultures of the Cape Fear River basin transition between the usual Archaic (8000–1000 B.C.) and Woodland (1000 B.C.–A.D. 1650) weapons systems and food preparation technologies: dart points to arrow points, fire cracked rock to ceramics. Some recent dating argues that ceramics may have developed as early in the Cape Fear River valley as anywhere along the Atlantic Slope (Jones et al. 1997; Sanborn and Abbott 1999:15). However, in the long term and broad areal perspectives, the regional cultural evidence remains relatively ephemeral across the millennia of prehistory. Although evidence is plentiful that people of the Coastal Plain knew of and had systematic exchanges of goods with Mississippian groups (A.D. 800–1600) to the west and south (Irwin et al. 1999:59; Ward and Davis 1999:210 ff), they never fully adopted the cultural regalia of the chiefdom- or state- based Mississippian

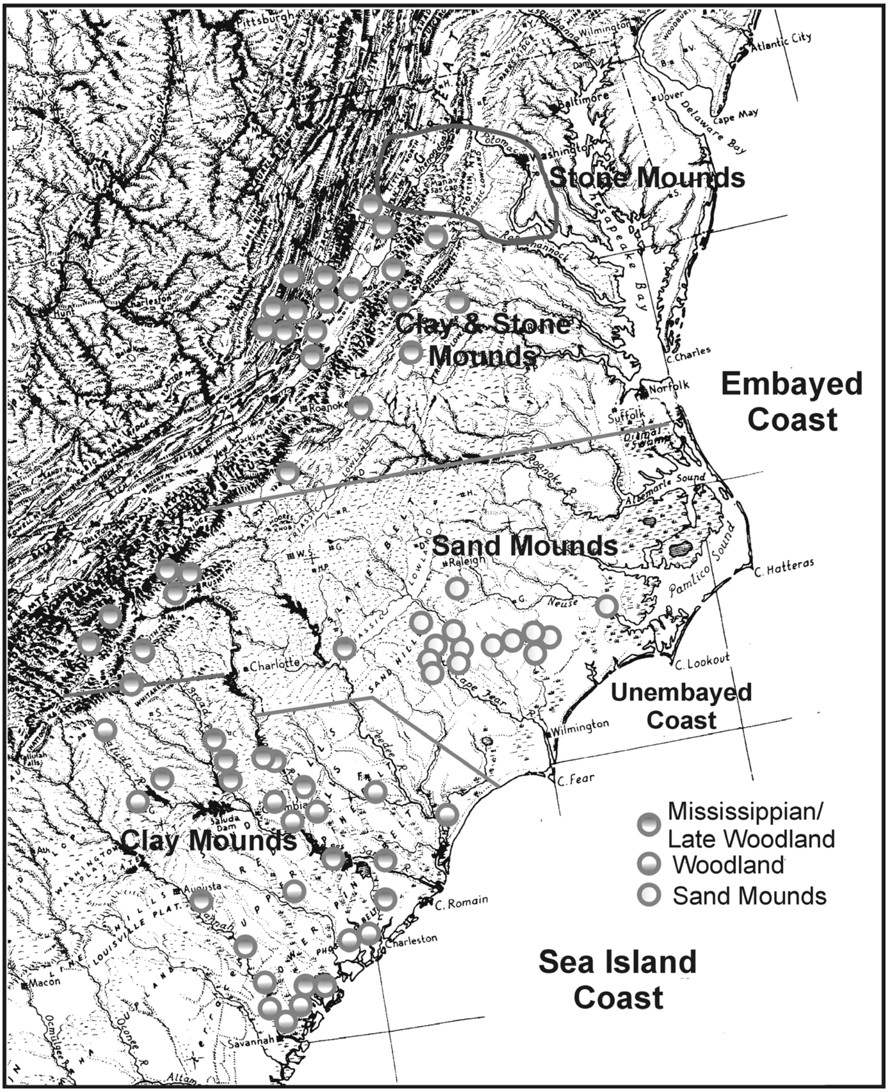


Figure 1. Distribution of stone, clay, and sand mounds along the Atlantic Slope (adapted from Dunham 1994, Frierson 2002, Gardner 1993, Levy et al. 1990).

civilizations. This distinction is recognized in the local cultural chronology as a continuation of the Woodland period until the seventeenth century. The period recognized in adjacent regions as Mississippian is termed Late Woodland (A.D. 800–1650) in the lower Cape Fear River valley.

The disjunction between the cultures of the lower Cape Fear River and surrounding regions is nowhere more apparent than in the distribution of accretional mounds, clay, rock, or sand structures designed initially for mortuary purposes in the Woodland and later for ritual in the Mississippian (Willey 1966) (see Figure 1). As near as South Carolina (Frierson 2002), and in the Appalachian Mountains and foothills (Dunham 1994; Levy et al. 1990), such mounds were recapped generation after generation for 100s of years and grew to great size. In the Chesapeake Bay area, rock mounds were constructed, some to considerable heights with standing interments (Gardner 1993; Gunn 1994; Pigeon 1853). In great contrast to these intentional structures, on the southern Coastal Plain, occasional opportunistically appropriated natural sand mounds were used for multiple interments. A possible cluster of constructed low sand mounds has been identified near the Cape Fear River channel on Rockfish Creek to the southwest of Fayetteville, North Carolina (Irwin et al. 1999:61; Ward and Davis 1999:206–210). Artifacts recovered from these mound burials clearly indicate contact with Mississippian groups, and perhaps origins from among them. They include 25 stone smoking pipes, some of which were platform pipes made in the style of the Ohio Valley Middle Woodland Hopewell tradition (Ward and Davis 1999:207).

A parallel line of evidence is historically recorded Indian trails. Recent research suggests that Indian trails in some cases may have origins as early as the Paleoindian period (M. Brooks, personal communication, 1998), and could have been elephant migration routes in the Pleistocene. A map of these trails as they were known in the historic period (Myer 1971) shows major paths skirting the Coastal Plain along the edge of the Piedmont, and proceeding onto the Coastal Plain in South Carolina and Virginia, but seldom going into the Coastal Plain in North Carolina.

The mound and path patterns seem to imply a rather donut-hole cultural enclave in the Coastal Plain. What are the underlying causes of the cultural donut-hole? Although without imposing mounds and depopulated in historical times, the region was certainly culturally active in prehistory. As far as they can be traced, given a less than refined cultural chronology, on occasion migrations and/or diffusions of cultural traits appear to enter *into* the southern Coastal Plain from north, south, or west, cross its landscape, but not penetrate beyond its opposite boundary (Figure 2). In other words, they seem to be trapped or “boxed in” by the southern Coastal Plain. Other cultural traits approach *to* or expand *through* the region. Ceramics varieties and some other traits provide examples:

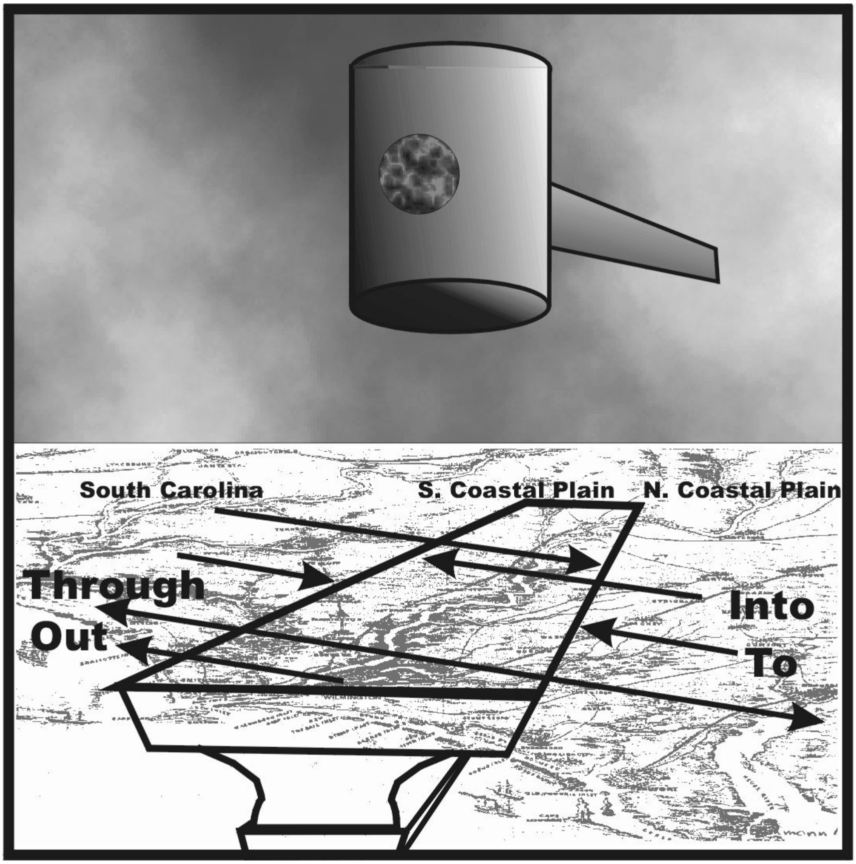


Figure 2. Movement patterns of traits relative to regions.

Into. There are several examples of traits penetrating into the region, but not spreading beyond it boundaries. In the Late Archaic (2000–1000 B.C.), Thom's Creek sand-tempered ware with reed-punctate and plain surface treatments appeared in South Carolina and crossed into the region spreading to the Neuse River but not beyond (Herbert 1999:43). Soapstone-tempered ware (Marcey Creek, 1200–800 B.C.) spread from the Chesapeake Bay region beyond the Neuse River (Herbert 1999:43). During the late Middle Woodland (around A.D. 600), Algonkian mortuary practices and physiology crept into the region from the north and halted half way across at the New River, then retreated to the Neuse River by the historic period

(Mathis 2000). (What conditions restrain traits from spreading beyond the regional boundary opposite that of entry?)

To. Some traits ceased to advance at the boundary of the southern Coastal Plain. Croaker Landing clay and grog tempered ware reached only *to* the southern Coastal Plain northern boundary (Herbert 1999:43). The Algonkian movements crossed into the southern Coastal Plain, but later retreated to the northern Coastal Plain being limited to it. (What conditions restrain traits from entering a region?)

Through. Other traits extend *through* the southern Coastal Plain and into adjoining territories such as fiber tempered ware, which originated in the south and is found as far north as the Chowan River (Herbert 1999:43). (Were key elements of the Middle Holocene climate so different that Stallings territory included a range beyond the Neuse River? Or, was it merely that some Holocene climates extended the range of Spanish moss further north along the coast? Was Stallings a water-oriented adaptation and thus not limited by the characteristics of the southern Coastal Plain?) Middle Woodland Deptford sand-tempered, check-stamped ceramics not only crossed the southern Coastal Plain, but also expanded in the form of Yadkin grit-tempered, check-stamped ware into the westward adjacent Piedmont (Herbert 1999:44). (What were the contextual conditions that permitted these movements through the southern Coastal Plain into nearby regions?)

Out. Some varieties of ceramics appear to originate in the southern Coastal Plain and spread *out* from it. Hanover grog-tempered ware appears to begin in the region and later exit to South Carolina (Sanborn and Abbot 1999:15). Early Woodland Hamps Landing limestone tempered ware might be another such case as it appears in both North and South Carolina; dating remains ambiguous (Herbert 1999:43). (Under what conditions did indigenous inventions spread out of the southern Coastal Plain?)

The movement of cultural traits into the southern Coastal Plain has provoked an enduring debate. It has been the subject of attention since South began his studies around the mouth of the Cape Fear (Ward and

Davis 1999:196). The cultural anvil hypothesis differs from that of South (1960) in that it supposes all boundaries of the southern Coastal Plain region pose filters and barriers to the flow of ideas and populations. The reason being that when the region is invaded, either by thought or deed, that movement presupposes a pre-adaptation to the then-current conditions of the southern Coastal Plain in one of the three surrounding regions. The extent of the movement will be constrained at the opposite boundary by characteristics of the region unless that region has assumed similar conditions. On occasions where new patterns run through the boundaries of the region, explanations other than environmental adaptation appear to be appropriate. For example, during the Late Archaic, fiber-tempered Stallings Island ceramics spread *through* the region as far north as the Chowan River (Herbert 1999:43; Ward and Davis 1999:199). Why was Thom's Creek, the contemporary of Stallings Island, constrained by the northern boundary of the region while Stallings was not? In an equally interesting reverse perspective, Early Woodland Marcy Creek steatite-tempered ware (Ward and Davis 1999:199) and Middle Woodland Mockley Creek (Ward and Davis 1999:203) found their southern limit at the Neuse River implying a mal-adaptation to the then-current conditions that prevented its movement further south.

The repeated occurrence of boundary-limited influxes of cultural phenomena into the southern Coastal Plain suggests an enduring cultural process. In the following sections of this article I attempt to find possible influencing factors that may underlie such a process. By "process" I mean an identifiable cultural development that reoccurs in a similar pattern multiple times. If it reoccurs twice, it is a possible process. If it reoccurs three times or more, it is a probable process. Support for a process emerges from the identification of a constellation of factors that arguably could account for the reoccurring features of the process. Since we view past cultures through their technologies, a new process will emerge with each new technological change such as the shift from stone boiling to ceramic-vessel food preparation technologies.

Cape Fear Arch—the Geological Anvil

The preeminent feature of the Atlantic coast that evidently separates the northern and southern Coastal Plain is the contrast in coastlines. From the Neuse River north, the coastline winds it way through a fractal maze of bays, islands, river mouth insets, and barrier islands. The length of the coastline from the Neuse to Chesapeake Bay traces five times the length of that to the south (Herbert and Mathis 1996; Phelps 1983; South 1960;

Ward and Davis 1999:194–195). Early on, the contrasting features of the two zones of the coast impressed Fenneman (1938:38–46) enough for him to give separate names, "embayed coast" to the north and "sea island coast" to the south. Fenneman attributed this difference to the concave shape of the sea island segment of the coast. The concave coast focused tides accounting for higher tidal rises and more extreme water movements in and out of river mouths. This influx and outflux of sea water prevented the accretion of barrier islands and cut the coast into island segments between river mouths.

Culturally, the embayed-sea island distinction is significant because broad coastal estuaries such as those found north of the Neuse River support the transference of large runs of migratory or anadromous fish between salt and fresh water. Such fish runs are a key survival issue among subsistence hunters and horticulturists since they appear at a critical time of the year. During the late winter and early spring, food is most likely to be in short supply among hunters and gatherers and subsistence agriculturists (Gunn et al. 1998; Gunn and Stanyard 1999; Millis 1999). Thus, at the first level of analysis, the embayed coast could be expected to support a much more plentiful key subsistence resource than the sea island segment of the coast. This pattern ramifies up the Coastal Plain to the Piedmont boundary or fall line, the highest point in the rivers where anadromous fish can reliably be expected in the driest years (Gunn et al. 1998; V. Schneider, personal communication, 1998).

At the same time that Fenneman was describing the outline of the Atlantic slope, his geological colleagues were studying the Cretaceous and Cenozoic geological strata of the Coastal Plain and developing information that would serve to explain the differences in coastal outlines, and ultimately refine the description. Upper Cretaceous marine sediments were initially deposited around 100 million years ago against the crystalline Piedmont bedrock in deep formations (Sohl and Owens 1991). River deltas and near-shore currents did most of the work. Some time around the beginning of the Cenozoic (about 50 million years ago) the area of the southern Coastal Plain began uplift by geologic forces. Thus, while the Neuse River to the north and the Pee Dee River to the south remained low and subject to marine transgression and deposition, the Cape Fear valley was uplifted and left high and somewhat dry, a feature referred to as the Cape Fear arch (Figure 3). The Cape Fear River and its tributary, Rockfish Creek southwest of Fayetteville, North Carolina, cut deep into the Cretaceous sediments. For this reason, most of the geological type sections of Cretaceous age deposits are in the deeply dissected inner Coastal Plain and Sand Hills around Fayetteville.

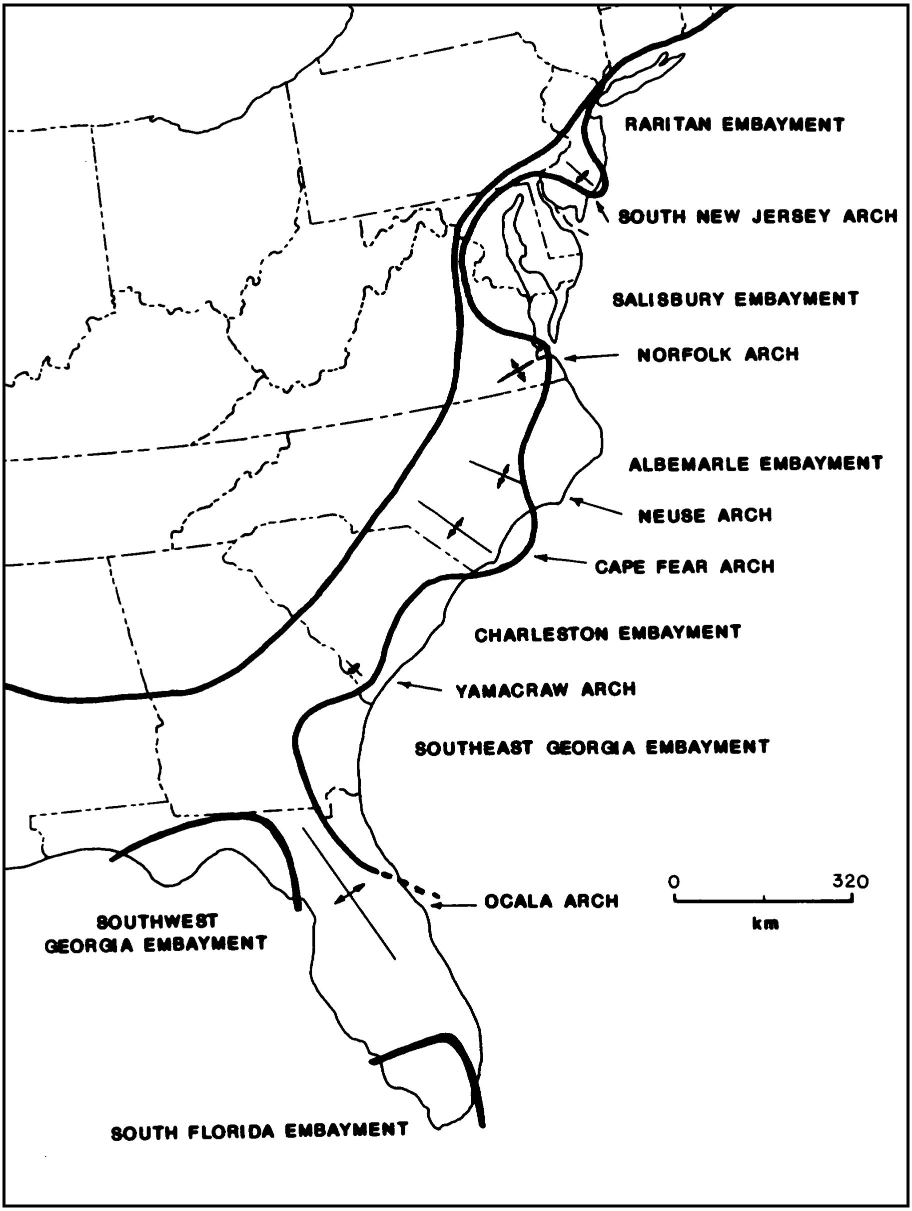


Figure 3. The Cape Fear Arch and other structural features of the Atlantic Coast (adapted from Ward et al. 1991).

Figure 4. Photograph of the deeply incised Cape Fear River during construction of the Fayetteville Outer Loop.

The consequences of this uplift are more than a little noticeable. The Neuse and Pee Dee rivers are soggy, meandering rivers that bury their history in ample sediment loads. Since the beginning of the uplift, the Cape Fear River has been destroying its history as it cuts sideways to the southwest deep into a 100 million years of accumulation (Figure 4). Surrounding elevations are dry and occasionally have been near desert (Robinson 1986; Sohl and Owens 1991). In the Middle Holocene (4500–7500 B.P.), sand blew freely in the Cape Fear valley, creating active sand dunes (Soller and Mills 1991:301–302). During the Illinoian glacial advance, blowouts appeared across the Cape Fear watershed on the Socastee formation, resulting in the highest density between Maryland and Florida of Carolina Bays, or oval upland ponds (Bennett and Nelson 1991; Soller and Mills 1991). These features are not visible in the Pee Dee and Neuse valleys because they were intermittently reworked by Cenozoic marine transgressions and not of sufficient elevation to support drought and the creation of aeolian features. The uplift also brings a solution to the unembayed character of the southern Coastal Plain shoreline. In the coastal zone, the steeper continental shelf created by the uplift imposes an attenuated breadth. In addition to the sea island process, the steep shore and narrow coastal zone further limits anadromous fish estuary habitat. The difference is so distinctive along the southern North Carolina coast that it will be referred to here as the "unembayed" portion of the sea island coast.

We are privileged to a firsthand account from 1663 of conditions on the Cape Fear arch. Between September 24 and December 4, 1663, the ships company of the *Adventure* explored the Cape Fear River basin traveling up several of its tributaries (Lawson 1967:72–79). It appears that they ascended just beyond present day Fayetteville in the main channel of the river. In the lower reaches of the Cape Fear valley they observed great pines growing in barren ground, in other places large dried swamps they judged good for pasture. On the Coastal Plain they reported "good lands" within two miles of the river but beyond that "all Pine Land, but good Pasture Ground" (Lawson 1967:75). Along the river channel above Fayetteville were oaks, pines, and a number of other species of trees.

Some judgments can be made about the moisture regime of the period from these observations. The pine parklands on the Coastal Plain suggest an active fire regime and insufficient spring moisture to support deciduous varieties of trees. However, the oak-pine forests in the Sand Hills-Fall Line zone indicate that the elevation of those features triggered enough precipitation in the spring on a regular basis to sustain temperate species. Apparently the hydrological regime was not moist enough near the coast to sustain the large seasonal swamps as they were dry and grassy. The *Adventure* exploration was during the later Little Ice Age (1650–1750, Stahle et al. 1988:1518). Tree rings from the Black River (see below) "become drier" according to Stahle et al. (1988), though 1663 is only a decade into a century-long episode of drought. It may also be important that the Cape Fear valley was uninhabited by Native American, while one of its tributaries, perhaps the Northeast Cape Fear River near the coast, sustained substantial populations whose subsistence included acorns, fish, and corn. The Native Americans also appear to have been raising cattle and hogs.

Culturally, the rather peninsular character of the Cape Fear arch lends a certain coherence to cultural patterns in the southern Coastal Plain. Colonial Scots Highlanders (Fischer 1989:818; Powell 1989) occupied the Cross Creek confluence of the Cape Fear River following 1730 and created a distinctive American version of highland culture (Ray 2001). They continued up the elevated landscape to the west, apparently a product of the same uplift as the Cape Fear arch. They continued up the well-worn roots of the Uwharrie Mountains and the highest elevations in the southern Appalachian Mountains, such as Grandfather Mountain where the Highland Games are held to the present.

During prehistoric times the dry elevations of the Cape Fear arch witnessed the only intrusion of Mississippian mound building in the constructed sand burial mounds to the southwest of Fayetteville. Grog tempered ceramics seem to have moved up the Cape Fear River and been somewhat constrained to it as will be discussed below. Myer (1971) shows the only path to the coast from the Piedmont to wend its way down the Cape Fear desert to Wilmington.

Cultural Interleaving—A Confusion of Temper and Surface Treatment

As discussed above, influxes of cultural traits into the Cape Fear arch and southern Coastal Plain appear to have a bounded character. Although subject to a number of influxes of cultural traits across its region boarders, the spread of these traits seldom exceeds the opposite regional boundary. When traits do exceed the boundary of the region, it seems to be in cases where they originated in the region and spread outward from it, such as grog tempering (Sanborn and Abbott 1999:15). This pattern gives an interleaved character to the accumulated traits as appears in the shuffling of a deck of cards. It is also important to note that the boundaries seem to filter the range of traits that find acceptance in the region. A perfectly understandable example of this dynamic is clay mounds since clay is available only in limited quantities in dominantly sand and gravel sediments. However, the size of mounds is also limited by population size and consequent constraints on the organization of labor to build mounds. This is most likely a product of the anadromous fish limitation.

Because of the many physically independent dimensions of ceramic manufacture, such as paste and surface treatment, ceramics provide an unusually sensitive gauge of trait interleaving. An interesting case is

Hanover ceramics. Grog-tempered ceramics appeared in the late Early Woodland-early Middle Woodland in the southern Coastal Plain of North Carolina in an associated pattern of paste and surface treatment recognized as the Hanover type (Sanborn and Abbott 1999:15). Three hundred years later, grog temper was manifest in the South Carolina Coastal Plain as two recognizable ceramic types, Hanover and Refuge (Cable 1998; Sanborn and Abbott 1999). Was grog tempering introduced to two groups of ceramists in South Carolina, each of which gave vessels with that temper a special cultural spin, a characteristic surface treatment?

An equally intriguing sequence of events unfolds during the late first millennium A.D. Hanover ceramics with a dominant temper of grog appeared (Herbert et al. 2002). Given the earlier dates for Hanover/ Deptford-like ceramics in the area, at about 1000 B.C. (Sanborn and Abbott 1999:15), the Middle Woodland and Late Woodland coherence of the dates obtained on the grog tempered sherds by Herbert et al. (2002) might be entertained as a reintroduction from the south around A.D. 500. A sand-dominated temper pattern continues until about A.D. 1500 (Herbert 1999:5; Herbert et al. 2002). However, during the Medieval Maximum a subset of Hanover ceramics acquires a grog-dominated pattern. The question might be asked if the population introduced from the Pee Dee imposed this pattern as part of their control of the region while local potters continued with their established paste construction habits. Was the transition gradual, or did contextual factors contribute to a founder's-effect cultural drift in ceramic manufacture? Was some other process involved such as a change in the marriage alliance patterns that altered the means by which potters came to the region?

In addition to the shifting grog temper scene, other influences were at work. During the early Middle Woodland, the region seems to have been dominated by cord-marked, pebbly sand-tempered New River ceramics (Sanborn and Abbott 1999) and a culture that sported Eared Yadkin points (Claggett and Cable 1982; Gunn et al. 1998). Probably around A.D. 200, fabric-impressed wares appeared from the north along with Wakefield points, a derivative or relative of Piscataway points in Virginia (Claggett and Cable 1982; Gunn et al. 1998; Kurchin 2001). Can the rhythm and timing of these interleavings be matched to detectable changes in conditions on the Cape Fear arch?

Cultural Analogy—Cultural Anvil

The prehistoric cultural upheavals evident in the southern Coastal Plain are set in the context of the elevated, drought-prone terrain of the

Cape Fear arch and the relative lack of stability that anadromous fish provide. As such, the unembayed portion of the coast and its hinterland become, at least in theory, a region in which populations are likely to be unstable and to suffer occasional episodes of population setback. Such areas are referred to as “cultural anvils” (Fitzhugh 1972; Gunn 1979). People occupy cultural anvil regions during episodes when climate or other factors favor occupation by their technology. When the favorable regime collapses at too sudden a pace for readaptation, its human population follows suite. The classic example is that of the Naskapi of the Labrador Peninsula who subsisted on caribou as big game hunters. This pattern continued until an unusual episode of winter warming melted the snow enough to cause a sheet of ice over the moss and lichen food of the caribou. Without forage, the caribou population disappeared in one winter and the Naskapi were crushed as a big game hunting culture. They were forced to resort to Eskimo villages along the coast where they ate fish, the worst humiliation to their minds (Fitzhugh 1972). Presumably the Naskapi would eventually be replaced when hunting was better by a group moving in from a nearby region, the Montagni of the boreal forest, as the Naskapi themselves had done earlier. While the Naskapi are an unusually dramatic example, other cultural anvils can be readily cited. Among them are nineteenth-century Euro-American settlers of the Plains who flourished for a time but eventually experienced the dust bowl of the 1930s, a periodic drought phenomenon of the Plains (Gunn 1994*a*). The tragedy and cultural upheaval of the 1930s still resonates in parts of the country as distant as California, as illustrated in Steinbeck’s treatment in *The Grapes of Wrath*.

The Black River Tree Rings: The Climatic Hammer

In the case of the Naskapi, the effects of global warming are readily evident: winter ice blocks access to moss and lichens – caribou die – end of culture. On the Cape Fear arch, the links between the earth system and local climate are not so immediately apparent. The exact impact of climate change on the unembayed segment of the Atlantic Coast and Coastal Plain requires patient investigation and the following is offered as a preliminary model.

For later cultural periods such as the Late Woodland, the central concept of a cultural anvil model might be represented in the following scenario. An episode of reliable rainfall in the appropriate season lures unsuspecting horticulturists from a nearby region. These “good times” are followed by an episode of insufficient and/or seasonally inappropriate precipitation. Population stresses inevitably arise. Were there a sufficient length of time between the luring and the stressing, evidence of a cultural adaptation would accumulate on the landscape. The subsequent period would be marked by some alternative pattern of cultural adaptation.

A pattern of stress can be seen in the transition from Middle to Late Woodland in the northern South Carolina interior Coastal Plain west of Charleston, South Carolina, a finding that originally suggested to this author that an anvil effect existed. At that time, single component site inventories indicate a sudden decline in the number (n=21 to n=5) of artifact categories (points, scrapers, ceramic wares, etc.). I later discovered that this transition could have been the outcome of a worldwide cooling event and local drying (Anderson 2000; Gunn 1991, 2000*a*).

Other previously formulated subsistence models could easily work as components of a cultural anvil explanation. Loftfield's (1988) subsistence model for Woodland cultures in the Wilmington-New River area, which posits retreat to the coast during periods of poor agricultural productivity to collect shellfish, could be the product of an unstable culture-climate process in the coastal hinterlands on the Cape Fear arch; it would be a habituated version of the Naskapi fleeing to the coastal Eskimo. Mathis (personal communication, 2002) attributes the aforementioned retreat of the prehistoric Algonkian speakers from the unembayed section to the decline of shellfish and schooling fish in near-shore waters as sea level declined during globally cooler periods. Such conditions would have been coeval with drought in the interior Coastal Plain as both events are the result of global cooling. Woodall's (2000) model of shifting resource bases between lowland horticulture and upland mast depending on seasonality of moisture would be appropriate for the inner Coastal Plain where coastal resources were less accessible. In the Savannah River basin, Anderson et al. (1995) developed a storage model to explain climate-related cultural changes and adaptations. When droughts were of sufficient duration, cultural changes ensued. On the Cape Fear arch, the aggregated potential for climate, cultural, and population change would have contributed to the cultural transitional zone frequently discussed by various authors (Abbott et al. 1995; Cable 1998; Mathis 2000; Phelps 1983; South 1976; Willey 1966), which is generally identified with the unembayed, uplifted segment of the Atlantic Coast.

Refinement of local lithic and ceramic chronologies is required before they can provide a continuous cultural influx-outflux record that would definitively support a cultural anvil model. In the present state of knowledge two questions can posed whose answers imply relevant research:

1. What were the likely times of ideal conditions that would have encouraged influxes of populations or ideas/traits to the Cape Fear arch region?; and
2. Are there any particular incidents of cultural change that encourage this line of research?

The first question of appropriate times is largely a climatic question from the point of view of the cultural anvil model. The geological component is effectively stable for the time period of this study. As the above discussion of Pleistocene and Holocene sand movements suggests, global conditions appear to correlate with those of the Cape Fear arch in a three-faceted relationship. If global conditions are cold, as in the glacial or late Little Ice Ages of the 1600–1800s, cold droughts ensue. During globally hot times, as during the Middle Holocene (5500–2500 B.C.) or Medieval Maximum (A.D. 900–1250) (Gunn 1994*c*), hot drought transpires. In some yet-to-be precisely defined intermediate range of global temperatures, sufficient precipitation accrues at the correct time of the year to support more temperate climate and its associated ecology and complex of food plants dependent on late spring-early summer moisture. When was it neither globally too hot or too cold to cause culture-crushing droughts? When were conditions just right for people to enter the region and enjoy a sufficient amount of moisture at the right time of the year to hunt and crop?

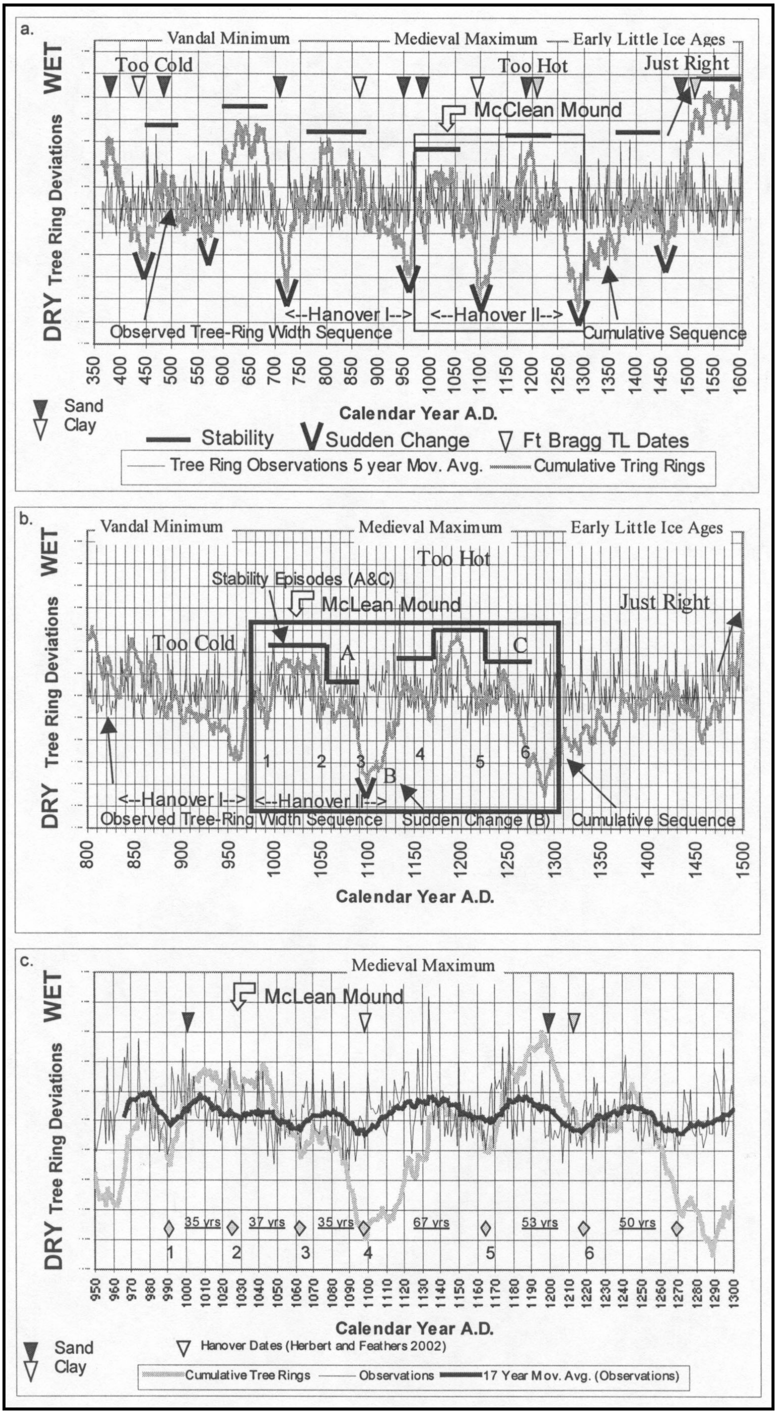
Tree Rings and Culture

The immediate entree to the question of appropriate climate on the Cape Fear arch is tree rings from the Black River, a tributary of the Cape Fear River on the Cape Fear arch. Stahle et al. (1988) found the longest tree ring record on the Atlantic Slope in the durable wetlands of the Black River. The great age of the trees has the favorable effect of making them appropriate for the study of long-term climate change (Esper et al. 2002: 2250). Why the Black River swamps should be such a reliable bed for the growth of bald cypress is an interesting question in itself: perhaps because of its extremely flat floodplain as it edges toward the center of the Cape Fear arch at its confluence with the Cape Fear River.

The Black River tree ring chronology begins in A.D. 365 and runs unbroken to the present. A cumulative graph (Bell 1975) of the tree ring time series distinguishes periods of stability from sudden change (Figure 5*a*). The Medieval Maximum provides a clear example of the distinction between periods of stability and sudden change. In the middle of an approximately 300-year period of relative stability, a sudden change around A.D. 1100 marks local drought, probably the result of a global cooling event. This pattern is recognizable in the climatic profiles of the Medieval Maximum in many regions worldwide. The cultural impacts are also clearly observed. In Europe the construction of cathedrals slowed. In the American Southwest, the building of new Anasazi settlements abetted for a time. The change is thought to be the result of volcanism.

The cumulative graph of the Black River tree-ring sequence from A.D. 365 to A.D. 1604 shows several sudden changes (see Figure 5*a*). They separate seven periods of stable spring-summer moisture appearing around A.D. 400, 600, 800, 1000, 1200, 1350 and 1500. Herbert et al.'s (2002) ceramic dates (also shown) demonstrate that in their present study they correctly selected specimens to date the entire sequence. However, another sampling design might determine if cultures (e.g., Hanover I, Hanover II) became archaeologically visible during these periods of stability, and disappeared during sudden changes. Humans can adapt to almost any condition as long as it is stable for a sufficient period of time. Do the periods of stability in spring-summer moisture correspond to population surges in the southern Coastal Plain? Are there distinctions between just right climates and other periods of stability? These are questions that could be answered by a highly resolved (i.e., <50-year) cultural chronology. Existing data suggests this may be the case as is discussed below.

Stahle et al. (1988) found a reoccurring pattern of droughts and wet periods through the entire Black River tree ring sequence. The cycling of wet-dry periods reoccurs 28 times. The range of duration of these periods is 21 to 63 years. Thus, the seven long-term periods outlined above contain a more refined sub-chronology of short-term periods. The difficulty of dealing with such highly resolved, short-term chronologies frequently ends archaeological analysis because direct comparisons falter as the resolution of the climatic sequence falls below the resolution of the local cultural sequence. In some locations of the American Southwest prehistoric human activities can be documented on a year-by-year basis and no such faltering occurs (Dean 2000). On the Atlantic Slope, the approximately 100-year resolution of the human chronology poses a formidable threshold that can only be crossed with difficulty, although there are new methods on the horizon (Anderson 2000:161). Methods that offer direct dating of artifacts (such as thermoluminescence of ceramics and lithics) and wave functions derived from large numbers of dates (Gunn


a.
Vandal Minimum
Medieval Maximum
Early Little Ice Ages
Too Cold
Too Hot
Just Right
McClean Mound
<--Hanover I-->
<--Hanover II-->
Observed Tree-Ring Width Sequence
Cumulative Sequence
WET
DRY Tree Ring Deviations
350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600
Calendar Year A.D.
Sand
Clay
Stability
Sudden Change
Ft Bragg TL Dates
Tree Ring Observations 5 year Mov. Avg.
Cumulative Tring Rings
b.
Vandal Minimum
Medieval Maximum
Early Little Ice Ages
Too Hot
Stability Episodes (A&C)
McLean Mound
Just Right
Too Cold
A
C
B
1
2
3
4
5
6
<--Hanover I-->
<--Hanover II-->
Observed Tree-Ring Width Sequence
Sudden Change (B)
Cumulative Sequence
WET
DRY Tree Ring Deviations
800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500
Calendar Year A.D.
c.
Medieval Maximum
McLean Mound
35 yrs
37 yrs
35 yrs
67 yrs
53 yrs
50 yrs
1
2
3
4
5
6
WET
DRY Tree Ring Deviations
950 960 970 980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300
Calendar Year A.D.
Sand
Clay
Hanover Dates (Herbert and Feathers 2002)
Cumulative Tree Rings
Observations
17 Year Mov. Avg. (Observations)

2000*b*; Gunn and Stanyard 1999) to obtain statistical resolution offers some immediate means of breaking this impasse.

If reasonable affiliations can be discovered between tree ring moisture measures and human occupation events, the more resolved climatic chronology can resolve the cultural chronology. If there are identifiable relationships between climate and culture, the annual resolution of the tree-ring regime establishes an environmental process that has reoccurred many times during the periods of overlap between tree rings and ceramic technology. It probably reoccurred many other times before the start of the tree rings during the ceramic period. During the non-ceramic technologies, there were other processes yet to be recognized that await other highly resolved environmental measurements. Thus, part of the answer to the second question is to identify culture/climate processes during the duration of different cultural technologies.

The Medieval Maximum is of particular interest in this study because it exhibits a pronounced drought cycle according to Stahle et al. (1988: 1519), as it encompasses Hanover II ceramics defined by Herbert et al. (2002:104). The climatic cycling during this episode appears in Stahle et al.'s 1614-year graph. Its pronounced qualities are visually evident. There were six (Figure 5*b* and *c*, numbered 1 to 6) relatively large magnitude and distinct (statistically significant) wet and dry cycles during this episode.

The character of these droughts differs before and after the A.D. 1100 sudden change. Before, the wet-dry cycles are near the average duration of 34 years (Figure 5*c*). However, after the sudden change the cycles extend to 50–67 years in duration. Eddy (1994:30, fig. 4) has studied solar emissions historically through records of aurora borealis and believes that the early Medieval Maximum solar emissions were modestly elevated as during the twentieth century (Lean et al. 1992). However, during the late Medieval Maximum the sun was unusually active, perhaps with monthly average sunspot numbers as high as 260, well above normal twentieth-century monthly values. Was the extended length of the late Medieval Maximum wet-dry cycles on the Black River related to the higher solar emissions? Climate now at the turn of the third millennium suggests so. High solar emissions in combination with greenhouse warming are part of the current record North Carolina drought context. Did late Hanover II peoples have to cope with similar conditions? The Hanover II culture must have been drought adapted, especially in the late Medieval Maximum. Does this condition explain the more local character of the

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⟵Figure 5. Black River tree-ring sequence and episodes of stable cumulative moisture: *a*. A.D. 365–1605; *b*. A.D. 800–1500; and *c*. A.D. 950–1300 (Medieval Maximum).

ceramics, sand-grog temper? Could it reflect a more parochial and culturally isolated perspective than early Hanover II? The scenario implied by the climate suggests as a hypothesis that Hanover II will eventually fall out into two sub-periods as more is understood about its dynamics and dating is improved in terms of population density and artifact frequencies. Thus, the environmental chronology suggests a more highly resolved cultural chronology, a theme for future research.

Lifetime Scale

The short-term wet-dry cycles in the tree rings approximate a human lifetime. They provide intriguing insights into the year-to-year conditions that would have been faced by inhabitants of the Cape Fear arch. They suggest that in the interaction of environmental and cultural chronologies, cultural adaptations at lifetime scales may be detected. Spectral analysis of the tree-ring series shows that the strongest cycles are at 3.7, 10.1, and 17.9 years (Stahle et al. 1988:1518). That these are also related to global scale conditions is implied by the fact that the periods of these cyclicities approximate the El Niño, solar emissions, and lunar gravity influences that have been detected in global climates. Apparently in some combination these cycles produce an alternating wet and super dry cycle that averages about 34 years (Stahle et al. 1988:1519). All of these factors are lifetime-scale environmental changes.

Although seldom overtly recognized in archaeological writings (see Hill and Gunn 1977 for extended discussions), lifetimes must be the *de facto* temporal unit of analysis of cultural sequences. The human life cycle with an early learning phase and a late application phase imposes an element of stability on cultural change at around 50 years. This simple acknowledgment could lend some order to our otherwise elusive understandings of past cultural sequences at short-term time scales. Humans cope with life in 50-year chunks.

The lifetime scale of analysis is clearly important in both the tree-ring record and historic record. Stahle et al. (1988:1519) point out that occasional extreme events of unknown physical origin occur. Such events, either of wet or dry, would have provoked unusual and probably difficult times. Such an event is recorded historically in the Winston-Salem, North Carolina, Moravian records for the year 1816. This year followed the Mt. Tambora, Sumatra, eruption, the largest such event in the Holocene. The year 1816 is known the world over as "the year without summer" (Stommel and Stommel 1976). During that year, the Moravians reported frost in August.

> Bethabara Aug. 22, 1816. Yesterday and today it has been very cool. Several days ago it hailed a few miles from here, and last night there was frost here and there. [Fries 1947:3313]

Although spared the scourge of summer freezes and snows experience further north (Stommel and Stommel 1976), unusual weather was evident. The mixed pattern is instructive since it may correspond to other sudden change events recorded in the tree ring climates. The days in 1816 were unusually hot, especially for the globally cooler nineteenth century, with the thermometer reaching as high as 104°F. However, the nights were remarkably cool. Some crops such as corn faltered or died all together. The wheat harvest, however, was unusually good. This was because the climate was essentially Mediterranean; that is, with a wet winter and an unusually long dry period in the summer for the wheat to dry and be harvested. Streams were so low in the summer that some of the struggle for food involved problems with mills not running. The winter was harsh, often preventing attendance at church. Many were sick and many died.

> Bathania March 14, 1816. Easter Sunday. The weather was still very cold for the time of the year, and this morning there was heavy frost and ice. In addition many among us were not well, so in accordance with the wish of many members the Easter litany was prayed this time in the church about six o'clock in the morning. [Fries 1947:3315]

> Bathania Sept. 1, 1816. After the sermon we knelt and prayed that our faithful God and Savior would relieve the present distress in our neighborhood. For many weeks it has not rained and during the summer it has been so dry that nothing could grow in our gardens, no cobs could develop on the cornstalks, our mill had to stop for lack of water, and almost no meal could be secured. For lack of meal many people have cooked wheat and eaten it. We and many of our fellow-citizens consider this as a punishment sent by our God and Lord for the great indifference shown to Him, and we prayed fervently that from His merciful heart He would make and end of it and send us other weather and rain. [Fries 1947:3316]

Fortunately, the rains soon came in over abundance and the crisis passed. In the end-of-the-year summary, it was remarked "Because of the most unusual weather during this year the output of the produce of the land was pathetic. Late frosts … ruined the prospect of fruit…. [P]ractically no rain fell for 15 weeks [in the summer] … food rose unusually high in price … in the spring a serious type of illness … less of the usual fever in the fall…." (Fries 1947:3286). Such short anomalies of weather almost certainly occurred at other times in the more remote past, such as the year

A.D. 536, with worldwide ramifications (Gunn 2000*a*). Interestingly, in the Black River tree rings neither the A.D. 536 event nor the year without summer are evident as huge departures from the usual. From the above description, it can be seen that 1816 was a sudden change of great import to the people and cultures of central North Carolina. In Europe the A.D. 536 event had the greatest impact on tree rings of any 15-year period in the last 6,000 years (Baillie 1994). This discrepancy implies that the Black River tree rings are subtle in their response to global climate, not surprising given the proximity of the ocean and especially the Gulf Stream. It could help to account for the great longevity of the Black River bald cypress. It also serves as a warning that highly significant cultural events can be rendered subtle in the paleoclimatic record. It is important to note that there were winners and losers—no corn, but a great wheat crop.

The overview of the foregoing discussion is that local tree rings reflect global climate conditions, and relate to local cultures, through a pattern of wet and dry cycles ranging in duration from 30 to 60 years. Imposed upon and contributing to the variation in duration is global temperature variation: as global conditions depart from moderate temperatures, the cycles become dominated by drought. Drought results from either too hot or too cold global conditions. In long-term perspective (>100 years), the tree rings appear to support this climate change process inferred above from geomorphology. During the early stages of Medieval Maximum and the Little Ice Age (A.D. 1300–1600), relatively moist conditions prevailed (Stahle et al. 1988:1518). As conditions progressed toward hot and cold in the two periods, the Black River tree rings turned relatively dry. Modern meteorological observations reinforce the impression that global warming intensifies drought. A drought in 1985 and 1986 was one of the five worst droughts in the 1614-year tree-ring record. The preceding 29 years (1956–1985) were among the five wettest periods in the entire record. All of this supports the contention that middle global temperatures were just right for Cape Fear arch cultures, while too hot and too cold temperatures resulted in troublesome droughts. It can be added as of 2002 that the turn of the millennium droughts along the east coast are the worst on record, which, given the accelerated rate of global warming in the last few years, lends further credence to the too-hot-is-dry hypothesis. The shifts in global atmospheric flow patterns that implement the moisture changes have been examined elsewhere (Gunn 1997). Some of the climate cyclicities detected in the Black River Tree rings are equivalent to human lifetimes. It is in the lifetime cycles that climate variation meets head-on with culture's most fundamental stability factor.

Hanover II on the Anvil

To address the second question, are there incidents of culture that suggest climate effect, I will re-examine the mound distributions presented earlier from the perspective of the cultural anvil model. Groups in the Coastal Plain and Piedmont of what is now interior North Carolina were always consensus-based bands and tribes rather than power-based chiefdoms or rule-based states (Rogers 1993). Although the population densities were less than sufficient for power-based societies, they appear to have mimicked surrounding, more densely populated polities in language and whatever other practices that proved feasible for them. Among these was the burial of the dead in mounds. However, the mimicked version of mound interment was primarily burying individuals in opportunistic mounds, generally sand hills in the Coastal Plain.

A restudy of sand hill burial mounds by Irwin et al. (1999) shows that most appear on the Cape Fear arch. To some extent, the sand hill burial mounds fill the accretional mound void (see Figure 1). In more than one mound, interments were secondary and multiple, indicating mobile populations returning to traditional burying grounds for final disposition of the dead. However, in a few exceptional mounds around Fayetteville the structures appear to be accretional (Irwin et al. 1999:61). These constructed mounds suggest an element of stability and capacity to mobilize labor otherwise absent in Coastal Plain mounds. Beyond the annual rituals of burial and intensification, ceremonial elements would have been incorporated to calendar planting and harvesting. A village site (31CD967) associated with the Middle/Late Woodland period was found on the south flank of Rockfish Creek to the east of the Hope Mills mounds (Gunn and Sanborn 2002) (Figure 6). This village and the mound sites are located in the vicinity of the deeply incised Rockfish Creek on wetland tributaries. Slightly elevated, long linear sites adjacent to wetlands on the well-drained upland margin of Rockfish Creek seem to be the occupation habitat of choice of the village community and its presumably associated mounds. Such a habitat would have provided a contrasty environment that supplied both arable land and hunting-fishing habitat.

It might be supposed that the Fayetteville mounds were constructed during a time when populations of the southern Coastal Plain were sufficiently dense and connected to surrounding groups that they could entertain relationships with the more established accretional mound groups. In fact, if the region of the Cape Fear arch functioned as implied by the cultural anvil model, they were probably immigrants from areas of

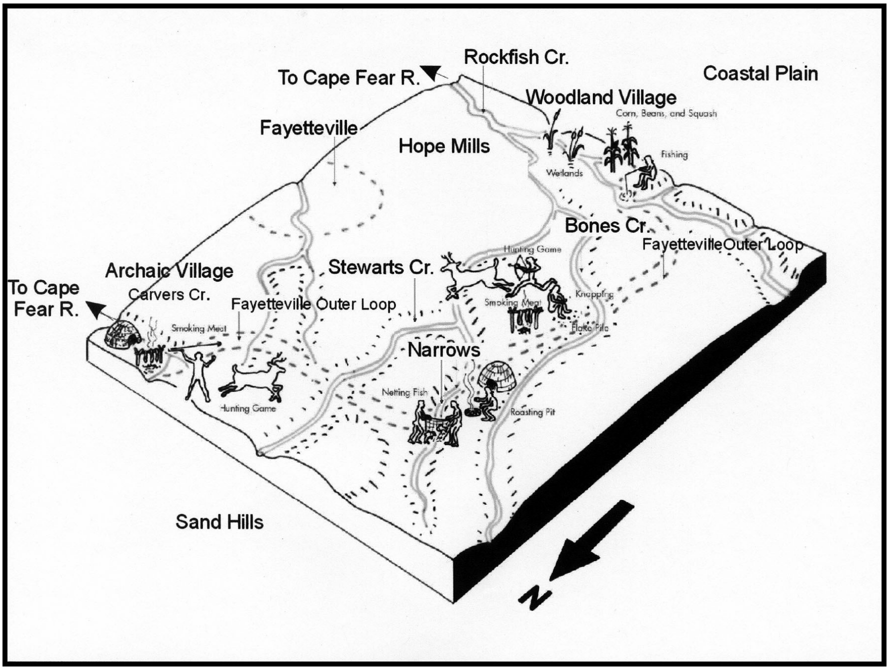

Figure 6. Site Clusters along the Fayetteville Outer Loop and the Hope Mills Sand Mounds.

accretional mound populations, suggested by at least three researchers to be the Pee Dee settlement 92 km to the west (Irwin et al. 1999:62). In other words, they were probably in the Coastal Plain during conditions ideal for horticulture as it was practiced at Town Creek. Without appreciable fish runs, they would have been dependent on horticulture for the population density and stability to construct mounds. Limited fish runs would have confined occupation to major streams such as the Cape Fear River and Rockfish Creek below the fall line, the highest reach of the streams the runs could reach in dry, low discharge years. This inference is supported by findings during the Fayetteville Outer Loop project, which transects a wide swath around the north, west, and southwest of Fayetteville (Gunn and Sanborn 2002, see Figure 6). An Archaic village was found in the Sand Hills, and horticultural villages were found in the Coastal Plain. Probable fishing stations followed the Sand Hills-Coastal Plain boundary, appearing at narrows such as on Stewarts Creek.

Based on ceramics and other artifacts (e.g., points, pipes, beads) included with burials in the sand mounds, Irwin et al. (1999:79) judged the sand mound phenomenon to have begun about A.D. 800–1000 during the transition from late Middle Woodland to early Late Woodland. Three radiocarbon dates now define McLean Mound's span of use to A.D. 770–1270 (Herbert et al. 2002:105–106). However, most of the ceramics in the sand mound core area around Rockfish Creek date to Herbert et al.'s (2002:104) Hanover II between A.D. 1000 and 1400. This is a period when grog is a more prevalent feature of Hanover temper than sand. It marks a separation from Hanover I, which had more sand than grog; Hanover I continues through the Medieval Maximum but appear as early as A.D. 500. The termination of Hanover II ceramics at around A.D. 1400 may indicate that the major activity at the sand mounds was confined to the Medieval Maximum. This approximates the period within which McClean Mound dates (A.D. 770–1270) (see Figure 5).

As can be seen in Figure 5*c*, McLean Mound and Hanover II co-occur with an extended period of relatively stable spring-summer moisture between A.D. 950 and 1250. As is frequently the case in the construction of more complex societies, which the accretional mounds imply, they require a period of at least 100 years or more of favorable conditions to become archaeologically visible. The stability is broken around A.D. 1100 by the Medieval Maximum sudden change. For life on the Cape Fear arch, it implies that there should have been an interlude of disrupted cultural continuity at around A.D. 1100. The hypothesized interrupted interlude can serve as a testable hypothesis when sufficient numbers of dates are obtained on early Late Woodland occupations to show a statistical decline at that time. Herbert (personal communication 2002) believes the area around Fort Bragg may have been all but deserted during the late Medieval Maximum.

In somewhat similar conditions along the Savannah River, Anderson et al. (1995) used tree rings to establish that Mississippian Coastal Plain groups were sensitive to droughty conditions. These groups are on another geologic arch, the Yamacraw arch (Horton and Zullo 1991:7; see Figure 3). In the case of the Cape Fear arch, one might suppose that the region and its inhabitants were even more sensitive to drought because of it being more elevated and therefore more exposed to droughty episodes.

Conclusions

The modeling of cultural and environmental change on the Cape Fear arch is clearly a question of margins and centers of ecological zones. Margins and centers have been a central question in anthropology and archaeology since Wissler proposed the Age-Area hypothesis early in the last century (Freed and Freed 1983). Wissler thought that new technologies were likely to originate in the centers of ecological zones. Dixon proposed in a counter argument that new ideas were more likely to originate in marginal areas, a perspective that was examined in depth by later authors (Freed and Freed 1983:816). The back-and-forth between the two points of view has provided anthropology with productive model to the present. The peculiar cultural chronology of the Cape Fear arch promises to provide poignant insights into the processes that influence cultures in unstable marginal regions and how they impact surrounding regions. Perhaps most promising are the Hanover ceramic series. The process of the cultural anvil imposes a respiration of cultural traits. It exhales traits to environmentally appropriate, adjacent regions at a sudden change, and inhales them when stable and appropriate conditions compare favorably with pre-adaptations in a surrounding region. The Hanover ceramic technique seems to have been both exhaled and inhaled. The period of Hanover ceramics overlaps in part with the annual climate data of the Black River tree rings.

Irwin et al. (1999) argue that the cultural efflorescence of Mississippian culture on the southern Coastal Plain was a function of social forces, most likely stemming from a chiefdom located at Town Creek to the west. Although this culture and its forward position in the Mississippian advance up the Atlantic Slope is a reasonable and likely potent factor, the information presented in this article suggests that landscape influences, especially geology and climate, also played vital roles in this Mississippian episode. Geology marked the spatial boundaries of the manifestation with an uplift between the Neuse and the Pee Dee rivers, while climate tendered the temporal boundaries by providing periodic, favorable circumstances for occupation by horticultural people. This pattern is especially detectable during the Woodland period; whether so in the Archaic remains to be determined. It also appears likely, based on repeated incidents of regionally bounded intrusions of cultural traits from adjacent areas, that the Mississippian influx was a member of a class of cultural manifestations that occurred repeatedly during prehistory, or in other words, a process. The drought-prone character of the Cape Fear valley and the cyclical nature of global climate change could have sponsored the process. The particular form of each individual manifestation was entirely unique to the technological initial conditions at the time of its inception.

Notes

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CHEROKEE CERAMIC TRADITIONS OF SOUTHWESTERN NORTH CAROLINA, CA. A.D. 1400–2002: A PREFACE TO "THE LAST OF THE IROQUOIS POTTERS"

by
Brett H. Riggs and Christopher B. Rodning

The following article, "The Last of the Iroquois Potters," is a reprint of M.R. Harrington's classic 1909 study of the manufacture of traditional Cherokee ceramics by Iwi Katâlsta (Catolster), a master potter from Yellow Hill (now Cherokee), North Carolina. In 1908, Harrington spent a month in the Cherokee communities of the Qualla Boundary to document and collect examples of Cherokee material culture for the Museum of the American Indian (Heye Foundation). During his visit, Harrington attended dances and ballplays, purchased baskets, blowguns, scratchers and moccasins, and commissioned Iwi Katâlsta to produce pottery vessels "in the old style." Katâlsta, who was born around the time of the Cherokee removal of 1838, learned the potter's craft from her mother, who was born at the old town of Kituhwa around 1803. By the time Harrington came to Qualla in 1908, Katâlsta had dealt with ethnographers and curio collectors for more than 20 years, building "old style" vessels for academics while younger potters made "new style" Catawba-influenced wares for tourists. Harrington's work with Katâlsta is especially important because he seized what appeared to be the last opportunity to document an unbroken Cherokee ceramic tradition that had lasted more than 500 years. As such, "The Last of the Iroquois Potters" provides important insights into the Qualla ceramic series (Egloff 1967; Keel 1976)—ceramic wares that figure prominently in the archaeological record of southwestern North Carolina from A.D. 1400 through the Cherokee removal of 1838.

Although mid-nineteenth century travelers and journalists, such as Alexis (1852), had noted the persistence of traditional ceramics among the Eastern Cherokees, Edward Palmer of the Bureau of American Ethnology (Smithsonian Institution) first focused academic attention on traditional potters during an 1881 reconnaissance among the Cherokees. Palmer was followed by E.P. Valentine of Richmond's Valentine Museum, who came to Qualla Boundary in October 1882 to loot the Saunooke (Nununyi) Mound for artifacts for museum displays. While there, he purchased old Cherokee vessels and commissioned new vessels from local potters. In his field notes, Valentine left an important early record of Cherokee pottery manufacture:

> … we through the kindness of the Chief who acted as interpreter for us were enabled to make arrangements with a squaw [sic] seventy three years of age who had in her younger days made pots for her own use & who at present had two in use, … which included all the varieties of which she had any knowledge. These pots which were of the same type as those of her ancestors were but inferior in workmanship. The implements which she used in making the unornamented pots were simply a shell & smooth quartz rock. A paddle with a fruit cut upon it was also used when ornamented pottery was to be made. The material is a yellow clay which is beaten with a stick until it becomes uniformly soft. It is then formed into a bar which is coiled into the shape in which the pot is intended to have. Then by means of the hand and the smooth quartz rock above mentioned it is worked into a thin pot of uniform thickness, the shell is then brought to bear, with which all the rough edges are erased. The pot is then placed in the sun where it is allowed to stay until it becomes dry, after which it is put near the fire and turned about occasionally until it becomes comparatively hard. Then a hole about the size of the pot is dug and a charcoal fire started in it. Over this fire which is kept at a uniform heat never allowing it to flame up is inverted the pot. This being done the pot can without the least uneasiness be used for cooking. The larger of these pots are used for cooking corn, beans, apples, etc.; the smaller ones for cooking eatables of greater variety. These pots in addition to the pan shaped pots are also used on the table (Valentine n.d. [ca. 1882]).

In 1888, W.H. Holmes of the Bureau of American Ethnology requested that James Mooney investigate and report upon the state of contemporary Cherokee pottery. Mooney's detailed notes identify Iwi Katâlsta and her mother, Katâlsta, as primary conservators of the ancient art (Figure 1). Holmes states:

> [In 1888] Mr. Mooney found that although the making of pottery had fallen into disuse among the Cherokees, three women were still skilled in the art. The names of these potters are Uhyûñli, then 75 years of age, Katâlsta, about 85 years of age, and Ewi Katâlsta, daughter of the last named and about 50 years old.
>
> Cherokee processes differ from the Catawba, or more properly, perhaps, did differ, in two principal points, namely, *a*, the application of a black glossy color by smother-firing, and *b*, the application of ornamental designs to the exterior of the vessel by means of figured paddles or stamps. The employment of incised decoration was more common among the Cherokees than among the Catawbas.
>
> Katâlsta used clay of the fine dark variety obtained near Macedonia Church. She prepared it as did the Catawba women, but in building she sometimes used one long coil which was carried spirally from the bottom to the rim after the manner of the ancient Pueblos and the potters of Louisiana. The inside of the vessel was shaped with a spoon and polished with a stone, the latter having been in use in the potter's family, near Bryson City, North Carolina, for three generations. The outside was stamped all over with a paddle, the body of which was covered with a checker pattern of engraved

Figure 1. Katâlsta and Iwi Katâlsta at work, 1888. Photograph by James Mooney, Bureau of American Ethnology. National Anthropological Archives, neg. no. 1034-A3.

lines, giving a somewhat ornamental effect. The rim was lined vertically by incising with a pointed tool. At this stage of the process the vessel was lifted by means of a bit of cloth which prevented obliteration of the ornaments. When the vessel was finished and dried in the sun it was heated by the fire for three hours, and then put on the fire and covered with bark and burned for about three-quarters of an hour. When this step of the process was completed the vessel was taken outside the house and inverted over a small hole in the ground, which was filled with burning corn cobs. This fuel was renewed a number of times, and at the end of half an hour the interior of the vessel had acquired a black and glistening surface. Sometimes the same result is obtained by burning small quantities of wheat or cob bran in the vessel, which is covered over during the burning to prevent the escape of the smoke.

The implements used by the potters of this reservation are the tool for pounding the clay; bits of gourd or shell, or other convex-surfaced devices for shaping and polishing; the knife for trimming edges; smooth pebbles for final polishing; pointed tools of wood, metal, etc., for incising patterns; and paddle stamps for imparting a rude diapered effect to the exterior surface of the vessel. The stamp patterns are usually small diamonds or squares, formed by cutting

> crossed grooves on the face of a small paddle of poplar or linn wood. [Holmes 1903:56]

Following Mooney, other ethnographers and collectors began wending their way to the Katâlstas for “old style” pottery. Frederick Starr, then of the Peabody Museum, visited Qualla Boundary to purchase ethnographic objects and retain demonstrators for the 1893 World’s Columbian Exposition in Chicago. Some of Katâlsta’s vessels were exhibited at the fair, and then found their way into the collections of the University of Chicago’s Field Museum.

Prior to his 1908 collecting trip, Harrington sought out Mooney to learn about potential resources and informants living on Qualla Boundary. Mooney undoubtedly directed Harrington to Iwi Katâlsta, the daughter of the woman whom Mooney described as “the last conservator of the potter’s art among the East Cherokee.” In the midst of a whirlwind itinerary, Harrington contracted with Iwi Katâlsta to make pottery, then observed and documented each step of the process. Harrington obtained the pottery vessels that Katâlsta produced, along with the carved stamp paddles she used, and perhaps even the ancient polishing stone that Mooney had seen 20 years earlier. He sent these materials to his friend, Arthur Parker, at the New York State Museum, where Katâlsta’s pottery and tools remain today.

Harrington, like Valentine, Mooney, and Holmes, recognized direct continuity between the “old style” wares of Eastern Cherokee potters and the archaeological ceramics found in local mound and village sites. Such evidence of ceramic continuity helped debunk the “Moundbuilder myth” and established a direct linkage between the archaeological past and the ethnographic present. Archaeologists now characterize Katâlsta’s wares as part of the Qualla ceramic series (Egloff 1967; Keel 1976), a rubric that encompasses more than 500 years of Cherokee pottery from southwestern North Carolina. Originally formulated by Egloff to describe the late prehistoric and early historic era pottery from the Cherokee Middle Towns area (upper Little Tennessee River basin), the Qualla ceramic series:

> … possesses the basic attributes of the Lamar style horizon: folded finger impressed rim fillets; large, sloppy, carved stamps, and bold incising.… The distinctive qualities of the Qualla paste … moderate to abundant quantities of grit coupled with partial burnishing of the vessel’s interior make Qualla sherds distinctive even when the exterior surface finish is obliterated. [Egloff 1967:34-35]

Keel provides additional detail:

> Ceramics of this [Qualla] series, like other series made throughout the area, were produced by the coiling technique. Vessel walls were thinned with mussel shell scrapers. Interiors, as well as some exteriors, were highly polished with small river pebbles. Surface finishes were produced by being paddle stamped (complicated, simple, and checked types), cord marked fabric impressed, smoothed-over-stamped, plain, burnished or polished, corncob marked, and brushed. Decoration of vessels consisted of incised rectilinear or curvilinear patterns on the upper parts of casuela bowls; however, the decoration of rims occurs on all types of the series. Simple rim forms are uncommon.… Flanges, at or just below the lip, are quite common…; but the most popular … was the everted rim with an added fillet usually embellished with fingernail punctations, notches, or short oblique incisions. [Keel 1976:63]

The inclusive Qualla ceramic series is directly comparable to Tugalo (sixteenth century) and Estatoe (eighteenth century) phase ceramics of northeastern Georgia (Hally 1986), and Boyd ceramics (nineteenth century) of north-central Georgia (Caldwell 1955), and Galt wares (nineteenth century) of northwestern Georgia (Baker 1970; Caldwell 1955, Garrow 1979). All of these wares are associated with protohistoric or historic era Cherokee occupations.

Temporal and spatial variability within the long-lived and widespread Qualla series is, as yet, imperfectly understood. Dickens (1979) proposed subdividing the Qualla phase into early (ca. A.D. 1450–1650) and late (ca. A.D. 1650–1838) phases, but did not specify ceramic attributes or trends that distinguish those phases. Importantly, he notes continuity of the tradition into the twentieth century: "Qualla style pottery persisted in the Middle and Out Towns until Indian removal, and was produced at the Qualla Reservation as late as 1880–1900" (Dickens 1979:26). Dickens (1979) derives the Qualla series from the Pisgah ceramic series, a South Appalachian Mississippian ware group that occurs primarily to the north of the documented Qualla phase area, within the French Broad and upper Catawba river basins (Dickens 1976; Holden 1966; Moore 1981).

Expanding upon Dickens' work, Ward and Davis (1999) posit a tri-partite subdivision of the Qualla phase, with the Early Qualla phase predating A.D. 1450, a Middle Qualla phase (ca. A.D. 1450–1700) subsuming Dickens' early phase, and a Late Qualla phase (ca. A.D. 1700–1838) encompassing the era of sustained European contact. The Early Qualla phase (pre-A.D. 1450) was postulated to address mounting evidence that the Qualla phase was not a direct derivative of the Pisgah phase, but rather an *in situ* development in the upper Little Tennessee and Hiwassee river basins. Recent analyses have shed more light upon the earliest wares of the Qualla ceramic series and its immediate antecedents. Materials recovered in testing at 31JK291, the Cherokee Casino site, document an early fifteenth-century village occupation (Riggs et al. 1997), and ceramics associated with it are consistent with the Qualla series. These wares are grit-tempered, with rectilinear complicated-stamped, check-stamped, or plain/burnished surfaces, smudged, burnished interiors, and simple rims. This small sample of early fifteenth-century ceramics differs from the Qualla series only in the absence of elaborated rims and incised cazuela forms. Slightly later contexts (ca. A.D. 1420) documented at the Coweeta Creek site (31Ma34) yielded similar stamped, grit-tempered wares which exhibit the first known instances of appliqué rimstrips—ceramic hallmarks that clearly constitute early examples of the Qualla series (Wilson and Rodning 2002) (Figure 2). Characteristics of this Early Qualla ceramic assemblage include:

1. large jars (≈ 12 liter) with pronounced shoulders, tall vertical necks, and slightly everted, simple (occasionally castellated) rims (these vessels resemble late Savannah wares);
2. large (≈ 12 liter) and small (≈ 4 liter) jars with distinctive filleted rimstrips with saw-toothed fenestration along their lower edges (these vessels correspond to early Lamar wares and constitute the basis for Qualla phase attribution of the assemblage);
3. limited incidence of hemispherical bowls and small jars with thickened, punctate rims and linear-stamped surfaces (these rim modes correspond to late Pisgah series wares); and
4. small, red-filmed plain bowls with simple incision and a limited incidence of incised cazuela bowls.

The majority of these Early Qualla phase wares evince rectilinear complicated-stamped or check-stamped surfaces, with check stamping largely restricted to jars with simple rims. Also diagnostic of Early Qualla assemblages is the incidence of thin-bodied jars and bowls with dark, very sandy, and highly compacted paste; these differ markedly from later Qualla wares. In general terms, this emergent Qualla series assemblage is most comparable to the terminal Savannah/early Lamar assemblages of northern Georgia (e.g., Rembert phase, Anderson and Schuldenrein 1985; Rudolph and Hally 1985) and does not appear to be closely related to contemporaneous Pisgah series assemblages of the French Broad River basin.

Middle Qualla phase (ca. A.D. 1450–1700) pottery (Figures 3 and 4), best known from the Coweeta Creek site assemblage, is characterized by:

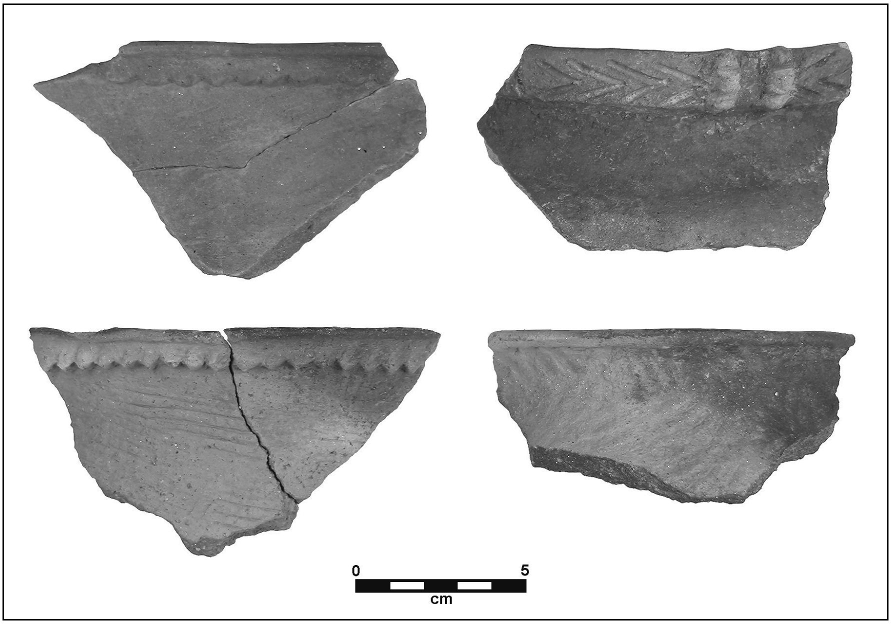

Figure 2. Early Qualla phase ceramics (ca. A.D. 1420) recovered from the Coweeta Creek site: (*top left and bottom left*) Qualla series rectilinear complicated-stamped jar rims with serrated rimstrips; (*top right*) Pisgah series jar rim with hachured incisions and appliqué nodes; and (*bottom right*) late Savannah-like rectilinear-stamped jar fragment with simple rim.

> …jars with flaring rim forms, usually adorned with a notched appliqué strip added beneath the lip. …Middle Qualla phase vessels were most often stamped with a carved wooden paddle. Rectilinear-stamped and curvilinear-stamped designs occurred, with the latter having become more popular during the last half of the phase. Concentric circle, figure nine, parallel undulating line, chevron, and rectilinear line block or herringbonelike designs were popular motifs….
>
> Cazuela bowl forms, with their sharply carinated shoulders, made their debut during the Middle Qualla phase.… Incised designs were executed in a variety of motifs around the broad cazuela bowl shoulders….
>
> Burnishing, check stamping, and cordmarking were minority surface finishes during the Middle Qualla phase, with burnishing being the most popular. [Ward and Davis 1999:181–183]

The Late Qualla phase, as defined by Ward and Davis, is exemplified by single household assemblages from the Tuckaseegee site (31Jk12, ca. A.D. 1700–1730) and the Townson site (31Ce15, ca. 1776) (Figures 5 and 6). Ward and Davis note:

Figure 3. Middle Qualla phase ceramics recovered from the Coweeta Creek site: (*top*) Qualla series curvilinear complicated-stamped bowl with slightly constricted neck and notched appliqué rimstrip; and (*bottom*) Qualla series curvilinear complicated-stamped jar with strongly everted rim.

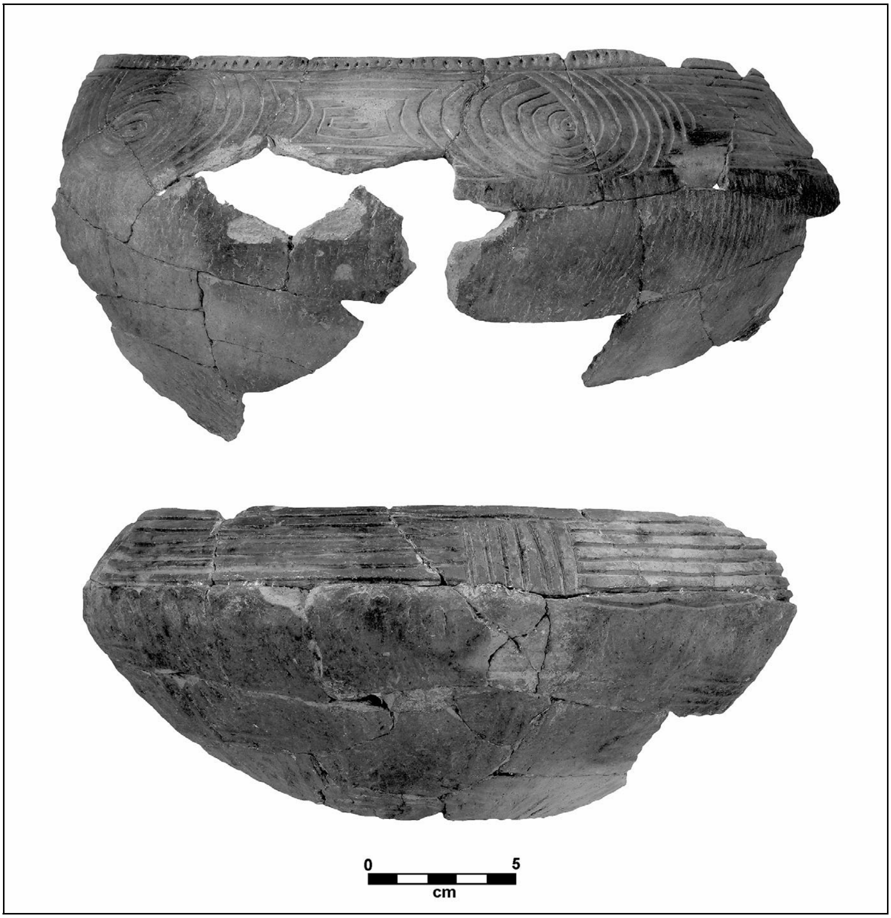

Figure 4. Middle Qualla phase cazuela bowls recovered from the Coweeta Creek site.

The pottery of the Late Qualla phase reflects the relative stability and conservatism that mark the beginning of this phase. No drastic changes occurred to clearly demarcate the Late Qualla ceramic tradition from pottery made during the preceding Middle Qualla phase. Instead, curvilinear, complicated-stamped designs gradually became more popular as rectilinear motifs declined. After the middle of the eighteenth century, all complicated-stamped designs became bolder in form and cruder in execution. Concomitantly, incised decorations and burnishing of vessel surfaces decreased in frequency as cordmarking and corncob impressing became more popular methods of surface treatment….

Although the pots [from Townson site, ca. A.D. 1776] varied in size and surface finish, their general form was very similar. Most were globular jars with broad shoulders and out-flaring rims. Some of the rims were folded,

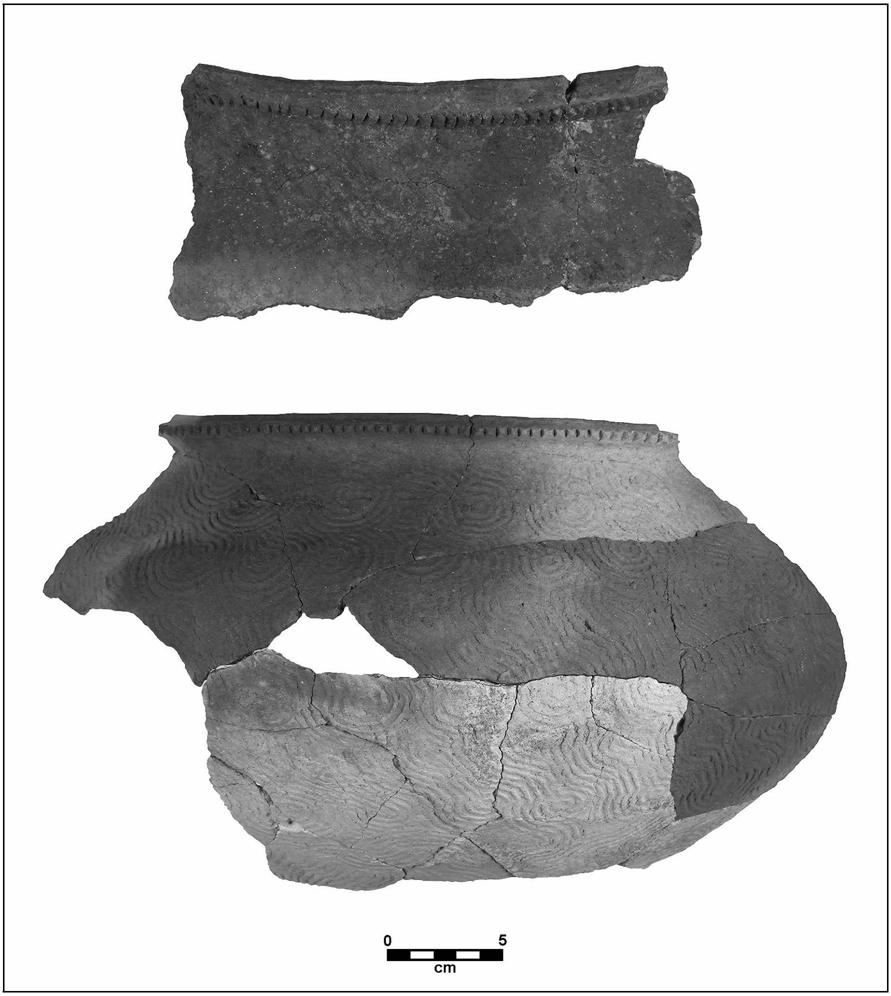

Figure 5. Late Qualla phase (early eighteenth century) jar fragments recovered from the Tuckasegee site: (*top*) rectilinear complicated-stamped tall-necked jar with notched appliqué rimstrip; and (*bottom*) curvilinear complicated-stamped squat jar notched with appliqué rimstrip.

> creating a rolled lip, and were unadorned. On other vessels, the folded rim formed a filletlike strip that was notched …. [Ward and Davis 1999:268]

More recent comparisons of Middle and Late Qualla phase samples from Coweeta Creek reveal several points of contrast. Middle Qualla phase jars are characterized by extremely everted rim forms; most are stamped with varieties of the 'figure-9' curvilinear motif. Incised cazuela

Figure 6. Late Qualla phase (late eighteenth century) vessels recovered from the Townson site.

forms are common and exhibit a wide range of Lamar Bold Incised motifs. Late Qualla phase jars from Coweeta Creek (ca. A.D. 1700–1730) tend to have only slightly everted rims, and rectilinear complicated-stamped motifs appear much more commonly. Cazuela bowl forms and, concomitantly, incised decorations are much less common in the Late Qualla phase samples and probably disappear around 1740.

Hally (1986), in discussing long-term continuity in Cherokee ceramic traditions in northeastern Georgia, offers descriptions of sixteenth century Tugalo phase assemblages and eighteenth-century Estatoe phase ceramic assemblages, all of which conform to the more inclusive Qualla series. Hally contrasts and compares the assemblages, which are equivalent to Middle Qualla phase and Late Qualla phase assemblages:

> The most obvious difference between the Tugalo phase and Estatoe phase ceramic assemblages is the absence of check stamping in the former…. Complicated stamping is more common in the Tugalo phase. Only one basic rim form, the folded rim, occurs on jars in the Tugalo phase. A caldron shaped jar with undulating rim is common in the Tugalo phase but appears to be absent from the later phase, while the squat jar form of the Estatoe phase does not occur earlier. The barred oval and filfot cross stamped motifs are present only in the Tugalo assemblage, while the concentric cross motif is represented only in the Estatoe phase assemblage. Finally, an incised guilloche motif, present in small numbers in the Tugalo phase, appears to be totally absent from the later phase.
>
> Similarities between the two assemblages far outweigh differences. Complicated stamping is the predominant form of surface treatment in both assemblages. Pinched rim jar, tall neck jar, carinated bowl and flaring rim bowl vessel forms differ only slightly between the two assemblages. All numerically important stamped and incised motifs, furthermore, are represented in both assemblages in approximately equal numbers (Hally 1986:111-112).

Late eighteenth-century and early nineteenth-century trends in Qualla series ceramics are well documented by assemblages recovered from sites along the Hiwassee River in Cherokee County, North Carolina (Riggs 1995, 1999). Samples from the post-1780 settlements of Cootlohee and Takwa'hi exhibit rectilinear complicated-stamped or check-stamped jars with notched or plain appliqué rimstrips and gently recurvate profiles. Prominent in these samples are tall, flaring-walled, flat-based pan forms, typically plain, but also check stamped or rectilinear complicated stamped. Pan rims are generally simple, but occasionally exhibit appliqué rimstrips. Hemispherical or slightly carinated bowls occur as minor elements in these samples. No decorative incision is observed in these samples, and curvilinear complicated-stamp motifs are rare. These Late Qualla phase samples are closely comparable to the contemporaneous Galt series wares from northwestern Georgia (Baker 1970; Caldwell 1955; Garrow 1979; Hally 1986). Like earlier Qualla ceramics, these wares exhibit grit-tempered bodies and blackened, burnished interiors.

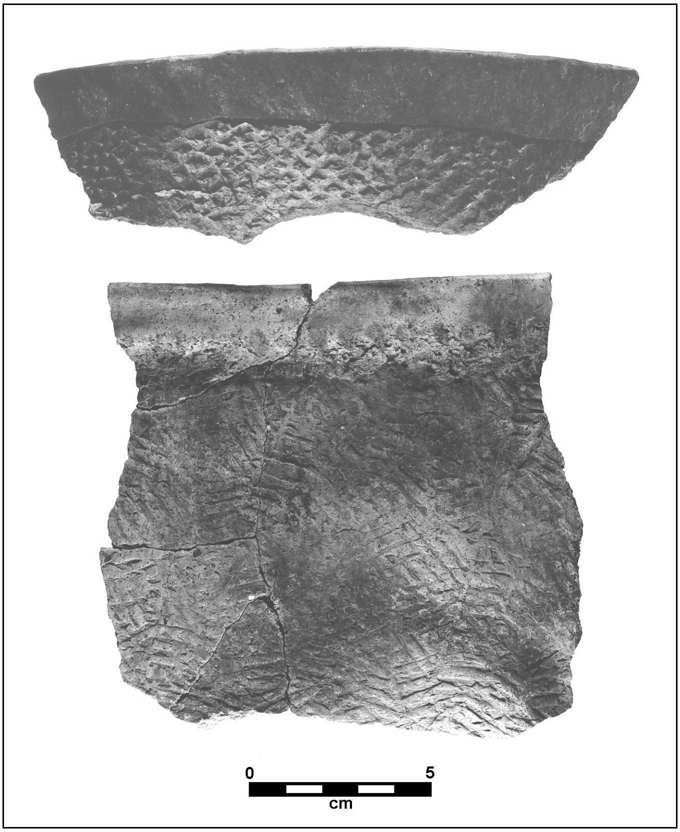

Figure 7. Removal Period (ca. 1838) Qualla series jar fragments from the Chewkeeaskee Cabin site.

Ceramics from documented Removal-era (ca. A.D. 1835-1838) household sites in the Hiwassee River Valley (e.g., John Christie, Chewkeeaskee, Sataka, and Brush Picker house sites) closely resemble late eighteenth-century wares from the same area, but exhibit even higher frequencies of check-stamped surfaces (>50%) and lack bowl forms (Riggs 1999) (Figure 7). These assemblages also exhibit quantities of mass-produced trade ceramics and metal cooking vessel fragments—vessels that supplanted many of the functions of traditional ceramics. The widespread availability of cheap, mass-produced containers probably spurred substantial narrowing of the traditional ceramic repertoire during the early nineteenth century. Cherokee spoliation claims for household goods lost as a result of the forced military removal of 1838 document

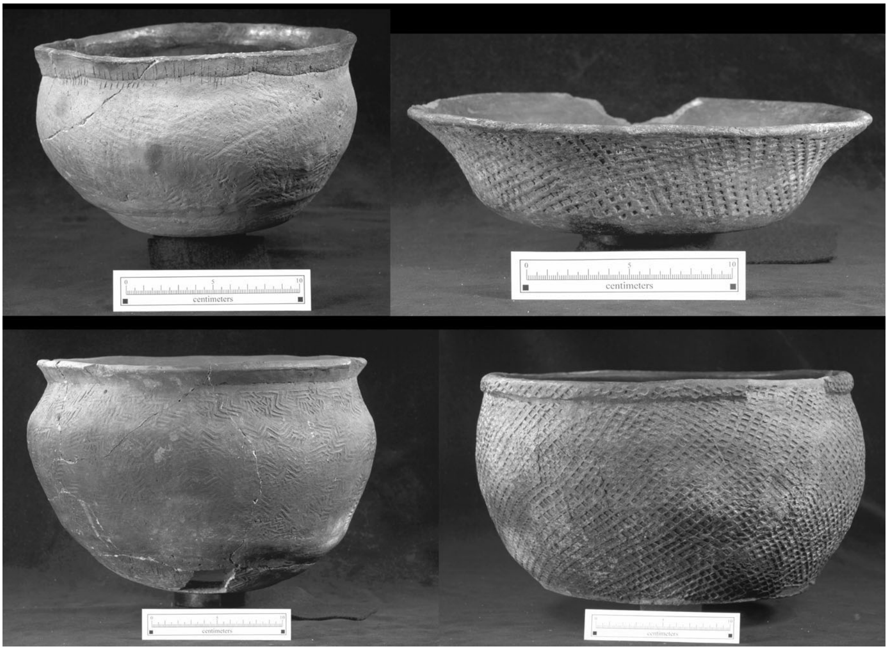

Figure 8. Qualla series vessels purchased in 1882, Qualla Boundary, North Carolina: (*top left*) rectilinear complicated-stamped jar, probably made by Katâlsta; (*top right*) check-stamped pan, maker undocumented; (*bottom left*) rectilinear complicated-stamped jar, probably made by Sally Nic-a-jac-ee; (*bottom right*) check-stamped jar, made by "Widow Saunooke." UNC-RLA Valentine Collection.

traditional "hommony pots" and "dirt pans" in about 10% of Cherokee households in southwestern North Carolina. Archaeological evidence indicates these wares were much more common (Riggs 1999).

Post-removal era Cherokee ceramics are best known from ethnographic collections assembled in the late nineteenth century. The vessels that Valentine purchased on Qualla Boundary in 1882, now housed by the University of North Carolina Research Laboratories of Archaeology, include ceramic jars, bowls, and pans with grit-tempered bodies, stamped exterior surfaces, and blackened, burnished interiors (Figure 8). The jars tend to be nearly hemispherical with little or no neck constriction and slightly flaring rims decorated with flattened appliqué rimstrips. Jar bases are slightly to prominently flattened and exhibit impressions from commercially made bowls or saucers used as forms in the building process. Exterior surfaces are check stamped or rectilinear complicated stamped; some specimens exhibit both treatments. The large

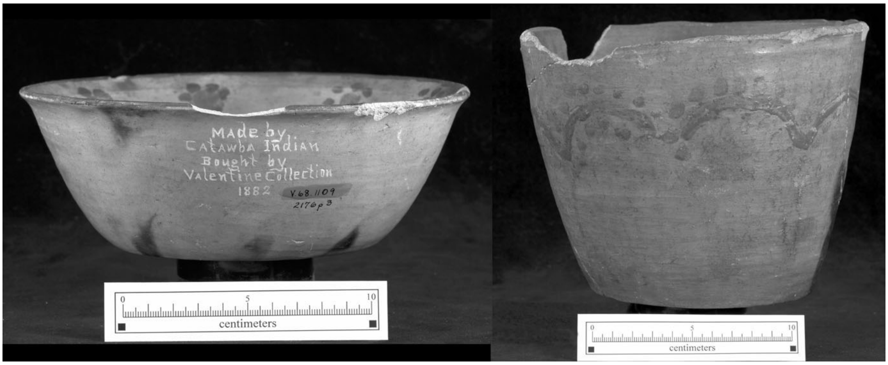

Figure 9. Polychrome painted vessels made by Catawba potter Sally Wahuhu, ca. 1882. UNC-RLA Valentine Collection.

vertical jar with a flat base, shown in Figure 8, appears to have been a post-Removal innovation. Most of the small, flat-based pans are plain or burnished, but check-stamped and rectilinear complicated-stamped examples are also present. It is not surprising that these vessels substantially resemble Removal period examples from archaeological contexts; the potters that Valentine and Mooney observed were active during the mid-nineteenth century, and some had learned their craft from eighteenth-century potters.

During the 1880s, Palmer, Valentine, and Mooney also collected wares of a different tradition from the potters of Qualla Boundary. Catawba potters, some of whom had lived among the Eastern Band Cherokees since 1840, made plain, burnished wares in a wide variety of forms. The Catawba pottery was thin and lightweight, and vessel types often mirrored commercially made mugs, pitchers, kettles, plates, and bowls. Some Catawba pottery was decorated with polychrome painted floral designs (Figure 9). For more than a century, Catawba potters had developed and refined a cottage industry in their homeland around Rock Hill, South Carolina, selling their tailored wares to Anglo-American and African-American customers as far afield as Charleston. In 1888, Mooney visited Sally Wahuhu and Susannah (Harris) Owl, Catawba potters married to Cherokee men, and documented their craft in detail. Mooney observed that the Catawba style pottery was gaining currency among the Cherokees, while the old utilitarian Qualla pottery of Katâlsta was waning.

The popularity of the Catawba-style pottery grew with the early development of the tourist trade on Qualla Boundary and the growth of a commercial context for pottery among the Cherokees. With the influx of

Figure 10. Modern (2002) Cherokee ceramic vessels by Amanda Swimmer. The highly burnished surfaces and incised decorations are twentieth-century innovations inspired by Catawba pottery.

white urban tourists that followed the opening of the railroad into the southern mountains during the 1880s and 1890s, potters found outlets for their wares as tourist curios. White tourists preferred the more familiar, westernized Catawba wares, and Catawba and Cherokee potters were sensitive to such market demands. By the time of the first Cherokee Fall Fair in 1914, all of the pottery displayed in the crafts exhibits was burnished Catawba ware—diminutive vessels made for the tourist trade (Hill 1997:245). Susannah Harris Owl and Nettie Harris Owl, both accomplished Catawba potters and experienced entrepreneurs, led the commercialization of pottery at Qualla Boundary through the 1920s (Blumer 1987). Their success inspired a generation of Cherokee artists such as Maude Welch, Rebecca Youngbird, Lottie Stamper, Cora Wahneetah, Louise Bigmeat Maney, and Amanda Swimmer. These famed Cherokee potters used the Catawba-style wares as a point of departure, innovating new, individualistic styles that constitute the present-day Cherokee tradition. They have drawn inspiration from sources as diverse as San Ildefonso potter Maria Martinez and the crafts programs at Indian boarding schools (Blumer 1980, 1987). Their work has kept Cherokee ceramic arts vital and vibrant through periods of tremendous social, cultural, and economic change for the Eastern Band of Cherokee Indians, and their wares, sold to tourists and art collectors, have become definitive markers of Cherokee cultural identity for the outside world (Figure 10).

Now, a twenty-first-century revival of "old-style" Qualla pottery is underway at the hands of contemporary Cherokee artists. Through workshops organized and sponsored by the University of North Carolina

Figure 11. Scenes from the the hands-on workshop on Qualla pottery: (*top left*) master potter Amanda Swimmer holding a nineteenth-century jar by Sally Nickajack; (*top right*) Tom Belt and Shirley Oswalt discuss a replica of a cazuela bowl from Kituhwa; (*bottom left*) Aylene Stamper using a nineteenth-century jar as a model; and (*bottom right*) Amanda Swimmer, Melissa Maney, and Shirley Oswalt building ceramic vessels.

Research Laboratories of Archaeology, the Museum of the Cherokee Indian, and the North Carolina Arts Council Folklife Program, Cherokee potters have examined firsthand the pottery of Katâlsta and her contemporaries, as well as archaeological examples of traditional Qualla pottery that span 400 years (Figure 11). With the help of ceramicist Tamara Bean, this new generation of potters has reached back to learn the ceramic styles and techniques of their ancestors from the wares themselves. Informed by the ethnographic work of Mooney and

Figure 12. Modern (2002) Qualla series stamped vessels: (*left*) small jar with strap handles by Bernadean George; and (*right*) cazuela bowl by Davy Arch.

Harrington, Cherokee artists like Joel Queen, Bernadean George, Dean Reid, Aylene Stamper, Betty Maney, Davy Arch, and Shirley Oswalt are recreating Qualla series pottery for the first time in almost 90 years (Figure 12). Their models for this effort are Qualla series vessels from the University of North Carolina's Valentine Collection (ca. 1882), as well as archaeological pottery from the Coweeta Creek, Birdtown, Tuckasegee, Townson, Nununyi, and Kituhwa sites, also part of the Research Laboratories of Archaeology collections.

By recreating traditional Qualla pottery, contemporary Cherokee potters are not abandoning the last three generations of innovation in ceramic art. Rather, they are expanding their current repertoires to encompass an artistic and technological lineage that they can claim as exclusively Cherokee. Like their grandmothers and great-grandmothers at the turn of the last century, contemporary Cherokee potters must articulate with an external commercial market, but now on artistic terms that the potters themselves define. Indian arts collectors have grown sufficiently educated and sophisticated to appreciate the Qualla pottery of Katâlsta and her heirs, and contemporary Cherokee potters are seeking to stimulate the market with these new-old wares. When M.R. Harrington observed Iwi Katâlsta and wrote "The Last of the Iroquois Potters," he assumed that he was documenting the final death throes of a tradition. He certainly never considered that his brief study might form one of the bases for a revival of Qualla pottery, nor did he foresee that academic collections of ethnographic and archaeological pottery might one day return to Qualla Boundary to inform new generations of Cherokee artists. Like many other researchers who foretold the progressive disappearance of "the old ways," he underestimated the recurrent cycles of tradition and the stubborn resilience of Cherokee culture.

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THE LAST OF THE IROQUOIS POTTERS

by
M. R. Harrington

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The ceramic art of the New York Iroquois has long been obsolete. Although the knowledge that their ancestors manufactured vessels of clay still persists among them, none of the technical details remains, so far as I have been able to discover, even in tradition. For this reason I have long been interested in the reported survival of the potters' craft among the Eastern Cherokee[1] who are known to be Iroquoian in language and to have resembled in culture, to a certain extent, the Iroquois of the north. Here, thought I, may be an opportunity to throw light on questions which have long puzzled New York archeologists and to put on record a first-hand account of the art in which the Five Nations had developed such proficiency.

My opportunity came in July 1908, when in connection with my anthropological work for Mr. George G. Heye of New York I visited the Cherokee settlements in western North Carolina for the purpose of collecting ethnological specimens.

Before starting I received many helpful hints from Mr. James Mooney who has made the Eastern Cherokee an object of special study; thus I was enabled to know, approximately what to expect before arriving on the ground. After securing an interpreter I began to make inquiries about pottery, and soon discovered that a number of families still kept a few pieces for their own use, or as mementoes of the old days. As a rule I was able to secure these, but in some cases neither money nor persuasion had any effect—the owners remained obdurate. Nevertheless a very fair collection was secured, comprising specimens of various ages, sizes and uses.

Three principal forms may be distinguished in modern Cherokee ware, as represented by the collection secured for Mr. Heye: the large jar (u^n ti^n), the pot (tu sti^n) and the bowl (de wa Li^n). The jars are usually 12 to 16 inches high and average about 8 inches in diameter. Generally these are provided with a flat bottom from which the sides bulge slightly, contracting again toward the rim. Such vessels are usually covered with stamped designs applied with a carved paddle, but no free-hand incised decoration was seen. The name u^n ti^n while specifically applied to these large **[223]** jars, is often used as a generic term for any sort of pottery. Soup, cooked hominy and other foods are kept in such vessels. With the exception of the flat bottom which may be a comparatively recent adaptation to facilitate standing on shelves and tables, this form may well be of aboriginal origin, but bears a greater resemblance to what the New York archeologist would call the Algonquin rather than the Iroquoian type.

A distinct resemblance to Iroquois pottery may be observed in the pots, which often show, to a greater or less extent, a rounded bottom, spheroidal body and constricted neck sometimes surmounted by a projecting rim or collar, all of which features are characteristic of Iroquois ware. The rim is sometimes even decorated with notches, dots and simple incised lines, which add to the Iroquois effect as in the jars the body is frequently covered with stamped paddle patterns. Such pots were formerly employed for general cooking purposes but have been recently used more for stewing fruit than anything else. The height of the modern specimens is generally under 8 inches, but in former times larger ones were made. One small vessel of this type was provided with handles of modern design. Bowls are variable as to size and various as to use; some are round bottomed, some flat, some stamped, some plain; but the rims of all the bowls collected were invariably more or less flaring, not bent sharply inward as in many Muskhogean and some modern Catawba specimens. Similar flaring bowls are occasionally found on northern Iroquois sites. The only saucerlike form seen was made, the Indians told me, in imitation of white man's ware. When baking a batch of pottery the old Cherokees were accustomed to put in a lot of little toy vessels, dolls and animals modeled in clay, which were greatly appreciated by the children. Crude clay pipes were also made, and these too were reproduced in miniature as toys. Such toy vessels, figurines and pipes, are not infrequently unearthed from ancient Iroquois sites in New York.

Mr. Mooney had given me the name of one potter, Iwi Katâlsta, and I lost no time in making her acquaintance. Inquiry resulted in the discovery of but one more, an aged woman known as Jennie Arch, whose feeble hands had all but lost their skill. For this reason I confined myself almost entirely to Iwi's methods of pottery making. Fully half the pottery I secured from the Eastern Cherokees is said to be the work of her hand.

Her tools were few, and with one exception simple, consisting of a hammerstone for pounding the clay, a sharpened bit of stick **[224]** for making lines and notches, and a fine grained, waterworn pebble for

Plate 1. Home of the Cherokee potter.

smoothing, showing the polish of long use. The exception is the carved paddle for stamping the pottery—a broad bladed wooden affair about 8 inches long, carefully carved to produce a checkerwork pattern when struck against soft clay. More paddles were later collected bearing different figures, some quite complex. Other accessories were a common axe, a bucket of water, a low sided wooden tray for kneading clay and a flat oval piece of wood used as a stand to build large jars upon and provided with a handle at either end for convenience in turning; some saucers, of china or gourd, and some pieces of cotton sheeting.

After Iwi Katâlsta had dug her clay from a bed on Soco creek, the exact location of which she did not seem inclined to reveal, she was accustomed to mold it into a cake some 14 inches long, resembling in form a loaf of bread, in which shape it was dried and laid away for future use. When we visited her home at "Yellow Hill" [pl. 1] and requested her to make us some pottery she broke off the end of this cake and proceeded to pulverize it on her hearthstone, using the back of a common axe as a

Plate 2. Pounding clay for pottery.

crushing instrument. In old times, she explained, a “long rock” was used for this purpose.

When sufficiently pulverized the clay was placed in a wooden tray, moistened and again thoroughly pounded [pl. 2]. This time Iwi used a hammerstone which she kept especially to crush hickory nuts, but which she often used in place of the axe in pounding the dampened clay. From time to time the mass was kneaded and a little more water or dry clay added as seemed necessary to obtain the required consistency. Sometimes,

Plate 3. Molding the bottom of a vessel.

I was informed, a fine sand was added at this stage as a tempering material; but in this case it was omitted. Iwi had a vessel of the pot form in mind. Taking a large handful of the clay she patted it into a ball which she took in both hands and pressing her thumbs deeply into one side, began to turn it rapidly [pl. 3]. In a surprisingly short time a small bowl with fairly thin sides was produced to serve as a base for the future vessel.

Plate 4. Rolling the coil of clay preparatory to making a pottery vessel.

During this process she had taken care to keep her hands wet. Then supporting the inside of the bowl with the fingers of her left hand she struck it sharply on the outside with her carved paddle, slightly turning the embryo vessel before each stroke and moistening the paddle now and then in a vessel of water which stood near. The bowl-shaped base was then carefully laid upon a bit of cotton cloth resting on a common china saucer. When questioned as to what the Indians **[225]** used before saucers were available, Iwi replied through the interpreter, that she had heard that for large vessels the base was set in a hole in the sand lined with some sort of cloth, the sand being often inclosed in a basket for convenience. For small vessels, she said, a saucer made of gourd was just as serviceable as one of china; and as I liked the old style, she would take care to use gourd supports hereafter in making pottery for me. It was her custom, she continued, when making the large, flat-bottomed hominy jars to set the base on the oval, flat utensil of wood before mentioned, especially made for the purpose and provided with a handle at either end to facilitate turning.

Plate 5. Applying a coil to the pot base.

The bowl-shaped base having been safely ensconced in the saucer she pinched its edges thin with wet fingers; then, rapidly rolling out a lump of clay on a plank into a long thin cylinder [pl. 4] she applied it just inside the rim of the base and projecting above it about half its width, pinching it fast the while until the circuit was completed [pl. 5]. The coil proved a bit too long, so she broke the superfluous piece off and blended the two ends together with care. Then by careful pinching and smoothing with wet fingers and finger nails the coil was blended with the bowl-shaped base and thinned at the top to receive another coil which was also applied

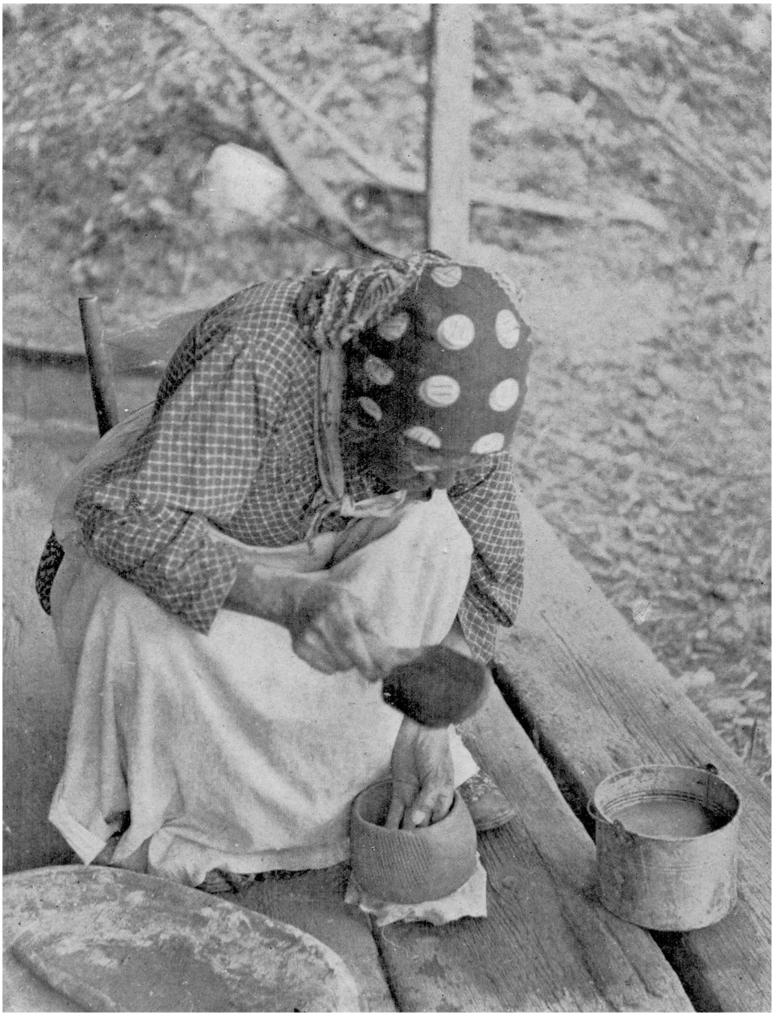

Plate 6. The use of the stamping paddle.

inside. The object of applying each coil inside instead of directly on top of the preceding was to produce strength by overlapping. Thus the coiling proceeded until the required form and height were reached, when the rim coil was applied outside the one beneath. After being blended in the usual way this was pinched into lateral protuberances, and notched, dotted or marked with a sharpened stick to suit the fancy [pl. 8]. After each coil had been applied and blended the vessel was allowed to dry and harden a few minutes before the next one was added; and after the jar had received its

Plate 7. The polishing stone in use.

shape it was allowed to become quite firm before the final stamping was applied.

It will be remembered that the base of the vessel had already been stamped before being placed in the saucer, so it was now only necessary to strike the body briskly with the wet paddle until the surface was covered with its imprints [pl. 6]. In one jar the stamping was complete before the rim was added. After stamping the vessel was set away to dry.

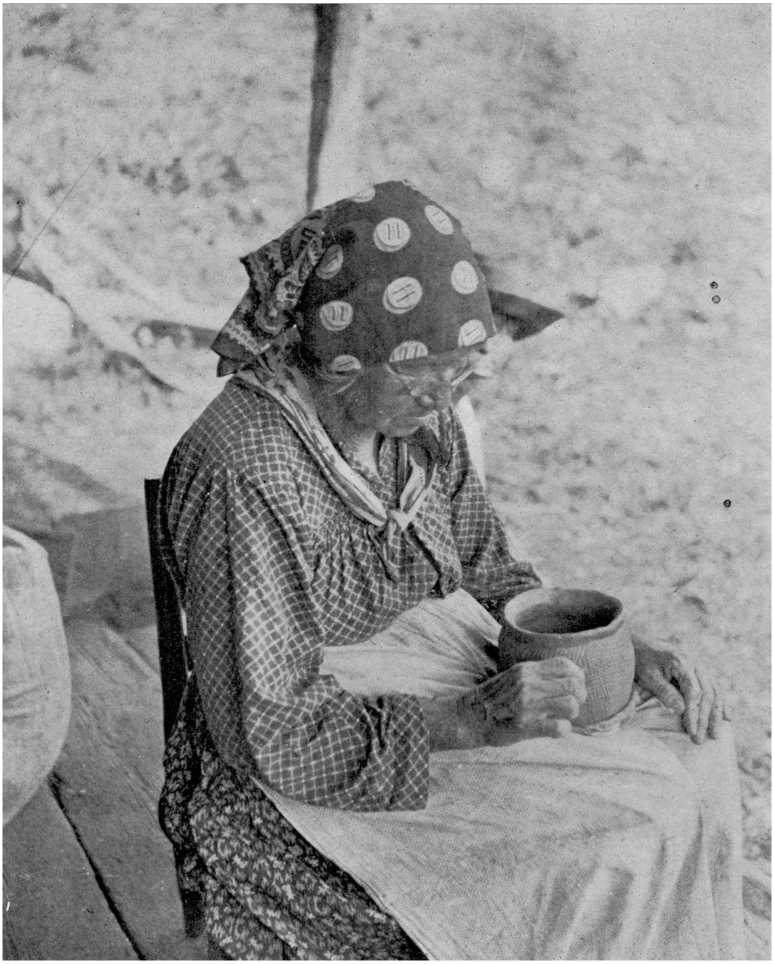

Plate 8. Decorating the vessel.

The fact that Iwi used no tools except the paddle, the marking stick and her fingers seemed remarkable to me, in view of the numerous smoothing tools of gourd, shell and wood employed by **[226]** the Catawba.[1] Inquiry revealed the fact that while they had apparently never heard of gourd smoothers, the Cherokee formerly used mussel shells and a marine shell, probably some species of *cardium* for this purpose. Iwi herself sometimes used a chip of wood in making large vessels.

After drying—a process that takes from one to three days, depending on the weather—the vessel was carefully rubbed and polished on the

Plate 9. Arranging the vessels for firing.

inside, and on the outside whenever necessary [pl. 7] with the smoothing stone kept wet by continual dipping in water.

When a number of vessels had been made and dried the next step was to prop the vessels up on their sides around the fire, mouth toward the blaze, until a faint brown color, beginning near the fire crept over the whole of the vessels—a sign that they were hot enough for firing. Then the potter, with a long stick, rolled them over mouth down upon the embers [pl. 9] and covered them with pieces of dry bark to the depth of 2 or 3 inches. Making sure that the bark had caught fire all around [pl. 10] she left them to their fate. About an hour later the bark had burned away leaving the rounded bottoms of the pots protruding through the ashes. Then, taking her long hooked stick, Iwi rolled the vessels from the fire, tapping them sharply to detect cracks. If a vessel rang clear it was perfect.

"In order to be good for cooking, these pots should be smoked," she said. "If this is not done the water will soak through." So she dropped a handful of bran in each one while they were still almost red-hot, stirred it

Plate 10. Firing the clay vessels.

with her stick, tipped the pots this way and that, and finally, turning out the now blazing bran from each in turn, inverted the vessels upon it. In this way the inside was smoked black and rendered impervious and this without leaving any odor of smoke in the vessels when they became cold. Generally, Iwi told me, corncobs were employed for this purpose, but she always used bran when cobs were not available. This probably explains the black color of the inner surface so often seen in New York aboriginal pottery.

I was told that in later times the firing has been generally done indoors, because an absolutely still day was necessary for a successful burning in the open air, any breeze being liable to crack the vessels. The firing of my pottery was, however, done out of **[227]** doors, the fire being built on a rude hearth of flat stones sunk level with the ground.

It seems probable from the evidence at my disposal[1] that similar methods were once used by the New York Iroquois in making pottery. As before mentioned the form of many Cherokee vessels is quite like the style we know as Iroquois. Similar rims are found in western and northern New York, as are potsherds showing the overlapped method of coiling, while from the ash pits on the early Mohawk site known as “Garoga” in Fulton county, New York I have unearthed with my own hands pottery bearing the impress of the checkerwork paddle.

But the ancient pottery of the Cherokee embraced forms still more like the Iroquois styles than are those of modern make, if we can judge by the specimens found near the “Town House Mound” at Yellow Hill on the Eastern Cherokee Reservation—a mound which the Cherokee claim was made by their ancestors. The pieces of rim and the single perfect vessel would not be considered intrusive or imported if found on an ancient Onondaga site in Jefferson county, New York. They show not only the spheroidal body, constricted mouth and projecting rim or collar, but also exhibit a well developed neck of true Iroquois style which is not clearly marked in the recent ware of the Cherokee.

The carved paddle for decorating pottery seems to have become obsolete among the Iroquois at an early date, for potsherds showing its use are rarely if ever found on their later sites so far as my knowledge goes. But such potsherds are not seen as a rule on New York sites once occupied by Algonquin tribes, so it is probable that here we have another link connecting the northern Iroquois with the Cherokee. The blowgun, the nearly universal possession of the southeastern tribes, seems also to have been peculiar to the Iroquois in the north. Possibly such apparent trifles may help us to trace the migrations of the Iroquois before they reached the region of Lake Erie and the St. Lawrence.

It is perhaps fortunate that I was able to go to North Carolina when I did, for Iwa Katâlsta is old, and her health is failing, while Jennie Arch can no longer make pottery worthy of the name. The younger generation does not care, apparently, for pottery making, and the western Cherokees, from all I can learn, have abandoned the art. Hence it is probable that a few more years see the last of the Iroquoian potters.

Notes

[222] [1]Holmes. Aboriginal Pottery of Eastern U. S. p. 52.
[226] [1]Harrington. Catawba Potters and their Work. *Am. Anthropo1ogy,* Sept. 1908.
[227][1]Iroquois Industries.

TAKING THE WATERS: ALL HEALING SPRINGS SPA AND NINETEENTH-CENTURY HOMEOPATHY

by
J. Alan May

Abstract

Within the southern Piedmont of North Carolina are a number of streams and springs as well as a temperate climate. During the latter half of the nineteenth century there arose an interest in homeopathic medicine and related cures. Principal among these was healing springs and water treatments. Local entrepreneurs built a hotel/ resort in western Gaston County, North Carolina near Crowders Mountain to cater to an increasingly affluent local populace. An archaeological survey and testing program was undertaken to recover artifacts and information about this resort. Several foundations associated with the spa—hotel, dormitory, and residence—were identified and collected. Much of the area has returned to secondary growth forest and identifying spring and building sites described in the literature was difficult. Two cisterns along with the principal springs were relocated, cleared of debris, and mapped.

Introduction

This report describes the results of the survey and testing for artifacts and historic structures in the area of All Healing Springs. The location of survey transects are northeast of Crowders Mountain, Gaston County, North Carolina (Figure 1). Much of the county is underlain by igneous formations of granite, diorite, and gabbro. The survey area is located adjacent to Crowders Creek that flows east and then south into South Carolina to the confluence with the Catawba River. The project area is west of the river and south of the creek. Joe Sox, Crowders Mountain State Park Superintendent, who, along with his staff facilitated our work, served as liaison between survey crews and Mike Peters, local historian, who assisted with field supervision. Mike Peters has been working with informants from Linwood College since 1990 and has collected an array of materials that he has made available for duplication. He has also copied documents from informants who are familiar with All Healing Springs and Linwood College. Volunteers from Schiele Museum, the Gaston County Historical Society, and students from Gaston College and Belmont Abbey College contributed the majority of labor needed to complete this project.

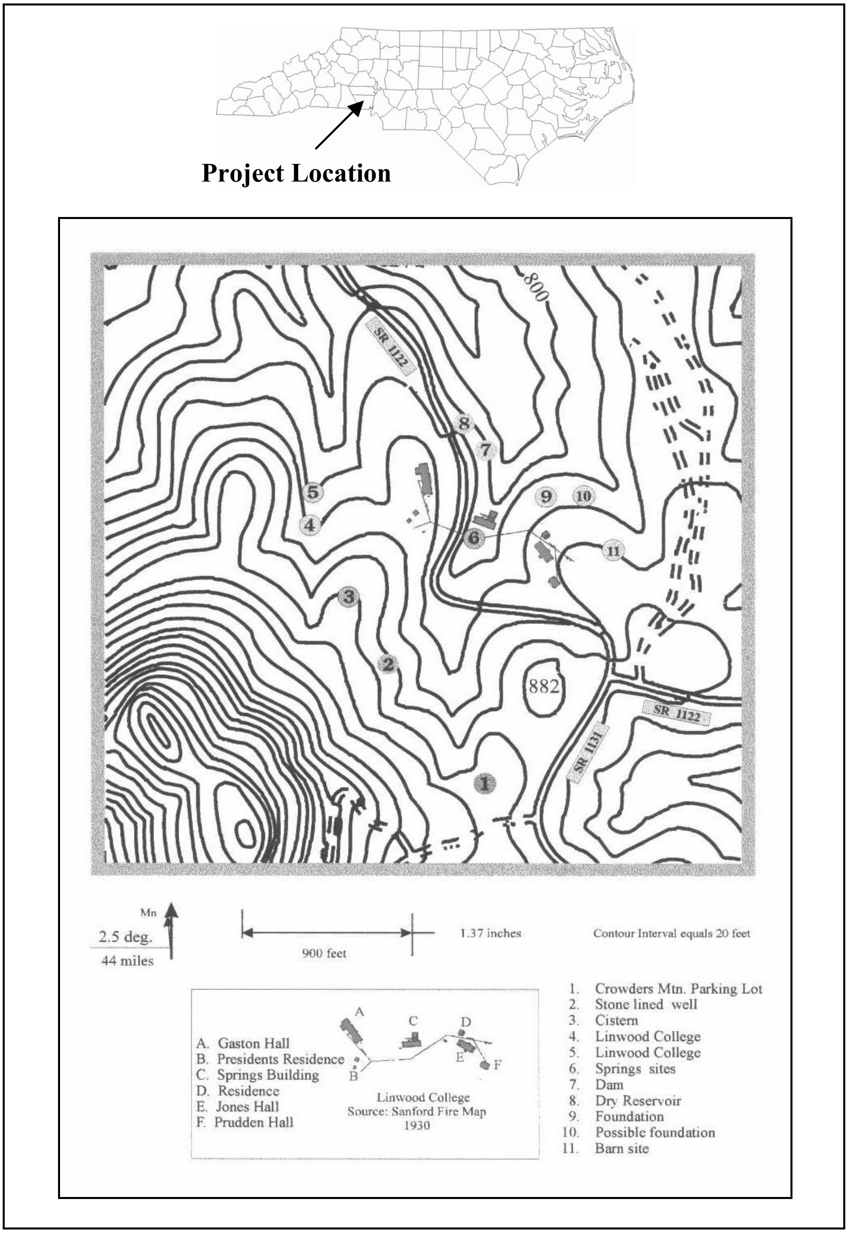

Figure 1. All Healing Springs vicinity with topographic map identifying building foundations and springs locations (map graphic produced by John Lathem, project volunteer).

The latter half of the eighteenth century marks the beginning of increasing numbers of Euro-colonial populations moving into what is now Gaston County. These early settlers were interested in the land for purposes of agriculture, mining, and timber harvesting. Gaston County has numerous streams that were initially harnessed for power production to run the textile mills that were built beginning in the nineteenth century. Additionally, with the discovery of iron ore in Gaston and Lincoln counties, streams such as Crowders Creek near Crowders Mountain were dammed to turn the machinery associated with iron manufacturing. A number of springs have also been noted within Gaston and adjacent counties, and in the area of Crowders Mountain. Toward the end of the nineteenth century local businessmen organized and built a resort/spa to cater to the health concerns of an increasingly affluent local populace.

Homeopathy

Homœopathy (Home' - ee - AH' - puh - thee; sometimes spelled homeopathy) is a system of healthcare developed and introduced by the German physician Samuel Hahnemann in 1796 (Shah and Shah 2000). At its heart is the phenomenon of cure by similars, where a substance that could produce disease in a healthy person (when given in excess) is used to invite a healing response in someone presenting with a similar disease. Homœopathy takes its name from this phenomenon of cure by similars; from the Greek, homoeo = "similar," pathos = "suffering" (Shah and Shah 2000).

A second cornerstone of homœopathy is the minimum dose. The incredibly tiny doses used in treatment came about through careful, systematic experimentation by early homœopaths. While larger doses might elicit the healing responses desired, this would often be accompanied by undesirable side effects of the medications. Reducing the dose served to minimize or eliminate these undesirable side effects. Much to the surprise of Hahnemann and his colleagues, these smaller doses also often worked much more effectively in bringing about a healing response. Although the "logic" of using such tiny doses may defy us, we observe it to work in practice, and continue to rely on these minimum doses today (Shah and Shah 2000).

Early Naturopathy

In looking at the natural healers and naturopaths of the late nineteenth and early twentieth centuries, one can find many common points. All of them believed in healing by bringing strength to the individual rather than by curing specific diseases. All had a reverence for nature, and many of them could point to specific observations that led to the formation of theories and practices. Personal experience of illness and recovery often led them to practice natural healing. They frequently learned from each other or studied on their own, instead of, or in addition to, receiving a formal education. The medical establishment persecuted most naturopaths. Those on record were highly successful, bringing good health to many people.

Whether they emphasized the use of hydrotherapy, nutrition, manipulation, herbs, or homeopathy, the goal for all practitioners of natural healing was to stimulate the body to heal itself. *Vis medicatrix naturae*, or the healing power of nature, remains central to naturopathic philosophy today. Rather than trying to attack specific diseases, natural healers focus on cleansing and strengthening the body. Regardless of the specific methodology, and regardless of whether the healer practiced in the last century or is active today, the approach remains basically the same (*The History of Traditional Naturopathy* 2002).

All Healing Springs Spa was built to take advantage of the purported medicinal qualities of a local spring. A hotel and several cottages were associated with this site in the period 1882–1903.

> In addition to the superior accommodations and variety in amusements offered, the favorable climate, its variety in Mineral Spring Waters, have proved by trial to exercise a curative influence on almost all diseases of the human system. There is no hesitation in saying that the waters and climate have in many cases affected a marked and favorable cure of Lung Diseases, Dyspepsia, General Debility, Constipation, Chronic Diarrhea and Scrofula [swelling of the lymph nodes in the neck], Asthma, Bleeding Piles, Nursing Sore Mouth, and Constitutional Syphilis.
>
> Diabetes and Gravel have been treated with such marked success as to warrant the belief that in the treatment of stone in the bladder, and diseases of the Kidneys, these waters will prove to be more valuable than any yet discovered.
>
> All Skin Diseases and Ulcers, such as Eczema, Scald Head, Catarrhal Affections, Diseases of the Scalp, Eruptions and Itching Affections, these waters are considered a specific.
>
> Rheumatism, Gout and Uterine Diseases have had great benefit from the use of these waters.
>
> Twelve (12) Springs, all of varying composition and temperature (the difference being six degrees), afford the greatest variety of Mineral Waters offered at any place.
>
> Arsenic, Iron and Sulphur is found in a greater or less quantity in all the waters, two of the Springs being largely Sulphur—Red and White—and one being very strong with Iron—while the All Healing carries Arsenic to a greater degree than any of the others, it carries minerals in combination not to be found

> in any other Spring, its principal ingredients being Arsenic, Sulphur, Iron, Lithia, Potash, and Magnesia, its temperature is 56°, a sweet, pleasant water to drink and can be taken in large quantities without the bad effect or heavy feeling at pit of stomachs often felt by the use of other waters, while for bathing purposes it stands without an equal, leaving the skin soft and of a velvety feeling produced by no other water known. [Cozzens and Thomas 1888]

Personnel from the North Carolina Geological Survey performed an analysis of the water of All Healing Spring in 1908 with the following mineral content results (in parts per million): Potash (0.6), Soda (2.4), Lime (3.5) Magnesia (2.0), Ferric oxide (0.4), Sulphuric oxide (4.9), Chlorine (2.8), Phosphoric oxide (trace), and Silica (8.9). No presence of Arsenic or Lithia was identified (Pratt 1908:108).

In addition to the spa, Linwood, an early college in Gaston County (1914–1921), was founded adjacent to the spring and contained classrooms, dormitories, administration building, and presidents house. Project objectives included: (1) compiling a detailed map of foundation stones for the hotel and cottages around the spring; (2) a pedestrian reconnaissance of the areas of Linwood College; (3) a literature review of pertinent sources, including Archives and History as well as local informants; and (4) a report of results. Volunteers from Schiele Museum, the Gaston County Historical Society, and students from the University of North Carolina at Charlotte, Gaston College, and Belmont Abbey College contributed the labor necessary to complete this project. The Gaston County Library has been a major source of primary documents. Members of the Gaston County Historical Society have also been valuable sources for the names of families associated with the project area. Numerous newspaper articles during this period have also led to additional informants and documents.

Site Clearing in the Vicinity of All Healing Springs

In early February 1996 volunteers began the task of clearing thick underbrush and downed trees and limbs from the vicinity of All Healing Springs and around the locations of building footings and foundations. Most of the spring's outlets were clogged with limbs and a thick growth of briers and privet. Some of this growth was cleared to facilitate runoff and promote drying in the area of several concrete cisterns, and in the vicinity of a dormitory pictured in the 1908–1909 Annual Report. A gasoline-powered leaf blower was used to clear leaf litter and small limbs from brick rubble and building footings adjacent to the springs. Transect lines were also run and cleared at 50-foot intervals for possible cottage site locations and outbuildings associated with the All Healing Springs Resort.

Establishing Map Grid for All Healing Springs, Jones Hall, and Prudden Hall

The project used the Schiele Museum's GPS instrument to locate mapping stations in the relatively dense woods surrounding the springs and covering the former building sites. Eight map stations were set with transit and tape in early February to facilitate mapping structural remains in the vicinity of All Healing Springs. Mapping and surface reconnaissance in the area of the spa was facilitated by reference to a Sanborn Fire Insurance Map of the area from 1930. Several buildings are identified on this map and have been confirmed by brick rubble and foundation stones. A 1908 15-minute series topographic map, Kings Mountain, North Carolina–South Carolina, also was used to identify building sites and several cottage sites referred to in the literature review of All Healing Springs.

Systematic Surface Collecting of Major Structures Associated with All Healing Springs

Several of the buildings identified on the Sanborn Insurance Map were carefully cleared of tree limbs and leaf litter to facilitate a systematic gridding and surface collection within and adjacent to the main structures associated with All Healing Springs. Exterior and interior locations were determined by the placement of foundation stones and the locations of stones used as steps to porches and entrances. A five-foot grid oriented with each of the buildings was established and each square was carefully collected. A minimum of 10 minutes and a maximum of 20 minutes was required for each square. These collections were then evaluated for the presence or absence of subsurface deposits and features, and this determined the placement of subsequent test excavations. Collections were made at Jones Hall (Hotel building), Prudden Hall, a possible residence north east of Jones Hall, and several outbuildings east of Prudden Hall. All materials collected have been washed and are awaiting analysis. The majority of material recovered was flat glass. Metal nails and door hardware were also recovered.

Historical Overview

Gaston County was formed from Lincoln County in 1846 and had some unusual and interesting historical developments (*Gastonia Gazette*, October 1970). Legislation creating the county required the construction of a courthouse, jail, and stocks (by then rare in the United States) at the county seat of Dallas (*Public Laws of North Carolina* 1846–1847:c. 24, 25). Gaston had more ante-bellum cotton mills than either Lincoln or Catawba counties (US Census Records 1850). The major crop of the county may be inferred from its nickname: "the banner corn whiskey county of North Carolina" and the dubious distinction of having more distilleries than mills (Sharpe 1954–1965:11, 765; Cope and Wellman 1961:119).

By 1846, three major cotton textile factories were operating: Woodlawn Mill, Stowe's Factory, and Mountain Island Mill (Cope and Wellman 1961:72; Separk 1949). The first two were located on South Fork Catawba River and the latter on Catawba River. The Mountain Island Mill was housed in a four-story red brick building founded by John R. Tate. Woodlawn was built by John Caleb Lineburger and others, and operated 600 spindles (Cope and Wellman 1961:70). The successful use of women in the workforce at Woodlawn inspired Jasper Stowe to seek female employees for his factory, but the labor force was small. Stowe then hired young men to court the young women and entice them to come work for Stowe (Cope and Wellman 1961:72). All three of these mills were profitable and prosperous prior to the beginning of the Civil War.

The war brought economic disaster and changed land use patterns in the county. Textile machinery was old and worn out; a warehouse fire that destroyed 1,000 bales of cotton nearly put the Lineburgers out of business; and Stowe's factory was almost idle (Cope and Wellman 1961:104). One hope for recovery lay in farm production, but with the large number of freedmen competing for farms and labor, the return of prosperity was uncertain. A major problem for the area was one of transportation.

In 1870, construction began on the Charlotte and Atlanta Airline Railroad, with many of the county residents believing that the line would run through Dallas, the county seat. However, engineers moved the roadbed four miles to the south and constructed Gastonia Station (Cope and Wellman 1961:107). Then, in 1873 the Chester and Lenoir Narrow Gauge Railroad received a charter to connect points in North and South Carolina. This line ran through Lincolnton and Dallas and intersected the Charlotte and Atlanta tracks at Gastonia Station (Cope and Wellman

1961:107). The resulting construction and ancillary activities resulted in the founding of Gastonia in 1877 (*Gastonia Gazette* 1946).

With the coming of the railroad, stations quickly grew into towns, which in turn were followed by industry looking for areas where labor was available. In 1874 A.P. and D.E. Rhyne and A. Costner built the Mount Holly Cotton Mills adjacent to the bridge where the Wilmington, Charlotte, and Rutherford Railroad crossed the Catawba River (Cope and Wellman 1961:109). Later that same year, J.H. Wilson and J.W. Moore constructed the Spencer Mountain Mills on the South Fork Catawba River (Cope and Wellman 1961:109). In 1881, there were six cotton mills employing 350 workers, including 113 children under the age of 15, in Gaston County (Branson 1880; Cope and Wellman 1961:114). During this period, other mills that were established included McAden Mills in 1881, Tuckaseege Manufacturing Company in 1883, and the Hooper Manufacturing Company in 1885 (Branson 1881, 1883, and 1885). These and other companies located near the railroads, forming an east-west corridor through a growing Gastonia which, after two unsuccessful attempts, was made county seat in 1909 (Sharpe 1954–1965:II, 766, 772–781).

The cultural heritage and history of the county is supported by an active historical society founded in 1946 (Brengle 1982:41). In the early 1970s this group's activities came to the attention of the North Carolina Department of Archives and History, Raleigh, North Carolina, which began research on several properties now listed in the National Register of Historic Places. In addition, a joint program between the Departments of Transportation and Cultural Resources resulted in the placement of 10 highway markers of statewide historical significance in Gaston County (Brengle 1982:41). Eight properties in the county have been nominated to the National Register of Historic Places, with others proposed for consideration.

All Healing Springs

Beginning in August 1852, Benjamin Briggs of South Carolina purchased a large tract of land including Crowders Mountain and All Healing Springs. He purchased this land for the timber and iron ore he believed to underlie much of the western part of the county. Large tracts of timber were necessary for the production of charcoal, which in turn was necessary for iron smelting. Iron processing ceased here in about 1862. Subsequently, Philip S. Baker ordered a dam constructed across Crowders Creek west of the mountain to power the water wheels used in textile

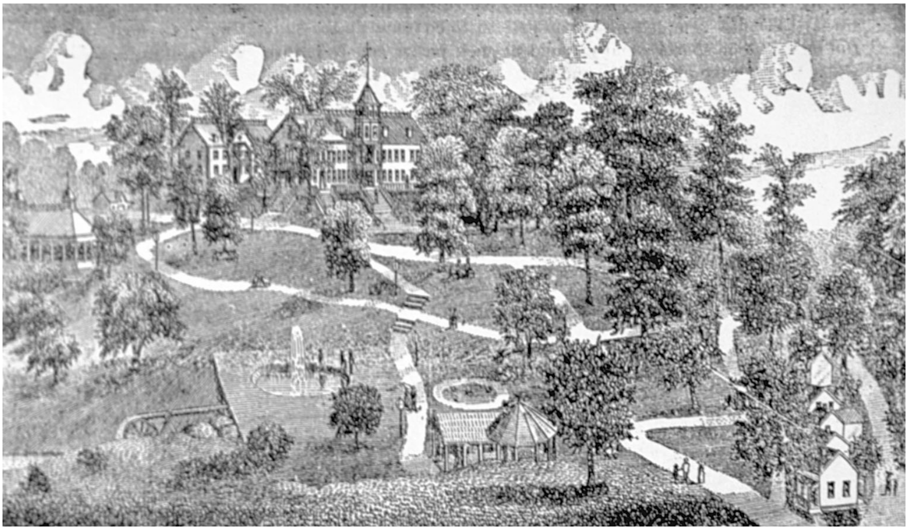

Figure 2. Picture of the All Healing Mineral Springs Health and Pleasure Resort from an 1888 brochure. The principal springs are located in the middle foreground under the octagonal roof. Photograph courtesy of Mike Peters.

production. In 1863 the Garrett Brothers purchase 9,526 acres from Samuel Oakes, Peter Baxter, and A.R. Homesley for $6,500.

The Garrett Brothers—Charles, Issac, (Dr.) Francis, Richard, and (Dr.) John James—held this property, which included the area of All Healing Springs, until about 1880 when they formed the All Healing Springs Company. They were joined by R.Y. McAden, textile mill owner associated with the development of McAdenville (Gaston County) on South Fork of the Catawba River.

In 1881 the Garretts transferred land tracts (including the springs) to the All Healing Springs Company. At about this time Dr. Francis M. Garrett opened the All Healing Mineral Springs Health and Pleasure Resort (1888 pamphlet), a building described as being three stories tall by 165 feet long (Figure 2). By 1882, cottage lots were being sold for $10.00 each and were rectangles of 60 by 80 feet. Several streets were laid out (e.g., Yorkville, Chester, 1st, 2nd, 3rd, etc.), and water lines were promised to each lot. Deeds were restricted; for example, no commerce could be conducted from the cottages and no alcohol could be served.

On July 18, 1884, fire destroyed the hotel, Dr. Garrett's home, and two or three cottages. Fortunately, there were no reported injuries (*Gastonia Gazette*, August 1, 1884). At this same time Ms. Emily C. Prudden bought 50 acres of AHS property for $1.00 as an incentive to start and operate a school. This school was called Jones Hall and Institute, and consisted of one large building and a two-room cottage (*Gastonia Gazette*, August 1, 1884). In 1885 another building was added. This school was located in the vicinity of the AHS hotel but not close enough to have been damaged by the fire that destroyed the hotel. In fact, the school building may not have been completed at the time of the fire. "In connection with the springs ... is an Institution that promises to accomplish a large and benevolent work for the country around. This is the erection of the female seminary known as Jones Hall and Institute…. This benevolent enterprise is being built up by wealthy parties in Minneapolis, Minnesota" (*Gastonia Gazette*, August 1, 1884).

Emily Catherine Prudden

Emily C. Prudden was born June 13, 1832 in Milford, now Orange, Connecticut. She spent the first 50 years of her life in New England and Minnesota before coming south from Minneapolis in 1882. She stated that "... hampered by deafness from the age of seventeen, I could not enter ways of large endeavor" (Prudden 1913). This condition did not prevent her from answering a call for assistance from an old schoolmate. She left Minneapolis in the fall of 1882 to become a "housemother" to 40 girls in an institute (school) in Chester, South Carolina. Although she does not mention the name of the school in her autobiography, it was probably the Brainerd Institute founded during the late 1860s.

While her girls were in school, Emily Prudden visited the homes of other families, both white and black, in the vicinity. She found that children of local white families were as disadvantaged as her expectation for opportunities for black children. "I'd find three or four white girls, sisters so fair blue eyes, rosy cheeks and gentle manners; but without one advantage, no school, no church, no society, more to be pitied than the colored, who are social and full of gladness" (Prudden 1914). With this in mind, she traveled to All Healing Springs at the base of Crowders Mountain in Gaston County at the close of her second school year. Here she bought 50 acres of land from Dr. Francis M. Garrett for the sum of one dollar for the purpose of establishing a benevolent institution for the education of young white girls. This school was called Jones Hall and Institute, and was capable of accommodating and teaching 50 girls (Gaston County Deed Book 12, page 209).

Two years after starting the school at All Healing Springs, Emily Prudden and one of her teachers were vacationing in the Blowing Rock, North Carolina vicinity and found conditions similar to those of Gaston

County. In 1886, she opened another school there, known as Skyland Institute, and when that school was well established she then returned to Gaston County (Prudden 1913).

During the years she worked to establish the school at All Healing Springs she noticed that African-American children in the Crowders Mountain area had little opportunity for formal education. In 1888, Lincoln Academy was established by Emily Prudden as a boarding school for these children. Almost immediately she turned over responsibility of maintenance and operations of the school to the American Missionary Association.

Having reached her eightieth birthday on June 13, 1912, Emily Prudden finished her educational responsibilities after establishing 15 schools: eight white and seven African-American (Prudden 1913). She died on Christmas Day, 1917, and, in accordance with her wishes, was returned to Orange Connecticut for burial in the Orange Congregational Church cemetery (Correspondence, Orange Historical Society, September 12, 1992).

In 1885 the hotel was rebuilt by Mr. M.A. Cozzens and Mr. Thomas who operated the first hotel for the Garrett Brothers (AHS Company) (Figure 2). Business must have been sufficient to remain open but not prosperous enough to prevent Cozzens and Thomas from selling the hotel and property to E.S. Jones in 1887. Jones had provided the funds to help build a school for Emily Prudden in 1884. Ms. Prudden also sold the school and property to Jones at the same time he bought the hotel. The following year, 1888, Jones Institute was renamed Jones Seminary. At this time a large amusement pavilion was added that contained a billiards room, ten-pin alley, and gymnasium with floor space for roller-skating (Figure 2). A ballroom containing 2,400 square feet adjoined the amusement pavilion. Seminar buildings were described as “two commodious and substantial structures about 100 feet apart.”

In 1899 the school closed for a year and then reopened under the guidance of the ARP Church. In 1904 Dr. Lindsay assumed permanent control of the school. A college campus grew from the initial 50 acres to slightly over 138 acres. From 1903–1921 this school was known as Linwood College.

Survey Results

During the winter months of 1995–1996, 40 meter-wide transects oriented with compass headings were run in the area identified as the location of All Healing Springs (Kings Mountain, North Carolina Fifteen

Minute Quadrangle 1914). Using this technique we identified the footings and chimney falls of several buildings. We also were also able to relocate two concrete cisterns noted in photographs of buildings from the Linwood College era. In the vicinity of these cisterns was a set of steps leading down to another spring and a concrete lined discharge culvert. Iron pipes pierced the walls of this drainage at approximately 10-foot (3 meter) intervals. Currently, many of these pipes are dry but a trickle of water flows from a few suggesting a drain field. This area is marshy with standing water. In photographs from the first decade of the twentieth century, this area appears as a maintained lawn with a gravel path to the cistern. No evidence of this path remain. Photographs of the area also indicate that an octagonal covering was built over the large spring, but today no evidence of it remains. A breached dam was also identified during this initial survey and is recognizable in the woodcut of the spa in the 1888 brochure (Figure 2).

Within areas of the buildings identified during the literature review at All Healing Springs, a five-foot grid was established over the grounds and surface collected (Figure 3). The main buildings at All Healing Springs—Hotel or Jones Hall, Prudden Hall, and a residence northeast of the Hotel—are oriented 335° east of magnetic north. These foundations and artifacts reflect at least two and possibly three periods of construction. Certainly the final phase of operation is associated with Linwood College 1903–1921.

The following tables, resulting from collections made at Prudden Hall, the Residence, and Hotel (Jones Hall), reflect a grid nomenclature based upon letters and numbers. The letters reflect east-west lines beginning at the south end of a building, and numbers represent north-south lines beginning with the west side of a building. The southwest corner designates five-foot squares. For example, "A1" is the southwest corner of any of the buildings described. Additionally, a designation of "Surface" or "Level 1" is indicative of either a surface collection or a test excavation in the tables and text. For example, "I9" of the Hotel was both surface collected and excavated to sterile subsoil. Clearing understory and site preparation, including cleaning out the main series of springs, was accomplished during the winter months.

All Healing Springs Resort

Throughout the activity of collecting primary documents for this project, it was found that a theme dominating the writings of observers is that of growth and construction. Construction of the original hotel was

Figure 3. South-facing view of granite piers of the Mountain View Hotel/Linwood College dormitory. These are the eastern piers supporting the rear of the building. Note the chimney fall in the middle right.

Figure 4. Photograph of the Hotel/Jones Seminary/Linwood College dormitory taken about 1915 and reproduced in the college annual. Photograph courtesy of Mike Peters.

begun on or before April 1881 at a cost of $10,000 (*Gastonia Gazette*, April 2, 1881). After the completion of the hotel a number of cottages were constructed in the vicinity (*Gastonia Gazette* June 22, 1883). There are also accounts of a hotel fire on July 18,1884 that resulted in at least one reconstruction at that site (*Gastonia Gazette*, August 1, 1884). “The hotel was 348 feet long and two stories high, affording with the cottages around accommodations for 250 guests” (*Gastonia Gazette*, August 1, 1884).

Hotel Testing

During the surface reconnaissance, standing foundation stones were measured, and their long and short axes were evaluated with respect to the described dimensions of the Hotel building. The foundation stone distances are 101 feet from north to south and 45 feet from east to west. There is brick chimney fall on both the east and west sides of these pier stones (Figure 3). Altogether, there are eight piles of decaying brick, four on each side, and this matches with a 1915 photograph of a building (unidentified) in a Linwood College Annual. In this same annual is a photograph of another unidentified building that is probably Prudden Hall, located to the right of a building that appears to be Jones Hall/Hotel (Figure 4). The first five-foot collecting square of the Hotel was in the southwest corner of the last pier on what was the southwest side of the building and is designated Square A1 (Table 1). A linear depression oriented north-south runs through the center of the piers and may be the remains of a shallow basement or mechanical equipment crawlspace. A number of sheet metal fragments, some of more than five feet in length, were noted but not collected in this trench.

Window glass and bottle glass were the most abundant materials collected from the surface and testing squares within the Hotel (Table 1). Three different sizes of cut nails were recovered from these squares. A few of the small cut nails were recovered with small, thin, metal disks similar to modern roofing tacks. They were probably used in a similar manner for one of several roofs that covered the structure located here. Most of the window glass is modern in appearance and lacks imperfections usually found in glass produced in the late nineteenth century. Less than 50 wire nails were found and are inconsistent with the kind of window glass recovered. More than three times that number of two sizes of cut nails was recovered (Table 2). Only a few sherds of whiteware and ironstone were recovered.

Square I9, Level 1, produced the following additional items not described in Table 1: three wall plaster fragments; one fragment of a metal stove grate; one roof slate fragment; one unidentified plastic fragment; two phonograph record (red) fragments; seven fragments of an auto battery; four large metal screws; four round roof tabs; 11 metal hangers; two screw-type jar lids; three melted lead fragments; one auto tire valve stem; two ceramic electrical insulators; and two fragments of iron sanitary sewer pipe (Drain Waste Vent stack).

Square B8, Level 1, produced the following additional items not described in Table 1: two plaster fragments; one metal hinge with two wood screws; one small metal screw cap; two wire fragments; one press-mold glass fragment; one glass marble; one ceramic insulator with two metal wood screws; seven round metal roof tabs; eight metal hangers; one large metal screw; and two large metal tacks.

Square F6, Level 1, produced the following additional items not described in Table 1: one auto battery cell cap; two ceramic black door knob fragments; two red phonograph record fragments; one metal roof tab disk; one clock works (incomplete); one large metal tack; one fragment wire; nine metal hangers; six round metal roof tabs; three plaster fragments; one large metal bolt; two metal screws; one lead fragment; one metal door hinge; seven auto battery (Ford) fragments; and one broken “shot “ glass.

Table 1. All Healing Springs Hotel Surface Collections and Testing.

Context	White-ware	Iron-stone	Window Glass	Bottle Glass	Burned Glass	Buttons	Other Artifacts	Comments
Square B8, Level 1	-	-	99	-	-	-	31	2 plaster frags.; 1 metal hinge, etc.
Square F6, Level 1	-	-	62	43	-	-	42	1 auto battery cell cap; 2 ceramic insulators
Square F6, Surface	-	-	-	8	-	-	5	2 plaster frags.; 1 large battery casing frag.
Square I2, Level 1	-	-	188	11		1	42	20 roof material frags.; 2 fence brads
Square I9, Level 1	5	12	181	124	-	1	40	3 wall plaster frag.; 1 metal frag.
Square I9, Surface	-	1	108	5	1	-	7	1 wire frag.; 5 metal "hangers"; 1 unid. metal frag.
Square M6, Level 1	-	-	-	2	-	-	13	4 plaster frags.; 1 metal canning, etc.
Square M6, Surface	-	-	1	17	-	-		jar lid, bottle caps, screws, door hinge
Square Q6, Level 1	2	-	102	38	2	1	26	3 plastic frags.; 16 auto battery frags.
General Surface	-	-	-	-	-	-	1	1 porcelain electrical fixture
Total	7	13	741	248	3	3	207	

Table 2. All Healing Springs Hotel Metal Artifacts from Surface Collections and Testing.

Context	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Fragments
Square B8, Level 1	8	50	43	24
Square F6, Level 1	9	31	18	27
Square F6, Surface	-	2	-	4
Square I2, Level 1	1	35	17	-
Square I9, Level 1	15	53	27	11
Square I9, Surface	5	7	10	-
Square M6, Level 1	4	16	11	2
Square M6, Surface	-	2	3	4
Square Q6, Level 1	1	6	2	10
Total	43	202	131	82

The significance of the recovered artifacts from the Hotel/Jones Hall is the absence of more kitchen and serving ware. It is likely that at the time of the closing of the school many of these items were removed from the abandoned buildings. Additionally, except for the recovery of white graniteware fragments interpreted as chamber pots, no evidence of privies was identified during survey. The presence of many electrical insulators and fragments suggest that the buildings were among the first in the area to be electrically illuminated after the turn of the twentieth century. Photographs of Linwood College as late as 1915 and student recollections suggest that electricity was not installed until after that time. There is a total absence of cutlery from the Hotel area, again suggesting that these items were curated and removed at the time of the college's closing.

Trash Dump Testing

A trash dump immediately north of the Hotel was identified and tested during survey. The objective of testing here was to identify all of the periods of occupation by the resulting artifacts. After clearing leaves and tree limbs, the majority of surface debris consisted of extremely rusty "tin" cans and broken bottle fragments. A number of soft drink bottles were identified and recovered in Test A (Table 3).

A greater number of sheet and container metal fragments were recovered from Test B, Level 1 (Table 3). Test B (Table 3) also produced

Table 3. All Healing Springs Trash Dump Testing.

Context	White-ware	Iron-stone	Window Glass	Bottle Glass	Lamp Glass	Wire Nails	Large Cut Nails
Test A, Surface	3	-	-	77	6	-	30
Test A, Level 1	3	1	-	69	7	-	3
Test B, Level 1	6	-	4	71	-	20	40
Total	12	1	4	217	13	20	73

Table 3 continued.

Context	Metal Fragments	Other Artifacts	Comments
Test A, Surface	40		
Test A, Level 1	4		1 RC soft drink bottle dated March 3, 1925; 1 granite ware fragment; possible chamber pot
Test B, Level 1	114	21	14 medium cut nails; 1 metal jar lid; 1 "tin" can frag; 2 bottle neck frags.; 2 vein quartz flakes; 1 stove clinker fragment; 1 fragment roofing material; 1 milk bottle fragment; 1 roof hanger
Total	158	21	

the greatest number of cut nails and relatively older items of glass (i.e., glass with more of a patina indicating a longer period of exposure to the elements).

Square Test B, Level 1 also produced the following additional items not described in Table 3: 14 medium cut nails; one metal jar lid; one “tin” can fragment; two bottle neck fragments; two vein quartz flakes; one stove clinker fragment; one fragment roofing material; one milk bottle fragment; and one roof hanger.

Prudden Hall Testing

A building south of the Hotel and identified as Prudden Hall (Figure 4) on the 1930 Sanborn Fire Insurance Map was cleared, gridded, and collected in the manner described for the Hotel. There are at least two photographs of this building from Linwood College Annuals, as well as a woodcut from an advertisement for All Healing Springs as early as 1883. The approximate location of this building was confirmed from examining a faint drip line on the ground and identifying building footings of brick and porch piers of stone. In a 1906 photograph the building is shown from the west as being three stories high and having at least one chimney. A subsequent photograph from 1915–1916 shows the same building from the same vantage with an addition of a porch on the west side. Evidence of this addition was observed during field reconnaissance.

In a similar manner to the Hotel, the majority of recovered artifacts were building materials: window glass, nails, (both wire and square cut), and metal fragments (Table 4). Of note here is the presence of lamp glass, suggesting that portions of this building are relatively less disturbed than that of the Hotel. However, there was a greater quantity of wire nails here, suggesting remodeling or improvements after the turn of the twentieth century.

Unlike the finds at the Hotel, a slightly greater quantity of tableware, whiteware, was recovered from Prudden Hall (Table 5). At least one serving dish lid with a transfer print motif was recovered from the surface of Square B7. Several cross mends were also identified for another serving piece on the surface of Square E1 (Table 5). Two fragments of a chamber pot lid were recovered from the surface of Square D10.

The significance of these finds is in the confirmation of written documents outlining the function of Prudden Hall as that of a dormitory and residence for students, first at Jones Seminary and Institute and later at Linwood College. It is likely that Emily Prudden's residence is also in the vicinity of this structure and dates to the initial construction phase begun in 1881.

Residence Testing

A building northeast of the Hotel and identified as the Residence on the 1930 Sanborn Fire Insurance Map was cleared, gridded, and collected in the manner described for the Hotel. An unidentified structure is pictured in an early woodcut of the All Healing Springs Hotel, and there is no reference to this structure in subsequent literature about either the college or spa. This may be the site of Dr. Francis Garrett's rebuilt residence or the rebuilt residence of proprietor M.A. Cozzens. A preliminary reconnaissance in early February 1996 produced evidence of a chimney fall and a small trash dump toward the southeast of this site. This area was subsequently cleared of leaf litter and downed tree limbs, the

Table 4. All Healing Springs Prudden Hall Metal and Glass Artifacts from Surface Collections and Testing.

Context	Window Glass	Bottle Glass	Lamp Glass	Burned Glass	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.
Square A0, Surface	4	7	-	-	-	-	-	-
Square A2, Surface	2	-	-	-	-	-	-	-
Square A3, Surface	1	-	-	-	-	-	-	-
Square A5, Surface	5	-	-	-	-	-	-	-
Square A6, Surface	1	-	-	-	-	-	-	-
Square A7, Surface	1	-	-	-	-	-	-	-
Square A8, Surface	4	-	-	-	-	-	-	-
Square A9, Surface	9	-	-	-	-	-	-	-
Square A10, Surface	-	-	-	-	-	-	-	1
Square A12, Level 1	230	164	3	1	16	6	22	23
Square B1, Surface	15	10	-	-	-	-	-	-
Square B3, Surface	-	1	-	-	-	-	-	-
Square B4, Surface	35	-	-	-	-	-	-	-
Square B5, Surface	9	-	-	-	-	-	-	-
Square B6, Surface	4	-	-	-	-	-	-	-
Square B8, Surface	1	-	-	-	-	-	-	-
Square C5, Surface	33	-	-	-	-	-	-	-
Square C6, Surface	26	2	-	-	-	-	-	-
Square C7, Surface	9	-	-	-	-	-	-	-
Square C9, Surface	1	-	-	-	-	-	-	-
Square D1, Surface	1	-	-	-	-	-	-	-

Table 4 continued.

Context	Window Glass	Bottle Glass	Lamp Glass	Burned Glass	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.
Square D2, Surface	1	-	-	-	-	-	-	-
Square D3, Surface	13	-	-	-	-	-	-	-
Square D5, Surface	1	-	-	-	-	-	-	-
Square D6, Surface	26	-	-	-	-	-	-	5
Square D7, Surface	7	-	-	-	-	-	-	-
Square D8, Surface	58	4	-	-	-	7	6	1
Square D9, Surface	12	-	-	-	-	-	-	-
Square D10, Surface	11	-	-	-	-	-	-	-
Square E2, Surface	4	-	-	-	-	-	-	-
Square E3, Surface	3	-	-	-	-	-	-	-
Square E9, Surface	12	1	-	-	-	-	-	1
Square E10, Surface	10	1	-	-	-	-	-	-
Square F1, Surface	3	-	-	-	-	-	-	-
Square F4, Surface	-	-	-	-	-	1	-	-
Square F7, Surface	4	-	-	-	-	-	-	-
Square F10, Surface	17	-	-	-	-	-	-	-
Square G1, Surface	2	-	-	-	-	-	-	-
Square G2, Surface	-	-	-	-	-	-	-	1
Square G4-5, Surface	-	-	-	-	-	-	-	2
Square G10, Surface	2	-	-	-	-	-	-	-
Square H1, Surface	2	-	-	-	-	-	-	-
Square H2, Surface	8	-	-	-	-	-	-	-

Table 4 continued.

Context	Window Glass	Bottle Glass	Lamp Glass	Burned Glass	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.
Square H3, Surface	-	-	-	-	-	-	-	7
Square H6, Level 1	386	10	26	-	4	22	9	-
Square H6, Surface	110	20	3	-	-	6	3	4
Square H7, Surface	2	1	-	-	-	-	-	-
Square H9, Surface	1	-	-	-	-	-	-	-
Total	1086	221	32	1	20	42	40	45

Table 5. AHS Prudden Hall Ceramics and Miscellaneous Artifacts from Surface Collections and Testing.

Context	White-ware	Iron-stone	Other Artifacts	Comments
Square A4, Surface	-	1	-	granite ware-possible chamber pot
Square A5, Surface	1	-	-	whiteware matches sherds in Squares F7 and C5
Square A7, Surface	-	-	1	1 etched glass serving dish
Square A12, Level 1	2	32	17	12 med. cut nails; 2 metal clasps; 3 wire frags.
Square B1, Surface	-	-	5	5 frags. of serving dish ware
Square B4, Surface	1	-	1	1 ceramic electrical insulator
Square B5, Surface	-	-	5	1 electrical insulator fragment; 4 etched glass lid frags. (Serving dish)
Square B6, Surface	-	2	-	ironstone ware matches with B8 and E10
Square B7, Surface	2	-	-	1 serving dish lid with transfer print and embossed pattern; 1 "milk glass" canning jar lid
Square B8, Surface	-	1	-	ironstone ware matches E10 and B6

Table 5 continued.

Context	White-ware	Iron-stone	Other Artifacts	Comments
Square C5, Surface	1	-	-	
Square C6, Surface	-	6	2	2 ceramic electrical insulator frags.
Square D1, Surface	-	-	1	1 ceramic electrical insulator
Square D2, Surface	-	1	-	1 ironstone ware fragment possible matches: F5, E1, D2, H7, G4
Square D6, Surface	-	-	1	1 ceramic electrical insulator
Square D8, Surface	1	-	5	3 frags. plaster; 1 ceramic electrical insulator
Square D10, Surface	-	2	-	2 joinable granite ware chamber pot lid frags.
Square E1, Surface	-	1	-	ironstone ware possible matches: F5, E1, D2, H7, G4
Square E9, Surface	2	-	-	
Square E10, Surface	1	1	-	ironstone matches with frags. in B8 and B6
Square F5, Surface	-	1	-	ironstone ware possible matches: F5, E1, D2, H7, G4
Square F5-7, Surface	-	-	4	4 auto battery case fragments
Square F6, Surface	1	-	-	matches F7
Square F7, Surface	3	1	-	2 matches: F6-whiteware (thin pieces); and 1 matches: A5-whiteware; 1 granite ware chamber pot fragment
Square F8, Surface	3	-	1	1 earthenware sanitary sewer pipe fragment
Square G1, Surface	-	-	1	1 ceramic electrical insulator
Square G2, Surface	-	-	1	1 ceramic electrical insulator
Square G4, Surface	-	1	-	ironstone ware matches with squares H7, F5, E1, and D2
Square G6, Surface	1	-	-	1 fragment hollow ware, whiteware
Square G7, Surface	-	-	1	1 ceramic electrical insulator

Table 5 continued.

Context	White-ware	Iron-stone	Other Artifacts	Comments
Square H4, Surface	-	-	1	bakelite fragment
Square H6, Surface	6	11	1	chamber pot frags. (white granite ware); 1 ceramic electrical insulator
Square H6, Level 1	5	4	4	3 ceramic electric insulators; 1 vein quartz flake, prehistoric
Square H7, Surface	2	1	-	ironstone ware possible matches F5, E1, D2, G4
Total	32	66	52	

majority of which was Hurricane Hugo debris, and gridded after the manner of the other buildings.

Tables 6 and 7 contain the results of both surface collecting and testing at this Residence. As with the other buildings, a number of electrical insulators and pieces of wall or ceiling plaster were recovered. It is probably misleading to continue to call this structure a residence because there is almost a complete absence of tableware and kitchenware (Table 6). However, it is likely that most or all of those items were removed when the school closed in 1921. A 1938 aerial photograph, as well as the Sanborn Fire Insurance Map of 1930, describe the building as abandoned and in poor repair.

As with the other structures, the greatest quantity of recovered material was window glass, followed closely by bottle glass (Table 7). Other artifacts include roofing nails, a metal snap button, a fragment of hard rubber or Bakelite, shoe "upper" leather, and canning jar fragments. Chimney fall and a possible hearthstone were noted on the east side of this structure in the middle of an outside wall. An iron stake usually associated with a system of lightning rods and grounding straps was noted within the drip line on the west side.

The significance of this site is as part of the school complex and perhaps dates to the reconstruction of the buildings after the fire of 1884. Several of the glass fragments recovered from this building appear to have been sooted or melted. The same is true for two of the wood fragments recovered from Squares G7 and I9. This is not the caretaker building

Table 6. All Healing Springs Residence Ceramics and Other Artifacts.

Context (all surface)	White-ware	Iron-stone	Other Artifacts	Comments
Square A5	-	-	4	3 shoe fragments; 1 electrical insulator
Square B8	-	-	2	1 fragment wall plaster; 1 electrical insulator
Square C1	-	1	-	
Square C7	-	-	2	1 electrical insulator fragment; 1 ceramic doorknob fragment
Square D2	-	-	1	1 fragment mortar
Square D6	-	-	5	4 electrical insulators (1 with electrical tape residue); 1/2 of ceramic electrical light fixture
Square D8	-	-	3	1 coal fragment; 1 ceramic electrical insulator
Square D9	-	-	1	1 coal fragment
Square E4	-	-	2	1 shoe sole; 1 coal fragment
Square F2	-	-	1	1 wall plaster fragment
Square F4	-	-	1	1 electrical insulator
Square F6	-	-	1	1 fragment wall plaster
Square F7	-	-	1	1 knot from a 1/4 sawn board, "tiger eye"
Square F9	-	-	1	1 electrical insulator fragment
Square G7	-	-	1	1 pine knot from floor joist
Square G8	-	-	4	1 plaster fragment
Square G9	-	-	1	1 electrical insulator
Square H2	1	-	-	
Square H4	-	-	2	1 leather shoe upper ; 1 rubber jar lid seal
Square H6	-	-	3	3 wall or ceiling plaster fragment: 2 frags. finished surface
Square H7	-	-	2	2 ceramic electrical insulators
Square H8	-	-	2	2 frags. electrical insulators
Square H9	-	-	4	1 fragment hard rubber; 3 plaster frags.
Square I9	-	-	1	1 knot from a floor joist partly burned
Total	1	1	45	

Table 7. AHS Residence Glass and Metal Collection.

Context (all surface)	Win-dow Glass	Bottle Glass	But-tons	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.	Other Arti-facts	Comments
General	-	2	-	-	-	-	-	-	shiny (patinated); sharp edges

Table 7 continued.

Context (all surface)	Window Glass	Bottle Glass	Buttons	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.	Other Artifacts	Comments
Square A4	1	-	-	-	-	-	-	-	
Square A5	5	10	-	-	-	2	1	3	shoe 3 frags.
Square A6	-	2	-	-	-	-	-	-	1 mason jar frag.
Square B1	131	3	-	21	-	-	7	2	2 med. length cut nails; 2 whole bottles
Square B3	4	1	-	-	-	-	-	-	
Square B5	4	2	-	-	-	-	-	-	
Square B7	8	-	-	-	-	-	1	-	rusted sheet metal flashing
Square B8	1	-	-	-	-	-	-	1	1 wall plaster frag.
Square B9	1	-	-	1	-	-	-	-	
Square C1	-	-	-	-	-	-	1	-	1 large cable frag.
Square C3	2	-	-	-	-	-	-	-	1 window glass frag.-may be sooted
Square C4	1	-	-	-	-	-	-	-	
Square C5	1	-	-	-	-	-	-	-	
Square C7	-	3	-	-	-	-	-	-	
Square C8	3	-	-	-	-	-	-	-	
Square D2	-	1	-	-	-	-	-	1	1 mortar frag.
Square D6	-	6	-	-	-	-	-	-	2 bottle types represented
Square D8	-	-	-	-	-	-	1	-	1 coal frag.; 1 shotgun shell brass
Square D9	-	-	-	-	-	-	10	1	1 coal frag.; sheet metal frags.
Square E1	2	-	-	-	-	-	-	-	
Square E3	26	19	-	-	3	-	2	2	1 galvanized pipe fitting; 1 shotgun shell brass; 4 flat glass frags. very thin
Square E4	-	-	-	-	-	-	1	2	1 shoe sole; 1 metal strap frag.; 1 coal frag.
Square E5	-	3	-	-	-	-	-	-	
Square E7	-	-	-	1	-	-	-	-	1 long nail in piece of wood
Square E8	2	1	-	-	-	-	-	-	
Square F1	-	-	-	-	-	-	2	-	flat or sheet metal

Table 7 continued.

Context (all surface)	Window Glass	Bottle Glass	Buttons	Wire Nails	Large Cut Nails	Small Cut Nails	Metal Frags.	Other Artifacts	Comments
Square F2	-	-	-	-	-	-	-	1	1 wall plaster frag.
Square F4	-	-	-	1	-	-	-	-	
Square F6	-	-	-	-	-	-	-	1	1 plaster frag.
Square F7	-	-	-	-	-	-	-	1	1 knot from a 1/4 sawn board
Square G1	13	-	-	-	-	-	-	-	
Square G2	15	-	-	-	-	-	-	-	
Square G5	1	3	1	-	-	-	-	-	
Square G7	-	-	-	-	-	-	-	1	1 pine knot from floor joist
Square G8	1	-	-	-	-	-	-	4	3 thin burnt metal, or aluminum; 1 plaster frag.
Square G9	5	1	-	-	-	-	1	1	1 chimney fall frag.
Square H2	-	1	-	-	-	-	-	-	
Square H4	8	1	-	-	-	-	-	2	1 shoe leather; 1 rubber jar lid
Square H6	2	-	-	-	-	-	-	3	3 frags. wall or ceiling plaster
Square H7	1	2	-	-	-	-	-	2	2 ceramic electrical insulators
Square H8	-	-	-	2	-	-	-	2	2 frags. electrical insulators
Square H9	-	-	-	-	-	1	1	4	1 piece hard rubber; 3 plaster frags.; thin sheet metal disk with 1 small cut nail through it
Square I2	16	1	1	-	-	-	-	-	1 metal "snap" button from the first half twentieth century
Square I3	105	4	-	-	1	-	-	-	large portion of mason jar
Square I5	1	-	-	-	-	-	-	-	
Square I6	1	-	-	-	-	-	-	-	
Square I8	2	-	-	-	-	-	-	-	
Square I9	-	1	-	-	-	-	-	1	1 knot from a floor joist partly burned
Total	363	67	2	26	4	3	28	35	

referred to by some sources after the closing of the school. That particular building was located on the west side of Linwood Road in the vicinity of Gaston Hall.

Summary and Conclusions

This study was designed to record and describe the archaeological resources present within the proposed survey area near Crowders Mountain State Park, Gaston County, North Carolina. It was supported by a survey and planning grant, administered by the North Carolina Division of Archives and History, to locate and document archaeological resources associated with All Healing Springs Spa and Linwood College. The project survey area falls within an approximately 700 acre (284 ha) area of Crowders Mountain State Park and adjacent private property (Figure 1). The surveyed area is roughly bounded by Sparrow Springs Road (SR 1125) to the west, US Highway 29-74 to the north, Archie Whiteside Road (SR 1122) to the east, and Crowders Mountain to the south. Throughout the park area, ridge toes extend to within five meters of first order tributaries of Crowders Creek (Figure 1), and, except for survey areas located in creek floodplains, the project area is contained within the ridge toe and ridge top physiographic regions.

During the field reconnaissance, the previously unrecorded historic archaeological area containing All Healing Springs Spa and Linwood College was identified and recorded (Figure 2). Shovel testing and leaf blowing along transects within areas delimited by structural remains (i.e., brick chimney fall, stone piers, and drip lines) revealed additional artifacts indicative of both large and small structures at All Healing Springs Spa. Additionally, two concrete cisterns identified in early photographs of Linwood College and the main spring were relocated, cleared, and mapped. A previously unreported concrete-lined drainage ditch and system of iron pipes to de-water the area around the concrete cisterns was cleared of undergrowth and surface collected. No cultural artifacts were recovered from within the main spring basin.

Three major structures were identified at All Healing Springs Spa: Prudden Hall, the Hotel (Figure 4), and a later residence. These were surface collected and tested. Additionally, several outbuilding sites, including a pump house near the springs, at least one cottage, and a trash dump north of the Hotel, were surface collected and, in the case of the trash dump, tested. The majority of recovered artifacts can be classified as building materials: window glass, bricks, nails, sheet metal, and roofing shingles. Little in the way of kitchen and serving wares were recovered.

Several fragments of white granite ware (chamber pot remains) were recovered from the dump, Hotel/Jones Hall, and Prudden Hall. A number of machine-made glass bottle fragments were recovered from all surface contexts, and most date to the first quarter of the twentieth century. Few artifacts attributable to the Spa era were recovered and identified. A great deal of disturbance and dumping activity occurred between the close of Linwood College in 1921 and the current survey. However, standing foundation stones and chimney falls remain to serve as interpretive stations for future park trails that will remind visitors of the activity around All Healing Springs.

Notes

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County and Local Resources. County and local resources used in this research include: *Gastonia Gazette*, Gastonia, North Carolina; Gaston County Register of Mensa Conveyance; Gaston County Deeds; and Gaston County Corporate Records.

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THE ARCHAEOLOGY OF SANDY SOIL SITES: A NEW APPROACH TO THE FIELD VALUATION OF SITE INTEGRITY

by
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Abstract

Recent archaeological research conducted at sandy soil sites along the South Atlantic Slope has provided the framework for an argument regarding the archaeological integrity of buried cultural deposits. Such an argument for integrity applies directly to the evaluation of significance for an archaeological resource with regards to cultural resource protection legislation. Research into sandy site integrity often rests upon multidisciplinary approaches that require significant and occasionally prohibitive costs and specialized skills. A new approach to the evaluation of archaeological integrity in buried cultural deposits in sandy soils (particularly in the Carolina Sandhills) may be based upon two basic principles. The first is that the geochemical study of phosphate analysis (in concert with more traditional, but strictly applied excavation techniques) has the potential for isolating activity areas at buried archaeological deposits suggesting some level of integrity. The second is that through the application of a relatively new test-strip technique for phosphate analysis to an integrated archaeological survey and resource evaluation, access to an easy, inexpensive, and highly diagnostic archaeological procedure can be made more widely available to the researcher in the field.

Agnosco veteris vestigia flammae.
"I recognize the footprint of an old fire" [Aeneid IV:22–23]

Virgil's words on the lips of an archaeologist are a much more welcomed portent than they were for poor Dido. The interpretation of an archaeological deposit cannot be maintained without a foundation rooted in an understanding of the given deposit's context, defined here by Butzer (1982:4) as a "spatial-temporal matrix that comprises both a cultural environment and a noncultural environment." The recognition of evidence for the cultural environment (human behavioral activities) and the noncultural environment (usually expressed through natural events) in the archaeological record allows for a more accurate interpretive construction of the metamorphosis of a cultural deposit through time. The archaeologist's perception of the human factors that direct the primary depositional context of archaeological evidence and the subsequent environmental elements of this metamorphosis (post-depositional site formation processes) allows for the extrapolation of information about past human lifeways. These factors are typically conceptualized as the cultural deposit's capacity to transmit information concerning the primary human activity that creates the archaeological record. Within the methodological paradigm of compliance archaeology (cultural resource management [CRM]), this concept is often expressed as "site integrity" and is essential to the consideration of site significance (Glassow 1977; Shrimpton and Andrus 1991; Townsend et al. 1993).

Sandy Soil Sites

Much of the recent discussion concerning sandy site archaeology in upland settings on the inner Coastal Plain of the South Atlantic Slope has been concerned with the integrity of cultural deposits identified in such contexts. For the archaeologist operating in these areas, ambiguities and inconsistencies in the archaeological record have been perceived as the result of difficulties with the issue of integrity owing to complexities in the natural environment and landscape history of the region. Sediments that had been continuously eroded from the Piedmont physiographic region throughout the Cretaceous and Paleocene periods (from 144 to 54.6 million years ago) were transformed through the eluviation of fine particles during the Pleistocene into unconsolidated sands in the inner Coastal Plain. These unconsolidated sands were then redeposited through aeolian processes on the side-slopes of the gently rolling landscape of the Carolina Sandhills region (Beyer 1991:167–169; Markewich and Markewich 1994:24–25). Aeolian features have long been considered fraught with interpretive difficulties due to their vulnerability to cyclic soil deflation and other physical and chemical alterations (Schuldenrein 1996:24–25).

As recently summarized in a symposium on the archaeology of the region during the 57th annual meeting of the Southeastern Archaeological Conference, research into the archaeology of the Carolina Sandhills region and similar areas in adjacent states range from landscape utilization to culture history and chronology (Schuldenrein 2000). Inquiries into the post-depositional site formation processes in the Carolina Sandhills may be generally divided into two basic models for the reconstruction of landscape histories in the region: the theory that the burial of archaeological material in the Carolina Sandhills is the result of widespread and consistent bioturbation; and the theory that locally variable aeolian sedimentation buried cultural deposits sporadically during the Holocene.

The homogenization of soil profiles and the horizonization of clasts (including archaeological materials) in a soil matrix due to biological (as well as chemical and physical) processes are now understood to have considerable implications for the interpretation of post-depositional effects to archaeological deposits and their contexts (Butzer 1982:110–114; Wood and Johnson 1982). Some researchers in the Southeast have adopted the perspective that the vulnerability of archaeological deposits in aeolian features to noncultural transformation agents has compromised site integrity at the majority of upland sites in the Sandhills region. The effects of bioturbation on soil formation and the displacement of objects throughout a soil profile have long been known, as evidenced by Charles Darwin's 1881 publication of *The Formation of Vegetable Mould Through the Action of Worms with Observations on Their Habits* (Howard 1966). As an illustration of the degree to which this disturbance may reorganize the location of archaeological materials, a number of studies on the ecology of pocket gophers (*Thomomys bottae*) with regards to archaeological sites have been conducted in California (Bocek 1986, 1992; Erlandson 1984; Johnson 1989). These studies have indicated that faunal turbation at archaeological sites may be widespread, considerable (Bocek 1992:267–268; Erlandson 1984:788–789), and may also be masked in a soil profile by similarities in matrix color (Johnson 1989:372,386). While the pocket gophers that were the subject species of the above studies are not indigenous to the Carolina Sandhills region, these case studies illustrate the potential degree of bioturbation hypothesized for deposits in those settings (Gresham et al. 1989).

It is exactly this type of process that David Leigh (2000) of the University of Georgia proposes as the primary post-depositional site formation agent in the Carolina Sandhills. Heavy mineral and particle size analyses conducted by Leigh along the Lynches River in South Carolina (1998a) and particle size and phytolith analyses undertaken at sites at Fort Bragg, North Carolina (1998b) suggested that aeolian reorganization of particles at upland sites had not occurred, but that bioturbation was evident. Leigh (2000) argues that, in the absence of conclusive evidence of aeolian sedimentation, bioturbation is the most likely cause of artifact burial. Even though aeolian erosion and sedimentation in the Carolina Sandhills region may have indeed occurred before the Late Pleistocene, Leigh (2000) argues that paleoclimatological histories generated for the region (see Delcourt and Delcourt 1985) indicate that this phenomenon would not have occurred within the past 15,000 years. Therefore, bioturbation is the most likely culprit for artifact burial at archaeological sites in the region.

On the other hand, a study conducted by Markewich and Markewich (1994) of the United States Geological Survey has revealed that the dunes on the inland Coastal Plain of Georgia and the Carolinas date to the Pleistocene and the early part of the Holocene, between 15,000 and 3,000 years ago. In addition to suggesting a post-Pleistocene date for some aeolian features, Markewich and Markewich (1994) provide a likely set of criteria under which differential early Holocene sedimentation might occur. These criteria include: an orientation of stream segments at approximately S. 40° E.; a nearby adequate source of sandy sediment; strong, persistent winds from the southwest; and a mean annual precipitation less than 1,250 mm with a mean annual evaporation of approximately 1,100 mm (Markewich and Markewich 1994:28–29).

Recently, some researchers in the Sandhills region have applied the geological hypothesis of Markewich and Markewich (1994) to interpretations of landscape history for archaeological deposits (Abbott 2001). Differential aeolian burial of cultural deposits has been theorized for upland sites in the region. A geoarchaeological study based on sediment fraction analysis and quantitative geochemical testing was conducted at 31HK140 at Fort Bragg, North Carolina, resulting in the identification of a "leached" occupation zone capped by well-sorted aeolian sediments (Braley and Schuldenrein 1993). At this site, it was determined that bioturbation (identified by the presence of krotovinas) had occurred but was not a significant source of artifact redistribution. Upland sites with aeolian features in the inner Coastal Plain have been subjected to a pattern of "dynamic equilibrium between soil formation and deflation" throughout the Holocene (Schuldenrein 1996).

Graviturbation has also been interpreted as an instrument of post-depositional metamorphosis at archaeological deposits. Investigations conducted at a sandy site along the Coastal Plain Margin in South Carolina by Gunn and Foss (1994) focused on an upland feature that exhibited aeolian erosion and redistribution based on the soil morphology and the spatial distribution of diagnostic cultural material throughout the feature (horizontal and vertical distributions). As a result, the relationship between clast size and degree of redistribution of fire-cracked rock suggests that clast (artifact) size exhibits an inverse ratio to the degree of downward movement through the soil profile (Gunn and Foss 1994). This phenomenon is, at least in part, due to particle sorting under the influence of gravity.

Whether the primary factor in the post-depositional transformation of a buried archaeological deposit is biological, gravitational, or aeolian in nature, research in the field is still fraught with difficulties in the determination of integrity. True site metamorphosis may not be easily determined without extensive post-excavation analysis by cross-disciplinary specialists; that is, the burial of a cultural deposit through the formation of a biomantle and associated "stone zone" (without obvious krotovina or other macroscopically observable soil changes), clast sorting by gravity, or Holocence aeolian sedimentation under drought-like conditions may not be readily obvious to the archaeologist directing the course of field research. In any case, the question can only be addressed through the implementation of a strictly applied excavation methodology combined with earth-science based interpretations.

Chemical Analysis of Archaeological Soils

The current proposal for combining strictly applied excavation methodology (tight proveniencing in particular) and geoarchaeological approaches to determine potential peaks in relative artifact density is not novel. Researchers from the College of William and Mary Center for Archaeological Research have proposed that rigidly provenienced excavation within sandy site contexts may and have provided indications of site integrity in Virginia and North Carolina (Blanton and Pullins 2000). Investigations conducted by Pullins and Blanton (1994a, 1994b), on behalf of the Virginia Department of Transportation, at two sites in Southhampton County, Virginia (31SN225 and 31SN226), applied a methodology utilizing 5-cm excavation levels. Soil samples (measuring 225 ml) from each level were submitted to the Soils Testing Laboratory at Virginia Polytechnic Institute and State University for chemical and particle size analysis. The spatial and typological analysis of the artifacts was conducted by the College of William and Mary Center for Archaeological Research. At Site 31SN225, peaks in the levels of manganese (Mn), magnesium (Mg), iron (Fe), and copper (Cu), roughly corresponding to one peak in artifact density, hinted at geochemical support for an interpretation of archaeological integrity (Pullins and Blanton 1994a:23–24). Soil testing at Site 31SN226 produced peaks in levels of calcium (Ca), phosphorus (P), manganese (Mn), and iron (Fe), all slightly below peaks in artifact density (Pullins and Blanton 1994b:38). High levels of copper (Cu) were observed at 31SN226, specifically at peaks in artifact density throughout the soil profile. Geochemical interpretations at both of these sites were composed, though, without comparison to a similarly tested off-site control column.

Chemical analysis of soils from archaeological sites usually emphasizes a limited number of elements which are thought to be particularly indicative of past human activities. The elements carbon (C), nitrogen (N), phosphorus (P), and calcium (Ca) have all received particular attention based on their abundance in refuse associated with past human settlements (e.g., Cook and Heizer 1965). Other minor elements, like magnesium (Mg), have also proven to be useful for differentiating natural and cultural disturbances (e.g., Van der Merwe and Stein 1972). Because of the strong attraction of phosphorus for oxygen, the phosphate form of phosphorus is the most common in soils. Therefore, phosphorus/ phosphate, above all others, has proven to be one of the most reliable elements for reconstructing past human activities (Ahler 1973; Leonardi et al. 1999; Mohler 2000).

Soil phosphate analysis has the most persistent and varied history of applications for detecting abandoned settlement sites whose physical remnants have disappeared. Phosphorus in the form of phosphate is especially appropriate for detecting settlement-affected soils, known as anthrosols because of their universal association with human activities. "Since parent materials supply soils with minute amounts of phosphate over geologic rather than short periods of time, natural recycling does not mask human-caused alterations. By comparing background and anthrosol phosphate concentrations, therefore, the investigator can interpret abnormal soil phosphate readings as chemical evidence of human settlement" (Eidt 1977:1327).

Human habitation adds certain chemical elements to natural soils, including carbon (C), nitrogen (N), and calcium (Ca); however, none of these elements can be used as reliable indicators of past human settlement (Woods 1975:27–29). Carbon, although it is common to all organic matter, can be drained to lower soil levels and easily washed away. Once deposited, nitrogen goes through an immediate and steady loss by leaching, returning to the natural nitrogen cycle. Even though bone is comprised more of calcium than phosphate, calcium can be rapidly dissolved and leached by acidic soils. In alkaline soils, any additional calcium merely augments the already high calcium content.

Phosphorus, on the other hand, is rather resistant to change. Its wholesale removal from the soil cannot be stimulated by normal oxidation, reduction, or leaching processes, as is true of compounds of nitrogen (N), calcium (Ca), carbon (C), sulfur (S), and other common elements. Phosphate forms highly insoluble compounds with iron (Fe) and aluminum

(Al), which are widely present in most soils. These elements help lock up the phosphate *in situ*, providing a chemical signature for human occupation which archaeologists can utilize in searching for and reconstructing archaeological sites. In some instances where traditional archaeological material is absent, the only evidence of past human occupation is due to the decay of organic remains recorded in the soil. In theory, phosphorus is a useful element for analysis because of its high concentration in vegetal material, flesh, and animal bone. Of equal importance is that, in its inorganic form, phosphate is not easily translocated chemically from its source of deposition; it remains a measure of the activities that produced it (Schuldenrein 1995). Phosphates stay largely bound to their original deposition site, displaying only minor migration tendencies and additions over the course of archaeological time (Eidt 1985). Since nature ultimately destroys physical traces of human efforts in many soils, differences in phosphate content may not only aid in the identification of locations, outlines, functions, and relative ages of past settlement phenomena, but they may also offer significant information regarding a site's integrity.

Regardless of when it was deposited in time, the increase of the surface concentration of phosphorus remains indicative of human occupation. Therefore, both the size of the site area and the depth at which samples are taken are important factors in determining the intensity and duration of the settlement in question. Another important factor to be determined is the phosphorus content of the native, or undisturbed, soil surrounding the site area (Mohler 2000). Sampling several areas around the site where there are no signs of occupation/disturbance is considered adequate. Levels of phosphorus for on-site soil samples would then be compared to the natural background levels obtained from off-site samples, from areas where, as far as could be ascertained, there was little or no evidence of any occupation.

The combined inorganic and organic forms of phosphorus make up the total phosphorus content of the soil. Organic phosphate is easily available and absorbed by plants, but inorganic phosphate is preserved in archaeological deposits where it tends to remain constant through time because of its insolubility. Some archaeologists have only measured the available, or organic, phosphorus content of the soil (Provan 1971; Schwartz 1967). Others have compared the results of available phosphorus with tests for total phosphorus (Leonardi et al. 1999). Still others have examined the conversion of organic phosphorus to inorganic phosphorus through time (Mattingly and Williams 1962). As can be seen, there is little agreement as to which type of phosphorus analysis is appropriate for certain archaeological investigations.

While others find available phosphorus tests useful (Provan 1971), it has been stated that "total phosphorus is by far the most useful test and that there is little relationship between the distribution of total and available phosphorus" (Ahler 1973:117). In his studies, Ahler (1973) revealed that the total phosphorus concentration generally paralleled the distribution of cultural debris. In addition, the concentration of available phosphorus was more closely related to natural soil development, while total phosphorus was linked more intimately with cultural activities.

Site 31MR205

An opportunity to attempt a new approach to sites in sandy contexts was provided during the June 2001 archaeological investigations at Site 31MR205 in Moore County, North Carolina, conducted by the staff of the Archaeology Unit of the North Carolina Department of Transportation (NCDOT) (Figure 1). As part of the environmental studies associated with the proposed improvements to US Highway 1 in Moore County, field investigations were undertaken in order to delineate and evaluate Site 31MR205 for eligibility to the National Register of Historic Places (Petersen 2002). Previously identified in 1990 (see Lautzenheiser et al. 1990 and Robinson 1995), this site was relocated near the crest of a ridgetoe overlooking the confluence of two minor tributaries of Little Crain's Creek in the Cape Fear River Drainage Basin. The landform was covered in grasses and occasional mature hardwoods, and was reported by the landowner to have been cleared of old growth several decades ago for the sole purpose of providing pasture for horses (Figure 2).

The archaeological study area, which included Site 31MR205, is located on the margins of the Carolina Sandhills, an area of inland dunes on the interior Coastal Plain of North Carolina. Markewich and Markewich (1994) have indicated that the convergence of several environmental and landscape factors in settings such as is found in the vicinity of 31MR205 could account for the formation of inland dunes due to aeolian processes during the late Pleistocene and early part of the Holocene.

Field Investigations

The delineation of buried cultural materials at Site 31MR205 was undertaken through the employment of subsurface tests along a 20-m grid

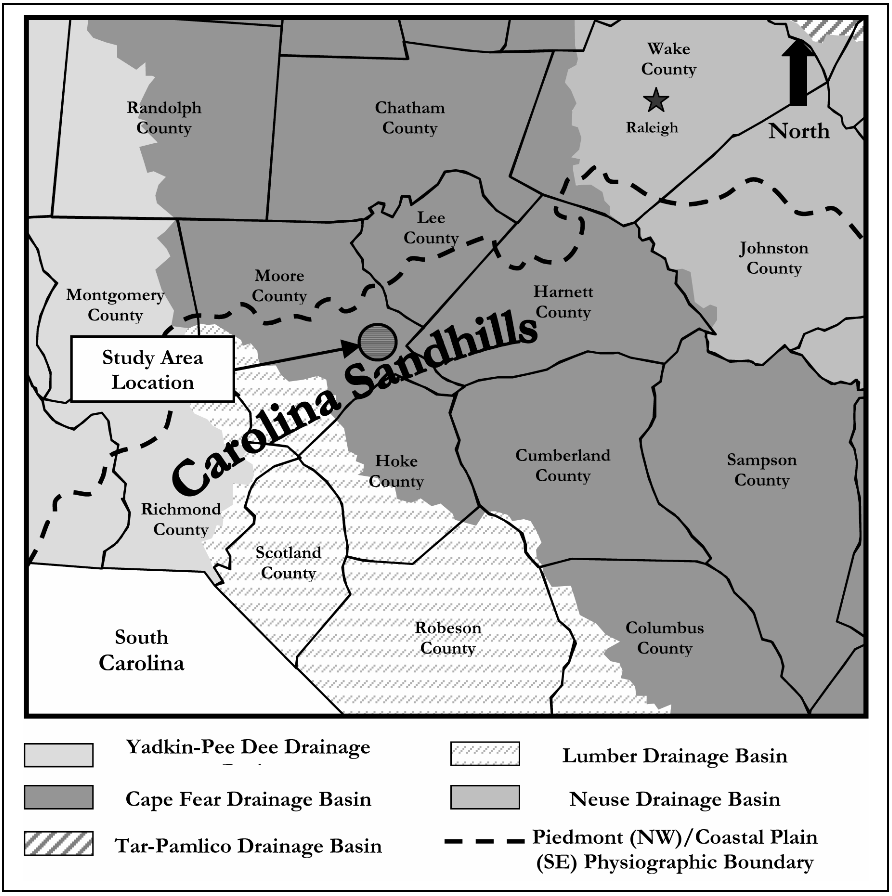

Figure 1 .Map of the Southern Piedmont illustrating the location of the subject study area.

over the landform, but within the proposed right-of-way for the highway improvements. This system of 30-cm diameter shovel test pits allowed for the creation of a horizontal artifact density map across the ridgetoe (Figure 3). The core area of artifact concentration then guided the placement of two 1-m-×-3-m test units in high-density areas. An excavation methodology for the removal of natural soil strata in arbitrary 5-cm levels was applied based on the generally positive results reported by Pullins and Blanton (1994a, 1994b). The first natural soil stratum, however, was removed from each test unit as a single level to include the relatively thick root mat and to allow for the possibility of soil homogenization due to modern human activity. This method allowed for artifact densities to be

Figure 2. Mosaic photograph illustrating the environmental setting and landscape at site 31MR205.

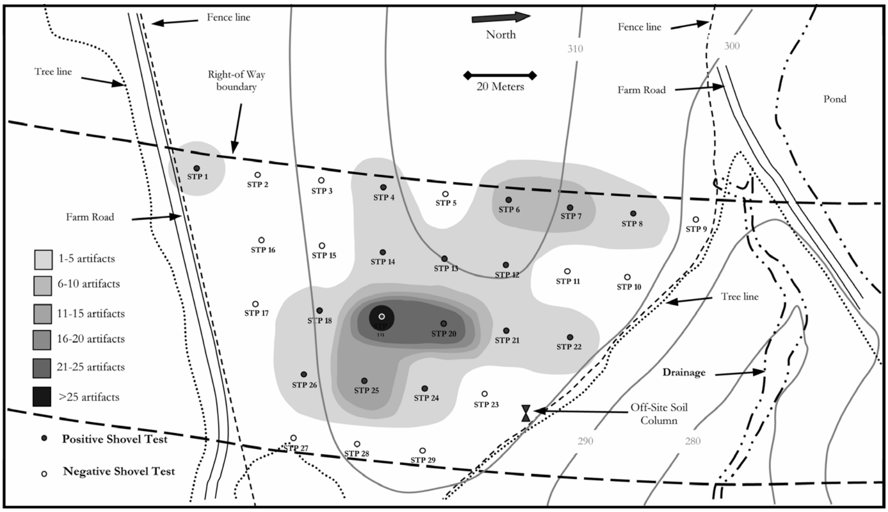

Figure 3. Artifact density map for site 31MR205, illustrating the locations of shovel test pits and artifact densities in relation to local topography and surface landmarks, as well as the limits of the project's current right-of-way (APE).

charted vertically through the soil profile of each test unit. Additionally, soil column samples from arbitrary 10-cm levels from Test Units 1 and 2, as well as a control column from off-site, were collected for geochemical analysis.

The first test unit (TU 1) was excavated along the maximum peak in artifact density in between the two subsurface tests that had produced the largest concentration of cultural material (Shovel Test Pits #19 and #20). The first soil stratum below the surface vegetation was composed of very dark grayish brown (10YR3/2) sandy loam and produced a relatively small number of quartz and metavolcanic debitage (n=13). As the excavation of the first natural stratum (Zone 1) proceeded, the soil matrix became mottled with light yellowish brown sand (10YR3/2 mottled with 10YR6/4), the degree of mottling increasing with depth. No plow scars or clearly delineated change in the texture or coloration of the soil matrix was discernable that would indicate the presence of an Ap Horizon (plow zone). At approximately 17 cm below the ground surface, the lighter yellowish brown sand of the mottles became the dominant texture of the soil matrix. With depth, the dark grayish brown mottles of sandy loam began to disappear, and the texture of the sandy matrix appeared to become coarser. One hundred and sixty-five artifacts were recovered from this second natural soil stratum (Zone 2), the majority of which were located within the uppermost 35 cm of Zone 2. Below this point (Zone 2, Level 7), artifact density dramatically declined, so that within the remaining 35 cm in the stratum only 30 artifacts were recovered.

Several classes of artifacts were represented in the assemblage recovered from the second soil stratum in Test Unit 1, including debitage (of both quartz and metavolcanic material), manuports (fire-cracked rocks, etc.), cores (only in quartz), and bifaces (including one projectile point/knife). At a depth of approximately 85 cm below the ground surface, the first of a series of post-depositional soil structures, known as lamellae, became evident (recorded as 7.5YR5/8 – strong brown sandy clay loam). The portion of the soil profile composed of yellowish brown sand (10YR5/6) and containing these structures was considered to be a third natural soil stratum, designated Zone 3. Only three artifacts were recovered from this final natural stratum in the soil profile. At 120 cm below the ground surface, it was determined that the maximum safe depth of the unit had been reached (especially given the very low relative artifact density); therefore, excavation of Test Unit 1 was terminated. No features were recorded in Test Unit 1; however, some floral disturbances were evident, including one very large amorphous stain in the southernmost section of the unit. This rather poorly defined anomaly, which appeared only within Zone 3 of the soil profile, was interpreted as a root stain.

The second test unit (TU 2) was placed within the assumed core of cultural activity, between the subsurface test that produced the largest number of artifacts, and the only subsurface test to produce Native American ceramic sherds (Shovel Test Pits #19 and #25). Similar to Test Unit 1, the first natural soil stratum (Zone 1) was observed as very dark grayish brown sandy loam (10YR3/2), the only difference being the addition of some charcoal and ash on the surface of the ground and mixed in the root mat. This soil stratum measured about 14 cm in depth, slightly more shallow than the corresponding soil stratum in Test Unit 1. Again, the base of the soil stratum was less clear than is typically expected of an

Ap Horizon (plow zone); so, a new provenience was begun when light yellowish brown sand (10YR6/4) became more common than simple, occasional mottles.

Although no Native American ceramics were recovered in this uppermost soil stratum (as was the case in Shovel Test Pit #25), 83 artifacts were recovered in Zone 1. This collection of artifacts was composed of a wide variety of debitage types (in quartz and metavolcanic material), manuports (mostly quartz fire-cracked rocks), and one quartz core fragment. The appearance of artifacts during the excavation of the second natural stratum (Zone 2) was far more prolific than the preceding natural soil stratum in this test unit and also the corresponding second natural stratum in Test Unit 1. Over 60% (n=237) of the 391 artifacts recovered from Zone 2 in Test Unit 2 were located within 30 cm of the ground surface. The remainder of the second stratum in Test Unit 2 produced 90 artifacts in densities that decreased with the depth of excavation. The 391 artifacts recovered in Zone 2 represented various types of quartz and metavolcanic debitage, manuports (again, mostly fire-cracked quartz rocks), cores, one side scraper, two bifaces (including one possible projectile point/knife), and one expedient tool (retouched flake). Approximately 30 cm below the ground surface, a relatively dense cluster of lithic material (n=36, debitage and fire-cracked rocks) was identified in the western portion of the test unit. This cluster of lithic material was interpreted as inorganic evidence of a hearth. Following the third 5-cm level in Zone 2, the artifact density in the test unit began to drop off significantly, so that only eight artifacts were recovered in the final 5-cm arbitrary level of Zone 2. The excavation of Test Unit 2 was terminated at this point (approximately 55 cm below the ground surface), having completed the evaluation phase at Site 31MR205.

Phosphate Testing

In addition to the excavation of these test units in 5-cm levels, as previously mentioned, 10-ml soil samples were obtained at 10-cm intervals from the soil profile of each unit. An additional off-site shovel test pit was excavated downslope from the project area (northeast of Shovel Test Pit #23) to obtain control soil samples.

Following experiments conducted at the Archaeological Research Laboratory of Stockholm University, K. B. Persson (1997) has examined the use of test strips for measuring soil phosphate levels. The principle of measurement is based on the phosphomolybdenum blue (PMB) method, first developed by Murphy and Riley (1962). However, the PMB test only measures the level of orthophosphate in the soil, which is naturally available to plants. Therefore, soil samples should be decomposed in order for the total phosphate level to be measured. However, Limbrey (1975) states that phosphorus in the soil/plant system is almost entirely in the form of the orthophosphate radical, in inorganic combination with hydrogen and metal cations and in organic combination with various organic substances. Therefore, the level of the orthophosphate radical could be used to represent the level of the total phosphorus content of the soil (Limbrey 1975; Mohler 2000). With this in mind, the total phosphorus content of the soil samples was examined using the new Persson (1997) field method of phosphate analysis.

Relatively new to the United States, this method of soil phosphate analysis, developed primarily for field measurement, could possibly increase the applicability of phosphate investigations in archaeological field surveys and aid in determining sandy soil site integrity. The utility of phosphate analysis has been clearly understood by many archaeologists, but the work of Persson (1997) has attempted to improve upon the basic field phosphate analysis technique of “spot testing” and make the method more widely available.

The generic field technique of “spot testing” is based on phosphate ring chromatography that incorporates the use of filter paper upon which the soil sample and prepared solutions would be added (Eidt 1973, 1977, 1985). After a few minutes, the soil solution would produce a blue color, the intensity of which would indicate the relative amount of phosphate contained in the sample. A spot test demands the evaluation of four variables: (1) the length of the radiating lines; (2) time of appearance; (3) percentage of ring formed around the sample; and (4) the intensity of the color. Each sample would then be assigned a rating from 1 to 5 (none, weak, average, good, strong) to assess the relative levels of phosphate present in the soil samples.

Persson’s method (1997) is centered on the use of a test-strip for measuring phosphate concentrations in the soils, similar to how pH levels are determined. The method is reported to be quicker and more efficient than spot testing in measuring phosphate levels, allowing more time to be devoted to interpretations (Mohler 2000). Additionally, the Persson method (1997) has some advantages over spot tests in that it gives the same result for different users and the reagents do not have to be prepared in advance. Only one characteristic, the color, is evaluated in the test-strip method in order to determine soil phosphate levels. More importantly, the evaluation is done objectively through the use of a reflectometer and not by the naked eye. By contrast, the field technique of “spot testing” is merely a subjective qualitative chemical method for determining the presence of increased soil phosphate (Mohler 2000).

For these investigations several tests took place first, in order to verify that the test-strips actually measure the phosphate concentration of soil samples. In order to verify the method, several "clean" soil samples, unrelated but in close proximity to Site 31MR205, were "spiked" with a known phosphate solution. The chemical procedure, as described below, was performed with a reflectometer (RQflex meter) recording the resultant phosphate concentration. Several tests were then repeated in order to determine the validity of the test-strip measurement.

Chemically speaking, orthophosphate ions (PO_4^{3-}) and molybdate ions form molybdophosphoric acid in a solution acidified with sulfuric acid. This is reduced to phosphomolybdenum blue (PMB), the concentration of which is determined reflectometrically. However, the PMB test only measures the level of orthophosphate in the soil, which is naturally available to plants. Ideally then, samples should be decomposed before the total phosphate level can be measured. Yet as stated before, "phosphate in the soil/plant system is almost entirely in the form of the orthophosphate radical, in inorganic combination with hydrogen and metal cations and in organic combination with various organic substances" (Limbrey 1975:69). Consequently, the level of the orthophosphate radical can be used to represent the level of the total phosphorus content of the soil.

Many foreign substances, causing incorrect readings, may influence the soil phosphate levels, but the concentrations of these substances lie below the limit at which the measurement is affected (Table 1). Checking whether the phosphate content of the sample is within the measuring range starts the preparation of the soil samples. Samples containing more than 120 mg/L (phosphate) PO_4^{3-} (600 ppm) would have been diluted with distilled water. The pH level must also be within the range of 4–10. If the pH level were lower than 4, sodium hydroxide would have been added. If the pH level were greater than 10, sulfuric acid would have been added.

All chemical procedures were performed within a protective hood, but the procedure can easily be conducted while in the field. Instructions for the RQflex reflectometer (Merck, Ltd.) regarding phosphate tests were combined with the procedure suggested by Persson (1997) to create an all-encompassing analysis. Ten drops from a reagent bottle containing sulfuric acid (0.2 M) were combined with 5 ml of water. One ml of soil was then added and swirled for approximately two minutes. A test-strip (Reflectoquant Test Strips and Reagent for Phosphate, #16978-1, Merck, Ltd.) was then immersed into the solution for two seconds. The

Table 1. Foreign Substances That May Influence Soil Phosphate Readings.

Foreign Substance	mg/L	Foreign Substance	mg/L
Ag^{+}	1000	Mg^{2+}	1000
Al^{3+}	1000	Mn^{2+}	1000
Ascorbate	1000	NH^{4+}	1000
BO_3^{3-}	1000	Ni^{2+}	1000
Br^{-}	1000	NO^{2-}	10
Ca^{2+}	1000	NO^{3-}	1000
Cd^{2+}	100	Oxalate	1000
Citrate	1000	SO_3^{2-}	1000
Cl^{-}	1000	$S_2O_3^{2-}$	1000
CN^{-}	1000	Tartrate	1000
CO_3^{2-}	1000	Anionic substance (1)	1000
Cr^{3+}	100	Cationic substance (2)	100
CrO_4^{2-}	10	Nonionic substance (3)	100
Cu^{2+}	10	H_2O_2	100
Fe^{2+}	10	NaCl	10%
Fe^{3+}	10	Na_2SO_4	10%
K^{+}	1000		

(1) tested with Na-dodecyl sulfate
(2) tested with N-cetylpyridinium chloride
(3) tested with polyvinylpyrrolidone

reflectometer was started when the test strip was dipped into the solution and after ninety seconds, the sample was measured. Because of the simple chemical procedure, soil samples may be tested one after the other, without any need for recalibration. However, the number of samples tested at a given time should remain small, since the reflectometer can measure only one test-strip at a time. Even though the number analyzed at a time is small, the chemical procedure and measurement is rather quick and efficient (Mohler 2000).

Once a test-strip was ready to be analyzed, it was placed within the reflectometer (RQflex Meter), which was calibrated with a preprogrammed bar code that is included with the test kit. The optical density of the test-strips was measured by means of reflectance, with the phosphate concentration in the solution (5 ml) digitally displayed for each sample. According to Persson (1997), the phosphate concentration in the

Table 2. Conversion Factors.

Units Required	=	Units Given	×	Conversion Factor
mmol/m^3 PO_4^{3-} or P	=	**mg/L PO_4^{3-}**	×	10.5
mg/L P	=	**mg/L PO_4^{3-}**	×	0.326
mg/L P_2O_5	=	**mg/L PO_4^{3-}**	×	0.747
mg/L PO_4^{3-}	=	mmol/m^3 PO_4^{3-} or P	×	0.095
mg/L PO_4^{3-}	=	mg/L P	×	3.07
mg/L PO_4^{3-}	=	mg/L P_2O_5	×	1.34

soil was consequently five times higher in order to convert mg/L to ppm (parts per million of phosphate) PO_4^{3-}. The results were automatically stored and may be interfaced with a computer, where the results of every sample can then be compared to each other and to the predetermined background phosphate level. Displaying the various graphs side by side would, then, reveal any significant disparities, or "peaks."

This procedure was then repeated for all of the soil samples for the Moore County site. The results were given as mg/L (phosphate) PO_4^{3-} soluble in 0.2 M (sulfuric acid) H_2SO_4 and subsequently converted to parts per million. This conversion was suggested by Sjoberg (1976) and used by Ahler (1973), Eidt (1977), and Woods (1977) in order to standardize results for interpretation by the archaeological community. The measurement range for the Reflectoquant phosphate test strips is 5 to 120 mg/L or 25 to 600 ppm (phosphate) PO_4^{3-}. All measurements can be converted using the following conversion factors (Table 2).

When compared to the naturally occurring levels of phosphate from the Control Column taken off-site, patterned vertical changes in the soil phosphate content of Test Unit 1 become apparent (Figures 4 and 5). Peaks in phosphate content at the 10-cm and 50-cm levels from Test Unit 1 are recorded as containing nearly double the total levels of phosphate noted at the corresponding depths in the off-site Control Column. However, this observation becomes even more remarkable when compared to the recorded concentrations of artifacts by arbitrary 5-cm levels in Test Unit 1 (Figure 6). These peaks in relative total phosphate content roughly correspond to peaks in vertical artifact density at 15 and 45 cm below the ground surface (Zone 2, Level 1 and Zone 2, Level 7). Such independent confirmation of results suggests that intact occupation levels have been preserved in Test Unit 1. However, a patterned vertical change in Test

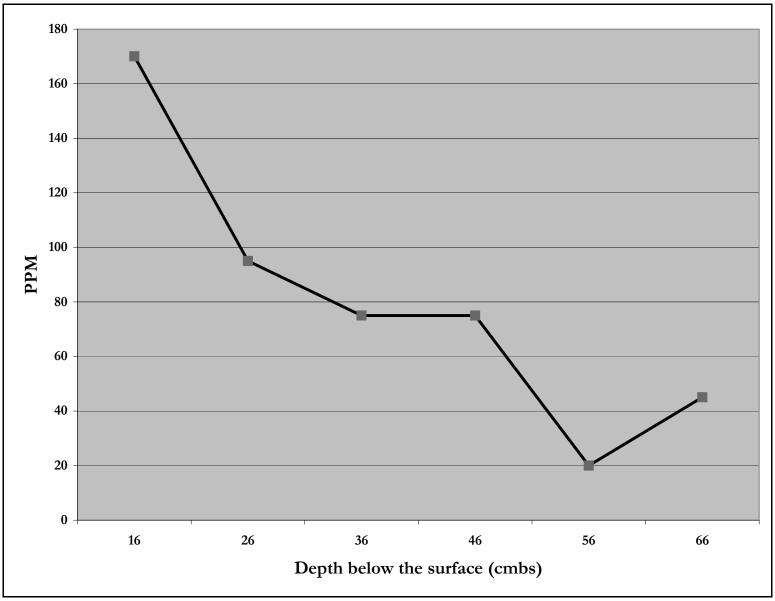

Figure 4. Phosphate levels recorded for the off-site control column.

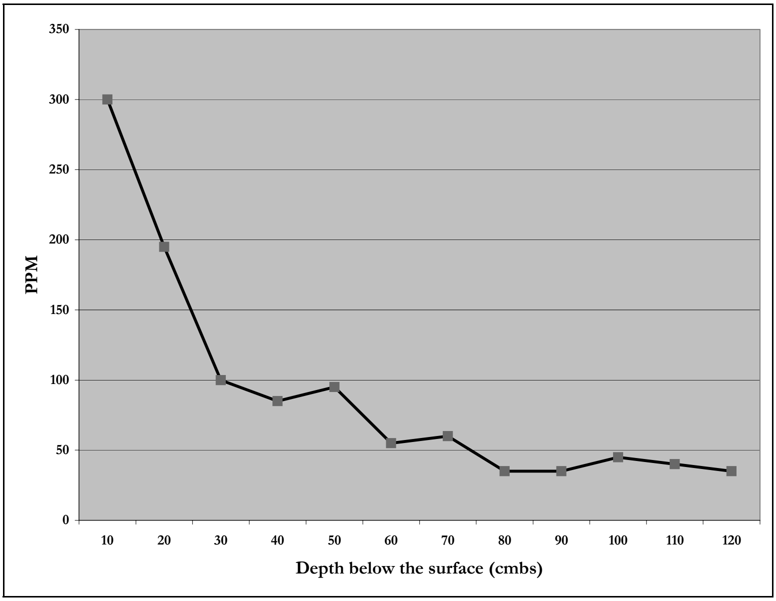

Figure 5. Phosphate levels recorded for samples from Test Unit 1.

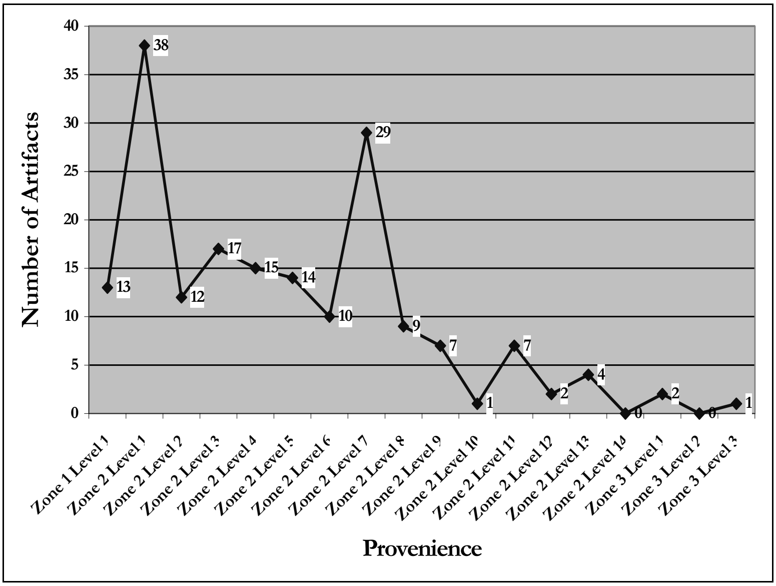

Figure 6. Artifact totals recorded by arbitrary 5-cm level in Test Unit 1.

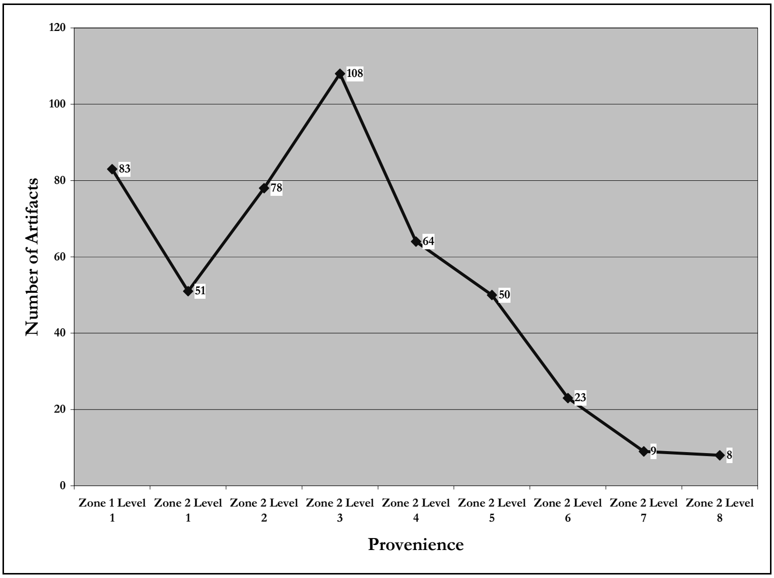

Figure 7. Artifact totals recorded by provenience for Test Unit 2.

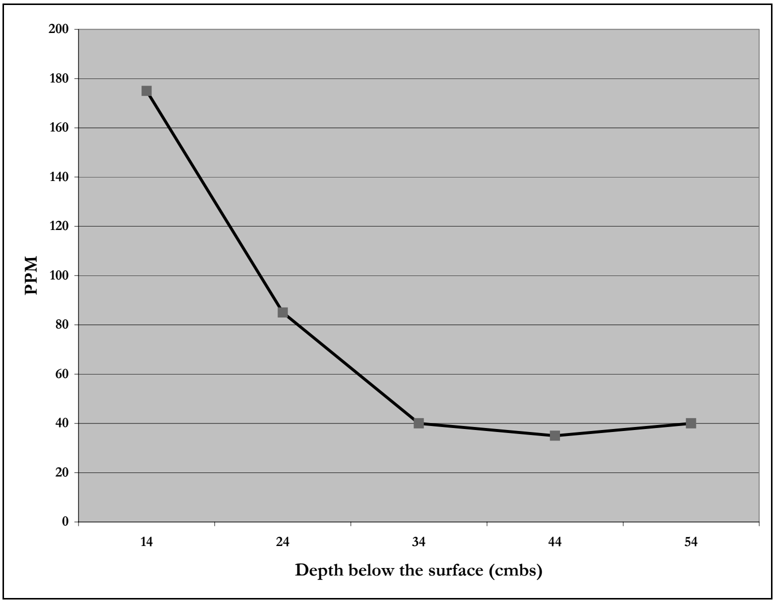

Figure 8. Phosphate levels recorded for samples from Test Unit 2.

Unit 2 was not apparent; results from these samples were very similar to those from the Control Column (Figures 7 and 8). There is always a risk of "overinterpreting" data of this kind, but until the observations are determined to be spurious they warrant careful consideration and further testing (Pullins and Blanton 1994a, 1994b).

Conclusions

As previously mentioned, phosphates are widely viewed as perhaps the most reliable chemical indicators of past human activity. In this study, phosphorus levels have exhibited a potentially significant pattern. At Site 31MR205, peaks in the vertical distribution of phosphorus tend to occur at peaks in artifact density even in a sandy soil matrix. It should be noted, however, that downward leaching of phosphorus in a site's sandy matrix may be the most plausible explanation for depleted levels of the element (Shackley 1981), as observed in the samples from Test Unit 2. Pullins and Blanton (1994a, 1994b), though, have suggested that inconsistencies reflect differences in the intensity and activities of separate occupations (see Cook and Heizer 1965; Woods 1984).

In any case, it has been demonstrated that concentrations of a suite of particular chemical elements, in this case phosphorus, can aid in the identification of buried cultural horizons if examined relative to vertical artifact distributions and with reference to the naturally occurring chemical signatures. This has the greatest utility at sites like 31MR205 where cultural horizons cannot be macroscopically discerned in the soil profiles. Natural homogenization of these sandy deposits has progressed to the point that color and textural changes to signify former surfaces or soils are lacking. These factors may be deceiving at cultural deposits in sandy environments, as this case shows, since vestiges of a deposit's richer history are perceived only as scant chemical signatures and relative concentrations of artifacts in an otherwise massive sandy matrix.

Undoubtedly, future studies at these and other similar sites should include more thorough soil analyses where conditions warrant it and where refinement of this problem has important ramifications for reconstructing trends in environmental change and, in turn, patterns of human settlement and subsistence. However, this level of investigation is important in several aspects. The results of these investigations have indicated that, at least to some degree, sites located in the Carolina Sandhills may retain the ability to transmit information concerning past human behavior beyond the material culture record. The tracking of vertical artifact densities, as well as the distribution of vertical phosphate levels, can serve together to establish levels of site integrity at cultural deposits where such an assessment might otherwise be elusive. To the archaeologist in the field, the ability to make assessments of integrity based on supporting geoarchaeological data allows for more efficient and effective archaeological survey and opens up new avenues of research. Additionally, this knowledge can then be applied in deciphering the complex stratigraphic records at sites experiencing more intensive occupation over longer periods of time.

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