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GAINESVILLE, FLORIDA
NOVEMBER 6-8, 1975

Edited by
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MEMPHIS, TENNESSEE

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Preface

This *Bulletin* looks a bit different from last year's and, I suppose most of our previous efforts. Turning copy over the printer rather than typing it for offset certainly makes the editor's job a lot easier. I wish to thank the contributors to this issue for making this possible. With almost no exceptions, the copies of the papers came in ready for the printer; even most of the illustrations were in form. Some of the "bibliographies" were in need of a bit of standardization, and I did change all the "archeologies" I could find to "archaeology" in consideration of the name of the Conference.

I hope that no papers sent in to me were lost in the mails or on my desk. Because of the cost of printing, to save every possible page the several abstracts that I received (including those with the papers) have been deleted. Also missing is a list of participants in the Gainesville meetings. One thing to list here, however, is the roster of SEAC officers:

President:	R. Berle Clay
Vice-President:	Charles Fairbanks
Secretary:	Martha Rolingson
Treasurer:	Alfred Guthe
Sergeant-at-Arms:	Robert Neitzel
Editor of the Bulletin:	Drexel Peterson
Editor of the Newsletter:	David Dye

Finally, I must acknowledge the job done, particularly in the final stages, by David Dye.

Drexel Peterson, editor

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Article titles and authors may vary slightly between the program and the Bulletin.

A. R. Kelly

9MU104, A Multi-Unit Woodland Site at Carter's Dam, Georgia

In the summer of 1972 at Carter's Dam, Murray County, Georgia, the U.S. Corps of Engineers carried out under contract extensive excavations on the west bank of the Coosawattee River preliminary to the diversion of the Coosawattee to provide a new channel to a second dam construction at Carter's called the Regulation Dam. Successive bulldozing operations cut away six to seven feet of alluvial overburden in the river bend of the Coosawattee, exposing during June and July a succession of buried occupation layers, denoted as "hot spots" by the archaeological workers and students currently occupied in summer field exploration at the Bell Field and Little Egypt sites located on opposite sides of Talking Rock Creek, which joins the Coosawattee river near the diversion point.

On occasions when heavy rains and ponded excavations made work impossible at their scheduled sites the field crews made several surface collections in the freshly bulldozed areas on the west bank of the river. These collections from the several "hot spots" yielded pottery and other artifacts diagnostic for several different archaeological components assignable to the Early to Middle Woodland provenience in North Georgia. The nature of the bulldozing operations undoubtedly mixed the collections in some parts of the disturbed area to a considerable extent but a small section of the west bank, overlooking the river by 25 feet or more, was not bulldozed and provided some original soil deposition from which a 14 inch midden was exposed, giving good archaeological context. This initial buried occupation in the river bank was excavation unit A (XUA) and was sampled by undercutting the four feet of alluvial sandy overburden and trowelling to extract the initial sampling from a perceived predominatly Swift Creek occupation. A second relatively undisturbed context of the same occupation layer was uncovered by a bulldozed cut made from the east edge of the headquarter's or staging area of the contractors through the high bluff in which XUA was early observed, thus exposing another right angled portion of the same midden. Between 25 and 30 feet of continuous midden was revealed in this cut, denoted excavation unit B (XUB) and another sample was trowelled from this context. As expected on analysis XUB shows a predominant Swift Creek occupation. The only complication here was that a historic cabin site of the late 18th century or first quarter 19th overlayed the Swift Creek occupation by a few inches. This upper historic cabin situation was examined and sampled by Patrick Garrow of Shorter College who prepared a paper on this apparent Cherokee cabin belonging to the late Coosawattee Old Town period just prior to the removal of the Cherokees. The pottery and historic trade goods including some cream ware was closely assimilated to a proto historic and historic occupation found by David J. Hally and his student workers in some of the village levels at Little Egypt (9Mu102).

In subsequent bulldozing of the wide strip between the river and the Re-Regulation Dam an occupied zone was uncovered some 40 to 60 yards behind XUA and XUB. During July and August some shovel shaving in this area was carried out in an effort to find additional undisturbed soil with a view to uncovering pits and possible house patterns. Field accessions during this interval were labeled excavation unit C (XUC). On analysis of this material a wider range of Woodland materials was indicated which might be accounted for as due to mechanical mixing or overlapping occupations implying some time depth and secular change in pottery and other diagnostic artifactual material.

In the final bulldozing on the area the heavy earthmoving machines cut down several more feet and struck one "hot spot" where the upturned pottery exposed in a 2500 to 3000 square was observed to represent an almost "pure" assemblage of limestone tempered, fabric impress, ware identical to the well-known Tennessee variety as Long Branch Fabric Impressed. There could be no doubt but that this occupation had been separated vertically by several feet of sterile overburden from the upper depositions assignable to the Cartersville Period, including the Swift Creek occupation which previous north Georgia surveys had demonstrated to occur in typical late Cartersville times. Joseph Caldwell's unpublished Allatoona survey and Robert Wauchope's north Georgia survey for the University of Georgia documented this conclusion.

It is most regrettable that time and funds were not available to permit qualified archaeological testing, including 10 or 20 foot test pits through the overburden and several "hot spots" uncovered by the bulldozing operations. Inasmuch as the relatively undisturbed Swift Creek levels (XUA and XUB), and the so-called "hot spots" had been covered with five feet or more of alluvial sand and silt, there is some philosophical comfort in the view that we would never have been aware of stratified middens belonging to most of the Woodland interval in prehistory in north Georgia, were it not for the revelations of the bulldozing.

Moreover we were already deeply involved and committed to a final excavation of the early mound levels at Bell Field where the initial stages of earth lodge occupation were being exposed. 9Mu104 obviously would have constituted a major archaeological project, requiring additional archaeological personnel and funding, impossible to consider at this late juncture. The salvaged collections following the bulldozing of the site made by volunteer efforts of devoted and concerned students, gleaned from inadequate archaeological context, do allow for some insight into the long, intermittent and successive occupations of the Carter's Dam area, extending from the Archaic to historic Cherokee. The more intensive archaeolog-

ical site explorations conducted by University of Georgia field parties over a period of ten years had been concentrated largely on mound and village situations assignable to the later Mississippian chronology.

The first site indications at 9Mu104 occurred in June, 1973, when a buried midden was reported exposed in the west bank of the Coosawattee River, opposite the Bell Field site. The high bluff of the river rising 25 to 30 feet above the margin of the stream, was slumping with huge blocks of earth forming a wide talus slope. Between four and five feet of sandy alluvium mantled the 10 to 12 inches of dark midden. Our first concern was to recover as much material as possible from a five foot wide area in the exposure representing a large campfire, hearth, or cooking area. This feature was trowelled out by undercutting since there was not time to remove the extensive overburden. Charcoal, ash, cracked stones, and other matter were collected for organic extraction and C_{14} samples. At the present writing the Geochronology Laboratory at the University of Georgia is being installed at a new location and the data are not available. Pottery and artifacts were collected and the data are not available. Pottery and artifacts were collected from a span of 20 feet exposed in the river bank. This excavation (XUA) yielded the initial material gleaned from undisturbed context.

The second excavation (XUB) was exposed by a bulldozer cut at right angles to XUA which cut down to the XUA level and was confluent with it. For this reason XUA and SUB collections were combined for analysis. A total of 327 study sherds shows that the majority belong to a Swift Creek occupation. Only 23 sherds of check stamped, simple stamped, linear stamped, steatite (7%) were non-Swift Creek.

The Swift Creek materials were divided into three categories. First there were the well executed stamps, with clearly executed pottery designs of classic Middle Swift Creek Complicated Stamp, 77 in all or a fraction over 23% of the total series.

The second Swift Creek class was composed of 132 sherds of Swift Creek Complicated stamped which had been so badly smeared as almost to obliterate the designs. In some cases only a wet surface under refracted light would bring out the faint patterns. This means that 40% of the Swift Creek Complicated Stamped ware was so carelessly executed in applying the carved wooden paddle to the wet paste that the decorative treatment was almost completely ineffectual. One is tempted to believe such smearing and obliteration was deliberate although there is no plausible motivation for such action. This phenomenon has been observed in some measure at most Swift Creek sites and might normally be ascribed to the simple fact that individual potters varied enormously in their basic skills and artistic performance. Still the sharp contrast in stamping is remarkable. More attention will be given to this problem when more comparable Swift Creek site data are assembled.

One interesting detail has come from the study of stone work at 9Mu104. This relates to the wide, preponderant use of a blue black chert derived from the well-known Fort Payne formation in north Georgia. The prevailing projectile is small, slender, with straight stem and slightly notched sides – all made from the blue chert. Extensive collections of cores, preforms, and chapped debitage implies that workshop activity was customary on the site. Contrast this situation at the Carter's Dam site with the minority showing of similar types of projectiles occurring with occasional preforms and very limited chipping at the type Swift Creek site at Macon. The bulk of the Macon flint is a bright, variegated colored flint coupled with a completely different projectile type. There was evident some transport of the north Georgia projectiles or quarry material to the Macon site.

The third set of surface materials came from the spoil pile from a deep drainage ditch extending from the river west toward the Re-Regulation Dam, and two to three acres of bulldozed area behind XUA and XUB, collected during July, 1973. This operation intercepted more the Swift Creek component represented in XUA and XUB but cut deeper and mixed sherds from overlapping "hot spots." Hence, it is not surprising we have more early Woodland sherds included along with three fabric impressed. Swift Creek Complicated Stamped decreased to 15.7%, the obliterated Stamped increased from 40 to 48%, the smooth plain decreased from 29% to 24%. Eroded sherds rather than simple smeared in the obliterated class were more frequent. Actually the percentage of non-Swift Creek was about the same (7% as against 7.6%). The eroded category probably reflects more mechanical deterioration from river scouring that seems to have occurred to the XUA and XUB collections. The smearing process leading to practical obliteration in many cases is clearly careless or inept application of the pottery stamps. This phenomenon has been observed at all of the Swift Creek sites and might normally be ascribed to the simple fact that individual potters varied enormously in their personal skills and artistic performance.

In the final days of July extending into August, 1973, the bulldozing cut deeper and one more "hot spot" was unearthed. This disclosure was particularly interesting as approximately 100 sherds picked up in one afternoon after a heavy rain constituted a "pure" collection of limestone tempered, fabric impressed sherds which had they been found in Tennessee would surely have been identified as Long Branch Fabric Impressed. The type reported by Haag in 1939 was one of the Early Woodland standards of TVA archaeology (Haag 1939:11). The fabric impressed counterpart in north Georgia was first denominated Kellogg Fabric Impressed by Joseph Caldwell, later changed to Dunlap Fabric Impressed – this type was sand or grit tempered. The limestone tempering from the new occurrence in 9Mu104 had been much leached, leaving angular vesciles or pockmarks in nearly all recovered sherds. Only one rim was observed, this one with a small folded rim similar to those on the Swift Creek sherds. Bulldozing does not provide the best vertical stratigraphy, but in this instance there could be no doubt but that a 2500 to 3000 square foot occupied area had been exposed a foot or more beneath the Swift Creek-Cartersville "hot spot" above it.

In conclusion 9Mu104 is appraised as a site somewhat smaller than the type Swift Creek site at Macon, probably less than two acres in extent. Despite the bulldozing of the deeply mantled area one can conclude there were no sizeable mounds – platforms possibly but nothing comparable to Mandeville or Ocmulgee. After all later mounds belonging to the Mississippian interval, at Bell Field, Little Egypt, and Sixtoe were still intact despite over 100 years of continuous modern cultivation and river erosion. There is evidence, especially in the blue chert projectiles, of direct contact with Macon Swift Creek. The Middle Swift

Creek stage as defined on the Ocmulgee. Rims are primarily straight, with rounded or flattened lips, small folded, notched or scalloped — although the scalloped variety does not occur at 9Mu104. Zoning with the upper part of the vessel under the rim left Plain occurs, as do occasional flat bottoms. Only one large tetrapod and that with indications of a check-stamped body. At Macon tetrapods are not exactly plentiful but are more common than at Carter's Dam. Note no single human bone fragment or evidence of burial at 9Mu104. As at Macon Swift Creek appears in a matrix of check-stamped and simple stamped identified with Caldwell's North Georgia Cartersville Period. Linear stamping, a very small minority, relates more to Napier-like sherds, with known strong occurrence of Woodstock Complicated in the Carter's neighborhood, as well as the presumptively derived Etowah Stamps.

Reference cited:

Haag, W. G. 1939. Pottery Type Descriptions. *Newsletter,* Southeastern Archaeological Conference, vol. 1, no. 1.

J. Mark Williams

WPA Excavations at Stubbs Mound

This paper represents only a small part of the analytical work done on the W.P.A. collections from central Georgia held by the National Park Service in cooperative contract with Florida State University over the last three years. The focus of this particular work is the Stubbs Mound site, located about eight miles downstream from Ocmulgee National Monument near Macon, Georgia. The site is actually located on the south side of Tobesofkee Creek, eight-tenths of a mile west of the Ocmulgee River.

The only excavations ever to take place here were from August 1936 to February 1937 under the field direction of Gordon R. Willey, then a graduate student. A. R. Kelly was, of course, principal investigator, although he was primarily involved with the huge Macon Plateau site at the time. He has published the only mention of the site in the literature in his 1938 monograph on central Georgia. This involved a brief site report with a hint of possibly significant chronological data.

Stubbs Mound was at one time some 9-10 feet high, but was plowed down early in this century to fill low land to the east. At the time of excavation all that remained was a two-foot circular rise about 100 feet in diameter.

A total of four structures, two of which were burned, were located in the mound remnant. Structure 1 was a 25 x 15' floor area found just beneath the plow zone on top of the remnant. No post pattern was apparent around the feature and whether it was actually a floor is still in question. Structure 2 was the most unusual of the Stubbs Mound structures. It was completely burned; the floor of the structure was 25 x 30'. All indications are that this structure was a rectangular, red clay covered earthlodge. Two rows of large deep posts were on the floor inside the outer wall posts. The center fire pit is very similar to the one at the famous Macon Earthlodge. The entrance to the structure was a wall-trench and post passage on the west side of the structure. Relatively little midden was found on the floor. Structure 3 was a simple rectangular post pattern 20 x 26' found at the base of the Mound. It was unburned so few other features were apparent. The doorway, however, appears to be of the overlapping wall type, a form also found on Macon Plateau. Structure 4 was a 21' square burned structure located in the northwest corner of the excavations. Charred roof remains suggested a flat roof.

These structures were not set one directly upon the other, nor were they set in an intentional mound fill. They were carelessly arranged on a midden level and covered with more midden after their destruction. The available evidence points to the Mound's formation as a result of a continuous occupation, primarily secular in nature, over a fairly long period of time. Kelly has termed the above situation an accretionary one with reference to the upper levels of the Swift Creek Mound.

A total of 42 burials were located in the excavations. Most of these were fully deteriorated, making sexing or ageing almost impossible. Most of the burials were either northwest or southeast of Structure 2, the probable non-secular structure. The only attribute separating the two burial clusters was that the northwest cluster had no grave goods with any of the burials. The few that had goods in the southeast cluster contained shell beads, pendants, ear pins and one copper ear spool.

The ceramics from Stubbs Mound showed an interesting admixture of traditional Southeran Appalachian complicated stamped wares with classic Mississippian Plain wares. These types are in direct association with each other in both midden levels and features. In addition the stamped ware appeared to be an evolutionary intermediary between Late Swift Creek Complicated Stamped and Lamar Complicated Stamped. Statistical analyses were run comparing various ceramic types and attributes with the different levels of the site that were recorded. Several statistically significant patterns were evident. The bulk of this data, as well as the lithic, structural, stratigraphic and miscellaneous artifactual data, supports the following cultural-historical analysis.

It is apparent that members of both sexes from both Mississippian and Southern Appalachian traditions were interacting on a day-to-day basis at Stubbs Mound. There is no good evidence that either of these groups was politically dominant over the other or that any hostilities were in fact taking place. Rather, we see a pattern of symbiosis which is probably the result of an on-going acculturation. This acculturation could have originated in many ways such as wife trade, or other associated economic activity. It is believed that the type of acculturation seen at the Stubbs Mound site is typical of the cultural processes that led to what is classically known as Lamar in central Georgia.

It has been found that the presently accepted chronological sequence for Macon Plateau and central Georgia as proposed by Fairbanks in 1956 does not have fine enough detail to aid in the understanding of sites away from Macon Plateau, such as Stubbs Mound. It is felt that the following alterations allow for more adequate explanation of central Georgia prehistory as a whole (Table 1).

Basically, the concept of the Lamar period is pushed back in time to about AD 1100 and divided into two phases. The last of these, the Cowarts Phase, named after the Cowarts Landing site two miles south of Stubbs Mound, represents what has been traditionally called Lamar. This is best represented of course, by the major portion of the famous Lamar site itself. The early phase of the Lamar period is here designated the Stubbs Phase. This is the time of acculturation which eventually resulted in full-blown Lamar. Macon Plateau is no longer here regarded as a full period in central Georgia prehistory. It

and Brown's Mount remain the only anomalous pure sites of this group of people. In terms of overall trends, however, the peoples of the Swift Creek period remained in central Georgia during and after the initial Mississippian intrusion and settlement. The type of acculturation represented at Stubbs Mound is possibly a result of the interaction of the traditional Swift Creek indigenes with the early Macon Mississippian intruders as well as later interactions with people at Chattahoochee Mississippian centers such as Rood's Landing.

It should be noted that the concepts of Etowah and Savannah do not apply in this area. Even though there definitely are sherds of these types present on many sites, they are always in an extreme minority and to name a period or phase after these materials would be stretching the data beyond realism.

In summary, it is felt that the acculturative interation recorded at Stubbs Mound involving members of both Mississippian and southern Appalachian traditions occurring during the Stubbs Phase of the Lamar Period is typical of the interactive networks which resulted in the classic Lamar culture of the Cowart's Phase. It is hoped that this analysis will stimulate a renewed interest in central Georgia archaeology and that hypotheses developed here may be applicable to other Lamar areas in the nuclear southeast in order to eventually better answer the old question of What is Lamar?

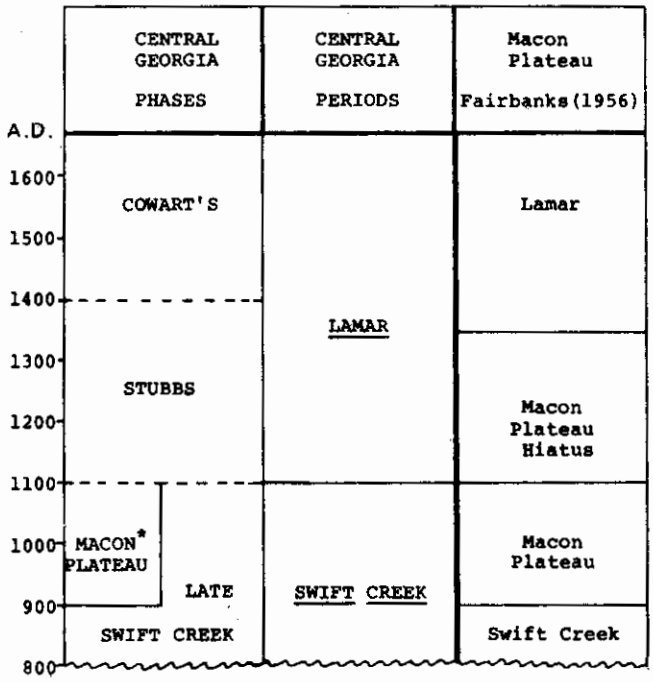

TABLE 1

Charles Pearson

Analysis of Late Prehistoric Settlement on Ossabaw Island, Georgia

The purpose of this paper is to present data concerning late prehistoric settlement on Ossabaw Island, Georgia. The late prehistoric cultural manifestation on Ossabaw is known as the Irene Phase and dates A.D. 1350 to A.D. 1550 (Caldwell 1971:88). The particular settlement phenomena of concern here are 1) site variability, as expressed by site size and 2) site variability as reflected in site relationships to quantified environmental variables. The intent of this paper is not only to describe settlement phenomena but also to present a useful technique for analyzing the sorts of prehistoric settlement data available in coastal Georgia.

Ossabaw is one of the barrier islands lying off the Georgia coast (Figure 1). The island is approximately 20 kilometers southeast of Savannah and is separated from the mainland by an extensive salt marsh estuary 8 to 10 kilometers wide. The island is not a continuous land mass but is dissected by saltwater marsh and creeks. Ossabaw is 16 kilometers long and from 4 to 6 kilometers in width (Figure 2).

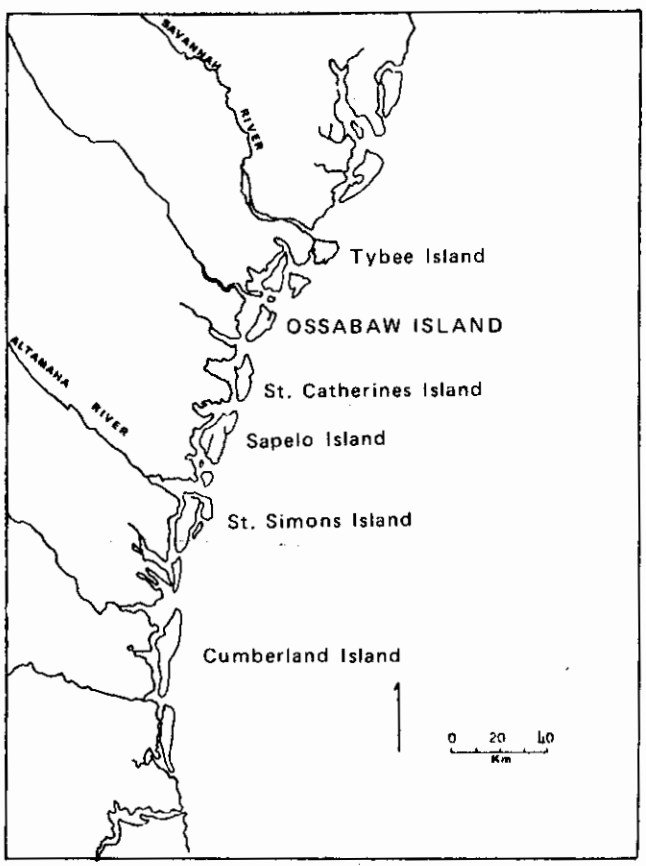

Figure 1. Map of the coastal region of Georgia.

Relief on the island is minimal, ranging from sea level to about 8 meters. The projected climax forest type for

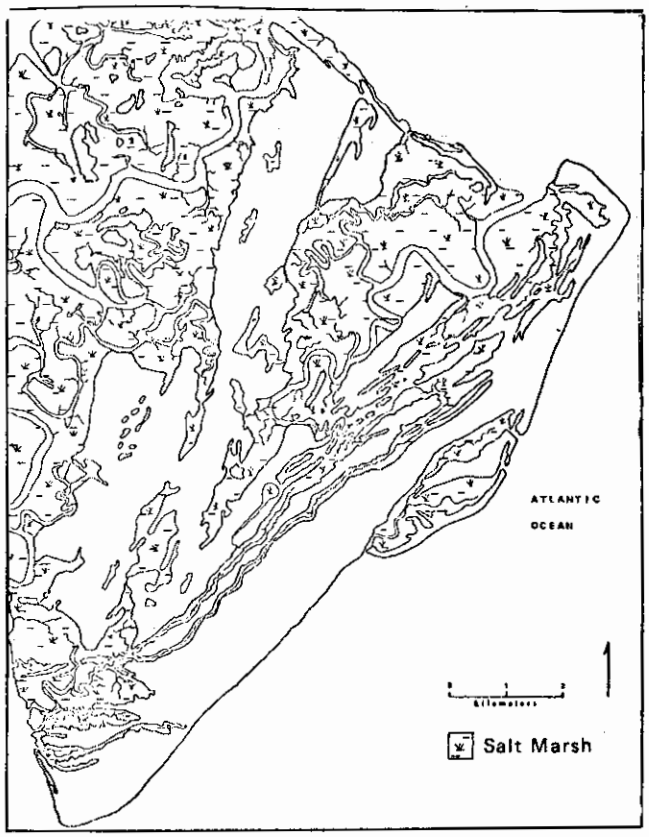

Figure 2. Ossabaw Island

the island is a maritime live oak forest (Hillestad *et al* 1975:76). This forest type is characterized by a distinct dominance of live oak (*Quercus virginiana*) and an abundance of other oaks and nut bearing trees.

The salt marshes along the Georgia coast are characterized by an extreme abundance of fish and shellfish. It would appear that the marshes, together with the flora and fauna of the island forest, provided an abundant and easily exploited food source for prehistoric populations.

Archaeological evidence from Irene sites on Ossabaw indicate that, although land mammals were hunted, especially the whitetailed deer (*Odocoileus virginianus*), an even heavier reliance was placed on marsh-estuary resources. The most important of these appears to have been oysters. Corn has been recovered but only in very small quantities and the importance of cultigens in the Irene diet is not known.

The fact that Ossabaw is a relatively isolated and discrete geographical unit with its abundance of natural resources leads one to believe that the island may have operated as a discrete socio-economic unit and, as such, would be amenable to settlement pattern analysis.

Archaeological surveys of Ossabaw, carried out over the last three years by Shorter College of Rome, Georgia

and by students from the University of Georgia, have located a total of 161 prehistoric sites (DePratter 1974). These surveys have covered most of the island and have included portions of all biotic communities and physiographic areas on the island. It is assumed that the majority of prehistoric sites have been located.

Of the 161 sites located, 47 have been identified as having Irene Phase occupations. These 47 sites are discussed in this paper. Surface collections and area measurements were obtained for all sites. At several sites test pits were excavated to obtain sufficient cultural material for analysis.

Site size was chosen as the most appropriate measure with which to begin settlement pattern analysis. Size is a measurable variable common to all sites. At present, it is considered the most adequate available measure of cultural response to environmental variation. Settlement size is considered by most anthropologists and geographers to be a useful indicator of the number, as well as the sorts, of activities carried out at any particular site (Haggett 1971:115-117). Within a settlement system, then, variation in site size is, at least, an initial indicator of variations in site functions.

Considering site size as reflective of site function and variability, it is assumed that sites of equivalent size will display similar socio-cultural traits. To produce reasonable analytical units for settlement pattern analysis some means of grouping sites into equivalent size classes is necessary. Cluster analysis provides an objective means of achieving this grouping.

The general computational method used in the cluster analysis is Ward's Method. A computer program, HCLUS, is used to perform the analysis. HCLUS was developed by John Wood of Northern Arizona University and modified by Donald Graybill of the University of Georgia (Graybill 1974, Wood 1974).

Briefly, what any cluster analysis attempts is only one thing — to group units or variables (in this case site sizes) into clusters so that there is a higher degree of association within clusters than between clusters. Ward's Method is a hierarchical agglomerative clustering technique in which clustering proceeds by progressive fusion beginning with the individual cases, i.e. sites, and ending with the total population (Anderberg 1973:142-145).

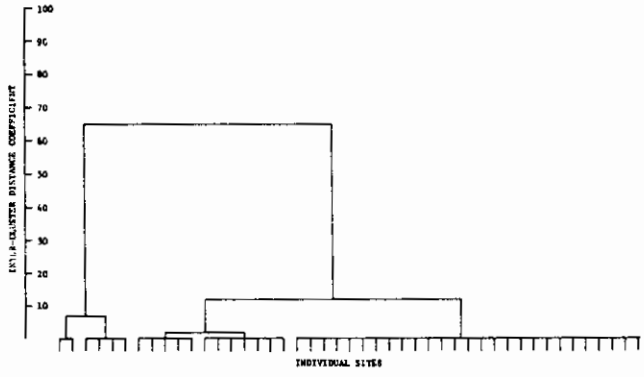

Figure 3. Dendrogram of complete linkages.

As mentioned, site size is the only variable used in this analysis. Size is the square meter area of the site and was obtained by measuring the total extent of shell scatter or shell middens at a site.

Figure 3 presents a dendrogram of the clusters produced by the analysis. Only 45 of the 47 sites are used, the two largest sites having been excluded from the analysis. These two sites are so much larger than the others that they have been placed into a size class of their own.

The 45 nodes along the bottom of the dendrogram represent the individual sites. The cluster "merge levels," a measure of cluster distance, are scaled along the Y axis.

Using the dendrogram, the next procedure was to determine the optimum acceptable number of clusters to be included in the analysis. One means of assessing the best cluster solution concerns the amount of "information" that is gained or lost at any particular step in the cluster analysis (Graybill 1973).

Presented in Figure 4 is a graph of the percent of change in information in relation to the number of clusters produced. This graph is best viewed in terms of "information" versus "resolution" such that the more clusters one uses the more information is available per cluster but the less resolution or inter-cluster difference. A cluster solution that falls at a point intermediate between the extremes of information and resolution is desired. As can be seen from Figure 4, a reasonable cluster solution, for the particular problem at hand, based on the criteria of information and resolution, is that of three clusters. This point falls at a point of major transition of information and resolution.

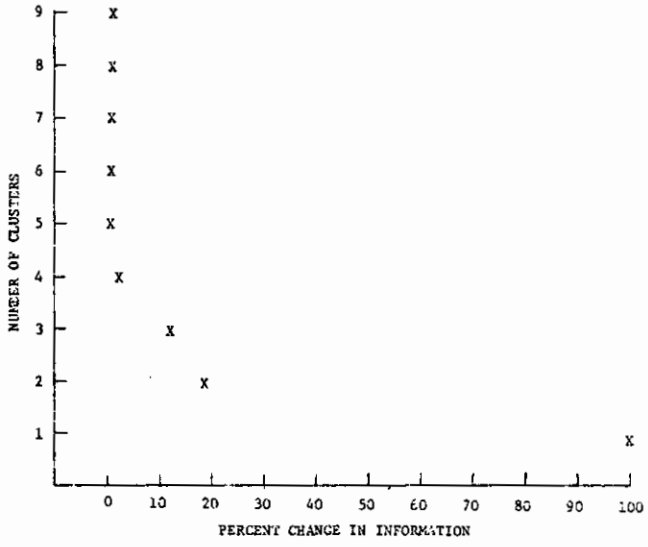

Figure 4. Interpretive data from cluster analysis.

The three cluster solution was chosen. Figure 5 presents a dendrogram of the hierarchical relationship of the three clusters. Using these three clusters, and considering the two very large sites mentioned earlier as a single cluster, a hierarchy of four site size classes is produced.

It must be pointed out that the four level site hierarchy does not necessarily portray cultural reality. The cluster analysis does, however, produce usable units which can be further analyzed in light of various socio-cultural data as a test of their cultural reality. This will be done, first, by looking at the pattern of site size distribution in

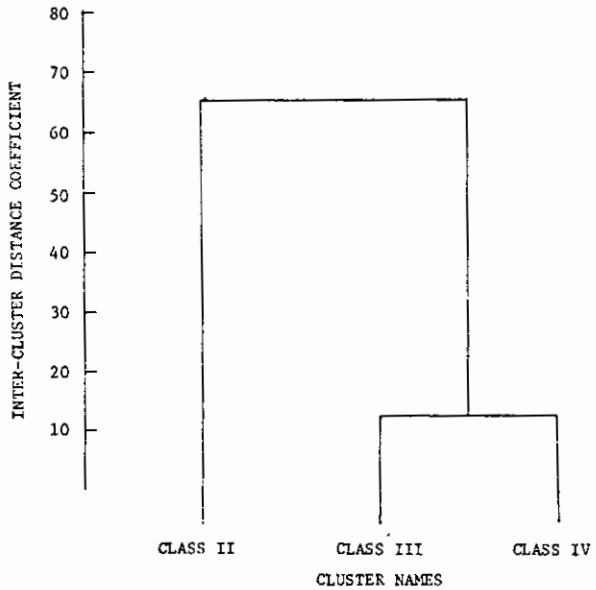

Figure 5. Dendrogram of three cluster solution.

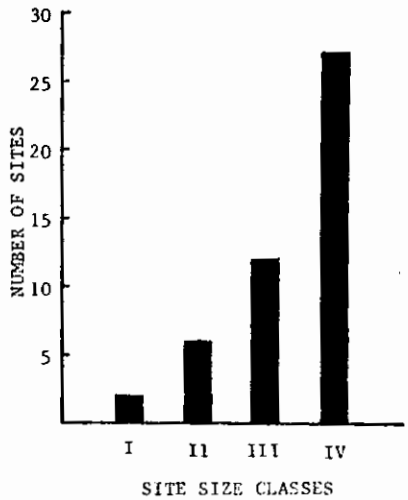

Figure 6. Frequency distribution of sites by size class.

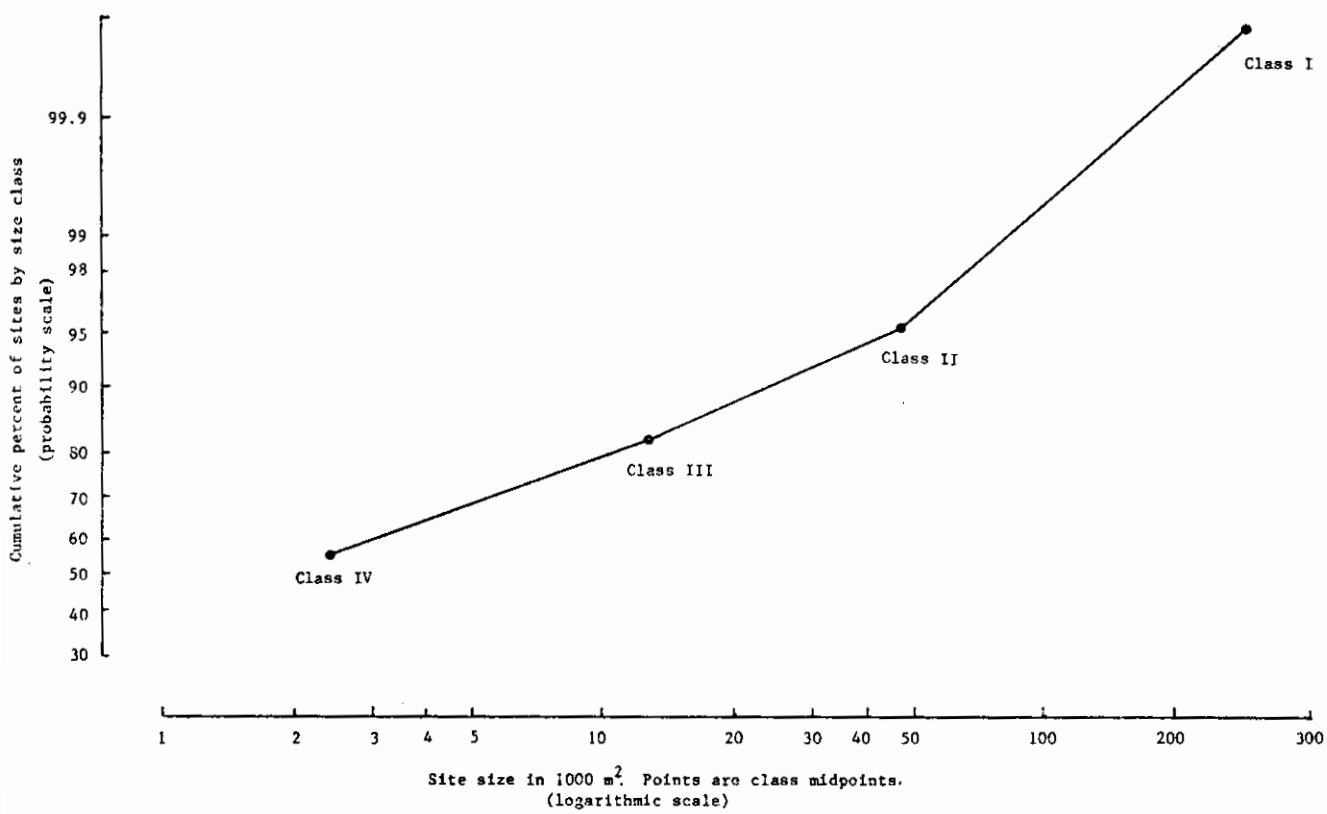

Figure 7. Cumulative frequency of sites by size class.

light of some theoretical explanations of such distributions and, secondly, by looking at the variations between the four site size classes as they relate to several quantified environmental variables.

A histogram of site frequency per size cluster or class is presented in Figure 6. Across the X axis are listed the size classes numbered I through IV. Class I consists of the two largest sites, Class III of the 12 third largest sites and Class IV of the 27 smallest sites.

This histogram is interesting in a number of respects. It illustrates the familiar J-shaped curve which geographers have shown is to be expected in the size distribution of settlements operating within the same system (Haggett 1971:100-101, Simon 1955). In fact, not only the general shape of the curve but the number of sites within each size class conforms to the theoretical expectations of class membership within an operating settlement system (Berry 1961, Berry and Garrison 1958, Simon 1955).

Another interesting feature of this distribution concerns the size of the two largest sites (Class I) relative to the remainder of the sites. When the cumulative frequency of sites versus class size is plotted on log-normal probability paper the sites in Classes II, III and IV form a relatively straight line while the Class I sites, due to their extreme size, fall off this line (Figure 7). The type of settlement size distribution characterized by this type of curve, in which a stratum of smaller communities is dominated by one or a few very large ones, is called a primate distribution (Berry 1961:573). Geographers have generally associated primate distributions with areas that have "simple" economic and political development (Berry 1961:538). More explicitly, Vapnarsky (1969) has shown that the curve in Figure 7 is to be expected when dealing with a small homogeneous area where there is a high degree of interaction occurring among all sites within the area and with only a few sites (here the two large sites) interacting outside of the area. Such a situation seems reasonable for Ossabaw Island.

It seems that accurate and effective analysis of settlement patterning can best be achieved by dealing with a total or, at least, an accurately sampled settlement system. The conformity of the site size distribution of the Ossabaw sites to the geographic models discussed above seems to indicate that the 47 sites utilized represent an adequate and accurate sample of sites. This conformity also illustrates some possible relationships of sites to one another.

Further analysis of Ossabaw's Irene settlement patterns will be a discussion of site size class relationships to several quantified environmental variables. To be discussed is site location in respect to soil types, forest communities, salt water marsh and salt water creeks. Each of these variables have been quantified by ranking them in accordance with their assumed importance to Irene inhabitants. Even though the rankings are to some extent subjective, they are considered logical and plausable in light of available data on Irene subsistence and adaptation.

Table 1 shows site frequency, by class, in relation to forest communities.

The four forest communities that occur on Ossabaw are ranked 1 through 4. Forest community 1 is considered the most desired for settlement and exploitation and community 4 the least desired. Rankings are based on the productivity of exploitable food resources; mainly acorns, nuts, and fauna associated with the forest community (Hillestat *et al* 1975). As can be seen the large sites are located in the most valued forest communities while location of the smaller range of sites varies across the forest communities.

Table 1. Site frequencies cross-tabulated by size class and forest communities.

	Forest Communities			
Size Classes	1	2	3	4
Class I	2			
Class II	5		1	
Class III	8	3	1	
Class IV	11	8	6	2
Total	26	11	8	2

Table 2. Site frequencies cross-tabulated by size class and soil types.

	Soil Types						
Size Classes	Lp	Cm	Ol	Lr	El	Kic	Ch
Class I	2						
Class II	4	1	1				
Class III	4	4	1	2	1		
Class IV	7	1	6	2	6	3	2
Total	17	6	8	4	7	3	2

Table 2 shows site location in respect to soil types. These soil types, as listed from left to right, are ranked from those assumed most valued to those that are considered least valued for settlement. The rankings are based mainly on drainage characteristics such that the most valued soil type, Lakeland Fine Sand, listed Lp on the table, is the best drained soil and as one moves to the right across the table drainage is progressively worse. (United States Department of Agriculture 1974).

Drainage characteristics are, at present, the most logical means of ranking soils since they carry with them factors such as possibility of year round settlement and agriculture. Long term settlement would be possible only on the better drained soils since those that are poorly drained are often seasonally flooded. None of the island soils are very fertile but the better drained soils are more amenable to agriculture than are the wetter ones (United States Department of Agriculture 1974).

Table 2 indicates that larger sites tend to be located on the better soils while the smaller sites show a varied distribution.

Site location in relation to the salt water marsh and estuary is shown in Tables 3 and 4. As mentioned earlier, archaeological evidence indicates that rather heavy exploitation of marsh-estuary resources was undertaken by Irene peoples. An attempt was therefore made to relate site location to marsh resources. It is not feasible to quantify the actual food resources of the marsh, therefore, site distance from the marsh was used as a plausable measure of its importance to a particular site.

Table 3 presents data on site distances from salt marsh. Distance category 1 indicates a site is within 100 meters of the marsh, category 2, 100 to 200 meters and category 3, over 200 meters from the marsh. Here it can be seen that the majority of sites fall within category 1. This is interpreted as indicative of the importance of marsh resources for all sites of all sizes.

Table 4 presents data on site distances from salt water creeks. This measure is deemed important since creeks allow access into the marsh thus increasing the exploitable area available to a site. Creeks are also important in producing a means of movement on and off the island. The distance categories are the same as those in Table 3.

Table 3 Site frequencies cross-tabulated by size class and distance from marsh.

Size Classes	Distance Categories 1	2	3
Class I	2		
Class II	5		1
Class III	9	2	1
Class IV	20	3	4
Total	36	5	6

Table 4. Site frequencies cross-tabulated by size class and distance from nearest creek.

Size Classes	Distance Categories 1	2	3
Class I	2		
Class II	2	2	2
Class III	6	2	4
Class IV	8	7	12
Total	18	11	18

What is shown in Table 4 is a rather great variation in distance from creeks, especially in the case of the smaller sites. It appears that while proximity to the marsh was important for most sites, access into the marsh or off the island was not an important consideration in locating small sites.

The distribution of sites by size class is presented in Figure 8 to give an overall picture of site distribution on the island.

In general the data presented in the above tables indicates that larger sites are associated with more "valued" environmental variables than are small sites. The two largest, and presumably, most important sites on the island are, in every instance, associated with optimum environmental conditions. It appears that these two sites are strategically located to permit ease in exploitation of a combination of resources, indicating that a range of cultural activities could have been operating, and sustained, at these locations. It is interesting to note that the larger of these two sites is located on the salt water creek that provides the most direct access to the mainland. Interaction with the mainland was likely funneled through this

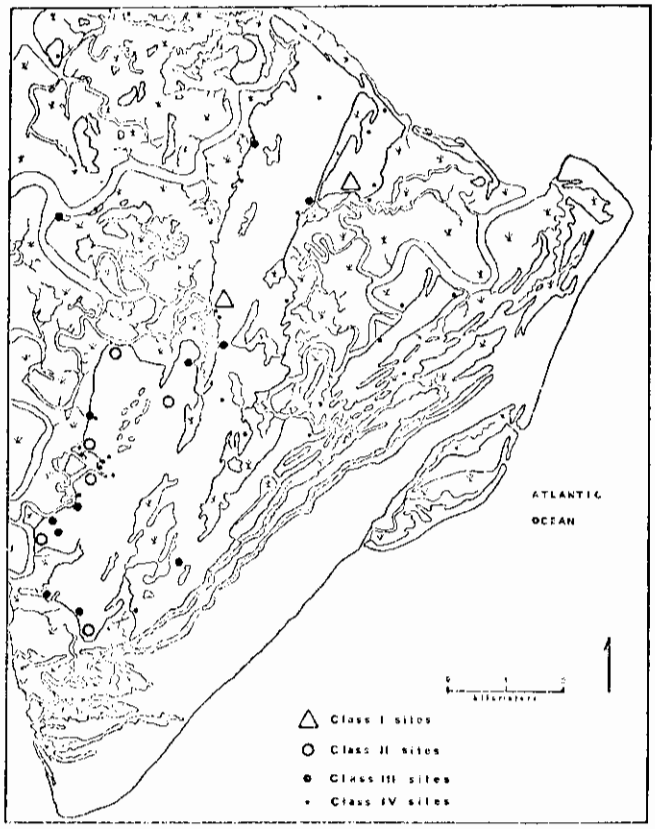

Figure 8. Location of sites on Ossabaw Island.

site thus increasing its importance.

It is suggested that Class I sites were the most important settlements on the island. They likely served as centers of interaction on the island as well as in handling most interaction off the island. Though archaeological evidence is lacking, the fact that these sites occupy such advantageous environmental locations (especially in regards to the soil which is not in danger of seasonal flooding) would seem to indicate that they, and possibly other large sites, were year round settlements.

As sites get smaller there is a general lessening of environmental quality associated with them. No specifics can be given concerning the functional position of the middle range of sites, however, some generalizations can be made about the smaller sites.

Class IV site locations demonstrate the greatest variety in relation to the environmental variables. Many are located on seasonally wet or flooded soils which would seem to indicate short term or seasonal occupation. Few are located near creeks that would provide access into the marsh or away from the island. Most (74 percent), however, are located next to the marsh. It is suggested that these were transitory and specialized sites occupied primarily for shellfish gathering or other types of estuarine exploitation.

It appears, then, that the size classes do demonstrate variability in relation to certain environmental variables and it has been suggested that this variation is a reflection of the site's role or function in the total settlement system. It seems, however, that the usefulness of the size classes would be more meaningful if quantifiable differences could be observed between classes. One way of doing this is to examine the mean of the total environmental rank for each size class. This was done by simply summing all of the environmental ranks for each site and

then finding the mean of this total for each size class. Sites in the class having the lowest score would be those located at points of optimum environmental conditions.

Not surprisingly, the mean for Class I sites was the lowest with a 4.0, Class II sites had a score of 6.2, the score for Class III was 6.9 and for Class IV it was 9.1.

Quantification of environmental rank for each class supports the general assumption made above. A decrease in site size corresponds to a selection for location in areas of decreased overall increasing specialization as sites get smaller with a concomitant decrease in a site's functional variability.

The data presented demonstrates that a hierarchical arrangement of Irene sites existed on Ossabaw. Each level of this hierarchy, i.e. each size class, is differentially associated with a set of quantified environmental variables. These variations of association are seen as reflective of the sorts, as well as number, of activities occurring at sites in different levels of the hierarchy.

Besides, and perhaps more important than the analysis of Irene settlement, this paper demonstrates that an easily obtainable archaeological measure- site size- provides a usable, and logical, starting point for the analysis and interpretation of settlement systems.

The settlement arrangement presented and discussed in this paper is not meant to be a final answer to Irene settlement. This analysis is seen, however, as an initial step in the development of a model of late prehistoric settlement and adaptation in coastal Georgia.

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Richard W. Jefferies

The Lookout Valley Research Project: A Micro-Regional Approach to Locational Analysis in Settlement Archaeology

Introduction

Until recently, archaeological research in the Southeast has been oriented toward the excavation of a relatively disjointed collection of sites, with particular emphasis on the excavation of mounds and large habitation areas. Seldom have archaeologists looked beyond the site to the more complex intersite relationships. Past emphasis on large sites has lead archaeologists to ignore less spectacular and less impressive sites. Such sites have usually been viewed as being unimportant or insignificant, or were entirely overlooked because of their small size or the lack of any systematic sampling scheme. As a consequence of these practices, most of the data presently available concerning past human activity in the Southeast is based on a very small collection of unrelated sites. The Lookout Valley research project is an attempt to change this situation.

During an eight week period from mid June through mid August 1975, a research team from the University of Georgia conducted an archaeological reconnaissance of the Lookout Valley watershed (Figure 1). The research area is located in Dade County, Georgia in the extreme northwestern corner of the state. The goal of the survey was to systematically locate sites in a designated research universe for the purpose of collecting cultural and locational data to test certain hypotheses concerning locational variability of prehistoric settlements. Particular emphasis is being placed on testing these hypotheses with data collected from Woodland sites located in the area. A total of 62 sites were located during the first phase of investigation of which 32 sites have been tentatively classified as having Woodland components.

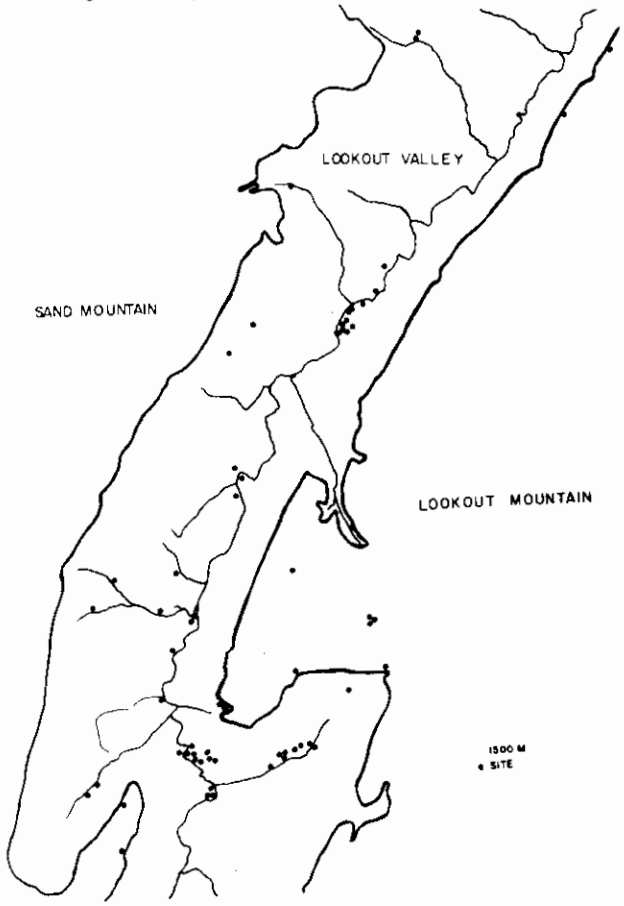

Fig. 1: Distribution of sites located in phase one of the Lookout Valley research project.

Physiographic Description

The topography of the research area is mountainous and lies within and at the edge of the Cumberland Plateau. The salient physiographic characteristic is Lookout Valley, an erosional feature oriented northeast-southwest that separates Lookout Mountain on the east from Sand Mountain on the west. The altitude of Lookout Mountain, actually a plateau, ranges between 550-675 meters a.s.l. A steep escarpment or bluff, often over 100 meters high, separates the mountain uplands from the more gradual slope of the mountain side. The altitude of the valley floor ranges between 200-400 meters a.s.l. and generally less than three miles wide. Chert-capped ridges running parallel to the larger mountains rise 75-100 meters above the valley floor. The primary drainage feature of the watershed is Lookout Creek. The creek flows along the east side of the valley for a distance of 40 kilometers, eventually emptying in to the Tennessee River near Chattanooga, Tennessee.

Selection of Research Area

The choice of the Lookout Valley area for the research project was based on both physiographic and archaeological variables. The problem of establishing the boundaries of the research area was somewhat alleviated by the physiographic disposition of the valley. The steep bluffs on the sides of the mountains flanking both sides of the valley present natural barriers to transportation and communication. Historical and ethnographic evidence indicates that movement in and out of the valley was severely restricted on the east and west sides of the valley by these escarpments. The north and south boundaries of the research area are defined as a matter of convenience; that is, an area was delineated for analysis that was largely unaffected by the processes of 20th century urbanization and industrialization.

A second factor influencing the selection of the area was based on archaeological data. The prehistory of the Lookout Valley region of northwest Georgia is largely unknown. As far as can be determined, no formal archaeological research was conducted in the area prior to 1957. Considerable research has been done along the Tennessee River in the vicinity of Chattanooga and considerable data is available concerning the prehistory of much of the remainder of the Tennessee River Valley. The Lookout Valley project is an archaeological analysis of one of the lesser tributaries of the greater Tennessee River Valley system. In 1957, Dr. James Brown conducted an excavation of half of a small rockshelter on the western bluff of Lookout Mountain. Brown's work disclosed the presence of two stratigraphically separated cultural components. The lower component was interpreted as a Middle Woodland storage and processing camp and the upper level contained Mississippian lithic material (Brown n.d.).

In 1973, a research team under the direction of Dr. Joseph R. Caldwell, University of Georgia, excavated the Tunacunnhee mound and habitation area in Lookout Valley. The Tunacunnhee site is of archaeological significance for several reasons. It is the only well documented Hopewellian site in north Georgia, excavation of the mound recovered the greatest variety and quantity of Hopewellian artifacts from the interior Southeast, and the site contains not only the widely known and excessively documented mortuary remains of a Hopewellian affiliated occupation, but also an associated habitation area (Jefferies 1975). The data collected from these two sites, along with reports of similar sites in the region, gave impetus to the choice of the Lookout Valley area for the research project.

Description of the Research Universe

There have recently been several attempts to apply Binford's (1964) ideas concerning a regional research design to reconstruct extinct settlement systems (Struever 1968; Thomas 1969, 1973). Cultural variation in space has been viewed in terms of differing adaptive requirements to specific resources within the environment. If the area of research is regional in scope, the nature of the extinct settlement system should be reflected in the kind, number, and distribution of settlement types. Settlement types are to be defined from those sites that demonstrate particular configurations of exploitive and maintenance activities. These sites will contain a similar structure of material elements (Struever 1968). The choice of the Lookout Valley research area is an attempt to analyze the locational and functional variability of prehistoric settlements within a regional framework. The research area is large enough to offer a variety of environmental zones where different settlement types could operate, yet small enough to permit intensive survey of a large portion of the area.

The research universe for the purpose of the project, has been defined as a 15 kilometer section of Lookout Valley, bounded on the northeast and southwest perimeter by a line on the top of Lookout and Sand Mountain, 1500 meters from the bluff area. The northwest and southeast perimeters are formed by lines crossing Lookout Valley perpendicular to the longitudinal axis of the valley. The research area encompasses an area of 158 square kilometers.

The area is divided into six units or strata. The criteria for stratification are based on environmental and physiographic factors since the hypotheses to be tested are primarily concerned with prehistoric environmental factors. The purpose of dividing the research area into strata is to keep the environmental variables relatively constant in each of the strata to aid in making comparisons among sites or assemblages (Thomas 1969:92). Based on the aforementioned criteria, the research area has been divided into the following strata:

a) *Upland Plateau* – located on top of Lookout and Sand Mountain within 1500 meters of the bluff and constitutes approximately *40 percent* of the total area of the research universe.
b) *Bluff Area* – a narrow strata located at the edge of the upland plateau constituting *5 percent* of the universe.
c) *Plateau Slope* – located on the sides of Lookout and Sand Mountain between the bluff and the valley floor. The strata represents *22 percent* of the total area.
d) *Primary Drainage Floodplain* – located adjacent to Lookout Creek on the valley floor constituting *5 percent* of the research area.
e) *Secondary Drainage Floodplain* – located adjacent to tributary streams of Lookout Creek. The strata represents *4 percent* of the total area of the research universe.
f) *Valley Ridges* – low chert ridges on the floor of Lookout Valley constituting *22 percent* of the research universe.

The six strata are uniformly distributed through the research universe parallel to the longitudinal axis of the valley.

Initial Research Design

The initial research design for the Lookout Valley project was derived from research techniques utilized by archaeologists and locational analyists in geography. It was realized at the time the plan was formulated that many of the techniques employed would not be specifically applicable to research performed in the Southeast and that modifications of the research plan would be an ongoing process once the plan was operationalized in the field. The goal of this research design is two fold. The first stage of research will analyze locational variability of Woodland sites and will be primarily concerned with two questions:

1. What environmental factors were relevant to site selection?
2. What was the relative order of importance of these factors (after Plog and Hill 1971).

The distribution of the sites in the research area may reflect the role the site played in the overall settlement system.

The second phase of the research will be to identify the functional variability of sites in the settlement system based on the critical environmental factors identified in the first phase of the research design and the archaeological data collected from sites located in the research area.

Sampling Scheme

The sampling technique initially utilized in the selection of areas in the research area to be surveyed was *transect sampling*. The universe was divided into 500

meter wide transects oriented perpendicular to the axis of the valley, crosscutting the six environmental strata previously discussed. Due to the irregular boundaries and small areas of some strata, it is more efficient to use transects as sampling units than to use quadrants. Judge, Elbert and Hitchcock working in Chaco Canyon and Plog working in Oaxaca, Mexico, have found that transects were more effective sampling units than quadrants (Mueller 1974:30). Since the strata are uniformily distributed through the research universe, a transect would contain a proportional area of each strata as is present in the research universe. The individual transects to be surveyed were chosen using a random numbers table. The research design called for the sample to include 40 percent coverage of the research universe. The initial plan required that the entire length of each transect selected for survey be covered on foot by five crew members approximately 50 meters apart.

Modification of the Initial Research Design

Despite what was thought to be a carefully planned research design, numerous problems developed when the plan was operationalized in the field. The same physiographic attributes that first attracted attention to the area created a multitude of problems during the survey. Initially, there was a problem of locating the transect lines on the ground surface. The use of aerial photographs and U.S.C.G.S. quadrangle maps facilitated finding the general location of each line on the ground surface, but the actual laying out of the lines across the research area was still a very time consuming process. These problems were caused by the inability to traverse parts of the survey area because of the very rough terrain and the lack of visibility caused by dense ground cover. These same two problems, poor ground surface visibility and rough terrain, combined with the difficulties associated with having to obtain individual private land owners permission to cross property lines, greatly hindered the actual archaeological reconnaissance of the designated transects. It became obvious during the first few weeks of the project that the research design was very inefficient as far as the cost-benefit ratio was concerned. In other words, a lot of time was being used to find very few sites. It is realized that the goal of the research plan is not soley to locate sites, however evaluation of the plan revealed that the cost of continuing the program would allow only a very small portion of the research area to be surveyed.

From experience gained in the aforementioned portion of the project it was determined that the majority of the sites already located were found in areas where there was good visibility of the ground surface. No sites, with the exception of caves and rockshelters, had been located in the forested areas, and the only sites located in heavy grass areas were found through subsurface testing. The research plan was revised in that only the areas within the research area that had relatively good ground surface visibility would be initially surveyed and that areas having dense ground cover would be sampled for testing in a later stage of investigation. Obviously, certain biases were created through this action, but if a large enough sample of sites was to be located in the research area within the allocated time and budget, the adjustments had to be made. A conscientious effort was made to insure that representative portions of each of the six strata were searched for sites.

Hypothesis Formulation

Most of the research oriented toward settlement system analysis has been done in the Southwest (Plog and Hill 1971, Lipe and Matson 1971, and Lindsay and Dean 1971), the Basin-Range (Thomas 1969, 1973) and the Midwest (Struever 1968). Very little research of this nature has occurred in the Southeast (Sears 1956, 1961). Nevertheless, many of the hypotheses concerning site distribution tested in other parts of North America are at least generally, if not specifically applicable to the Southeast. The goal of analyzing locational variability of a specific settlement system is to be able to determine which variables were critical in determining site location and the relative importance of those critical variables.

Numerous hypotheses have been formulated by researchers in geography and anthropology concerning the distribution of settlements (Gummerman 1971, Haggett 1965 and others). It is generally proposed that archaeological sites are distributed with respect to selected critical factors or environmental variables. The term "environmental variable" is defined as including both physical and social attributes. It has been proposed that these variables can be utilized to explain or predict the distribution of sites over the land. If the variability of archaeological remains and the spatial distribution of sites is a reflection of different types of human behavior, it may be possible to relate variability of cultural remains and site location with certain kinds of behavior. The specific hypotheses to be tested are based on the "minimax" model: the minimization of effort required to exploit the potentially available resources and maximization of access to critical resources (Lipe and Matson: 134).

The hypotheses to be tested concern the settlement system present in the Lookout Valley area during the Woodland period (1000 B.C.-A.D. 1000). Two of the general hypotheses to be tested are:

H_1: The structure of the Woodland settlement system in Lookout Valley will be reflected by the locational variability of settlement types with respect to certain *physical and social environmental* variables.

H_2: The structure of the Woodland settlement system in Lookout Valley will be reflected by the *functional* variability of settlement types in the research universe.

These hypotheses, or modified versions, will be tested with data collected during the survey portion of the research design. Much of the data will be in the form of information concerning the previously discussed physical and social factors.

Variables

The existence of an organism depends on a complex of conditions. Any condition which approaches or exceeds the limits of tolerance is said to be a "limiting condition" or "limiting factor." These limiting conditions or factors are not of equal importance to the survival of the organism (Odum 1971: 110-111). The goal of the Lookout Valley project is to determine which factors are operationally important and how each factor or combination of factors effected human behavior in the past.

Given the assumption that the Woodland population of Lookout Valley based its subsistence on a wide variety of resources, various quantifiable environmental factors have been selected that may have effected the potential ex-

ploitation of available resources and consequently influenced the distribution and type of settlements present in the area.

From major categories of physical envirnomental factors have been selected for analysis: *Hydrology, Pedology, Landform* and *Vegetation*. The physical landscape of the area has been altered by the introduction of new technical and social factors, however, many of the physical attributes of the area are still the same as during the period of prehistoric occupation. Attributes such as water resources, basic soil distribution and climatic conditions were essentially the same as they are today. The changes in these factors are minor compared to the alteration of the prehistoric vegetation pattern. Major alteration of the plant community has occurred throughout the research area, particularly on the valley floor, the area most suitable for modern agriculture. There are, however, resources available that will assist in determining prehistoric vegetation distribution including: early 19th century land plats with notation of existing vegetation on each land lot, paleoenvironmental data, and historical or ethnographic information.

The reason for selecting these four major categories (water, soil, landform and vegetation) is based on several factors. First, it has been hypothesized and somewhat supported that the environmental variables previously discussed appear to be important in the explanation of variability of prehistoric settlements in other locations where this type of research has been done. Secondly, these variables are easily quantifiable and their definitions are not subject to much controversy (Plog and Hill 1971: 15).

The following is a tentative list of variables that will be measured and analyzed for each site located in the research area:

1. *Hydrology*
   a. Distance to nearest water source
   b. Type of nearest water source
   c. Reliability of water source (permanent, semi-permanent, impermanent)
   d. Drainage rank of nearest stream
   e. Proximity to primary drainage
   f. Proximity to secondary drainage
   g. Proximity to confluence of primary and secondary drainages
2. *Pedology*
   a. Soil type on which site is located
   b. Soil depth
   c. Area extent of soil type
   d. Ph factor of soil
   e. Slope on which soil type occurs
   f. Moisture retaining ability of soil
   g. Soil color
   h. Soil composition
3. *Landform*
   a. Elevation of site
   b. Type of landform on which site is located
   c. Landforms within 500 meters of site
   d. Direction of exposure of site
   e. Slope of landform on which site is located
   f. Physiographic strata in which site is located
4. *Vegetation*
   a. Type of plant community in which site is located
   b. Distance to next plant community
5. *Social Variables*
   a. Size of site in square meters
   b. Distance to major habitation site
   c. Distance to nearest mound site
   d. Distance to nearest other site
   e. Artifact content of site
   f. Features of site

Initial analysis of the data from the survey will be to test the hypotheses concerning the effect of these variables on population location. Unknown variables and the interaction effect between previously selected variables may cause difficulty in the interpretation of the role of the individual variables on settlement distribution. Some of the variables selected may prove to be too gross (requiring more specific ones) while other attributes presently being used may prove to be meaningless in determining locational variability.

In summary, the Lookout Valley research project has been designed to utilize various research strategies to study the locational variability of prehistoric settlements within a regional framework. The research design was formulated with the thought in mind that various research strategies and techniques employed in other parts of North America may be successfully utilized in the Southeast and may reveal new information that will ultimately lead to the explanation of variability of human behavior in the past.

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John T. Penman

The Lamar Phase in Central Georgia

The phenomenon known as Lamar consists of finely made bold incised and complicated ceramics in association with truncate mounds. Since the first description in 1938 of this ceramic material from the Lamar site in central Georgia, Lamar ceramics have been found as far north as Ontario and as far west as Louisiana (McMichael 1960:157).

This complicated stamped pottery in a late prehistoric context which occurs over such a large area has been called the Lamar explosion by some researchers. The seeming Lamar explosion is probably what prompted Chase (1962:70) to state that "Lamar now, like the omnipresent Kudzu vine, has grown and expanded and gone all over the place. . . ."

While Lamar pottery in the Carolinas is generally considered to be Cherokee, Fairbanks believes that Lamar in central Georgia is Creek (Fairbanks 1952:294).

Though Lamar sherds have been recovered from a vast geographical area, Lamar sites are concentrated in the northern half of Georgia and the Carolinas (Figure 1).

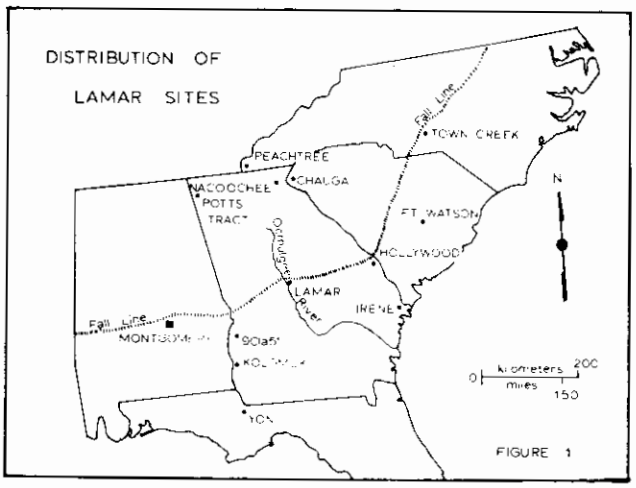

FIGURE 1

Analysis has been made of the sites in the areas north of the Lamar site itself (see Wauchope 1966:440 and SEAC 1971:61), and they have been compared to the Lamar site which is located in Bibb County below the Macon Plateau. Though the Lamar site was excavated over three decades ago, it has only recently been studied.

Excavations were carried out at the Lamar site from 1934 to 1941 as part of the Civil Works Administration and Works Progress Administration archaeological program in the southeast (Deutschle 1973:4). The first series of excavations conducted by James A. Ford concerned itself with the large platform mound and various test squares in the village site. In addition, Ford excavated one house pattern which he termed Village Site Excavation Number 1 and began excavations, which were not completed, on a second house. In 1937 Gordon R. Willey followed Ford's excavation at Lamar by placing 20 test squares in the village and plaza area in an attempt to discover temporal differences between the lowest levels and the more shallow strata. Later Charles Fairbanks excavated the palisade which encircled Mounds A and B and the 21 acre village (Deutschle 1973:16).

The first report on Lamar was published in 1938 by A. R. Kelly. Later a progress report was made by Jesse Jennings (1939) and the result of the palisade excavations were reported by Fairbanks (1940). While excavations were in progress at Lamar and on Macon Plateau, Willey tested other Lamar-like sites such as Cowart's Landing (Willey 1939). Because of the outbreak of World War II, detailed analysis of the site material recovered was not accomplished by the original field researchers. More than four decades later the Southeastern Archeological Center of the National Park Service in cooperation with Florida State University began laboratory analysis of the site material from the Ocmulgee River basin.

The materials from the Lamar site were analyzed in 1973 at F.S.U. (Smith 1973a). A description of the excavations at Lamar was presented in the report edited by Smith, as were sections on lithics, tobacco pipes, burials and faunal material. Approximately 25% of the total ceramic sample was dealt with in the 1973 report (Penman 1973:22), and all of the historic artifacts were studied. A surface collection of 24,261 sherds proved that better than 50% of the ceramics recovered from Mound A and the surrounding village are of the Lamar Complicated Stamped, Lamar Bold Incised and Lamar Plain types. There is a Late Archaic component represented by Stallings Island Plain (fiber tempered ceramics) and also scattered Woodland occupation (Deptford series ceramics). In the Village Site No. 1 unit approximately 25% of the recovered material was studied with the result that almost 70% (69.45%) of the total ceramics are of the Lamar types. The next largest category was 28.60% plain body sherds with ceramics of the Ocmulgee Fields series making up less than .5%. Some historic materials, notably trade beads, were recovered from the Village Site No. 1 excavations by James Ford. Though these historic items from the Village Site 1 unit do not provide a very narrow time estimate for manufacture and use, the total historical artifact assemblage clusters in a 1680 - 1800 time span (Tesar 1973:86). Since the quantity of trade goods at Lamar is scant, it is postulated that occupation of the site terminated before a great influx of European influence (Penman 1973:34). In addition, the aboriginal ceramics do not exhibit any evolution in style. There is no significant increase in Lamar Bold Incised over Lamar Complicated Stamped through time (Figure 2), as has been previously reported (Kelly 1938:48-49). Further, there is one design termed a Figure 9 which is persistent throughout horizontal and vertical units. The Figure 9 occurs on Lamar Com-

plicated Stamped ceramics and seems to be a degenerate form of the filfot cross such as was found at Irene. The evolution of a well executed filfot cross to the less refined Figure 9 cannot be exhibited at the Lamar site. The

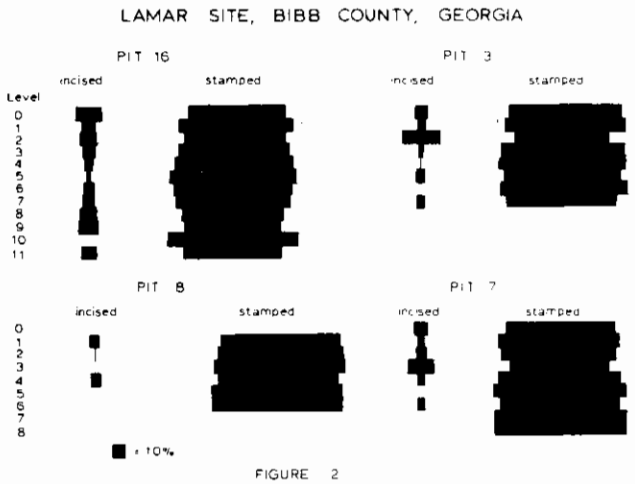

FIGURE 2

Cowart's Landing site which lies some 9 miles south of Lamar in the Ocmulgee basin was dug by Gordon Willey in 1937-1938. Cowart's Landing is similar to Lamar in that it is within the Ocmulgee floodplain, but differs from Lamar in that there are no mounds and the village is only one half the size of the Lamar village. Also, there have been no historic artifacts recovered from Cowart's Landing and stamped ceramics are more finely executed than those from Lamar (Hamilton, Lauro, and Swindell 1975). Though the Cowart's Landing site is somewhat earlier than Lamar, it is not an *in situ* development from the still earlier Swift Creek (Hamilton, Lauro and Swindell 1975:16). Hamilton notes (Hamilton, Lauro, and Swindell 1975:20) that there is a disparity in the types Lamar Bold Incised and Lamar Complicated Stamped when Cowart's Landing and the Lamar Site are compared. He states that the ratio of incised sherds to stamped ware at Cowart's Landing is 3:7, while from a selected sample of pits from the Lamar site the ratio is 1:9. Hamilton interprets this difference as being a temporal one, although this author prefers to think of it as a difference in the function of the incised versus stamped wares. The Cowart's Landing site further differs from Lamar in that there is no palisade or other type of fortification at the former.

Lamar ceramics have been uncovered from the upper levels of the earthlodge and Mound D on Macon Plateau (Nelson, Prokopetz and Swindell 1974). Lamar series ceramics also occur at the Ocmulgee Bottoms site in the floodplain below Macon Plateau. Nelson, Swindell and Williams (1974:28) suggest that the Ocmulgee Fields decorative techniques at the Ocmulgee Bottoms site could have developed before the demise of the Lamar ceramic tradition, since both occur in the same 6 inch level in many of the pits. Since there was a considerable degree of mixing of Woodland and later strata at Ocmulgee Bottoms, confirmation of this hypothesis must await excavation of undisturbed sites in central Georgia.

Excavations undertaken in other portions of Georgia since the W.P.A. work at the Lamar site have revealed ceramics similar to those uncovered at the Lamar site.

The Potts' Tract site in northwestern Georgia yielded Lamar Complicated Stamped vessels with rim and surface treatments more similar to those from the Lamar site than to the coastal variations (such as the material from Irene). Approximately 26% of the ceramics recovered from the Potts' Tract site are of the shell tempered Dallas series common in the Hiwassee River basin. The majority of the ceramic material, however, is Lamar (Hally 1970:12). Hally feels that Potts' Tract could possibly represent a transition from the Dallas culture to Lamar culture. He defines this situation which exists at Potts' Trace as the Barnett Phase of Lamar Culture (Hally 1970:18). Hally adds that the Barnett Phase may represent a Cherokee or Lamar intrusion into the territory of the Coosa who are represented archaeologically by the Dallas Culture (Hally 1970:20).

Site 9-CLA-51 located on the Chattahoochee River yielded Lamar Complicated Stamped sherds and at least two earlier components. Though there was considerable mixing of material by prehistoric activity on the site, the Lamar materials generally occur in the upper levels (Broyles 1962:Table 1). Lamar ceramics from CLA-51 are for the most part obliterated stamp designs with some bull's-eyes and figure eights also present. Broyles (1962:32) notes that while the Lamar ceramics vary from the original type descriptions they are similar to Lamar ceramics recovered from Kolmoki.

Sears (1951:32-33) has stated that the presence of Lamar Complicated Stamped with checked stamped indicates an "early variety" of Lamar at Kolmoki. His Mecier Checked Stamp from Kolmoki has Lamar style rims and a paste indistinguishable from Lamar.

Lamar ceramics have also been recovered from the Nacoochee mound (Heye, Hodge and Pepper 1918) and Etowah. The stamped ceramics from the former have better executed designs than those from Lamar. Sears has given a relative date of 1650 for the occupation of both Etowah and Nacoochee (Sears 1955:147), and adds that the "Lamar occupation at Etowah is early Cherokee" (Sears 1955:144).

Though no historic artifacts have been recovered from Irene, it is considered to be a late Lamar. The Irene site (Caldwell and McCann 1941), which is located on the Georgia coast, has well-executed complicated stamped designs and a variety of rim treatments differing considerably from those at Lamar.

The Yon site (8Li2) in north Florida also contains Lamar series ceramics in the upper levels (unpublished data).

Cherokee sites in South Carolina (Chauga) and North Carolina (Peachtree) also contain Lamar or Lamar-like ceramics. The Chauga and Peachtree sites both have considerable time depth and both are considered to be Cherokee (Kelly and Neitzel 1961, Setzler and Jennings 1941:55, and Coe 1961:57).

The documentation of many northern Lamar sites as Cherokee leads one to seriously question Fairbanks's statement that Lamar in central Georgia is Creek, specifically Lower Creek (Fairbanks 1952:294). This contention was based on the assumption that Swift Creek evolved into Lamar (Fairbanks 1952:290) and that Lamar in turn was transformed into Ocmulgee Fields (Fairbanks 1958:54-55). Fairbanks based part of this assumption on the contention that there are vessels at the Lamar site which exhibit evolution in incising from Lamar to Ocmulgee Fields. In the recent analysis of several pits and a large surface collection from the Lamar site no such evolution could be shown. This proposed evolution does not seem to have taken place on the Macon Plateau either for

no such occurrence is mentioned for the North Plateau (Williams and Henderson 1974), the Middle Plateau (Smith 1973b and Prokopetz 1974), the Mound D area (Nelson, Prokopetz and Swindell 1974) or at the Ocmulgee Bottoms site (Nelson, Williams and Swindell 1974). Further, there is no evolution from Swift Creek to Lamar at the Cowart's Landing site (Hamilton, Lauro and Swindell 1975:16).

Russell (1973:12-13) has argued that this evolution from Lamar to Ocmulgee Old Fields, or Creek cannot be shown in the Chattahoochee region either. Therefore since an *in situ* development from Lamar to Creek cannot be shown within the area known during historic times as the Creek territory an alternate hypothesis is called for.

It is proposed here then that Lamar in central Georgia is not Creek. With the wealth of information on Lamar-Cherokee sites to the north then it is logical to assume that Lamar is Cherokee in central Georgia also.

Sears brought out the argument against Lamar to Creek in 1955 when he observed that no Lamar style has evolved into a brushing tradition such as Chattahoochee Brushed or Walnut Roughened both of which are Creek ceramics (Sears 1955:148). He adds that only one of the Lamar styles of rim treatment is found on historic Creek wares while other Lamar style rim treatments are "duplicated at the contact level only in Cherokee pottery" (Sears 1955:146). Sears does point out, however, that Tugalo incised is "stylistically intermediate between Lamar Bold Incised and Ocmulgee Fields Incised" (Sears 1955:144). The interaction between the Lamar site and the Plateau is evidenced by the presence of Ocmulgee Fields wares at Lamar and Lamar Incised ceramics on the Plateau. These "foreign" wares occur in minute quantities at both sites, however. If the scarcity of exotic ceramics on the Lamar site is added to the fact that Lamar was fortified, one can assume that the exchange between the Plateau and the Lamar site in the floodplain was less than a friendly one. The vessel shapes and decorations of Ocmulgee Fields Incised are similar enough to Lamar Bold Incised to demonsrate that the Creeks adopted this single style.

The evolution of Lamar ceramics cannot be demonstrated from any single site. There is, however, evidence that such evolution does exist, at least with regard to stamped wares. From prehistoric sites such as Nacoochee and Irene the stamping designs are well executed and design motifs can be determined. One of the earliest designs on stamped pottery is the filfot cross which is well represented at Irene. If Sears's date of 1650 for the occupation at Nacoochee is correct, then the utilization of well-executed patterns extends at least to that time. At later sites such as Lamar itself the decorations are sloppy and carelessly applied. The filfot cross has degenerated to the point that only one or two arms of the cross are discernible. Mason (1963:62, 68) has suggested that certain burials and pits on the Plateau date prior to the establishment of a trading post at that location. She argues that since there is a scarcity of trade goods in the pits and since some burials under the trading post structure itself lack a quantity of European artifacts, these interments were made before trade was well established. Since the English traders did not enter the area with grand-scale trade until 1690, a pre-1690 date is suggested for such features (Mason 1963:19). As has been previously stated, trade goods appear on the Lamar site in scant proportion, so a pre-1690 date for Lamar is also suggested. Thus, obliterated stamping occurs prior to 1690. Though occupation at Lamar and probably all Lamar Phase sites in the Ocmulgee basin (near Macon) had ceased by 1690, another stylistic change can be exhibited further north. Caldwell (1955:279-280) reports that burials in northwest Georgia contain a considerable quantity of trade goods and a check stamped pottery similar to Lamar Creek Stamped, which he terms Boyd Check Stamped. This resurgence of check stamping while bold incising declines in popularity could be due to movement of Cherokee populations from the Atlantic slope into the Chattahoochee as a result of pressure from European expansion (Caldwell 1955:280; Fairbanks 1961:64). Harrington notes the use of cross natchured paddles to produce check stamped designs was in use as late as 1908 by the Cherokee (Harrington 1922:196-202 and Plate 63). Though activity on the Lamar site had ceased by 1690, a sequence of occupation can be postulated for the Ocmulgee River basin south of the Plateau. At some time in the late prehistoric or protohistoric periods, peoples moved from the north into the Ocmulgee basin, probably to a point southeast of the Lamar site. As the population expanded, villages were established close to the Plateau. Due to this expansion northward, fortifications were needed to protect the Lamar peoples from their hostile neighbors on the Plateau, thus the palisade at Lamar. Evidently there was some exchange of ideas or at least ceramics, for the inhabitants of the uplands adopted the incising techniques and decorations from Lamar.

The reason for the failure of the Lamar peoples in the Ocmulgee basin cannot be postulated at this time. If the above sequence is correct, however, the Lamar phase represents the climax of Cherokee occupation in central Georgia.

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Bruce D. Smith

Gypsy Joint: A Small Middle Mississippi Site

Introduction: The Powers Phase

The term "Powers Phase" has been assigned to a prehistoric human population that occupied an area of southeast Missouri for perhaps 50 to 100 years, at around A.D. 1300. On the basis of the temporal and geographical placement, as well as the artifact assemblage of the Powers Phase, it has been placed within the rather amorphous general cultural category "Middle Mississippi."

For the last eight years this Middle Mississippi Phase has formed the research universe for an ongoing, long term archaeological research project. The Powers Phase Project, funded during this period of time by a series of grants from the National Science Foundation, has been under the overall direction of James B. Griffin, with James E. Price directing field research.

The area occupied by the Powers Phase is at the extreme western edge of the western lowlands of the Central Mississippi Valley, directly adjacent to the Ozark Uplands.

The settlements of the Powers Phase are located on a series of sand ridges that parallel the Ozark Escarpment in a northeast-southwest direction. The sand ridges are early Wisconsin braided stream channel levee remnants or interfluves.

The settlements of the Powers Phase consist of a single ceremonial center, a series of smaller fortified villages, and an as yet undetermined number of sites that are smaller than the fortified villages.

Powers Fort is the central place of the Powers Phase. A fortification wall and ditch enclose three sides of the 12 acre site, while the east side fronts on a cypress swamp area. Within the fortified area there are 4 mounds: a flat-topped pyrimidal mound and associated plaza area, as well as three smaller mounds.

A number of Powers Phase villages have been located and investigated to varying degrees. Surface soil stains indicative of burned structures have been mapped at two sites, and single structures excavated at each. The Flurry site, which is bisected by a dirt road, is thought to be of village size based on the mapping of 21 surface stains. Similarly, the Wilborn site would appear to be of village size, judging from the 46 surface stains that have been observed. Another two village sites of the Powers Phase have been almost totally excavated. The Turner site is the smaller of the two sites, having 44 structures with associated refuse pits in a fairly ordered pattern around a central courtyard and burial area, with approximately 1.5 acres enclosed by the fortification ditch and palisade. The Snodgrass site is almost twice as large as the Turner site, having a total of 90 structures with associated refuse pits arranged in an ordered street like pattern, with approximately 2.5 acres enclosed by the fortification ditch and palisade wall. In addition to the 4 village sites already discussed, six other sites have been tentatively identified as Powers Phase villages on the basis of the spatial extent and nature of surface collections.

The third category or class of Powers Phase sites is a catch all category of "sites smaller than village size." That this category is deliberately vague reflects the very limited amount of data that is available concerning these sites. As the excavation at the Turner and Snodgrass sites neared completion in 1973, it was clear that more detailed information concerning smaller than village size sites was needed if any detailed overall models of the Powers Phase settlement system were to be developed. Excavation of a smaller than village sized Powers Phase site was therefore scheduled for the Summer of 1974.

The Gypsy Joint Site

The overall research design of this planned excavation was oriented toward determining the functional role of the site within the overall settlement system of the Powers Phase.

More specifically, a series of 5 interrelated problem areas were to be considered.

1) Seasonality of occupation
2) Duration of occupation
3) Size and composition of the occupying group
4) The type and range of activities carried out at the site, and
5) The political, economic, and kinship ties between the occupants of the site and other Powers Phase settlements.

The specific site chosen for excavation was the Gypsy Joint site, which was located just east of Naylor, Missouri, where the research center for the Powers Phase is located. The Gypsy Joint site is also located on Barfield Ridge, the largest of the sand ridges in the area, about 1.5 miles southwest of Powers Fort, the ceremonial center of the phase. The site is located on a small ridge running northwest-southeast (Figure 1).

A total of almost 8,000 ft.^{2} of plowzone was removed in a single large black excavation, starting at the highest point on the hill and expanding outward. In addition, a slit trench was run from the block excavation northwest along the crest of the ridge to the tree line. Side trenches were put out every 20' in an attempt to determine if additional structures or other features were strung out along the ridge line. No features, Mississippian or otherwise, were uncovered outside of the block excavation.

Within the block excavation area a total of 15 cultural features were uncovered and excavated (Figure 2). Twelve of these features could be assigned to the Powers Phase occupation at the site, while three Woodland features were uncovered at the southern edge of the excavation surface (Burial 1, Pit 1, and Pit 9).

The spatial distribution of the twelve Powers Phase features can be most easily viewed from the vantage point of

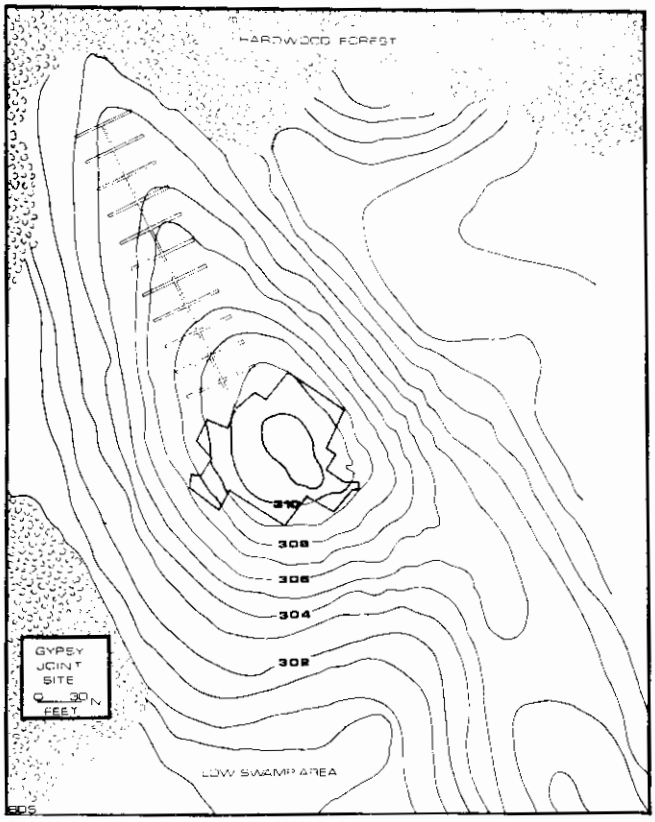

Figure 1. The location of the Gypsy Joint site on a low sand hill, with the block excavation unit and slit trench shown.

Structure 1, which is located at the top of the small rise (the ½ foot contour intervals shown were taken at the base of the plowzone). If we move clockwise around Structure 1 starting with Pit 4 to Pit 6, Pit 3, Pit 5B, Pit 5A, Pit 10, the maize grain concentration, Pit 8, Pit 7, and Structure 2, these features form a rough circle around Structure 1. The single Powers Phase feature not fitting into this pattern is Pit 2, located in the southern corner of the block excavation.

Structure 1: Structure one was a single wall post structure covering an area of 265 ft.^{2} that had been burned. Architectural remains were recovered only along the two northern sides of the shallow house basin, and it is possible that the southern sides of the structure were open. There were no indications of either a hearth or storage pits inside the structure. Rim sherds from a minimum of 5 different large utilitarian jars were recovered, with no more than 30% of any one vessel being recovered. No other vessel forms were represented in the structure. Although most of the ceramic debris seems to have been clustered either in the northern corner of the structure near the northeast wall or in the south central area of the structure, there was clearly some horizontal disturbance of sherds. A total of seven chert and quartzite cores were recovered from Structure 1, with 3 cores and a hammerstone coming from the western corner of the structure, and two more cores occurring along the southwest wall. Most of the faunal remains from the structure suggested either tools (2 deer mandibles, beaver incisor) or gaming items (deer astragali). One of the mandibles indicated a

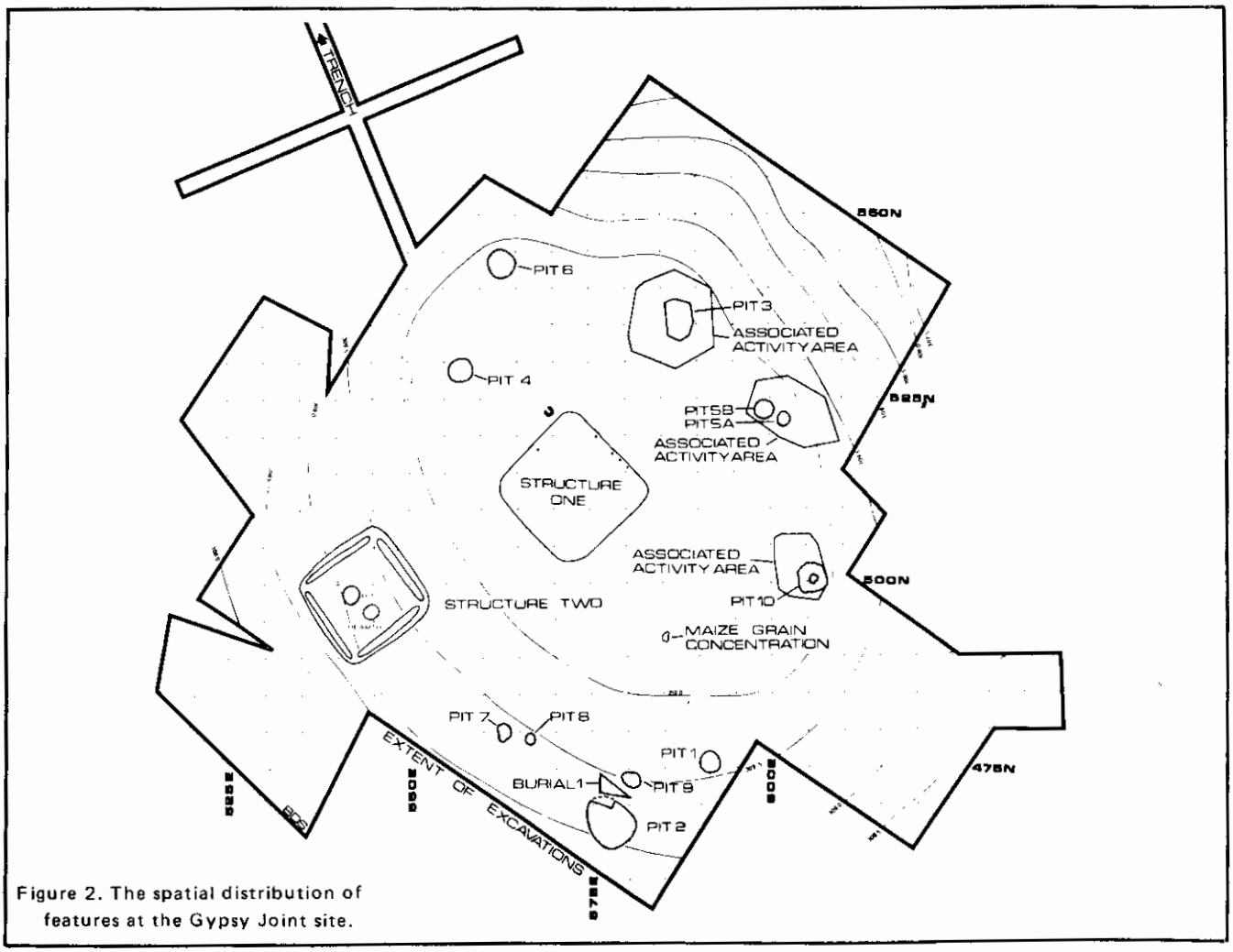

Figure 2. The spatial distribution of features at the Gypsy Joint site.

fall-winter time of death for the deer. Ethnobotanical material included hickory nut hulls and corn kernels, with no concentration or high densities observed.

Structure 2: Structure 2 differed from Structure 1 in a number of ways. It is smaller than Structure 1, with its house basin covering an area of only 207 ft.^{2} (VS. 265 ft.^{2}) with only 125 ft.^{2} within the wall trenches. It is also a wall trench rather than a single wall post structure, had a deeper house basin, and it was not burned. Further, it contained both an internal hearth and pit (the pit was shallow, and was probably not a storage pit). This contrast between the two structures was also clear in terms of ceramic debris. Structure 2 yielded a small painted bowl rim, a short necked bottle rim, and rims from a minimum of 3 large jars, one with a notched rim. Once again no more than 20% of any vessel could be pieced together. Lateral disturbance of sherds was also again evident. A total of seven cores were scattered in the house fill, along with a number of utilized flakes and two projectile points that were botched during manufacture and discarded. Once again, faunal elements for the most part suggest tools (deer mandible, antler) or gaming items (deer astragali). Five ocher lumps (both limonite and hematite) were recovered from structure fill, with most occurring in the northern half.

Pit 4: A shallow saucer shaped pit covering an area of 10.4 ft.,^{2} and yielding only seven items, including 2 Powers Phase body sherds.

Pit 6: Pit 6 was also a shallow saucer shaped pit, covering 14.4 ft.^{2} and yielding 69 items, including burned sandstone and chert angular fragments, along with burned fox squirrel, box turtle and unidentified small mammal skeletal elements.

Pit 3: Pit 3 was a roughly oval pit covering an area of about 17.6 ft.^{2}, and having concave sides sloping to a flat base at a depth of 0.8 feet. A total of 209 items (mostly lithic — 1 jar rim sherd, 6 white-tailed deer elements) were recovered from the pit fill. A shallow, roughly rectangular scatter of cultural debris surrounds Pit 3 covering an area of 100 ft.^{2}, with most of the artifacts within this area occurring on the south and west sides of the pit. A total of 13 chert and quartzite cores were recovered from the two five foot squares south and west of the pit, along with over 200 flakes and angular fragments. Two botched and discarded projectile points were also recovered from this possible activity area surrounding Pit 3, along with 7 utilized and retouched flakes, a knife, and a biface. Front and rear leg elements of one or more white-tailed deer were recovered around the northeast edge of the pit. Ethnobotanical remains from the pit and surrounding area have not yet been analyzed.

Pits 5A and 5B: Pits 5A and 5B were adjacent circular, concave pits covering areas of 4.3 and 5.8 feet^2 respectively, with Pit 5B being slightly deeper. Both pits were filled with large numbers of charred and broken hickory nut hulls of a number of different species. Both pits also yielded chert and quartzite angular fragments and flakes, clay fragments, Mississippian points (both unfinished and unbroken) and 2 jar rim sherds. The area around the two pits was subsequently excavated, and a shallow scatter of artifacts covering an area of 66.6 ft.^{2} was uncovered.

From this possible activity area, 162 items were recovered, including a jar rim sherd, 2 Mississippian points (1 broken, 1 unbroken), a hammerstone, 3 cores, left front and left rear leg elements of one or more white-tailed deer (most occurring to the north of the pits), as well as deer mandible, antler, and skull fragments. Nut hull fragments were scattered throughout this area.

Pit 10: Pit 10 was a circular pit covering an area of 12.8 feet, with an area of reddish-orange burned earth covering an area of 1.5 feet on the bottom of the pit. A total of 70 items were recovered, including sherds, chert and quartzite flakes and angular fragments, clay fragments, and some nut hulls. An area of artifact scatter covering 42.6 ft.^{2} was uncovered around Pit 10, and a total of 87 items were recovered. These included rim sherds of a minimum of 5 jars, clay fragments, chert and quartzite flakes and angular fragments, a broken projectile point, and white-tail deer skeletal elements (mostly possible tools indicated).

Maize Grain Concentration: The maize grain concentration consisted of 441 corn kernels and kernel fragments uncovered at the base of the plowzone. No architectural evidence or pit outline was discernible. The kernel concentration resulted from a number of small, fully ripe 10 and 12 rowed ears of corn being burned. The corn is very similar to other materials recovered from Powers Phase sites in terms of numbers of rows per cob and the size of both individual grains and whole cobs. (Hugh Cutler and Leonard Blake were kind enough to analyze the kernels.)

Pit 2: Pit 2 was a large shallow pit covering an area of 40.6 ft.^{2} and yielding a total of 36 items, including 1 chert core, 1 utilized flake, a biface, 2 deer skeletal elements, pottery, and chert and quartzite flakes and angular fragments.

Pits 7 and 8: Pits 7 and 8 were adjacent, irregularly shaped concave pits covering areas of 3.7 and 1.7 ft.^{2} respectively. A total of 26 items were recovered from Pit 7, with 11 of the items showing evidence of burning, and 12 of the items being faunal remains of box turtle, fox squirrel, and unidentified small mammal elements. Pit 8 yielded 10 items, four of which were burned, and 4 being skeletal elements from raccoon and fox squirrel.

Discussion

These then are the Mississippian features at the Gypsy Joint site. It should also be kept in mind that materials outside of features were collected by 5 foot square over most of the excavation area, with very little being recovered in comparison with the features (less than 400 items were recovered from the whole skim surface).

Getting back to the first of five problem areas mentioned earlier, there is some evidence bearing on seasonality of occupation of the site. The mandible of an 18-20 month old deer along with a male deer skull, antlers attached, indicate a fall-winter occupation (if you assume, of course, that the deer were killed by occupants of the site rather than having been carried in). The wild plant material from the site, on the basis of a cursory inspection, seems to consist of nuts of a number of species of oaks and hickories, which also suggests occupation of the site occurring during some period of the fall-winter. Similarly, the corn kernels from the site are from fully ripened cobs, indicating a harvest date of August at the earliest. While there is evidence indicating that the site was occupied during some period of the fall-winter, there is little evidence of the site being occupied during the spring or summer (other than the corn, if you assume that since it was stored there it was also raised there). Two hoe flakes were recovered from the site, but both

were from a disturbed plowzone context.

If given the choice between the three ethnographically plausible possibilities of:

1) Fall-winter seasonal occupation,
2) Spring-summer seasonal occupation,
3) Permanent year round occupation,

the fall-winter seasonal occupation is the possibility most supported by the data. There are of course a number of other possibilities that are also supported by the seasonality indicators. Attempting to estimate the duration of occupation of the site involves treading on rather thin ice. The energy involved in constructing structures, and the orderly spacing of activities strongly suggest a sustained continual occupation rather than a series of brief visits. I would tentatively speculate that the site was occupied over a period of 1 to 2 years, probably only during the fall and winter or some portion of these seasons. A wide range of activities were carried out at the site. Flint knapping and retouching of flakes into projectile points and other tools was apparently undertaken in both structures and adjacent to Pit 3. Butchering and perhaps cooking of deer apparently took place adjacent to Pits 3 and 10, while small mammal cooking was apparently accomplished in Pits 6, 7, and 8. Processing of wild and domestic plant materials appears to have taken place in Structures 1 and 2, and in the vicinity of Pits 5 and 10.

If general patterns of sexual division of labor for the Southeast would apply (females collect and process wild and domestic plant materials) the most likely group to have occupied the site would seem to be a small group of males and females, perhaps a nuclear or extended family.

So to summarize, I would tentatively speculate that the Gypsy Joint site was occupied by a nuclear-extended family group during the fall-winter for a single or several seasons at the most. For those of you who do not feel comfortable with tentative speculations, the final written report will hopefully be out within 18 months, and it will include a detailed, explicit employment of multiple working hypotheses, descriptions of bridging arguments (ethnographic and other analogs), and will allow the reader to draw his or her own conclusions as to the strength of the data base.

Small Mississippian Sites

In searching for comparative sites I have found very little other than Hatchery West and Toothsome that are published on, even in a preliminary way. Alan Harn, Pat Obrian and Dan Morse have, however, all provided some unpublished data. I thought at first that this inability to find comparable sites was because of my lack of familiarity with the literature (which still may be true), but I now realize that I started out by thinking that there was more information on such sites available than actually exists. Why did I think that such information was available? Because since the early 1960s when settlement pattern studies became popular, Mississippian archaeologists have been developing overall settlement system models encorporating such small sites. But these sites invariably turn out to be known only through surface collection. On the basis of surface collections and apparent size, such small Mississippian sites have been identified as and placed in such taxonomic categories as "farmstead" or "extractive site," and used to flesh out Mississippian settlement pattern models. While this has resulted in attractive settlement pattern models, it has also served to effectively obscure the possible variety of functionally different small sites that may exist.

I think that rather than continue to place small Mississippian sites into such comfortable but arbitrary categories, it is time that such sites were excavated and reported upon in numbers sufficient to determine how closely our preconceived notions about the lower end of Mississippian settlement systems actually fits reality. I would guess that as more sites of this size are excavated a temporal and regional pattern of confusing complexity and variation will emerge in terms of functionally different sites.

Marjory W. Power

Delineation of the Angel Phase: A Middle Mississippian Occupation in Southwestern Indiana

The purpose of this paper is to delineate the spatial, cultural and temporal dimensions of the major Middle Mississippian occupation in Indiana. Data will be discussed within the context of an archaeological phase, as defined by Phillips (1970:524, 972): ". . . a geographically coherent group of site locations . . . in an area of distribution that could reasonably be inferred for a single integrated society." The sociocultural and geographical center of the proposed phase is Angel Mounds, the easternmost Middle Mississippian town in the Ohio Valley.

Angel Mounds

Initial interest in Mississippian manifestations in Indiana was stimulated by descriptions of sites and artifactual remains published in geological and other reports in the late nineteenth century. In the 1930s, a continuous program of prehistoric investigations was begun through the efforts of the Indiana Historical Bureau and later expanded by the Indiana Historical Society and Indiana University. While this work contributed to knowledge of prehistoric cultures in general, the major focus of Middle Mississippian research was upon the long-term excavation of Angel Mounds. In 1938, the site was purchased by the Historical Society, and excavations began in the spring of 1939 under the direction of Glenn A. Black, with labor provided by W.P.A. crews. During the years 1939-1942, a total of 277 men were employed at the site; total area excavated was 119,800 square feet (Black 1967:22, 26). Intermittent excavations were conducted from 1944 to 1962 under the joint auspices of the Historical Society and Indiana University. Despite the ambitious and intensive nature of the investigations, only 11 percent of the site has been excavated. From this area more than 1.8 million artifacts have been recovered. Black's comprehensive two-volume report – *Angel Site* – was published by the Society in 1967 after his death. The site continues to function as a research center for Indiana University, and in 1972 the interpretive area of the Angel Mounds State Memorial was formally dedicated and opened to the public.

Angel is located east of Evansville, on the second terrace of the Ohio River; areal extent is approximately 103 acres. As Middle Mississippian centers are traditionally defined, Angel is typical, and is characterized by multiple truncate mounds grouped around a central plaza, various domestic and specialized structures, palisades and a surrounding slough. The artifactual assemblage includes 12,000 items manufactured of stone, bone, clay, shell and metal; the remainder of the catalogued artifacts – slightly more than 99 percent – are pottery sherds (Kellar 1967:431). Although a radiocarbon date of A.D. 1430±100 derived from a feature in the second of three platform surfaces in the "temple" mound (F) may reflect the period of maximum size, it is believed (Kellar 1967:484) that Angel was first settled sometime prior to A.D. 1300 and abandoned by A.D. 1600.

Site Distribution

Using Angel as a data base, 66 other sites were included in the study, all of them identified as Mississippian in the literature or in the collections at Indiana University's Glenn A. Black Laboratory of Archaeology. The overall distribution pattern encompasses the Wabash Valley northward to the southern portion of Vermillion County and eastward along the Ohio River from the mouth of the Wabash to Clark County, opposite the Louisville, Kentucky area (Figures 1-4).

Posey County, in the extreme southwestern portion of Indiana, was the most congested area in the state, with 23 sites reported, including several large villages – Mann Site, Bone Bank, Welborn and the Murphy or Mouth of the Wabash Site. Murphy was excavated by Clifford Anderson in 1898, under the long-distance direction of W. K. Moorehead. Three cemeteries were located by Anderson; his brief field notes indicate that more than 150 burials were encountered, the majority accompanied by profuse grave goods. Moving up the Wabash, sites are smaller, widely dispersed and produced far less material that could be considered diagnostic of Angel. In the Ohio Valley, Angel occurs at the dividing line between Vanderburgh and Warrick Counties; 20 sites, the majority consisting of small farmsteads, are recorded for the two. Eastward, five sites – including a village which has been destroyed by undercutting of the River – were recorded in Spencer County. Two rock shelters occur in the rugged upland forests of adjacent Perry County; both yielded minimal amounts of Mississippian material. No sites are recorded in Crawford, Harrison or Floyd Counties, although there is some suggestion (Guernsey 1941) that Mississippian sites may have been present in Floyd County prior to the 1937 flood. Clark County marks the eastern limit of the distribution pattern in the Valley. Six sites, generally referred to as the "Falls of the Ohio" sites, were investigated in the early 1930s by E. Y. Guernsey, and one of these, Prather, was excavated in 1971 by Donald Janzen. Although Guernsey wrote an article summarizing the Falls sites (1941) and some pertinent correspondence is on file at the Black Laboratory, no field notes or other precise records have been located. During preliminary work at Prather, his most formal report (n.d.) was written in iambic quatrain; the following excerpts mention three mounds that were present at the site:

> However, this much we have found
> A most prodigious, flattened mound,
> In length about two hundred feet,
> In width one hundred fifty, neat.

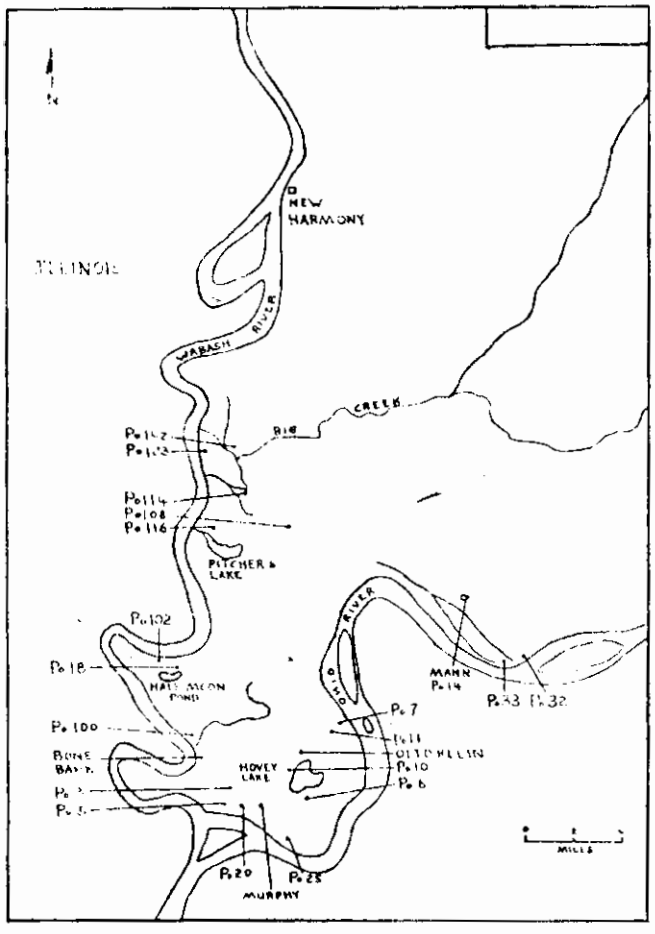

Fig. 1. Mississippian Sites in Posey County, Indiana.

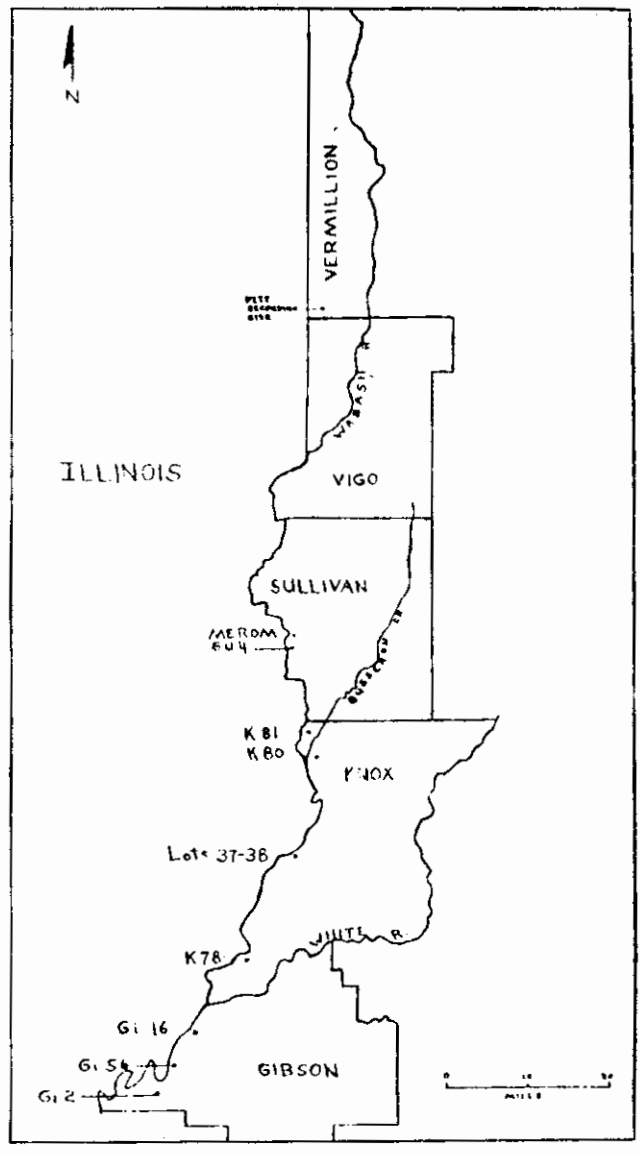

Fig. 2. Mississippian Sites in the Wabash Valley North of Posey County.

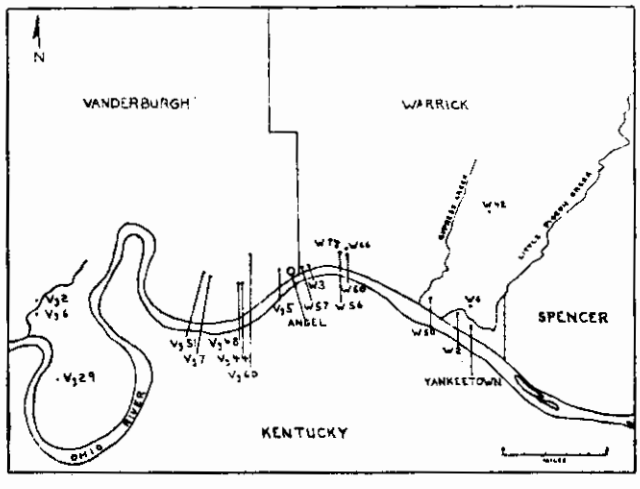

Fig. 3. Mississippian Sites in the Ohio Valley; Vanderburgh and Warrick Counties.

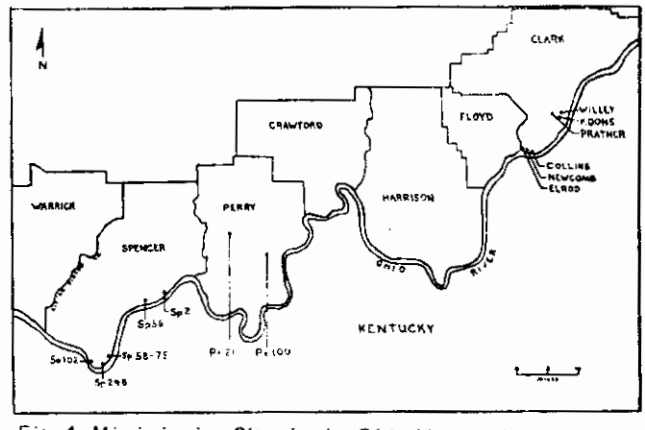

Fig. 4. Mississippian Sites in the Ohio Valley; Spencer-Clark Counties.

Gorgets, here, are most prolific;
But always crude – to be specific.
We haven't mentioned in this ditty
Two other mounds, well nigh as pretty.

Our only hopes some red Cellini
However pumpkined, maized, or beany,
Still found the time at old man Prather's
To fashion things as rare as Hathor's.

Spatial and Cultural Discontinuities

Explicit in the formulation of a phase is the criterion that the archaeological record "... must be reasonably free of geographical or cultural discontinuities" (Phillips 1970:972). Within the distribution pattern, two spatial discontinuities can be identified: The most obvious occurs in the Ohio Valley between the easternmost site in Spencer County and the cluster of sites in the vicinity of the Falls; the second is in the Lower Wabash Valley, where a break is apparent between the tightly grouped sites in southwestern Posey County and the small and widely scattered sites located upriver. Comparative analysis of cultural remains reveals three areas in which differentiation appears to warrant exclusion of sites as active participants in the Angel Phase. Two are concomitant with the geographical extremes – the Falls and the Wabash Valley north of Posey County. The third is represented by a cluster of sites within the vicinity of the Mouth of the Wabash.

Southwestern Posey County

The cluster of disparate sites in Posey County range from villages to farmsteads and include Murphy, Welborn (Po25) and seven other seemingly related sites. Murphy most clearly illustrates a radical departure from Angel, indicated by the nature of the burial complex and reinforced by the artifactual assemblage derived from the village area and surface collections. The site appears to represent a combination of traits which are characteristic of both Upper and Middle Mississippian groups. Relationships between Murphy and the other sites is suggested primarily on the basis of commonly shared ceramic features which appear to reflect the same kind of admixture. In addition to ceramics, Upper Mississippian influences identified at Murphy include stone disc pipes, a high frequency of snub nosed scrapers, copper spirals, rolled copper beads, tinklers, copper-covered wooden ear pins, shell spoons placed in mortuary vessels and hoes of bison or elk scapulae. These traits are duplicated at various Oneota sites on the Upper Iowa River (Wedel 1959).

The ceramic complex includes a wide variety of basic Middle Mississippian vessel forms. It is not vessel form, however, but the diversity of decorative features or embellishments that serves to distinguish the ceramics at Murphy. These include the use of vertical or horizontal applique strips affixed to jars or bowls, the common occurrence of multiple handles ranging from 4 to 20 on jars, and the use of multiple decorative techniques on single vessels, particularly combinations of incising, punctating and trailing. At other sites in the cluster, various frequencies of these elements occur, but together constitute 3 or more percent of the total sample from each site. In the sorted collection at Angel, only .1 of 1 percent of the sherds are decorated by such techniques, and combinations of elements do not occur. Negative painted pottery, a marker at Angel, did not appear at any of the sites in the cluster.

The spatial overlapping in an area that presumably would be subject to Angel's political control may reflect a difference in time. Assuming that Murphy and the other sites were occupied simultaneously, the cluster would probably represent a later Mississippian manifestation. The relative lateness of Murphy has been suggested in the past by Griffin (1946:83-84) and Adams (1949:46-47) who also pointed out the admixture of Middle Mississippian and Oneota elements. A more recent interpretation of Murphy and other sites at the Mouth of the Wabash is the definition of the "Caborn-Welborn Complex" by Munson and Green (1973), who identify parallels with the historic Oneota Fanning Site in Northeastern Kansas and with the Menard Site, an historic Quapaw Phase Site on the Lower Arkansas River. Also reinforcing the historic occupation of Murphy is the recent discovery that many of the "copper" artifacts are actually brass (Munson and Green 1973:6-8).

While the general impression of a later occupation for the cluster is indicated, there may have been a chronological overlapping. If some form of interaction did occur, it perhaps followed the period during which the Angel Phase exerted maximum influence in the region.

The Wabash Valley

The general distribution pattern in the Wabash Valley is in marked contrast to the situation at the River's mouth. There is a significant spatial break – approximately 45 river miles – between the northernmost Posey County site (Po123) and the next upriver site in Gibson County (Gi12). North of here the pattern is one of widely dispersed sites, diminished in size and in complexity. Because of the paucity of artifactual remains, comparative analysis is possible only with regard to pottery. Commonly shared ceramic features at each of the upriver sites consist of a predominance of Mississippi Plain ware, the virtual absence of Bell Plain, and a relatively high percentage of cord marked pottery, ranging from 7 to 38 percent in the samples. In the sorted collection at Angel, cord marking constitutes .2 of 1 percent of the sherds and the technique is restricted to large jars with straight plain rims, which exhibit consistent vertical application of the cordage. In the Valley, rims are flaring and no consistency in orientation is apparent. A further departure is the limited range of vessel forms other than jars and bowls.

The frequencies of cord marking and ceramic atrophy might suggest that sites in the Valley are associated with the "Vincennes Culture," a Mississippian manifestation identified by Winters (1967) on the Illinois side of the Wabash, which may represent a separate phase. If so, its temporal placement and relationship to Angel are difficult to assess. Noting the seeming hybridization of Cahokia Cordmarked and Kincaid Plain ceramic traditions, Winters (1967:83) views the Culture as a "very late" manifestation. Another interpretation of the Culture is offered by Robert Clouse (1971), who encountered refuse pits containing a mixture of Late Woodland and Mississippian ceramics at several sites. He suggests (Clouse 1971:8) that if in these instances coexistence is inferred, it perhaps occurred during the initial Mississippian occupation of the Valley.

Assuming that the Posey County cluster is late, it may

be of significance that ceramic features diagnostic of that group did not penetrate northward into the Valley. High frequencies of cord marked vessels did, on the other hand, occur at two Posey County sites assigned to the Angel Phase. Whether the Vincennes Culture is earlier than or contemporaneous with Angel cannot be determined with any assurance. It does seem fairly clear, however, that the sites in the Wabash Valley cannot be included as active participants in the Angel Phase.

Falls of the Ohio

The third area to be excluded from the Phase is the enclave at the Falls of the Ohio. Elrod is 70 straight-line miles from the easternmost site in Spencer County; by river, the distance is almost doubled.

The artifactual assemblages at the three sites from which adequate collections were available for analysis — Elrod, Newcomb and Prather — indicate a considerably diluted Middle Mississippian manifestation, particularly with regard to ceramics. The Falls complex is characterized by a preponderance of Mississippi Plain ware, the negative to rare occurrence of Bell Plain, a limited range of vessel forms and decorative embellishments, and significantly hign frequencies of cord marking. As previously noted, cord marking at Angel occurs in .2 of 1 percent of the collection. At Elrod and Newcomb, 2 percent of the samples are cord marked; higher frequencies are recorded at Prather — 5 percent in Janzen's sample and 20 percent in the Guernsey collection. This situation could suggest affinities with Ft. Ancient to the east. Several decorative elements at Newcomb might also point in this direction, including the survilinear guilloche, trailed or incised sherds, some in conjunction with punctates, and rims with contracting handles. The possible intergrading of Middle Mississippian and Ft. Ancient occurs only in the immediate area of the Falls. The guilloche design element appears on only three sherds at Angel . . . east of the town, neither Ft. Ancient design motifs nor high frequencies of cord marked pottery are found in the intervening Counties.

That the Falls sites should be excluded from the Phase seems reasonably clear; less clear is the nature of the cultural relationships and temporal placement of the group. The single date at Prather — A.D. 1045±70 (Donald E. Janzen, personal communication) — does little to clarify the situation. While the date was derived from a submound structure and undoubtedly reflects the initial occupation, it is more in line with emergent Mississippian than with Angel. Temporal relationships with Ft. Ancient are equally obscure. It is vapidly concluded that the Falls Complex is a Middle Mississippian variant that possibly appeared in the Valley earlier than the Angel Phase and was perhaps coeval with the Madisonville Focus in southeastern Indiana.

The Angel Phase

As presently perceived, the easternmost boundary of the Angel Phase in Indiana is represented by Sp2; to the west, components extend to the Mouth of the Wabash and upriver in southwestern Posey County to Po123. By river, the distance between the two extremes is approximately 130 miles; in terms of land travel, Angel Mounds is located at the geographical center of the Phase — approximately 30 miles to either site. Tentative inclusion of components from adjacent portions of Kentucky and Illinois does not alter the dimensions to any significant degree: The eastern and northern boundaries remain unchanged; to the west, components are restricted to the Mouth of the Wabash area (Figure 5).

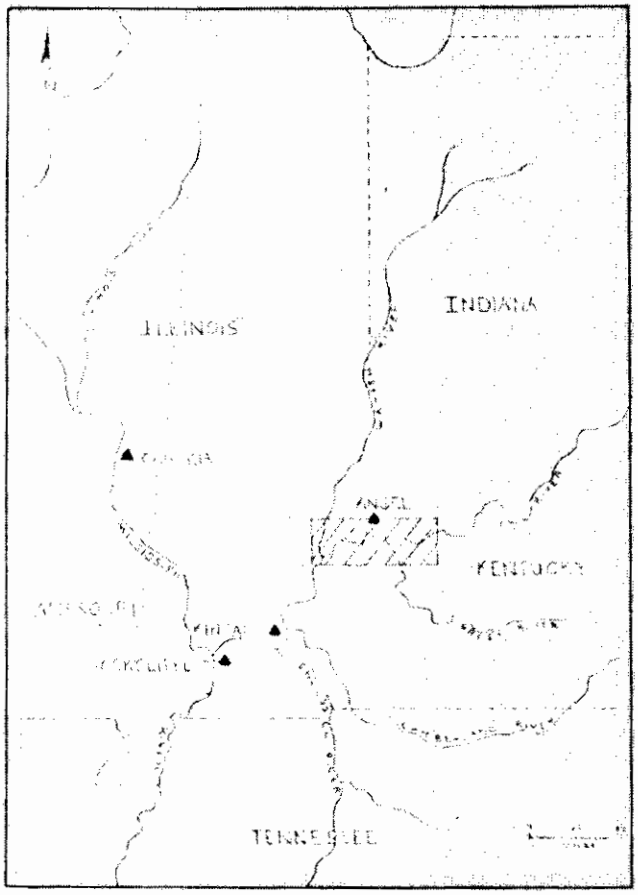

Fig. 5. Region Encompassed by the Angel Phase.

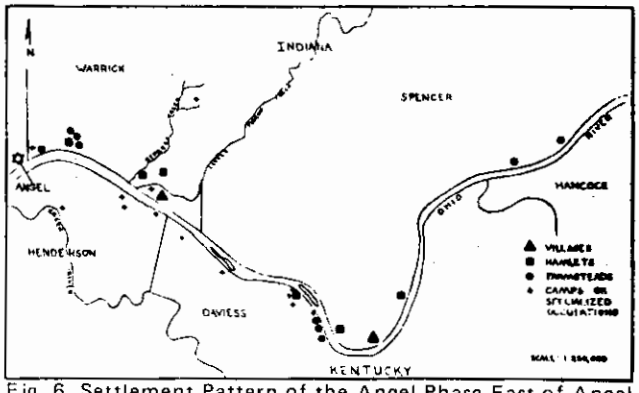

Fig. 6. Settlement Pattern of the Angel Phase East of Angel Mounds.

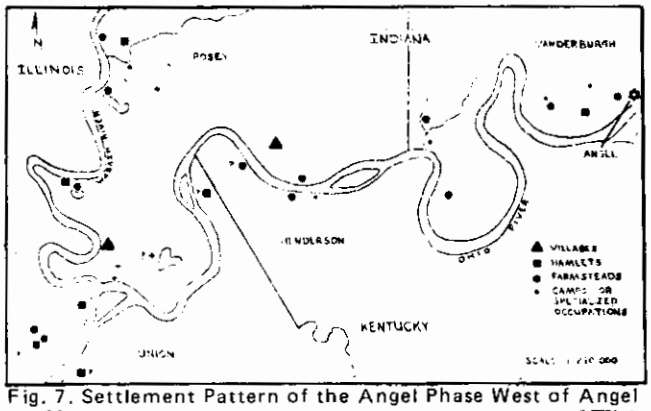

Fig. 7. Settlement Pattern of the Angel Phase West of Angel Mounds.

Despite the limitations of data and the tentative assignment of components, a settlement pattern emerges which appears to conform with the standard Mississippian macropatterns displaying socio-political centers comparable to Angel Mounds: A lineal arrangement of components dispersed along the river valleys – most commonly on first or second terraces – radiating from the center of the Phase and composed of satellite villages, hamlets, farmsteads, camps or other transient occupations (Figures 6-7). Sites are not evenly distributed and within the pattern several clusters can be identified. Intermittent components are located between these clusters, but in no case does the maximum distance between any of the components exceed 12 straight-line miles. (The Perry County rock shelters, because of their distance from both Sp2 and the Ohio River, undoubtedly represent seasonal hunting forays in the uplands and are not included as part of the generalized pattern.)

Examination of the geographical dimensions of the Phase within the environmental rubric reveal significant correlations which may account for the northern and eastern limits of the Phase. All components are confined to the aggraded valleys of the Wabash Lowland physiographic unit (Malott 1922:103); the Phase's eastern boundary coincides (less four straight-line miles) with the eastern boundary of the Wabash Lowland. Although the unit extends north into the Central Wabash Valley, the end of the Phase occurs in the middle of Posey County, a boundary which coincides with the Illinoian glacial terminus (Schneider 1966:Figure 14). The significance of the boundary may lie in the nature of the bedrock surface cover that occurs in the glaciated and unglaciated portions of the County. Outside the terminus, and in common with the rest of the area encompassed by the Phase, the surface cover is composed of relatively thin and dissected soils (Gutschick 1966:Figure 4A). Discrete analysis of specific soil types at each of the components has not been attempted. However, in gross terms, all components with the exception of W42 are located in Soil Region H (Ulrich 1966:Figure 19). While variations affecting agricultural potential do occur – for example, Fox soils of the first terraces have a relatively poor moisture supplying capacity – Region H soils, especially Huntington and Genessee, are the most highly productive in the Wabash Lowland (Ulrich 1966:67-68).

Associated with the eastern boundary of the Lowland and the Phase is the vegetation pattern. Using Küchler's (1964:74-113) scheme, Spencer County marks the end of the Southern Floodplain Forest, or, in the Petty and Jackson (1966:Figure 38) model, the Oak-Hickory Forest. Since both of these extend north of the Phase in the Wabash Valley, other factors take precedence here, possibly the surface cover, and almost certainly climatic factors.

The distribution of components occurs within the area representing the maximum growing season of 190-200 days (Newman 1966:Figure 50). The eastern boundary of this area includes Perry County, but topography and associated lack of alluvial soils would not permit agricultural activity. This growing season extends northward beyond the Phase's limits, but south to north gradations in temperature and rainfall probably inhibited expansion, although they did not prohibit it. It should also be noted that the southwestern half of Posey County and the extreme tip of Vanderburgh are the only areas that experience a frostless season of 200 days. Higher temperatures and more annual precipitation are experienced east of the Phase in the Ohio Valley, but again, these factors are cancelled by the absence of the aggraded terrace development of the Wabash Lowland.

In short, the correlation of environmental data with the spatial limits of the Phase strongly suggests that agriculture was a primary consideration in the settlement of the area, which represents the easternmost portion of the Lower Ohio Valley where optimum conditions for full-time hoe agriculture could be met.

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Jefferson Chapman

Early Archaic Site Location and Excavation in the Little Tennessee River Valley: Backhoes and Trowels

In 1964 Joffre Coe published the *Formative Cultures of the Carolina Piedmont* in which he demonstrated that stratified early sites may be preserved in alluvial valleys, and, in the same report, presented an hypothesis that sought to increase the probability of finding these deeply stratified sites. Bettye Broyles' (1966, 1971) excavations at the St. Albans site in West Virginia demonstrated that these sites could have stratified deposits as much as 36 feet in depth. As seminal as Coe's and Broyles' research was for Archaic period studies, little has been done over the last ten years in the Southeast to locate and test other early alluvial buried sites.

Basically two obstacles have stood in the way of these investigations. First has been an assumption on the part of many investigators that there was little exploitation of the river bottoms during Paleo-Indian and Early Archaic periods. What sites that there were, were assumed to have been destroyed during subsequent flooding and levee formation. The abundance of diagnostic early material on upland ridges and second terraces suggested that Early Indian settlement patterns were confined primarily to the upland areas. Luchterhand (1970), for example, pursued this line of reasoning in his study of Early Archaic projectile point types in the Illinois Valley.

A second obstacle to the discovery of early alluvial sites is the depth to which they are buried. So much of the archaeology of the southeast has been reservoir salvage. Testing has seldom penetrated the four to five feet of apparently sterile alluvium that is found beneath so many rich sites. Testing with a single small pit may be like looking for a needle in a haystack when one considers the large area of a river terrace. Certainly time, money, and the priority of known sites have prevented deep exploration. In addition, there has been a reluctance many times to employ heavy equipment in archaeological excavation. There is also a deep seated reluctance to destroy any late occupations at the surface, the result usually being insufficient time to test for deeper horizons.

In 1973 and 1974 a deeply buried Early Archaic component was excavated on Rose Island. The excavations were a part of the University of Tennessee Tellico Archaeological Project, a salvage project funded by TVA and NPS in preparation for the inundation of the final 33 miles of the Little Tennessee River in eastern Tennessee. The significant results of this research have been presented elsewhere (Chapman 1975 a & b).

Stimulated by the presence of one buried, stratified Early Archaic site at Rose Island, a research design was generated and investigations funded by National Park Service and the Tennessee Valley Authority, to locate other sites on certain alluvial bottoms within the proposed Tellico Reservoir. Following the example set by Coe along the Yadkin and Roanoke, I located five areas where the topographic situation might have permitted early levee formation and the burial preservation of early sites on these levees. Previous excavations (Schroedl 1975 and personal communication) at two of these sites (40Mr40 and 40Mr21) had identified the presence of deeply buried cultural horizons but insufficient time and funds had prevented their sampling. That there might be at least two more buried early sites gave support to the research design.

The model that was employed was based on two observations and assumptions. First, during flooding in the Little Tennessee River Valley, constrictions in the river flood plain would cause eddies to form below a constriction thus encouraging early levee and point bar formation with rapid burial of any occupation surfaces. Above the constriction the backwater effect would reduce load capacity and encourage the burial of any early occupation surfaces. Based on the Rose Island example, the lower ends of islands were also considered probable site locations as the velocity of flood water is reduced during flooding and the island would tend to build up in a downstream direction.

The second important observation was that in the Little Tennessee River valley there are several river terraces. The second and third terraces are too old to contain buried cultural horizons, such that cultural material spanning the entire prehistory of the valley is present in the plow zone. The first terrace, however, has developed over the last 10,000-12,000 years. Test excavations were therefore restricted to areas where the first terrace was present and where the terrace correlated with the hypothesized terrace generation and site preservation dynamics.

To carry out the testing and to remove the overburden from any buried horizons encountered, a tractor-backhoe was leased by the Project and employed full time in this research. The backhoe had a reach of 13 feet and utilized a toothless 3 feet wide bucket. Testing procedure was to space holes along the river terraces until a buried cultural horizon was encountered then to define the area of the buried site by more closely spaced trenches. Optimum trench size was that excavated by a single arc of the backhoe – approximately 13 feet long at the top and tapering to 3-4 feet at the bottom. Hard hats and trench jacks for shoring the trench sides are mandatory (Figure 1). Once an area had been selected for sampling, the backhoe removed the overburden above the horizons to be investigated, leaving a backhoe trench adjacent to the square for stratigraphic control (Figure 2). Excavation then proceeded by hand with all soil being waterscreened through ¼ inch mesh for maximum sample recovery.

Figure 3 illustrates the locations of Rose Island and the five sites that were tested in 1975. Rose Island is a part of the wide flood plain below the narrows formed by

Fig. 1. Typical backhoe exploratory trench employed in deep testing.

Fig. 2. Backhoe removing overburden from Early Archaic horizons.

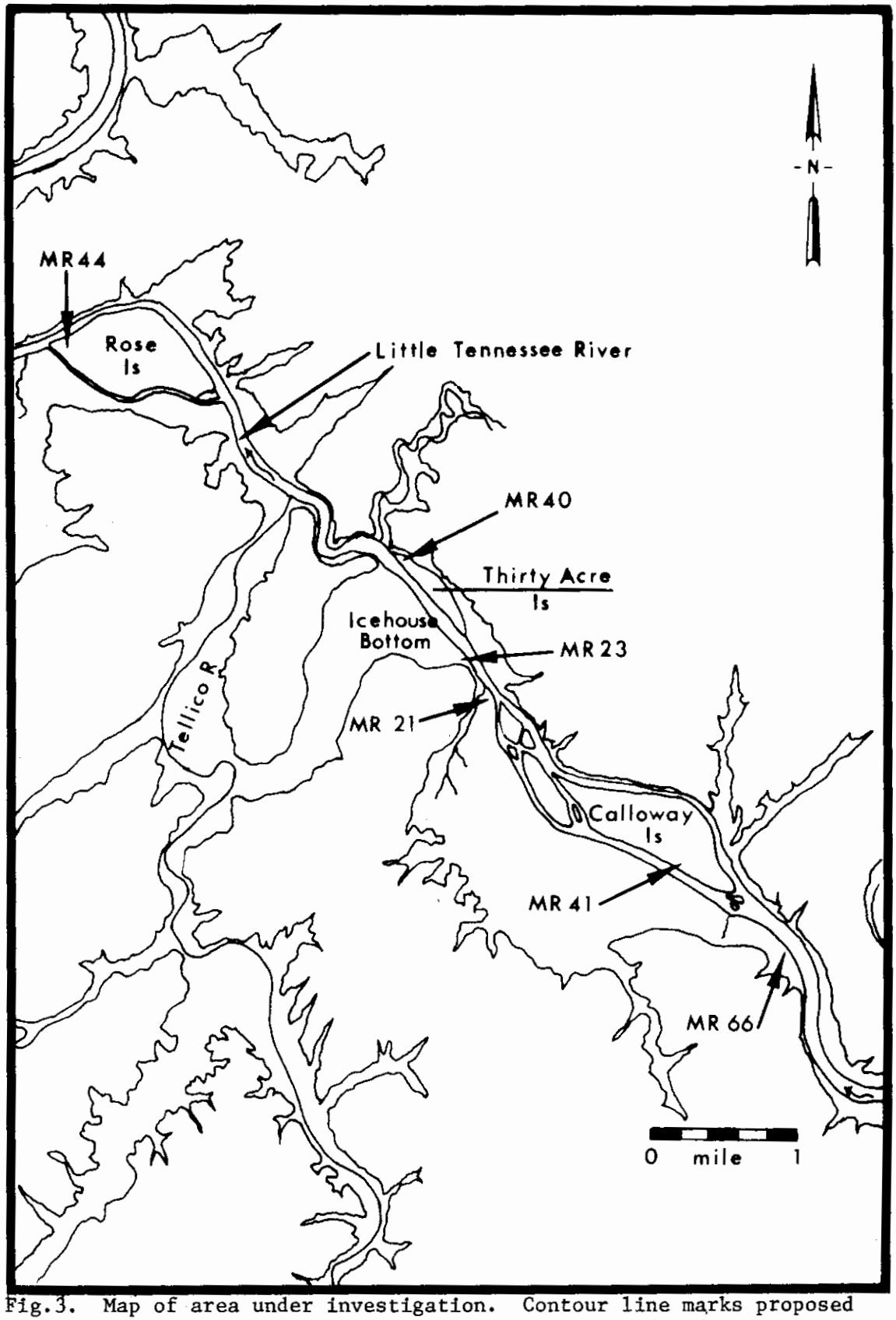

Fig.3. Map of area under investigation. Contour line marks proposed Tellico-Reservoir pool level and delineates upland and ridge areas.

Garrison Bend and Indian Rock. The flood waters, increased in volume by Nine Mile Creek and the Tellico River, would emerge from the narrows, decrease in velocity, and deposit sediments. It is postulated that Rose Island formed in this manner, the island tip building up rather than being scoured.

Thirty Acre Island apparently presents a depositional history similar to Rose Island. Gerald Schroedl (personal communication) excavated Woodland and Late Archaic components on the Patrick site (40Mr40) at the downstream end of the island in 1972 and 1973. In a 5x10 feet test area he recovered scattered cultural material to a depth of 15 feet below ground surface. Backhoe testing and stratigraphic excavation of two 10x10 feet squares in 1975 defined a series of cultural horizons extending from 6.0 feet to 14.0 feet below ground surface (Figure 4). Clearly stratified were cultural horizons of the Stanly, Kanawha, LeCroy, St. Albans, and Kirk phases.

The Harrison Branch site (40Mr21) has a complex depositional history due to its situation immediately above the constriction formed by Rock Crusher Bluff and the flow of Harrison Branch. Here deep testing revealed a series of buried horizons to a depth of over 10 feet below ground surface. Sampling of the buried horizons suggests they span the Middle and part of the Early Archaic periods.

Early Mississippian, Middle Woodland, and Late Archaic components at the Icehouse Bottom site (40Mr23) were sampled in 1969 (Gleeson 1970) and in 1970 and 1971 (Chapman 1973). The situation of the site at the head of Icehouse Bottom, immediately below the valley constriction created by Rock Crusher Bluff made the site a prime candidate for buried early horizons. No deep testing had been done previously nor had there been any excavation done upstream from the earlier excavations.

Backhoe testing in 1975 began at the downstream end of the bottom and proceeded upstream to the head (Figure 5). At the head of the bottom, as the model predicted, a series of buried cultural horizons were encountered (Figure 6). These buried horizons were extensively excavated in the summer and fall of 1975. The backhoe was invaluable in removing the overburden above the deposits, delineating the site limits, excavating wheelbarrow ramps from the excavation areas, and digging settlement basins for the waterscreened soil. The area of the buried site covers approximately four acres and there are 14 feet of well stratified cultural horizons. Excavations defined distinct, stratified components representing Morrow Mountain I, Stanly, LeCroy, St. Albans, Kirk and other corner notched projectile point phases.

Backhoe excavations at the downstream end of Calloway Island, as well as limited testing on the smaller islands below Calloway Island, failed to reveal any distinct buried early horizons. This situation was counter to the expectations of the model being tested. Backhoe tests were then placed along the terrace edge of the island proceeding upstream. In the area of the Early Woodland site (40Mr41), two buried horizons were encountered at 4.2 feet and 5.1 feet below ground surface. Crop cultivation and time limitations prevented further testing and sampling in the area, but cultural material observed in the profiles suggests an affiliation with Early Archaic bifurcate tradition. In that the chronology of the formation of Calloway Island is unknown, an explanation employing

Fig. 4. Stratigraphic test excavation adjacent to backhoe cut. Horizons above the Stanly level were removed by backhoe.

the proposed model is speculative. It may be, however, that the island was smaller or segmented 8000 years ago and the site was, in fact, situated on a point bar. Archaeological sampling of the horizons is planned for the summer of 1976.

The last area to be tested was the Howard site (40Mr66). The bottom formation appeared to be analogous to that of Icehouse Bottom with a valley constriction formed by Bacon Bend. A series of backhoe trenches revealed several buried cultural horizons from 5.0-10.5 feet below ground surface. The site represented by these buried horizons is approximately 1000 feet x 200 feet in area. Cultural material in association with the horizons suggests Early Archaic affiliation. Archaeological sampling of the deposits is planned for the summer of 1976.

It would be easy under the pressures of salvage Archaeology to consider the Early Archaic time period adequately tested in the valley and move on to the manifestations of other cultural periods. Such a policy has, I fear, been the one exercised in other reservoir projects and has yielded a patchwork sample with little understanding of patterns and systems, especially of the earlier periods.

Continued exploration and testing of early sites along the Little Tennessee River are planned for 1976. These early sites are viewed as individual elements in a settlement system. Within a limited geographical area such as the lower Little Tennessee River valley, the prehistoric occupants developed certain adaptive strategies and these alluvial sites may have served certain specific functions. As elements of a system, no single site is going to reflect in its material remains the total cultural assemblage. Site distribution, especially during the Early Archaic, may have been seasonally determined, certain resources being

Fig. 5. View downstream from site area on Icehouse Bottom showing distribution of backhoe test trenches.

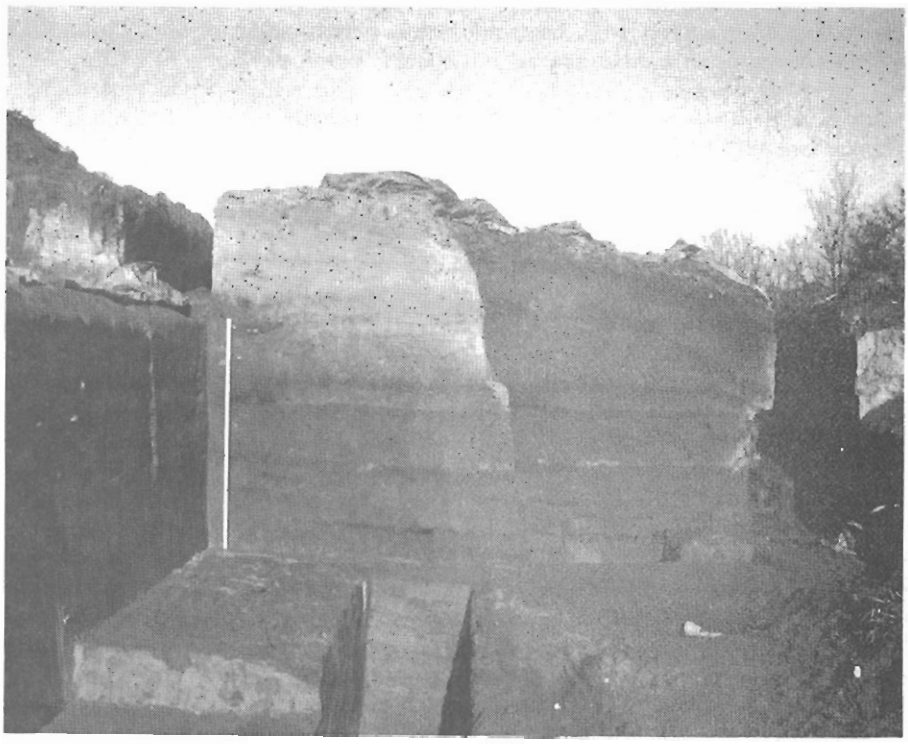

Fig. 6. Profile showing Middle and Early Archaic horizons, Icehouse Bottom site. Stadia rod at left is 7.3 feet.

exploited at certain places at certain times of the year. Shifts in locale may have been as subtle as the cyclicity of nut bearing trees.

Further research is therefore planned to generate and to support theories concerning settlement patterns and systems in the alluvial bottoms, as well as acquire data on the tool assemblages used to exploit this environment. It is then hoped that with the definition of tool assemblages, and with firm temporal controls on these assemblages obtained from stratified context, that the non-stratified upland and ridge sites can be included in our understanding of the total settlement pattern and system during this period in the valley.

I do not feel the situation in the Little Tennessee River valley is unique. Sites in other alluvial valleys are there to be found with the proper equipment and research strategy. It is my hope that this research will be undertaken, both to confirm the model being tested in the Little Tennessee River valley and to enable us to speak in the near future about more than the artifacts of the Early Archaic period in the eastern United States.

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Frank Schnell and Jack Tyler

Hydrology and Archaeological Site Conservation

This paper addresses the needed interface between professional archaeologists and contractors involved in reservoir and dam construction. Specifically, the paper deals with hydrology, reservoirs and archaeology, and the use by archaeologists of other data generated during the planning and construction phases of reservoir and dam development. Just because a reservoir is completed does not necessarily mean that all the sites adjacent to or contained therein are destroyed, or, as some might say, "encapsulated." There are hydrologic factors which we need to investigate.

A reservoir is usually divided hydrologically into three sections. The first is the area which, while influenced by the hydrologic curve, still retains gravity flow and the reservoir is bounded within the old channel (at the upper end). Here the laws of stream dynamics and morphology are in control and it is in consideration of them that we discern the effects of this section upon archeological sites. The next section, the middle section, is transitional and again we turn to stream dynamics and morphology, but we are limited to an extreme condition of stream flow; that is, flood flow. In this section there is gravity flow down stream and the water extends beyond the channel onto the flood plain. In the last section there is relatively little, if any, surface flow. The water extends deeply over the floodplain and the thermocline forms.

In the first section, the mechanism by which sites are endangered is scour. The sides and bottom of the substrate (or bottom of a reservoir) will scour when sheer at the interface is greater than the substrate cohesion. Substrate cohesion is dependent upon size of particles and the compaction of the particles of which it is composed. All these kinds of data are available to engineering firms because these are part of the planning process for dam construction. There is an optimum size, volume to weight ratio, about that of sand grains which erode most easily. If they are heavier than that, a large amount of turbulence is required to produce sufficient force to life and suspend the particles. If, however, they are smaller than sand grains (such as clay), these particles may be so compact as to require very high sheer to be disturbed. Thus, the order of erosion of particles is not the reverse of deposition of suspended particles.

Archaeological sites are in the greatest danger from scour when the stream undercuts the banks on which sites are located and subjects them to gravity erosion. This is most likely to occur in areas subject to meander shift. Meandering is the mid part of a morphological continuum which begins with a relatively straight channel and ends with a braided stream. When a stream goes through a turn, the water moving with the greatest speed is brought by inertia into contact with the outer side of the channel. When this water of high velocity contacts the substrate, there is a high scour factor so that the outer bank erodes. The construction of dams can accelerate the shifting of meanders and we find so many sites on the meander bends on the outer side.

Downstream from the first section, the flood plain approaches the level of the dam and the reservoir waters expand past the old channel and cover low parts of the plain with shallow [illegible]ving water. The greatest danger to submerged sites [illegible]ne continued downstream flow. Added to this is disturbance by wave action. Sites on the shore line are also subject to danger. If the water level is raised and lowered during the course of a year, there will be parts of the shore devoid of vegetation. These sections are more likely to occur when the shore is steepest and the exposed sections are more likely to erode. These sites which have the least vegetative cover when submerged will suffer the least damage; that is, the sites which stay submerged. Vegetation above ground can act as obstructions to flow and thus cause turbulence. With turbulence comes erosion. Sites on a levy have an advantage in that they are the most likely in this middle section to be encapsulated. The flow through this section is such that it will prohibit any but coarse particles from settling. The deeper below the surface the better and the more cohesive the better. Most if not all of the organic material can be expected to float away after submerged. The humus zone probably will not be recognized, as was demonstrated in the Blackshear survey.

Nearest the dam the floodplain is deeply submerged and the downstream surface flow is markedly decreased. It is in this section that the thermocline forms. If the reservoir is flooded quickly in one step, the sites in the deepest parts of the section will be the best protected in the entire empoundment. There is, however, a common practice of partially flooding a reservoir. When this is the case, a tremendous amount of turbulence and destruction to sites that would ordinarily be protected below the thermocline takes place. The warmth from sunlight is trapped in the upper levels of the reservoir. This is particularly true of reservoirs of high turbidity. There is almost no mixing of water due to velocity turbulence so that there is a distinct zone of warm water near the surface of the reservoir. Below this there is a marked decrease in temperature at the interface of the warm and cold water. Sites below this thermocline are thus protected from wind current, but those in shallow water will suffer from erosion as a result. Again, for sites subjected to water current erosion, the less vegetation above the ground when submerged the better for the site. Also, in many reservoirs there is a continued flow through the old channel up to the dam. This flow is submerged and not visible at the surface. In these cases, the river continues to build up its submerged levies, thus protecting or eroding sites.

The part above the thermocline may also be divided

into two sections: those being within or below wave action. As wind blows across the surface of a reservoir, it transmits energy to the water. The amount is dependent upon the velocity of the wind and the area of open water it is flowing across. A small fraction of this transferred energy generates currents which may last for weeks, but most of it goes into the formation of waves. When waves break, about 90 percent of their energy goes into friction and turbulence, causing considerable erosion. Often, waves from motorboats in heavily used recreation areas contain more potentially destructive energy than windblown waves. The more parallel boatwaves or windwaves are to a shore, the more it will suffer from wave action. If undercutting of banks occurs in this section, it would be due to wave action; in the middle section it would be due to wave action and downstream flow. In the upper section, undercutting of banks is due primarily to downstream flow.

We may thus conclude that there is a variable factor of danger to archaeological sites due to the impoundment of reservoirs. Many factors can be clearly outlined and identified through the study of hydrology. Much of this data can now be quantified and fashioned into a predictive model of endangered sites. It is possible to rate sites relatively according to how badly they are endangered. In theory, this is the responsibility of the sponsoring agency; that is, those who are constructing the dam. But it is very important that these factors also be known to archaeologists involved in contract work or in any kind of site conservation. Such knowledge is necessary because there are so many misconceptions as to what happens to archaeological sites in reservoir areas. These misconceptions could be corrected by more intensive study that can only take place with a more active interface between archaeologists and engineering firms.

W. Dean Wood

A Sampling Scheme for Subsurface Archaeological Survey

In this paper I would like to present a new approach to the old business of archaeological survey. This approach extends the scope of archaeological survey to those often neglected sites which are buried by alluvial sediments or obscured by dense ground cover. I propose that subsurface survey compliment the more traditional methods of surface survey and should incorporate an overall sampling scheme enabling one to examine the total range of site variability in a given area.

In a way, this new approach has been developed out of necessity by those of us engaged in an archaeological survey of the Georgia Power Company's Laurens Shoals Project. This project is an eighteen thousand acre pumped storage reservoir on the Oconee River, twenty-nine kilometers north of the fall line in Middle Georgia.

The survey area has been subjected to intensive deforestation and subsequent soil loss during the last one hundred eighty-five years. This culturally induced erosion has caused intensive and extensive sedimentation in the flood plain of the Oconee River (Trimble, 1969). As might be expected this recent alluvium has buried many archaeological sites and prevented the investigators from viewing the total range of variability among sites.

Another factor which has hindered the survey's efforts is the dense ground cover encountered in an area which is ninety percent forested and ten percent pasture grassland. The survey area at the turn of the last century was intensively farmed and much of the land was cultivated. During the last twenty years almost all of the land has either reverted back to forest or been converted to grassland for cattle and dairy farms.

Recent sedimentation and dense ground cover necessitated designing a survey strategy which would detect obscure archaeological sites and allow reliable data collection. During the course of investigation in the Oconee River Valley we found that a pair of manually operated post-hole diggers were an inexpensive, portable, and effective tool for locating buried or obscured sites. With some practice a person can dig a small shaft as deep as 1.5 meters and bring out 10 cm core sections which in turn can be inspected for evidence of human occupation. In addition to the cultural information that these post-hole tests can give us, important geological data is obtained. During the inspection of each core section the soil type and its depth is noted and a soil profile is established. This allows the investigators additional data which is not normally available to archaeological surveys.

Now that we have a technique for locating buried or obscured sites we must incorporate it into a probability sampling scheme. This will assure that the data collected will be free from unconscious bias and allow valid statements to be made concerning artifact densities and site location with respect to environmental variables. The advantages of probability sampling in archaeology are numerous and have been pointed out by various authors, especially those working in the Southwestern United States (Chenhall, 1973; Matson and Lipe, 1973; Mueller, 1974; Read, 1973; Redman, 1974; Rootenberg, 1964; and Thomas, 1969, 1973, and 1974). It is generally accepted that no archaeological survey can afford not to use probability sampling. It should be used as a means of getting adequate representation of a given range of variability of sites without having to deal with all the sites.

As part of the Laurens Shoals archaeological project a pilot study was designed to utilize the technique of subsurface sampling for archaeological site detection. The study area was a randomly selected 2.1 square kilometer section of the river valley in Greene and Putnam Counties, Georgia, where the Oconee River drops rapidly across low granite ledges forming a series of shoals or rapids in the river before reaching the fall line at Milledgeville. Preliminary surveys at the shoals had indicated an intensively occupied section of river valley from the Early Archaic period through the Nineteenth Century Industrial Period. The river at this point has deeply entrenched itself some fifty meters into the valley. It widens, at times, to as much as one-half of a kilometer, with some two dozen large islands clustered in four major groups. From these four groups, one, Riley Shoals, was randomly selected (Figure 1). Riley Shoals lies at a bend in the river between Long Shoals and Lawrence Shoals about five kilometers upstream from Lake Sinclair. The river drops about five meters in one kilometer and is interrupted by nine riverine islands.

We decided that our sampling population should extend from upland ridge crest to ridge crest so that we would be sampling only the Oconee River's watershed which is a convenient geographical unit. Arbitrary lines divide Riley Shoals from Long Shoals and Lawrence Shoals. Three discrete strata were delineated on the basis of topographical, hydrological, and environmental criteria. They are: (1) the Upland stratum, which includes all land from the ridge crests down to an elevation of 122 meters (400 feet M.S.L.). This is the largest stratum in the population, covering 1.4 square kilometers, and is inclusive of all flat ridge remnants which protrude out from the main ridge. The second stratum is (2) the Riverine stratum which is limited to the area below the 122-meter contour to the river's edge and contains .7 square kilometers. This stratum includes all riverine geological features such as flood plains, terraces, and natural levee ridges. The third stratum (3), the Island stratum, as the name implies, is limited to the nine islands in the river at Riley Shoals. It is the smallest stratum and contains only .08 square kilometers.

By stratifying our population we hoped to increase the efficiency of our survey and provide for more accurate assessments of the densities of sites and cultural material

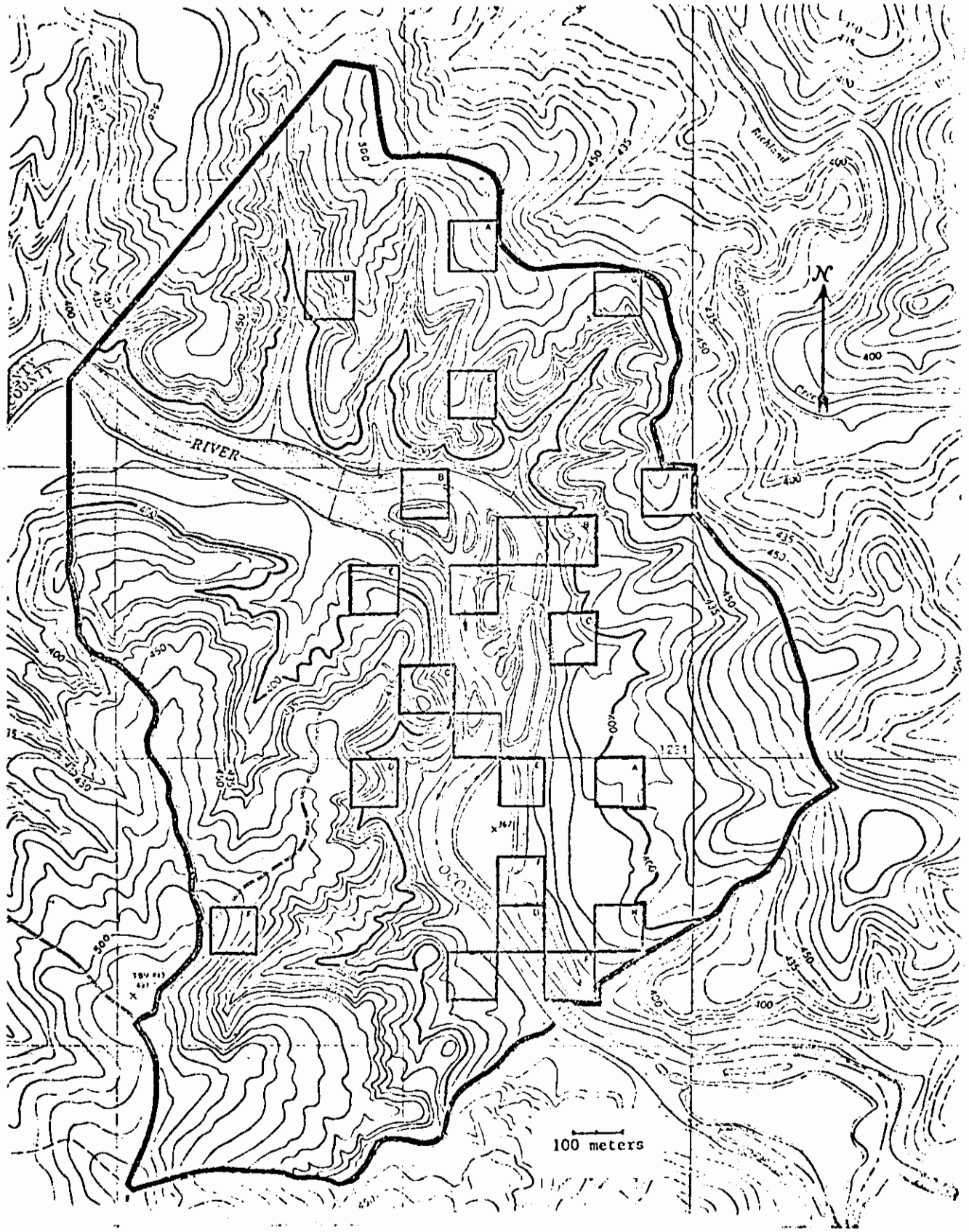

Figure 1

with respect to the environment. These strata were selected because of prior knowledge of the area to be sampled. We knew from preliminary surveys that different kinds of sites existed in the three strata. We assume that the sites within a stratum would tend to be more homogeneous than sites from two different strata.

After defining our sampling population and stratifying it, a decision was made concerning the size and shape of the sampling elements to be used. Linear transects and square quadrants were considered and their advantages weighed. Transects can be useful when delineating boundaries of phenomenon or when differentiating environmental zones. Transects, however, are often not as effective for use in stratified sampling schemes because of their tendency to extend beyond the limits of the strata. A linear transect at Riley Shoals would involve shooting a transit line across steep topography, dense vegetation, and the Oconee River for a distance of over 1.2 kilometers.

Square quadrants would involve less transit work and are small enough so as to allow their use in a stratified random sampling scheme such as ours. The use of square quadrants in archaeological sampling has been discussed by Matson and Lipe (1973) and Thomas (1973) in their work in the Western United States. In these surveys the quadrants were 500 meters square, but the density of cultural material was presumably less than what we expected to find at Riley Shoals. As already mentioned, the Riley Shoals area was intensively utilized by prehistoric and historic populations. Another factor in our decision to use one hundred meter square quadrants is that in order to adequately subsurface sample a 500 meter square much more time and resources would have to be expended than if we were to use 100 meter squares. Our sampling population was then gridded in 100 meter squares and numbered from 1 to 230. Samples from the three strata were then drawn from a table of random numbers without replacement. Eight quadrants, or five percent, of the Uplands were selected; nine quadrants, or eight percent, of the Riverine stratum were selected; and five quadrants, or 19 percent, of the Island stratum were selected. These unequal proportions were selected on the basis of availability of time and the need to know more about those areas of the population which will be inundated by the Laurens Shoals project.

The actual logistics of subsurface sampling is somewhat complicated and involves systematic random sampling within each quadrant with the sampling unit defined as a post-hole test. This scheme may best be described as random-systematic, unaligned, point sampling even though the post-hole test is somewhat larger than what is usually considered a point. We have attempted to use Berry's (1962) technique of unaligned point sampling because of its ability to systematically cover an area without the alighment of points so often encountered in systematic sampling. We wished to avoid this alignment because of the possibility, however remote, of any periodicity in the data. Berry's scheme would have us randomize the location of points from two directions on a grid. This would be extremely difficult to survey and lay out as each individual point would have to be located independently of all others. To attempt this in an area which is thickly forested would defeat the purpose of our idea, that is, a quick and easy way to subsurface sample. A compromise was reached so that we could still have the advantages of systematic coverage and the randomness of Berry's scheme. Instead of locating points from two directions, we randomized in one direction.

It was decided to place twenty-five points or post-hole tests within each quadrant in the following manner. The southern edge of each quadrant was designated as the baseline. Five lines running south to north from the baseline were spaced every twenty meters starting at the southwest corner of the quadrant. Five post-hole tests were in turn systematically placed every twenty meters along each of these north-south lines. The location of the first post-hole test in each line was chosen from a table of random numbers, so that each quadrant contained up to twenty-five post-hole tests staggered in five north-south lines. A total of twenty-two quadrants and 354 post-hole tests were investigated in seventy-seven person/days of field work at Riley Shoals.

The results of the subsurface sampling at Riley Shoals must be viewed in terms of occurrences of cultural material in each quadrant. We cannot use the traditional concept of an archaeological site since the data that is recoverable from a post-hole test is limited in nature. Often all that is recovered is a flake, a sherd or midden stain. It is difficult to say whether or not the cultural material that is observed in two or more post-hole tests belong to the same component or are totally unrelated to one another. Only follow-up testing of the area in question can determine if we are dealing with one or more archaeological sites. For these reasons we will not use the concept of sites but will refer to occurrences of cultural material instead.

In the Upland stratum five of eight quadrants contained cultural material. We investigated 175 post-hole tests but found that only 15 (9%) contained cultural material. The mean of post-hole tests with cultural material for the Upland stratum is 1.9 tests per quadrant.

The Riverine stratum in which six of nine quadrants contained cultural material was more densely occupied than the Uplands. Out of 137 post-hole tests investigated 32 (23%) contained cultural material. The mean of post-hole tests with cultural material is 3.6 tests per quadrant. This figure is almost twice that for the Uplands.

In the Island stratum four quadrants out of five contained cultural material. Of the 42 post-hole tests which were investigated 11 (26%) contained cultural material. The mean of post-hole tests with cultural material is 2.2 tests per quadrant.

An example of how this technique can delineate functional areas within a quadrant is Quadrant A in the Riverine stratum where some interesting patterns appear. Of the twenty-four post-hole tests that were investigated, seventeen (71%) contained some cultural material. Sixty-three sherds belonging to the Stallings Island and Lamar phases, along with twenty-two flakes of quartz and chert, were recovered from this quadrant. Two discrete occupations of the quadrant can be seen if one examines the differential distribution of material recovered. The majority of the lithic debris occurs on the western edge of the quadrant, as does the Stallings Island ceramics. The Lamar ceramics tend to be clustered toward the center and eastern portions of the quadrant. Fire cracked rocks appear throughout the quadrant and probably indicate food preparation activities. An interesting separation of cultural material occurs in the quadrant as line number three in the center contained no artifacts in five post-hole tests. Whether this separation actually exists in the quadrant has

yet to be substantiated.

Another example of how this technique can delineate discrete areas within a quadrant is in Quadrant C of the Riverine stratum. Twenty-two post-hole tests were investigated in this quadrant, which lies along the bank of the river. Seven tests, or 32%, contained cultural material and five of these which were all clustered at the northwest corner belong to a small Lamar phase site. Subsurface testing allowed us to plot the distribution of buried midden at the site and identify a possible trash filled pit or similar feature. In one post-hole test, 100 cm of darkly stained midden containing sherds, pebbles, a quartz flake, mussel shell and turtle caripace were encountered. Additional post-hole testing near this location failed to locate additional midden but did yield cultural material belonging to the same phase.

In general it can be said that the pilot study at Riley Shoals was successful in that it accomplished what it was designed to do, that is detect buried or obscured sites with a minimum expenditure of resources. There are several problems with the design which should be mentioned. By spacing our post-hole tests every 20 meters we will stand the chance of excluding sites smaller than 20 meters in diameter. We also stand the chance of missing sites which have a very low artifact density. This problem has been discussed by Hally, Zurel, and Gresham (1975) in their survey of McIntosh and Long Counties. Post-hole diggers were used to determine the limits of sites when dense ground vegetation prevented visual inspection of the ground surface. The investigators report that they were often unable to detect even known sites with post-hole diggers probably due to the low density of artifacts present. Another problem which could bias the samples obtained by this technique is that in some areas a post-hole digger cannot reach the depths necessary to detect very old sites which have been buried beneath more than 1.5 meters of sediment. The obvious solution to this problem is to use longer-handled post-hole diggers.

While setting up our 100 meter square quadrants on the islands we discovered that this size was too restricting and quite often 80 percent of the quadrant would be located in the river. On one occasion we had to delete a quadrant because of its location in the river. I think the solution to this problem is to use smaller sampling units on the islands or to use each island as a separate sampling unit to be randomly drawn from a frame consisting of all the islands.

In conclusion, I believe that the technique of subsurface sampling should be incorporated into an overall sampling scheme and used to compliment surface survey when conditions warrant it. It can be an inexpensive means of getting adequate representation of the total range of variability among archaeological sites in a given area.

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John A. Walthall and Ned J. Jenkins

The Gulf Formational Stage in Southeastern Prehistory

During the 1930s archaeologists working in Eastern North America became increasingly aware of the need to integrate and synthesize the voluminous amounts of information on prehistoric Indian life which had been accumulating from a century of research and field investigation. Several attempts at synthesis were made, most notably by William G. Haag (1942), James B. Griffin (1946), and James Ford and Gordon Willey (1941). Technological developments in the archaeological sequence served as major definitive criteria in all three of these integrative models. Ultimately, there emerged from these studies a sequence of four developmental stages in the prehistory of the East, Paleo-Indian, Archaic, Woodland, and Mississippian. We are here concerned with the intermediate stages, the Archaic and Woodland. The Archaic, as defined in the Northeast, was characterized by such traits as ground stone tools, large stemmed projectile points, stone vessels, and tubular pipes. On the other hand, the emergence of the Woodland was marked in the Northeast and Midwest by the appearance of such traits as cord or fabric impressed pottery and burial mounds. Southeastern archaeologists imported this Archaic-Woodland dichotomy and applied it to their sequences as well, and for a time with considerable success.

However, as more data and better chronologies emerged in the Southern Coastal Plain region it became apparent that such a simplified model did not always accurately reflect internal developments being recognized in local and regional sequences. Fiber-tempered pottery and other early ceramic complexes were a major classificatory problem as was the cultural placement of the Poverty Point culture (see Willey 1966 and Jennings 1974 for examples of attempts to deal with this dilemma). Were these developments to be considered Late Archaic or Early Woodland? Some archaeologists, at times with success (Bullen 1974), opted for a transitional placement for some of the early ceramic-producing cultures. But over extensive areas of the Southern Coastal Plain other cultures, appearing as a culmination of indigenous Archaic life, were abruptly replaced by new technological and cultural complexes radiating out of the midwest and South Appalachians. Since the term "transitional" implies continuity from one development to the next these manifestations can not properly be considered transitional.

While not believing that abandonment of the established developmental model is necessary or even desirable, a number of Southeastern archaeologists feel that some sort of modification is in order. With this in mind, we have attempted to draw these related Coastal Plain cultures into an intermediate cultural stage between the Archaic and Woodland. In this presentation it was decided to call this development the Gulf Formational Stage. In order to better illuminate the origins and growth of the cultures assigned to this stage the Southern Coastal Plain was divided into two sub-regions. The eastern region extends from eastern Alabama to the Atlantic coast while the western region encompasses the area between the Tombigbee drainage of western Alabama and the Lower Mississippi Valley. The Gulf Formational Stage begins in the eastern region with the appearance of fiber tempered pottery and ends with the spread of South Appalachian and Northern ceramics into the Southeast. In the interim several major developments occurred. In order to trace these, the Gulf Formational Stage can be divided into three sequential periods, Early (2500-1200 B.C.), Middle (1200-500 B.C.), and Late (500-100 B.C.) (Figure 1).

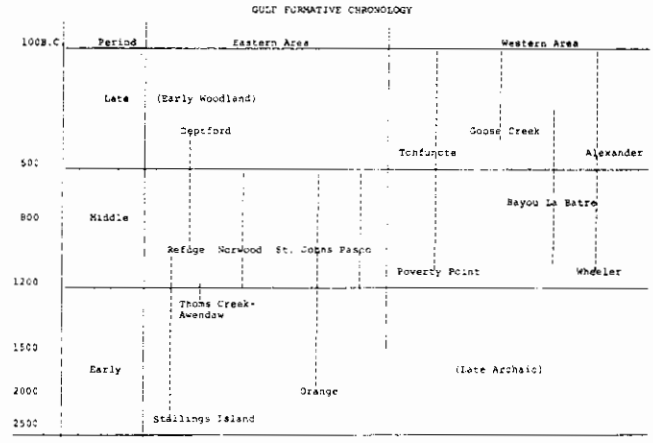

Figure 1

The Early Gulf Formational Period: 2500-1200 B.C.

The beginning of the Gulf Formational Stage is marked by the appearance of fiber tempered pottery at littoral harvesting stations along the Atlantic Seaboard. Two ceramic producing cultures are found in this area during this time, Stallings Island of the Georgia-Carolina coast (Clafin 1931; Fairbanks 1942), and the Orange culture of northeastern Florida (Bullen 1972) (Figure 2).

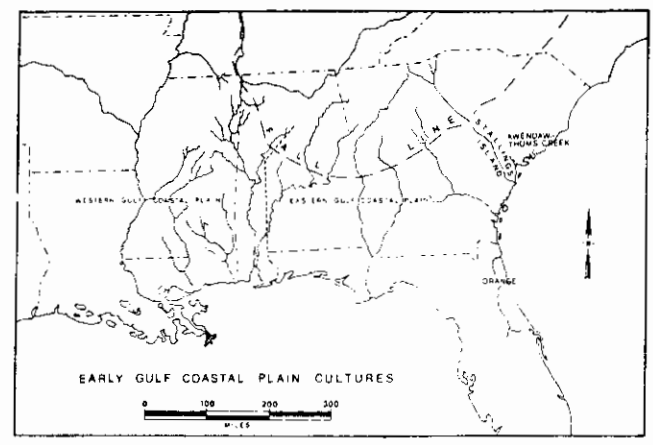

Figure 2

The term "Stallings Island culture" is used in this paper to designate those groups of the interior and coastal areas of the Savannah River region which produced fiber tempered pottery. Stallings Island pottery, the oldest in North America, appeared around 2500 B.C. and continued to be made until the beginning of the first milleneum B.C. Although most of the fiber tempered sherds found in the Savannah middens are undecorated, 3 decorative treatments have been recognized. Both punctation and incision commonly occur while simple stamping is a pronounced minority type. The simple wide mouthed bowl with a flattened to rounded base is the predominant vessel shape (Stoltman 1972). On the basis of strategraphic tests at the Stallings Island midden Bullen and Green (1970) have postulated 3 stages in the development of the Stallings Island ceramic complex:

> After the initial plain period, simple punctating was introduced and vessels boldly marked with half moons, circles, and slight curves. Circles were probably made by a hollow reed and the other marks by bone tools. Both random and straight line patterns were found but punctations were not placed extremely close to each other. A few sherds with slash-like incising were also found but not enough to justify a separate category. In the third stage, linear punctations or the stab-and-drag method was used and individual punctations are very close together.

Stallings Island material culture also includes large stemmed projectile points, knives, drills, stemmed scrapers and other chipped stone tools. Steatite, from upland Piedmont sources, was fashioned into vessels and grooved and perforated "net sinkers." The most distinctive artifact of the large bone assemblage is a finely engraved pin.

One hundred and fifty miles to the south of the Savannah River a second major fiber tempered ceramic complex, the Orange Series, is found in large shell middens along the St. Johns and Indian rivers on the Atlantic coast of Florida. Plain pottery appears in the local sequence around 2000 B.C. while decorated ware appears some 400 years later. This development has been divided into four subperiods by Bullen (1954;1959) based upon changes in ceramic vessel shapes and decoration. The major vessel form of the Orange pottery is a shallow, flat base pan, circular to rectangular in shape. The simple bowl form is also known but is not common. The most frequently occurring decorative technique of the Orange ceramic complex is incision, at times combined with punctations, to form a variety of designs, ranging from scrolls to concentric diamond motifs and crossed bands.

The Orange material culture also includes a large bone industry-pins, awls, fish hooks, and projectile points representing the most common artifacts made from this raw material. Chipped stone implements are rare but stemmed projectile points have been noted. During the Orange III subperiod (ca. 1400-1350 B.C.) steatite vessels and artifacts appear as the result of interaction with Piedmont ethnic groups.

During the final centuries of the Early Gulf Formational Period the Thom's Creek-Awendaw ceramic complex develops out of the earlier, and partially contemporary, Stallings Island Series. This pottery appears primarily north of the Savannah around 1500 B.C. and continues to be produced until ca. 1000 B.C. Punctate modes found on the Thom's Creek pottery include linear and drag-and-jab punctation. In most instances decorations are composed of circular or angular arrangements of linear punctation similar to Stallings Island motifs. Random punctation also occurs (Waddell 1963). The most common design found on Awendaw pottery is a linear arrangement of individual impressions made with a thumbnail and fingernail. Random punctation occurs frequently (Waddell 1965). The differences between Thom's Creek and Awendaw ceramics are poorly defined at present, although it appears that the Thom's Creek sites may represent the interior territory of the settlement system of the same group producing Awendaw ceramics on the coast (Stoltman 1972; Waddell 1963).

Middle Gulf Formational Period: 1200 B.C.-500 B.C.

During the Middle Gulf Formational Period mineral tempering (sand, grit, and clay) as well as temperless pottery became popular in the ceramic industries of the Gulf Coastal Plain settlements and fiber tempered pottery appears in the western Gulf Coastal Plain for the first time (Figure 3).

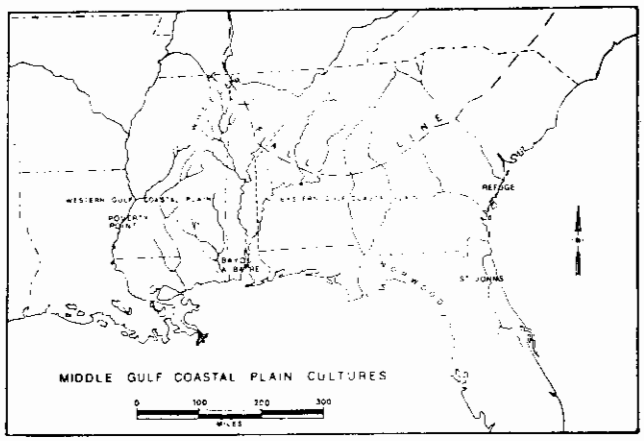

Figure 3

In the eastern Gulf Coastal Plain the Refuge ceramic complex (1100-600 B.C.) appears as a development out of Stallings Island. Refuge pottery is a coiled, sand tempered ware decorated by simple stamping, dentate stamping, punctation and incision. Straight sided cups with flat bases and open bowls (the same vessel forms as the Wheeler and St. Johns Series) are the major vessel forms. Refuge pottery appears primarily as a development out of the preceeding Stallings Island ceramic complex with dentate stamping appearing as a new trait. The flat based beaker form probably appears in the Refuge complex as the result of trait unit diffusion from the St. Johns Series where it developed from the flat based pan of the Orange series.

In Florida three ceramic complexes replace the earlier Orange Series. St. Johns pottery has been traced by Bullen (1969) as a direct development out of the Orange IV subperiod. This is a temperless chalky ware made in the form of straight sided flat based beakers and simple bowls. The ware is decorated with simplified straight line designs found in the Orange IV subperiod (Bullen 1972), Punctated and pinched modes occur on a St. Johns paste at the Zabski site on Merritt Island, Florida. Bullen (1972) has suggested that the appearance of punctated and pinched modes at Zabski is the result of interaction with the Louisiana area where the type Tammany Pinched

was made in Tchefuncte times. However, these ceramics are found in a Florida Transitional Period context and have been radiocarbon dated at 960 B.C. (Atkins and MacMahan 1967). Tchefuncte ceramics are not known this early. It is here hypothesized that the pinched and triangular punctated sherds at the Zabski site represent interaction of St. Johns groups with people making Awendaw-Thom's Creek ceramics along the Carolina coast. The primary decorative mode of the Awendaw complex is fingernail pinching but a variety of punctations are also known. This complex has been radiocarbon dated by Waddell (1965) at 1810 B.C. ± 130 years, however, this date is probably too early. Consequently the punctated and pinched sherds found at the Zabski site are possibly the progenitors of such early lower Mississippi Valley Tchefuncte types as Tammany Pinched and Lake Borgne Incised. The original Stallings Island designs may have been in part transmitted by way of Awendaw-Thom's Creek to St. Johns to Tchefuncte. This is substantiated by Bullen's (1972) recognition of St. Johns ceramics in collections from Poverty Point. Temperless St. Johns-like sherds were also found at the Claiborne site (Webb, Ford, Gagliano, n.d.), at the mouth of the Pearl River.

Developing apparently on the Gulf Coast of peninsular Florida at this time was a limestone tempered series (Bullen and Bullen 1950). The decorative modes of this complex appear to represent a combination of both straight lined Orange IV incised designs and linear punctating of the Thom's Creek or late Stallings Island complexes. The major types of this series are Perico Punctated and Perico Linear Punctated, Pasco Incised and Pasco Plain. Vessels have flat bottoms like the St. Johns Series (Bullen and Bullen 1950).

The third major complex of the Middle Gulf Formational Period found in the eastern Coastal Plain is the Norwood Series of Florida. The major decorative technique is simple stamping while the primary vessel forms appear to be simple bowls with rounded bases and flat based beakers. The tempering material in the Norwood series gradually shifts through time from fiber to sand (Phelps 1965).

In the Western Gulf Coastal Plain during the Middle Gulf Formational Period, two ceramic complexes make their appearances: the fiber tempered Wheeler Series of eastern Mississippi and northwestern Alabama, and the later Bayou La Batre Series of the Mobile Bay and Delta area.

The Bayou La Batre ceramic complex has been found at several shell midden sites in the area of Mobile Bay northward some 70 miles up the floodplain forest belts of the Tombigbee and Alabama River systems. These ceramics are grit tempered and the principle decorative mode is shell dentate stamping, followed in frequency by scallop shell impression. Vessel forms range from deep vessels with outstanding walls to globular bodied pots. Bases are at times flattened or have crude annular rings. Also present are wedge and mammiform-shaped podal supports (Wimberly 1953, 1960). The temporal position of Bayou La Batre is currently a topic of debate among regional archaeologists. In Wimberly's original discussion of the Bayou La Batre pottery he noted the numerous similarities shared by this complex and the Tchefuncte ceramics of the Lower Mississippi Valley. Wimberly equated the temporal position of Bayou La Batre with that of Tchefuncte, an interpretation still maintained by many archaeologists, including James B. Griffin (personal communication). On the other hand, more recent data suggests that Bayou La Batre may predate Tchefuncte. Trickey and Holmes (1971), during their excavations at the Bryants Landing sites, obtained a date of 1140 ± 200 B.C. on *Rangia* shells from Bayou La Batre midden, and David Chase (1971) has reported the association of Bayou La Batre pottery and Late Archaic projectile point types at another site to the north in Clark County.

In this present paper we have tentatively placed the development of the Bayou La Batre complex into a Middle Gulf Formational position, while noting that this pottery continues to be produced well into Late Gulf Formational times. Further strategraphic excavations, seriational studies, and more radiocarbon dates are needed to clarify this chronological problem.

Pottery also appears at the large geometically arranged site of Poverty Point in the Lower Mississippi Valley during this time. The initial pottery complex found at Poverty Point appears to be fiber tempered plain and punctate ware (Haag, personal communication). These authors feel that while this complex may be referred to as late Stallings Island it may be more appropriately designated as early Wheeler (see following discussion of Wheeler complex). This fiber tempered complex probably makes its appearance around 1200 B.C. Ford (1969) presented a Poverty Point ceramic complex which consisted of a clay tempered ware with rocker stamped decoration made by a smooth or notched tool rather than a scallop shell. Ford contended that the major vessel shapes are deep vase and wide-mouth pot forms. Podal supports are listed as present, as are rim nodes which are punched through from the interior (Ford 1969). However, this assemblage was not found in stratagraphic context and in fact reflects a selected number of attributes from a later Tchefuncte ceramic complex. However, one clay tempered sherd did come from a fire bed at the base of a 20 foot high conical mound that yielded radio-carbon dates clustering around 1000 B.C. A second sherd was found a few inches above a fireplace in the dwelling area which dated to 910 ± 100 B.C. (Ford 1969).

Although the majority of archaeologists working in the Lower Mississippi Valley today do not recognize the validity of Ford's proposed Poverty Point ceramic complex, there exists the possibility that an early Tchefuncte ceramic complex was in existence sometimes between 800 and 500 B.C. The earliest radiocarbon date known for the Tchefuncte complex is 520 ± 65 B.C. from the Big Oak Island site (Shenkel and Holley 1975). The Tchefuncte complex as it is recognized today appears to be a combination of attributes from earlier ceramic complexes. It does not appear that all of these attributes coalesced contemporaneously. The St. Johns and Bayou La Batre ceramics appear to represent the primary donor complexes although significant attribute contributions were also received from either the late Stallings Island or Thoms Creek-Awendaw ceramic complexes. Bayou La Batre pottery appears to have been the source of the Tchefuncte vessel forms (compare Ford and Quimby 1974, figure 17 to Wimberly 1960, figure 40) with the exception of the flat based beaker form which was derived from St. Johns. Bayou La Batre also contributed annular and pseudoannular bases as well as wedge-shaped and teat-shaped podal supports. Rocker stamping may

have also come from Bayou La Batre although most of the Bayou La Batre pottery is dentate stamped while Tchefuncte is plain rocker stamped.

The primary contributions of the St. Johns ceramic complex are 1) the rectilinear incised motifs which had been inherited by St. Johns potters from the earlier Orange IV subperiod and 2) the flat based beaker form. Rim bosses or nodes, more common at the Jaketown and Poverty Point sites, may also have their origin in the Florida St. Johns complex. Bullen (personal communication, 1975) has recently found similar bosses on Transitional Period St. Johns ceramics from the eastern coast of Florida. It also seems that the paste of Tchefuncte ceramics is a local copy of the St. Johns paste since both demonstrate a very close similarity.

Also found in the Tchefuncte ceramic complex is the incised stab-and-drag decorative technique of Lake Borgne Incised and the pinched decoration of the type Tammany Pinched. These attributes are derived from either the late Stallings Island ceramic complex or more probably from the Thoms Creek-Awendaw ceramics.

Consequently each of these modes or combinations of modes were probably added at different times (and places) and will probably reflect a temporal (and possibly spatial) development of the Tchefuncte ceramic complex.

The major ceramic series of the Western Gulf Coastal Plain during Middle Gulf Formational times is the Wheeler Series. It appears as a combination of attributes from the Stallings Island and St. Johns complexes which coalesced between 1200 and 1000 B.C. Later, perhaps after 800 B.C., dentate stamping, possibly derived from Bayou La Batre, and simple stamping appear in the Wheeler ceramic assemblage. The different punctate modes of Wheeler Punctate are all found in Stallings Island Punctate of the Savannah River area. Their presence in the Wheeler series is possibly the result of several site unit intrusions into the Pearl River Region from the Savannah River Region around 1200 B.C. Subsequently the Wheeler complex spread to the Tombigbee River drainage as well as the western Tennessee Valley where it is most well known. Here Wheeler Punctate, Dentate Stamped, Simple Stamped and Plain were first defined. These types were found to be made on both the flat based beaker and the simple bowl vessel forms. Local phases for the Wheeler culture have recently been defined for the western Tennessee Valley (Bluff Creek Phase) and the central Tombigbee drainage (Broken Pumpkin Creek Phase) Jenkins, 1975b; Jenkins and Walthall, n.d.). At the Bluff Creek Site, one of the few stratified Wheeler sites known, plain and punctate sherds predominate in the lower three feet of a six-foot thick midden, while simple and dentate stamped sherds increase in frequency in the upper levels.

$Lu^{O}59$	Plain	Punctate	Simple Stamping	Dentate Stamping
3-0 feet	30%	24%	4%	42%
6-3 feet	55%	32%	1%	12%

Wheeler groups appear to have been participating in a central based wandering type of settlement pattern. The two major base camps, $Lu^{O}25$, the Perry Site, and $Lu^{O}59$, the Bluff Creek Site (Webb and De Jarnette 1942) are large shell middens on the Tennessee River. Smaller transitory camps are found in the uplands (Jenkins 1974).

It is evident that the Middle Gulf Formational Period was a dynamic era, having increased territorial connections and interactions across the entire Gulf coastal plain.

Bullen (1974) has noted that during this time there is an acceleration in trade, as red jasper beads, Poverty Point type clay balls, and steatite vessels diffuse to Florida from the west and north and St. Johns pottery spreads westward among Gulf Coast settlements to the lower Mississippi Valley.

During the Middle Gulf Formational Period the first major ceremonial center of the Gulf Coastal Plain was established at Poverty Point. The presence of this center may have been at least one reason for the increased interaction and trade. The Poverty Point site is strategically located near the confluence of six major rivers — a position which would have allowed its inhabitants control over the flow of trade goods between other regions. That the Poverty Point culture participated in any may have been the center of a widespread trade network is demonstrated by the following factors:

1) the presence at Poverty Point of Wheeler ceramics from the northeast (eastern Mississippi or the western Tennessee Valley);

2) the presence of Poverty Point jasper locus beads in the Middle Tennessee and Upper Tombigbee Valleys (Jolly 1971; Webb 1971);

3) the report by Small (1966) of baked clay balls of characteristic Poverty Point types from Tick Island, Florida;

4) the identification by Bullen of St. Johns Incised pottery from the Poverty Point site as trade items originating in north or northeastern Florida around 1000 B.C.;

5) the presence of a Poverty Point jasper owl in the Withlacoochee River in Florida and from the Hebe site in the Yazoo Basin of Mississippi;

6) the confirmation by Clarence Webb of the presence of Poverty Point objects in the David Reichelt Collection from Choctawhatchee Bay sites in Florida. Red jasper pendants, two-hole gorgets, lamellar blades, cores and "Jaketown" perforators, large points of Arkansas novaculite and Motley point of grey chert all point to trade with Poverty Point (Lien, Bullen and Webb, 1974).

The establishment of the Poverty Point ceremonial center and the simultaneous pronounced increase in trade and interaction across the Gulf Coastal Plain during the Middle Gulf Formational cannot be considered coincidental. It appears to these authors that the establishment of the Poverty Point ceremonial center probably provided the impetus for this increased interaction through a trading network very similar to that found in later Hopewell times.

Jon Gibson (1974) believes that Poverty Point represents a chiefdom and certainly the huge earthworks and enormous amount of labor required for their construction suggest at least a complex tribal society. With the rise of the Poverty Point culture and associated ceremonialism there emerges a dynamic trade network for the procurement of raw materials from different regions and the export of finished articles. This trade in turn caused a considerable amount of interaction among the Gulf Coastal Plain cultures which is demonstrated not only in the trade articles but also very vividly in the ceramics of this time as well as those of the following Late Gulf Formational Period.

Late Gulf Formational Period: 500 B.C.-100 B.C.

The Late Gulf Formational Period is characterized by

three major events. In the Western Gulf Coastal Plain, 1) the disappearance of fiber tempered pottery and 2) the development of the related Tchefuncte, Goose Creek and Alexander Ceramic Series, and 3) in the Eastern Gulf Coastal Plain the appearance of the paddle stamped Early Woodland Deptford pottery. Deptford stamped pottery is a blend of both Early Woodland and Gulf tradition ceramic traits and evidently represents a direct developmental continuum from Refuge with strong Northern Woodland influences. Deptford Check Stamped is apparently a copy of Refuge Dentate Stamped, however the design was applied with a carved paddle. Podal supports were also contributed to the Deptford ceramic complex from the Gulf ceramic tradition. Also in Western Gulf Coastal Plain during this period Bayou La Batre peoples continue to produce their traditional pottery forms (Figure 4).

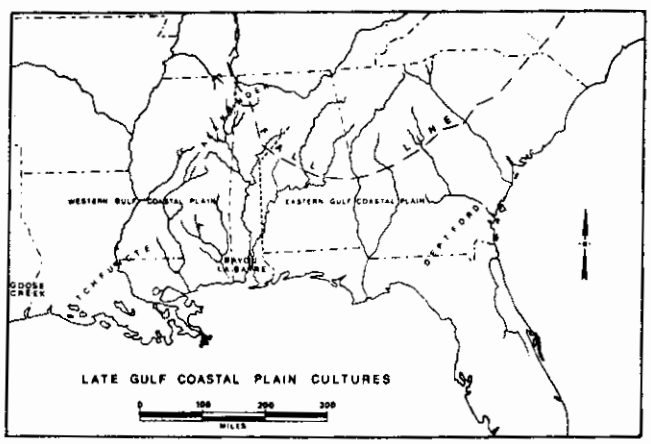

Figure 4

Although the Alexander ceramic complex was first recognized and defined in the Middle Tennessee Valley of northern Alabama (Griffin 1939; Haag 1939), it is the end product of interaction among at least four Gulf Formational cultures. This ceramic complex is an amalgamation of modes from the St. Johns, Bayou La Batre, Tchefuncte, and Wheeler ceramic complexes. The primary traits contributed by each complex are: 1) The St. Johns — rectilinear incised motifs which had been inherited from the Orange IV subperiod, 2) The Bayou La Batre complex — sand tempering, podal supports and ring bases, 3) The Tchefuncte ceramic complex — punched through rim nodes or bosses, 4) The Wheeler ceramic complex — a variety of punctate motifs, dentated stamping, the beaker vessel form and possibly pinching. As different Alexander phases are defined it is anticipated that the differences between ceramic modes of each phase will be the result of temporal and geographical proximity to the different parent complexes.

Two phases have been defined for the Alexander culture. Dye (1973) has defined the Hardin Phase in the Middle Tennessee Valley. He has divided this phase into three subphases on the basis of type frequency variation and geographical position. The Hardin Subphase I is composed of three components located in Hardin County, Tennessee just down river from the Pickwick Basin. The Hardin Subphase II includes the Alexander components in the Pickwick, Wilson and lower Wheeler basins and is considered the core area of the Alexander Culture in the Valley region. This subphase includes the Bluff Creek, Perry, and Mingo sites, three of the largest Alexander sites yet discovered. The Hardin Subphase III extends from the upper portion of the Wheeler Basin in Morgan County up-river into the Guntersville Basin. Components of this subphase, the largest of which is the Flint River shell midden (Webb and De Jarnette 1948) contain large amounts of undecorated ware and are considered to represent a marginal eastern extension of the Alexander culture.

To the south in the upper Tombigbee drainage area De Jarnette, Walthall and Wimberly (1975) have recognized a second Alexander phase, the Henson Springs Phase. The southern boundary of this phase is located in Gainesville Reservoir (Nielsen and Jenkins 1973; Jenkins 1975b). The western extension of this phase may extend to the Metzger site, near Starkville, Mississippi where Marshall has reported a large Alexander component. In the Lower Mississippi Valley Phillips (1970) has defined several Tchefuncte Culture phases of the Tchula Period, each containing varying amounts of Alexander pottery.

The Tchefuncte culture was defined by Ford and Quimby (1945) in the Lower Mississippi Valley. Since that time Phillips (1972) has defined a Tchula Period comprised of regional phases of the Tchefuncte culture. The primary types of the Tchefuncte ceramic complex are Tchefuncte Plain, Stamped, and Incised, Tammany Pinched and Lake Borgne Incised. Varying percentages of fiber tempered and Alexander present at the different components and phases may be a result of trade.

Other artifacts manufactured from clay include tubular pipes and the variously shaped baked clay objects. Bone artifacts consist of a variety of projectile points, antler atlatl hooks, perforating tools, flakers, fishhooks, antler handles, ground animal jaws and worked penis bones. Objects of shell include the gouge or adz, chisels, as well as containers and ornaments. Chipped Stone projectile points, illustrated by Ford and Quimby (1945, figure 8), appear most like the Flint Creek and Gary point types. Other chipped lithic tools include blades, drills, scrapers and celt-like implements. Ground stone artifacts include atlatl weights, plummets, pendants and steatite vessels. Burials were interred in low conical mounds or in village middens (Ford and Quimby, 1945).

West of the Lower Mississippi Alluvial Valley, in the vicinity of Galveston Bay, the Goose Creek ceramic complex has been defined by Joe Ben Wheat (1953). The culture which produced this ceramic complex represents the western-most manifestation of the Late Gulf Formational Period yet recognized. The ceramics are predominantly sand tempered although clay tempering does occur. The most common form of design is single, dual, or infrequently, multiple incised lines around the vessel and parallel to the lip. A variation of this style is wavy or zig-zag lines. Double concentric triangles occur infrequently. Parallel rows of punctation sometimes form triangles or other geometric figures. The primary vessel forms appear to be either narrow deep jars with nearly vertical sides, and a wide-mouth jar. Pointed, rounded and flat bases occur. Tchefuncte Stamped occurs as a trade ware linking this complex temporally with the Tchefuncte culture of the Mississippi Valley.

Summary

The primary intent of this paper has been to trace the development of the Gulf ceramic tradition from its initial appearance on the southern Atlantic Seaboard to its dif-

fusion into the interior of the Western Gulf Coastal Plain in the form of the Tchefuncte and Alexander ceramic complexes. While recognizing that we have omitted reference to many other facets of these early pottery producing cultures we have stressed ceramic development and change in order to provide a basic outline for future research and synthesis. By noting continuities among the ceramic forms produced by these ethnic groups processes, rates, and directions of culture change can be recognized, and ultimately, the development of such complex cultural manifestations as Poverty Point can be traced and interpreted in an overall cultural context.

The primary ceramic attributes – incising, punctation, pinching shell stamping, dentate stamping, and podal supports – are collectively referred to in this paper as the Gulf Tradition. Until 500 B.C. these pottery forms completely dominated the Southern Coastal Plain ceramic industries. After this time the Deptford ceramic complex developed as the result of Northern Woodland influence into the eastern Gulf Coastal Plain. After 100 B.C. (and possibly slightly earlier) many of the remaining Gulf Tradition ceramic complexes were submerged by ceramics of the Middle Eastern and Northern Traditions. The appearance of these ceramic traditions within the Gulf Coastal Plain was at times the result of site unit intrusions by distinct ethnic groups from the Northern Woodlands area.

Although Gulf Tradition ceramics were almost completely replaced by carved paddle stamped, fabric impressed, and cord marked ceramics in some areas they did persist in others. After the close of the Late Gulf Formational Period Gulf Tradition ceramics are found primarily in the pottery of the Marksville culture of the Lower Mississippi Valley and the Porter Hopewell culture of the Mobile Bay area. Marksville ceramics are a product of a direct continuum from Tchefuncte, while Porter Hopewell represents a continuum from Bayou La Batre with strong influences from the Lower Mississippi Valley. During the Late Woodland Period Gulf Tradition ceramics are confined almost exclusively to the Weeden Island Culture of northern Florida, southern Alabama and Georgia. By Mississippian times the last vestiges of the Gulf Tradition are discernable in several of the incised decorative modes of regional Mississippian ceramic complexes.

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Edwin Lyon

The Louisiana WPA Archaeological Project

WPA support of archaeology in the 1930s had a great impact on the development of the study of North American prehistory. Some archaeologists have argued that New Deal money and labor transformed archaeology into the professional discipline that it is today. In his review of the recent history of American archaeology, Frederick Johnson pointed out that "perhaps the greatest single event which was responsible for cementing the foundation of contemporary archaeology was the initiation of large relief projects in almost all sections of the country."[1]

Despite the importance of the federally sponsored projects of the 1930s, the history of this work has not been written. To begin the task of a history of WPA archaeology in the Southeast, this paper will briefly examine the origins, structure, and activities of the Louisiana State University — Work Progress Administration Statewide Archaeological Project. I will look at archaeology prior to the 1930s and then examine the WPA administrative apparatus before turning to the WPA project in Louisiana.

Archaeology Before the WPA

Archaeology before 1930 could be fairly characterized as provincial. Archaeologists were more interested in collection and description than in integration of local work in larger temporal and spatial frameworks.[2] The decade of the 1920s marked the beginning of the transformation of this old tradition of amateur archaeology. The Division of Anthropology and Psychology of the National Research Council (NRC) proposed in 1920 an archaeological survey of Illinois, Indiana, Iowa, and Missouri.[3] The committee appointed to encourage state archaeological surveys was reorganized in 1921 into the Committee on State Archaeological Surveys. This committee encouraged the formation of state archaeological societies and the use of acceptable archaeological procedures by amateurs.

Archaeological work in the 1920s was restricted by the general shortage of funds for field work. An appropriation of $20,000 by Congress to the Smithsonian Institution in 1928 for archaeological and ethnological research was of some help but few large-scale projects could be launched.[4] According to the estimate of Frank Setzler, "prior to 1930, average field expeditions consisted for the most part of 10 to 15 laborers and assistants, worked from 3 to 4 continuous months, and cost on the average about $2,500."[5]

The first large excavation was at Marksville, Louisiana from August to November, 1933. After the city of Marksville acquired the land containing the site, the city council and the local office of the Federal Emergency Relief Administration requested the Smithsonian Institution to send a representative to supervise the work of excavation and restoration. Frank M. Setzler, Assistant Curator of Archaeology of the United States National Museum, with his assistant James Ford, directed a crew of over one hundred men. This work became extremely important when the Civil Works Administration (CWA) was set up in December of 1933 to provide emergency relief during the winter. Setzler's work at Marksville convinced the officials at the Smithsonian that large-scale archaeology was possible if properly supervised by experienced men. When Setzler returned to Washington, he became the assistant to the Smithsonian's liaison officer with the CWA in the direction of archaeological projects in California and the Southeast.[6]

WPA Archaeology

In 1935 Congress passed the Emergency Relief Appropriation Act and Franklin D. Roosevelt set up the Work Progress Administration (later the Works Projects Administration) to put the unemployed to work. White collar workers and professional people, including archaeologists, were assigned work by the Division of Professional and Service Projects. During the life of this organization, projects employed writers, artists, musicians, scientists, and individuals from many other occupational groups.

The WPA officials required that the Smithsonian and the National Park Service supervise all archaeological projects. This meant these agencies had to approve projects before the WPA would support them. Both agencies reviewed and accepted proposed changes in project plans before they were acceptable to the WPA. Supervision by the Smithsonian and National Park Service was over broad matters of policy and not the everyday operations of each project.[7] The WPA also turned to the NRC for advice on archaeological matters. The Committee on Basic Needs in American Archaeology was formed as a result of a WPA request for assistance in coordinating archaeological research by archaeologists rather than by administrative control of the WPA.[8]

James Ford planned a WPA archaeological project when he was a student at the University of Michigan. The WPA did not approve his project until September of 1938, but by then he had selected his staff of archaeologists: Gordon R. Willey, Robert S. Neitzel, William T. Mulloy, Edwin B. Doran, and Arden King.

Whenever possible Ford selected archaeologists with extensive field and laboratory experience. Willey had a M.A. from the University of Arizona with emphasis on dendrochronology, and experience under A. R. Kelly at Macon, Georgia. Neitzel had worked as a field archaeologist for the University of Tennessee for over two years. Doran was a skilled engineer and draftsman and had some field experience. Mulloy had two summers of field work, as did King. Ford continued his policy of selecting experienced archaeologists in later phases of the project. George I. Quimby had field experience in Arctic archaeology when he replaced Willey as State Supervisor in September of 1939. Between the date Willey left and

Quimby arrived, Preston Holder ran the laboratory.

Ford created three major units of the project to operate through the winter of 1938-1939: a central laboratory, a field unit in Avoyelles Parish, and one in LaSalle Parish. LSU provided space for the laboratory in New Orleans. It consisted of a Catalog Division, Preparing Division, Analysis Division, Statistical Section, Engineering Division, Photography, Archives and Records, Dendrochronology, and carpentry, secretarial and administrative sections.[9]

Field activities began at the Greenhouse site near Marksville in September, 1938. The crew at this site numbered about forty-five men. By December Neitzel felt that the stratification of the site was clear and noted that the Coles Creek material was found in the upper levels and Marksville in the lower levels. He tentatively related Marksville to the Ohio Hopewell. In 1938 Willey and Ford almost completed a draft for a report on the site, but Ford finally completed it alone and published it in 1951.

About forty-five men worked on the excavation of the Crooks Mound in LaSalle Parish between October, 1938 and April, 1939. The archaeologists selected this site because previous work led them to believe the site belonged to the Marksville horizon, then the earliest known in the area. Ford and Willey argued that the population which built the structures was scattered through the region and that the mounds served as a common burial ground for the entire area. They found evidence of extensive trade using conch shells from the Gulf of Mexico, copper from the Lake Superior region, and quartz from the Arkansas mountains.

The excavation of the Tchefuncte sites was the next stage of the project. The LSU-WPA archaeological survey was not the first project to work with the Tchefuncte complex. A CWA project had worked for six months in the shell deposits on the shore of Lake Pontchartrain, but the work was not satisfactory because of deficiencies in recording and excavation techniques.[10]

When the LSU archaeologists recognized that the Tchefuncte material formed a previously unrecognized complex, they decided to take another look at the Little Woods site. A crew of thirty-five men under the supervision of Preston Holder and Doran began work at the site in July, 1939. Doran directed the excavation of another Tchefuncte site, Big Oak Island, in September, 1939. Only a small part of the site was excavated because of the inaccessibility of the site and the heat and mosquitoes. Doran also supervised a crew that dug the Tchefuncte site in the Tchefuncte State Park in January and February of 1941. Based on this work, Ford and Quimby concluded that the lithic complex, the shell industry, and the bone complex could be related to other Woodland manifestations in the Eastern United States. They argued that this period was the oldest in the Lower Mississippi Valley.[11]

The excavations in the area around Baton Rouge concluded the last major stage of the project. Doran excavated the Medora site in West Baton Rouge Parish between November, 1939 and April, 1940. The archaeologists selected Medora for excavation because it could supply information about the period between Coles Creek and the Natchezan, and also because of the availability of WPA labor. The work showed that the Plaquemine culture was a development of the earlier Coles Creek.[12]

Doran, and later Carlyle S. Smith, supervised the excavation of the Bayou Goula site in Iberville Parish in 1940-1941. The archaeologists chose this site for excavation because the LSU project had developed a fairly good picture of Marksville, Troyville, and Coles Creek, but not of the historical period. In order to find a suitable site, Allbrecht combed the seventeenth-century sources and found an area where historic tribes had lived. Then Doran searched the area and found the site. Excavation showed that a Plaquemine level was under a historic occupation of the Natchezan type.

The LSU project did more than excavation and laboratory work. Doran did a quick preliminary site survey in Southwest Louisiana early in 1941. His party drove along the route of the survey and asked people if they knew the location of any sites. By this means Doran found about twenty sites and visited about fifteen more. The survey was not as successful as had been anticipated, but it led Doran to recommend that future surveys concentrate their efforts near large streams because all the sites discovered were near streams.[13]

Despite the demands of the project, the archaeologists wrote a number of valuable papers. These reports ranged from complete site reports to short discussions of limited topics. Ford and Quimby wrote a preliminary report on the Tchefuncte sites. Albert Allbrecht, the ethnohistorian on the staff, compiled a one-hundred and seventeen page "Bibliography of Southeastern Ethnographic Sources," and wrote a seventy-six page paper on "A Survey of Data Pertaining to the Agriculture of the Southern Aborigines."

Conclusion

Did WPA archaeology in Louisiana transform archaeology into a scientific discipline? The answer is no, and this answer defines the future course of my research. Despite the importance of the work in Louisiana, a state is not a suitable unit for research into the history of WPA archaeology. The WPA officials tried to confine archaeologists within state boundaries, but they were not very successful. Archaeologists slipped from state to state without regard for the administrative divisions of the WPA. Ford, Phillips, and Griffin invaded Arkansas, made off with state treasures, and tried to process them in the Louisiana WPA laboratory. Archaeologists sent specimens, photographs, and maps back and forth across state boundaries. They visited laboratories and excavations in other states and maintained regular correspondence with each other.

The reason why archaeologists did not adhere to the WPA rules and sometimes suffered the consequences was that their viewpoint was regional, at least as compared with the 1920s, and not local. They tried to put their work in the framework of Southeastern or Eastern prehistory rather than within the artificial boundaries of a state. One result of this concern with the prehistory of the Southeast was the creation in 1938 of the Southeastern Archaeological Conference to deal with the great amount of material coming out of the WPA projects. Another consequence of WPA and other federally-sponsored archaeology of the 1930s was that it became possible to develop a synthesis of Eastern North American prehistory for the first time. This synthesis, represented by Ford and Willey's "An Interpretation of the Prehistory of the Eastern United States," published in 1941, was firmly based on the published and unpublished work produced by

archaeologists supported by federal agencies.[14]

Because of this kind of regional cooperation, the history of WPA archaeology cannot be state centered. The history of WPA archaeology in any state only takes on its full significance if placed in the perspective of the federally-sponsored archaeology of the Southeast.

Acknowledgements

A previous version of this paper was read by Stuart Neitzel, Robert Neuman, Burl Noggle, and Miles Richardson. I am grateful for their help. The paper is based on documentary material in the Laboratory of Archaeology, Louisiana State University; The National Anthropological Archives of the Smithsonian Institution; the National Archives; and The National Academy of Sciences. Archivists at these institutions assisted me with my research in many ways.

[Editor's Note:

In a cover letter to the submitted manuscript, Mr. Lyons noted, if you will pardon the expression, his use of footnotes rather than the usual style for anthropological writings. Since he felt that that would only be justified in consideration of his archivist friends, I saw no reason to alter the form even with his permission to do so.]

Footnotes

1 "A Quarter Century of Growth in American Archaeology," *American Antiquity,* 27 (July, 1961), 2. William G. Haag argued that Eastern archaeologists view the work of the federal programs as the heyday of their field. "Twenty-five Years of Eastern Archaeology," *American Antiquity,* 27 (July, 1961), 16.

2 James A. Ford, "Greenhouse: A Troyville-Coles Creek Period Site in Avoyelles Parish, Louisiana,," *American Museum of Natural History, Anthropological Papers,* 44 (1951), 11.

3 "Proposed Archaeological Survey of the States of Illinois, Indiana, Iowa, and Missouri," n.d. Archives of the National Academy of Sciences.

4 For accomplishments of this program see M. W. Stirling, "Summary of Achievements in Ethnological and Archaeological Research made possible by an appropriation by Congress in 1928 to the Smithsonian Institution for Cooperation with Organizations Working in Those Fields," n.d. National Anthropological Archives, Smithsonian Institution. U.S. National Museum, Division of Archaeology, Office Files 1911-1959.

5 "Archaeological Explorations in the United States, 1930-1942," *Acta Americana,* 1 (April-June, 1943), 206.

6 *Ibid.,* 207. The work at Marksville also led to a new awareness that a variant of the Hopewell culture was found in the Southeast. At first Setzler resisted the idea, but he finally concluded that the evidence for this connection was overwhelming. Henry B. Collins to James A. Ford, April 11, 1933 and November 16, 1933 (Laboratory of Archaeology, Louisiana State University). Also see *Explorations and Field-Work of the Smithsonian Institution in 1933,* Washington (1934), 38.

7 According to Vincenzo Petrullo, WPA consultant on archaeology, representatives of the Smithsonian and NPS met with WPA officials as an informal committee for technical review of archaeological projects. (Minutes of the Committee on Basic Needs in American Archaeology meeting May 21, 1939, 9. Archives of the National Academy of Sciences.)

8 Florence Kerr, Assistant Administrator of the WPA, asked for the help of the NRC (Kerr to Ross G. Harrison, Chairman of the NRC, January 28, 1939. Archives of the National Academy of Sciences). On April 27, 1939 Carl Guthe, Chairman of the Division of Anthropology and Psychology of the NRC formed the Committee on Basic Needs in American Archaeology consisting of W. D. Strong, Chairman, C. Wissler, A. V. Kidder, Fay-Cooper Cole, W. C. McKern, J. O. Brew, and W. J. Webb. The Committee issued a report in *Science* ("The Basic Needs in American Archaeology," 90 December 8, 1939, 528-530) and also a confidential set of "Recommendations of the Committee on Basic Needs in American Archaeology (meeting in New York, June 24-25, 1939. Archives of the National Academy of Sciences).

9 The laboratory is described in detail in the WPA Quarterly Report for December, 1938 (Laboratory of Archaeology, LSU). The complete series of Quarterly Reports for all states was deposited in the National Anthropological Archives. A summary of each quarterly report and a list of work in each county was prepared by George D. McCoy, "Summary of WPA Archaeological Projects, 1934-1942." (NAA Catalog number 4844, Box 1)

10 A report on the earlier work was published by J. R. Czajkewski in the *Louisiana Conservation Review,* July 1, 1934.

11 Ford and Quimby, "Tchefuncte: A Premarksville Horizon in Louisiana," WPA Quarterly Report, December 31, 1939.

12 George I. Quimby, "The Medora Site, West Baton Rouge Parish, Louisiana," *Anthropological Series, Field Museum of Natural History,* 24 (1951).

13 Edwin B. Doran, "A Preliminary Survey of Archaeological Sites in Southwest Louisiana," WPA Quarterly Report, March 1941.

14 *American Anthropologist,* 43 (July-September, 1941).

Elsie Sears and William Sears

Preliminary Report on Prehistoric Corn Pollen From Fort Center, Florida

The large and long occupied Fort Center site just west of Lake Okeechobee in South Central Florida was extensively excavated between 1962 and 1970. Samples for pollen analysis and for C-14 dating were routinely collected during all excavations as were all faunal specimens. A limited number of specially prepared charcoal samples have been C-14 dated and provide the basis for the generalized dates referred to in this paper. All pollen sample preparation and analysis has been or is being done by the senior author.

The purpose of this paper is to present, in archaeologically useful fashion, what we believe is highly significant data on corn pollen from the site. Its presence, in the time periods and cultural associations described has, we believe, significance for efforts at cultural synthesis in most of eastern United States.

Final presentation in a detailed monograph will include a great deal more information, of course, but at present, with all laboratory analyses still proceeding, cultural synthesis of the site and area and preparation of a final report are still some years ahead of us. Some preliminary description and efforts at interpretation were published several years ago in "Archaeology" (Sears 1971). That article will serve to supplement the minimum data and interpretations presented here, held in this article to that level required to make the pollen data useful.

Occupation at the site started, with semi-fiber-tempered pottery, before the excavation of a 1200 foot diameter circular ditch, interrupted by causeways at two points. It had been preceded by two smaller, 300 foot diameter circular ditches. All three were, we believe, built to supply drainage required by agriculture. The completion of the large ditch dates around 400 B.C. At this time, and throughout the history of the site, living areas were on small earth platforms which were located at various times in the river meander belt, the open savannah, or in a hammock. Exceptions consist almost entirely of a string of midden deposits on a high natural levee fronting on the river and adjacent to the northern edges of the circles.

Starting about A.D. 1, with a change in the finish of the plain open bowls to one characteristic of the type Belle Glade Plain in a percentage of the vessels, ceremonialism with Hopewell relationships appears. A few features are an artificial pond containing a charnal platform supported by and decorated with carved wooden figures, a low platform of earth on which bodies were prepared, it in turn partially enclosing a large bathtub shaped pit, and an earthen embankment which encloses all of these units. A contemporaneous and directly adjacent living area developed over time into a low platform about one acre in size. Features of this living area midden deposit include a large number of clay platform pipes of several varieties, some other pipe forms, trade sherds from the St. Johns, Deptford, and Crystal River ceramic series in the predictable types, and direct evidence for the burning of shells into lime throughout the accumulation of the midden. The action of the lime in its quicklime form accidentally preserved a large number of human feces. Some of these, along with all other midden constituents including bone and sherds, were moved to the bottom of the pond under the charnal platform at one point in time.

Considering all of the data we have available, the explanation for the lime, produced continuously for centuries, is that it was used to soften dried corn for preparation as food. This meso-American technique did not occur in the eastern United States during the historic period, but a change from lime to the wood ash-hominy technique at some later point in time is at least logical and, we believe, probable.

This period, with the transition barely understood except in terms of ceramic change, and increase in the popularity of Belle Glade finish, was succeeded by one in which the occupation moved to an adjacent area to the east. Houses continued to stand on small platform mounds, but each of these is adjacent to a linear embankment. These embankments run up to 1200 feet long and over 100 feet wide. We have believed, since the beginning of the project, that these linear earthworks were built as long linear agricultural plots, the same interpretation as that offered by Denevan (1970) and others for linear embankments, ridged fields, and other earthwork variants in other Savannah areas in the New World. We do not have proof of this, but they definitely did not have a ceremonial function. Our explanation, since these may have lasted into the contact period, is apparently contradicted by our one eyewitness account of the area, that of Fontaneda who does not mention agriculture of any sort (Fontaneda: 1945). But then, he does not mention the linear earthworks either.

This investigation had two objectives. The first was to determine whether or not corn pollen grains could be recovered from samples taken at the site. In this study, slides from any samples of soil, coprolites, and a white pigment from a wood carving were scanned for graminae pollen grains over seventy microns in length and having typical corn pollen exine patterns. Forty-eight grains of graminae pollen larger than 70 microns, having regularly punctate exine patterns, were found. The largest of these was 95 microns in length.

The second objective was to determine the range in size (i.e. long axis measurements) for the corn pollen found at Fort Center. In this study, four of the samples which had been found to contain corn pollen were investigated further. Many slides from each sample were scanned and all of the large (over 50 micron) graminae

grains with corn pollen type exine were measured.

Preparation of Samples

A sample weighing from 5 to 10 grams was treated with potassium hydroxide and heated on a boiling water bath for four hours. It was then strained through a fine wire mesh to remove large particles and the filtrate was centrifuged. The liquid was discarded and the solid residue, after several washings with water, was treated with hydrochloric acid to remove any carbonate present. It was then treated with hydrofluoric acid to remove sand and silicates, washed with hydrocholoric acid and water, and then dehydrated with glacial acetic acid. At this stage, most inorganic impurities had been removed. The residue was then further broken down by acetolysis, that is, heating with a mixture of acetic anhydride and concentrated sulfuric acid. After centrifuging and washing, some of the solid residue was mounted on glass slides in prestained glycerine jelly. The stain used was Saffronin O. The remainder of the residue was stored in glycerin.

All samples were treated with all reagents so that the pollen grains recovered would be completely comparable. Occasionally it was necessary to repeat treatment with one or more reagents to remove further debris from the sample.

The amount of pollen recovered varied considerably, depending on the kind of material analyzed. In many cases, a 5 gram sample of soil would yield enough pollen to make a hundred slides or more, each containing at least 100 pollen grains. Some samples, especially those from midden areas, yielded very little pollen, probably because of the rapid decay taking place in the midden.

Examination

All slides were scanned at 100 magnifications. Large graminae grains were examined and measured with an eyepiece micrometer at 600 magnifications. The exines of the larger grains were examined under the phase contrast microscope at 400 and 1,000 magnifications.

Since the large corn pollen grains in most cases represented much less than 1 percent of the total pollen recovered, it was necessary to scan a number of slides from each sample.

Criteria for Identification

The large graminae pollen grains were identified as corn on the basis of size, that is, length of the long axis of the grain, and of exine pattern.

SIZE – According to Irwin and Barghorn (1965:40) tripsacum and teosinte "are the only New World Grasses so far investigated which cannot be distinguished from maize by a simple measurement, i.e., greater than 47 microns for the long axis and greater than 5.7 for the pore axis ratio." That is, besides maize, the only graminae grains which might be larger than 47 microns in length are tripsacum and teosinte.

Since teosinte is not a native Florida grass (Irwin and Barghorn 1965:44) we need only to distinguish between corn and tripsacum. The extremes in size of tripsacum pollen are reported by Barghorn (Barghorn, Wolfe and Clisby 1954:231) to be 33-64 microns. Our herbarium specimen of tetraploid *Tripsacum dactyloides* had an extreme range of 45-70 microns.

In the samples from Fort Center discussed here, we have found 48 grains of graminae pollen which are 70 microns or larger. The largest of these is 95 microns in length, much larger than the largest tripsacum pollen grains.

EXINE PATTERN – Irwin and Barghorn (1965) have shown that the exine pattern of tripsacum pollen differs from that of corn pollen when observed under the phase contrast microscope. Corn pollen exine appears regularly punctate while the tripsacum pollen exine is mottled and irregular. While it is apparently not possible to distinguish between corn and teosinte pollen by this technique (Mangelsdorf 1974:185), it is possible to distinguish between corn and tripsacum.

The large graminae grains from the Fort Center site all had regularly punctate exine patterns under phase contrast microscopy. On the basis of size and exine pattern then, we identified 48 large graminae pollen grains from these samples as corn pollen.

Determination of Size Range of Corn Pollen

The large graminae pollen grains described above occurred very rarely – a total of 48 grains in many hundreds of pollen grains scanned. However, a number of graminae pollen grains were observed which were 50 microns or larger and which had regularly punctate exine patterns when viewed under the phase contrast microscope.

All of the larger graminae pollen grains with regularly punctate exines were measured in the four samples presented. Table 1 shows the frequency distribution of axis length measurements of these grains and of Tripsacum dactyloides.

ELSIE SEARS – FORT CENTER

POLLEN – TABLES

TABLE 1

Axis length (microns)	P-47	P-116	P-157	P-294	Tripsacum
45-49	0	0	0	0	4
50-54	4	5	5	8	19
55-59	11	12	17	24	24
60-64	16	12	8	33	9
65-69	6	4	3	19	3
70-74	4	3	4	9	1
75-79	1	2	1	2	0
80-84		1	3	4	0
88-89				2	0

Frequency Distributions-Axis lengths of large Graminae Pollen Grains with regularly punctated exines and *Tripsacum dactyloides*

TABLE 2

Sample	Mean	95% confidence interval mean	Extreme size range	# grains counted
P- 47	61.8	59.6-64.0	50-78	42
P-116	62.2	59.7-64.7	50-83	39
P-157	61.8	59.1-64.5	50-80	42
P-294	63.5	62.0-65.0	50-95	101
Tripsacum Dactyloides	54.3	52.7-55.9	45-70	60

Means and Extreme Size Ranges of Axis length of pollen grains

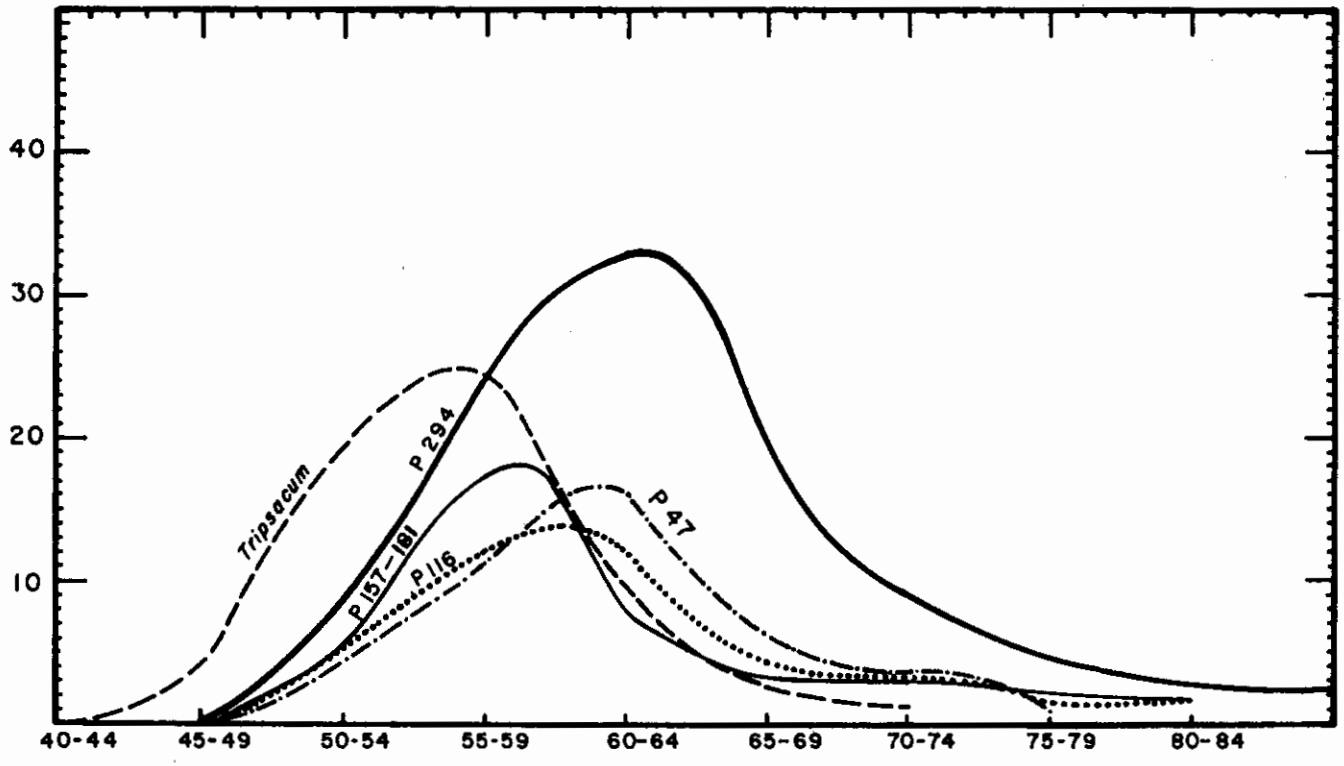

Figure 1: Caption-Frequency Distributions of Pollen Grains. Legend-Center under graph-Size of Pollen Grains in Microns.

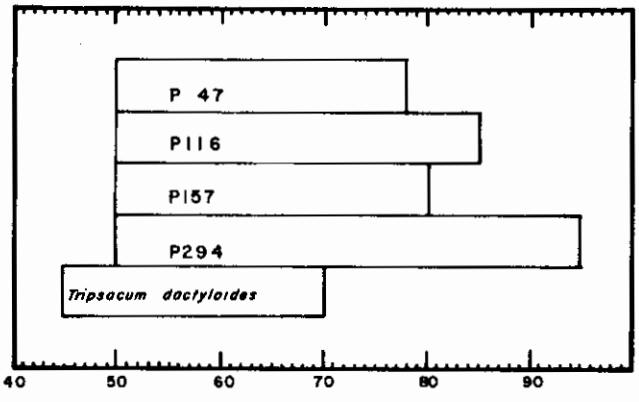

Figure 2: Extremes of Graminae Pollen Grain Size in Microns.

The mean diameters of the pollen grains in the four samples thus studied were determined. These are shown in Table 2 as are the extreme size range for each sample.

Figures 1, 2, and 3 present further data, respectively frequency distributions for axis length measurements, extremes of axis length measurements and means of axis length measurements with the 95% confidence interval for each.

From these mean values for the diameters of the population of graminae pollen grains with regularly punctate exines, we conclude that these are corn pollen grains although the values are somewhat lower than those usually reported for corn pollen. Irwin and Barghorn (1965:39) report the pollen size for Chapalote, a primitive race of corn, as ranging from about 63 to 75 microns with a mean of about 69. The means for our samples (See Table 2) are thus only slightly smaller.

In the four samples reported here, 37, or 16 percent, of the 223 pollen grains were 70 microns or longer.

We have then been able to identify 48 graminae grains 70 microns or larger with typical corn exine patterns, as corn. We suggest that they make up about 15 percent of

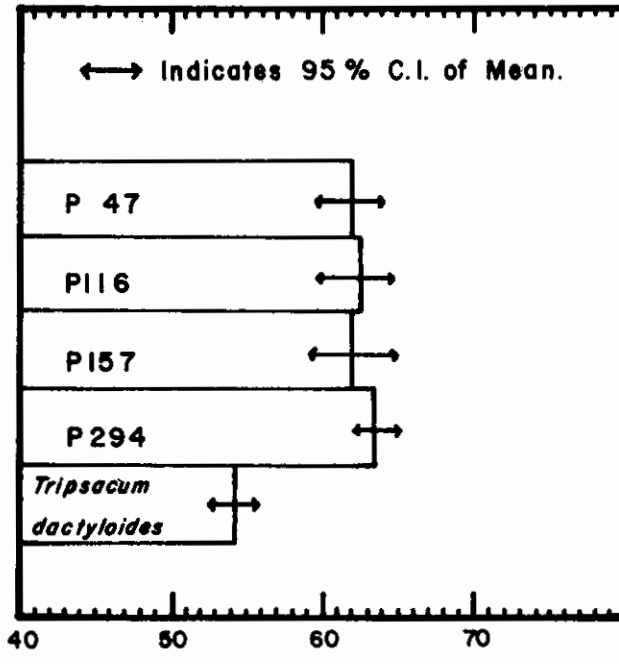

Figure 3: Means of Size Distributions of Graminae Pollen Samples in Microns.

a total population of corn pollen ranging in size from 50 to 95 microns.

Associations

The temporal distribution of these samples is roughly from some centuries B.C. until nearly A.D. 1,000. The four samples studied most intensively, with distributions shown on the graphs and tables cluster more tightly. P-157, a coprolite from the pond, and P-294, pollen recovered from strips of pigment adhering to a bird carving which was found at the bottom of the pond, fall well within the A.D. 1-500 period during which we have Hope-

wellian traits and other evidence of contemporaneity with the main portion of the mid-western Hopewell development. P-69, a sample from the high midden on the riverbank, deposited in the great circle ditch after it started to fill in, is in this period on the basis of associated ceramics. There is no possibility of contamination of any of these specimens by modern pollen. All three had been buried since shortly after their deposition, a deterrent to even the most ardent adherent of corn pollen movement by wind. Such movement, really very limited, would certainly not account for corn pollen in the interior of a human fecal specimen nor into pigment on a bird carving which has been covered by many feet of mound wash since shortly after the collapse of the charnal platform around A.D. 500.

The fourth of these samples, P-116, came from a buried soil surface in the interior of the great circle. Since it was not deep, some possibility of contamination might be considered. We believe that its similarity to the other specimens, and it and their difference in size range from modern corn pollen, eliminates that possibility. Unfortunately, since there was no occupation in the circles except for the midden on the high natural levee, we can only say that it was deposited after the building of the earlier circles, perhaps centuries before the A.D. 400 date, and probably before A.D. 500, the end of most occupation at the nearly adjacent ceremonial center.

The cluster of three of the samples, and there are others, associated with the lime production trait as well as with platform pipes, elaborate mortuary ceremonialism, and other Hopewell features, is obviously of particular importance.

Their implication for the development and significance of an agricultural, corn-based economic system in North America are clear. We would only emphasize again that the production and use of lime in quantity clearly magnifies the importance of the pollen grain evidence considerably. It says that a lot of corn was treated over a very long period of time.

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Jeffrey P. Brain

The Question of Corn Agriculture in the Lower Mississippi Valley

The question of agriculture in North America must be approached in the broadest possible perspective. It is not just a question of its presence, but of its ramifications. While maize, and its oft associated cultigens, are taken as the classic expression of native American domestication of plant resources, it represents but one of many stages in developing subsistence strategies, the contextual significance of each of which must be carefully considered.

As a working hypothesis, we may perceive of a probable development in different regions, at different times, of a general trend from tentative management of native plant resources, to a more sophisticated horticulture of those same resources, to the acceptance and integration of introduced foreign cultigens (such as cucurbits), to an incipient maize agricultural subsistence base, to its intensive development, to the final successful multi-cultigen (corn-bean-squash) agriculture so well known in the ethnohistoric accounts. Granted that this hypothetical scheme is too neat to have been followed consistently in any one region, even if possibly valid in the overview, it does provide a framework within which to assess the archaeological evidence.

But the assessment of subsistence strategies must have as its working basis the significance of each innovation in a particular context. Too often, the whole question has been couched in the general term of "agriculture" (usually synonymous with maize cultivation) and been hailed as the special spark to certain great developments. Thus, in the eastern United States, the great developments of Poverty Point, Adena-Hopewell, and Mississippian have all been attributed, at least in part, to a subsistence base of corn agriculture. But if it was already assimilated and basic in Poverty Point, it is difficult to explain Hopewell in these same terms. And, if present in Hopewell, it is difficult to explain Mississippian. Of course, the problem feeds upon itself, and is unnecessarily complicated by being reduced to the simple question of the presence or absence of corn.

It is necessary to question the automatic assumptions of the significance of agriculture in general, and of the introduction of corn in particular. It is necessary to ask whether corn agriculture was indeed a necessary prerequisite to certain developments; and then to ask the even more subtle question of whether it always has a salutary effect, or whether it may have had a variable, even contradictory, impact upon those other aspects of sociocultural development which we have tended to value highly in archaeological research. This paper shall focus upon these questions relative to the Lower Mississippi Valley.

In the Lower Mississippi Valley, we cannot meet the problem of early agricultural practices and the introduction of corn directly. With the exception of cobs and kernels at late prehistoric sites after A.D. 1200, and only rumors of such at Marksville and Troyville, there are only the reports of cucurbit seeds from the late Archaic Bayou Jasmine and Weeks Island excavations (Robert Neuman, pers. comm.). While the span of cultivation practice is probably represented here, there is no real evidence to the significance of this practice at each step in the great developments that may be observed in this same area. Yet, there are other clues in the archaeology when we look beyond the surface of those great developments.

I would take as a case study the Lower Yazoo Basin where intensive analysis of the archaeological data provides some startling clues. The Lower Yazoo participated in all the great events, at least to some degree, but this study shall be confined to the last two thousand years of prehistory, from the middle of the first millennium B.C. to the middle of the second millennium A.D., roughly the period for which corn can now be documented to have been present in the aboriginal eastern United States. Looking first at the known presence of corn at the end of this period, and the archaeological evidence for its impact, an extrapolation backwards in time to comparable evidence shall consider the case for corn agriculture at an earlier stage of development.

The early Mississippian occupation of the Lower Yazoo Basin is impressive. At the latest count, 118 components of the Winterville-Lake George phases have been recorded (figure 1). The sites represented include major multimound primary centers, such as Winterville and Lake George, numerous secondary and tertiary mound centers, and more than a hundred smaller villages and hamlets. The distribution of these sites is extensive, and within the limited occupational (*i.e.*, habitable) potential of the alluvial valley nearly every potential locale bears evidence of the Mississippian presence. In demographic terms, the densest native population was achieved at this time.

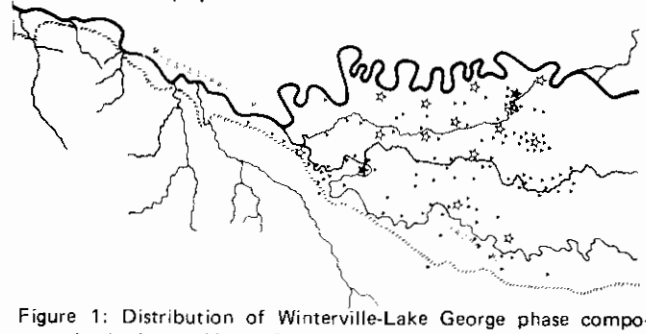

Figure 1: Distribution of Winterville-Lake George phase components in the Lower Yazoo Basin. The primary mound centers, Winterville and Lake George, are indicated by the solid stars, lesser mound centers by the hollow stars. The data base is drawn from Phillips (1970), with additional information from a survey conducted by the author during 1967-1968. This still unpublished data nearly doubled the known number of sites for the Lower Yazoo Region.

The demographic pattern of the Mississippian occupation is especially impressive when it is compared with the immediately precedent late Coles Creek occupation of the Crippen Point phase (figure 2). Only 37 components, one-third of the early Mississippian components, can be recorded at this writing, and their distribution is far more restricted. Furthermore, the sites are uniformly small,

even the primary centers rarely equalling the tertiary Mississippian mound centers in physical presence. The obvious question is how to explain this dramatic demographic increase of at least three-fold from late Coles Creek to early Mississippian.

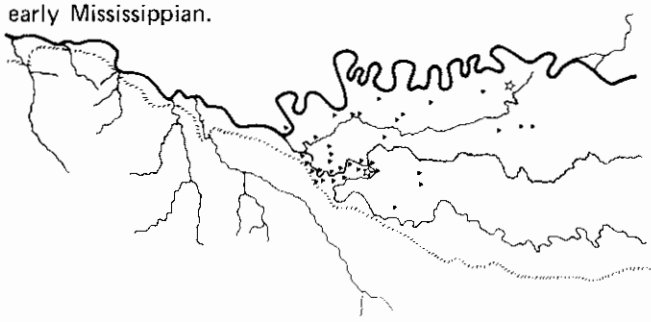

Figure 2: Distribution of Crippen Point phase components in the Lower Yazoo Basin.

As already noted, the presence of corn can now be documented for late prehistoric sites in the Lower Valley. Most notable for the Yazoo is Lake George, one of the few late prehistoric sites to be extensively excavated, where corn was found in Winterville and Lake George phase contexts (Williams and Brain, n.d.). Corn was not found in Crippen Point phase contexts at Lake George, nor has it been at any other Crippen Point or Coles Creek site in the Lower Valley. The first obvious hypothesis, therefore, would attribute the observed demographic changes in the archaeological record to the Mississippian introduction of corn ca. A.D. 1200. But such a late introduction would seem unlikely in the face of the presence and obvious acceptance of corn a thousand or more years earlier in areas just to the north and east. Of course, in a naturally rich environment, there could have been cultural objections to the introduction of another subsistence base, but this seems a poor excuse.

A second hypothesis, then, would contend that the late Coles Creek-early Mississippian transition reflects the introduction, not of corn agriculture, per se, but of improved agricultural practice and plants – presumably the integrated propagation of corn-bean-squash (Brain 1971: 70-73). A coincident change in food processing that allowed corn to be accidentally preserved in greater quantities may have been responsible for its archaeological appearance at this time (Belmont 1967), but does not preclude its significant presence at an earlier horizon. In fact, if the overall outline of the development of plant management outlined at the beginning of this paper has any validity, then such a rich agricultural area demands a closer look for earlier evidence for the introduction of corn. Being denied the primary evidence, it is necessary to turn to otheer aspects of the archaeological record, seeking clues in socio-cultural elaboration and/or demographic-settlement patterns. For the latter, especially, changes at least as dramatic as those noted for the Coles Creek-Mississippian transition should be expected and documented, if the case is to be made.

The presence of corn can be documented for other parts of the east by the first millennium B.C. (Yarnell 1975). Its introduction into the Lower Mississippi Valley is the moot point, and a study of the contemporary Tchefuncte culture at the end of the first millennium offers little encouragement in answering the question. In the Lower Yazoo Basin, the Tchefuncte occupation of the Tuscola phase is not very impressive in comparison to earlier and later periods of occupation. At this writing, only 21 small sites have Tuscola phase components (figure 3). This is only about half the number of components

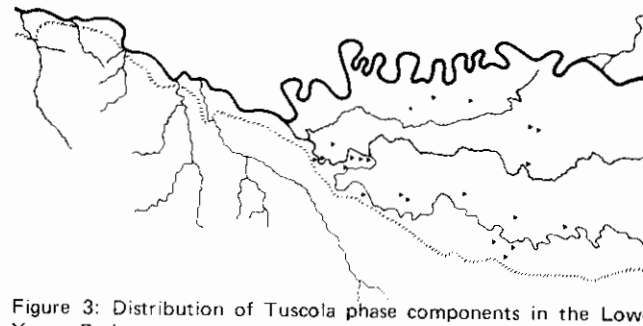

Figure 3: Distribution of Tuscola phase components in the Lower Yazoo Basin.

that can be documented for the late Poverty Point occupation of the same region (Williams and Brain, n.d.). The settlement pattern, however, is comparable: an extensive distribution throughout the basin, which emphasized what would have been stable wetland environments contiguous to active river channels. These would have been naturally rich econiches supporting a wide diversity of fauna and flora. If corn was introduced at this time, then its impact was nil. In fact, all of the supporting archaeological evidence – apparent socio-ceremonial decline from Poverty Point, demographic depression, and settlement-subsistence continuity – is completely negative.

Upon this base, appears the Hopewell-Marksville horizon at about the time of Christ. That event must also be considered as a vehicle for the introduction of corn, but again the secondary evidence lends little support. The 18 known components of the early Marksville occupation manifest a general continuity in demography and settlement pattern (figure 4). Nevertheless, given that there must have been an initial period of introduction, adoption, and adaptation, as well as its known presence at other Hopewell sites in the east, it may be taken as a working hypothesis that corn was present at this time. But, if so, the archaeological record still does not support any significant impact. Even in terms of socio-ceremonial elaboration, the developments of the Marksville culture are compatible with a hunting-gathering subsistence base (in this case, as practiced by the Tchefuncte peoples).

Figure 4: Distribution of early Marksville components in the Lower Yazoo Basin.

By the late Marksville period, however, there is a dramatic change in the archaeological record. The occupation of the Issaquena phase in the Lower Yazoo is recorded at 77 sites, four times the number of Tchefuncte or Marksville sites (figure 5). Moreover, not only is this occupation more intensive, it is also far more extensive, as locales previously ignored were now populated. Especially notable in this respect is the increased emphasis on the occupation of the natural levees of even small interior streams. How is this four-fold demographic increase and distinctive settlement patterning to be explained?

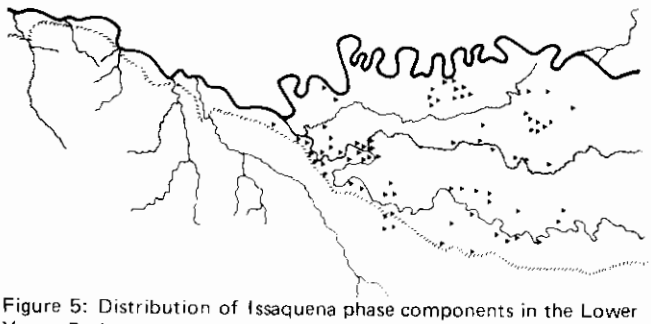

Figure 5: Distribution of Issaquena phase components in the Lower Yazoo Basin.

The question becomes even more urgent when the evidence for the following Deasonville occupation is considered. Known components of the Deasonville phase (ca. A.D. 400-500) number 156 (figure 6), twice that of Issaquena, and *eight* times the number of Tchefuncte or early Marksville sites! Even allowing for an inevitable skewing of the archaeological record as earlier components are lost through later activity, this is a startling increase. Furthermore, the change in settlement patterning clearly supports the trend, and minimizes the potential error since so many of the sites were newly occupied for the first time.

Figure 6: Distribution of Deasonville phase components in the Lower Yazoo Basin.

It must be argued that a dramatic change in subsistence activities occurred during the first half of the first millennium A.D. in the Lower Yazoo. It is my hypothesis that at least part of the explanation for the demographic-settlement data presented above must be sought in the realization – *i.e.*, the full systemic integration – of intensive corn agriculture. The case is strengthened by the artifact inventory which includes the appearance of specialized tools eminently suited to agricultural practice and food preparation, such as mussel shell hoes, chipped stone implements that could have been used for cultivation, and a variety of grinding stones. The pottery vessels, too, show a general tendency towards increase in size, which indicates their use as storage containers for grains and seeds. While none of these traits, alone, are convincing markers for agriculture, together they are suggestive of a tool kit adapted to food production at a time when an agricultural economy was being woven into the fabric of cultures in the eastern United States.

However, it must also be emphasized that the adoption of corn agriculture is not the whole of the story. For it is during late Issaquena-Deasonville that another significant event occurred. That was the introduction of the bow and arrow into the Lower Valley. The evidence is in the form of the Collins point (Williams and Brain, n.d.): a small, delicate, stemmed point that could only have functioned as an arrowhead. The impact of this innovation, alone, is difficult of comprehension at this point, but its introduction coinciding with a developing agricultural base could have resulted in a fundamental "economic revolution" at the subsistence level. A never before achieved degree of efficiency and sufficiency was possible.

Curiously, however, while these basic aspects of life reflect an optimum development, there is an equally apparent decline in socio-ceremonial aspects. If a relative high point coincident with Hopewellian developments is presumed for Early Marksville, then there is a definite decrease in social and ceremonial activities manifest in Issaquena, and an absolute nadir expressed in Deasonville. I have previously proposed the hypothesis that there was a direct correlation between these phenomena, *viz.*, that the development of more successful subsistence strategies was at least partly responsible for the apparent decline in elaboration of social and ceremonial structures, at least over the short run (Brain 1971: 62-65). Specifically, in this case, that the adoption and successful integration of intensive corn agriculture and the bow and arrow together allowed for a greater degree of self-sufficiency by smaller, more independent social units, and that the larger, more dispersed, and perhaps shifting, population was therefore more immune to the pressures of a socio-ceremonial superstructure. This is another way of looking at the whole question of "Hopewell decline" (see also Fowler 1973: 51 and Hall 1973 for similar observations and hypotheses relative to Midwestern data).

To conclude: the question of early agriculture in the Lower Mississippi Valley is not so much a question of its presence, as the type and quality of plant management that was practiced at any one stage, and most importantly of all its contextual impact (figure 7). Corn and other

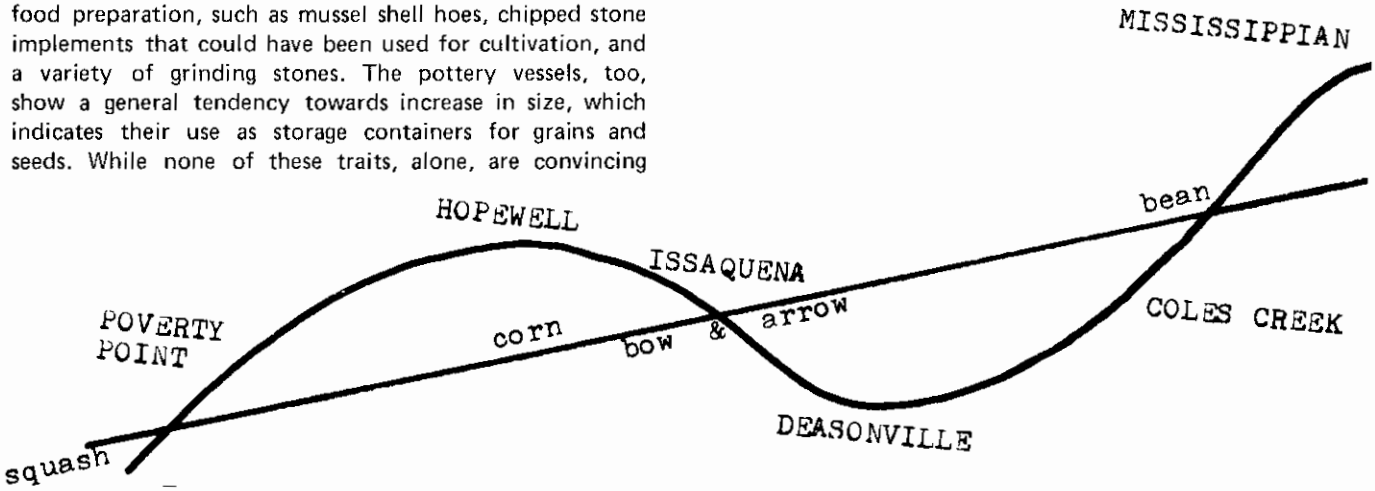

Figure 7: Schematic of developments in Lower Valley prehistory. The classic culture-historical view is perceived as an undulating developmental curve based on observed archaeological traits and inferred socio-ceremonial phenomena. The straight line, on the other hand, represents the development of an ever more efficient subsistence base which through time has included the adoption of various agricultural strategies, as well as other innovations, that have contributed a crosscutting undercurrent. These subsistence strategies were intimately associated with socio-ceremonial developments, but may have had negative, as well as positive, impacts depending upon the contextual situations.

imported cultigens play a central role in this development, but they must be put in perspective. Corn agriculture appears to have been accepted quite late in the Lower Valley, and in fact its initial acceptance appears to have had a quite depressing effect on other aspects of cultural development, which leads one to suspect some cherished assumptions of North American archaeology. On the other hand, this basic agricultural commitment was surely a necessary precondition for the great Mississippian developments to follow. In the Lower Valley, at least, more sophisticated technologies and strategies, probably combined with new hybrids and cultigens, resulted in the classic corn-bean-squash intensive agriculture that was the key to ultimate Mississippian success, and the great socio-ceremonial elaborations that characterize it.

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Rochelle A. Marrinan

Assessment of Subsistence Strategy Evidenced by Shell Ring Sites

Over thirty shell ring sites have been reported from the Atlantic coasts of South Carolina and Georgia. These sites are circular accumulations of cultural and subsistence debris and date from 2200-1000 B.C. Ford (1969) considered ring sites to be a distinct settlement pattern introduced by seagoing colonists from Central or South America. Others have considered them ceremonial, defensive, or because some of these sites are presently located in salt marshes, fish traps (McKinley 1873, Moore 1897, Waring and Larson in Williams 1968, Edwards 1965). While their function remains unclear, on the basis of excavations by Waring and Larson, Edwards, Calmes, and Hemmings it is apparent that these shell circles are the result of subsistence activities; that is, the debris comprising the circular accumulations is composed of the remains of foodstuffs.

Investigations in two shell ring sites on Cannon's Point, St. Simon's Island, Glynn County, Georgia begun in 1973 were directed at a study of the subsistence practices represented by ring constituents. This paper is a result of this study supported by the University of Florida, the National Science Foundation, and Sea Island Properties, Inc. landowners. Cannon's Point is the easternmost point of land at the north end of St. Simon's Island, a barrier island located east of Brunswick, Georgia. The project area included most of the point and was proposed to study changing man-land relationships during the period *circa* 2000 B.C. to A.D. 1865. Late Archaic sites were located along the eastern margin of the point, facing on extensive salt marsh. In surveying this area, it is apparent that many sites are eroding into the marsh.

It has not been uncommon to find shell ring sites in groups, for example, Fig Island, Hilton Head Island, and Sapelo Island. In the Cannon's Point project area, two shell ring sites were identified. A third shell ring is located on Cannon's Point south of the project area at a distance of approximately 2 kilometers. Within the project area, one ring site (here to be called the marsh ring – 9Gn57) is completely isolated from high ground and is surrounded by salt marsh. This site was the first identified and the largest. The second site (here to be called the land ring – 9Gn76) is located on high ground beneath a dense hardwood and understory cover a distance of approximately 75 meters southwest of the marsh ring. This site is eroding into the marsh on its southern arc. The land ring is considerably less extensive than the marsh ring. Depth of deposit in the land ring ranges from 45-65 cm while in the marsh ring, depth of deposit ranges from 1.3-1.8 meters.

After a review of available information on shell rings and Late Archaic fiber-tempered ceramic sites (Marrinan 1973), certain research goals were proposed. First, while excavations revealed ring constituents to be subsistence related, no systematic study of cultural practices relating to subsistence, nutritional contributions of foodstuffs, or biotope usage was available. Second, in almost all cases, faunal remains are simply noted as species lists and mention of floral material is excluded. All functional explanations were considered as a third point with an attempt to substantiate or refute these hypotheses. Fourth, credible radiocarbon dates for the southern range of shell ring site distribution were desired. I should like to take some time at this point and review the general findings of these excavations before proceding to a specific consideration of subsistence.

Excavation strategies have given a rather biased view of shell ring sites. In the past, excavations have been concentrated in the ring arcs and inside the shell enclosure; no excavation had been concentrated outside the ring. One very important consideration in excavating a shell ring site, or any other site for that matter, is to excavate it in relationship to its prehistoric environmental situation and not its present one. Excavations on Cannon's Point clearly demonstrated that the area surrounding the ring, now under 0.5 to 1 meter of salt marsh and sediments had formerly been forested and was culturally productive. Tree stumps and roots were exposed in what appeared to be primary position supporting this contention. Scattered cultural and subsistence material along an old land surface could not be said to be in primary position since movement from tidal effects was possible. No shell midden deposit was exposed beneath the present marsh surface. Excavation revealed a former cultural level with a mixture of fiber-tempered and grit-tempered (Refuge-Deptford) ceramics, large amounts of faunal material, a considerable amount of floral material, and a sample of lithic material. Subsequent dates on wood and charcoal indicated that innundation of this area occurred after 835-820 B.C. No cultural material was recovered intermediate to the present marsh surface and the cultural level. The exposure of stumps of hardwood trees suggested that at the time of deposition, the marsh ring site was located on high ground in a forest. On this basis, it could not have served as a fish trap.

Radiocarbon dating gave a basal date for the marsh ring of 2240 B.C. and an upper level date of 1815 B.C. For the land ring, a basal date of 1910 B.C. and an upper level date of 1655 B.C. was obtained. All dates were on oyster shell.

Both ring sites contained fiber-tempered ceramics; the marsh ring had a scattering of grit-tempered ceramics in the upper 10 cm. In the land ring, grit-tempered sherds were confined to the upper 15 cm. Recovery of ceramic fragments having Orange Period (Florida Orange Period) motifs is not unusual in sites having fiber-tempered ceramics on St. Simon's Island. This was first observed by Pres-

ton Holder (1938) in the late 1930s. However, the provenience of fiber-tempered ceramics having Orange motifs is very interesting. In the marsh ring, such fragments were recovered from very shallow proveniences (th upper 30 cm). No sherds having Orange motifs were recovered from the basal levels. In the land ring these ceramics were recovered from the basal levels. A very typical example of Tick Island Incised was recovered from the basal level.

When excavations began, a working date of 1500 B.C. was proposed on the basis of ceramic occurrence. The marsh ring site was known to have decorated ceramics in superficial levels. The dates for the closest ring site, Sapelo Island, were averaged at 1750 B.C. based on an almost totally plain ceramic sample. The selected working date of 1500 B.C. did not seem unreasonable given the ceramic assemblage. However, our radiocarbon dates are earlier than Sapelo Island and the ceramic assemblage after excavation is known to represent decorated ceramics throughout the midden deposit. Decorated ceramics are not numerous (55 of 731 sherds or 7%). Similarly, decorated bone pins of classic scroll motif are considered late developments, but our single example came from the base of the midden — situated on the midden-submidden soil interface.

In the past it has been noted that human skeletal material is not present in any quantity in shell ring sites. The fragmentary nature of such material has led to consideration of cannibalism. Cannibalism is a very difficult condition to prove. Perhaps the best case for cannibalism is made by Phelps and Burgess for an early Woodland site in the Savannah River drainage (1964). In any event, human skeletal material was recovered in the marsh ring. Its condition was that of entire elements (*e.g.* femur, cranium, pelvis) which were apparently crushed in place. The basal radiocarbon date for the marsh ring comes from shell associated with an exposed human cranium located slightly above the base of the shell deposit. No articulated burial was recovered by us nor is any known to exist for shell ring sites.

Waring and Larson's contentions (in Williams 1968), and lately Crusoe and DePratter (1972) that lithic material is very scarce on the coast during the Late Archaic is supported by the Cannon's Point findings. Excavations in the marsh ring yielded only three utilized examples and no appreciable debitage. A slight increase in debitage, but no worked examples, is noted for the land ring. It is the submarsh cultural level collections that contain significant amounts of lithic material. These specimens are of black, grey, or bluish chert and are presumed to be from Fall Line outcrops.

Bone tools are a common cultural inclusion in shell ring sites. They are not numerous and appear to be primarily utilitarian in function. These tools are usually produced by vertical splitting of the metapodial or cannon bone of the white-tailed deer.

Midden content recovery is biased by methods applied. Waring and Larson trowelled through material at the Sapelo Island ring site (No. 1). Hemmings and Edwards used screens but no account of Edwards' findings is available except a "preliminary report" and Hemmings information has not yet been published. There has been a tendency to be more interested in cultural material resulting in our ignoring other sources of information.

In excavation, screening is a very important consideration but as anyone who has used screens can attest, it is a commitment to considerable time and, therefore, money. In the past, shell sites have not been screened. I am referring to sites specifically in the Southeastern United States. With the change in problem-solving orientation, there is an attempt to interpret and reconstruct aboriginal lifestyles. To this end, past techniques do not suffice. Molluscs are obviously important dietary constituents. However, aboriginal peoples consumed a varied diet and most of these constituents are recoverable. The importance of some dietary constituents, for example floral materials, is not easily estimated. Shell presents a very difficult matrix — the more sediment involved, the greater the opportunities for overlooking; the more ashy the matrix, the more uniform in color are all inclusions regardless of whether they are shell, seed, bone, lithic, or ceramic.

In a shell site, some area should be consistently screened. One cannot make a believable claim to the increased availability or absence of any constituent when screening is neglected. In analysis, many species may be reduced in numbers of individuals present; others may be missed entirely. Screen size must be selected with thought to the types of material potentially available. Using ¼th-inch screen, it was possible to miss one entire family of fish. When screen size was decreased, this family — the herrings and menhaden — was shown to be a considerable dietary constituent in terms of numbers of individuals. Additionally, much more information was suggested from the size of this family (23-43 mm.) requiring netting, trapping, or poisons to have been used in procurement.

One of the problems in undertaking either a zooarchaeological or a paleoethnobotanical analysis of archaeological materials is the fact that unless the investigator realizes the bias introduced into their sample by failure to screen, they render their sample noncomparable to extant collections. While their collections may be interesting, for research comparisons they are problematical. It should be recognized that research goals including a typological analysis of lithic or ceramic materials are benefited by use of screens; far more material is generated.

There is, potentially an infinite number of ways in which human groups may adapt to and exploit their environment. However, such an array does not occur. Instead, aboriginal groups faced limitations which were culturally and environmentally imposed. Turning to subsistence, it has been noted by many that quantities of molluscs provide a more sedentary existence during the Late Archaic. During excavations of the Cannon's Point shell ring sites, over two dozen molluscan species were identified from the midden debris. The species offering greatest subsistence potential in order of their frequency were oyster, quahog clam, whelks, and Tagelus (a razor clam). These molluscs all inhabit tidal creeks. In addition, numerous marine snails were recovered. Some of these species became midden inclusions through harvesting of other molluscs or marsh plants (for example the marsh periwinkle and the oyster drills). Marsh periwinkle (*Littorina irrorata*) do not seem to be a food item in the marsh ring while in the land ring there is definite evidence of such use. Numerous species of carnivorous terrestrial snails were also recovered. Commonly labeled "garbage snails," these molluscs inhabit moist habitats and some prefer decaying vegetation. These species probably represent no food contribution but were drawn to the moist midden accumulation.

Culturally, the whelks were the most frequently used and then as pounding or scraping tools. Mammalian remains were primarily represented by deer, raccoon, opossum, and dog. Dogs were food items as the cracked and burned condition of recovered skull fragments attests. Mammals represent a substantial dietary contribution when compared to molluscs. For example, 100 grams of oyster adds 66 calories to the diet compared with equal weights of deer at 126 calories and opossum at 221 calories. When protein is considered, oyster yields 8 grams, deer 21 grams and oppossum 30 grams (nutritional values are from Watt and Merrill 1963).

Fish are present in great quantity. A diet of molluscs and fish would, when dietary calculations are considered, provide a very substantial diet. Augmentation by plant food is presumed. Mammals, while not present in great numbers would provide variation in such a diet. It seems apparent that the most critical resource in the Late Archaie coastal subsistence base was fish. Because mammal exploitation in an island environment is limited and is archaeologically indicated by few individuals, failure of fish availability would have placed severe strain on the aboriginal diet. While hunting and gathering on nearby islands and marsh is presumed, there is no indication that resources from freshwater areas were utilized. Numbers of fish species (30) comprise 45% of the species list; mammals 27% and reptiles 16%. The mammalian species list is inflated by the fact that several recovered species represent incidental animals, for example, a few rodents, shrews, and moles are not food items. When molluscan species are added to the total species list, a total of 95 species, the percentage of fish continues to be higher than any other class.

Exploitation was focused on the tidal creek and salt marsh biotopes. No use of the beach-dune biotope can be demonstrated by this sample. Sea turtle, a commonly occurring seasonal species on the beaches of these barrier islands, are absent in this collection. The nearest beach in the project area is approximately 4 kilometers distant across salt marsh and tidal rivers. Forest resources are essential to the diet and in tool-making.

Procurement techniques evidenced by cultural remains recovered include spear for large mammals and leisters for fish, probably of moderate size. Techniques for fish procurement probably included basketry traps, netting, weirs, or poisons. This supposition is based on the size of the fish in the sample. Use of fish poisons is not an impossibility in this area. The tidal factor in the Cannon's Point locale is 2.1 meters annually. At periods of low tide, remnant pools are very obviously present and exploitable. Foot travel across the salt marshes for considerable distance is possible during periods of extended neap tide.

Seasonality of occupation was a question posed initially. On the basis of fish size and availability, a spring and summer occupation is suggested. However, a more detailed analysis of the faunal constituents is underway. Floral material suggests a spring to fall occupation. However, the occupational duration on the coast is not known. Until we have adequate surveys and excavations of sites located in the coastal plain, particularly along river courses, it is impossible to truly interpret the subsistence system. Until such a data base is generated, questions of degree of nomadism or sedentism are difficult to approach.

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Michael Trinkley

Paleoethnobotanical Remains From Archaic-Woodland Transitional Shell Middens Along the South Carolina Coast

This paper reports on the status of ethnobotanical research in Archaic-Woodland transitional shell middens along the coast of South Carolina. As ethnobotany is in its infancy in South Carolina the questions asked were basic: are plant remains present in the coastal shell middens; and if present what do they indicate about aboriginal plant utilization and the prehistoric environment?

The author has studied small flotation samples from three sites — Daw's Island (38Bu9), Spanish Mount (38Ch62) and Sewee Shell Ring (38Ch45). The Daw's Island site is a shell midden on Daw's Island, located in the Port Royal Sound (Hemmings 1969; Michie 1973). A radiocarbon date on oyster shell from the midden is 3395 ± 100 radiocarbon years: 1445 B.C. (GX-2281) and Stalling's Island and Thom's Creek Wares are eroding from the midden. Today the site is inundated by the ocean to a depth of 1.5 meters during high tide. Spanish Mount is a shell midden situated on the southern end of Edisto Island, bordered by a tidal creek which is gradually eroding into the site (Sutherland 1974). Two radiocarbon dates on charcoal from the site are 3820 ± 185 radiocarbon years: 1870 B.C. (UGa-583) and 4170 ± 350 radiocarbon years: 2220 B.C. (UGa-584) and the site is predominantly associated with Thom's Creek Ware. Sewee Shell Ring is located in the Francis Marion National Forest about 25 miles northeast of Charleston, S.C. (Edwards 1969). The site has one radiocarbon date of 3295 ± 110 radiocarbon years: 1345 B.C. (GX-2279) and is associated with Thom's Creek Ware. Sewee is distinct from the other sites considered due to its circular shape.

Two samples each were obtained from Daw's Island and Sewee; a series of 12 stratigraphic samples and 21 radiocarbon samples were obtained from Spanish Mount, through the co-operation of Dr. Donald Sutherland (Department of Anthropology, University of South Carolina). Each flotation sample was sifted through a series of ten screens (graded in millimeters: 6.35, 4.00, 2.83, 2.38, 2.00, 1.41, 1.00, 0.71, 0.42 and 0.21). Then each fraction was weighed and the first 5 fractions were entirely examined and sorted under low magnification (7x to 30x) and quantified by weight. The quantities of plant remains below the fifth screen were extrapolated on the basis of the quantities determined for the first 5 screens (this procedure basically follows Yarnell 1974).

The results of the flotation examinations are found in Tables 1-6. Between 50 and 80 percent of each sample was wood charcoal and less than 25 percent (usually 2 to 10%) was carbonized plant food remains. Although a few seeds were found from each site, the predominant plant food remains recovered were hickory nutshell (*Carya spp.*) and a small amount of acorn shell (*Quercus spp.*). Most of the seeds appear to belong to the grass family, Gramineae, and none are known to be a food source.

All of the sites thus far studied show the exploitation of both hickory nuts and acorns. As Yarnell (1974:119) has suggested, the acorn shell is lighter in weight than the hickory nutshell and acorn shell represents much more food for its weight than does hickory nutshell. Thus, to derive a food equivalence of acorn to hickory, the acorn shell recovered must be multiplied by a factor of 10 to 20. In most samples this would cause the quantity of acorn food to equal that of hickory. The food value of hickory and acorn compliment each other and offers a good nutritional combination. Hickory nuts are high in protein and fat, but low in carbohydrates. The acorn is high in carbohydrates, but low in protein and fat (Asch and Ford 1971). Hickory nuts have a caloric value equal to that of most meat (Hutchinson 1928:261).

The genus *Quercus* is subdivided into two subgenera: the red or black oaks, *Erythrobalanus,* and the white oaks, *Lepidobalanus.* The acorns of the black oaks are generally bitter and inedible unless the tannic acid (tannin) is removed. The white oaks have acorns which are sweet and edible as they come from the tree (Larson 1969:269).

The dependability of the various nut sources varies considerably. Hickory nuts are fairly dependable with masts occurring every 2 to 3 years and are available from September through December. Acorn crops are less dependable and oaks will not develop acorns until they are at least 20 years old. The Post Oak (*Quercus stellata*) may yield 500 to 2,400 acorns in a season and the White Oak (*Quercus alba*) may yield 0 to 1,900 acorns with the masts being from 4 to 10 years apart (Fowells 1965). The acorns ripen in September and fall by December. Man is in competition with a number of other animals for the acorn crop, and if it is not gathered soon after ripening the nuts will be destroyed.

The presence of "weed" seeds in the samples is important as it indicates a disturbed habitat which one would expect to find in an area of human habitation and close to water. The absence of seeds that might have been food sources is indicative of little and may be due to the small sample size. More analysis is needed before anything definite may be said.

The samples are particularly enlightening in terms of environmental reconstruction. The coast of South Carolina is characterized by the Maritime Magnolia Forest and the Live Oak-Sea Oats region (Shelford 1963; Küchler 1964). The Live Oak-Sea Oats region varies from open grasslands to dense shrub and groves of low broadleaf

TABLE 1. Flotation Samples: contents by weight in grams for 38Ch62 (Wood column C)

Level	Sample weight (excluding fine debris)	Sample Components					Plant Food		
		Bone	Shell	Unident.	Wood Charcoal	Plant Food	Hickory	Acorn	Seeds
0-15 cm.	1.00	-	.76	-	.24	-	-	-	t*
15-30	1.10	t	.55	-	.55	t	t	-	-
30-45	2.01	-	.54	-	1.19	.28	.28	-	-
45-60	5.78	.13	1.28	.13	3.73	.51	.38	.13	-
60-80	3.07	-	.52	-	2.34	.21	.21	t	-
80-95	7.46	.08	3.45	-	3.53	.40	.24	.16	-
95-115	4.41	.09	.59	-	3.55	.18	.18	t	-
115-135	4.09	.17	1.65	-	2.10	.17	.17	t	-
135-155	5.97	-	2.77	-	3.08	.12	.12	t	-
155-170	3.21	-	2.20	-	.91	.10	.10	-	-
170-185	2.99	-	1.04	-	1.88	.07	.07	-	-
185-	1.20	.05	.40	.08	.47	.20	.20	-	-

t= <.05 grams
* = non-carbonized

TABLE 2. Flotation Samples: contents as percent of total sample (excluding fine debris) for 38Ch62

Level	Sample weight (excluding fine debris)	Sample Components					Plant Food		
		Bone	Shell	Unident.	Wood Charcoal	Plant Food	Hickory	Acorn	Seeds
0-15 cm.	1.00	-	76	-	24	-	-	-	t*
15-30	1.10	t	50	-	50	t	t	-	-
30-45	2.01	-	27	-	59	14	14	-	-
45-60	5.78	2	22	2	65	9	7	2	-
60-80	3.07	-	17	-	76	7	7	t	-
80-95	7.46	1	46	-	47	6	4	2	-
95-115	4.41	2	13	-	81	4	4	t	-
115-135	4.09	4	40	-	52	4	4	t	-
135-155	5.97	-	47	-	53	2	2	t	-
155-170	3.21	-	69	-	28	3	3	-	-
170-185	2.99	-	35	-	63	2	2	-	-
185-	1.20	4	33	7	39	17	17	-	-

t= < 1%
* non-carbonized

TABLE 3. Flotation Samples: contents by weight in grams for 38Bu9

Sample	Sample Weight (excluding fine debris)	Sample Components						Plant Food		
		Bone	Shell	Unident.	Wood Charcoal	Cane	Plant Food	Hickory	Acorn	Seeds
1	41.08	.85	4.22	.76	32.48	.16	2.53	2.21	32	.08
2	5.95	.15	.15	-	4.17	-	1.48	1.48	t	t

t=<.05 grams

TABLE 4. Flotation Samples: contents as percent of total sample (excluding fine debris) for 38Bu9

Sample	Sample Weight (excluding fine debris)	Sample Components						Plant Food		
		Bone	Shell	Unident.	Wood Charcoal	Cane	Plant Food	Hickory	Acorn	Seeds
1	41.08	3	10	2	79	t	6	5	1	t
2	5.95	2	2	-	70	-	25	25	t	t

t=<1%

TABLE 5. Flotation Samples: contents by weight in grams for 38Ch45

Sample	Sample Weight (excluding fine debris)	Sample Components						Plant Food		
		Pottery	Bone	Shell	Unident.	Wood Charcoal	Plant Food	Hickory	Acorn	Seeds
1	140.22	0	7.3	62.80	1.43	68.64	-	-	-	-
2	173.41	5.37	8.67	52.02	.19	95.02	12.14	11.79	.35	t

t= <.05 grams

TABLE 6. Flotation Samples: contents as percent of total sample (excluding fine debris) for 38Ch45

Sample	Sample Weight (excluding fine debris)	Sample Components						Plant Food		
		Pottery	Bone	Shell	Unident.	Wood Charcoal	Plant Food	Hickory	Acorn	Seeds
1	140.22	-	5	45	1	49	-	-	-	-
2	173.41	3	5	30	t	55	7	7	t	t

t=<1%

trees with the dominants of Live Oak (*Quercus virginiana*) and Sea Oats (*Uniola paniculata*); the Maritime Magnolia Forest occurs in hammocks, growing on slightly raised substratum not wet enough to be a swamp, with the Southern Magnolia (*Magnolia grandiflora*) as the dominant species (Shelford 1963).

Küchler identifies three vegetation types which would exist in significant quantities along the coast, "if man were removed from the scene and if the resulting plant succession were telescoped into a single moment" (Küchler 1964:2). This situation is termed potential natural vegetation and the three types are identified as the Oak-Hickory Pine Forest, Southern Mixed Forest and Southern Floodplain Forest.

Wood charcoal probably gives a fair indication of the trees in the site area at the time of occupation. However, there are several factors which may bias any environmental reconstruction based solely on charcoal evidence. First, selective gathering by the Indian may cause some wood to be over represented and second, differential self-pruning of the trees may cause some wood to be more accessible and thus over represented.

Table 7 lists the various woods identified from the sites studied. Pine, hickory and oak are most frequently found, but individual samples may contain large amounts of other woods. Of the 9 genera identified, six can be found in the Southern Floodplain Forest; the Oak-Hickory-Pine Forest and the Southern Mixed Forest both support 5 genera.

TABLE 7. Wood Charcoal Identificaction by Site

	Bu9	Ch42*	Ch45	Ch62
Acer sp.				?
Carya sp.	x	x	x	x
Cornus florida				x
Gleditsia sp.				x
Liquidambar styraciflua				?
Pinus sp.	x	x	x	x
Quercus sp.	x	x		x
Salix sp.		?		x
Taxodium sp.				x
difuse porous	x			x
non-porous			x	x

*Koeppen 1971

Soft Maple (*Acer sp.*) is commonly a bottomland tree and is probably a subclimax genus. Hickory (*Carya spp.*) grows most often in well drained soil but survives in sloughs and backwater areas. Dogwood (*Cornus florida*) is an understory tree and prefers well drained soil. The Water Locust (*Gleditsia aquatica*) is found in swamps and riverbottoms. Pines (*Pinus spp.*) are subclimax and will usually be replaced by understory hardwoods. Oaks (*Quercus spp.*) will grow on a variety of soils and are usually climax trees. In the oak-hickory climax forest the pines are replaced by hardwoods and the composition of the forest is 84 to 86% oak, 3 to 7% hickory and 6 to 7% miscellaneous hardwoods (Shelford 1963). Willow (*Salix nigra*) grows best in wet areas and flourishes at or slightly below water level. The willow will easily stagnate and will not succeed itself naturally. Cypress (*Taxodium sp.*) is a good self-pruner and is restricted to wet soils (Fowells 1965). A small amount of cane (*Arundinaria giguntea*) was found in the Daw's Island sample and is indicative of a fresh water biome.

In summary, the ethnobotanical remains from shell middens in South Carolina, dating from 2000 to 1500 B.C. are only beginning to be realized. Carbonized plant remains can be recovered by convential water flotation methods and indicate a reliance on nuts that is not otherwise suggested. The limited data suggests that plant foods played an important part in the subsistence pattern of these people and perhaps in this period, as Marquardt and Watson (1974) reason for an earlier period in Kentucky, "plant foods were as important as, if not more important than, molluscan and mammalian faunal resources." The data also suggests an environment not significantly different from that found along the coast today, although due to what finds its way into the archaeological record and then what is recovered by the archaeologist this is a guarded statement. Further investigation is being conducted at the Research Laboratories of Anthropology.

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Elisabeth Sheldon and Marguerita L. Cameron

Reconstruction of Prehistoric Environments: The Warm Mineral Springs Project

Warm Mineral Springs (8 So19) is a collapsed cave fed by hot mineral-water located in south Sarasota County, Florida. Remains of several human burials have been recovered from a ledge at the 45-foot level of the spring which have been radiocarbon dated at 8200 B.C. Geologists hypothesis that the sea level was as much as 300 feet lower during that time interval supports Cockrell's theory that the cave was dry at the time of burial. Furthermore, presence of stalctites and stalagmites within the cave indicates that the water level of the spring was 60-90 feet below its present level at that time.

Analysis of the artifacts has aroused much interest among archeologists, primarily because the burial was undisturbed; not only had pieces of stalactite been placed over the body, but a series of rockfalls covered the whole area by 7000 B.C. However, the site is also of considerable botanical importance: the deposit in which the burial was discovered contains whole leaves, twigs, large pieces of wood, and seeds, as well as carbonized remains. This unusual state of preservation has been caused by infusion of the sediments by mineral water containing only very small amounts of dissolved oxygen.

The south Sarasota County bedrock consists of Eocene or more recent deposits of Key Largo limestone, Caloosahatchee marl, and terrace sands. The prevailing soil is fine sandy loam usually containing sufficient organic matter (approximately 1%) to give it a dark color. Analysis of soil from Punta Gorda indicates major mineral nutrients in the following amounts: nitrogen, 0.02%; potassium, 0.01%; and phosphorous, 0.005%. The average elevation is 6-15 feet above sea level.

The modern climate is humid and sub-tropical. Rainfall averages 50+ inches per year, half of which falls between June and September. Temperatures average between a maximum of 90 degrees and a minimum of 75 degrees during the summer; in winter these averages are 77 degrees and 55 degrees respectively.

The modern vegetation may be characterized as palmetto flatlands. The dominant tree is slash pine with thick undergrowth of saw palmetto and wire grass. Where there is sufficient moisture the understory vegetation consists of saw palmetto, hardwood trees including bluejack oak, laurel oak, myrtle oak, live oak, and shrubs species of holly and myrtle. At the edges of the sea rush marshes which border the Myakka River there are thick stands of leather fern. Introduced species from Australia and South America especially Casuarina, cajeput tree, and pepper tree are spreading rapidly throughout the frost-free areas of Florida along the watercourses and beaches.

This introduced vegetation is very different from that of sixteenth century historic records from Manatee and Sarasota Counties which describe thick forests of broadleaved deciduous trees including live oak and other oaks, hickories, bays, mulberries, cherries, and cabbage palms; with large grape vines intertwined through the treetops, and with a thick undergrowth of saw palmetto.

Those records, however, are in agreement with comprehensive studies which have characterized the potential vegetation as a southern mixed hardwood forest (a tall forest of broadleaved deciduous and evergreen trees and of needleleaf evergreen trees) with the following species as dominant: sweetgum, bull bay, slash pine, loblolly pine, bluejack oak, laural oak, and live oak. Other elements in the forest include hickory, mulberry, red bay, cabbage palm, and saw palmetto.

Today in Sarasota County, only small isolated stands of this forest occur, usually inland where settlement is sparse and along watercourses where there is enough moisture to protect these trees from frequent fires. It is arson which maintains the slash pine-scrub oak- oak palmetto association commonly observed along the highways.

The cultural time frame at the springs, i.e. the Pleistocene-Holocene interface, makes environmental reconstruction difficult for several reasons. There is still controversy over changes in sea level caused by glaciation, more specifically how much it was lowered and the rate at which it rose to its present level. Secondly, there is very little published data on evolution of the forests of southcentral Florida, on botanical remains from archeological sites, or on palynological studies in the southeast.

Recent publications by Clausen, *et al* (1975) and by Watts (1971, 1975) have postulated a dry Pleistocene and early Holocene climate which permitted development of only an oak scrub and prairie vegetation for peninsular Florida. In spite of these, based on our own field work and library research, we feel that at Warm Mineral Springs at 8,000 B.C. the vegetation was a mixed hardwood forest, as described above. Palynological profiles from the burial sediments prepared by Dr. James E. King of the Illinois State Museum and preliminary identifications of some macrofossils from the same deposit support this conclusion.

Major components of the vegetation included oaks, myrtle, hazelnut, and birch. The presence of ash, willow, cypress, cattail, and elm, all rich woods and riverbank genera, are also indicated in the profile. All leaf fragments so far identified in our laboratory belong to live oak, a sandy, damp woods tree.

Clausen *et al* conclude that the climate must have been more arid and cite, as evidence, the presence of slash pine, cabbage palm, liveoak, laurel oak, hickory, peppervine, and shield fern – all mesic species which are adapted to moderately wet habitats. This is due to a common misconception that all sandy soils are dry. At Warm Mineral Springs, although it is true that small xerophytic herbs grow on the dry surface, a layer of blue-gray clayey

limestone, 6-8 feet below the surface, which is impervious to water, would have retained sufficient moisture in the fine sandy soil to sustain a mesic forest, regardless of seasonal distribution of precipitation, or a lowered water table.

We have no doubt that Watts' reconstruction is correct for the central Florida highlands; it is, however, unusual and unfortunate that he chose to generalize his scrub oak-prairie and coarse sandy soil data to the entire Florida peninsula.

Because there is nothing in the paleoflora and paleofauna which cannot now be found in the south central Florida area, it appears likely that the environment and climate were probably similar to those at present.

Acknowledgement

The authors would like to acknowledge the assistance provided by W. A. Cockrell, Florida Underwater Archaeologist and WMS Project Director, and by Dr. Joab L. Thomas, University of Alabama Botanist. Without them this study would have been impossible.

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Kathleen Mary Byrd

Tchefuncte Subsistence: Information Obtained from the Excavation of the Morton Shell Mound, Iberia Parish, Louisiana

Due to the often poor bone preservation and nearly total vegetal destruction at most southeastern archaeological sites, many interpretations of past subsistence patterns are based on fragmentary and inferential evidence and intraregional correlations. In certain areas, however, unusual depositional and post-depositional factors result in the preservation of otherwise highly perishable remains. The Morton Shell Mound is one site where this occurred.

The Morton Shell Mound, a multicomponent site, stretches along Weeks Bayou on the northwestern side of Weeks Island, a salt dome located in the marshes of Iberia Parish, Louisiana. The site is 700 feet long, 110 feet wide and reaches a height of 12 feet above the surrounding marsh and extends at least 9.5 feet below it. Investigation at the site began in 1969 and continued intermittently until August 1971. During this time Robert W. Neuman, Curator of Anthropology at Louisiana State University and director of the project, excavated a total of five units. Sections of two of these units, Excavation Unit 1 and 3 (Figure 1) could be extended deep enough to reach the early Tchefuncte material dated at 300 B.C. to A.D. 300.

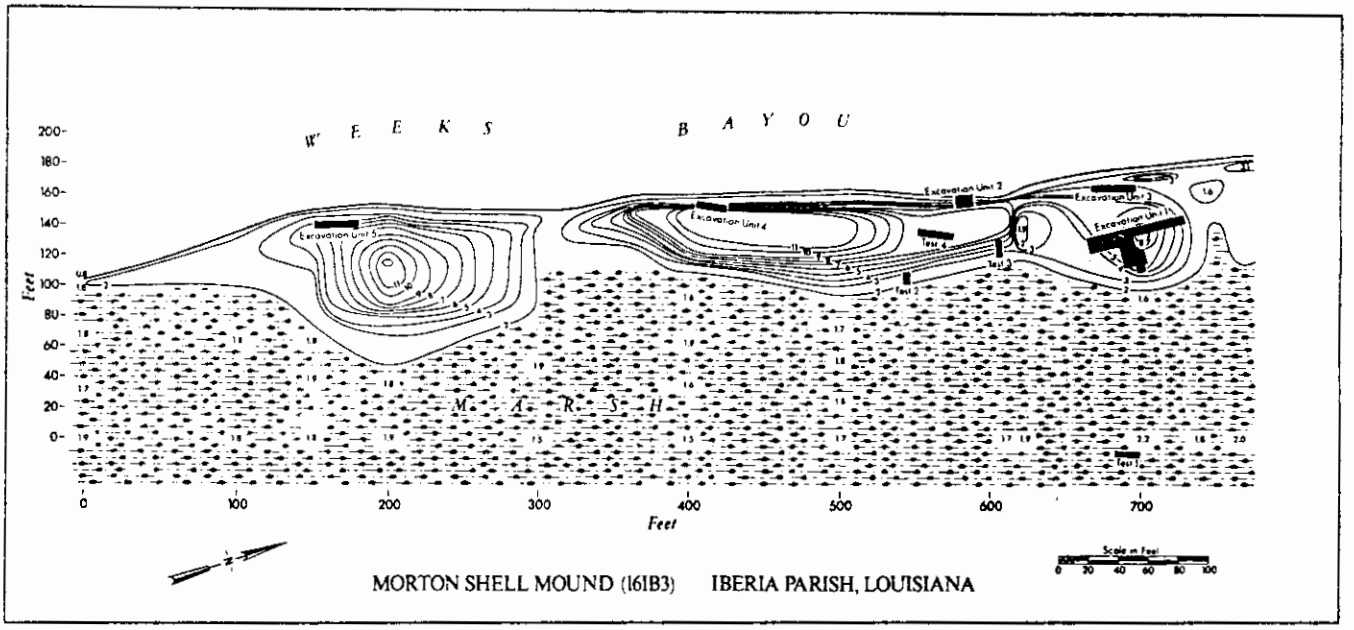


Figure 1.

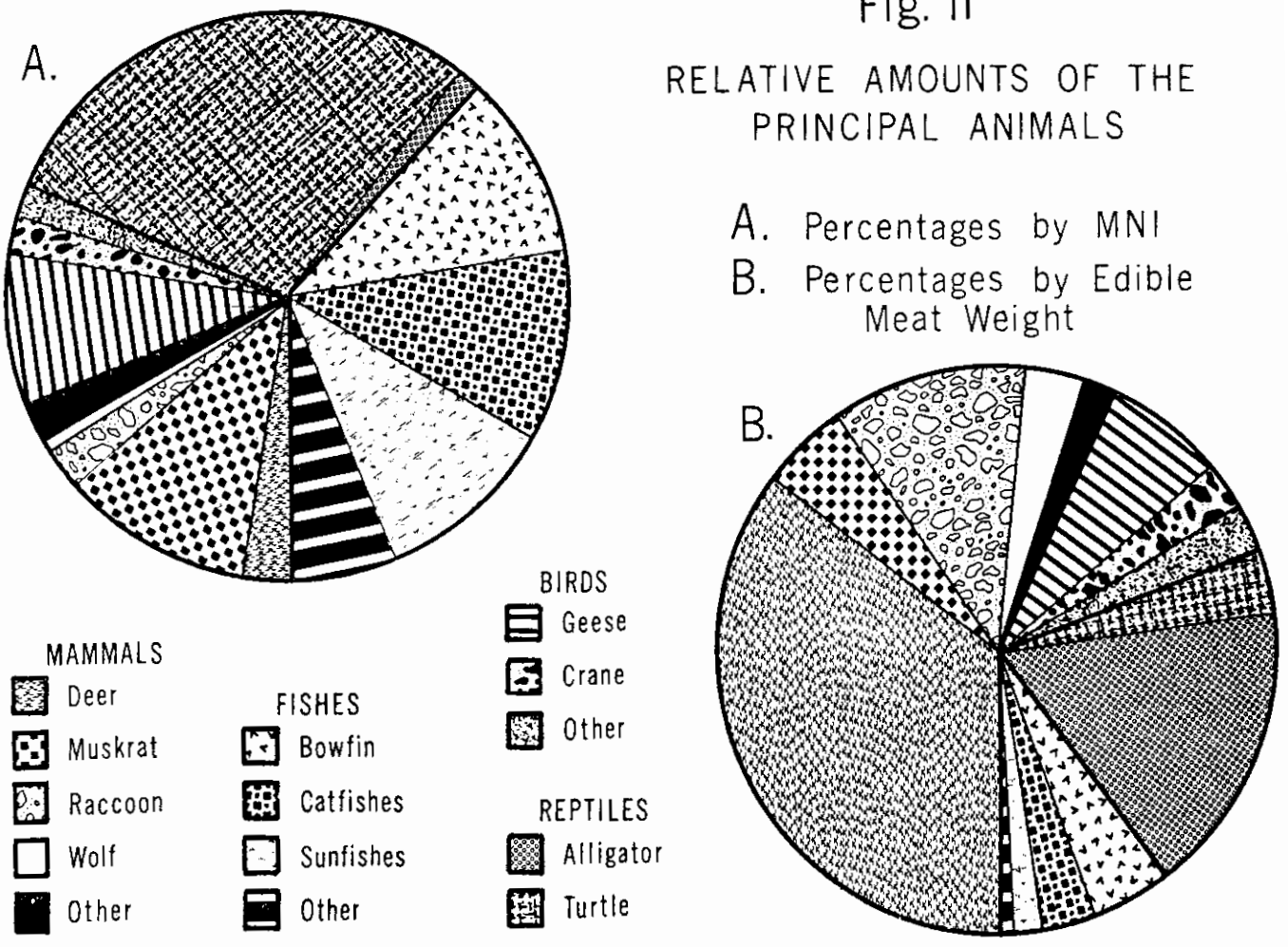
In Excavation Unit 1 basically pure Tchefuncte material appeared at a depth of 12 feet below surface and continued to 14 feet. At 14 feet excavation was discontinued because of the slumping of the loose shell walls resulting in unsafe working conditions. Excavation Unit 3 was located on the beach segment of the site west of Excavation Unit 1. In this unit Tchefuncte ceramics appeared at six feet and continued in decreasing amounts until 9.5 feet below surface. The first foot of this Tchefuncte material was embedded in highly organic peat, the rest in a clay. Primarily the peat but to a lesser extent the clay provided the medium allowing for the unusually good vegetal preservation at this site. All the material from the site was screened through ¼ inch mesh and matrix samples for later flotation were collected.

The zooarchaeological analysis of the bone recovered from the Tchefuncte levels at the site was undertaken by this author (Byrd 1974). The mammal, bird, reptile and amphibian skeletons in the Louisiana State University Museum of Zoology were used in the identifications of the archaeological recovered bones of these classes. The fish collection at the Tulane University's Riverside Research Laboratories were consulted in the fish identification. After identification, the minimum number of individuals or MNI was computed for each of the species. Following White's (1953) technique the number of individuals was then multiplied by the average amount of edible meat represented by each species. This resulted in an estimate of the importance both in terms of number of animals and amount of meat of each species in the Tchefuncte diet. Figure 2 illustrates the principal vertebrates recovered from the midden and their relative numbers. In terms of number of individuals deer, muskrat, and raccoon were the more abundant mammals, geese and

Fig. 11

RELATIVE AMOUNTS OF THE PRINCIPAL ANIMALS

A. Percentages by MNI
B. Percentages by Edible Meat Weight



crane important birds, turtle the principal reptile, and bowfin, catfish and the sunfishes the most widely exploited fishes. When viewed in terms of weight of edible meat, deer is by far the most important source of animal protein with alligator and to a lesser extent raccoon, geese, and catfish also important foods.

Because of the overwhelming impression shellfish makes in terms of gross volume, these invertebrates are often viewed as the principal or at least one of the most important foods of shell midden inhabitants. In an attempt to provide some perspective on this assumption Table 1 was constructed. This table illustrates the kilograms of meat represented by various volumes of shell refuses. For example, 22.4 kg. of shellfish meat would contribute 19,481.9 cu. in., 11.27 cu. ft. or 0.328 cu. yards of empty shells or a total of 24,398 whole clams to a midden. One deer represented in the midden by one humerus could contribute this same amount of edible meat, i.e. 22.4 kg. In addition, for every 100 grams of deer meat there is 21 grams of protein and 126 Calories while clams have only 12.6 grams of protein per 100 grams and 76 Calories (Watt and Merrill 1963). Shellfish, then, although without doubt a widely exploited food should not be viewed uncritically as an exceptionally important protein or Caloric source.

Man does not live by meat alone and undoubtedly plant foods also played an important part in the Tchefuncte diet. Table 2 lists the plant remains recovered from the Tchefuncte levels at the Morton Shell Mound. Some of the larger floral fragments, such as wood and nut shells, were recovered in the screens but the majority of the remains, especially the small seeds, were retrieved by the flotation of the extremely rich peat deposit. Numerous individuals associated with several institutions participated in the identification of the floral remains including Hugh C. Cutler and Leonard W. Blake of the Missouri Botanical Gardens, Claire A. Brown of Louisiana State University, the staff of the Feed and Fertilizer lab at Louisiana State University, and members of the Department of Zoology at the University of Southwestern Louisiana.

The presence of the remains of some of these species undoubtedly represent plants that grew on or around the site and due to natural causes were incorporated into the midden. These remains, although they do not indicate human dietary patterns, provide important information on the past vegetation in the area. The presences (Figure 3) of bald cypress (1), tupelo-gum (o), and the moister loving spearheads (p) and storaxes (n) suggest that during the period of Tchefuncte habitation the immediate environs of the site was a swamp rather than the marsh of today.

A number of the species recovered from the midden provides edible parts some of which were reportedly used by the historic southeastern tribes. These would also have been available to the Tchefuncte gatherers. Important among these edible species are hickory (k), acorn (h), and

TABLE I

Rangia cuneata MEAT WEIGHT CORRELATIONS

Kilograms of edible-meat	Volume cu. in.	Volume cu. ft.	Volume cu. meters	Number of clams	Equivalents
0.074	64.68		0.001	81	ave. (3) shell samples
22.400	19,481.90	11.27	0.328	24,398	(1) deer
0.896	779.28	0.45	0.013	976	(1) muskrat
7.840	6,818.67	3.95	0.125	8,539	(1) raccoon
1.568	1,363.70	0.79	0.023	1,708	(1) goose (Chen)
4.480	2,182.00	1.26	0.037	2,732	1 crane
9.677	1,397.00	0.81	0.240	10,540	(1) 6.5 ft. alligator
1.111	966.30	0.56	0.016	1,210	(1) 21 in. bowfin
0.116	101.31	0.06	0.002	127	(1) 10.7 in. catfish

TABLE II

FLORAL REMAINS

I

Scientific name	Common name	Identified by	MNS minimum number of seeds	Number of fragments	Type of remains
Taxodium distichum	Bald Cypress	MBG,CAB	0	72+	cone
Rynchospora sp.	Spearhead	CAB,FFL	44	1	seeds
Smilax cf. tamanoides	Greenbriers	MBG	32	5	seeds
Carya sp.	Hickory	MBG	0	over 50	nut shells
Juglans sp.	Walnut	USL	--	--	pollen
Salix sp.	Willow	USL	--	--	pollen
Quercus sp.	Oak	MBG	0	6	nut shells
Celtis sp.	Hackberry	FFL	0	1	seeds
Rumex sp.	Docks	CAB	33	0	seeds
Polygonum sp.	Smartweed	MBG,CAB,FFL	825	32	seeds
Prunus sp.	Wild Plum	MBG	3	0	seeds
Vitis cf. aestivalis	Grape	MBG	14	18	seeds
Nyssa aquatica	Tupelo-gum	CAB,MBG	26	3	seeds
Diospyros virginiana	Persimmon	MBG	3	0	seeds
cf. Styrax sp.	Storaxes	CAB	103	86	seeds
Viburnum sp.	Arrow woods, Haws	MBG	1	0	seeds
Cucurbita pepo var. ovifera	Squash-gourd	MBG,CAB	308	161	seeds & rinds
Lagenaria siceraria	Bottle Gourd	MBG	36	35	seeds & rinds
Umbelliferae	Parsley Family	CAB	15	107	seeds

Figure 3: Botanical Remains from the Morton Shell Mound. a) *Cucurbita pepo* (squash-gourd) seeds and rind; b) *Lagenaria siceraria* (bottle gourd) seeds and rind; c) grape; d) haws; e) plum; f) persimmon; g) smartweed; h) acorn; i) greenbrier root; j) hackberry; k) hickory; l) bald cypress; m) docks; n) storaxes; o) tupelo gum; p) spearheads.

the fruits of the plum (e), grape (c), persimmon (f), and haws (d) and the roots of the greenbrier (i).

In addition to these naturally occurring native plants, the Tchefuncte people also had at their disposal the squash-gourd (*Cucurbita pepo*) (a), and the bottle gourd (*Lagenaria siceraria*) (b). Both these plants were cultivated by the historic southeastern tribes.

The squash-gourd (*Cucurbita pepo*) or squash originated in Central America, probably in northeastern Mexico (Whitaker and Davis 1962). During early times it may have been a weed or camp follower but by 4050 B.C. it was undoubtedly cultivated.

Whether cultivation is necessary for the survival of *Cucurbita pepo* in the southeastern United States is the subject of some debate. Whitaker and Davis (1962) believe that some sort of cultivation is necessary for the survival of the *Cucurbita* sp. They state:

> So far as is known, bona fide specimens of the wild counterparts of the cultivated species have never been collected (Whitaker and Davis 1962:1).

Other authorities appear to favor a local ancestor for the southeastern squash. Botanists point to similarities between *Cucurbita pepo* var. *ovifera* and an almost identical plant, the weedy wild *C. texana* of central and southern Texas (Whitaker and Davis 1962:9). Whether the *C. texana* is actually a truly wild plant and the ancestor to the *C. pepo* or has "escaped" from cultivation, is still the subject of debate. It would seem then, based upon the necessity for cultivation for the squash-gourd, the antiquity of this cultivation, and the discontinuous dis-

Figure 4.

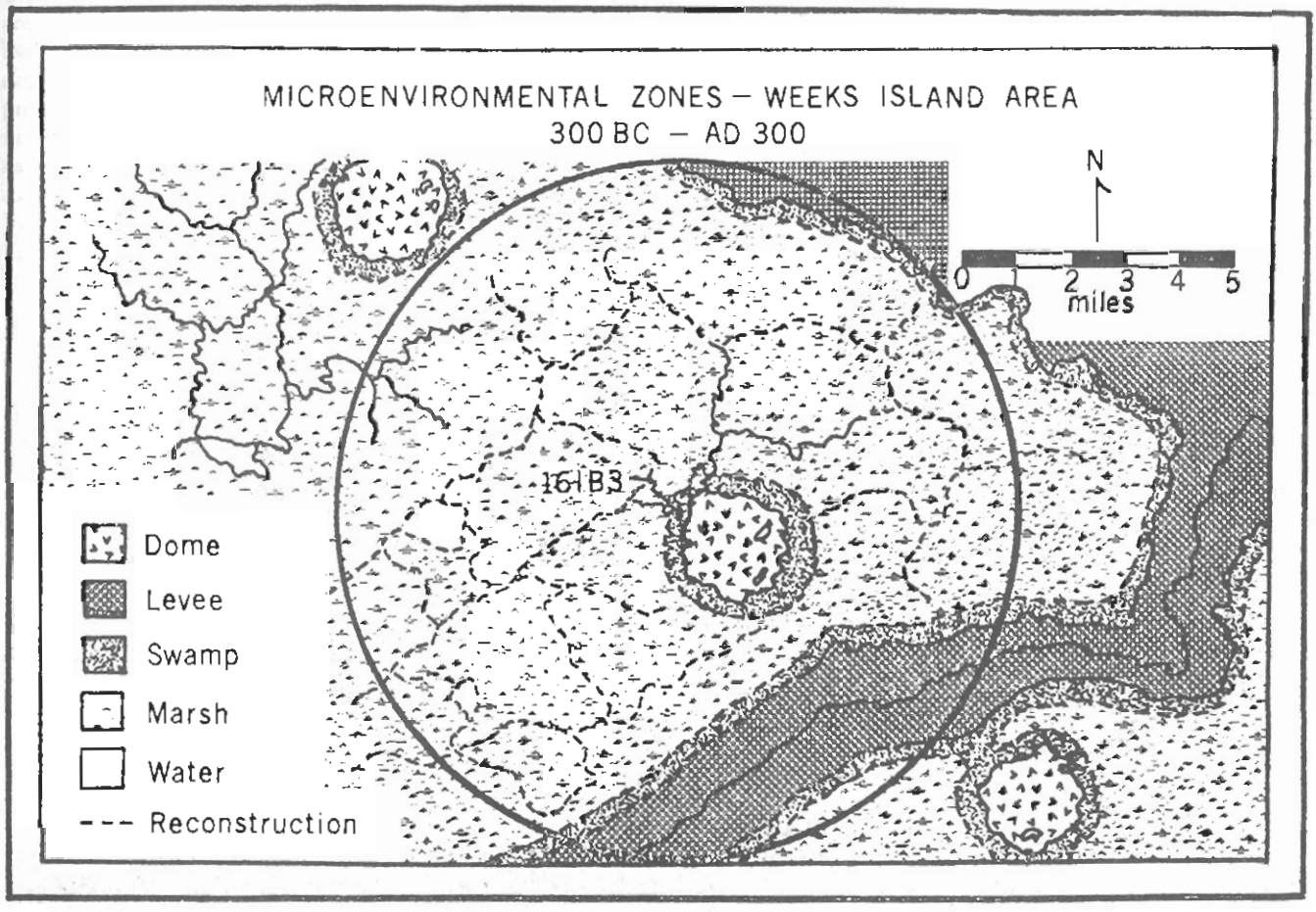


TABLE III

AVAILABILITY OF ANIMALS
BY ZONES

	acres per zone	deer[1] per zone	muskrat[2] per zone	mink[1] per zone	rabbit[1] per zone	raccoon[1*] per zone	blue goose[3] per zone	box turtle[4] per zone
Dome	2,010	175	——	——	402	2,000	——	20.096
Cypremort levee	8,582	895	——	——	2,047	10,200	——	102,336
Teche levee	1,651							
Swamp	6,598	132	——	1,980	1,320	6,600	——	——
Marsh	59,654	963	715,853	542	——	5,400	9,545	——
TOTAL		2,165	715,853	2,522	3,769	24,200*	9,545	122,432

* Based on ratio - questionable

[1]St. Amant 1959
[2]O'Neil 1949
[3]Lowery 1952
[4] Carr 1952

TABLE IV

PROPORTION OF AVAILABLE MEAT (SERVED AREA)
OBSERVED MEAT - WEIGHT EQUIVALENTS FROM 16IB3

	in served area		Morton Shell Mound	
	kilograms	%	kilograms	%
deer[1]	48,712.5	5.0	147.70	50.6
muskrat[2]	644,267.7	66.1	20.60	7.2
mink[1]	1,136.7	0.1	0.45	0.2
rabbit[1]	3,392.1	0.3	1.34	0.5
raccoon*[1]	190,575.0	19.5	47.00	16.3
blue goose[3]	15,033.4	1.5	23.5	8.2
box turtle[4]	22,037.8	2.3	8.6	3.0
fishes[5]	45,189.0	5.1	41.2	14.1
TOTAL	970,344.2	99.9	642.4	100.1

[1]St. Amant 1959
[2]O'Neil 1949
[3]Lowery 1952
[4]Carr 1952
[5]Rostlund 1952

*questionable

tribution of the wild gourd, that horticulture was necessary.

At the Morton Shell Mound a total of 308 *C. pepo* seeds and 161 seed or rind fragments was retrieved during the excavation and later flotation. The squash has a relatively shallow root system and requires fertile well-drained soils. It does not tolerate wet, poorly-drained areas (Whitaker and Davis 1962:145) and therefore would not grow in the peat area where its seeds were found. Thus, the plants grew elsewhere and, when ripe in late summer, were gathered and the desired edible parts consumed, the unconsumed refuse, the seeds and rinds, thrown into the low, wet (peat) area.

The bottle-gourd is the other historic cultigen found with the Tchefuncte material. This plant can grow wild but the established practice of cultivating squash and the occurrence of squash and bottle gourd in the same historic garden plots seems to suggest that this plant might have been cultivated also.

In an effort to go beyond the simple recording of raw data and to learn about the actual procurement patterns of the Tchefuncte people, an attempt was made to examine Tchefuncte selective hunting practices. This required, first, the estimation of the served area, i.e. the area used or exploited by the people living at the site (Higgs and Vita-Finzi 1972:28). Ethnologically based imput-output analysis demonstrates that for a hunting and gathering economy a threshold of productivity is reached at a distance of 10 km. from the home base (Lee 1969). Since the Tchefuncte relied primarily on hunted and gathered foods this 10 km. estimate is employed here in the determination of the Tchefuncte exploitation sphere.

It is not only the size of the exploited area but also the types and extent of the various ecozones within this area that must be considered in the reconstruction of selective hunting practices. The composition of the various ecozones, i.e. their plant and animal components, were presumably not much different than today. The size and extent of these various zones, however, has changed radically due to subsequent post-Tchefuncte land erosion, subsidence and deltaic change. Although it is impossible to determine the exact ecology of the area during the Tchefuncte occupation Figure 4 represents a partial reconstruction. Geomorphological and botanical studies form the basis for this reconstruction.

Having determined the extent of the various ecozones within the served area and by utilizing data on animal population densities, a method similar to that employed by Munson, Parmalee and Yarnell (1971) is used here in the reconstruction of the natural carrying capacities of the various zones within the served area (Table 3). This was done by estimating the size of the various zones within the served area and then determining the carrying capacities for the various zones with respect to certain animals. The carrying capacities were then computed from vegetation type-species density correlations estimated by zoologist for certain populations within Louisiana. Assuming that all species could be taken with equal ease and that the species were hunted or gathered according to their availability one would expect the percentage of availability to equal the percentage of occurrence based on the remains from the site (Table 4). As can be seen from the comparison of the relative percentage of these species meat weight equivalents in the served area and in the midden material this is not the case. The occurrence of deer at the site is about 10 times, the blue goose almost six times, the box turtle 1.3 times and fishes almost 2.8 times their expected frequency. The occurrence of the mink and rabbit reflects more or less their availability. The raccoon and muskrat, on the other hand, are less than their expected frequency. Based on these estimates, then, the Tchefuncte people selectively exploited the deer, blue goose, box turtle, and fishes, took the mink and rabbit when available, and more or less ignored the muskrat and to a lesser extent the raccoon.

Since this method of determining selective hunting practices is based on a number of assumptions, i.e. the size of the served area and the extent of the various vegetation zones and their animal carrying capacities, considerable error could be introduced into these calculations. For this reason only the extremes should be excepted uncritically. Deer was undoubtedly hunted above their expected frequency and muskrat considerably below it. The trends in the exploitation of the other animals considered should be viewed with the possible sources of error in mind.

To summarize the data indicate that based on the material recovered from Excavation Units 1 and 3 at the Morton Shell Mound the Tchefuncte people of this area were primarily hunters and gatherers although they did grow squash and possibly bottle gourd. They selectively exploited deer, blue goose, box turtle, and fishes relying on the deer for their major animal food source. Shellfish were also collected. In addition these Tchefuncte people gathered a number of different plants including wild plum, persimmon, and hickory nuts.

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William O. Autry, Jr. and Thomas C. Loftfield

Species Content of North Carolina Coastal Shell Middens and Their Cultural Implications

Introduction

An archaeological survey undertaken along the southern coast of North Carolina (Figure 1) during March and April 1974; and also during several years preceding that date by Loftfield and Tucker Littleton, brought us to the observation that shellfish species contained within midden deposits along the White Oak River and in surrounding areas between Capes Lookout and Fear related to the immediate sources of such species near the middens. Loftfield offered the hypothesis that as fresh water sources increased, i.e., as one moves up the rivers and away from the tidal flows and

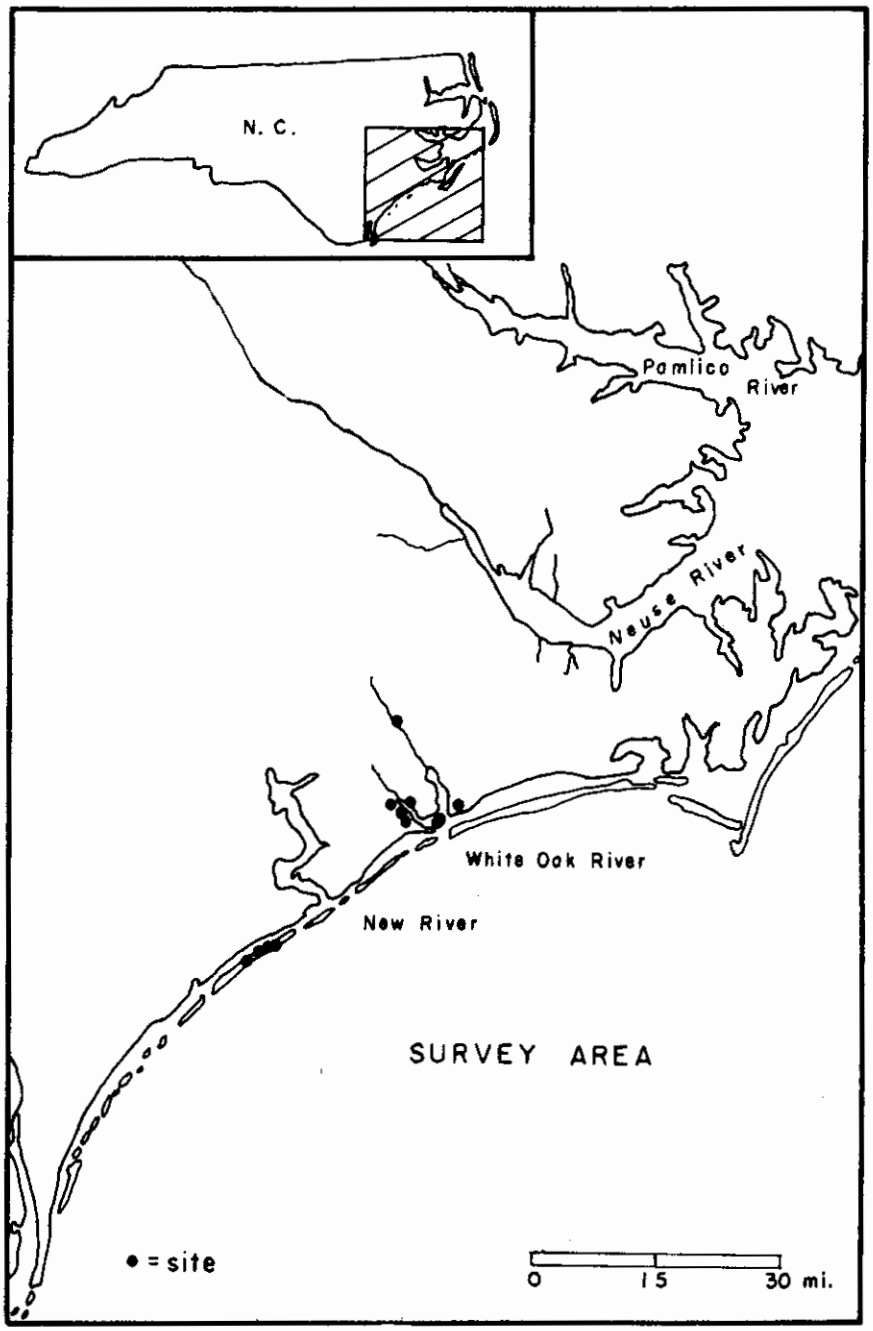

FIGURE 1: Survey Area of Coastal North Carolina

salt water intrusions, that the midden content of the species *Mercenaria mercenaria linne* [clam] would approach 100 percent of the midden shellfish species content. The corollary, of course, would be the expectation to find greater amounts of species tolerating higher salinities, e.g., *Crassostrea virginica gmelin* [oyster], in the sounds and ocean areas. Marine biologists, working in the area of Morehead City, North Carolina, have suggested that four factors, including (1) water temperature, (2) substratum, (3) number of predators, and (4) water salinity, are important in determining the availability of shellfish in any particular locale. Wells (1961: 258-261) has shown that salinity tolerance for lower concentrations of NaCl is best with *Mercenaria* and that there appears to be a significant correlation between salinity tolerance and the geographical distribution of shellfish. Of the four factors affecting shellfish availability he concludes that salinity is the most important and controlling factor. Once we had proposed that there was some correlation between local salinities and the shellfish in any midden deposit; the next step was to examine the archaeological sites in areas of varying water salinities in order to determine if the middens within particular areas would reflect different ratios of shellfish midden content.

We surmised that at least five factors including, (1) cultural preferences, (2) technological innovations, (3) seasonal exploitation differences, (4) macroenvironmental shifts, and (5) shellfish habitats (based primarily upon salinity), would be responsible for the variations in shellfish content within any particular midden deposit. The middens analyzed within this survey date from the Woodland period. No Archaic middens are known or recorded from this region of the Carolina coast, and in all probability, the Archaic shell middens have been inundated by sea level rise within the last 4,000 years. In addition to this negative evidence, several of the Woodland sites now lie within the intertidal flats suggesting some sea level rise that would have covered the earlier middens. Even though we have no radiocarbon dates from the coast, and since the entire group of shell middens falls within the Woodland period [guess dates 1000 B.C. through A.D. 1713]; we feel that technology can be held constant in terms of shellfish exploitation techniques. At least, there is no suggestion, i.e., new artifact categories, in the archaeological record to indicate new technology. The coastal macroenvironment can also be accepted as a constant for this period except for slight rises in sea level which would tend to increase areal estuary situations. Cultural preferences, however, are another matter. Since we do not have any way of asking the prehistoric inhabitants about their particular tastes, and we can not reasonably assume that these tastes were in any respect "constant"; we come to a small hurdle which should not be side-stepped. Braun (1974: 582-596) has made, in another coastal situation, but one emphasizing evolution of cultural adaptations, a case for the primacy of ecological factors as opposed to cultural factors in the adequacy of explaining the changing patterns of shellfish exploitation. In light of his conclusions, and he is careful *not* to deny the fact that internally initiated cultural changes may have taken place during the transition from Archaic to Woodland times (1974: 594), we would suggest that tastes, or cultural preferences, should be assigned a secondary role to those of ecological factors. At this point, two variables remain to be examined, seasonality and the relationship between shellfish habitats and shellfish exploitation. Before considering these two variables we should like to turn to the ethnohistorical accounts for coastal exploitation because the contact situation provides interesting data in the evaluation of these variables.

Based upon the accounts of the Roanoke Island colonists Loftfield (1975: 100-111) has reconstructed the seasonal subsistence pattern of the Roanoke area Algonquians. He cites additional evidences for Algonquian groups living along the sounds of North Carolina at least as far south as Bogue Inlet [White Oak River] and perhaps even further south. His summary of subsistence activities is as follows:

> Beginning in the Spring they built and repaired their fish weirs in which they trapped the anadromous fish running up the rivers to spawn. This allowed the Indians time to till and plant their gardens while providing a large source of high quality food. This season lasted from February to May, but by late May when the fields were all planted the fish had stopped running and few other sources of food were available. In this season, (late Spring to early Summer) which in many interior areas was a starving time for the aboriginals, there were as yet no planted crops ripe enough to eat, few edible wild plant foods, and the hunting was bad. As a consequence the Indians dispersed to the shores of the salt water sounds and estuaries to subsist on gathered shellfish, other seafoods and what little meat could be had from the hunt. In midsummer the people returned to their villages to begin harvesting the planted crops and wild plants as they came into season. This activity lasted in various forms until December at which time they began to eat the vegetable foods which they had stored and meat from hunting (1975: 107).

Based upon this ethnohistoric description and reconstruction, and archaeological data to be evaluated in a subsequent section, it is clear that seasonality must be considered when evaluating archaeological shell midden remains. First, if the occupations are primarily seasonal, then one would expect to find that the closest shellfish habitat would be extensively exploited while surrounding habitats might be utilized in varying lesser degrees [equal access to all available habitats is assumed]. However, if the occupation were a permanent village, then one would expect to find that several habitats were being extensively exploited throughout a longer period of occupation, and indeed, that the village would probably be located in such a place as to maximize exploitation of several microhabitats [equidistant from several such habitats or centrally located].

Loftfield (1975) also suggested that there is a correlation between the Algonquian groups and shell tempered pottery along the sounds and estuaries [Figure 2: White Oak series is shell tempered]. Since the primary type of pottery found upon the sites in this survey was shell tempered, and such pottery is late in time, then there would appear to be some ethnohistoric suggestions that many of the sites may be seasonal. Archaeological survey and testing also tend to confirm this suggestion since many of the middens are quite small. Thus, we can conclude that many of the shell middens examined in this survey were probably the products of summer gathering.

After this brief treatment of four variables: cultural preferences, technological innovations, seasonal exploitation, and macroenvironmentals shifts, we continue to the examination of the final variable, shellfish habitats as a determinant of midden shellfish species content.

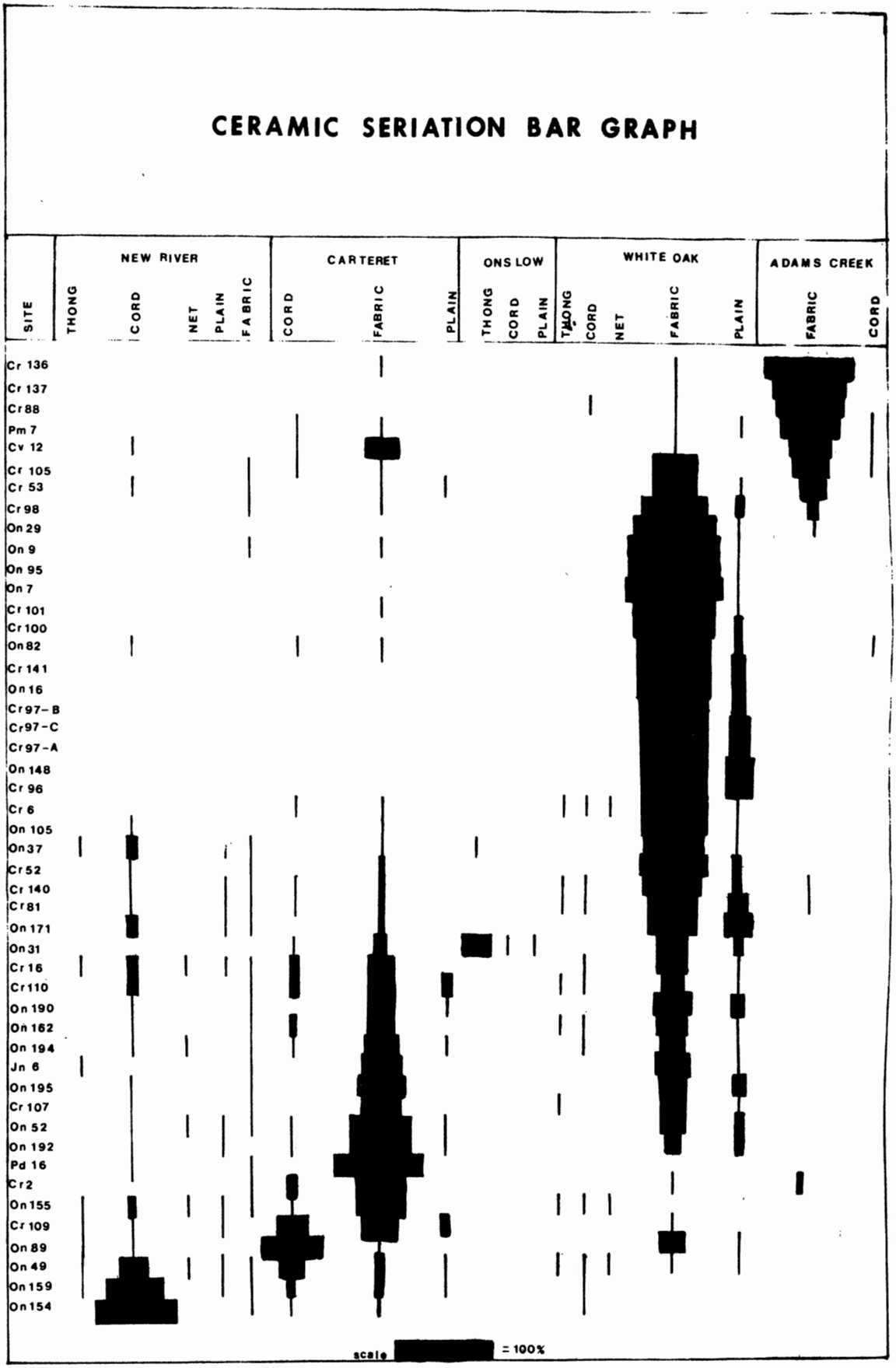

FIGURE 2: Ceramic Seriation

Problem and Method

As previously stated, the problem encompasses the distribution of shellfish as related to salinity factors, i.e., habitats, and the exploitation of these shellfish by aboriginal populations. *Hypothesis:* If the salinity of the water within any habitat is the primary ecological variable controlling the availability of any species of shellfish to the Indians in that habitat, then the shellfish species in any midden deposit within that habitat will reflect the shellfish species available within the salinity ranges provided in that habitat. Thus, if the hypothesis is valid and there is a correlation between water salinity and midden shellfish content; then various habitats should be definable (in space) based upon water salinity, and these defined habitats should reflect uniformity of shellfish species content in middens. In order to test this proposal, samples, collected randomly from the surfaces of shell middens, were tabulated by species in order to determine the percentage of each species represented in that particular midden [In Figure 4]. A series of hypothetical shellfish harvesting areas (habitats) was proposed based upon salinity factors in surrounding waters. The mean of each area for percent *Mercenaria mercenaria* by weight was computed and analysis of variance (ANOVA) was computed in order to determine if any two of the means of the hypothetical areas were equal.

Before continuing to a discussion of the results of this analysis, we feel that a more detailed description of our methods is required. First, the field collections are discussed and then, we include some remarks about problems and limitations upon the techniques employed. In sampling shell middens, we employed the following procedures in order to assure a random sampling of each midden:

(1) Midden defined by examination of shell distribution on the surface.
(2) Fifty foot tape placed along the long axis of the midden, in most cases this was the North-South axis.
(3) Table of random numbers consulted to generate numbers which when added together sequentially provided a series of points along the tape.
(4) "Dog leash" technique utilized with stake placed at point defined by random numbers and a circle with a radius of 1 foot was traced upon the surface of the ground. (Area of each circle = 3.14 square feet.)
(5) All pieces of shell which were visible within the unit, or which touched the interior of the drawn circle, were collected for tabulation by species. At least five collection areas were generated for each midden using this technique.

Middens in this section of North Carolina tend to be small, rarely over 70 to 80 feet in diameter, rather shallow, and in all sampled cases, well plowed. The small size of each midden, although there may be many within a plowed field, suggests that each such deposit represents an accumulation over a short period of time. The uniformity of ceramic types within many of the middens also tended to lend some support to this idea. The plowing tended to make the shell content of each midden homogeneous from top to bottom so that a random sample should reflect the midden contents without the bias of small concentrations of shell that might otherwise have been located throughout the midden. In the original analysis, samples from excavated sites were utilized in order to increase the sample size to 41 sites; but these samples were collected through screening in excavated levels and flotation, so sample sizes were not uniform. We also encountered problems with site reoccupations in some of these sites, reflected in stratified levels with sherds of different types. Thus, in the final analysis, reported here, we decided to utilize only the 18 sites in the sample from surface collections. Since this number is so small, we can only consider these results to be preliminary and agree that larger samples must be collected before we can make more reliable statements.

The second step was to define, or propose, hypothetical, geographic areas that would reflect single shellfish collecting areas (habitats) based upon water salinities. Each site was placed within a particular area based upon its location. The following five areas were initially proposed:

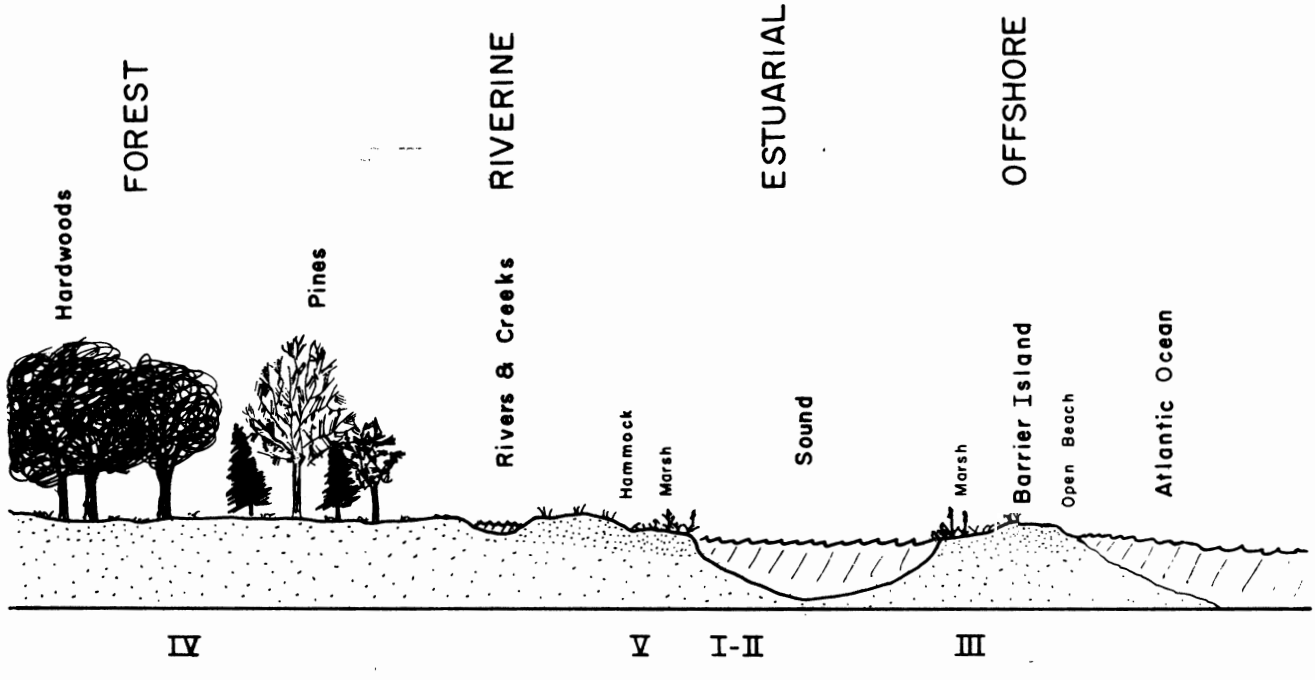

Figure 3: Coastal Microhabitats

I. Sound
II. Sound near fresh water source (springs)
III. Offshore sound (barrier island)
IV. Upriver
V. Sound with river/creek orientation.

The assumption was made here that each area reflected different salinities in the shellfish harvesting areas; however, during the analysis it was discovered that Area I was in all respects equal to Area II as defined since it appears that the presence of small springs in the area would have little or no effect upon local salinities. Thus, these two proposed areas were lumped in order to form a single area, (I-II). Figure 3 gives these shellfish harvesting areas imposed upon a general schematic diagram of the present habitats along the Carolina coast in the White Oak region. As one moves upriver there are decreasing amounts of oyster within the shell middens, lower water salinities, and increasing amounts of clam. Thus, in order of decreasing salinity, the areas run sequentially from the highest, III, (I-II), V, to lowest, IV. We have also classified the habitats of the coast into four groups, Forest, Riverine, Estuarial, and Offshore, with each area representing or containing specific primary resources. Some specific examples, in subsistence are given below:

Forest — deer, black bear, turtle, turkey, squirrel, fox, rabbit, raccoon, snakes, frogs, freshwater fishes, hickory nuts, other wild plants, and clams at the edge of the tidal range.

Riverine — deer, rabbit, freshwater and anadromous fishes, wild plants, clams, etc.

Estuarial — fishes, crabs, few clams, oysters, migratory birds, possibly a few deer, marsh plants, shrimp, etc.

Offshore — oysters, crabs, fishes, perhaps a few migratory birds.

Even without detailed lists of available resources for each habitat, it is not difficult to see that hammocks would be favored locations for settlements in order to exploit all the zones. Preliminary analyses suggest that permanent and continuously reoccupied sites are located in hammocks. The barrier island sites, with limited resources, are smaller and suggest short-term, probably seasonal occupations. These offshore sites also provide evidence of reoccupations based upon buried middens and various sherd tempers, but as yet there appears to be no conclusive data for permanent settlements on the islands in the White Oak region. This, however, may be a function of sampling error. One of the features excavated at On v 195, on Topsail Island, did yield evidence of corn, bean, and squash cultivation, but we have no data to either suggest that it was grown there or brought out to the island. Other excavated features contained,

Region:	(I - II)	III	V
N = 18 Surface data: Percent clam by weight. (Sites)	94.9 63.2 62.8 51.9 51.4 35.7	32.5 20.8 13.5 13.4 5.3 2.5 0.6 0.6	36.6 28.7 27.2 20.0
Total	359.9	89.2	114.5
$\bar{x}$	59.98	11.15	28.62
σ	18.09	10.55	5.91

ANOVA	S.S.	d.f.	m.s.	F
Between	8,225.56	2	4,112.78	
Within	2,995.66	15	199.70	
TOTAL	11,221.22	17		F = 20.594

F is significant at $p < 0.001$.

Percent Clam by weight (Plot of standard deviations):

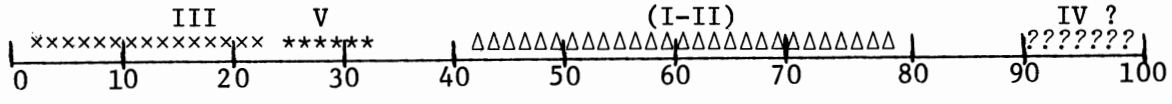

FIGURE 4: ANOVA Results

besides shellfish and fish remains, only hickory nut shells. Estimates for the percentage of yearly diet provided by agriculture are nothing better than pure speculation at this time, but we would venture a wild guess as to certainly *no more than 25%.* Smith and Strachey (Tyler 1907) give an estimate of 20% from fields and the remainder from gathering. In summary, subsistence would appear to be very much oriented towards gathering. The sites on the barrier islands, and in some areas along the sounds, appear to be seasonal occupations based upon their size, homogeneity of ceramic types, and ethnohistoric accounts provided by the settlers of Roanoke Island to the north. Based upon the suggestion that many of the small shell middens are seasonal occupations, occurring from late Spring to early Summer, there would tend to be even greater support for maximal use of local resources from the habitat in which the sites were located. Perhaps even particular locales were even favored by particular groups because of the immediate availability of "preferred" shellfish. As we intend to show, this accessibility to particular shellfish was a function of the marine habitat.

Analysis and Tentative Results

Once the sites were placed within the proposed shellfish gathering zones (habitats), based primarily upon salinity factors, then analysis of variance (ANOVA) was computed for the sample in order to determine if the means for the proposed shellfish areas were equal. If the means were found to be equal, then the proposed shellfish zones and sites within them did not reflect any regional differences in the relationship between site location and the shellfish gathered by the Indians or that the Indians were extensively exploiting several habitats in these primarily seasonal sites. Figure 4 provides the tabulations and results of the ANOVA analysis for 18 sites. Note that Area IV is not represented in the calculations. Since we have only the single tabulated example from this region, we decided not to include it in the computation of the F statistic. [However, when included, Area IV = 90.0 with Areas I and II treated separately, then F = 24.347 and is significant at $p < 0.001$.] The ANOVA values given in Figure 4 indicate that the means of the various proposed regions are significantly different at the $p < 0.001$ level. This indicates that the proposed shellfish gathering areas are valid constructs, and that ecological factors are primary in the determination of the shellfish contents of any particular midden.

In summary, the results support the hypothesis that the shellfish species within any particular midden deposit are related to the particular habitat in which that midden is situated and more specifically, that the salinity of the water tends to be a primary factor in the determination of available shellfish resources. Since most of the middens examined are thought to be seasonal, short-term occupations; then it only follows that the inhabitants of those sites were eating what was close at hand. From this observation we might even speculate that the Indians were locating in areas in order to acquire particular shellfish species according to cultural preferences or "tastes," but additional data are needed before more far reaching conclusions can be generated.

Acknowledgements

Many thanks to Tucker Littleton, resident of Swannsborough, North Carolina, whose continuing interests in the archaeology of the Carolina coast made this study possible. Thanks are also extended to Joffre L. Coe of the Research Laboratories of Anthropology of the University of North Carolina in Chapel Hill for his assistance and support of the archaeological reconnaissance in the White Oak region.

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Elizabeth S. Wing

Role of Zoology in Archaeological Research

Zooarchaeology has only come into its own in about the last two decades. Previously an archaeologist who wanted the animal remains that were uncovered during excavation, identified, sent them to a specialist either in the study of mammals or birds, etc. The specialist would in time provide the archaeologist with a list of the animals identified. This was neither satisfying to the biologist who had other projects of more consuming interest, nor to the archaeologist who wanted to know a great deal more about man's use of animal resources.

In the past 20 years, however, a great many changes have taken place to improve this situation. A number of people have started to specialize in the interdisciplinary work of Zooarchaeology and are not only skilled in the identification of fragmentary animal remains but also imaginative in the interpretation of these data. Faunal material from each site will provide differing challenges and opportunities. Studies of such remains may result in a better understanding of the past ecology in the vicinity of the site or seasonal occupation of the site. Human selection of the available resources may be determined. Careful scrutiny of the bone fragments themselves may provide clues that will make it possible to reconstruct the hunting, butchering, and cooking techniques that were used. Evidence for uses of animals for purposes other than food, as, for example, the use of bone for tools or ornaments, may also be found. Insight into animal domestication and food production may also be gained. Clearly, to take full advantage of the clues offered by these materials, both biological and anthropological information must be drawn upon for the reconstruction of prehistoric resource use.

This interdisciplinary nature of Zooarchaeology depends most heavily on certain sub-fields of both Zoology and Anthropology. In Zoology, for example, comparative osteology and taxonomy are of basic importance to the identification of vertebrate remains. In order to understand the problems faced by the hunter or fisherman who caught the animals whose remains were identified, it is important to have information about animal distribution, ecological preference, life cycle, and behavior. These types of information must be drawn upon to reconstruct season, place, and methods of hunting and fishing. Likewise, anthropological information must be considered for reconstruction of past use of animals. Most basic to an understanding of the faunal material are the excavation techniques used and the associated cultural remains. Understanding of human patterns of resource use, including techniques of hunting, fishing, agriculture, herding, and butchering may be used to augment what is known about the species represented among the archaeological remains.

As must be clear from this brief outline of the potentials and objectives ot zooarchaeological research, the field work must be designed to gether zoological and anthropological data equally. The zooarchaeologist must work closely with all phases of the archaeology project in order to integrate all the information recovered and draw conclusions that are more than the sum of the parts.

The basic tool of the trade is a comparative skeleton collection. This is time consuming and increasingly difficult to accumulate but a basic collection of skeletons can be made by preparing animals killed along the road. In doing this, however, care must be taken to abide by state and federal wildlife regulations. Possession of rare or endangered species, migratory birds or marine mammals is illegal without a permit even when they are picked up dead. In every faunal assemblage there will be rare species represented by only a few bone fragments and these can be taken to a museum collection for identification. If identifications are going to be done in the field a comparative collection pertinent for identification of the bulk of the material must be available. If, on the other hand, detailed identifications will only be done at the home laboratory where comparative material is available then the zooarchaeologists must be sufficiently familiar with the assemblage to make provisional field identifications so that pertinent biological information can be gathered about at least the most important species in the assemblage.

Assessment of the ecological zones in the environs of the site must include survey of the land forms, structural geology, soils, present plant communities and animal populations. With the building boom and other changes wrought in the environment by man, it is often difficult to visualize the land as it was prehistorically but the objective of the study of present ecology must be to gain greater understanding of past conditions.

The source of the faunal assemblage must aways be kept in mind. For this reason, exact excavation techniques must be known for the correct interpretation of the faunal remains. For example, as small a detail as the size of screen used may make a very significant difference in the animal species recovered. The biases introduced by use of different recovery techniques have been amply discussed by R. Marrinan, 1975, and S. Payne, 1972, and the problems of excavation bias is familiar to all archaeologists. Biases can also enter the problem through careless handling of faunal materials, making some bones too fragmentary to identify. It may also be important to know precisely where bone was recovered relative to other cultural and human remains.

In some areas it is possible to gather ethnographic information about subsistence farming, hunting, and fishing by indigenous peoples. Although these opportunities are rare, information gathered about subsistence techniques is often most enlightening. Ethnographic study provides the opportunity to get information that is rarely possible to

reconstruct from archaeological remains, such as beliefs about the powers of certain animals or their place in the myths and cosmos of the people. Naturally, caution must be used in application of the ethnographic analogy but it is important to remember that all people have had beliefs about animals familiar to them even though the evidence of these has not survived. More concrete facts, such as precisely where and when deer are easiest to hunt, the most successful techniques for catching snook, what fibers can be used for making netting, and what parts of the deer skeleton are best used for making tools, may provide suggestions that can be incorporated in the interpretation of bone tools and other animal remains.

To reiterate, all possible avenues must be explored in attempts to reveal the network of interrelationships that exist in subsistence economies. The student must be prepared to draw upon a wide variety of sources in their attempt to unravel subsistence networks.

The objectives of a training program in Zooarchaeology should be concerned as much with teaching the archaeologist the potentials, as well as limitations of zooarchaeological research as with the specialist. The specialist in zooarchaeology must, of course, follow an intensive program including practice in the identification of a variety of faunal samples and formal instruction in ecology, whole animal biology, archaeology and ethnology.

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Rochelle A. Marrinan

The University of Florida's Field School Program: The Student Point of View

Overall, this paper serves to communicate the attitude of an individual student regarding the problem of educating archaeologists and one answer to this problem – the field school. In particular, an examination is made of a field school in one institution to point out the difficulties, advantages, and disadvantages such a program may have.

Many students are drawn to archaeology through collecting. Frequently the individual already has a background of "digging". In many cases, an attitude of monetary value is prevalent. Some students have their initial introduction to archaeology through anthropology courses. How should a novice receive an archaeological education? This is the primary question. There is general agreement that classroom descriptions of methods and techniques are inadequate; that field exposure and practice of these skills is required. It is my belief, having personally experienced this process, that the most ideal situation for learning and practicing archaeological techniques is the field school. Let me hasten to add that I do not equate field *work* with field *school.*

A field school is an introduction to professional archaeology. In the United States, departments of social science (particularly Anthropology, Cultural Geography, Sociology, and combinations of these) are largely responsible for the archaeological curriculum. This brings up another point of concern. Archaeology has a history, theories, ethical code, and an extensive body of published literature. It is not sufficient merely to educate a potential archaeologist in field methods. Rather, the curriculum must integrate physical methods and techniques with intellectual exposure to information from archaeology and the social sciences.

A field school is limited by the availability of personnel and equipment. A financial commitment for faculty time and equipment is required of the sponsoring institution. An archaeological site conducive to excavation (proximity, condition, potential for study, and relative size are all pertinent considerations) is requisite. Finally, a number of students sufficient to warrant a field school and support the commitment of the institution is required. The latter is usually no problem but has been from time to time.

Some institutions lack qualified personnel and should not consider either urging unprepared faculty members to teach excavation methods or encourage weekend or holiday "digs". Excavation and artifact collection enjoy wide interest and reception. Such an emphasis actually does more harm to public conceptions of archaeological goals. Instead, much thought must be given to the ability of the institution to support analysis of the material, communication of the information gathered, and subsequent curation of the excavated material.

Potentially a field school's most critical limitation is the teaching environment. Only faculty members properly prepared and motivated to teach students in a field situation should undertake a field school. Some very important criteria for such persons include familiarity with a wide range of excavation methods and techniques, commitment to communication of information, intention to conserve and curate excavated materials, an interest in teaching novices, and a liberal amount of patience.

Field schools are productive. In terms of the individual student, one field school experience is usually an adequate initiation. I do not imply that all a student's needs are met by a single field school. Certainly, a wide range of site types, excavation methods, and physical settings is desirable to add to a student's knowledge and skill. However, the ability to be a knowledgeable and contributing participant of subsequent excavations has been gained. For the student who does not intend to pursue archaeology as a career, a more representative picture of the methods, goals, and problems of archaeological excavation and interpretation has been gained.

The University of Florida Archaeological Field School is generally an annual offering (Spring) of the curriculum of the Department of Anthropology. Florida has had a field school for over twenty years but the remarks in this paper are confined to the years since 1964. Since that time, 180 students, an average of 16 per field school, have attended. The school involves the time of one professor and both undergraduate and graduate students. Anthropology students with an interest in a career in archaeology are preferred but students from other anthropological subdisciplines, other departments, and other colleges are accepted. Admission is accomplished by arrangement with the professor teaching the field school; usually a brief, informal interview. In recent years, a waiting list has been maintained.

Thirteen credit hours are granted for the field school; 8 for the daily field sessions and 5 for the classes held in the evening twice weekly. This credit arrangement allows a student full-time status during the quarter in which the field school is taken. Additional hours may be arranged outside the field school to increase the credit load if such is the need of the student, but this is usually not encouraged.

The site is selected as the result of many considerations. If a graduate student has a particular thesis or dissertation problem and arrangements can be made to hold the field school at a site that would provide needed information, this type of site is usually chosen. There is an incentive to structure the field school around a hypothesis-testing situation. If the site is in some way threatened and excavation would provide some useful information, such a site may be selected. A single site is usually

chosen, but depending on the size of the site, a second site may be used. Field trips to excavations conducted by other institutions are included, when available, to expose students to other methods, other areas, or other time periods. Proximity to the university is of real consequence in budgeting transportation costs. The field school has been held, on several occasions, at considerable distance from the university. The greatest problem in this situation is the availability of an adequate library. However, distance does increase student costs and may conflict with housing contracts.

Information from field school research is destined to become Master's theses or doctoral dissertation subjects. This is usually planned prior to beginning field work but occasionally the interest of a graduate student is aroused as work progresses. Seventy percent of all Master's theses in archaeology at the University of Florida have been based on information from field school projects. Seventy-one percent of all doctoral dissertations in archaeology used information and material generated from field school excavations. A paper on some aspect of the excavation is required of each participant. For most, this is the first introduction to writing a professional paper. Copies of these papers comprise a file which along with related field notes and maps becomes a permanent, frequently-used source of information on the site.

Initial instruction in elementary surveying methods is given on the university grounds and then in the field. Usually field work begins on the second day of classes. Field sessions are generally 6½ to 8 hours on weekdays. Evening classes are 2½ hours. The field school is in operation for 9 to 10 weeks.

Responsibility is a very important part of education. Students have responsibility for every aspect of the excavation process. Very little initial responsibility gives way to greater responsibility as knowledge and skill increase. Responsibility for notetaking, mapping, field cataloging, and instrument use is rotated daily. For those without a major assignment, responsibility for the physical requirements of excavation are rotated but in a less formal manner: for example, shoveling, screening, reaming out features, trowelling, or field preservation of materials. Graduate students already having had a field school are valuable as sources of assistance in early training in equipment use and excavation methods. However, the number of students in the field school already having had a field school experience may be low. A graduate student may be given almost total responsibility for research design, field instruction, and analysis. In the case of a thesis or dissertation project, this is not uncommon, particularly if there are a number of sites under excavation. Additionally, at least one member of the field school is assigned to the laboratory each day. Usually this precludes all field work for that day. Such an assignment allows continual processing and analysis of materials as the excavation progresses. Inclement weather also provides analysis time.

Evening classes are devoted to such topics as development of archaeology, conservation and preservation methods, data organization, professional ethics, and lectures on theoretical aspects. Articulation between developments in the field excavation and information given in the lectures is not overlooked. Attention is paid to special analytical techniques. One of these techniques, zooarchaeological analysis, has been elaborated by Dr. Wing in a preceding paper.

In the social sciences and particularly in anthropology, the manner in which field work for archaeology students is accomplished is a bit unusual. Instead of sending an individual alone to his or her field study in the traditional manner, the archaeology student is joined by peers. A spirit of cooperation is initiated. One graduate student assists another. Such a practice creates a close-knit group having future professional consequences. One gets to know a person quite well when one digs with him or her.

Difficulties and advantages aside, what are possible disadvantages of a field school program? One potential problem is the somewhat egocentric attitude that the methods taught constitute the "right" way to excavate, analyze, and interpret. It would seem obvious that this cannot be so but nevertheless, such an attitude can exist. Perhaps it is more a problem of maturity. With respect to varying approaches, one of the outstanding advantages of field school training is the ability to observe any field practices and evaluate the reliability of data retrieval. Another possible disadvantage would be overwhelming the individual with such a load of information and practice. In this case, a preparatory course in techniques, methods, and cultural background in a preceding quarter or semester would be helpful. Students enrolled in field school have widely variable course backgrounds.

In my opinion, field school training is highly desirable. My own dissertation research was the product of two field schools and four field sessions using student excavators. In a sense, this may be construed as using cheap labor or taking advantage of a captive labor force to meet one's own ends. However, one of the most valuable lessons of a field school experience is the participation in a research effort from which all may benefit.

Charles H. Faulkner

The Normandy Field School and the 1975 Field Season of The Normandy Archaeological Project: A Summary

The 1975 summer field season in the Normandy Reservoir Archaeological Project was the final season in the excavation phase of this project which has been funded by the Tennessee Valley Authority and the National Park Service and conducted by the University of Tennessee Department of Anthropology since 1972. With the scheduled completion of the Normandy Dam in January, 1976, a 3200 acre reservoir will be filled in the upper Duck River Valley in Coffee County, Tennessee (see figure 1). This paper is intended as a brief summary of this project at the conclusion of the field phase.

The location of the Normandy Reservoir in an edge area between two physiographic sections (Eastern Highland Rim and the Central Basin of the Interior Low Plateaus Physiographic Province) and two forest regions (the Mixed Mesophytic and Western Mesophytic forests) provided an unique opportunity to test hypotheses about prehistoric cultural development in this distinct environmental area in the Middle South. The research design of the Normandy Archaeological Project has been focused on the subsistence and settlement patterns of the prehistoric cultures that inhabited this unique environmental area (see Faulkner and McCollough 1973). The intensive survey of the reservoir and surrounding area revealed a large prehistoric population from the Late Archaic through the Middle Woodland periods. This supported one of our initial hypotheses that this edge area between two rich biotic zones corresponding to the two physiographic sections and forest regions would have a high carrying capacity and a corresponding high population density of prehistoric hunters and gatherers (Faulkner and McCollough 1973: 9). The survey also indicated that the valley was

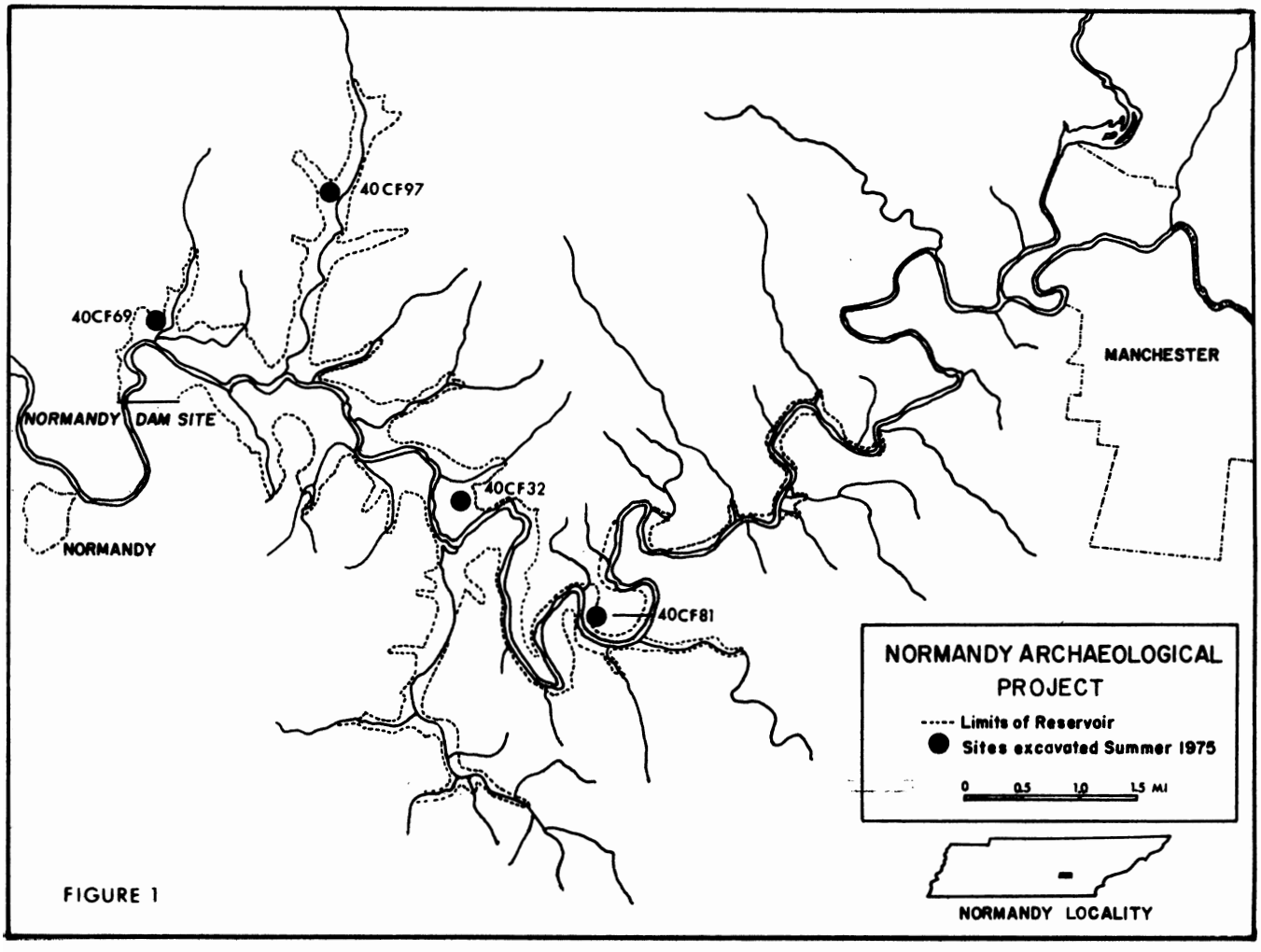

FIGURE 1

divisible into two natural "zones" corresponding to the upper and lower portions of the reservoir. The upper reservoir zone is characterized by narrow restricted alluvial terraces in a deeply entrenched valley bordered by the flat Highland Rim. The lower reservoir zone has broader alluvial terraces in a wider valley with advanced stream dissection and narrow bordering ridges of the dissected Highland Rim. These two zones could be further subdivided into four major biogeographic zones: flood plain, older alluvial terraces, valley slopes and bluffs, and uplands (Faulkner and McCollough 1973: 3).

Changes in settlement and community patterning in cultures from the Late Archaic through the Mississippian periods in the upper and lower reservoir zones and in the four biogeographical zones had been demonstrated in the survey, testing, and excavation phases of the project through the 1974 field season. During the 1972 and 1973 field seasons, testing and extensive excavation was concentrated in the lower reservoir zone to establish the community and settlement patterning of the prehistoric phases found here. In the 1974 field season, the focus of excavation shifted to the upper reservoir zone to determine how the settlement patterns differed in this zone from those patterns indicated by site utilization and distribution in the lower reservoir zone.

By the end of the 1974 field season, enough cultural material and radiocarbon dated features had been found on excavated sites of six cultural phases from the Late Archaic through the Mississippian periods to demonstrate the nature of changes in the distribution of sites through this range of about 4,000 years (see Faulkner and McCollough 1974).

The Ledbetter phase, dated prior to 1000 B.C., is represented by two types of sites; a possible hunting and butchering camp that does not have more permanent installations, and a base camp that contains large storage pits. Ledbetter sites are found in both the lower and upper reservoir zones.

The terminal Archaic-Early Woodland Wade phase sites are also found in both the lower and upper reservoir zones. These appear to be primarily base camps with structural evidence and storage pits dating between 1000 B.C. and 200 B.C.

There appears to be an unbroken continuity in the basic subsistence and settlement patterns between the Ledbetter and McFarland phases although by the time of the emergence of the early Middle Woodland McFarland phase the population has substantially increased and sites appear to have been more intensively occupied. This may be due to the introduction of cultivated plants. Squash has recently been identified on a McFarland site in the adjacent Elk River Valley (Bacon 1975). Sites now have multiple oval or circular tensioned wall-roof structures, clusters of earth ovens and cylindrical storage pits, and cremation cemeteries. These settlements are located in both the lower and upper reservoir zones, but the largest of these sites are found in the upper reservoir zone.

A major settlement shift appears during the Middle Woodland period between the McFarland and Owl Hollow phases about A.D. 200. Although the latter phase appears to be the direct lineal descendant of the former phase, the community pattern now includes substantial structures with internal earth ovens interpreted as winter lodges (figure 2), and more lightly built tensioned wall-roof structures that appear to be summer dwellings. It is not known at this time if these sites were occupied year around with a shift in structure type or if they were occupied seasonally. By the end of the 1974 season, it appeared that these Owl Hollow settlements were only found on the wide first terraces in the lower reservoir zone. The Owl Hollow phase may date as late as A.D. 600 in the upper Duck Valley.

During the Late Woodland Mason phase, sites are again found in both the lower and upper reservoir zones. Although Mason material has been found on most of the major sites excavated, only one, the Eoff I site (40Cf32) seems to have been extensively occupied by these people. There is some indication of a depopulation during this time. It is possible the population centers shifted to the adjacent upper Elk River Valley during the Late Woodland period. Radiocarbon dates of A.D. 970 and 985 also indicate an overlap with the Mississippian occupation.

Mississippian sites of the Banks phase are represented by small hamlets or single family farmsteads. Again, settlement seems to shift to the lower reservoir zone. A hamlet is found on the Banks V site (40Cf111) with a mean radiocarbon date of about A.D. 900 (range of means on individual determinations from A.D.735-1045). The settlement here possibly consisted of the initial establishment of a single family farmstead represented by a wall-trench house and/or the late development or expansion into a larger hamlet of several structures and a burial area. The former community pattern is supported by structural remains on the Parks site (40Cf5) where a

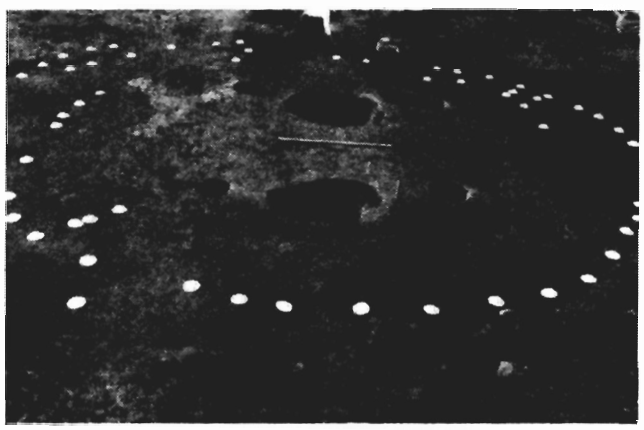

Figure 2: Double-oven Owl Hollow phase structure excavated on the Banks III site (40Cf108) during the 1972 fall field season.

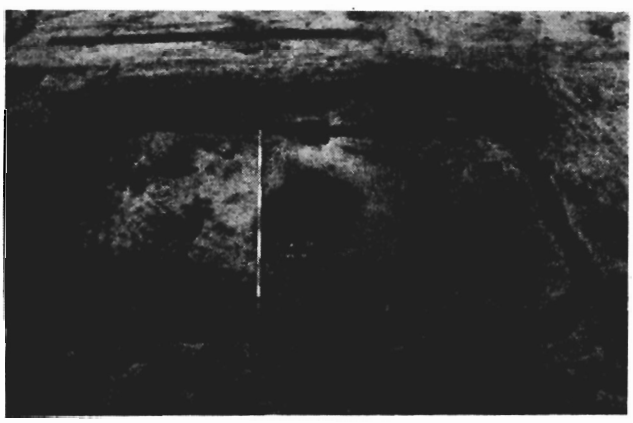

Figure 3: Wall-trench Banks phase structure excavated on the Parks site (40Cf5) during the 1974 fall field season.

single wall-trench house with supporting features were located in the 1974 fall season (figure 3). The two radiocarbon dates of A.D. 645 and 735 are probably too early for this installation, but the house type and material culture indicates a date between A.D. 800-1000.

The 1975 summer field season was conducted as a field school by the University of Tennessee Department of Anthropology and the Wright State University Department of Anthropology, Dayton, Ohio. The UT field school consisted of 16 students and eight field staff members under the supervision of Charles H. Faulkner and Major C. R. McCollough. The Wright State field school had 10 students and a field staff of two students supervised by Bennie Keel. The amount of work accomplished by these students and the results of their labor described below is a tribute to their diligence and hard work.

Five hypotheses were to be tested during the 12 weeks of the 1975 field season. First, the 1972 survey and testing during the 1975 spring field season had revealed what appeared to be a buried Archaic horizon on the Aaron Shelton site (40Cf69) that could have dated as early as the Middle to Early Archaic periods. Since an Early Archaic component had not been excavated in the reservoir, it was deemed vital to pursue extensive excavation on this site. The Shelton site location on an older and higher terrace (850-870 feet AMSL) in the lower reservoir zone afforded an opportunity to test two hypotheses: (1) Early Archaic sites were found on the older and higher terraces in the lower reservoir zone, and (2) late occupation during the Owl Hollow and Banks phases would not include this higher terrace since there appeared to be a preference by these groups for the lower terraces in this zone.

Five weeks were spent on this site by half the UT field school under the direction of Major McCollough. A total of 55 features and 60 post holes were excavated here. Some of the Archaic features near the edge of the terrace were covered by a foot of overburden and midden, but their contents indicated they probably dated no earlier than the early Late Archaic period. This phase, tentatively designated Benton, had been dated on the Eoff I site in 1973 at 3000-3500 B.C. Further back from the terrace edge no midden was encountered, and mechanical stripping revealed scattered features of the Ledbetter, McFarland, and Mason phases. This correlated with our generalized settlement hypothesis that sites of these phases, particularly McFarland, are widely dispersed in both the upper and lower reservoir zones. The lack of substantial dwellings on the site indicates it was possibly a short-term refuge, particularly during the McFarland phase when it may have functioned as a seasonal base camp like the 40FR47 site in the Tims Ford Reservoir (Bacon and Merryman 1973). The absence of Owl Hollow and Mississippian remains did strengthen hypothesis (2) above that these phases preferred the wider alluvial terraces for their settlements.

On July 14 this crew moved to the Duke site (40Cf97) on Riley Creek, one of the principal tributaries in the lower reservoir zone. This site appeared particularly important because of the substantial number of Early Archaic Big Sandy projectile points that had been recovered here by the landowner (Faulkner and McCollough 1973: 351). The site was tested by McCollough during the 1973 fall season. An organic rich midden was discovered that appeared to be of Woodland derivation. Because of the proximity to the Duke house, the site could not be excavated until the house was removed in 1975. The site was chosen for extensive excavation largely for intuitive reasons; the possibility of finding an Early Archaic horizon *in situ* that had thus far eluded us in the reservoir, but more to the point simply documenting what culture groups had utilized such a relatively intensively occupied site on a tributary stream. The results were disappointing. The site had been badly disturbed by the historic occupation and flood scouring had apparently destroyed the Early Archaic horizon. A possible late (?) McFarland component was present here, but a definite identification will have to await analysis of the cultural material. On July 28, the McCollough crew moved to the Eoff I site (see below).

Two important multi-component sites remained to be excavated in the upper reservoir zone. These were the Boyd site (40Cf68) which was tested in the summer of 1973, and the Wiser-Stephens I site (40Cf81) which was tested during the 1973 spring field season. The Boyd site was the larger of the two and the testing indicated intensive occupation from Archaic to Woodland times; however, litigation prevented access to the site during this final season. The Wiser-Stephens I site was smaller, but the surface collection also revealed an intensive occupation (Faulkner and McCollough 1973: 378-379). The 1973 test indicated the presence of a Woodland midden. Since this latter site was accessible, it was selected for intensive excavation to verify the evidence from the 1974 excavations in the upper reservoir zone that Owl Hollow and Mississippian sites were not found on these narrower terraces.

Eleven weeks were spent on the Wiser-Stephens I site by the Wright State field school under the direction of Bennie Keel. In addition to six 5x5 foot test units, 48 5x5 foot units (1200 ft^2) were hand excavated in the midden and waterscreened to sample this deposit. This leached midden did not produce enough data to justify a continuation of this sampling and the remainder of the site was mechanically stripped to reveal the community patterning present here. Clusters of Ledbetter, Wade, and McFarland storage pits, earth ovens, a possible structure, and a shallow linear feature attributable to the Mason phase were found, the latter of unknown function (Davis and Keel 1975). This substantiated the conclusion based on previous work in the upper reservoir zone that these narrow terrace sites were not utilized by the Owl Hollow or Banks phase peoples. The Wright State crew spent their last week on the Eoff I site (see below).

The major project for the UT field school was the excavation of the Eoff I site. This site was of extreme importance because it was the last extensive bottomland site in the lower reservoir zone before the upper reservoir zone was reached. If the Owl Hollow and Banks peoples chose wider flood plains for their settlements, they should have lived on this site. Previous excavations here indicated at least the latter group had been present. Testing of the site in the 1972 summer field season revealed a Mason phase midden at the north or "toe" end of the site and two test pits in another area of the 25 acre site produced five small eroded shell-tempered sherds (Faulkner and McCollough 1974: 86-94). In the 1973 summer field season, two areas were extensively hand excavated; the north or toe area where both Mason and McFarland components were found, and the southwestern corner of the

site where there were extensive Late Archaic and McFarland occupations. Power equipment could not be used because the land was still being farmed. It was significant that no Owl Hollow or Mississippian material was recovered in this excavation although it must be remembered that only an infinitesimal portion of this large site was sampled. Nevertheless, there was the suggestion that an Owl Hollow occupation (if present) was certainly not extensive, and the Banks Mississippian occupation (known to be present) probably consisted of scattered single family dwellings like that found on the Parks site.

Twelve weeks were spent at the Eoff I site by half the UT field school under the direction of Charles H. Faulkner. This crew was augmented at the end of the field season by McCollough's portion of the UT field school and Keel's Wright State crew. The work here was directed at testing two hypotheses and sampling the Late Woodland Mason phase midden. The hypotheses were (1) an Owl Hollow settlement should be located here since this was an extensive terrace in the lower reservoir zone; and (2) the Banks phase habitation remains were single family farmsteads widely scattered over this broad terrace, a settlement pattern that appeared to characterize the Emergent Mississippian occupation in this area. Since the landowner was vacating his property, the entire 25 acre front portion of the terrace was stripped with a John Deere self-loading pan with the exception of the Mason phase midden at the north end of the site. This was the only feasible way to locate the centers of Owl Hollow and Banks phase activities and record their community patterning on this extensive site.

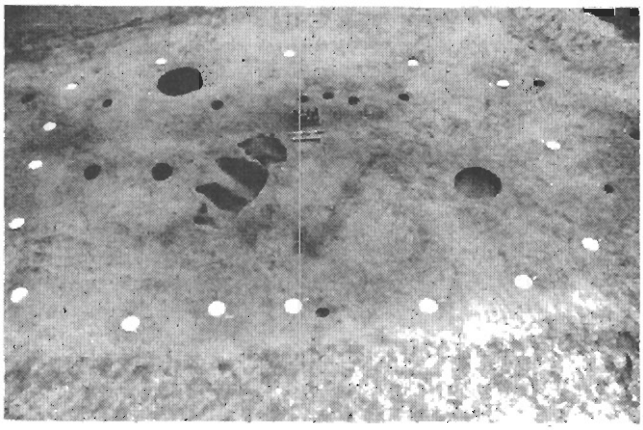

Figure 4: McFarland phase structure excavated on the Eoff I site (40Cf32) during the 1975 summer field season. Note storage pit just inside east wall.

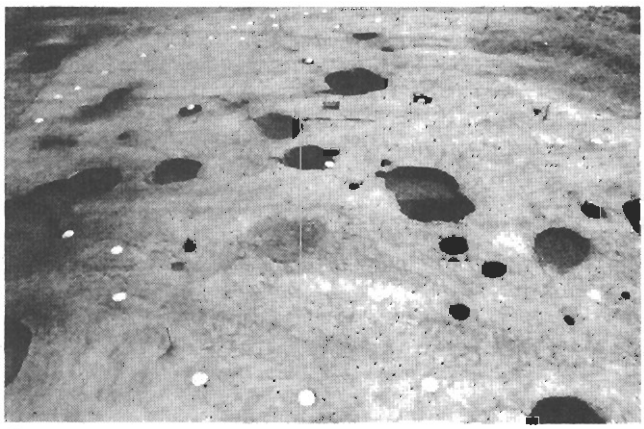

Figure 5: Double-oven Owl Hollow phase structure excavated on the Eoff I site (40Cf32) during the 1975 summer field season. Northeast and southwest walls top and bottom left, earth ovens with central support posts top center of figure.

As was indicated by the 1972 and 1973 excavations, the most intensive occupation here was by the McFarland phase. Two complete and one partial McFarland structures were exposed, plus numerous cylindrical-shaped storage pits and earth ovens of this phase. Two of the structures were distinctive in that a cylindrical storage pit was located along the east wall (figure 4).

Evidence for an Owl Hollow occupation was disappointing since only one definite structure was found in the south-central portion of the site. This was a large oval double-oven winter lodge with one shallow and one deep earth oven, the latter being filled with 400 pounds of burned limestone (figure 5). The absence of an extensive burned limestone-filled midden around this structure suggested brief use. This structure was located on the foreslope of the terrace crest and the south wall had been destroyed by erosion. Several other shallow earth ovens, some with paired interior support posts, and apparently attributable to this phase were located just to the east of this large structure, but a century of cultivation and slope erosion had eradicated the outer wall posts. The size of these ovens indicates they may be early in the Owl Hollow phase; radiocarbon and archaeomagnetic dating will clarify their temporal placement. Although the Owl Hollow people did settle on this last broad terrace at the upstream end of the lower reservoir zone, the occupation apparently was brief and perhaps early in the development of this phase.

A test trench cut into the Mason phase midden in the 1973 summer field season produced faunal material in a fair to good state of preservation. Since the research design of the Normandy Archaeological Project has focused on changing subsistence and settlement patterns through time, a large sample of food remains from this phase is requisite to compare Late Woodland and Early Mississippian subsistence patterns. Two 5x5 foot units were placed into the midden to locate the concentration of faunal remains. These units were hand excavated and all the soil water screened and/or floated, but unfortunately bone preservation was spotty and little was recovered. However, these strata cuts did produce substantial lithic debris and Mason phase pottery in the Elk River series (Faulkner 1968).

A considerable effort was made to delineate the Mississippian community pattern on this site. The picture that emerged through the summer was some type of more nucleated settlement that was circumscribed on the west and south sides by an alignment of basin-shaped borrow pits for clay (house daub) that had ultimately been used as trash receptacles. Within this arc of features were several large tree falls, all filled with Mississippian refuse. It would appear that either these people had killed these large trees and when they fell or rotted the cradle-knoll was used for a trash pit, or perhaps a violent wind storm had knocked them down and the Indians took advantage of this naturally cleared area. Besides these natural features, there were also large straight-sided storage pits dug down into the gravelly subsoil and scattered post holes, some possibly central support posts like those in a large Mississippian structure found on the Brickyard site in the Tims Ford Reservoir (see Butler 1968). Unfortunately, extremely dry conditions, the gravelly subsoil, the prehistoric Indians' construction techniques, or a combina-

tion of these factors prevented the delineation of these Mississippian structures. The ceramics and other artifacts found in the features suggest a slightly later occupation than that represented by the Banks phase at the Banks V and Parks sites, and it is possible that the wall-trench house was no longer in use. Several radiocarbon samples will be submitted to clarify the temporal range of this occupation.

At the close of the summer field season, one of the Mississippian features excavated outside the arc of borrow pits was found to be a rectangular structure with small posts in a trench or individually placed around a depressed floor (figure 6). Except for the depressed floor, this structure is very similar to the single Banks phase farmstead on the Parks site. This structure was completed during the fall season by Willard Bacon and other amateur archaeologists from the Tullahoma-Manchester area, and UT graduate students. Although the material from the house pit and floor has not been completely analyzed and radiocarbon dates need to be obtained from charcoal from the central hearth, it would appear that this structure represents the scattered farmstead settlement pattern of an earlier portion of the Banks phase, and the more intensive occupation within the arc of borrow pits represents a later shift toward nucleation of settlements. Whether these are two distinct Mississippian phases or evidence of a settlement trend within the Emergent Mississippian Banks phase will be determined by intensive analysis of the material culture and a series of radiocarbon dates that have been submitted. At the present time, however, it still appears that by Late Mississippian times, the upper Duck Valley was abandoned by its aboriginal inhabitants.

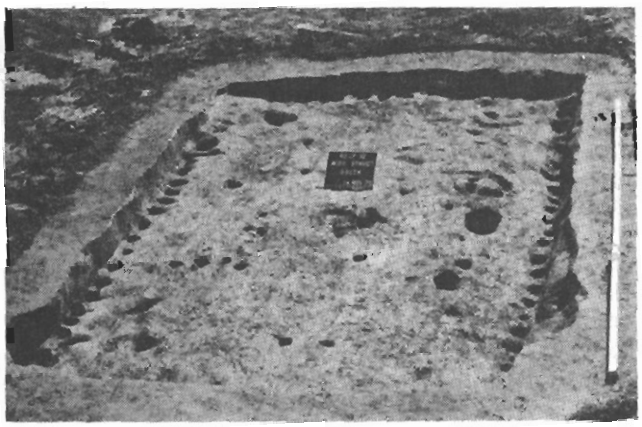

Figure 6: Banks phase pit house excavated during the 1975 fall field season. Note step or ramp in top left corner.

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Prehistoric Settlement Patterns in the Upper Central Tombigbee River Valley

During the summers of 1973 and 1974 site surveys were carried out between Alicebille, Alabama, and Aberdeen, Mississippi, in the upper central Tombigbee River Valley. This is a distance of approximately 60 miles by air. The surveys were sponsored by the National Park Service and were part of the archaeological work associated with the Tennessee-Tombigbee Waterway project. The 1973 survey was concentrated in the lower portion of the study area which is in the Prairie ecosystem. In contrast, the 1974 survey was centered in the upper section of the study area which is in the Tombigbee Sand Hills ecosystem (figure 1).

When the results of the two seasons of survey were compared it was noted that there was a marked difference in the sites found in 1973 and 1974. These differences have possible implications for the study of the beginnings of agriculture in eastern Mississippi.

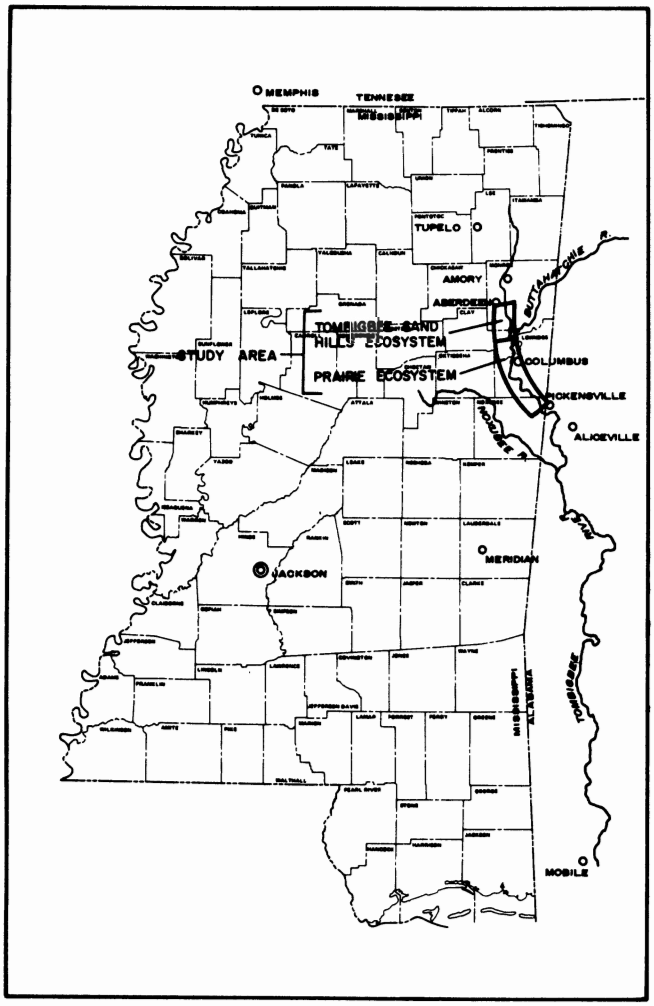

Figure 1: Location of 1973-1974 Study Areas.

Figure 2 summarizes the distribution of the occupational components from the two surveys on the basis of the population density in each ecosystem during the various occupational periods. These population curves are strictly relative and are defined by the frequency of the components of each occupational period divided by the total number of sites from each of the surveys. For example, of the 78 sites located by the 1974 survey which could be assigned to occupational periods, 46 (59%) had Miller III components. This is reflected by the highest peak of the solid curve on figure 2. The curves in figure 2, then, can only be called population density curves with the warning that what they really represent are relative densities of the occupations of the two survey areas by the various cultural groups.

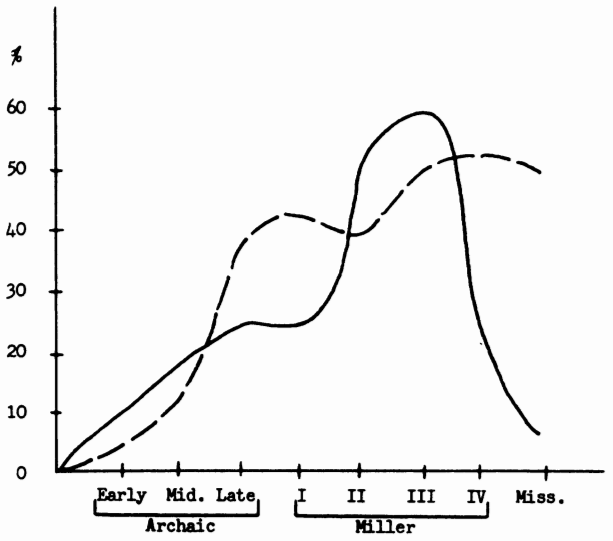

Figure 2: Population Density Curves for the Prairie (dashed line, 1973 survey) and Tombigbee Sand Hills (solid line, 1974 survey) Ecosystems.

While a treatment of each ecosystem's occupation curve separately may be of some interest, it is more instructive to compare the population trends in the two ecosystems and to attempt to arrive at explanations which might account for the differences and the similarities. For this reason figure 3 was plotted. This graph was derived by computation of the proportional differences between the two surveys for each occupational period. Thus, the deviation of the curve in figure 3 from the x-axis indicates the differences between the Prairie and the Sand Hills in the proportions of sites with components of each occupational period. Since the differences were computed by subtracting the 1974 values from the 1973 values, all points above the horizontal axis indicate a proportionally heavier occupation of the Prairie during that corresponding period, and points below the axis represent a denser

occupation of the Sand Hills. The curve in figure 3, then, indicates which of the ecosystems was more densely occupied during the various occupational periods relative to the total number of sites found in each ecosystem. The question then arises, how significant are these differences? In order to test the significance of the proportional differences ploted in figure 3, the z statistic was used.

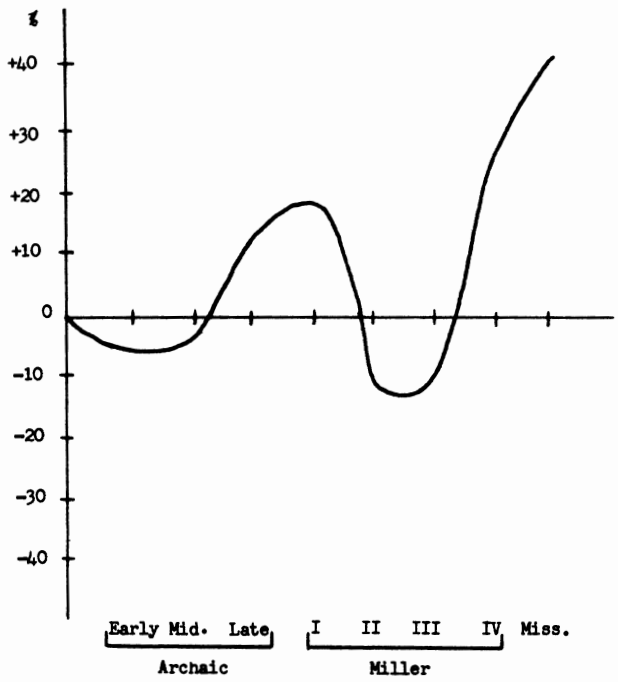

Figure 3: The Proportional Difference (p (i, 73)-p (i, 74)) between the Population Density of the Prairie and Tombigbee Sand Hills for each Occupational Period (i).

The value of the z for each of the occupational periods is recorded in the bottom row of Table 1. Using a two-tailed test, at the .05 significance level a difference is significant if the absolute value of z is greater than or equal to 1.96. It can be seen from Table 1 that this is true for only two of the calculated values of z. Occupation of the Prairie ecosystem along the river was significantly greater than the occupation of the Sand Hills by Miller I and Miller IV groups. Furthermore, by extrapolation, the Mississippian occupation of the two ecosystems was also significantly different, focusing primarily in the Prairie. An examination of figure 2 shows that throughout prehistory the population of the Prairie was increasing with a possible slight decline in the Miller II and Mississippian occupational periods, and the occupation of the Sand Hills was constantly increasing up through the Miller III period with a leveling off in the Late Archaic and Miller I period, followed by a sharp increase in the Miller II. From the Miller III occupational period through the Mississippian there was a precipitous drop in the occupation of the Sand Hills ecosystem.

This examination of figure 2 also emphasizes that throughout prehistory the population of both ecosystems was generally on the increase, but that this increase was greater in the Prairie during the Miller I and during the Miller III/IV and Mississippian periods. From figure 2 it appears that throughout the Archaic the population of the two areas was increasing in a parallel fashion, but beginning in the Miller I, some change initiated in the Prairie led to a rapid increase in the population of that zone while the population of the Sand Hills leveled off. This increase in the Prairie population in the Miller I was followed in the Miller II period by a parallel increase in the population of the Sand Hills. From the Miller II into the Miller III, population in both zones was again increasing in a parallel way. However, in the Miller IV and the Mississippian periods, the population in the Prairie stabilized while the population of the Sand Hills markedly declined.

These are trends in population change which are indicated by the survey data. The question which now remains to be answered is why did these trends occur? This can certainly not be answered at present. However, some hypothetical solutions which can be tested in future work in eastern Mississippi, both within the context of research associated with the waterway construction and outside of such salvage oriented research can be suggested.

First, it seems probable that during the Archaic occupations of the region the forest fauna were being exploited. In the ecological study of the acreages to be affected by the waterway, Miller *et al* (1973:53) found that on the average the Prairies and Sand Hills were approximately the same in terms of deer and rabbit productivity while the Sand Hills were slightly poorer habitats for squirrel and turkey. Both zones were listed as poor areas for quail. If we assume that most of the first terrace in both zones along the river was covered prehistorically by mixed oak hardwood forests, we find that the two zones are even closer in terms of potential animal resources, both being good for squirrel, average for deer and rabbit, and very poor for quail. As a source of turkey the mixed forests of the Prairie are average while those of the Sand Hills are poor. Therefore, it is hypothesized that the occupational patterns of both the Prairie and the Sand Hills were similar during the Archaic and were based on an extensive exploitation of the forest Resources of the region. Although we have some data to support this

Period Yr.		Early Archaic	Middle Archaic	Late Archaic	I	II	III	IV	Miss.	# Sites with ident. comp.
1973	f(i)	2	7	19	22	20	26	27	25	53
	p(i)	3.8%	13.2%	35.8%	41.5%	37.7%	49.1%	50.9%	47.2%	
1974	f(i)	7	13	19	18	38	46	20	5	78
	p(i)	9.0%	16.7%	24.4%	23.1%	48.7%	59.0%	25.6%	6.4%	
z(i)		--	-0.56	1.45	2.31	-1.28	-1.15	3.045	--	131

Table 1. Summary of Occupational Components: 1973 & 1974 Surveys

hypothesis from the faunal materials recovered from the excavations in 1973 and 1974, we need to direct a research program aimed at obtaining comparative data on the Archaic subsistence patterns from the two ecosystems.

It is with the end of the Archaic that differences in the occupational patterns of the two zones begin to occur, and during the Early Woodland this difference reaches a statistically significant level. Rucker (1974:22) suggested that Miller I groups were occupying "small horticultural hamlets and villages." As a working hypothesis, because we have no good data on Miller I subsistence patterns, the following suggestion is made. Using the concept of the indigenous Eastern Agricultural Complex (Fowler 1971a; Jones 1936; Struever 1971; and Yarnell 1971), I propose that the significant increase in the occupation of the Prairie during the Early Woodland may be related to the development in the area of a subsistence pattern heavily dependent upon plant foods which could have been cultivated. These could include such plants as lamb's-quarter (*Chenopodium sp.*), pigweed (*Amaranthus sp.*), ragweed (*Ambrosia sp.*), sunflower (*Helianthus annus*), and marsh-elder (*Iva sp.*). This shift in the economy of the region in the direction of an increasing dependence on plant foods would be consistent with development elsewhere in the eastern U. S. at this same time. For example Struever (1971:389) states:

> Evidence discussed here indicates the use of seeds from a number of eastern plants beginning in the Late Archaic and continuing, at least in the case of goosefoot, into Middle Woodland times in the midwest.

Fowler (1971b:402) addressing himself to the same problem said:

> In general this synthesis of the Central Mississippi and Lower Ohio Valley area has pointed up the following ideas regarding the consequences of food production in the area. 1. There was a food gathering base that was part of the Late Archaic subsistence pattern. This subsistence pattern was based upon a seasonal cycle settlement system.
>
> A part of this system was the collection of seeds and a probable simple cultivation of seed plants such as sunflower, some forms of amaranth, marsh elder, and others.

What do the Prairies have to offer for this form of subsistence which the Sand Hills did not? That is, why do we have a significantly heavier occupation of the Prairie during this period? Although the data which could be used to deal with this problem are not at hand, some testable hypotheses can be made. First, let us consider the ecosystems themselves. Within the Sand Hills ecosystem the soils are naturally low in fertility, and some of the terrace soils are poorly drained due to the presence of a fragipan (Vanderford 1962:30, 113). In contrast, the soils of the Prairie are more fertile than those of the Sand Hills (Vanderford 1962:114). Giving an indication of the potential of the Prairie soils Vanderford (1962:37) stated, "Good soil management will probably pay greater dividends in the Black Belt than in any other area of the South." Thus, it appears that the Prairies are more suited to cultivatioh, especially without modern soil management practices, than are the Sand Hill soils. It should be understood here that this does not imply that the grasslands themselves were hoe cultivated. Instead, it is probable that the wooded areas of the Prairie ecosystem along streams cutting across the zone (Lowe 1921:32) were the sections of the Prairie ecosystem most heavily utilized by the early horticulturalists. This hypothesis, like others made here, awaits testimony through future research.

A second avenue which may be used to account for this heavier occupation of the Prairies by the initial horticulturalists is the hypothesized crops themselves. The sunflower is itself a prairie species and the marsh elder occurs in the stream bottoms of the Prairie. Neither of these plants would be as frequent in the Sand Hills as in the Prairie (McDaniel, personal communication). Since these are the two plants most commonly accepted as a part of the native Eastern Agriculture Complex, it again seems probable that the Prairie would have been favored over the Sand Hills as an environment in which Miller I groups would have concentrated if, indeed, they were practicing cultivation of native North American plants.

To determine the credibility of these hypotheses relating the Miller I occupation to the two ecosystems, it will be necessary to develop a research program designed specifically to identify the Miller I subsistence patterns, and to determine whether the hypothesized advantage of Prairie occupation over Sand Hills occupation for that form of subsistence pattern can be supported. An alternative which may be considered in judging this concentration of Miller I sites in the Prairie is that the Miller I culture results from the intrusion into the region of peoples from elsewhere, and the Prairie furnished the best route for movement. This would still require an identification of the Miller I subsistence patterns, but would also imply a general lack of continuity between the Late Archaic and Early Woodland occupations of the area, requiring, therefore, an examination of this transition.

By the beginning of the Miller II period the population in the Sand Hills had "caught up" with the Prairie. It is generally conceded that corn cultivation had reached the eastern U. S. by Middle Woodland times although it was probably not until the Late Woodland that corn became the basis for the economy of the East (see Munson 1973:109-110). It appears that during Miller II the population growth in the Prairies leveled off while the Sand Hills was catching up. Returning to a hypothetical level I suggest the following factors which may help to account for this growth pattern. Having established the initial cultivation techniques in the Prairie during the Late Archaic to Early Woodland transition period, the population of the Prairies grew rapidly as indicated in figure 2. By Miller I times, the population had reached the level which could be supported by these techniques in the Prairie. Therefore, continued growth meant that the population had to spread spatially. This spread was accomplished by movement into the Sand Hills and is reflected in the rapid increase in the population of the Sand Hills from the Miller I to Miller II periods. Occupation of both the Sand Hills and the Prairie by Miller II groups was at essentially the same level as the Miller I occupation of the Prairies. Returing to figure 2 we note that from Miller II to Miller III there was a parallel rise in the population of both the Sand Hills and the Prairie. This rise may well correspond to an increasing mastery of corn agriculture. Munson (1973:110) has suggested that corn was a "relatively rare and/or minor element in the diet" of the Eastern U. S. before about A.D. 800. In this area this would correspond

to the Miller IV occupation (Rucker 1974:17) if Rucker is correct in his estimated dates. Therefore, the increase in population evident from Miller II to Miller III may be the result of a slight increase in production due to the introduction of the new crop, or it may be that corn became important in the diet along the Tombigbee prior to the Late Woodland and accounted for the rise. If the population curve for the Prairie is examined, it will be seen that there are two plateaus. One occurred during the time from the Late Archaic through Miller II and one characterized the Miller III through Mississippian periods. I have suggested above that the first of these plateaus was a time of initial horticulture in the area. Here I suggest that it is possible that the second plateau is the product of the cultivation of the Mesoamerican crops, corn/beans/squash. During the Late Woodland (Miller III and IV) the population of the Prairies stabilized at what appears to be the highest prehistoric population density in that ecosystem. In contrast the population of the Sand Hills dropped precipitously as indicated by the decline in the number of sites with Miller IV and Mississippian components. The explanation of this Sand Hills decline in population is not clear. Quite possibly after an initial period of experimentation with corn agriculture in the Sand Hills by Miller III groups it was found to be a poor area for such crops. This may have been related to drainage, fertility, or the difficulty of clearing the more extensive Sand Hills forests. As with other suggestions made in this summary, the reason for this late decline in the Sand Hills and the implications of the second population plateau in the Prairie await further research aimed at those specific problems.

A number of hypothetical suggestions have been made above to help account for the site distributions identified in the two surveys of the Upper Central Tombigbee Valley. The net result of those suggestions is that we now have many more questions about the patterns of prehistoric occupation of the area than we have answers. The research during the 1974 season brought into focus a number of previously unidentified patterns of prehistoric site distribution, and it appears that certain significant differences in the prehistoric occupations of the two major ecosystems in the region have been identified. However, the crux of any anthropologically oriented archaeological research is the explanation of patterns of prehistoric change. As Plog (1974:8) has stated, "Archaeologists can fruitfully focus our research upon this question: Why do cultures change as they do? In other words, explaining change should be our primary undertaking." Change in the occupation along the Tombigbee has been identified. Future research must now be directed toward an explanation of that change. That will require that we direct ourselves toward techniques aimed specifically at those factors hypothesized to be operative in instituting the identified changes. Subsistence patterns, distributions of sites relative to particular soil zones, and the relationships between environmental and demographic variables to mention only a few subjects, must come under our critical eye. Then, and only then, can we claim that the end purpose of archaeological research within an anthropological framework is being met.

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Daniel L. Simpkins and Alan E. McMichael

Sapelo Island: A Preliminary Report

During the field seasons 1974 and 1975, the Department of Anthropology, West Georgia College, conducted archaeological investigations on Sapelo Island under the direction of Lewis H. Larson, Jr. This paper is intended as a preliminary report on the objectives and results of investigations thus far.

Occupying a central position on the Georgia coast, Sapelo Island lies directly north of Saint Simon's Island and south of Saint Catherine's Island. Like all islands on the Georgia coast, Sapelo is a barrier island, separated from the mainland by an extensive salt water marsh lagoon. The island itself is composed of a series of old beach ridges isolated by the transgressing ocean which flooded the area behind the ridges, creating the lagoon. The marsh was formed by sedimentation and colonization by salt-tolerant grasses (Hoyt 1967). If the island could be seen in cross-section, it would prove to be slightly concave. As a consequence, the interior tends to remain boggy.

Larson (1969) has divided the southeastern coast into three ecological sections. From east to west they are: the Strand section, where the ocean meets the land in a shoreline, beach, and dune sequence; the Lagoon and Marsh section, which includes the islands and the tital marshes; and the Delta section, where fresh water rivers draining the coastal plain enter the ocean, creating an estuary.

Sapelo Island occupies the Strand and the Lagoon and Marsh sections. Of the two, the Lagoon and Marsh section, with its high degree of ecological diversity and biomass, was of greater economic importance to aboriginal populations (Larson 1969:13).

Previous research on Sapelo includes the exploration of the shell ring and three burial mounds on the north end by Clarence Moore in 1897 (Moore 1897:55), and, more recently, a test excavation at the shell ring by Waring and Larson in 1950 (Waring and Larson 1968:263).

Current investigations by West Georgia College are in the form of a field methods course and consist of an archaeological survey utilizing surface collections and test excavations. Due to the thick undergrowth covering most areas of the island, optimum survey crew size has been found to be two or three individuals. The majority of the crew remains engaged in test excavations at selected sites. The survey is limited to that part of the island owned by the Georgia Department of Natural Resources; the northern three-fourths of the island.

At this point a site should be defined as ". . . a spatial concentration of material evidence of human activity," after Deetz (1967:13).

Aboriginal sites on Sapelo Island are characterized by accumulations of mollusk shell, predominately oyster (*Crassotrea virginica*). The middens are usually covered by a layer of humus, becoming exposed by erosion along the edge of the marsh or by modern disturbances such as borrow pits or firebreaks. Of course, it is entirely possible that sites other than shell middens exist on the island but such sites have not been encountered. The shell middens do not exhibit an abundance of artifacts on the surface, and large surface collections are the exception rather than the rule. The majority of artifacts recovered are potsherds, lithic and bone materials occurring infrequently.

Aboriginal sites located by the survey have been grouped into six general areas (figure 1). While the boundaries of these areas generally reflect the archaeological situation, they are in some instances the result of such coverage problems as heavy ground cover and the limitations of time.

1. Kennon Field. This area is a peninsula projecting into the marsh from the west side of the island. It is bordered on the northwest by the Duplin River and on the south by Barn Creek. The field is presently covered with planted pine. Small shell middens, 5-10 meters in diameter and yielding Deptford pottery (Waring 1968) are scattered over the southern half of the field, surrounding a conical mound approximately 25 meters in diameter and four meters high. The mound was reported by Moore (1897) but remains unexcavated.

2. Moses' Hammock. This area is a hammock or small marsh island separated from Sapelo Island by about 75 meters of marsh. Small scattered shell middens 15 to 20 meters in diameter are found over the entire southern half of the hammock and along the northwestern corner, where the Duplin River touches the high ground. In the southwestern corner of the hammock there is a large disturbed midden. This midden was test excavated and an alidade map was made of the entire hammock.

3. Drawbark. This is a series of sites located along the edge of the marsh, both north and south of a brackish stream which drains the low-lying interior. The area is presently covered with mixed pines and hardwoods plus stands of planted pine. Shell middens occur along the edge of the marsh and extend eastward for as much as 750 meters in some places. Surface collections from this area have recovered pottery from the Wilmington, Savannah, Irene (Williams 1968), and San Marcos series (Smith 1948; Otto and Lewis 1974).

4. Mud River Area. This area extends along the west side of the island from Chocolate to High Point. The vegetation in this area resembles what Shelford has called the Magnolia Forest (Shelford 1963:63-4). Middens are small, averaging about six meters in diameter, and are scattered along the edge of the marsh, extending inland as far as 500 meters, where the elevations begin to drop. Pottery on the surface ranges from St. Simon's Plain through Wilmington, Savannah, Irene, and San Marcos, with the latter wares in the majority. The Shell Ring, perhaps the most striking archaeological feature of the

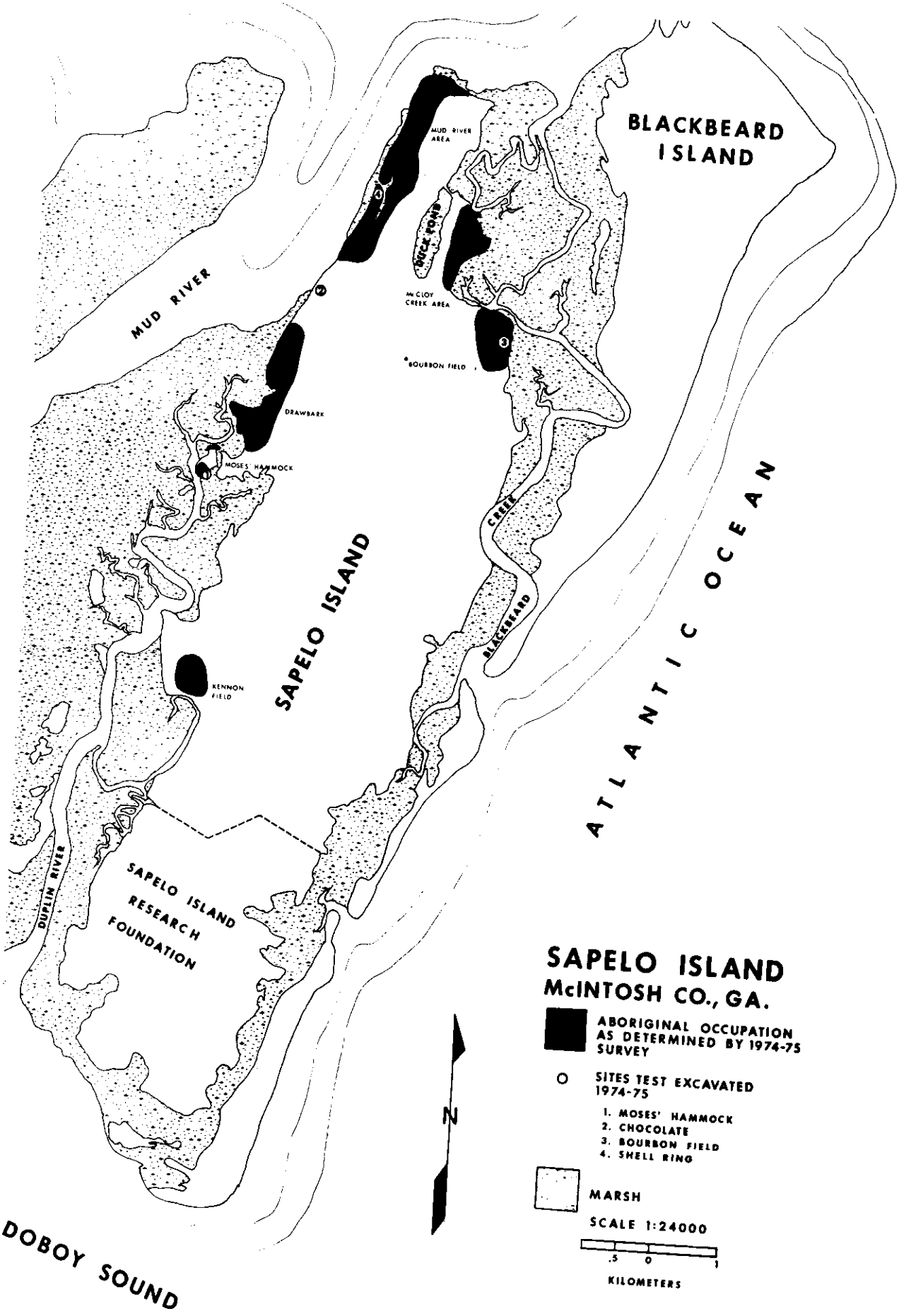
BLACKBEARD ISLAND
MUD RIVER AREA
BUCK TOMB
McCLOY CREEK AREA
BOURBON FIELD
MUD RIVER
DRAWBARK
MOSES HAMMOCK
SAPELO ISLAND
CREEK
BLACKBEARD
KENNON FIELD
ATLANTIC OCEAN
DUPLIN RIVER
SAPELO ISLAND RESEARCH FOUNDATION
DOBOY SOUND
N
SAPELO ISLAND
McINTOSH CO., GA.
ABORIGINAL OCCUPATION AS DETERMINED BY 1974-75 SURVEY
SITES TEST EXCAVATED 1974-75
1. MOSES' HAMMOCK
2. CHOCOLATE
3. BOURBON FIELD
4. SHELL RING
MARSH
SCALE 1:24000
.5 0 1
KILOMETERS

Figure 1

island, is located in this area. South of the Mud River Area is a historic plantation site, Chocolate Field, which was the scene of test excavations, mapping, and detailed structural drawings in 1974.

5. McCloy Creek Area. This area lies on the northeastern side of Sapelo between the Duck Pond and the eastern edge of the island. The marsh off the eastern edge is drained by two tidal creeks, McCloy and Blackbeard, which flow close to shore near the areas of midden concentration. The sites in this area are characterized by rather extensive shell middens uniformly covering an area of hundreds of square meters, rather than the clusters of small middens typical of the Drawbark and Mud River Areas. Wilmington, Savannah, Irene, and San Marcos series pottery appear on the surface. This area is probably the location of "the mound in Dumoussay's Field," excavated by Moore in 1897 (1897:67).

6. Bourbon Field. Bourbon Field is an extensive, multi-component site located on the northeast corner of the island. Blackbeard Creek flows along the northern edge of the site. At the present, Bourbon Field appears as an open field, one half kilometer by one kilometer, bordered on the north and east by marsh and on the south and west by Live Oak-Magnolia forest. A midden at this site was also tested in 1974. Materials from the 1975 excavations have not been analyzed.

While the archaeological survey of Sapelo is only partially completed, some tentative statements can be made as to the nature and extent of aboriginal occupation.

First, habitation sites on the island appear to be strategically located with respect to natural features rather than uniformly spread over the island or occurring purely at random.

Second, sites appear to be concentrated in areas contiguous to the marsh, i.e., the western side of the island and the northeast corner.

Third, within these areas, sites tend to occur closest to points at which tidal streams approach the shore.

Fourth, sites are encountered most frequently on the perimeter of the island, those areas of greatest elevation. Sites appear to be lacking in the low-lying interior.

Further survey will modify or expand those observations, and at this point they must be regarded as based on preliminary data.

In 1975, a six man crew spent six weeks delineating the Sapelo Shell Ring Site through contour mapping and limited testing (figure 2). Among shell rings, the Sapelo Ring, or possible ring complex, has been one of the best documented. Past explorations had concentrated upon the midden and interior of the ring with a brief reconnaissance of the site area exterior to the ring. Waring and Larson had concluded in their report on the 1950 excavation that:

> The excavation definitely established the fact that no matter to what use the ring ultimately may have been put, it was composed of occupational midden in primary position which was deposited as the result of habitation sites located on the ring (Waring and Larson 1968:273).

It was hoped that investigation exterior to the ring would reveal the nature of land utilization in the area.

Shell middens containing plain and ornamented pottery have been reported in the literature pertaining to the site (Waring and Larson 1968:268; McKinley 1873:423). Two 2x2 meter squares were therefore excavated in middens to establish if they were contemporary with the ring.

Sq. 488R439. This test pit was located on a small, low, well-consolidated shell midden near the edge of the marsh. Its 20 cm thick midden contained low fired brick and fragments of oxidized, free-blown lipped bottle in association with Irene, San Marcos and possibly earlier wares. Beneath the midden, the sandy soil contained St. Simon's Plain sherds and poverty point object fragments.

Sq. 505R524. This square was located in a disturbed midden with Mississippian and protohistoric wares overlying thinly scattered Wilmington, and deeper fiber-tempered wares. Several faint features were examined, but root impressions and leached sand made it difficult to make any positive stratigraphic interpretations.

Sq. 508R500. This test pit was located on the southeastern exterior edge of a scalloped portion of the shell ring on a small rise above the generally level adjacent plain. Dark humic soil interlaced with shell reached a depth of 40 cm. Features apparently resulting from slumpage were encountered as the ceramic sequence graded from a thin covering of Irene wares into a zone of St. Simon's wares. This area may represent a remnant of the ring pulled away during the collection of shell for tabby.

Sqs. 489R500 and 502R500 and Unit 494R503. Artifacts in this section of the site tended from Irene wares to increasingly predominant fiber-tempered wares. A small fire pit was encountered at 45-50 cm in the center of the 2x5 meter unit. A nearly sterile lens of chalky, white sand of varied thickness which contained a single concentration of Deptford Geometric Stamped sherds was located in this area of the site. The lens lies between an Irene horizon and a fiber-tempered horizon at 74-88 cm. Beneath this anomolous zone, in a shell-free context; a small refuse pit was found which contained small concretions, fish bones, charred and fragmented hickory nut shells, seeds of a still unidentified plant, and a fiber-tempered potsherd. At the north end of the unit a shattered, reconstructable portion of a St. Simon's Plain bowl was encountered at a depth of 80-100 cm. An examination of the profile of the square to the north suggests the adjacent squares may have been terminated prematurely above a possible occupation layer.

William McKinley's (McKinley 1873:422-3) 1872 description of the Sapelo Shell Ring Area as being composed of three individual rings was considered to require verification. As a result of surface survey in 1974 a large, very disturbed midden was located in the general vicinity of McKinley's Ring No. 2. The area had been subject to rather extensive borrowing, but several areas of undisturbed midden still exist. It was felt that if ring deposits had been removed, leaving the area beneath not too greatly disturbed, the site might provide an excellent opportunity to learn more of the basal structure of shell rings without first excavating intact midden. Consequently, three 2x2 meter test pits were placed in areas where the top strata were obviously disturbed, but where it was hoped that the lowest strata of the midden had remained intact.

Test Pits 1 and 3 at WGC 718 can be briefly described as consisting of a complex but rather homogeneous matrix of highly organic soil and shell with excellent faunal preservation. In the first fifteen cm level large quantities of late aboriginal sherds were found in context

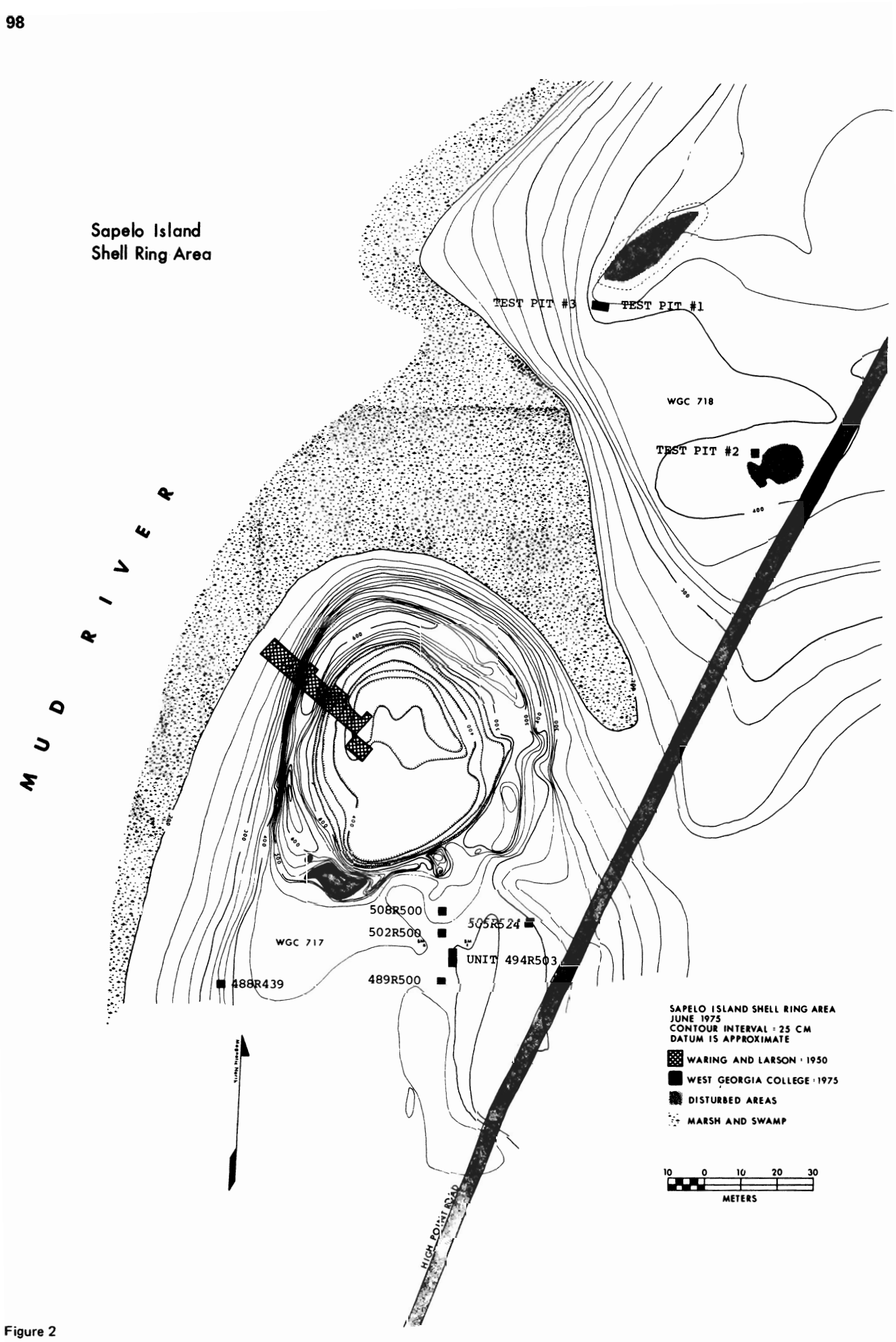
Sapelo Island
Shell Ring Area
MUD RIVER
TEST PIT #3
TEST PIT #1
WGC 718
TEST PIT #2
508R500
505R524
502R500
WGC 717
UNIT 494R503
488R439
489R500
HIGH POINT ROAD
SAPELO ISLAND SHELL RING AREA
JUNE 1975
CONTOUR INTERVAL = 25 CM
DATUM IS APPROXIMATE
WARING AND LARSON : 1950
WEST GEORGIA COLLEGE : 1975
DISTURBED AREAS
MARSH AND SWAMP
10 0 10 20 30
METERS

Figure 2

with historic materials, including a molded spherical lead object, low fired brick, hand wrought laminated square and rose headed nails, a white clay pipe stem, and tin and lead glazed European ceramics indicating a data at least prior to 1850 A.D. These materials overlay and were mixed with the original Archaic midden below.

Test Pit 2 was terminated above a refuse pit after obtaining a St. Simon's Plain sherd from the feature. The upper levels of the midden exhibited an historic component in the form of olive jar and tabby fragments, and hand forged nails in association with Irene and San Marcos wares. Savannah and St. Simon's sherds increased in abundance with depth.

All pits at WGC 718 were closed while still in heavy midden which was determined by artifactual comparison to be approximately contemporary with Ring No. 1 (WGC 717).

The general context of WGC 718 is that of at least one Archaic midden of undetermined shape and size overlain and mixed in the upper levels with a Mississippian, protohistoric, and historic component. No evidence of Ring No. 3 was found in either 1974 or 1975, and McKinley's description implies that both Rings Nos. 2 and 3, assuming they actually were rings, were already disturbed in 1872. The strong historic component at the site reawakens speculation pertaining to the location of the Spanish Mission at Sapelo and may also account for some of the early descriptions referring to the site as the "Spanish Fort" (Floyd, 1937).

The cultural remains, not already mentioned, represented at these two sites can be divided into several categories. Shell, of course, is predominant; the great majority of which is Eastern oyster (*Crassotrea virginica*) with other representatives, including Southern Quahog (*Mercenaria campechiensis*), periwinkles (family *Littorinidae*), Knobbed Whelk (*Busycon carica*), Channeled Whelk (*Busycon canaliculatum*), and an occasional olive shell (family *Olividae*). The only shell which might constitute artifactual material is whelk in the form of *Busycon* hammers, picks, or hoes. Not all whelk exhibit the pecked dorsal holes and exposed columella; and these alterations of the shell can also be considered as merely a means of obtaining the mollusk meat.

Although no analysis of the faunal remains has been undertaken, it can be generally stated that mammalian, bird, fish, reptile, crustacean, and possibly amphibian remains are present. One human deciduous tooth was encountered, and fragments of polished, undecorated bone pines were located in Archaic midden.

An initial typology of the aboriginal ceramic population yields the following approximate percentages: fiber-tempered wares, 33%; Deptford and Wilmington, ½ of 1% each; Savannah, 3%; Irene, 47%; San Marcos, 5%; with 11% remaining unidentified. A re-evaluation of the wares would probably shift the %'s away from Irene toward San Marcos.

Hematite and limonite impregnated sands forming concretions around tree roots and in the sand were common. Although their dates of origin probably post-date the archaeological context of the area, they were recovered. Lithics consisted of a fragment of pecked and ground steatite, perhaps representing a broken gorget; a small fragment of chlorite schist, one chert Madison point in an Irene association and a few quartz and chert fragments.

Without becoming enmeshed in the complex subsistence problems inherent in midden analysis, West Georgia College hoped to contribute new data concerning a little known area of the site; the area immediately surrounding the ring proper. In an anthropological context, the Sapelo Shell Ring can be viewed as the manifestation of either technological, sociological, or ideological; i.e., "ceremonial" processes of a hunting and gathering culture. Given that the ring is composed of occupational midden, it was deemed important to determine if contemporary occupation sites exist exterior to the ring. Such an arrangement would indicate a somewhat more complex social organization than the egalitarian nature commonly attributed to purely hunting/gathering cultures. The existence of such sites is suggested by the presence of Archaic midden at WGC 718 and a possible occupation zone in the 2x5 meter unit. In this respect, our results are inconclusive but encouraging.

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Kent A. Schneider

Resource Management: Tasks, Manpower, and Funds Introduction to the Symposium

"Archaeological Resource Conservation" has been variously phrased as a contemporary issue if not a permanent problem in a flurry of recent articles and discussions. Most of these seem to rehash old and propose "new" conservation measures, management schemes, and legislation aimed at nipping what some have suggested as a very real threat to the essence of archaeology: wholesale destruction of the data source (see for example Davis, 1972; King, 1972; Lipe, 1974). Indeed, in the symposium "Roles of the State Archaeologist: Problems and Prospects," the general tone and discussion left me with the impression that an ever-present and growing phenomena of archaeological "administration" is a serious matter and one to be dealt with rather than ignored (Society for American Archaeology, May 2, 1974). In light of these developments, it seems striking that the Southeastern Archaeological Conference continues to structure around traditional and academic problems of culture and culture history and pay little formal notice to a very real and obvious problem at hand.

The present symposium address management and conservation issues as these impinge upon the course of archaeology in the Southeast. The position of contract archaeology as well as the role of the professional doing it will be considered in detail. The environmental assessment and review process will be examined. I believe it is incumbent upon all of us to become aware of state and federal legislation so that we assure ourselves and others that ground disturbing activities are in keeping with sound environmental practices. Experience with a federal program (CETA Title VI) through which funds to conduct archaeological surveys and excavations can be obtained will be critiqued. Finally, the rise as well as the successes and failures of independent archaeological corporations as "lucrative" service enterprises will be evaluated. The thrust of the ideas presented will be discussed as a wrap-up of the symposium.

Archie C. Smith and Kent A. Schneider

CETA Title VI: Manpower Pool for Archaeology

On December 31, 1974, and in the wake of rising unemployment and a depressed economy, Congress enacted the "Emergency Jobs and Unemployment Assistance Act of 1974" (Public Law 93-567). Under this Act a new program, administered by the Department of Labor and designated CETA Title VI – Emergency Job Programs – provided public service employment opportunities for unemployed and underemployed individuals. In need of personnel to conduct excavations at four (4) state historic sites, the Archaeology Section, through the Assistant Secretary of the Department of Cultural Resources, applied for and received in early January, 1975, thirty-eight positions funded under CETA Title VI.

The present paper briefly outlines the history of CETA Title VI and describes the kinds of jobs and wages available as these have related to archaeology in North Carolina. Nine month's experience with thirty-eight persons hired under the CETA Title VI program to conduct archaeological surveys and excavations are discussed and evaluated.

What is CETA Title VI all about?

The "Emergency Jobs and Unemployment Assistance Act of 1974" amended the "Comprehensive Employment and Training Act of 1973" (CETA) by shifting Title VI to Title VII and putting in its place the "Emergency Job Programs." This new title authorized the Secretary of Labor to allocate up to 2.5 billion dollars for the employment of unemployed and underemployed persons in "needed public services."

History. CETA grew out of existing manpower programs created by legislation passed in the early 1960s. The first of these programs was the Manpower Development and Training Act which was passed in 1962 to provide a training program to enhance employment opportunities for persons displaced by mechanization. This Act was combined with the Economic Opportunity Act of 1964 and provided such programs as Institutional Training and Neighborhood Youth Corps.

After some seven years of costs, confusion and duplication in programs, a movement toward reform was initiated with the passage of the Manpower Training Act of 1969. In 1971, following a severe rise in unemployment, the Emergency Employment Act was passed to enable employment of those without jobs in public works projects. It was at this time that efforts were begun to pass legislation which would decentralize manpower programs and make flexible the disbursement and expenditure of federal funds at the state and local levels. These efforts culminated in the passage of the Comprehensive Employment and Training Act of 1973 (Public Law 93-201). The Act was initially comprised of six titles, four of which dealt with manpower programs. These programs provided a rnage of manpower services to aid the economically disadvantaged (such as training, education, and Job Corps), but did not address fully the critical rise in unemployment. The structure for direct financial aid through creation of jobs was, however, implicit in the Act. With the passage of the Emergency Job Programs – or CETA Title VI – in December, 1974, Congress appropriated funds to mitigate the unemployment crisis.

Nature of CETA Title VI. The 2.5 billion dollars appropriated by Congress was to provide on a nationwide scale transitional employment for unemployed and underemployed persons in needed public services. These funds also were to provide training and manpower services to enable persons to move into permanent employment. Those persons eligible for participation in the program include those unemployed who have exhausted their unemployment insurance benefits, those ineligible for unemployment insurance, those persons unemployed for at least thirty days. Underemployed persons are also eligible provided they work twenty hours or less per week and are seeking full-time work, or are working full time but the total wage is below a poverty level set for the program.

How are Funds Allocated? Funds are allocated by the Secretary of Labor only for "eligible applicants," meaning prime sponsors qualified for fiscal year 1975 under CETA Title I, and Indian tribes on Federal and state reservations. As set forth under *Regulations of the U.S. Department of Labor Governing Programs under the Comprehensive Employment and Training Act, Attachment B,* Section 95.3, prime sponsors are defined as:

1. States;
2. Units of general local government which have a population of 100,000 or more persons;
3. Conscrtia consisting of general local governments which are (A) located in reasonable proximity to each other; (B) each of which retains responsibility for operation of the program; (C) at least one of which has a population of 100,000 or more persons; and (D) which, as a consortium, can plan and operate a comprehensive manpower program that provides administrative and programmatic advantage over the other methods of delivering services under the Act . . .
4. Any unit of general local government, or any combination of such units, without regard to population which, in exceptional circumstances, is determined by the Secretary . . . (i) to serve a substantial portion (e.g. 75 percent) of a functioning labor market area or to be a rural area with a high level of unemployment, and (ii) to have demonstrated that (A) it has the capability for effectively carrying out a comprehensive manpower program under the Act . . . (B) there is a special need for services provided by the Act . . . and (C) it will afford administrative and programmatic advantages over other

methods of delivering services under the Act; and
5. A limited number of CEP grantees existing at the time of the enactment of the Act. . . .

Prime sponsors in the State of North Carolina are certain specific local governments and consortiae of local governments. The Governor serves as sponsor for eighty-seven counties that do not qualify under provisions set for local governments and consortiae.

CETA Title VI funds are administered through the Office of Manpower Services in the State Department of Administration. This organization receives and subcontracts funds with other "non CETA" resources. These include employment security commissions, colleges, private non-profit organizations including public works, and other agencies.

The North Carolina CETA Archaeology Program

Early in January, 1975, the Archaeology Section was notified that the positions applied for had indeed been funded and that hiring procedures should commence immediately. The positions to be filled included eight experienced field supervisors, twenty-six crew members, one laboratory technician, and one stenographer. These positions were to be combined as excavation teams consisting of two field supervisors and crew members as needed to conduct archaeology on four state-owned historic sites. Since none of the sites were located in prime sponsor counties, in theory manpower could be drawn on a statewide basis. A major problem was finding competent field supervisors who would work at a rate of $7,000 per year ($590 per month). The main thrust of the CETA Title VI program was to provide employment opportunities for those whose financial commitments could not be met due to loss of employment. The business of archaeology, however, seems to thrive during a depressed economy and, as was quickly discovered, there were no archaeologists on the unemployment rolls.

The question of what constituted eligibility for CETA Title VI employment was thus explored in great detail. The Office of Manpower Services made it quite clear that students were not eligible. We were cautioned that should students or other "ineligibles" be found during an audit of the payroll, the Department of Cultural Resources would be forced to reimburse the federal government and would stand the chance of losing its CETA program. Therefore, the question of what constituted a "student" was explored in detail, since the recently graduated and available student contingent clearly was the hiring target. The interpretation of the eligibility clause rendered by Manpower Services opened the door to our labor force. Essentially, college graduates or former college students could be hired providing they had been recently employed but out of a job for thirty days. As a security measure, it was suggested that former students who applied include a letter from their former employer (such as instructor if they worked in a laboratory) indicating the last day of employment. In the event applicants "fudged," the onus would fall on their shoulders, not ours.

Hiring Process. A primary concern was filling the supervisory positions with qualified people who could run a dig, since overall supervision from the Archaeology Section would be sporadic. Although universities in the state had a potential labor force, this source had to be ruled out. There were, however, several students who had either recently graduated and were contemplating graduate school while holding down part-time or permanent jobs, or graduate students who, for their own reasons, had taken leave from advanced training. In several cases, candidates who qualified under CETA employment rules applied for supervisory positions, but they lacked sufficient archaeological experience. From a small list of available archaeologists, the field supervisors were hired. Employment of crew members presented unforseen problems, since there were not sufficient numbers of potential candidates with archaeological or anthropological training to form a single team. Hence, the crews at each site consisted of a mixture of those with some formal archaeological training and those without.

The procedure for employment was as follows: The interested party first registered with the Employment Security Commission (ESC) as an unemployed resident in the county in which the excavation was to take place. Following applicant interview, the ESC sent a copy of the applicant's application to the hiring official in the Archaeology Section. The applicant was then interviewed for the job. Based upon the interview and comments from the applicant's employer or former professor, the applicant was either hired or rejected. Rejections had to be specific and sound. Descriptions of the qualifications for each position had been previously submitted in the request for CETA funding. Field Supervisor positions required experience: "The supervisors should have several years' experience in field archaeology as well as be able to carry out simple land survey, mapping, and photography chores and be able to oversee the day-to-day work conducted on the site." But for crew positions, reasons for rejection had to be concisely worded as there were no qualifications other than "shovelability." As was later discovered, that all-important word, shovel, was the key to recruiting personnel who would stay on. The attrition rate of crew members was high.

The CETA Excavations: Critique. The State of North Carolina operates, maintains and interprets twenty-one historic properties for the education and benefit of the general public. Of these, four sites were selected for CETA-funded archaeological investigation: a) Fort Dobbs, a Revolutionary War period site; b) Halifax, a significant 18th century town; c) Reed Gold Mine, site of the first authentic discovery of gold in the United States; and d) Fort Fisher, the largest Civil War earthwork fortification in the Confederacy. The objectives of these excavations were to broaden the data base for interpretive purposes, and to clear areas scheduled for construction to insure that the state was in full compliance with sound environmental practices. Since reports of the actual excavations are beyond the scope of the present paper (these will be made available by the Archaeology Section), we summarize briefly our experience with the CETA archaeology program.

In general, there were several benefits gained. Excavations conducted at the sites did yield valuable insights which would not have been derived for years to come. Backlogs of artifacts in need of analysis preparatory to report preparation were considerably reduced by CETA employees. Surveys were also conducted, and it is here that we feel the CETA program offers its greatest potential to archaeology. Familiar as we are with the increasing loss of our resources, environmental assessement and survey teams — including administrators, draftsmen,

photographers and secretaries — can be put together under a CETA program. CETA teams can also aid the state-wide archaeology plan as is required by the National Park Service.

However, as is true of any new program one anticipates problems (sometimes in advance) and attempts to balance these to achieve success. In our case, we had some problems from the start. Anxious as we were at the prospect of securing a "free" labor force, we accepted the program with little forethought as to personnel, and funds for travel, supplies, equipment, and report preparation. Combined with limited in-house funds and a small professional staff, the lack of funding and equipment constantly hampered excavations at the sites. Separated by as much as 300 miles, movement of personnel and equipment to sites was a continuing problem throughout the program.

A most important ingredient in any program is finding and retaining qualified personnel. Due to residency rules and employment qualifications noted above as conditions for CETA eligibility, it was difficult to find and keep qualified field supervisors and crew members. While unemployment was at an all-time high, so was our crew member turnover rate. This may have been due in part to what one laborer described as "beneath my dignity, digging these holes"; but the high turnover rate reflects such other trends as collecting unemployment insurance in lieu of working on an archaeological excavation.

An additional factor which hindered operations was lack of coordination. The majority of in-house professional staff became increasingly involved in the environmental assessment process; hence, time available to oversee excavations at each site decreased considerably, and communications broke down. To illustrate the need for prior planning, including an assessment of one's own commitments and resources when considering a CETA-funded archaeological program, we share the following "innovation":

> Arriving one sunny morning at a site which had not recently been visited by in-house staff, the supervisors and crew were observed mapping two newly opened squares. A new technique had been born — the "Oval Excavation." Rather than cut in the conventional manner, the corners of each five-by-five square were round and mapped as such.

Summary

As of this writing, the Comprehensive Employment and Training Act can be viewed as a source for expanding archaeological programs. However, before seeking CETA assistance, prior planning is absolutely essential. Local Manpower agencies should first be consulted, as legislation will surely change. Salient points to bear in mind are: a) availability of qualified and eligible personnel; b) funds for equipment, travel, artifact processing and report preparation; c) laboratory space sufficient to clean, acquisition and analyze materials recovered from the field; and available staff time to oversee operations.

Donald L. Crusoe

The New Era? Commercial Archaeology

In any field such as anthropology, where the central thrust of the discipline has revolved about the university, where the mind and mentality of the business world has only been a study for the academician, and where our own discipline has continually shied away from the realities of the business world in favor of the realities of the hunting patterns of modern and ancient eskimo, it is no wonder that a commercialized aspect of the field is viewed by the academician with anxiety and jaundice. One need only look to our journals to determine that there is a considerable amount of threat to the academician, which is expected from the commercial world as a result of new legislation. What is the nature of this presumed threat to the establishment, most persons ask, but the real question is what is to become of the resource in light of this presumed threat.

At the bottom of all this is the need to protect and preserve archaeological resources, collectively called these days "cultural resources." Hester Davis pointed out a few years ago that these resources needed to be protected, and a fervor came over the field. I can remember Joe Caldwell saying that "if we only had one percent of that damned construction money then we could go out and do proper salvage on those sites." Now there are signs that perhaps one percent is not enough, and perhaps this is true because we are in the last stage of a lot of construction and maybe some of these sites that are "out there" do need to have more funding – and its available. However, I feel that for the future better planning is the more obvious answer to the site destruction problem. Better planning means more complete cultural resource inventories, and these inventories are the basis for the evaluations which are made in the environmental impact statement. In light of the vast extent of the legislation, weekend and summer session field surveys can not accomplish all the work that needs to be done.

Now, I think that universities need to gear up, perhaps along the lines of Tennessee or Alabama; or the offices of the state archaeologists need to gear up. or the state museums need to gear up. Otherwise, its going to the commercial companies. But, regardless of what happens, this whole thing means that there are going to be more jobs for qualified people, and there are not enough jobs right now to go around in the classic set-up. To survive, graduate programs must turn out qualified professionals. But what are these young professionals supposed to do? Are they supposed to sit around for ten years and wait for some guy in a university to die so they can take his job? Ridiculous! You cannot expect young talent to sit around and wait for somebody to die so they can have their job. Obviously, they are going to go somewhere and the big companies are going to buy them. So, what I am speaking of when I refer to commercial archaeology is a corps of professionals who are working on soft money and contract money, or who are on the payroll of some A & E (Architect and Engineer) contractor. With a proper registration as envisioned by the Society for American Archaeology, or perhaps some other body, the problems with the "qualified" individual versus the "unqualified" individual could be rectified. The world is continually reminding us that we live in a capitalistic society, and indeed it is strange that anthropology has survived outside of this society-wide, profit-minded approach. Realistically, this survival can only be attributed to the lack of money in the field, but now there is money and now we cannot expect society to let us sit as we were sitting before.

Let me examine what it is that commercial archaeologists do. To begin, let me present the general philosophy of an A & E contracting firm. The general corporate philosophy in the commercial sciences seeks to provide the highest quality of professional services to the client, and it seeks to serve the client and society's best interests. Now, that is philosophy. Reality is that the firm is out to make a buck. Reality is that the average firm is trying to do an adequate job or a job that will pass the reviewers. The firm has money and can provide the archaeologist with the kinds of professional expertise necessary to accomplish interdisciplinary tasks. To survive, the firm must accrue a profit and this appears to be in the realm of thirty percent. Most firms have little interest in providing curatorial services except for what is provided for in the contract. And after the contract, firms want to get rid of the artifacts and give them to the state from which they have been recovered. In the southwest, firms tend to leave the artifacts where they found them and do not even take them back at all. In commercial archaeology, the objective is the completion of the contract in accordance with the scope of work statement. The professional is providing professional advice to the client to be used in whatever fashion the client sees fit. In the past, we have provided information to the profession so that it could use the data in the manner it saw fit. The hazard with commercial archaeology is that the information will not penetrate to the professional level but will be used solely by the client. Moss-Bennett is less than two years old, and already horror stories permeate the field. There are rumors of rip-off, but some excellent work has been done. One would hope that this stage in our development will quickly pass so that the resource will not be adversely affected by the negative. Somehow, we must find a way to keep honest professional differences to ourselves and not spread them into the planning process. Such differences could do harm to the resource which really needs to be saved.

I have been speaking of money, but I have not stated what one might expect in the way of salary. If you take a job with an A & E contractor, you can expect to be paid about $20,000 a year if you have a Ph.D.; about $15,000 if you have an M.A.; about $10,000 if you have a B.A. The pay is good, but sometimes this is all you get, and your second year salary depends upon whatever you produced for the corporation the first year.

I have touched lightly upon several areas in which commercial archaeology and academic archaeology are at odds. I do not feel that there is any threat to the establishment by qualified firms and I think that, in the long run, the benefits of having commercial archaeology will prove themselves.

Robert L. Stephenson

Summary of the 1975 SEAC Symposium, "Resource Management: Tasks, Manpower, and Funds"

As a wrap-up let me try to summarize what has been said. I think we have covered rather extensively, in the preceding papers, some of the basic things that are involved in contract archaeology and some of the problems that contract archaeology has to face, and is facing. I believe that is important. Facing it is critical. Many of our colleagues have resisted contract archaeology and so-called public archaeology and I don't think we can, any longer, afford that attitude. Most of us throughout the country are into some kind of contract or public archaeology. Some of the things we have heard this afternoon I think are terrifically important for every aspect of American archaeology. Frank Schnell's comments about methodology in a reservoir have tremendous significance for what we might recommend as mitigation in an archaeological project at a reservoir. What happens to a site after the flood waters have covered it and maybe uncovered it one, two, or three times or more? I just recently learned of a project by Cal Cummings of the N.P.S. for a five-year project to learn what happens to sites that have been inundated. Hal Husher did a small study of just that thing in one of the Missouri River Basin reservoirs some years ago on one site. This is something we have really got to know about in order to know what to recommend for mitigation in an area that is going to be completely inundated by a reservoir.

Archie Smith has told us of a source of manpower we can potentially have and of some of the pitfalls of using that kind of manpower.

Larry Meier has talked to us about the potential of our local county areas being a source of funding. This can be of real value in developing an archaeological program within a county area; the use of various kinds of people, funds and facilities at local and county levels.

Don Crusoe opened up the door to a very important part of contract archaeology that is going to be thrust upon us throughout the country in years to come. We have only seen the very slightest crack of the door being opened in commercial company archaeology. Now, there are a number of these. There are the consulting firms that consult with an agency to develop an E.I.S. for air, water, and archaeological resources. Some companies are hiring archaeologists as part of their consulting staff. There are many inherent problems here, they can hire anybody they want to, and it is going to be a tremendous boon to the professional community when we have a register of qualified archaeologists that these companies can consult. Other kinds of commercial firms are consulting firms that do nothing but archaeology. I don't know of a successful one, but there may be some. It requires considerable capital to set up such a business. But, commercial company archaeology, in one way or another, is going to be upon us and it is not going to be a bad thing so long as the character and capability of the archaeologists involved are at least at the level of the academic archaeologists and the rest of us that are working in the kinds of contexts that we are working in today. Agencies are already hiring archaeologists. The U.S. National Forest Service, now, has an archaeologist in their regional office in Atlanta to handle the paper work and to insure that archaeology is done on Forest Service land. The Bureau of Land Management has many archaeologists on its staff.

Steve Gluckman's paper discussed and summarized many of the things we all have to face in contract archaeology, whether we be on the local level working with the county or on the state or federal level, or in private companies. Whatever it is, there are some basic things that we have got to contend with. We have got to know what we are agreeing to when we take on an archaeological contract. If you agree to find all of the sites, or do a 100% survey, you had better do it or say why you didn't do it. But let me modify this. I suggest that none of us ever be foolish enough to say that we are going to find all of the sites even in a 10 acre area – we are not going to do it. If we think that we are going to find all of the sites in any area we are going to be anticipating that that area will be completely stripped by heavy machinery to a depth of two or three, or maybe ten feet down to bedrock and that is the only way we are going to find all of the sites in that area. We are always going to have something potentially yet to be found and somebody will have a good possibility of coming up with a site we missed, be it next week, next month, next year, next decade. So, if you say you are going to do a 100% survey, you are going to have to do it in some kind of qualified terms, and be sure to spell these out so that you don't get caught in the web of not doing what you said you would.

We cannot, as archaeologists, be in the position of holding construction projects up, or we are going to lose all of the good legislation and the good rapport we have been developing over the past decade with federal, state, and local agencies and the public in general. If we don't handle it responsibly and do a responsible job, stating exactly what we can or can't do, and do it in the time frame within which the client can get his job done too, we are going to lose our whole ball game. We can't be in a position of holding up, delaying or stopping projects. There are many places in contract archaeology, particularly in highways or small projects, where we can get the contractor to alter his project. That isn't stopping the project; it is helping the contracting agency meet his commitments and still do his job.

Another point to be made is that we can't do *all* of our research on the contractor's money and time. We have got to do some of the research on the contractor's money in order to give the client a full scientific, archaeological statement, and tell him what is significant and what is important and what must be done in the mitigation phase. What the contractors are faced with is a very poor understanding of what we *want* to do. We talk to ourselves about this, now we have got to talk to the clients and agencies whether it be the Corps, the Forest Service, the environmental engineers, or whatever.

As a partial solution to this, Carl Chapman has put together an annual meeting the last couple of years in Columbia, Missouri. A day is spent with contract archaeologists discussing their problems with the agencies and the developers. A second day is spent with the agencies and developers telling the archaeologists their problems. The third day is devoted to trying to develop solutions. Through this we are beginning to understand the problems of each other. We are beginning to understand just what kinds of problems such agencies as the Corps of Engineers or highway departments have in terms of engineering and construction and how their time frames are developed so that we, as archaeologists, have some way of fitting our time frames into theirs. And, they are beginning to understand some of our problems, of how it isn't a great horrendous task to deal with archaeologists.

These meetings have been highly successful elsewhere, too. At the instigation of Richard Gingrich, in the Environmental Protection Agency regional office in Atlanta, we have had two meetings that have been very helpful in dealing with the E.P.A. and other agencies. We have reached the point, at least, where we can have some discussion and understanding of mutual problems. It is the kind of education that anybody in contract archaeology is going to have to devote a good deal of his time to. We are going to have to devote a good deal of our time also with H.U.D., or F.A.A. or any other agency as well as the contractors and consulting firms so that we can learn their problems and they can learn ours. This is a two-way situation and we must recognize this. It is not just us telling them; it is us telling *and listening.*

As regards planning, we in America are beginning to fit our archaeological research programs' total planning into the contract picture and the contract picture into total planning. As an example, South Carolina is developing a ten-year plan to include areas where Early Archaic problems are focused, or areas where Late Archaic-transitional problems are focused. We are developing a research plan for the entire state which will fit these little packages of specialized problems into a long range planning process and research development for the understanding of human lifeways and human behavior over a period of many millenium. Into these research area plans, we can plug any piece of our contract archaeological data.

Finally, we come to the point of guidelines. Everybody has guidelines now. Whether it be the Corps of Engineers, H.U.D., E.P.A., or anyone else. Everybody has guidelines – except the archaeologists. Yet, we are tied into these guidelines, like it or not, because *we didn't prepare our own first.* The guidelines under which we work were, for the most part, not prepared by archaeologists and I am just utterly amazed at how good these are. But, they have been thrust upon us simply because we didn't do it. So, we are going to have to live with the other fellow's guidelines and it is up to us to make these work.