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SOUTHEASTERN ARCHAEOLOGICAL CONFERENCE

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SOUTHEASTERN ARCHAEOLOGICAL CONFERENCE
GAINESVILLE, FLORIDA
NOVEMBER 6-8, 1975

Edited by
DREXEL A. PETERSON, JR.
MEMPHIS, TENNESSEE
1976
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 “archaeologies” 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 mail 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 Rullingon
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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Program Chairperson: Kathleen Deegan

THURSDAY, NOVEMBER 6

Volunteer Papers:
- **GEORGIA ARCHAEOLOGY AND SETTLEMENT**
  Chairperson: David Halley (U. of Ga.)
  - A. R. Kelly (U. of Ga.): Swift Creek Sites in Southeastern and Coastal Georgia
  - Betty Smith (U. of Ga.): Swift Creek: A Reappraisal
  - Mark Williams (U. of Ga.): WPA Excavations at Stubbs Mound, Bibb County, Georgia
  - Christopher Hamilton (FSU): A New Look at Lamar Ceramics

- **CHARLES PARSON (U. of Ga.): Late Prehistoric Settlement on St. Peter Island, Georgia**

- **RICHARD JEFFRIES (U. of Ga.): Locational Variability of Prehistoric Settlements in Lookout Valley, Georgia**

- **CHESTER DEPRATER (U. of Ga.): Settlement Data from Skidaway Island, Georgia**

Volunteer Papers:
- **MISSISSIPPIAN STUDIES**
  Chairperson: Ray Williams (USF)
  - Bruce Smith (U. of Ga.): The Gypsy Joint Site: Middle Mississippian Homestead
  - Craig Shelton (W. Ga.): Factors of Mississippian Settlement Strategies in the Coastal Plain of Alabama
  - Gail Schnell (Columbus College): Environment and Culture on the Flint and Chattahoochee Rivers ca. AD 1200
  - Marjorie Hoovenkamp (Vermond): The Angel Phase: Analysis of Middle Mississippian Occupation in Southeastern Indiana

Volunteer Papers:
- **SURVEY, RECOVERY AND ANALYSIS STRATEGIES**
  Chairperson: James Soutarville (FSU/SEAC)
  - Jefferson Chapman (U. of Tenn.): Early Archaic Site Location in the Little Tennessee River Valley: Backhoe and Traverses
  - Frank Schnell and Jack Tyler (Columbus Museum): Hydrolology and Archaeological Site Conservation
  - W. Dean Wood (U. Ga.): A Sampling Scheme for Sub-Surface Archaeological Survey
  - Timothy Thompson (N.C. State Archives): A Study of Artifacts from the Lower Cape Fear

Volunteer Papers:
- **CHRONOLOGY AND CULTURE HISTORY**
  Chairperson: Gerald Milliken (Florida State Museum)
  - John Walthall and Ned Jenkins (Ala.): The Gulf Formative Stage: A Model for the Cultural-Historical Integration of the Early Ceramic Producing Cultures of the Southern Coastal Plain
  - Ned Jenkins and Caleb Curren (Ala.): Archaeological Investigations on the Central Tombigbee River: Alabama Chronology, Subsistence, and Settlement
  - Chester DePrater (U. of Ga.): Phase, Pottery Types and Population: The Chatham County Georgia Sequences
  - Edwin Lyon (LSU): The Louisiana WPA Project

FRIDAY, NOVEMBER 7

Symposium:
- **AGRICULTURE IN SOUTHEASTERN PREHISTORY**
  Chairperson: George Percy (Fla. Div. Archives and History)
  - Richard A. Yarnell (UNC): Cultigen Prehistory in the Southeast
  - William Sears (Fla. Atlantic): Prehistoric Agriculture in Florida
  - David F. Pregl (E. Carolina): Prehistoric Agriculture in North Carolina and Adjacent Portions of the Atlantic Coastal Plain
  - William Wood (LSU): Prehistoric Agriculture in Louisiana
  - Richard Zierl (U. of Ga.): From Unmanaged to Managed Food Resources: Root Crops or Seed Crops? An Examination of Settlement Systems in Southeast Georgia
  - Jeffrey Brain (Harvard): The Question of Early Agriculture in the Lower Mississippi Valley
  - George Percy: Discussion

Volunteer Papers:
- **ENVIRONMENTAL AND SUBSISTENCE RECONSTRUCTION IN SOUTHEASTERN PREHISTORY**
  Chairperson: Bruce Smith (U. of Ga.)
  - Rochelle Marroian (U. of Fla.): Assessment of Subsistence Strategies as Evidenced by Shell Ring Sites
  - Mike Trinkle (U. of S. Ga.): Faunal and Botanical Remains from Archaic-Woodland Transitional Shell Middens on the Georgia Coast
  - Elisabeth Sheldon and Margaret Cameron (Ala.): The Reconstruction of Prehistoric Environments: The Warm Mineral Springs Project
SATURDAY, NOVEMBER 8

Symposium:

UNIVERSITY FIELD SCHOOL RESEARCH IN THE SOUTHEAST
Chairperson: Charles Fairbanks (U. of Fl.)

Charles Fairbanks: Introduction
Elizabeth Wing (Florida State Museum): The Role of Zoology in Archaeological Research
Rodney Harriman (U. of Fl.): The University of Florida’s Field School Program: The Student’s Point of View
David Phelps (E. Carolina): Eastern Carolina’s Field School Program
Kathleen Deagan (FSU): Florida State’s St. Augustine Program
Charles Faulkner (U. of Tenn.): Tennessee’s Normandy Field School Program
Crawford Quakenbush (Miss. State): Mississippi State’s Field School Program
John Waitek (Ala.): The University of Alabama’s Montgomery Field School
Dan Simpkins and E. McMichael (W. Ga. College): West Georgia’s Sapelo Island Project
George Fisher (NPS/SEAC): Field Schools, Site Conservation, and Public Archaeology
Charles Fairbanks: Discussion

Symposium:

THE ZEBREE PROJECT: NEW APPROACHES TO CONTRACT ARCHAEOLOGY
Chairperson: Dan F. Morse, Jr. (Arkansas Arch. Survey)

Dan F. Morse, Jr.: Background of the Investigation
David G. Anderson: Excavation Strategies
Jeff Nawarri: Environmental Data Evaluation Strategies
Eric Rosh: Preliminary Faunal Analysis
Suzanne Harris: Botanical Remains, Recovery Techniques, and Preliminary Student Results
Mark Rad: Developmental-Societal Hypotheses of Mississippian Society
Christopher Heblies (Meth., Museum of Anthropology): Discussion
Bruce Smith (U. of Ga.): Discussion

Symposium:

RESOURCE MANAGEMENT: TASKS, MANPOWER, AND FUNDS
Chairperson: Kent Schneider (N.C. Dept. of Cultural Resources)

Kent Schneider: Introduction
Robert L. Stephenson (S.C. Institute of Arch. & Archa.)
Resource Management: An Overview
Lawrence Meier and Carolin Reichburg (Arch. Survey—Cobb & Fulton Co.): Archaeology in Comprehensive Land Use Planning and Local Government
Stephen Gluckman (N.C. Dept. of Cultural Resources): Environmental Reviews and Archaeological Survey: Potential and Problems
Donald L. Cruice (Arch. Survey—Cobb & Fulton Co.): The New Era Commercial Archaeology
Kent Schneider: CETA Title IV: manpower Pool for Archaeology
Tom King (N.Y. Arch. Council): Discussion

Symposium:

COMPUTERIZED SITE FILES AND CULTURAL RESOURCE MANAGEMENT
Chairperson: Frank B. Fryman (U. of Arizona)

Mary K. Jones (Fla., Div. Archives: Florida’s Historical Resource Data Management System: An Overview
Sandra Sholtz (Arkansas Arch. Surv.): Geographic Display of Computerized Archaeological Site Information
Jack Keller: Title not received.

Action 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 Coosa River preliminary to the diversion of the Coosa River to provide a new channel to a second dam construction at Carter's called the Regulation Dam. Successful bulldozing operations cut away six to eleven feet of alluvial overburden in the river bend of the Coosa River, where site 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 Coosa River near the diversion point.

On occasions when heavy rains and ponded excavations made work impossible at their scheduled sites the field crew made several surface collections in the freshly buldozed 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 prehistory in North Georgia. The nature of the building occupations undoubtedly mixed the collections in some parts of the disturbed areas 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 teasing to extract the initial sampling from a perceived predominately Swift Creek occupation. A second relatively undisturbed outer zone 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 construction through the high bluff in which XUA was early observed, thus exposing another right angled portion of the same midden. Between 25 and 20 feet of continuous middens were revealed in this cut, denoted excavation unit B (XUB) and another sample was teased from this context. As expected, analysis XUB shows a preeminent Swift Creek occupation. The only complication here was that a historic cabin site of the late 18th century or first quarter 19th overlaid the Swift Creek occupation by a few inches. This upper historic cabin situation was examined and sampled by Patricia Garrar of Shorter College who prepared a paper on this apparent Cherokee cabin belonging to the late CoosaWista Old Town period just prior to the removal of the Creeks. The pottery and historic trade goods including bone creamware were closely assimilated to a proto historic and historic occupation found by David J. Hall and his student workers in some of the village levels at Little Egypt (9MU102).

In subsequent bulldozing at the wide strip between the river and the Re-Regulatory Dam an occupied zone was uncovered some 40 to 50 yards behind XUA and XUB. During July and August some shoveling shoving in this area was carried out in an effort to find additional undisturbed soil with a view to uncovering use and possible house patterns. Field excavations during this interval were labelling 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 seasonal change in pottery and other diagnostic artifact material.

In the final bulldozing on the area the heavy excavating machinery cut down several more feet and struck one "hot spot" where the uprighted pottery exposed a 2500 to 3000 square was observed to represent an almost "pure" assemblage of brinnarian tempered, fabric impressed, ware, identical to the well-known Tennessee variety as Long Branch Fabric Impressed. There could be no doubt but that this occupation had been preserved vertically by several feet of sterile overburden from the upper deposits assignable to the Carterville Period, including the Swift Creek occupation which prefaces north Georgia survey had demonstrated to occur in typical Late Carterville 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. Instead 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 analyzed in north Georgia, were not for the revelations of the bulldozing.

Moreover we were already heavily 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. Still obviously would have constituted a major archaeological project, requiring additional archaeological personnel and funding, impossible to consider at this late juncture. The salvage collections following the bulldozing of the site made by volunteer efforts of devoted and concerned students, gleaned from inexact archaeological context, do allow for some insights into the long, intermittent and successive occupations of the Carter's Dam area, extending from the Archaic to protohistoric Cherokee. The more intensive archeological
litical site explorations conducted by University of Georgia field school. Although the area was known to have been concret-
ized largely on mound and village sites, or sites attributable to the late Mississippian chronology.

The first site indications at BMU104 were found in June, 1973, when a buried midden was reported exposed in the west bank of the Coosa River, opposite the Bell Field site. The high bluff of the river rising 25 to 90 feet above the margin of the stream, was stumped with huge blocks of earth forming a wide talus slope. Between five and twenty yards of sandy soil containing a variety of red, brown, or orange-colored gravel was found from 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 area being represented by the same collection, hearth, or cooking area. This feature was travelled over by the most important since there was not time to remove the extensive overburden. Cave,谱, ash, cracked stones, and other matter was collected for organic extraction, and C14 samples. At the site 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 disturbed context. The second excavation (XUB) was exposed by a bulldozer at right angles to XUA which cut down to the Swifter Creek level and was confluent with it. For this reason XUA and XUB collections were made for analysis. A total of 327 study sherds shows that the majority belong to a Swifter Creek occupation. Only 23 sherd of check stamped, simple stamped, linear stamped, and textile (1%) were non-Swifter Creek.

The Swift Creek materials were divided into three categories. The first three were white-slipped stamped with a variety of pottery designs of classic Middle Swift Creek. Stamped, 77 in all or a fraction over 22% of the total series. The second Swift Creek class was composed of 132 sherd of Swift Creek Complicated stamped which had been so badly smeared as almost obliterated the designs. In some cases only a wet surface under refractory light would bring out the faint patterns. This means that 40% of the Swift Creek Complicated Stamped ware were so carelessly executed in applying the carved wooden paddle to the wet paste that the decorative treatment was almost completely ineffective. One is tempted to believe that 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 slab sites are assemblaged.

One interesting detail has come from the study of stamping. Although the entire area did not report a use of blue black chert derived from the well- known Fort Payne formation in North Georgia. The pre- vailing projectile is small, slender, with straight stem and slight, notched sides - all made from the blue chert. Extensive collections of cores, preforms, and chipped deluge imitate what workshop activity was customary on the site. Contrary to this situation at the Carter's Dam site with the minority showing of similar types of projectiles found with the artifacts from the Swift Creek site and the large amount of chiseling at the type of Swifter Creek site at Macon. The bulk of the Macon flint is a bright, variegated color flint found with complete implements but little in the way of chips. There was evident some transport of the north Georgia flint tiles or quarry material to the Macon site.

The third site surface materials came from the spoil pile of a deep drainage sluice extending from the river west toward the Re-Regulation Dam, and too to three elevated buildings which had 20 to 30 feet of earth layers on them during July, 1973. This operation interrupted more the Swifter Creek component represented in XUA and XUB but the other sherd from the trimming "hot spot." Hence, it is not surprising that the XUA and XUB included along with three fabric impressed. Swift Creek Complicated Stamped decrease to 76.7%, the obliterated Stamped increased from 40 to 48%, the smooth plain decreased from 26% to 24%. Exposed sherds rather than simple smeared in the obliterated class were more frequent. Actually the percentage of non-Swifter Creek was about the same (7% as 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 weathering process leading to practical obliteration in many cases is clearly careless or inapt 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 out deeper and one more "hot spot" was unearthed. This discovery was particularly interesting as approximately 100 sherds picked up in one afternoon after a heavy rain constituted a "pure" collection of lime- stone tempered, fabric impressed sherds which had they were found in Tennessee would surely have been identified as Long Branch Fabric Impressed. The type reported by Haag in 1959 was one of the Early Woodland standards of TVA archaeology (Haag 1959:11). The fabric impressed counterpart in north Georgia was first denomi- nated Kelloe Fabric Impressed by Joseph Caldwell, later changed to Dalton Fabric Impressed - this type was sand or grit tempered. The limestone tempering from the new occurrence in BMU104 had been much leached, leaving angular vesicles or pockmarks in nearly all recovered sherds. Only one rim was obtained, 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 that a 2500 to 3000 square foot open area had been ex- posed a foot or more beneath the Swift Creek-Cartersville "hot spot" above it. In conclusion BMU104 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 deepest sections, one can in many sizeable mounds - platforms possibly but nothing com- parable to Mandeville or Osceola. After all later, many belonging to the Mississippi interval, at Bell Field, Little Egypt, and Shreve were still intact despite over 100 years of continuous modern cultivation and river erosion. There is evident, especially in the blue chert projectiles, of direct contact with Macon Swift Creek. The Middle Swift
Creek stage as defined on the Ozolujee. Rims are primarily straight, with rounded or flattened lips, wall folded, notched or scalloped — although the scalloped variety does not occur at BMus 104. 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 Mason 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 BMus 104. As at Mason Swift Creek appears in a matrix of check-stamped and simple stamped identified with Catwell's North Georgia Cartersville Period. Linear stamping, a very small minority, relates more to Napier-like sherds, with known strong occurrence of Woodstock Complex in the Carter's neighborhood, as well as the presumptive derived Elmwood Stamp.

Reference cited:
This paper represents only a small part of the analytical work done on the W.P.A. excavations from central Georgia 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 Mazon 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 slowed 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 peat 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 earthbowl. 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 Mason Earthbowl. The entrance to the structure was a well-trenched 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 20' 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 Mazon 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 aging 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 pips and one copper ear spool.

The ceramics from Stubbs Mound showed an interesting admixture of traditional Southern 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 fired vessels 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 artifact 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 wfe 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 Mazon Plateau and central Georgia as proposed by Fairbanks in 1958 does not have fine enough detail to aid in the understanding of sites away from Mazon 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 1700 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. Mason Plateau is no longer here regarded as a full period in central Georgia prehistory. It
and Brown's Mount remain the only anomalous site sites of this group of people. In terms of overall trends, how-
however, the people of the Swift Creek period remained in
central Georgia during and after the initial Mississippian
intrusion and settlement. The type of acculturation repre-
sented at Stubble Mound is possibly a result of the inter-
action of the traditional Swift Creek indigenes with the
early Mason Mississippian intruders as well as later inter-
actions with people at Chattahoochee Mississippian cen-
ters such as Flood'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

<table>
<thead>
<tr>
<th>A.D.</th>
<th>CENTRAL GEEGIA PHASES</th>
<th>CENTRAL GEORGIA PERIODS</th>
<th>Mason Platform Periods</th>
</tr>
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<tr>
<td>1400</td>
<td>CONWAY'S</td>
<td>Lamast</td>
<td>Pritchett (14456)</td>
</tr>
<tr>
<td>1500</td>
<td></td>
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<td>1600</td>
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<td>1700</td>
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<td>1850</td>
<td>STURGIS</td>
<td>Mason Platform</td>
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<td>2000</td>
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<tr>
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<td>MACON'S PLATEAU</td>
<td>Late Swift Creek</td>
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<td>900</td>
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<tr>
<td>800</td>
<td>SWIFT CREEK</td>
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</tbody>
</table>

**Table 1**
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. 1500 to A.D. 1550 (Caldwell 1971:98). 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.](image1)

Relief on the island is minimal, ranging from sea level to about 8 meters. The projected climax forest type for the island is a maritime live oak forest (Hillcrest et al. 1976:78), 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 small 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 cultivars 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 led 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 past three years by Shorter College of Rome, Georgia...
and by students from the University of Georgia, have located a total of 181 prehistoric sites (DeFratter 1974). These surveys have covered most of the island and have included portions of all biotic communities and physiographic areas of the island. It is assumed that the majority of prehistoric sites have been located.

Of the 181 sites located, 47 have been identified as having late 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 (Haggart 1972:115-117). Within a settlement system, then, variation in site size is, at least, an initial indicator of variations in site functions.

Considering site size as a reflection 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 was 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).

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 2 presents a dendrogram of the clusters produced by the analysis. Only 46 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 3 presents a dendrogram of the clusters produced by the analysis. Only 46 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).

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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 size distribution in
Figure 6. dendrogram of class cluster solution.

Figure 7. Frequency distribution of sites by size class.

Figure 8. Cumulative frequency of sites by size class.
light of some theoretical explorations 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 (Ruggatti 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 1968, 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 1961:57). Geographers have generally associated primate distributions with areas that have "simple" economic and political development (Berry 1961:538). More explicitly, Vapnarsky (1959) has shown that the curve in Figure 7 is to be expected when dealing with a small homogenous 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 Osabaw 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 Osabaw 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 Osabaw's prine 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 Ienne inhabitants. Even though the rankings are to some extent subjective, they are considered logical and plausible in light of available data on Ienne subsistence and adaptation.

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

The four forest communities that occur on Osabaw 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 (Hilfiset al. 1976). 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 site size and forest communities.

<table>
<thead>
<tr>
<th>Size Classes</th>
<th>Percent Geanerity</th>
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</thead>
<tbody>
<tr>
<td>Class I</td>
<td>2</td>
</tr>
<tr>
<td>Class II</td>
<td>5</td>
</tr>
<tr>
<td>Class III</td>
<td>8</td>
</tr>
<tr>
<td>Class IV</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
</tr>
</tbody>
</table>

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 vary with their 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 Ienne 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 plausible 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 providing a means of movement on and off of the island. The distance categories are the same as those in Table 3.

<table>
<thead>
<tr>
<th>Site Classes</th>
<th>Distance Categories</th>
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<tbody>
<tr>
<td>Class I</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Class II</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Class III</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Class IV</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

Table 4: Site frequencies cross-tabulated by site class and distance from current creeks.

What is shown in Table 4 is a rather great variation in distances 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 large 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 funnelled through this 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 subsistence 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 disturbed overall increasing specialization as sites get smaller with a consequent 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 useful, 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.

References cited:


Introduction

Until recently, archaeological research in the Southwest has been oriented toward the excavation of a relatively disjointed collection of sites, with particular emphasis on the excavation of mound and large habitation areas. Seldom have archaeologists looked beyond the site to the more complex, intensive 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 Southwest 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 area. This area is located in Dade County, Georgia, on the extreme northeastern corner of the state. The goals of the survey were 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.

Physiographic Description

The topography of the research area is mountainous and lies within and at the edge of the Cumberland Plateau. The major physiographic characteristic is Lookout Valley, an erosional feature oriented northeast-southwest that parallels 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 slopes of the mountain side. The altitude of the valley floor ranges between 208-400 meters a.s.l. and generally less than three miles wide. Cliff-topped 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 into 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. Hypothetical 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 by 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 un-
known. As far as can be determined, no formal archae-
ological research was conducted in the area prior to 1937. Considerable research has been done along the Tennessee River in the past 15 years. Sufficient 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 excava-
tion 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 higher component was interpreted as a Middle Wood-
land storage and processing camp and the lower level con-
tained Mississippianistic material (Brown n.d.).

In 1973, a research team under the direction of Dr. Joseph R. C adjud was, University of Georgia, excavated the Tunacumachee mound and habitation area in Lookout Valley. The Tunacumachee site is of archaeological signifi-
cance 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 Southwest and the site contains not only the widely known and extensively documented mortuary remains of a Hopewellian affiliation occupation, but also an associated habitation area (Jeff-
ery 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 (Stuwever 1968; Thomas 1968, 1973). Cultural variation in image has been viewed in terms of differing adaptive require-
ments to specific resources within the environment. If the area of settlement is large enough, the nature of the ex-
tinct settlement system should be reflected in the kind, number, and distribution of settlement types. Settlement types are to be defined as those sites that demonstrate particular configurations of exploitative and maintenance activities. These sites will contain a similar structure of material elements (Stuwever 1968). The choice of the Lookout Valley research area is an attempt to analyze the locational and functional variability of prehistoric settle-
ments within a regional framework. The research area better includes a variety of environmental zones where different settlement types could operate, yet small enough to warrant 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 perim-
eter by a line on the top of Lookout and Sand Moun-
tain, 1500 meters from the bluff area. The northern and 
southwest perimeters are formed by lines crossing Lookout Valley perpendicular to the longitudinal axis of the valley. The research area encompasses an area of 156 square kilometers. The area is divided into six units or strata. The criteria for stratification are based on environmental and physi-
ographic factors since the hypotheses to be tested are pri-
marily 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 1968-92). Based on the aforesaid criteria, the research area has been divided into the following strata:

- 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.
- Bluff Area — a narrow strata located at the edge of the upland plateau constituting 5 percent of the
- 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.
- Primary Drainage Floodplain — located adjacent to Lookout Creek on the valley floor constituting 5 percent of the research area.
- Secondary Drainage Floodplain — located adjacent to tributary streams of Lookout Creek. The strata represents 4 percent of the total area of the re-
- Valley Ridges — low chalk ridges on the floor of Lookout Valley constituting 22 percent of the re-

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

Initial Research Design

The initial research design for the Lookout Valley proj-
et was derived from research techniques utilized by archaeologists and locational analysts in geography. It was realized at the time the plan was formulated that many of the techniques employed would not be specifi-
cally 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 selec-
tive?

2. What was the relative order of importance of these factors (after Plog and Hatt 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 archae-
ological data collected from sites located in the research area.

Sampling Scheme

The sampling technique initially utilized in the selec-
tion of areas in the research area to be surveyed was transect sampling. The universe was divided into 500
motor were transects oriented perpendicular to the axis of the valley, crossing the old environmental strata previously identified. 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. Smoke, swept and Obediah, working in Chaco Canyon and Pueblo working in Oaxaca, Mexico, have found that transects were more effective in sampling units than quadrats (from 1931-1932). Since the strata were uniformly distributed through the research universe, a transect would contain a proportionated 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 Train Research Design

Despite what was thought to be a carefully planned research design, several problems developed when the plan was operationally tested 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.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 inaccessibility to traverses 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 obtaining individual private land owners permission to cross property lines, greatly hindered the actual archaeological reconnaissance of the designated transects. Having become obvious during the first few weeks of the project that the research design was very inefficient as far as the interpretative ratio was concerned. 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 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 are located along the river courses where there was good visibility of the ground surface. No sites, with the exception of caves and rockshelters, had been located in the mountains and the sites located in highland areas were found through subsurface testing. The research plan was revised in that only the areas within the research area that were determined to have 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 study time frame, it was considered that this had to be made. A conscientious effort was made to ensure 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 (Plag and Hill 1971, Lipe and Marston 1971, and Luckey and Diani 1977), the San-Hexa (Thom 1969, 1979) and the Midwest (Bever 1968). Very little research of this nature has occurred in the Southipe (Sears 1956, 1961). Furthermore, many of the hypotheses concerning site distribution tested in other parts of North America are at least generally, if not specifically applicable to the Southipe. 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 these critical variables.

Numerous hypotheses have been formulated by researchers in geography and anthropology concerning the distribution of settlements (Summers 1971, Meggett 1968 and others). It is generally presumed 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 archaelogical 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 hypothesis to be tested are based on an "inmaximal model" the minimization of effort required to exploit the potentially available resources and maximization of access to critical resources (Lipe and Watson: 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:

H1: The structure of the Woodland settlement system in Lookout Valley will be reflected by the functional variability of settlement types with respect to certain physical and social environmental variables.

H2: 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." Thus limiting conditions or factors are not of equal importance to the survival of the organism (Gildon 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 effects human behavior in the past.

Given the assumptions about the Woodland population of Lookout Valley based on subsistence on a wide variety of resources, various quantitative environmental factors have been selected that may have affected the potential ex-
plotation of available resources and consequently influ-
enced the distribution and type of settlements present in the
area.
From major categories of physical environmental factors have been selected for analysis: Hydrology, Pedol-
ogy, 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 physi-
cal 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 suit-
able for modern agriculture. There are, however, resources
available that will assist in determining prehistoric vegeta-
tion 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 dis-
cussed appear to be important in the explanation of vari-
ability of prehistoric settlements in other locations where
this type of research has been done. Secondly, these vari-
able are easily quantifiable and their definitions are not
subject to much controversy. (Plog and Still 1971: 10).
The following is a tentative list of variables that will be
measured and analyzed for each site located in the re-
search 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 pattern nearest stream
   e. Proximity to primary drainage
   f. Proximity to secondary drainage
   g. Proximity to confinement of primary and sec-
      ondary drainage

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 of sites 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. Shape of landform on which site is located
   f. Physiographic state 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

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 inter-
action 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 data) while other attributes presently being
used may prove to be meaningless in determining loca-
tional 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 South-
east and may reveal new information that will ultimately
lead to the explanation of variability of human behavior
in the past.
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The Lamar Phase in Central Georgia

The phenomenon known as Lamar consists of finely made bold incised and complicated ceramics in association with truncated mounds. Since the first description in 1938 of this ceramic variant from the Lamar site in central Georgia, Lamar ceramics have been found as far north as Ontario and as far west as Louisiana (McMichael 1960:171).

This complicated stamp 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 (1963:70) to state that "Lamar now, like the omnipresent Khufu nub, 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).

DISTRIBUTION OF LAMAR SITES

Analysis has been made of the sites in the areas north of the Lamar site itself (see Rachba 1969:440 and SEAC 1971:61), and they have been compared to the Lamar site which is located in Bibb County below the Mason 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 1972:4). 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 A. vows excavated the Lamar Mound which contained Mounds A and B and the 21 acre village (Deutschle 1972:16).

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 partial excavations were reported by Fairbanks (1940). While excavations were in progress at Lamar and on Mason Plateau, Willey tested other Lamar-like sites such as Conway'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 Archaeological 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 material 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, burial and funeral material. Approximately 25% of the total ceramic sample was dealt with in the 1973 report (Penman 1973:2), 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 Stamp, Lamar Bold lanced and Lamar Plain types. There is a Late Archaic component represented by Staggs Landing Plain (florid tempered ceramic) and also scattered Woodland occupation (Dekalb series ceramics).

In the Village Site No. 1, approximately 25% of the recovered material was studied with the result that almost 70% (69.46%) of the total ceramics are of the Lamar types. The next largest category was 28.68% plain body wares with ceramics of the Ocmulgee 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 1800-1800 time span (Tesor 1972:38). Since the quantity of trade goods at Lamar is small, it is postulated that occupation of the site terminated before a great influx of Euroamerican influence (Penman 1973:38). In addition, the aboriginal ceramics do not exhibit any evolution in style. There is no significant increase in Lamar Bold lanced over Lamar Complicated Stamped through time (Figure 2), as has been previously reported (Kelly 1938:484). Further, there is one design - a Figure 9 which is persistent throughout horizontal and vertical units. The Figure 9 occurs on Lamar Comp.
Cowen's Landing site which lies some 9 miles south of Lamar in the Ocmulgee basin was dug by Gordon Willey in 1937-1938. Cowen'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 Cowen's Landing and stamped ceramics are more finely executed than those from Lamar (Hamilton, Lauro, and Swindell 1975).

Though the Cowen's Landing site is somewhat smaller than Lamar, it is not an in situ development from the still earlier Swift Creek (Hamilton, Lauro and Swindell 1976:16). Hamilton notes (Hamilton, Lauro, and Swindell 1975:20) that there is a disparity in the types Lamar Bold Incised and Lamar Complicated Stamped when Cowen's Landing and the Lamar Site are compared. He states that the ratio of incised sherds to stamped ware at Cowen'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 Cowen's Landing site further differs from Lamar in that there is no paßade 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, Prokupec 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' Trace 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' Trace 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' Trace 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 elaborated stamp designs with some built-up elements and eye shapes 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 Kolnichi.

Sears (1951:32-33) has stated that the presence of Lamar Complicated Stamped with checkboard stamping indicates an "early variety" of Lamar at Kolnichi. His Macrocheck Stamp from Kolnichi has Lamar style rims and a paste indistinguishable from Lamar.

Lamar ceramics have also been recovered from the Nacoochee mound (Hye, Hodge and Peiper 1918) and Etowah. The stamped ceramics from the former have better executed designs than those from Lamar. Sears has given a relative date of 1660 for the occupation of both Etowah and Nacoochee (Sears 1965:147) and adds that the "Lamar occupation at Etowah is early Cherokee" (Sears 1965:144).

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 stamp designs and a variety of rim treatments offering considerable from those at Lamar.

The Yan site (BL2) 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 Nitzel 1961, Nitzel and Jennings 1941:55, and Cox 1961:57).

The documentation of many northern Lamar sites as Cherokee leads one to seriously question Fairbanks' 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 1958:94-95). Fairbanks based part of this assumption on the contention that there are vessels at the Lamar site which exhibit evolution in mixing 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 or the Macon Plateau either for
no such occurrence is mentioned for the North Plateau (Williams and Matteson 1976), the Middle Plateau (Smith 1973b and Prokopcz 1974), the Mound D area (Nelson, Prokopetz and Swanell 1974) or at the Ocmul- gue River site (Swanell 1974). Further, there is no evidence from Swift Creek to Lamar at the Cowart's Landing site (Hamilton, Lauro and Swanell 1974).

Russell (1973:12-13) has argued that this evolution from Lamar to Ocmulgue Old Fields, or Creek cannot be shown to have occurred in the Southeast region. Therefore since there is no clear development from Lamar to Creek cannot be shown within the area known during historic times as the Creek territory an alternative hypothesis is called for.

It is proposed here that the Lamar Culture 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 1985 when he observed that no Lamar style has evolved into a brushing tradition such as Chattohoohooe Brushed & Walnut Rouched both of which are Creek ceramics (Sears 1986:148). 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 "dupli- cated at the contact level only in Cherokee pottery" (Sears 1985:146). Sears does point out, however, that Tugoza instead is "stylistically intermediate between Lamar Bold Incised and Ocmulgue Fields Incised" (Sears 1985:144). The interaction between the Lamar site and the Plateau is evidenced by the presence of Ocmulgue ceramics 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 on the floodplain was less than a friendly one. The vessel shapes and decorations of Ocmulgue Fields Incised are similar enough to Lamar Bold Incised to demonstrate that the Creeks adopted this single style.

The evolution of Lamar ceramics cannot be demon- strated 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 Iroce the stamping designs are well executed and design motifs can be determined. One of the earliest designs on stamped pottery is the fret cross which is well represented at Iroce. If Sears's data of 1500 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 sloppier and carelessly applied. The fret cross has degenerated to the point that only one or two arms of the cross are discernible. Mason (1963:62, 68) has suggested that cer- tain 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 struc- ture 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 data is suggested for such features (Mason 1982:19). As has been previously stated, trade goods appear on the Lamar site in sent proportion, so a pre-1690 date for Lamar is also sug-gested. Thus, obliterated stamping occurs prior to 1690. Though occupation at Lamar and probably all Lamar Phase sites in the Ocmulgue basin (near Mazon) had ceased by 1690, another stylistic change is evidenced further north. Coldwell (1959:77-298) reports that burials in northwest Georgia contain a considerable quan- tity of trade goods and a check stamped pottery similar to Lamar Creek Stamp, 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 Chattohoohooe as a result of pressure from European ex- pansion (Coldwell 1959:236-245). Coldwell also notes the use of cross hatched paddles to produce check stamped designs in use as late as 1698 by the Cherokee (Harrington 1952:196-202 and Plate 63). Though activity on the Lamar site had ceased by 1690, a sequence of occupation can be postulated for the Ocmulgue River basin south of the Plateau. At some time in the late prehistoric or protohistoric periods, peoples moved from the north into the Ocmulgue 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 Ocmulgue basin cannot be postulated at this time. If the above sequence is correct, however, the Lamar phase rep-resents the climax of Cherokee occupation in central Georgia.

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Introduction: The Powers Phase

The term “Powers Phase” has been assigned to a prehistoric human population and 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 Mississippian.”

For the last eight years this Middle Mississippian 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. Poe 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 northwest-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 usual 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 fort is area there are four mounds: a flat-topped pyramidal mound and associated plaza area, as well as three smaller mounds.

A number of Powers Phase villages have been located and investigated at 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, judging from the 40 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 64 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 39 structures, and associated refuse pits arranged in an ordered street-like pattern, with approximately 2.5 acres enclosed by the fortification ditch and plaza wall. In addition to the 46 sites already disclosed, 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 those 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.

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) Site and composition of the occupying group
4) Type and range of activities carried out at the site,
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 south of Naylor, Missouri, where the research center for the Powers Phase is located. The Gypsy Joint site is also located on Barfield Flats, 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 north-southwest (Figure 1).

A total of almost 8,000 ft2 of plowzone was removed in a single large block 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 other, 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 on the site, while three Woodland features were uncovered at the southern edge of the excavation surface (Burling 1, Pet 1, and Pet 9).

The spatial distribution of the twelve Powers Phase features can be most easily viewed from the vantage point of
Structure 1, which is located at the top of the small rise (the 1 foot contour intervals shown were taken at the base of the plowed zone). 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 ft² 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. Ran sherds from a minimum of 6 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 northwest wall or in the south central area of the structure, there was clearly some horizontal distribution of sherds. A total of seven chalk and silicate cores were recovered from Structure 1, with 3 cores and a hammerstone coming from the eastern corner of the structure, and two more cores occurring along the southwest wall. Most of the faunal remains from the structure suggested either tools (deer mandibles, beaver incisor) or gaming items (deer astragal). One of the mandibles indicated a
fall-winter time of death for the deer. Ethnobotanical material included and seen kernels, with no concentration or high densities observed.

Structure 2: Structure 2 differed from Structure 1 in a number of ways. It is taller than Structure 1, with its house basin covering an area of only 207 ft² (V.S. 265 ft²) with only 125 ft² within the wall trenches. It is also a wall trench rather than a single wall post structure. It had a deeper house basin, and it was not tilted. Further, it contained both an internal hearth and pit (the pit was shallow, and it 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 broken during manufacture and discarded. Once again, faunal elements for the most part suggest tools (deer mandible, antler) or gaming items (deer astragalus). Five other lamps (both monochrome and hamattic) 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 ft², and yielding only seven items, including 2 Poway Points, 1 projectile point.

PIt 6: Pit 6 was also a shallow saucer shaped pit, covering 14.4 ft², and yielding 69 items, including burned sandstone and chert angular fragments, along with burned fox squirrel, two turtle and unidentified small mammal skeletal elements.

PIt 3: Pit 3 was a roughly oval pit covering an area of 100 ft², 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, and 5A and 5B were adjacent circular, conical pits covering areas of 4.3 and 5.6 feet² respectively, with Pit 5B being slightly deeper. Both pits were filled with large numbers of charred and broken hideouts nut hulls of a number of different species. Both pits also yielded chert and quartzite angular fragments and flakes, chert fragments, Mississippi points (both unfinished and undarkened) 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 ft² was uncovered.

From this possible activity area, 162 items were recovered, including a jar rim sherd, 2 Mississippi points (1 broken, 1 unbroken), a hammerstone, 3 cores, left frontal 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. No hull fragments were scattered throughout this area.

PIt 10: Pit 10 was a circular pit covering an area of 12.8 feet², with a pair of dish-orange burned sherds along an area of 1.5 feet at the bottom of the pit. A total of 70 items were recovered, including sherds, chert and quartzite flakes and angular fragments, clay pipe, and some nut hulls. An area of artifact scatter covering 42.6 ft² was uncovered around Pit 10, and a total of 87 items were recovered. These include a minimum of 5 jars, clay fragments, chert and quartzite flakes and angular fragments, a broken projectile point, and white-tailed deer skull elements and possible tools indicated.

Maize Grain Concentrations: The maize grain concentrations consisted of 441 corn kernels and kernel fragments uncovered at the base of the midden. No architectural evidence or pit outline was discernible. The kernel concentration resulted from a number of small, fully ripe 10 and 12 cowered ears of corn being burned. The ears are 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 ft², and yielding a total of 38 items, including 1 chert core, 1 utilized flake, a biface, 3 deer skeletal elements, pottery, red 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 ft² 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 16 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 site). 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, leaves of oak and hickories, which also suggests occupation of the site occurring during some period of the fall-winter. Similarly, the presence of 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 hoes flakes were recovered from the site, but both
were from a disturbed plowzone context. If 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 tracing 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 Pits 3, Butcherings 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 domesticated 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 (ethno-
Delineation of the Angel Phase: A Middle Mississippian Occupation in Southwestern Indiana

The purpose of this paper is to delineate the social, cultural and temporal dimensions of the major Middle Mississippian occupation in Indiana. Data will be discussed within the context of an archeological 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 archeological 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 artifacts 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 on the long-occupation area 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, 261). 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; the extent is approximately 103 acres. As Middle Mississippian centers are traditionally defined, Angel is typical, and is characterized by multiple truncated mounds grouped around a central plaza, various domestic and specialized structures, piallades and a surrounding ditch. The archeological ensemble 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 shards (Keller 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 (Kotar 1967:454) 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 Vincennes County and eastward along the Ohio River from the mouth of the Wabash to Clark County, opposite the Louisville, Kentucky area (Figures 1-4).

Pawley 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, Wellborn and the Murphy or Mouth of the Wabash Site. Murphy was excavated by Clifford Anderson in 1908, under the "long-distance direction of W.K. Moorehead. Three communities were located by Anderson; his brief field notes indicate that more than 150 burial mounds 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 conclusively diagnostic of Angel. In the Ohio Valley, Angel occurs at the dividing line between Vanderburgh and Harrison Counties; 20 sites, the majority consisting of small mounds, 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 1907 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 lambs-quaratin; the following excerpts mention three mounds that were present at the site.

Homer, this much we have found:
A most prodigiously, flattened mound,
In length about two hundred feet,
In width one hundred fifty, near...
Gorges, here, are most prolific.
But always crude—to be specific,
We haven't mentioned in this dusty
Two other mouths, well sung at pretty.
Our only hope some red Geeli
However pumpkin-seed, mixed, or beany,
Still found the time at old man Prather's
To fashion things as rare as Author's.

Spatial and Cultural Discontinuities

Explicit in the formulation of a phase is the criterion that the archeological 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 upstream. Comparative anal-

ysis of cultural remains reveals three areas in which differ-

entiation appears to warrant exclusion of sites as active participants in the Angel Phase. Two are coincident with the geographical extremes—the Falls and the Wabash valley north of Posey County. The third is repre-

sented by a cluster of sites within the vicinity of the North 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 rein-

forced by the artificial 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. Relation-

ship between Murphy and the other sites is suggested primarily on the basis of community shared ceramic fea-

tures which appear to reflect the same kind of assemblage. In addition to ceramics, Upper Mississippian influences identified at Murphy include stone disc pipes, a high fre-

quency of small rock sources, copper spirals, spiral copper beads, tinklers, copper-covered wooden ear pins, shell spoons placed in mortuary vessels and hoes of blisen or ark scooper. These traits are duplicated at various other sites on the Upper Iowa River (Weed 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 serve to distinguish the ceramics at Murphy. These include the use of vertical or horizontal appliqué 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, punctu-

ating and trailing. At other sites in the cluster, various frequences of these elements occur, but together consti-

tute 3 or more percent of the total sample from each site. In the spatial collection at Angel, only 1 of 1 percent of the sherds are decorated by such techniques, and com-

binations 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 position of Murphy has been suggested in the past by Griffin (1946:83-84) and Adams (1948:4-67) who also pointed out the admixture of Middle Mississippian and Oneota elements. A more recent interpretation of Murphy and near 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 the "Morford Site, an historic Oneota Proctor Site on the Lower Arkansas River. Also reinforcing the historic occupation of Murphy is the recent discovery that many of the "cooper" artifacts are actually brass (Munson and Green 1973:5-8).

While the general impression of a later occupation for the cluster is indicated, there may have been a chronolog-

ical 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—approximate-

ly 48 river miles—between the northernmost Posey County site (Po173) 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 complex-

ity. Because of the paucity of archeological remains, comparative analysis is possible only with regard to pot-

tery. Community shared ceramic features at each of the upriver sites consist of a predominance of Mississippian 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 appli-

cation of the cordage. In the Valley, rims are flaring and no consistency in ornamentation is apparent. A further differ-

ence 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 "Wilderness Cultures," a Mississippian manifestation identified by Winters (1957) on the Illinois side of the Wabash, which may represent a separate phase. If so, its terminol-

ical placement and relationship to Angel are difficult to assess. Noting the seeming hybridization of Cahokia Cordmarked and Kincad Plain ceramic traditions, Winters (1967:83) views the Culture as a "very late" manifesta-

tion. Another interpretation of the Culture is offered by Robert Clouse (1971), who encountered refuse pits con-

taining a mixture of Late Woodland and Mississippian ceramics at several sites. He suggests (Clouse 1971:8) that if in these instances consensus 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 Vinemont Culture is earlier than or contemporaneous with Angel cannot be determined with any assurance. It does, however, appear 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 area of 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 artificial esclavages 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 occurrences of Bell Plain, a limited range of vessel forms and decorative embellishments, and significantly high 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 rims are cord marked; higher frequencies are recorded at Prather - 5 percent in Jantzen'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 flatlinear guilloche, trailed or incised sherds some in conjunction with punctates, and rims with contrasting 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 these 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. Jantzen, personal communication) -- was 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 vaguely concluded that the Falls Complex is a Middle Mississippian variant that slowly 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 S22; 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 9).

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.
Demand the limitations of delta and the tentative assign-
ment of components, a settlement pattern emerges which
appears to conform with the standard Mississippian
macrosystems displaying socio-political centers compar-
able to Angel Mounds: A linear arrangement of compo-
nents disposed along the river valleys mostly 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 pat-
tern several clusters can be identified. Intermittent com-
nents are located between these clusters, but in no case
does the maximum distance between any of the compo-
nents exceed 12 straight-line miles. (The Perry County
rock shelters, because of their distance from both Sp2
and the Ohio River, undoubtedly represent seasonal hunt-
ing forays in the valleys and are not included as part of the
generalized pattern).

Examination of the geographical dimensions of the
Phase within the environmental rubric reveals significant
conclusions which may account for the northern and east-
ern limits of the Phase. All components are confined to
the upland valleys of the Wabash Lowland physiog-
graphic 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 Illionian glacial
terminus (Schneider 1980:Figure 14). The significance
of the boundary may lie in the nature of the bedrock su-
face 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 general terms, all
components with the exception of W42 are located in Soil
Region H (Ulrich 1966:Figure 10). While variations affect-
ing agricultural potential do occur for example, Fox
soils of the first terrace have a relatively poor moisture
supplying capacity – Region H soils, especially Hunting-
ton and Genesee, are the most productive in the

Associated with the eastern boundary of the Lowland
and the Phase is the vegetation pattern. Using Kuechler’s
(1944:74-113) scheme, Spencer County marks the end of
the Southern Highland 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 likely pos-
sibly 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 asso-
ciated lack of alluvial soils would not permit agricultural
activity. This growing season extends northward beyond
the Phase’s limits but south to both gradations in tem-
perature 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 ex-
perience a frostless season of 200 days. Higher tempera-
tures 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 agri-
culture 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 agriculture could be met.

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

In 1984 Jeffre Cox 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 Brayley (1969, 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 Cox's and Brayley's 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 decades 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 terraces during Late Archaic periods. What sites there were, were assumed to have been destroyed by subsequent flooding and levee formation. The abundance of diagnostically early material on upland ridges and small terrains suggested that Early Archaic settlement patterns were confined primarily to the upland areas. Second, for example, pursued the 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 archeology of the southeastern United States 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 the 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 to employ heavy equipment in archaeological excavation. There is also a deep-seated reluctance to destroy any late occupations at the surface. The result is usually insufficient time to test for deeper horizons. In 1972 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 (Cox 1975a & 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 alluvial terraces within the proposed Tellico Reservoir. Following the example set by Cox along the Yaskin and Rouenke, I located five areas where the topographic situation might have permitted early levee formation and the burial preservation of early sites on these terraces. Previous excavations (Seely 1975 and personal communication) at two of these sites (4OM21 and 4OM22) 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, the river floodplain would cause eddies to form below a constriction thus encouraging early levee and point bar formation with rapid burial of any occupation surface. Above the constriction the backwater effect would reduce load capacity and encourage the burial of any early occupation surface. 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 lower area. 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 hypothetical terrace generation and site preservation dynamics. To carry out the testing and to remove the overburden from any buried horizon encountered, a tractor-backhoe was hired 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. Had the trenches for the trench sites been mandatory (Figure 1). Since an area had been selected for sampling, the backhoes 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 water-screened through % inch mesh for maximum sample recovery.

Figure 3 illustrates the locations of Rose Island and the five sites that were tested in 1973. Rose Island is a part of the wide floodplain below the narrows formed by
Fig. 1. Typical backhoe excavation 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.
Gerrison Bend and Indian Rock. The flood waters, in-
crescent in volume by Nine Mile Creek and the Tellico
River, would emerge from the narrow, decrease in
velocity, and deposit sediments. It is postulated that Rose
Island formed in this manner, that sand and silt building up
rather than being scoured.

Thirty Ace Island apparently presents a depositional
history similar to Rose Island, Gerald Schroeder (personal
communication) excavated Woodland and Late Archaic
components on the Pinneck site (40M-05) at the down-
stream end of the island in 1972 and 1973. In a 5 x 10
feet test area he recovered scattered cultural material to a
depth of 15 feet below ground surface. Backhoe testing
and stratigraphic excavation of two 10 x 10 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,
Kanawa, LeCroy, St. Albans, and Kirk phases.

The Harrison Branch site (40M-21) has a complex
depositional history due to its situation immediately
above the constriction formed by Rock Crasher Bluff and
the flow of Harrison Branch. More 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 Lehigh Bottom site
(40M-23) were sampled in 1969 (Glierson 1970) and in
1970 and 1971 (Chapman 1973). The situation of the site
at the head of Lehigh Bottom, immediately below the
valley constriction created by Rock Crasher Bluff made
the site a prime candidate for buried early horizons. No
deep testing had been done previously so had there been
any excavation data upstream from the earlier exca-

cations.

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 en-
countered (Figure 6). These buried horizons were exten-
sively excavated in the summer and fall of 1975. The
backhoe was invaluable in removing the overburden above
the deposits, delineating the site limits, excavating wheel-
barrow ramps from the excavation areas, and digging set-
tlement basins for the water-recirculated 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 (40M-41), two backhoe tests were encountered at
4.2 feet and 5.1 feet below ground surface. Coco cultura-
tion and time limitations prevented further testing and
sampling in the area, but cultural material obtained in the
profiles suggests an affiliation with Early Archaic bifur-
cate tradition. In that the chronology of the formation of
Calloway Island is unknown, an extirpation employing

Fig. 4. Stratigraphic test excavation segment on 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 augmented 9000 years ago
and the site was, in fact, situated on a point bar. Arche-
ological sampling of the horizons is planned for the sum-
mer of 1976.

The last area to be tested was the Howard site
(40M-661). The bottom formation appeared to be anal-
gous to that of Lehigh Bottom with a valley constric-
tion formed by Bacon Bend. A series of backhoe trenches
revealed several buried cultural horizons from 5.0 to 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 Archae-
ology to consider the Early Archaic time period adequa-
tly 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 rescue 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 settle-
ment system. Within a limited geographical area one can
in the lower Little Tennessee River valley, the prehistoric
occupants developed certain adaptive strategies and their
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 spatiotemporally determined, certain environ-

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

Fig. 6. Profile showing Middle and Early Archaic houses, Ironhouse Bottom site. Stacked logs 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 understood, 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.

References cited:
Hydrology and Archaeological Site Conservation

This paper addresses the mixed interface between pro-
essional archaeologists and contractors involved in mar-
ine and dam construction. Specifically, the paper deals
with hydrology, reservoirs and archaeology, and the use
by archaeologists of data generated during the plan-
ning and construction phases of reservoir and dam devel-
opment. Just because a reservoir is constructed does not
necessarily mean that all the sites adjacent to or con-
tained therein are destroyed; or, as some might say, "unad
descated." There are hydrological factors which we nee
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 base of stream dynamics and morphology
are in control and it is in consideration of them that we
divide the effects of this section upon archaeological sites.

The next section, the middle section, is transversal and
again we turn to stream dynamics and morphology, but
we are limited to an extreme condition of river flow
that is, flood flow. In this section there is gravity flow
downstream 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
erased or preserved is scour. The sides and bottom of the sub
stream (or bottom of a reservoir) will scour. If there is an area
at the interface is generally greater than the substrate erosion. Sub-
strate erosion is dependent upon size of substrates and the
composition of the substrates of which it is composed. All
these kinds of data are available to engineers. Forms
because they are part of the planning process for dam
construction. There is an optimum size, volume and shape
ratio, about that of sand grains which would most easily
if they are heavy, that a large amount of turbu-
ence is required to produce sufficient force to lift and
suspend the particles. If, however, they are smaller than
sand grains (such as clay), these particles may be so com-
 pact as to require very high shear to be dislodged. 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 increases at the banks and sites
are located and subjected them to wave erosion. This is
most likely to occur in areas subject to increased flow.
Mangroves is the mid part of a morphological continuum
which begins with a relatively straight channel and ends
with a brackish stream. When a stream goes through a
turbo, 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 substrata,
there is a high sheat factor so that the outer bank erodes.

The construction of dams can accelerate the shifting of
mangroves and we find so many sites on the mangroves
inside 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 water. The greatest danger to abraded
sites are those downstream from the dam. Flow, Aided
to by turbulence and 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
depths of the shore devoid of vegetation. These sections
are more likely to occur when the site is steepened 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 are sub-
merged. Vegetation above ground can act as obstacles to
flow and thus slow turbulence. With turbulence comes
erosion, Sites on a levee have an advantage in that they are
the most likely in this middle section to be repossessed.

The flow through this section is such that it will prohibit
any fine course particles from settling. The current below
the surface and the more cohesive the better. Mud or not all of the organic material can be explored to
slow away after submerged. The humus zone probably
will not be reacquainted, as was demonstrated in the Black-
shear survey.

Near to 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 embayment. There is, however, a common
practice of partially flooding a reservoir. When this is the
case, a tremendous amount of turbulence and destruction
too slow that would ordinarily be protected below the
thermocline takes place. The water from the surface is
trapped in the upper levels of the reservoir. This is par-
ticularly true of reservoirs of high turbidity. There is
almost no mixing of water due to the lack of turbidity so
that there is a distinct zone of warm water near the sur-
face of the reservoir. Below this there is a marked de-
erioration in temperature at the interface of the warm and
cold water. Sites below this thermocline are thus pro-
tected from water current, but those in shallow water will
suffer from erosion as a result. Again, for sites subjected
to water current erosion, the least vegetation above the
ground when submerged the better for the site. Also, in
many reservoirs there is a continual 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 levees, 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 99 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 breakwaters or windwaves are to a shore, the more it will suffer from wave action. It 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.
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 alluvium or obscured by dense ground cover. I propose that subsurface survey complement 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 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 this area which is ninety percent forested and ten percent pasture and 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 necessitate a subsurface survey 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 (Cheney, 1972; Matson and Lipa, 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 rapids 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 it 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, on 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.
with respect to the environment. These straw 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 quadrats were considered and their advantages weighed. Transects can be useful when delineating boundaries of phenomena 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 transect line across steep topography, dense vegetation, and the Oconee River for a distance of over 1.2 kilometers.

Square quadrats would involve less transect work and are small enough so as to allow their use in a stratified random sampling scheme such as ours. The use of square quadrats in archaeological sampling has been discussed by Macon and Ipe (1973) and Thomas (1970) in their work in the Western United States. In these surveys the quadrats 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 quadrats 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 quadrats, or five percent, of the Uplands were selected; nine quadrats, or eight percent, of the Riveine stratum were selected; and five quadrats, 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 Louisiana Shinn project.

The actual logistics of subsurface sampling is somewhat complicated and involves systematic random sampling with 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 (1952) technique of unaligned point sampling because of its ability to systematically cover an area without the alignment 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 sampling. 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 five north-south lines. A total of twenty-two quadrats and 384 post-hole tests were investigated in twenty-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 faile, a shred or midden stick. 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 quadrats 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 island stratum 1.3 tests per quadrant. The Riverine stratum in which six of nine quadrats 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 3.8 tests per quadrant. This figure is almost twice that for the Uplands.

In the Island stratum four quadrats out of five contained cultural material. Of the 42 post-hole tests which were investigated 11 (25%) 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. Five cracked rocks appear throughout the quadrant and probably indicate food preparation activities. An interesting variation of cultural material occurs in the quadrant as line number three in the center contained no artifacts in five two-hole tests. Whether this separation actually exists is a question that has
yet to be substantiated.

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

In general it can be said that the pilot study at Riley Shauls 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 minimized. 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 Holt, Zurek, and Grenchen (1975) in their survey of McIntosh and Long County. Post-hole diggers were used to determine the limits of sites where 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 larger hand-held post-hole diggers.

While setting up our 100 meter square quadrants on the islands we discovered that this site 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 fitness 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 complement 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. Jonkyns

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, it has emerged from these studies a sequence of four developmental stages in the prehistory of the East, Paleo-Indian, Archaic, Woodland, and Mississippi. 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 import 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-tempers pottery and other early ceramic complexes were a major classificatory problem as was the cultural placement of the Poverty Point culture (see Willey 1946 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, in times of 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 Appalachian. Some 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 (2500-1700 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 several harvesting stations along the Atlantic Seaboard. Two ceramic producing cultures are found in this area during this time, Stallings Island of the Georgia-Florida coast (Cafm 1931, Faibanks 1942), and the Orange culture of northeastern Florida (Bullen 1972) (Figure 2).

**Figure 2**

Early Gulf Coastal Plain Cultures
The term "Stallings Island culture" is used in this paper to designate those groups of the interior and coastal area 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 in use for another 2000 years, the last being the Chippewa or the first Lenape 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 was flattened to rounded base is the predominant vessel shape (Stoltman 1972). On the basis of stratigraphic 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 phase, period, simple punctating was introduced and vessels boldly marked with half moons, circles, and slant 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. Sisalite, 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 is a second major fiber tempered ceramic complex, the Orange Series. It 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 wares appear some 400 years later. This development has been divided into four subperiods by Bulen (1954:1959) based upon changes in ceramic vessel shapes and decoration. The major vessel form of the Orang 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, pipes, 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 Thon's Creek-Awendsaw ceramic complex develops out of the earlier, and partially contemporaneous, 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 Thon's Creek potterv include linear and drag-and-dash punctation. In most instances decorations are composed of circular or angular arrangements of linear punctation similar to Stallings Island motifs. Random punctation also occurs (Wadden 1963). The most common design found on Awendsaw pottery is a linear arrangement of individual impressions made with a thumbnail and fingernail. Random punctation occurs frequently (Wadden 1963). The differences between Thon's Creek and Awendsaw ceramics are poorly defined at present, although it appears that the Thon's Creek sites may represent an earlier stage of the settlement system of the same group producing Awendsaw ceramics on the coast (Stoltman 1972, Wadden 1963).

Middle Gulf Formational Period: 1200 B.C.-600 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).

In the eastern Gulf Coastal Plain the Refuge ceramic complex (1100-600 B.C.) appears as a development out of Stallings Island. Refugia 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. Refugia pottery appears primarily as a development out of the preceding 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 Bulen (1969) as a direct development out of the Orange IV subperiod. This is a tampschach clayware made in the form of straight sided flat based basins 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 site at the Ziski site on Merritt Island, Florida. Bullen (1972) has suggested that the appearance of punctated and pinched modes at Ziski is the result of interaction with the Louisiana area where the type Tammam Pinched
was made in Tchefuncte times. However, these ceramics are found in a Florida Transitional Period context and have been radiocarbon dated at 900 B.C. Atkins and McManus (1987). Tchefuncte ceramics are not known this early. It is here hypothesized that the pinched and triangular punctated sherds at the Zobiski site represent interaction of St. Johns groups with people making Awendaw-Thorn's Creek ceramics along the Carolina coast.

The primary decorative mode of the Awendaw Creek is fingerprint 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 Zobiski site are possibly the progenitors of such early Lower Mississippi Valley Tchefuncte types as Tammany Pinched and Lake Borgne Incised. The original Stallings Island design may have been in part transmitted by way of Awendaw-Thorn's Creek to St. Johns to Tchefuncte. This is substantiated by Rullin's (1972) recognition of St. John's ceramics in collections from Poverty Point. Tempersless St. Johns-like sherds were also found at the Calabane site (Welsh, Ford, Gajleano, w.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 1959). The decorative modes of this complex appear to represent a combination of both straight lined Orange IV incised designs and linear punctating of the Thorn's Creek or late Stallings Island complex. The major types of this series are Pinched Punctated and Parico Linear Punctated, Parico Incised and Parico Plain. Vessels have flat bottoms like the St. Johns Series (Bullen and Bullen 1959).

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

In the Western Gulf Coastal Plain during the Middle Gulf Formational Period, two ceramic complexes make their appearance: 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 middens sites in the area of Mobile Bay northwest some 70 miles up the Mobile flood plains of the Tombigbee and Alabama River systems. These complexes 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. Bees are at times flattened or have coarse annular rings. Also present are wedge and/or mold made functional nail supports (Wimberly 1953, 1980). 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 H. Griffin (personal communication). On the other hand, more recent data suggest that Bayou La Batre may predate Tchefuncte. Trione and Trione (1971), during their excavations at the Bryant's Landing sites, obtained a date of 1410 ± 200 B.C. on Rangia shells from Bayou La Batre middens, and David Cope (1974) recently recorded 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 tentatively place 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 stratigraphic excavations, serological studies, and more radiocarbon dates are needed to clarify this chronological problem.

Pottery also appears at the large geometrically 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 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 city tempered and with 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; Polito's support lists are listed as present, as are rim nodes which are punctured through from the interior. However, the nodule shape was not found in stratigraphic context and in fact reflects a selected number of attributes from a later Tchefuncte ceramic complex. However, one clay tempered vessel 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 vessel was found washed away a few inches above a fireplace in the dwellling 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 sometime between 800 and 500 B.C. The earliest radiocarbon date known for the Tchefuncte complex is 530 ± 60 B.C. from the Big Oak Island site (Shenk 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 complex. Although significant attribute contributions were also received from either the late Stallings Island or Thoms Creek 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 tear shaped petal supports. Rouwer 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. Plain bases or nodes, more common at the Jaketown are Poverty Point sites, may also have their origin in the Florida St. Johns complex. Bullen (personal communication, 1973) has recently found similar bases on Trans- 

tional Period St. Johns ceramics from the eastern coast of Florida. It also seems that the plats of Tchefuncte ceramic 

is a local copy of the St. Johns pats since both dem- 

onstrate a very close similarity.

Also found in the Tchefuncte ceramic complex is an incised rain-and-drop 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-Awadend 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 found in Stallings Island Punctate of the Savannah River area. Their presence in the Wheeler series is possibly the result of several site unit introductions into the Pearl River Region from the Savannah River Region around 1200 B.C. Subsequently the Wheeler complex spread into 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 Ware are first defined. These types were found to be made on both the flat based beaker and the simple bowl vessel forms. Locally phases for the Wheeler culture have recently been defined for the western Ten- nessee Valley (Bluff Creek Phase) and the central Tombig- 

bee drainage (Broken Pumpkin Creek Phase) Jenkins, 1975a; Jenkins and Wainhall, 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.

Wheeler groups appear to have been participating in a central based wandering type of settlement pattern. The two major base camps, Lu 59, the Perry Site, and Lu 259, the Bluff Creek Site (Webb and DeJesse 1942) are large shell middens on the Tennessee River. Smaller transi- 

tory camps are found in the uplands (Jenkins 1974).

It is evident that the Middle Gulf Formational Period was a dynamic era, having increased territorial connec-

tions 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 west- 

ward among Gulf Coast settlements to the lower Missis- 

ippi 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 inter-

action and trade. The Poverty Point site is strategically located near the confluence of six major rivers — a po-

sition 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 demon-

strated 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 focus beads in the Middle Tennessee and Upper Tombigbee Valleys (Jolly 1971; Webb 1971); 3) the report by Small (1966) of basked clay balls of characteristic Poverty Point types from Talladega, Florida; 4) the identification by Bullen of St. Johns incised pottery from the Poverty Point site as trade items origi-

nating in north or northeastern Florida around 1000 B.C.; 5) the presence of a Poverty Point jasper owl in the Wichitaacoochee River in Florida and from the Holze site in the Yazoo Basin of Mississippi; 6) the confirmation by Clarence Webb of the presence of Poverty Point objects in the David Reescht Collection from Choctawatchee Bay sites in Florida. Red jasper pendants, two-hoar gorgets, lamellae blades, cores and “Jaketown” perforators, large points of Arkansas novacu-

lite and Motley point of gray chert all point to trade with Poverty Point (Lien, Bullen and Webb, 1974). The establishment of the Poverty Point ceremonial cen-

ter and the simultaneous pronounced increase in trade and interaction across the Gulf Coastal Plain during the Middle Gulf Formational cannot be considered coinci-

dental. It appears to these authors that the establishment of the Poverty Point ceremonial center probably provided the impetus for this increased interaction through a trad-

ing network very similar to that found in later Hopewell times.

Jon Gibson (1974) believes that Poverty Point repre-

sents a chieftain and certainly the huge earthworks and enormous amounts of time 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 procure-

ment of raw materials from different regions and the ex-

port of finished articles. This trade in turn caused a con-

siderable 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 pacific stamped Early Woodland Depedto prevails. Depedto stamped pottery is a blend of both Early Woodland and Gulf tradition ceramic traits and evidently represents a derivative developmental continuum from Lobede with strong Southern Woodland influences. Depedto Creek Stamped is appar- ently a copy of Refuge Deltaic Stamped, however the design was applied with a carved paddle. Pedal supports were also contributed to the Depoted ceramic complex from the Gulf ceramic tradition. Also in western Gulf Coastal Plain (during this period) Bayou La Batre people continue to produce their traditional ternary forms (Figure 4).

Figure 4

Although the Alexander ceramic complex was first rec-OGGNEG throng the Middle Tennessee Valley of northern Alabama (Griffin 1936; Haag 1938), it is the end product of interaction among at least four Gulf For- mation cultures. This ceramic complex is an amalgamation of motifs from the St. Johns, Bayou La Batre, Tchefuncte, and Wheeler ceramic complexes. The primary motifs contributed by each complex are: 1) The St. Johns rectilinear and abstract motifs which had been inherited from the Orange IV subperiod; 2) The Bayou La Batre complex - sand tempering, paddle supports, and ring bases; 3) The Tchefuncte ceramic complex - bunched through rings or bosses, 4) The Wheeler ceramic complex - a variety of punctate motifs, stamped standing, the banana vessel form and possibly pinching. As different Alexander phases are defined it is anticipated that the differences between ceramic modes of their phase will be the result of temporal and geographical proximity to the different parent complexes.

Two phases have been defined for the Alexander cul- ture, Dye (1973) has defined the Hargis 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 is com- posed of three components located in Hardin County, Tennessee just downriver from the Pickwick Basin. The Hardin Subphase II includes the Alexander components in the Pickwick, Wilson and lower Wheeler basins and is con- sidered the core area of the Alexander Culture in the Valley region. This subphase includes the Buffalo 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 upstream into the Gunterville Basin. Components of this subphase, the largest of which is the Flint River shell midden (Ulebb and LeBaron 1948) contain large amounts of undecorated wares and are considered to repre- sent a marginal eastern extension of the Alexander culture.

To the south in the upper Tombigbee drainage area DeJarnette, Watisburg and Minkberry (1975) have recog- nized a third 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 Mer- rill 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 Phase comprised of regional phases of the Tchefuncte culture. The primary traits of the Tchefuncte ceramic complex are Tchefuncte Plain, Stamped, and Incised, Tammany Roped, and Lake Beggan Incised. Varying percentages of fiber tempered and Alexander present at different component and phases may be a result of trade.

Other artifacts manufactured from clay include tabular pipes and the variously shaped ovoid clay objects. Some artifacts consist of a variety of projectile points, ateratl hooks, perforating tools, tuskers, fishhooks, spear handles, ground animal jaws, and worked penis bones. Objects of shell include the gage or adz, chisels, as well as containers and ornaments. Chiapue Stone projectile points, illustrated by Ford and Quimby (1945, figure 8), appear most like the Flint River Cull and Gune type points. Other chipped lithic tools include blades, drills, scrapers and antlike implements. Ground stone artifacts include adzes, weights, plummetts, and shell and stone vessels. Britts were interested in low conical mounds or in village evidences (Ford and Quimby, 1946).

West of the Lower Mississippi Alluvial Valley, in the vicinity of Gallisvnon Say, the Goos Creek ceramic com- plex has been defined by Joe G. West (1955). The culture which produced this ceramic complex represents the westernmost manifestation of the Late Gulf Forma- tional Period yet recognized. The ceramics are pro- ducingly sand tempered although clay tempering does occur. The most common form of design is ringy, dual, or infrequently, multiple linear lines around the vessel and parallel to the lip. A variation of this style is wavy or zigzag lines. Double concentric rings occurs infrequently. Parallel rows or punctuation somous form triangles or other geometric figures. The primary vessel forms appear to be either narrow deep jars with nearly vertical sides, and a wide-mouthed jar. Pointed rounded and flat bases occur. Tchefuncte Stamped occurs in a trade ware linking this complex temporarily with the Tchefuncte cul- ture of the Mississippi Valley.

Summary

The principal 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 influences and Alexander ceramic complexes. While recognizing that we have omitted refer-
ence to many other facets of these early pottery produ-
cing 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 "regions" produced by these ethnic group processes, rates, and directions of cultural change can be recognized, and ultimately, the development of such complex cultural manifestations at Poverty Point can be traced and inter-
preted in an overall cultural context.

The primary ceramic attributes - incising, punctation, piercing shell stamping, dendritic stamping, and nodal supports - are collectively referred to in this paper as the Gulf Tradition. Until 500 B.C. these pottery forms completed dominated the Southern Coastal Plain ceramic industries. After this time the Deepwell ceramic complex developed as the result of Northern Woodland influence into the eastern Gulf Coastal Plain. After 150 B.C. (and possibly slightly earlier) many of the remaining Gulf Tra-
dition ceramic complexes were subsumed by ceramics of the Middle Eastern and Northern Traditions. The appear-
ance of these ceramic traditions within the Gulf Coastal Plain was at times the result of site unit intrusions by distinctly ethnic groups from the Northern Woodland area.

Although Gulf Tradition ceramics were almost com-
pletely replaced by carved paddle-stamped, fabric im-
pressed, and cord-marked ceramics in some areas they did persist in others. After the close of the Late Gulf Forma-
tional Period Gulf Tradition ceramics are found primarily in the pottery of the Marksville culture of the Lower Mississippi Valley and the Portr-Hopewell culture of the Mobile Bay area. Marksville ceramics are a product of a direct continuum from Tchefuncte, while Hopewell represents a continuum from Byuns La Rause with strong influences from the Lower Mississippi Valley. During the Late Woodland Period Gulf Tradition ceramics are con-
fined almost exclusively to the Woodland Island Culture of
Northern Florida, southern Alabama and Georgia. By Missi-
ssippian times the lacustrine areas of the Gulf Tradition are discernible in several of the included decorative modes of regional Mississippian ceramic complexes.

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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 reasserting the foundation of contemporary archaeology was the initiation of large relief projects in almost all sections of the country." 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. 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. 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 1930s 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. According to the estimates 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." 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 Southwest.

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. 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.

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 1936, 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 Mission, 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 its policy of selecting experienced archaeologists in later phases of the project. George J. Daimbo had field experience in Arctic archaeology when he replaced Willey as State Supervisor in September of 1939. Between the date Willey left and
Quinby arrived, Preston Holder ran the laboratory.
Ford created three major units of the project to oper-
ate through the winter of 1938-1939: a central labora-
tory, a field unit in Ayoquelle Parish, and one in LaSalle Parish. LSU provided space for the laboratory in New
Orleans, and funds for a field director, George C. Piggott. 
Preparation Divi-

tion, Analysis Division, Statistical Section, Engineering 
Division, Photography, Archives and Records, CENSU-
usowała, archywalną, organizacyjną, kontrolną i administracyjną

- Field activities began at the Greencroft site near Mar

ville in September 1938. The crew at this site num-

bered about forty-five men. By December Neitzel felt that 

the site was clear and noted that the Calcasieu 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 be-

cause previous work led them to believe the site belonged 

in 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 site 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.

- When the LSU archaeologists recognized that the Tche-

functe material was a previously unrecognized com-

plex, they decided to take another look at the Little 

woods site. A crew of thirty-five men under the super-

vision of Preston Holder began work at the site in July, 

1939. Doran directed the excavation of an-

other Tchefuncte site, Big Uck Island, in September, 

1939. Only a small part of the site was excavated because 

of the inaccessibility of the site and the heat and mos-

quitoes. Doran also supervised a crew that dug the Tche-

functe site in the Tchefuncte State Park in January and 

February of 1941. Based on the work, Ford and Quinby 

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.

- The excavations in the area around Baton Rouge con-

cluded the last major stage of the project. Doran exca-

vated the Medora site in West Baton Rouge Parish be-

tween November, 1939 and April, 1940. The archae-

ologists 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.

- Doran, and later Carlyle S. Smith, supervised the excava-

tion of the Bayou Goula site in Iberville Parish in 

1940-1941. The archaeologists chose this site for excava-
tion 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, 

Aldrete combated 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 labora-

tory work. Doran did a quick preliminary site survey in 

Southeast 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 concen-

trate their efforts near large streams because all the 

sites discovered were near streams.

- 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 Quinby wrote a preliminary report on 

the Tchefuncte sites. Albert Aldrete, the ethnobotanist 

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 archae-

ology 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 with out 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 bound-

a "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."

- 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 1930s, and not local. They tried to put their 

work in the framework of Southeastern or Eastern pre-

history 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 

comprehensive aspect of material coming out of the WPA projects. An-

other 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 East-

ern 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 stated nately. 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 Southwest.

Acknowledgements
A previous version of this paper was read by Stuart Naitez, Robert Reuman, Burt Nogis, and Miles Richard-son. 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 re-search 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
The large and long occupied Fort Center site just west of Lake Itkshoochee in South Central Florida was extensively excavated between 1962 and 1964. Samples for pollen analysis and for C-14 dating were routinely collected during all excavations as were all faunal specimens. A limited number of samples were processed, but oral 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 period and cultural associations described, we believe, significantly 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 casemates 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 muskler, the open swannah, or in a hammock. Exceptions consist almost entirely of a string of middles deposits on a high natural levee fronting on the river and adjacent to the northern edges of the circles.

Beginning about A.D. 1, with a change in the finish of the plain open bowls to one characteristic of the type Bain Glade Plain in a percentage of the vessels, aowerni cal and Hopewell relationships appears. A few features are an artificial pond containing a charcoal 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.

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 includes a large number of clay platform pipes of various varieties, some other pipe forms, trade shards from the St. Johns, Daytona, and Crystal River ceramic series in the predict- able types, and direct evidence for the burning of shells into lime throughout the accumulation of the midden. The action of the time in its quicklime form accidentally preserved a number of human faces. Some of these, along with all other midden constituents including bone and sherds, were moved to the bottom of the pond under the charmed platforms at one point in time.

Considering all of the data we have available, the exclamation for the time, 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 techni- que 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 increases in the popularity of Bell 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 mounts, but each of these is adjacent to a linear embank- ment. 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 Dereneck (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 contra- dicted by our own eyewitness account of the area, that of Fontaneda who does not mention agriculture of any sort (Fontaneda 1948). That is, 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 sample of soil, coprolites, and a white pigment from a wood carving were scanned for graminean pollen grains over seventy microns in length and having typical corn pollen exine patterns. Forty-eight grains of graminean 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 inves- tigated further. Many slides from each sample were scanned and all of the large (over 50 micron) graminean...
grains with corn pollen type swine were measured.

Retention of Samples

A sample weighing from 5 to 10 grains was treated with potassium hydroxide and heated on a boiling water bath for four hours. It was then drained through a fine wire mesh to remove large particles and the slurry was centrifuged. The deposit was discarded and the pooled residue, after several washings with water, was treated with hydrochloric acid to remove any carbonate present. It was then treated with hydroxyisobutanol, then isopropanol, and water, and then dehydrated with glacial acetic acid. At this stage, most organic impurities had been removed. The residue was then further broken down by maceration that is, hest- ling with a mixture of acetone and meconium and concentrated sulfuric acid. After centrifuging and washing, some of the solid residue was mounted on glass slides in pressure-glycerine jelly. The stain used was Seifert's O. The remainder of the residue was stored in glycerine.

All samples were treated with all reagents so that the pollen grains recovered would be completely comparable. Occasionally it was necessary to repeat smear tests 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 any case, a 5 gram sample of soil would yield enough pollen to make a hundred slides or more, containing at least 100 pollen grains. Some samples, especially those from middle areas, yielded very little pollen, probably because of the rapid decay taking place in the middle.

Examination

All slides were stained at 100 magnifications. Large grains were examined and measured with an eyepiece micrometer in 600 magnifications. The examiner of the larger grains was examined under the contrast microscope at 400 and 1,000 magnifications.

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

Criteria for Identification

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

SIZE - According to Irwin and Bargharn (1965:40) tripasum and teakite are the only two World Grapes to which it cannot be distinguished from maize by a similar measurement, i.e., greater than 47 microns for the long axis and greater than 57 for the pore area ratio. That is, possible maize, the only grain pollen grains which might be larger than 47 microns in length are tripasum and teakite.

Since type is not a native Florida grain (Irwin and Bargharn 1965:46) we need only to distinguish between corn and tripasum. The examiner of the tripasum pollen is reported by Bargharn (Bargharn, Wolfe and Clisby 1954:231) to be 33-64 microns. Our herbarium specimen of teakite (Tripasum decaryi) had an ex- tremum range of 45-70 microns.

In the samples from Fort Center discussed here, we have found 48 grains of gramme pollen which are 70 microns or larger. The largest of these is 98 microns in length, much larger than the largest tripasum pollen grains.

EXINE PATTERN - Irwin and Bargharn (1965) have shown that the exine pattern of tripasum pollen differs from that of corn pollen when observed under the phase contrast microscope. Corn pollen exine appears regularly punctate while the tripasum pollen exine is matted and irregular. While it is apparently not possible to distinguish between corn and teakite pollen by this technique (Bargharn 1974:185), it is possible to distinguish be- tween corn and tripasum. The large graine grains from the Fort Center site all had regularly punctate exine patterns under phase con- trast microscopy. On the basis of size and exine pattern then, we identified 48 large grains pollen grains from these samples as corn pollen.

Determination of Size Range of Corn Pollen

The large grain pollen grains described above oc- curred very rarely - a total of 48 grains in many hun- dreds of pollen grains scanned. However, a number of gramme pollen grains were observed which were 50 mic-rons or larger and which had regularly punctate exine patterns when viewed under the phase contrast micro- scope.

All of the large grains pollen grains with regularly punctate exine were measured in the four samples pre- sented. Table 1 shows the frequency distribution of axes length measurements of these grains and of Tripasum decaryi.

**Table 1**

<table>
<thead>
<tr>
<th>Axis Length (Microns)</th>
<th>F-47</th>
<th>F-116</th>
<th>F-157</th>
<th>F-223</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-49</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>50-54</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>55-59</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>60-64</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>70-74</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>75-79</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>80-84</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>85-89</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>90-94</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**FREQUENCY DISTRIBUTIONS OF AXES LENGTHS OF LARGE GRAIN PATTERN GRAINS WITH REGULARLY PUNCTATE EXINE OF T. DECARYI AND T. PARISHII**

**Table 2**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mean</th>
<th>KE Correlation</th>
<th>Extreme Exine</th>
<th># grains</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-47</td>
<td>61.6</td>
<td>0.91±0.04</td>
<td>50-76</td>
<td>42</td>
</tr>
<tr>
<td>C-116</td>
<td>32.2</td>
<td>0.74±0.15</td>
<td>35-50</td>
<td>18</td>
</tr>
<tr>
<td>C-157</td>
<td>57.8</td>
<td>0.91±0.15</td>
<td>25-55</td>
<td>42</td>
</tr>
<tr>
<td>C-223</td>
<td>62.5</td>
<td>0.92±0.15</td>
<td>50-76</td>
<td>107</td>
</tr>
<tr>
<td><strong>Tripasum</strong></td>
<td><strong>56.9</strong></td>
<td><strong>0.78±0.15</strong></td>
<td><strong>50-76</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

Mean and Extreme Tripasum of Axes Length of pollen grases
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 gramineae 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 Bangham (1965:39) report the pollen size for Chapalita, a primitive race of corn, as ranging from about 83 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 gramineae grains 70 microns or larger with typical corn exine patterns, as corn. We suggest that they make up about 15 percent of

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Figure 1: Cartoon Frequency Distributions of Pollen Grains. Legend—Center under graph Size of Pollen Grains is Microns.

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

Figure 3: Means ± Std Distributions of Gramineae Pollen Samples in Microns.

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indicates 95% C.I. of Mean.
wetland 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 river-bank, 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 its pigment on a bird carving which has been covered by many feet of mound wash since shortly after the collapse of the ceremonial 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 nearby 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.

References cited:
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 a sustainable subsistence, 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 cucurbita), 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 ethnographic 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" (usu-ally 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 Mississippiian 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. Also, 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 had a salutary effect, or whether it may have had a variable, even con-tradictory, impact upon those other aspects of socio-cultural development which we have tended to value high-ly 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 introduc-tion of corn directly. With the exception of cob 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 acorn cultists from the late Archaic Bayou Jasmine and Weeke 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 site in the great develop-ments that may be observed in this same area. Yet, there are other clues in the archaeology when we look beyond the surface of the great developments.

I would take as a case study the lower Yazoo Basin where intensive analysis of the archaeological data pro-vides 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 Mississippi 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 evi-dence shall consider the case for corn agriculture as an earlier stage of development.

The early Mississippian occupation of the lower Yazoo Basin is impressive. At the latest count, 116 components of the Winterville-Lake George phases have been recorded (Figure 1). The sites represented include major multi-mound 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 compo-nents in the Lower Yazoo Basin. The primary mound centers, Win-terville and Lake George, are indicated by the solid sites, lesser mound centers by the hollow stars. The data base is drawn from Philips (1979), with additional information from a survey con-ducted by the author during 1967-1968. This still unpublished data nearly doubles the known number of sites for the Lower Yazoo Region.

The demographic pattern of the Mississippian occupa-tion is especially impressive when it is compared with the immediately precedent late Coles Creek occupation of the Gripping 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 Misisippian 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.

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. 1500, 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 objectives to the introduction of another subsistence base, but this seems a poor excuse.

A second hypothesis, then, would contend that the late Coles Creek-Mississippian transition reflects the introduction, not of corn agriculture, per se, but of improved agricultural practices 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 it 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 the 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 other 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 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 most point, and a study of the contemporary Teche-Odasco culture at the end of the first millennium offers little encouragement in answering the question. In the Lower Yazoo Basin, the Teche-Odasco 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 not only about half the number of components that can be documented for the late Poverty Point occupations 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 terraces. These would have been naturally rich ecosystems 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 basis, apprao the late Marksville horizon at about the time of Christ. That event must also be considered as a watershed 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, adaptation, 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 Teche-Odasco people).

By the late Marksville period, however, there is a dramatic change in the archaeological record. The occupation of the Iseneyou phase in the Lower Yazoo is recorded at 77 sites, four times the number of Teche-Odasco 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 occupied. 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?
The question becomes even more urgent when the evidence for the following Davenport occupation is considered. Known components of the Davenport phase (i.e., A.D. 400-500) number 156 (Figure 6), twice that of Haunana, and eight times the number of Tocofteca or early Haunana sites! Even allowing for an inevitable skewing of the archaeological record as earlier components are lost through human activity, this is a startling increase. Furthermore, the change in settlement pattern clearly supports the trend, and minimizes the potential error since so many of the sites were newly occupied for the first time.

Currently, however, while these basic aspects of life reflect an optimum development, there is an equally apparent decline in sociocultural 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 Haunana, and an absolute nadir expressed in Davenport. I have previously proposed the hypothesis that there was a direct correlation between these phenomena, i.e., that the development of more successful agricultural strategies was at least partly responsible for the decline in elaboration of social and ceremonial activities, at least over the short run (Brain 1971:62). 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 socioceremonial infrastructure. This is another way of looking at the whole question of "Marksville decline" (see also Fowler 1973:5) and Hall 1973 for similar observations and hypotheses relative to Middlewood 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
imported-legumes-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-accepance-appears-to-have
had-a-remarkably-depressing-effect-on-other-aspects-of-cultur-
development, which-leads-one-to-suspect-some-changed-assump-
tions-of-North-American-archaeology. On-the-other-hand, this-bad-agricultural-commitment-was-surely
a-necessary-precondition-for-the-great-Mississippian-devel-
opment-to-follow. In-the-Lower-Valley, it-leads-more
sophisticated-technologies-and-strategies, probably-combined
with-row-hybrids-and-legumes, resulted-in-the-classic-corn-
bean-squash-intensive-agriculture-that-was-the
key-to-ultratypical-Mississippian-success, and-the-great-socio-
ceremonial-organizations-that-characterize-it.

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Peabody Museum.
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 2700-1000 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 ornamental, defensive, or because some of these sites are primarily located in saltmarsh, fish traps (McKinney 1973, Moore 1897: Waring and Lathey in Williams 1968, Edwards 1965). While their function remains unclear, on the basis of excavations by Waring and Lawson, Edwards, Calmes, and Mehnert they 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 began 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 front of the point end and was proposed to study changing mainland relationships during the period circa 2000 B.C. to A.D. 1969. Late Archaic sites were located along the eastern margin of the point facing an extensive salt marsh. In surveying this area, it is apparent that many sites are robbing into the marsh. It has not been uncommon to find shell ring sites in groups, for example, Fig Island, Hilton Head Island, and St. Simons Island. In 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 there to be called the marsh ring - RGN76 - is completely isolated from high ground and is surrounded by salt marsh. This site was the first identified and the largest. The second site there to be called the land ring - RGN77 - is located on high ground beneath a dense hardwood and understory cover a distance of approximately 76 meters southwest of the marsh ring. This site is robbing 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 shell-tempered ceramic sites (Marrinan 1973), certain research goals were proposed. First, while excavations revealed ring constituents to be siliciaco 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 distribution were desired. I should like to talk some time at this point and review the general findings of these excavations before proceeding to a specific consideration of subsistence.

Excavation strategies have given a rather biased view of shell ring sites, however, excavations have been concentrated in the ring arc and inside the shell enclosures; 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 settlements 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-Dentoff) 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 occupation of this area occurred after 365 B.C. No cultural material was recovered intermediate to the present marsh surfzone 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 2260 B.C. and an upper level date of 1815 B.C. For the land ring, a basal date of 1410 B.C. and an upper level date of 1655 B.C. was obtained. All dates are on oyster shell.

Both ring sites contained fiber-tempered ceramics; the marsh ring had a scattering of grit-tempered ceramics in the upper 15 cm. In the land ring, grit-tempered sherds were confined to the upper 15 cm. Recovery of organic 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 (16 upper 30 cm). No sherd having Orange motifs were recovered from the basal levels. In the land ring these ceramics were most abundant in the outer shell. A very early example of Tick Island Incised was recovered from the base of the shell.

When excavations began, a working date of 1450 B.C. was proposed on the basis of ceramic occurrence. The marsh ring site was shown to have decorated ceramics in scatterer amounts. However, the basal shell date at the deer ring site at Sapelo island, averaged at 1750 B.C. based on an almost totally plain ceramic sample. The selected working date for the shell assemblage was in- terchangeable 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 723 sherd on 7%). Similarly, decorated bone pips of classic scoll motif are considered late developments, but our single example came from the base of the midden—situated on the midden-submersion 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 the consideration of cannibalism. Cannibalism is a very difficult condition to prove. Perhaps the best case for cannibalism is made by Phillips and Burgess for an early Woodland site in the Savannah River drainage (1884). 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 total radiocarbon date for the marsh ring comes from shell associated with an extended 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 Craig and DePietro (1972) that lithic material is very scarce on the coast during the Late Archais is supported by the Cannon's Point findings. Excavations in the marsh ring yielded only three utilitarian 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 chart and are presumed to be from Fults Fishbone site.

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 or the white-tailed deer.

Midden content recovery is biased by methods applied. Waring and Larson travelled 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 the late ring sites in the eastern United States. With the change in problem-solving orientation, there is an attempt to interpret and reconstruct aboriginal life in the past. To achieve this, the sites must be excavated. The importance of some dietary constituents, for example floral materials, is not easily estimated. Shell presents a very difficult matrix with very poor preservation on the surface of the shell. The importance of some remains of shell, as for example, lime or oyster. It is a very interesting example of Tick Island Incised recovered from the base of the shell.

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 type of material potentially available. Using 1/8" screen, it was possible to miss one entire family of fish. When screen size was decreased, this family - the hemming and midden - was shown to be a significant dietary constituent in terms of numbers of individuals. Additionally, much more information was suggested from the size of this family (22-43 mm) regarding netting, trapping, or poisoning 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 he has introduced into his 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 beneficial by use of screens; far more material is generated.

There is, potentially an infinite number of ways in which human groups may adjust to and exploit their environment. However, such an array does not occur. Instead, aboriginal groups found 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 site, over twenty 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 Tagetes (a razor clam). These molluscs all inhabit tidal creeks. In addition, numerous marine snails were recovered. Some of these species became midden invasions through harvesting of other molluscs or marsh plants (for example the marsh periwinkle and the oyster drill), Muricidae (Littorina irrorata) do not seem to be a food item in the marsh ring while is the land ring there is definite evidence of such use. Numerous species of common terrestrial snails were also recovered. Commonly labeled "garbage snails," these molluscs inhabit moist habitat; and some prefer sandy substrates. These species probably represent no food contribution but were drawn to the midden accumulation.
Culturally, the whelks were the most frequently used and then as pounding or scraping tools. Mammalian re-
mains 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 add 68 calories to the diet compared with equal weights of deer at 120 calories and opossum at 221 calories. When protein is considered, oyster yields 8 grams, deer 21 grams and opossum 30 grams (intrinsical values are from Watt and Merrill 1903).

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 Archaic coastal subsistence base was fish. Because mam-
mal 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; mam-
mals 27% and reptiles 16%. The mammalian species list is inflated by the fact that several recovered species repres-
ent 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 pro-
curement 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 impossi-
bility in this area. The tidal factor in the Cannon's Point locale is 2.1 meters annually. As periods of low tide, remnant pools are very obviously present and exploitable. Foot travel across the salt marshes for considerable dis-
tance is possible during periods of extended neap tide. Seasonality of occupation was a question posed initial-
ly. On the basis of fish size and availability, a spring and summer occupation is suggested. However, a more de-
tailed analysis of the faunal constituents is underway.

Floral material suggests a spring to fall occupation. How-
never, 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 fully interpret the subsis-
tence system. Until such a data base is generated, ques-
tions 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 re-
search in Archaic-Woodland transitional shell middens along the coast of South Carolina. The site history 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 envi-
ronment?

The author has studied small flotation samples from
three sites – Daw's Island (38Bu69), Spanish Mount (38Ct62) and Sewee Shell Ring (38Ct48). The Daw's
Island site is a shell midden on Daw's Island, located in
the Port Royal Sound (Henninger 1969; Michie 1973). A
radiocarbon date on oyster shell from the midden is
2336 ± 100 radiocarbon years; 14C B.C. (GX-2281) and
Stallings' 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 located on the southern end of Edisto
Island, bordered by a tidal creek which is gradually ero-
ding into the site (Sutherland 1974). Two radiocarbon
dates on charcoal from the site are 3820 ± 180 radi-
carbon years: 1870 B.C. (UGA-683) and 4170 ± 360 radi-
carbon years: 2270 B.C. (UGA-684) and the site is pre-
dominantly associated with Thom's Creek Wares. Sewee
Shell Ring is located in the Francis Marion National
Forest about 25 miles northeast of Charleston, S.C.
(Edward 1969). The site has one radiocarbon date of
3296 ± 110 radiocarbon years: 1345 B.C. (GX-2279) and
is associated with Thom's Creek Wares. 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 (De-
partment of Anthropology, University of South Carolina).
Each flotation sample was sifted through a series of ten
screens (grated in millimeters: 6.35, 4.00, 2.63, 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 pro-
cedure 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 26 percent (usually 2 to
10%) was carbonized plant food remains. Although a few
weeks 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 complement 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 (Aae
and Ford 1971). Hickory nuts have a caloric value equal
to that of most meat (Hutchinson 1926:261).

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

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 de-
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 "weet" seeds in the samples is impor-
tant 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 Caro-
olina is characterized by the Maritime Magnolia Forest
and the Live Oak-Sea Oats region (Shelford 1963; Kuecher
1964). The Live Oak-Sea Oats region varies from open
goodlands to dune shrub and groves of low broadleaf
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<th>Plant</th>
<th>Plant Food</th>
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<0.09 grams
* = non-carbonised

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<0.09 grams
* = non-carbonised
### Table 3. Flotation Sample contents by weight in grams for 386409

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### Table 4. Flotation Sample contents as percent of total sample (excluding fine debris) for 386409

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### Table 5. Flotation Sample contents by weight in grams for 386415

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### Table 6. Flotation Sample contents as percent of total sample (excluding fine debris) for 386415

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This data seems to be related to the analysis of flotation samples from different sources, possibly for mineralogy or archaeology, given the context of the tables and their headings.
trees with the dominants of Live Oak (Quercus virginiana) and Sea Gums (Ulmus pumila); 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 (Sheffield 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 in 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-pleating 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 wood. 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. Charcoal Identification by Site

Küchler, A.W. 1965. Potential natural vegetation of the continent
unites States. American Geographical Society, Special Pub
lication 36.


Sutherland, Donald. 1924. Excavations at the Spanish Mound Shell

Reconstruction of Prehistoric Environments: The Warm Mineral Springs Project

Warm Mineral Springs (8 So18) 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 has been radiocarbon dated at 8000 B.C. Geologi-

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Elisabeth Sheldon and Marguerita L. Cameron

ists hypothesize that the sea level was as much as 300 feet lower during that time interval supports Cocke's theory that the cave was dry at the time of burial. Furthermore, presence of stalactites and stalagmites within the cave indicates that the water level of the spring was 60-96 feet below its present level at that time.

Analysis of the artifacts has aroused much interest among paleoarchaeologists, primarily because the burial was un-
disturbed; not only had pieces of saltwater been placed over the body, but a bed of rocks covered the whole area by 7000 B.C. However, this site is also of consid-
erable botanical importance: the deposit in which the burial was discovered contains various 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 tereose 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 phosphorus, 0.003%. The average deviation is 0.15 feet above sea level.

The modern climate is humid and rainy. 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 76 degrees during the summer; in winter these averages are 77 degrees and 65 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 meadow vegetation consists of saw palmetto, hardwood trees including blackjack 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. Interspersed with species from Australia and South America especially Casuarina, caipoj tree, and pepper tree are spreading rapidly throughout the flood-free areas of Florida along the wetlands and swamps.

This interrelated vegetation is very different from that of sixthteenth century historic records from Manatee and Sarasota Counties which describe slash forests of broad-

hickories, locusts, mulberries, cherries, and cabbage palms; with large grape vines interwoven through the treetops, and with a thick undergrowth of saw palmetto.

These records, however, are in agreement with compre-

hensive studies which have characterized the potential veg-
estation as a southern mixed hardwood forest (a tall forest of broadleaf deciduous and evergreen trees and of needleleaf evergreen trees with the following species as dominant: sweetgum, boll bay, slash pine, loblolly pine, bluejack oak, laurel oak, and live oak. Other elements in the forest include hickory, honeylocust, redbay, 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 moist-

ure to protect these trees from frequent fires. It is an area which maintains the slash pine-saw oak-palmetto association commonly observed along the highways.

The cultural time frame at the springs, i.e. the Pleisto-
cene-Holocene interface, makes environmental reconstruc-
tion difficult for several reasons. There is still conjecture over changes in lake level caused by glaciation, where spec-
cifically 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 southeastern Florida, although remains from archeological sites, or on palynological studies in the southeast.

Recent publications by Clawson, et al. (1976) and by Watkins (1971, 1979) have populated 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 investigations of some macrofossils from the same deposit support this conclusion.

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

Clawson et al. concludes that the climate must have been more arid and xeric, as evidence, the presence of slash-

pine, cabbage palm, live oak, laurel oak, hickory, pepper-

vine, and shrimp fern—all mesic species which are adapted to moderately wet habitats. This is due to a com-

mon misconception that all sand 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 clay
limestone, 6-8 feet below the surface which is impervious to water, would have retained sufficient moisture in the line 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 component 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.

References cited:
1975. A Late Quaternary Record of Vegetation from Lake Anne, South Central Florida. Geol., Vol. 3, No. 8, pp. 344-46.
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 pan 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 200 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 1968 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.

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 a 1/4 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 archeological recovered bones of these classes. The fish collection at the Tulane University's Riversides Research Laboratories were consulted in the fish identification. After identification, the minimum number of individuals of MNI was computed for each of the species. Following White's (1959) 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 middens and their relative numbers. In terms of number of individuals deer, muskrat, and raccoon were the more abundant mammals, gosso and

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 crumbling of the loose shell walls resulting in unsafe working conditions. Excavation Unit 3 was located on the beach segment of the site west of

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crane. Important birds, puff the principal reptile, and bowfin, catfish and the sunfishes the least 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 small fish make 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 kilogram of meat represented by various volumes of shell refuse. For example, 224 kg. of shellfish meat would contribute 19,451.9 cu. in., 11.27 cu. ft. or 0.322 cu. yards of empty shells or a total of 24,386 whole clam to a midden. One deer represented in the midden by oneumerous could contribute the same amount of edible meat, i.e. 224 lb. In addition, for every 100 grams of deer meat there is 21 grams of protein and 126 Calories while clam meat has 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 Tehuantepec diet. Table 2 lists the plant remains recovered from the Tehuantepec levels at the Morton Skull Mound. Some of the larger fossil fragments, such as wood and nut shells, were recovered in the screen but the majority of the remains, especially the small seeds, were retrieved by the flotation of the extremely rich shell deposit. Numerous individuals associated with several institutions participated in the identification of the faunal remains including, Hugh C. Cutler and Leonard W. Blakie of the Missouri Biological Gardens, Claire A. Brown of Louisiana State University, the staff of the Field 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 able to natural coast 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 presence of Figure 11 or bald cypress (T), red cedar (C), and the more common larch (L) and sassafras (S) suggest that during the period of Tehuantepec habitation the immediate environs of the site were a swamp rather than the marsh of today.

A number of the species recovered from the midden provide edible parts of which were reportedly used by the historic southwestern tribes. These would also have been available to the Tehuantepec gatherers. Important among these edible species are hickory (H), acorn (O), and...
### TABLE I

**Range current MEAT WEIGHT CORRELATIONS**

<table>
<thead>
<tr>
<th>Kilograms of edible meat</th>
<th>Volume (cu. in.)</th>
<th>Volume (cu. ft.)</th>
<th>Volume (cu. meters)</th>
<th>Number of clans</th>
<th>Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.074</td>
<td>4.45</td>
<td>0.001</td>
<td>0.001</td>
<td>81</td>
<td>24.398 ave. (3) shell samples</td>
</tr>
<tr>
<td>22.400</td>
<td>19,481.90</td>
<td>11.27</td>
<td>0.328</td>
<td>24.398</td>
<td>(1) deer</td>
</tr>
<tr>
<td>0.896</td>
<td>779.28</td>
<td>0.045</td>
<td>0.013</td>
<td>976</td>
<td>(1) muskrat</td>
</tr>
<tr>
<td>7.840</td>
<td>6,618.07</td>
<td>3.95</td>
<td>0.125</td>
<td>8,819</td>
<td>(1) raccoon</td>
</tr>
<tr>
<td>1.568</td>
<td>1,263.70</td>
<td>0.79</td>
<td>0.023</td>
<td>1,708</td>
<td>(1) ronde</td>
</tr>
<tr>
<td>4.400</td>
<td>2,181.00</td>
<td>1.28</td>
<td>0.037</td>
<td>2,727</td>
<td>(13.5 ft. alligator)</td>
</tr>
<tr>
<td>5.677</td>
<td>1,197.00</td>
<td>0.81</td>
<td>0.024</td>
<td>10,560</td>
<td>(1) 1 in. bowfin</td>
</tr>
<tr>
<td>1.111</td>
<td>961.30</td>
<td>0.56</td>
<td>0.010</td>
<td>1,210</td>
<td>(12.5 in. catfish)</td>
</tr>
<tr>
<td>0.116</td>
<td>101.11</td>
<td>0.06</td>
<td>0.002</td>
<td>137</td>
<td>(10.5 in. catfish)</td>
</tr>
</tbody>
</table>

### TABLE II

**FLORAL REMAINS**

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Identified by minimum number of seeds</th>
<th>Number of fragments</th>
<th>Type of remains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxodium distichum</td>
<td>Bald Cypress</td>
<td>KBG, Cab</td>
<td>0</td>
<td>72* cone</td>
</tr>
<tr>
<td>Umbellularia californica</td>
<td>Larrea tridentata</td>
<td>Spearweed</td>
<td>CAB, PFL</td>
<td>44</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Greenbriar</td>
<td>KBG</td>
<td>32</td>
<td>5 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Hickory</td>
<td>KBG</td>
<td>0</td>
<td>6 pollen</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Willow</td>
<td>KBG</td>
<td>0</td>
<td>6 nut shells</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Hackberry</td>
<td>PFL</td>
<td>0</td>
<td>6 nut shells</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Cokes</td>
<td>CAB</td>
<td>0</td>
<td>6 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Smartweed</td>
<td>KBG, CAB, PFL</td>
<td>805</td>
<td>32 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Wine Plum</td>
<td>KBG</td>
<td>9</td>
<td>18 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Grape</td>
<td>RS0</td>
<td>14</td>
<td>18 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Tupelo-gum</td>
<td>CAB, PFG</td>
<td>3</td>
<td>3 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Persea</td>
<td>KBG</td>
<td>1</td>
<td>3 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Storax</td>
<td>CAB</td>
<td>103</td>
<td>80 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Arrow woods, Haws</td>
<td>NSF</td>
<td>1</td>
<td>0 seeds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Squash gourd</td>
<td>KBG, CAB</td>
<td>308</td>
<td>161 seeds + rinds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Bottle gourd</td>
<td>NSF</td>
<td>36</td>
<td>32 seeds + rinds</td>
</tr>
<tr>
<td>Larrea tridentata</td>
<td>Parsley Family</td>
<td>CAB</td>
<td>15</td>
<td>107 seeds</td>
</tr>
</tbody>
</table>
the fruits of the plum (a), grape (c), persimmon (f), and henry (d) and the nuts of the greenbrier (e).

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 4000 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, bone flake 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 weakly wild C. texana of central and southern Texas (Whitaker and Davis 1962:3). Whether the C. texana is actually a truly wild plant and its 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-
### TABLE III
AVAILABILITY OF ANIMALS
BY SPECIES

<table>
<thead>
<tr>
<th></th>
<th>deer²</th>
<th>muskrat²</th>
<th>mink¹</th>
<th>rabbit¹</th>
<th>raccoon¹*</th>
<th>blue goose³</th>
<th>box turtle⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>zone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>per</td>
<td>per</td>
<td>per</td>
<td>per</td>
<td>per</td>
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<td>per</td>
</tr>
<tr>
<td></td>
<td>zone</td>
<td>zone</td>
<td>zone</td>
<td>zone</td>
<td>zone</td>
<td>zone</td>
<td>zone</td>
</tr>
<tr>
<td></td>
<td>2,010</td>
<td>175</td>
<td></td>
<td></td>
<td>402</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Cypress levee</td>
<td>8,582</td>
<td>855</td>
<td></td>
<td></td>
<td>2,047</td>
<td>10,200</td>
<td>102,336</td>
</tr>
<tr>
<td>Iscbe levee</td>
<td>2,541</td>
<td>132</td>
<td></td>
<td>1,980</td>
<td>1,320</td>
<td>6,600</td>
<td></td>
</tr>
<tr>
<td>Swamp</td>
<td>59,654</td>
<td>985</td>
<td></td>
<td>715,853</td>
<td>24,200*</td>
<td>9,945</td>
<td></td>
</tr>
<tr>
<td>Karah</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,165</td>
<td>2,522</td>
<td>3,769</td>
<td>24,200*</td>
<td>9,945</td>
<td>122,432</td>
<td></td>
</tr>
</tbody>
</table>

* Based on ratio - questionable

1st. Amant 1959
2nd. O'Neill 1949
3rd. Lowery 1952
4th. Carr 1958

### TABLE IV
PROPORTION OF AVAILABLE MEAT (SERVED AREA)
OBSERVED MEAT - WEIGHT EQUIVALENTS FROM 16183

<table>
<thead>
<tr>
<th></th>
<th>in served area</th>
<th></th>
<th>Norton Shell Mound</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kilograms</td>
<td>%</td>
<td>kilograms</td>
<td>%</td>
</tr>
<tr>
<td>deer¹</td>
<td>48,712.5</td>
<td>5.0</td>
<td>147.70</td>
<td>50.6</td>
</tr>
<tr>
<td>muskrat²</td>
<td>644,267.7</td>
<td>66.1</td>
<td>20.60</td>
<td>7.2</td>
</tr>
<tr>
<td>mink¹</td>
<td>1,136.7</td>
<td>0.1</td>
<td>0.45</td>
<td>0.2</td>
</tr>
<tr>
<td>rabbit¹</td>
<td>3,392.1</td>
<td>0.3</td>
<td>1.34</td>
<td>0.5</td>
</tr>
<tr>
<td>raccoon¹*</td>
<td>190,575.0</td>
<td>19.5</td>
<td>47.00</td>
<td>16.3</td>
</tr>
<tr>
<td>blue goose³</td>
<td>15,033.4</td>
<td>1.5</td>
<td>23.5</td>
<td>8.2</td>
</tr>
<tr>
<td>box turtle⁶</td>
<td>22,037.8</td>
<td>2.3</td>
<td>8.6</td>
<td>3.0</td>
</tr>
<tr>
<td>fishes⁵</td>
<td>45,189.0</td>
<td>5.1</td>
<td>41.2</td>
<td>14.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>970,344.2</td>
<td>99.9</td>
<td>642.4</td>
<td>100.1</td>
</tr>
</tbody>
</table>

1st. Amant 1959
2nd. O'Neill 1949
3rd. Lowery 1952
4th. Carr 1952

*questionable
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 one 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 Cape Lookout and Fear Island to the immediate source of such species near the middens. Loftfield offered the hypothesis that as fresh water sources increased, i.e., as one moves up the rivers away from the tidal flows and...
salt water intrusions, that the midden content of the species Mercenaria mercenaria (clam) would approach 100 percent of the midden shellfish species content. The corol-
yary, of course, would be the expectation to find greater amounts of species tolerating higher salinities, e.g., Cras-
sostrea virginica gemellin (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) num-
ber 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 toler-
ance for lower concentrations of NaCl is best with Mercen-
aria and that there appears to be a significant correlation between salinity tolerance and the geographical distribution of
shellfish. Of the four factors affecting shellfish availabili-
ty 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) cul-
tural preferences, (2) technological innovations, (3) sea-
sonal exploitation differences, (4) macroenvironmental
shifts, and (5) shellfish habitats (based primarily upon salin-
ity), 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 ex-
ploration techniques. At least, there is no suggestion, i.e.,
new artifact categories, in the archaeological record to
indicate new technology. The coastal macroenvironment
also can 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 anoth-
er 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: 592-596) 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 ade-
quacy of explaining the changing patterns of shellfish
exploitation. In light of his conclusions, and he is careful
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 taste, 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 exploi-
tation. Before considering these two variables we should
like to turn to the ethnohistorical accounts for coastal
exploitation because the contact situation provides interest-
ing data in the evaluation of these variables.
Based upon the accounts of the Roanoke Island colo-
nists Ledbetter (1890) and those of the sub-meridional sea-
sonal 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
hunters to wade in, kill and fish their gardens through-
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 Sum-
mer) which in many interior areas was a starving
time for the aboriginals there were yet no planted
crops ripe enough to eat, few edible wild
plant foods, and the hunting was bad. As a conse-
quently the Indians dispersed to the shores of the
salt water sounds and estuaries to subsist on gath-
ered 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 vege-
table foods which they had stored and meat from
Based upon this ethnohistoric description and reconstruc-
tion, and archaeological data to reconstruct the sea-
sonal section, it is clear that seasonality must be conside-
ed when evaluating archaeological shell midden remains.
First, if the occupations are primarily seasonal, then one
would expect to find that the closest shellfish habitats would
be extensively exploited while surrounding habitats might be
utilized in varying lesser degrees (equal access to all avail-
able habitats is assumed). However, if the occupation were
a permanent village, then one would expect to find that
several habitats were being extensively exploited through-
out a longer period of occupation, and indeed, that the
village would probably be located in such a place as to
maximize exploitation of the equivalent from several such habitats or centrally located).
Lofstedt (1975) also suggested that there is a correla-
tion 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 tem-
pered, 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
products of summer gathering.
After this brief treatment of four variables: cultural
preferences, technological innovations, seasonal exploita-
tion, and macroenvironmental 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 middens 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 (Fig. 4). A series of hypothetical shellfish harvesting areas (habitat) 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 leach" 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.

Middle in this section of North Carolina tend to be small, rarest over 100 to 20 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 aid some support to this idea. The plowing tended to make the shell content or each midden homogeneous from top to bottom so that 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 sherd 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:
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, (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 substance we given below:

Forest – deer, black bear, curlew, 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 recouped sites are located in hammocks. The barrier island site, with limited resources, are smaller and suggest a short-term, probably seasonal occupations. These offshore sites also provide evidence of recoupetions based upon buried middens and various shed tempers, but at 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 Ona v 195, on Tissell 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,

<table>
<thead>
<tr>
<th>Region:</th>
<th>(I - II)</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 18</td>
<td>94.9</td>
<td>32.5</td>
<td>36.6</td>
</tr>
<tr>
<td>Surface data:</td>
<td>63.2</td>
<td>20.8</td>
<td>28.7</td>
</tr>
<tr>
<td>Percent clam</td>
<td>62.8</td>
<td>13.5</td>
<td>27.2</td>
</tr>
<tr>
<td>by weight.</td>
<td>51.9</td>
<td>13.4</td>
<td>20.0</td>
</tr>
<tr>
<td>(Sites)</td>
<td>51.4</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35.7</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>359.9</td>
<td>89.2</td>
<td>114.5</td>
</tr>
<tr>
<td>R</td>
<td>59.98</td>
<td>11.15</td>
<td>28.62</td>
</tr>
<tr>
<td>ø</td>
<td>18.09</td>
<td>10.55</td>
<td>5.91</td>
</tr>
</tbody>
</table>

ANOVA

<table>
<thead>
<tr>
<th></th>
<th>S.S.</th>
<th>d.f.</th>
<th>m.s.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>8,225.56</td>
<td>2</td>
<td>4,112.78</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>2,995.66</td>
<td>15</td>
<td>199.70</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>11,221.22</td>
<td>17</td>
<td></td>
<td>20.594</td>
</tr>
</tbody>
</table>

F is significant at p < 0.001.

Percent Clam by weight (Plot of standard deviations):

![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 2%. Smith and Strachey (Tyler 1961) 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 the particular locates 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 areas 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 areas 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 Littler, resident of Swainsborough, North Carolina, whose continuing interest in the archaeology of the Carolina coast made this study possible. Thanks are also extended to Joffre L. Cole 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

Zoarchaeology 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 Zoarchaeology 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 revolve 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 Zoarchaeology 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 posed 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 of Zoarchaeological research, the field work must be designed to gather zoological and anthropological data equally. The zoarchaeologist must work closely with all phases of the archaeological 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 kind of 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 zoarchaeologist 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. Wst of the building boom and other changes wrought in the environment by man, it is often difficult to visualize the kind 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 always 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. Maritan, 1975, and S. Payne, 1972, and the problems of excavation bias is familiar to all archaeologists. Biases can also enter the problem through carelessness in 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 specialists. The specialists 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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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 is exclusive to excavation (proximity, condition, potential for study, and relative site is one pertinent consideration) 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 out 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 "digging." Excavation and artifact collection enjoy wide interest and reception. Such an emphasis actually does more harm to realistic 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 setting 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's 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, 160 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 subdivisions, 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 clawing 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

Rochelle A. Marrinan

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

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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, dis- tance 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 6 to 8 hours on weekdays. Evening classes are 2½ hours. The field school is in opera-
tion for 9 to 10 weeks.

Responsibility is a very important part of education. Students have responsibility for every aspect of the exca-
vation process. Very little initial responsibility gives way to
greater responsibility as knowledge and skill increase. Responsibility for note-taking, mapping, field cataloging, and instrument use is rotated daily. For those without a major assignment, responsibility for the physical require-
ments of excavation are rotated but in a less formal manner: for example, shoveling, screening, reaming out features, tunnelling, or field preservation of materials. Graduate students already having had a field school are valuable as sources of assistance in early training in equip-
ment 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. Addition-
ally, 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 develop-
ment of archaeology, conservation and preservation
methods, data organization, professional ethics, and lec-
tures on theoretical aspects. Articulation between develop-
ments in the field excavation and information given in the
lectures is not overlooked. Attention is paid to special
analytical techniques. One of these techniques, zooarchae-
ological 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 dis-
advantages of a field school program? One potential prob-
lem 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 pos-
sible 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 vari-
able 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 excava-
tors. 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.
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 McColloough 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 McColloough 1973: 9). The survey also indicated that the valley was
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 Highwood 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 biogeographical zones: flood plain, older alluvial terraces, valley slopes and bluffs, and islands (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 patterns 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 or excavated sites of six cultural phases from the Late Archaic through the Mississippian 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 fishing camp that does not have more permanent structures, 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 Wadie 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 site appearance has 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 (Beaton 1976). Sites now have multiple oval or circular trenched 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 linear descendent of the former phase, the community pattern now includes substantial structures with internal earth ovens interpreted as winter lodges (Figure 2), and more tightly built trenched 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 (40C132) 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 Woodl

Figure 2: Double-mound Owl Hollow phase structure excavated on the Banks III site (40C110B) during the 1972 fall field season.

Figure 3: Wall-trench Banks phase structure excavated on the Parks site (40C136) during the 1974 fall field season.
single wall-trench house with supporting features were located in the 1974 fall season (figure 3). The two radio-
carbon dates of A.D. 645 and 339 are probably too early for this installation, but the house type and material cul-
ture 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 Depart-
ment of Anthropology, Dayton, Ohio. The UT field school consisted of 16 students and eight field staff mem-
bers 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 super-
vised 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 hypothesis were tested during the 12 weeks of the 1975 field season. First, the 1972 survey and test-
ning during the 1975 spring field season had revealed what appeared to be a buried Arcachian horizon on the Aaron Shelton site (40CB86) that could date as early as the Middle to Early Arcachian periods. Since an Early Arcachian component had not been excavated in the reser-
voir area afforded an opportunity to test two hypotheses: (1) Early Arcachian sites were found on the older and higher terraces in the lower reservoir zone, and (2) late occupation during the Ozel Hollow and Banks phases would not include this higher terrace upon which there appeared to be a preference for these groups in the lower terraces in this area.

Five weeks were spent on this site by half the UT field school under the direction of Major McCollough. A total of 56 features and 60 post holes were excavated here. Some of the Arcachian features near the edge of the terrace were covered by a layer of overburden and midden, but their contents indicated they probably dated no earlier than the late Early Arcachian period. This site, tentatively designated Benton, had been dated on the Eoff I site in 1975 at 1000-3000 B.C. Further back from the terrace edge no midden was encountered, and mechanical strip-
ing revealed scattered features of the Leobettner, McFar-
land, and Mason phases. This correlated with our gener-
alized settlement hypothesis that sites of these phases, particularly McFarland, are widely dispersed in both the upper and lower reservoir zones. The lack of substantial mecking on the site indicated 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 (Boson and Merryman 1973). The absence of Ozel Hollow and Missis-
sippian remains still strengthen hypothesis (2) above that these phases preferred the wider alluvial terraces for their settlements.

On July 14 the crew moved to the Duke site (40CS72) on Riley Creek, one of the principal tributaries in the lower reservoir zone. This site appeared particularly im-
portant because of the substantial number of Early Arcachian Big Sandy projectile points that had been recov-
ered here by the landowner (Faulkner and McCollough 1973: 391). The site was tested by McCollough during the 1973 fall season. An organic rich midden was dis-
covered that appeared to be of Woodland derivation. Be-
case 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 examination largely for two reasons: the possibility of finding an Early Arcachian horizon that had thus far eluded us in the reservoir, but more to the point simply documenting what culture groups had utilized with a relatively intensively occupied site on a tributary stream. The results were dis-
appointing. The site had been badly disturbed by the his-
toric occupation and flood scouring had apparently destroyed the Early Arcachian 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 (40CB68) which was visited in the summer of 1973, and the Wiser-Stephens I site (40CS81) which was visited during the 1973 spring field season. The Boyd site was the larger of the two and the testing indicated intensi-
vite occupation from Arcachian to Woodland times; how-
ever, 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 occu-
pation (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 Ozel 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 feet units (1200 ft2) were hand excavated in the midden and water-screened to sample this deposit. This midden yielded, but produce enough data to justify a continuation of this sampling and the reminder of the site was methodically stripped to reveal the community pattern present here. Clusters of Leobettner, 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 Ozel 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 Ozel Hollow and Banks peoples chose wider flood plains for their settlements, they should have lived on this site. Previous excavations have indicated at least the later part had been present. Testing of the site in the 1972 summer field season revealed a Maquinna phase midden at the north or "be" end of the site and two test pits in another area. The 26 arc site produced five small eroded, shielled-tempered sherds (Faulkner and McCollough 1974: 88-94). In the 1973 summer field season, four areas were extensively hand-excavated: the north or toe area where both Mason and McFarland com-
ponents 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 drive. 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 26 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 pattern on this extensive site.

As 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 disappoimting since only one definite structure was found in the south-central portion of the site. This was a large oval coquina winter lodge with one shallow and one deep earth oven, the latter being filled with 400 pounds of burned limestone (figure 8). The absence of an extensive burned limestone-filled midden around this structure suggested brief use. This structure was located on the forested slope 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 eroded the outer wall posts. The size of these ovens indicates they may be early in the Owl Hollow phase; radiocarbon and archeomagnetic 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 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 Archeological Project has focused on changing subsistence and settlement patterns through time, a large sample of faunal remains from this phase is requisite to compare Late Woodland and Early Mississippian subsistence patterns. Two 6x5 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 lirritics 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 one type of more nucleated settlement that was circumnorted on the west and south sides by an alignment of basin-shaped borrow pits for clay house daub. The last 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 Tim's Ford Reservoir (see Butler 1968). Unfortunately, extremely dry conditions, the gravelly subsoil, the prehistoric Indians' construction techniques, or a combina-
tion of these features prevented the destruction 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 Site and Park Site, 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 trowel pits was found to be a rectangular structure with small post in a trench or individually placed around a de-

pressed floor (Figure 6). Except for the deposited floor, this structure is very similar to the single Banks phase features on the Parks site. This structure was completed during the fall season by Willard Bachm and other summer archaeologists from the Tullahoma-Manchester area, and UT graduate students. Although the material from the houel 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 struc-
ture represents the scattered settlement pattern of an earlier portion of the Banks phase, and the more intensive occupation within the arc of trowel pits represents a later shift toward exploitation of settlements. Whether these are two distinct Mississippian phases or evidence of a settlement trend within the Emergent Missis-
sippian Banks phase will be determined by intensive analysis of the material culture and a series of radi-

carbon 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.

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Figure 6: Banks phase pit house excavating during the 1975 fall field season. Note many of rooms in top with post.
During the summers of 1973 and 1974 site surveys were carried out between Atchitecture, 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 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 1: Location of 1973-1974 Study Areas.](image)

![Figure 2: Population Density Curves for the Prairie (dashed line, 1973 survey) and Tombigbee Sand Hills (solid line, 1974 survey) Ecosystems.](image)
occupation of the Sand Hills. The curve in figure 3, then, indicate which of the ecosystems were 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 plotted in figure 3, the z statistic was used.

![Figure 3: The Proportional Difference (x, 73g-p, 142) between the Population Density of the Prairie and Tomoptogon Sand Hills for each Occupational Period (x).](image)

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 IIIIV 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 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 salvery 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 faunas to be effected by the waterway, Miller et al. (1973:520) 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 habitat 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 predominantly 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 | Early Archaic | Middle Archaic | Late Archaic | I | II | III | IV | Miss. | # Sites with Identifiable
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Table 1. Summary of Occupational Components: 1973 & 1976 Surveys
hypothesis from the faunal materials recovered from the excavations in 1973 and 1974, we need to direct a re-
search program aimed at obtaining comparative data on the Archai subsistence patterns from the two ecosystems.
It is with the end of the Archai 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. Richauer (1974:22)
suggested that Miller I groups were occupying "small his-
torial hamlets and villages." As a working hypothesis, because we have no good data on the Late Arcaic subsistence patterns, the following suggestion is made. Using the con-
cept of the indigenous Eastern Agricultural Complex (Fowler 1974a; Jones 1936; Strunwe 1971; and Warnik
1971), I propose that the significant increase in the occu-
pation of the Prairies 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-earer (Chenopodium sp.); pigweed (Amaranthus sp.), rankweed (Ambrosia sp.), sunflower (Helianthus annuus), and marsh-elder (Iva sp.). This shift in the econ-
omy of the region in the direction of an increasing de-
pendence on plant foods would be consistent with develop-
ment elsewhere in the eastern U.S. at this same time. For example Strunwe (1971:880) states:
Evidence discussed here indicates the use of seeds from a number of eastern plants beginning in the Late Arcaic and continuing, at least in the case of goosfoot, into Middle Woodland times in the mid-
west. Fowler (1971:402) addressing himself to the same prob-
lem said:
In general this synthesis of the Central Mississippi and the Lower Ohio Valley area has pointed out the following ideas regarding the consequences of food production in the area. 1. There was a food gather-
ing base that was part of the Late Arcaic subsistence pattern. 2. This subsistence pattern was based upon a seasonal cycle settlement system. 3. A part of this system was the collection of seeds and a probable practice 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 Prairies 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 ecosystem itself. Within the Sand Hills 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 Prairies are more fertile than those of the Sand Hills (Vanderford 1962:114). Given an indication of the potential of the Prairies soils Vanderford (1962:33) stated, "Good soil management will probably grow greater din-
den in the Black Belt than in any other area of the South." Thus, it appears that the Prairies are more suited to cultivation, especially without modern soil management practices, than are the Sand Hills soils. It should be under-
stood here that this does not imply that the grasslands themselves were hoe cultivated. Instead, it is probable that the wooded area of the Prairie ecosystem along stream cutters across the Prairies during the 19th century were the sections of the Prairie ecosystem most heavily utilized by the early agriculturalists. This hypothesis, like others made here, requires testing through future research.
A second avenue which may be used to account for this heavier occupation of the Prairies by the initial hor-
iculturalists is the hypothesis made above. The sunflower is itself a prairie species and the marsh elder occurs in the stream bottoms of the Prairies. Neither of these plants would be frequent in the Sand Hills as it is in the Prairies (DickDaniel, personal communication). Since these are two plants most commonly accepted as part of the native Eastern Agriculture Complex, it again seems probable that the Prairies would have been favored over the Sand Hills as an environment in which Miller I groups would have concentrated it, indeed, they were practicing cultivation of native North American plants.
To determine the possibility of these hypotheses relating the Miller I occupation to the two ecosystems, it will be necessary to develop a research program designed spec-
ically 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 alter-
native which may be considered in judging this concentra-
tion of Miller I sites in the Prairies is that the Miller I culture results from the intrusion into the region of peoples from elsewhere, and the Prairies furnished the best route for movement. This would still require an identifica-
tion of the Miller I subsistence patterns which are likely to have a general lack of continuity between the Late Arcaic and Early Woodland occupations of the area, re-
quiring, therefore, an entirely new tradition.
By the beginning of the Miller II period the population in the Sand Hills had "caught up" with the Prairie. It is generally considered 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 of life in the East (see Munson 1972:100-110). It appears that during Miller II the popu-
lation growth in the Prairies leveled off while the Sand Hills was catching up to, or even exceeding, the population levels of the Prairies. This would suggest that the following factors which may help to account for this growth pattern. Having established the initial cul-
ivation techniques in the Prairies during the Late Arcaic and Early Woodland transition period, the population of the Prairies grew rapidly as indicated in figure 2. By Miller I times, the population had reached a 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. Returning 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 minority 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
in the Miller IV occupation. (Rudner 1974:17) if Rudner 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 too small to be a poor area for such crops. This may have been related to drainage, fertility, or the difficulty of clearing the most extensive Sand Hills forests. As with other suggestions made in this summary, the research for this late decline in the Sand Hills and the implications of the second population plateau in the Prairie must 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 these 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 have 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 operating in instituting the identified changes. Subsistence patterns, distributions of sites relative to particular soil zones, and the relationship between environmental and demographic variables to mention only a few subjects, must come under our critical view. And, only then, can we claim that the end purpose of archaeological research within an anthropological framework is being met.

References cited:
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. Leventhal, 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 tidal 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.

Larsen (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 tidal 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 bio-mass, was of greater historic importance to aboriginal populations (Larsen 1969:14).

Previous research on Sapelo includes the excavation of the shell ring area of the burial mound on the north end by Clarence Moore in 1907 (Moore 1907:55); and, more recently, a test excavation at the shell ring by Waring and Larsen in 1950 (Waring and Larsen 1946:262).

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 alluvial or coastal marsh 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 in time, a site should be defined as "...a spatial concentration of material evidence of human activity," after Duerst (1957:13).

Aboriginal sites on Sapelo Island are characterized by accumulations of midden shell, prominently oyster (Crassostrea 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 site 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 pottery sherds, lithic and bone material 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 variation, they are in some instances the result of such coverage problems as heavy ground cover and the limitations of time.

1. Knoll 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, 6-10 meters in diameter and yielding Diploflora pottery (Waring 1938) 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 (1907) but remains unexcavated.

2. Mossa Harmond. This area is a hamnook or small marsh island separated from Sapelo Island by about 75 meters of marsh. Small scattered shell middens 16 to 20 meters in diameter are found over the entire southwestern half of the hamnook and along the northwestern corner, where the Duplin River touches the high ground. In the southeastern corner of the hamnook there is a large disturbed midden. This midden was tested excavated and an alluvial map was made of the entire hamnook.

3. Drawbrick. 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 their area have recovered pottery from the Wilmingston, Savannah, Irene (Williams 1968), and San Marcus series (Smith 1946; 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 Liverford has called the Magnolia Forest (Liverford 1963:64). Middens are small, averaging about six meters in diameter, and are scattered along the edge of the marsh, extending island 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 Marcus, with the latter wares in the majority. The Shell Ring, perhaps the most striking archaeological feature of the
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. McCoy Creek Area. This area lies on the north-eastern 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, McCoy and Blackbird, which flow close to shore near the area 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 Drabkurb 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 Dummouisy's Field," excavated by Moore in 1897 (1987:67).

6. Bourbon Field. Bourbon Field is an extensive, multi-component site located on the northeast corner of the island. Blackbird 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 these 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 midden containing plain and ornamented pottery have been reported in the literature pertaining to the site (Waring and Larson 1968:288; McKinley 1873:423). Two 2x2 meter squares were therefore excavated in middens to establish if they were contemporary with the ring.

So, 4BR439. 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-burned lipped bottle in association with Irene, San Marcos and possibly earlier wares. Beneath the midden, the sandy soil contained St. Simon's Plain sherd and poverty point object fragments.

So, 50SR524. This square was located in a disturbed midden with Mississippians and protohistoric wares overlying thinly scattered Wilkinson, 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.

So, 50SR500. This test site was located on the south-eastern exterior edge of a scalloped portion of the shell ring on a small rise above the generally level adjacent plain. Dark humic soil interface with shell reached a depth of 40 cm. Features apparently resulting from slumping 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.

So, 4BR550 and 02SR500 and Unit 49R503. Artifacts in this section of the site tended from Irene wares to increasingly predominate 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 DePtrova 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 anomalous zone, in a shell-free context a small refuse pit was found which contained small concretes, fish bones, charred and fragmented Hickory nut shells, seeds of a xil 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 burning, 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
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.

Text Pit 2 was terminated above a refuse pit after obviating 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 Irena 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 artificial 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 undetected shape and size overlain and mixed in the upper levels with a Mississippian proto-historic, and historic component. No evidence of Ring No. 3 was found in either 1974 or 1975, and McKelvey's description implies that both Rings Nos. 2 and 3; assuming they actually were rings, were already disturbed in 1879. The strong historic component is the site reawakening 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 (Crassostrea virginica) with other representatives, including Southern Quahog (Mercenaria campechiensis), Pensacola (Family Ictipusidae), Knobbled Whelk (Buccinum canica), Channeled Whelk (Buccinum cancellatum), and an occasional olive shell (Family Oliva). The only shell which might constitute artificial material is whelk in the form of Buxton hammers, picks, or hoe. Not all whelks exhibit the pecked dorsal holes and exposed columnella; 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 copper pipes were located in Archaic midden.

An initial typology of the aboriginal ceramic population yields the following approximate percentages: fiber-tempered wares, 33%;passwd and Wilmington, 5% of each; Savannah, 3%; Irena, 47%; San Marcos, 5%; with 11% remaining unidentified. A re-evaluation of the wares would probably shift the 5% away from Irena 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 reworked. Lithics consisted of a fragment of pecked and ground steatite, perhaps representing a broken gorget; a small fragment of chert, whet stone, and stone Madison point in an Irena association and a small fragment chert fragments.

Without becoming immersed in the complex subsistence problems inherent in miden 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 ideational; i.e., "cere- monial" processes of a hunting and gathering culture. Given that the ring is composed of occupational midden, it was deemed important to determine if contemporaneous site e.xist 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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Larrin, Jesus H. 1969. Aboriginal Subsistence Technology on the Southeastern Coastal Plain During the Late Prehistoric Period. University MacRickards, Ann Arbor.
"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 reach old and propose "new" conservation measures, management schemes, and legislation aimed at ridding 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; Liss, 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 phenomenon 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 addresses 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 VII) 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 "profitive" service enterprises will be evaluated. The thrust of the ideas presented will be discussed as a wrap-up of the symposium.
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 93-647). 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 relate 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 retitling it in 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 refined 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 enhance employment of those who could not find work 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 deal with manpower programs. These programs provided a range 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 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 we 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. Consortia 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, 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 service provided by the Act. . . . (C) it will afford administrative and programmatic advantages over other
methods of delivering services under the Act; and 6. A limited number of CEP grants existing at the time of the amendment of the Act. Prime sponsors in the State of North Carolina are certain specific local governments and consortia of local governments. The Governor serves as sponsor for eighty-seven counties that do not qualify under provisions set for local governments and consortia.

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, 1976, 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 supervisiors, twenty-six crew members, one laboratory technician, and one typographer. These positions were to be combined as excavation teams consisting of two field supervisors and crew members as needed to conduct archaeology on six 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 where 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 students or other "ineligibles" be found during an audit of the payroll, the Department of Cultural Resources would be forced to reverse the federal government and would have 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 (taxatory) 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 various reasons, had taken leave from advanced training. In several cases, candidates who qualified under CETA employment rules applied for supervisiors positions and they were offered the posi-

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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 antici-
pates 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 profes-
sional 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 unem-
ployment was at an all-time high, so was our crew mem-
ber turnover rate. This may have been due in part to what one laborer described as "beneath my dignity, dig-
ging 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 profes-
sional staff became increasingly involved in the environ-
mental assessment process; hence, time available to over-
see excavations at each site decreased considerably, and communications broke down. To illustrate the need for prior planning, including an assessment of one's own com-
mittments 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 super-
visors and crew were observing mapping two newly opened squares. A new technique had been born — the "Oval Excavation." Rather than cut in the con-
ventional 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 prep-
aration; c) laboratory space sufficient to clean, acquisition and analyze materials recovered from the field; and avail-
able staff time to oversee operations.
In any field such as anthropology, where the central thrust of the discipline has revolved about the university, where the mind and mortality of the business world has only been a study for the academician, and where our own discipline has continuously shied away from the realitics of the business world in favor of the realities of the hunting patterns of modern and ancient edenics, 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 academian, which is expected from the commercial world as a review 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 dammed 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 we "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 office 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 archeology 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 assure a profit and this appears to be in the realm of thirty percent. Most firms have little interest in providing custodial 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 archeology, 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 archeology is that the information will not penetrate to the professional level but will be used solely by the client. Mos-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 archeology and academic archeology 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 archeology 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 Schlöss’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 once, 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 Cruse 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 com

pany 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 so 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 com-

mitments 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 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 each agency 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 in 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 conflict 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 millennia. 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 smacked 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.