# THE RIVERTON CULTURE

*HOWARD D. WINTERS*

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A SECOND MILLENIUM OCCUPATION IN
THE CENTRAL WABASH VALLEY

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# Preface

The following report deals with excavations in the Robeson Hills, Riverton, and Swan Island shell middens of the central Wabash Valley during the spring, summer, and fall of 1962 and the summer of 1963 at the Riverton Site. All three are closely related components within a hitherto unreported Archaic culture typified by a distinctive micro-tool industry in chert. The culture has been named the Riverton Culture after the site at which the micro-tool tradition was first noted in surface collections.

The culture seems to be intrusive into the central Wabash and to have its closest external relationships with the Eva Culture of the lower Tennessee Valley and the Indian Knoll Culture of Kentucky. However, neither of these cultures can be directly related to the Riverton Culture, which is probably a specialized regional development within the nexus of the Midcontinent Tradition of the Archaic (Lewis and Kneberg, 1959).

Since the assemblage from the sites has previously been only briefly reported in the literature (Winters, 1967), we have tried to provide reasonably complete descriptive data in the body of the reports and the appendices, and to amply illustrate items of material culture.

Artifacts have been analyzed in terms of groups of functional categories rather than the usual groupings under raw materials. The latter procedure is all very well for studies devoted to the importance of various types of raw materials or techniques of artifact preparation, but such a classificaiton inevitably tends to affect the thoroughness of analysis and to obscure the meaning of artifact classes within cultural units.

We wish to thank Dr. Thorne Deuel, Mr. Milton D. Thompson, and Dr. Joseph R. Caldwell of the Illinois State Museum for making the excavation of all three of the shell middens possible. We wish especially to thank Dr. Caldwell for making available the results of his careful excavation of the complex area of clay platforms and midden at the Riverton Site during the summer of 1963.

Our appreciation is also extended to the following in connection with excavations at individual sites:

Robeson Hills Site, Lw-1. Messrs. R. E. Green, N. M. McCarter and G. Tanner of the Green Construction Company for their cooperation in permitting salvage work in the borrow pit area; the staff of Illinois Highway District 7 for notifying the Illinois Archaeological Survey of the forthcoming destruction of the site; and Mr. Curtis Tunnel, Field Archaeologist of the Illinois Archaeological Survey, for making preliminary arrangements with the Green Construction Company.

Riverton Site, Cw-170. Mr. Horace Walker for permission to excavate at the Riverton Site, and to Mr. and Mrs. Emerson Walker for their interest and many courtesies during the excavation periods.

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Mr. Richard Leary, Curator of Geology at the Illinois State Museum, identified lithic materials from the 1963 excavations and provided information on red and yellow ocher, for which he has our sincerest thanks.

Mr. Robert Blakely of the Department of Anthropology of Indiana University kindly provided sex and age identifications for Burials 1 and 3 from the 1963 excavations at the Riverton Site.

Dr. Paul Parmalee, Curator of Zoology at the Illinois State Museum, has our deepest appreciation for his analysis of faunal remains, and for his valuable comments on sections of Chapter VII.

Professor Richard Yarnell of Emory University has our deepest gratitude for his analysis of and commentary on plant remains from the Riverton Site.

Dr. Joseph Caldwell and Dr. Robert Hall, Head Curator and Curator of Anthropology, respectively, at the Illinois State Museum, Dr. Warren Wittry, Assistant Director of the Cranbrook Institute of Science, and Professor James Brown of Michigan State University have offered valuable technical comments and criticism.

Our thanks are also extended to Messrs. Orlin and Lynn Stephens, whose continued interest and painstaking work made the excavations at all three sites much more profitable.

Mrs. Faye Berry Garvue, Assistant in Anthropology at the Illinois State Museum, prepared most of the maps and drawings and Mr. Charles Hodge of the Illinois State Museum did the photographic work. Miss Peggy Neems prepared the distribution maps in Chapter IV and the charts in Chapter VII. We offer our deepest appreciation to all the foregoing for their excellent and rapid technical assistance.

Mr. Glenard Helm of Robinson, Illinois, also very kindly procured for us specimens of present day mussel speci from the Wabash River in the vicinity of the Riverton Site, and provided many deeply appreciated courtesies that made ou field work more pleasant.

We also wish to thank the crew members of the 1963 season: Mrs. Barbara White, Mrs. Louise Storts, Miss Merrile Ryder, Miss Janice Eghn, Mr. James Gallagher, Mr. Gregory Helm, and Mr. Dwight New.

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We wish to thank the Princeton University Press for permission to quote from articles by Paul S. Martin and Peter Mehringer, David G. Frey, and Philip W. Smith published in *The Quartenary of the United States* edited by H. E. Wrigh Jr., and David G. Frey.

We also wish to thank John Wiley and Son, Inc., for permission to quote a paragraph from William D. Thornbury *Regional Geomorphology of the United States.*

Our special thanks go to Mr. Denzil Stephens who through his knowledge of the Wabash Valley, enthusiasm for th work at the Riverton Culture sites, and constant assistance made the solution of our problems so much easier.

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Both Dr. Robert Hall and Miss Gail Schroeder of the Illinois State Museum deserve special mention for the painstaking reading and editing of plate captions, tables, and bibliography.

All the foregoing who have given aid must, of course, be absolved from responsibility for any errors, either substantiv or interpretative, within the text of the report.

H.D.W.

April, 1967

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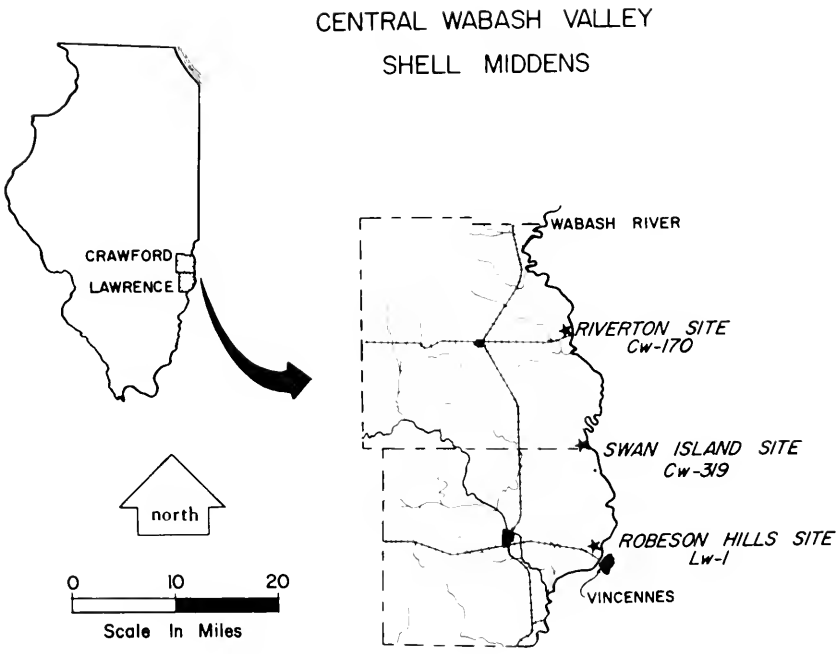


Fig. 1. Location of shell middens in the Central Wabash Valley.

# CHAPTER I

## The Environmental Setting

### GEOLOGICAL AND GEOGRAPHIC CONSIDERATIONS

According to Cox (1923) the superficial land forms in Clark, Crawford and Lawrence counties, Illinois, the area in which the shell middens and camps of the Riverton Culture are contained, are the products of Pleistocene glacial events. The Shelbyville moraine (Frye, Willman, and Black, 1965: Fig. 7), the terminal point of the Wisconsin Stage, lies only twenty miles north of the northernmost known camp of the Riverton Culture on Mill Creek in Clark County, while the border of the Illinoisan advance (Frye, Willman, and Black, 1965: Fig. 4), lies some fifty miles south of the southernmost camp on the Embarrass River in Lawrence County. The unconsolidated clays, silt, sand, and gravel mantling the area are part of the Illinoisan till, which in turn overlies the McLeansboro formation of the Pennsylvania series (Cox, 1923). In the uplands of Lawrence County, the mantle covers the McLeansboro formation to depths ranging from 0 to 36 feet, while in the lowlands of the Wabash, the glacial deposits range in depth from 60 to 176 feet. Small tributaries of the Wabash and Embarrass which were not carrying glacial gravels and silts, are filled to much shallower depths, and were, in fact, ponded by the build-up of gravels in the main river valley, thus accounting for the very broad, flat valleys of these tributary streams. These valley gravels were an important source of chert and river pebbles for the prehistoric inhabitants of the area.

There are also other features of the terrain that are attributable to events of the glacial period. For example, deep loess drifts are piled against the low western edge of the valley (Poggi, 1934: Fig. 2). Sand dunes and loess deposits also cap the high bluffs on the eastern side of the valley, with these features attributed to wind deposition during the Illinoisan and Wisconsin glaciations (McBeth, 1916). Other sand dunes are found within the valley proper as exemplified in the Sand Barrens south of the Embarrass River.

Other prominent features of the valley resulting from the action of glacial melt waters are the isolated hill masses which rise some hundred feet above the present valley floor. Underlying these hill areas are the sandstones and shales of the Pennsylvanian Series, which are in turn capped by clays formed from the decomposing sandstone and by wind blown loess and sand. Examples of these aggraded uplands would include the Dogtown Hills (Neumann and Fowler, 1952) and the Robeson Hills (Winters, 1967), both of which were isolated from adjacent uplands by the Wabash River as it shifted its channels sequentially from the west side of the valley to the east side. All of these erosional remnants are quite steep sided.

Thornbury (1965: 231-32) states of the valley in general that, "The present route of the Wabash River came into existence during the Tazewell and Cary subages. The major topographic features along the Wabash Valley, such as the gravel terraces, dunes, loess bluffs, areas of miniature scabland, and partially exhumed Silurian bioherms owe their development to glacial meltwaters flowing away from the receding ice front or to the overflow waters from Lake Maumee. . . .The lower Wabash Valley rivals the Illinois Valley in width, being in places as much as 15 miles wide, but the new part of the valley is much narrower and has along it numerous exposures of bedrock where in its postglacial downcutting the river has encountered buried bedrock ridges and upland tracts."

Two terraces, in addition to the T-O, are clearly discernible in the area of the central Wabash occupied by the Riverton Culture. Two interpretations have been advanced to explain the origins of these terraces, the uppermost of which has been termed the Shelbyville terrace and the lower, the Maumee terrace. The first interpretation, which has been advocated by Fidlar (1948), Wayne and Thornbury (1951), and Thornbury (1950, 1958) and which is apparently accepted by Hunter (1966), attributes the terrace formation to events beginning in Tazewell and early Cary times when glacial fill was deposited in the Wabash sluiceway. As summarized by Thornbury (1958: 465-67), the theory postulates that the Taxewell-Cary deposits were subsequently trenched by the torrent of glacial melt water flowing from Lake Maumee, the latter torrent being relatively clear since Lake Maumee acted as a settling basin. About twenty-five to thirty feet of the Tazewell-Cary deposits were removed to produce the present T-2 or Shelbyville (75 foot) terrace. Following the draining of Lake Maumee, the cutting of a new flood plain (the present T-O) into the Maumee erosion surface in late glacial and recent times created the present T-1 or Maumee (20 foot) terrace. From our own observations, the relative recency of the present T-1 is attested by the generally undissected surface and lack of erosion of the edges of the terrace, much of which is composed of very loose, sandy fill.

An alternative theory of terrace formation would equate them with climatic episodes. Thus, the Shelbyville terrace would represent valley filling during the Tazewell substage, with trenching and partial removal of the fill

during the Brady interstadial. Filling of the sluiceway would have occurred again during the Cary substage, but without the fill reaching the same elevation as that of the preceding Tazewell fill. The Maumee terrace would have been the result of dissection of the Cary valley train.

Thornbury (1958: 466) does not think that either interpretation has been established beyond doubt, but apparently thinks that the climatic interpretation is the weaker of the two, since, "examination of many exposures of outwash sands and gravels along the Wabash sluiceway has failed to produce evidence that there are two gravel fills in the valley." Furthermore he points out that in valleys such as that of the Eel River in northern Indiana where an episode comparable to the Maumee torrent is missing, there is only one terrace and no terrace corresponding to the Maumee. Thus, the theory stressing the importance of the Maumee torrent as a factor in terrace formation has at least some positive evidence in its favor, while the climatic theory is more notable for negative evidence.

For our present purposes, we shall accept the first interpretation, namely, that the present T-1 and T-2 can be explained on the basis of a single valley fill of Tazewell substage, subsequent dissection of the fill by the Lake Maumee torrent, and more recent dissection of the Maumee erosion surface by the Wabash River in late glacial and post-glacial times.

During the most recent period of dissection, the sea level has changed from a much lower level to approximately its present stand within the last four to six thousand years (Shepard, 1964). At the present time, the valley is in an aggrading cycle, since the present surface of the T-0 lies two feet above the bottom of the midden at the Riverton Site. It is not known when the aggrading cycle began or how rapid the deposition of silts at Riverton has been, but the silts would have had to have been deposited after 1370 B.C., a radiocarbon date on charcoal from near the base of the midden. There is also evidence of aggrading in the valley of Prairie Creek, a tributary entering the Wabash some twenty miles north of the Riverton Site. Wood collected by Wayne and Weir in the Prairie Creek Valley was covered by five feet of sediments and was dated at 2808 ± 250 B.C. by the U.S. Geological Survey (Rubin and Alexander, 1960), providing a *terminus post quem* for the cutting cycle. Much of the deposition may even be quite recent, however, with the silts derived from the erosion of plowed fields.

While glacial events give specific detail to the Wabash area, the region must also be interpreted in terms of larger physiographic relationships. All of the major Riverton Culture middens are found near the northern extremity of the Mt. Vernon Hill Country, a sub-division of the Central Lowland Province. A few Riverton camps occur in adjacent areas of the Springfield Plains, another sub-division of the aforementioned province. In the central Wabash Valley, the Mt. Vernon Hill Country is typified by low, rolling uplands, with wide valleys separating the low hill areas (Cox, 1923). But only 5 to 15% of the land in the area occupied by the Riverton Culture would be classified as broken or hilly (Poggi, 1934: Fig. 8), with the relief provided mainly by the mantling of the uneven underlying rock by the Illinoisan drift.

Our earlier reference in this section to the establishing of sea levels near or at that of present day sea level serves to focus attention on one of the factors that may have been critical in leading to the appearance of the "shell midden cultures" (Eva, Lauderdale, Indian Knoll, Riverton, and still undefined manifestations) in the Midcontinent area of the eastern United States. Although mussels had been a part of the diet of the inhabitants of such sites as Modoc for several thousand years, reaching a maximum for the latter site in the levels associated with the phase of Local Adaptation (Fowler, 1959) which is dated from around 7000 to 3500 B.C., the quantitative listing of mussels in Table 8 scarcely identifies mussels as a massive or basic component of the diet of any of the occupants of Modoc, either during the phase of Local Adaptation, the preceding initial Archaic phase, or the subsequent phase of Specialized Adaptation. After 3000 B.C., however, the intensive utilization of mussels does become a characteristic feature of many sites in the Wabash, Ohio, Green River, and Tennessee Valleys. Possibly, the pattern is even more widespread, since Caldwell (1958) remarks that the Old Quartz component at the Lake Springs Site on the Savannah River in Georgia is not associated with shell deposits, while the stratigraphically overlying component of a Stallings Island type of Archaic culture does have shell in association. Caldwell equates Stallings Island Archaic with shell mound cultures of Kentucky and northern Alabama in time, thus indicating that there may have been a roughly contemporaneous shift to the intensive utilization of shellfish in portions of the Savannah River Valley. Williams and Stoltman (1965) also assign the beginnings of shellfish utilization in the Southeast to Period II (Regional Variants) of their Meso-Indian Era, with the dating for Period II covering a range from 5000 to 3000 B.C. (Some of their Period II cultures, such as the Indian Knoll Culture and the later components at Eva, might better be assigned to their Period III, which they term Late Shell Mound Archaic.)

Before proceeding to outline the essentials of the present hypothesis, it might be well to consider alternative hypotheses that have been advanced to explain fluctuations in the utilization of shell fish in prehistoric sites in Eastern North America. Ritchie (1965), in noting the rarity of mussel shells in middens of the Lamoka Culture, ponders the possibility of food taboos or neglect because of availability and superiority of alternative food sources, but rejects these explanations since, "It seems more reasonable to suppose that, in common with certain other early eastern Archaic folk, they had not yet learned the esculency of such food." Along with Ritchie, we reject the first two suggestions since there is a consistent, although meagre, utilization of mussels over several millenia at Modoc, thus casting doubt on the universality of food taboos among the diverse cultures of the Archaic Pattern. The substitute that led to the ignoring of a desirable resource, such as mussel, because of its availability and superiority does not seem readily apparent.

But we must also ponder the general applicability of the "esculency theory" in eastern North America, although granting that it may have localized significance. While the eastern Archaic peoples may have gone through a stage of debating the suitability of mussels as a major food resource, with the few shells in the Lamoka middens representing an experimental approach, such a process hardly seems likely for the Midwest in general. Although intensive exploitation of mussels may have begun as early as 5000 B.C. at Eva in Tennessee (Lewis and Lewis, 1961), at such sites as Carlson Annis and Indian Knoll of the Indian Knoll Culture, most of the dates point to the third millenium as the earliest period of massive utilization of shellfish (Johnson, 1951; Libby, 1952). Since sites of the Green River Valley also have Archaic materials which should date as early as 7000 or 8000 B.C., to say nothing of the Paleo-Indian occupations at some of the sites, we would have to assume a protracted period of several millenia of indecision before Midwestern inhabitants perceived the desirability of mussels as a basic food item.

A second theory based upon environmental factors has been advanced by Lewis and Lewis (1961) to explain the intensive utilization of mussels at Eva as early as the Eva Phase, their increase in importance during the Three Mile Phase, and the absence of this item in the uppermost zone, which is assigned to the Big Sandy Phase. Essentially, their argument is that the considerable increase in shell fish during the Three Mile Phase may have been the result of adjustments to unstated environmental factors (Lewis and Lewis, 1961:20), which we suppose might imply a reference to the onset of the Hypsithermal. During the Hypsithermal (Altithermal), decreased rainfall led to lower river levels, hence more favorable conditions for mussel propagation and greater accessibility of the mussels. With the end of the Hypsithermal, increasing rainfall led to a rise of river levels, decreased accessibility, drowning of the mussel beds, increased silt loads in the river, and disappearance of the resource. As a partial analogy, they cite the dramatic disappearance of sizeable historic mussel beds following the damming of the Tennessee Valley in recent decades, and also point out that there are zones in Alabama shell mounds which have only sparse shells and that these zones may be contemporaneous with the Big Sandy Phase.

For several reasons, we are somewhat dubious of the foregoing argument:

1) It is increasingly doubtful that the Hypsithermal was marked in the Midwest by drastic changes in rainfall. Smith (1965: 634-35) in summarizing views on climatic conditions during the Hypsithermal states that, "Opinion varies widely on the magnitude of these events (Climatic and phytogeographic sequences of the Climatic optimum and Xerothermic Interval), embracing at one extreme, the view that 6,000 years ago the Midwest was semi-desert and, at the other extreme, a denial that the climate was any warmer than it is today. Perhaps the most dramatic illustration of the uncertainty of the sequences for the continent as a whole are Martin's (1963a) reference to the warm period as the most important event in postglacial history and his assertion that he finds in the Southwest no evidence for a climate warmer and drier than that of the present. . . .Although some recent studies. . .threaten the Xerothermic hypothesis, a vast and overwhelming amount of evidence has been assembled to support it, and it provides, for the present time, the best answers to many of the biogeographic questions that face the American student. Nevertheless, it is merely hypothesis, and a growing body of evidence casts doubt that the Xerothermic was any more arid than the present and perhaps less so than the early postglacial." To add further confusion to the problem of interpreting the Hypsithermal, Martin and Mehringer (1965) present an interpretation suggesting that along the Mexican border, the Altithermal may actually have been marked by greater precipitation than today as a result of the influence of the Mexican monsoon. While data from the Mexican border may not be directly relevant to the problem of climate in Midcontinent North America, they do point to the very complex nature of the Hypsithermal and the dangers of extrapolating local sequences over large areas.

But in general it would seem doubtful that marked changes in river depths can be postulated for either the critical period of the Xerothermic (ca. 4000 to 2000 B.C.) or for subsequent millenia.

2) The catastrophism attendant upon the creation of the historic lakes in the Tennessee Valley can hardly be assumed to provide a direct parallel to prehistoric events in that area. One might better expect a gradual change over a number of centuries in the course of climatic fluctuation, hence a gradual relocation of the loci of mussel beds rather than their catastrophic and immediate annihilation.

3) The absence of mussels from the uppermost level of the Eva Site is not necessarily evidence that this food was not an important factor at the site during the Big Sandy Phase. We had concluded that mussels were missing from the upper two feet of sites of the Riverton Culture, but more careful checking revealed that the seeming absence was the result of some two thousand years of leaching, and that evidence for mussels had to be deducted from the small fragments that represented their residues. The stratigraphic positions of the Big Sandy Phase and the upper midden levels of the Riverton Culture are identical, the environments similar, and the time during which leaching could have occurred of roughly the same magnitude. The foregoing remarks may also apply to the shift in shell content in the upper zones of at least some of the Alabama sites. Furthermore, before shifts in shell contents of middens can be used to document changes in the availability of the resource, it must also be demonstrated that such shifts are not the result of changes in the settlement system itself, with a concomitant shift in elements of the subsistance base.

4) While both shallow and deep water species were harvested at sites of the Riverton Culture (see Parmalee, Appendix I, infra), shallow water species always predominated. Thus, there seems to have been no drastic alteration of water level in the Wabash Valley between 1500 and 1000 B.C. that would point either to lack of accessibility of shallow and deep water species or to

conditions leading to the drowning of shallow water species.

5) Surveys and excavations have shown that shell middens in the Wabash and Tennessee Valleys have Woodland occupations of considerable magnitude, with some having sizeable Mississippian components. It would seem that in many parts of the Midwest, the harvesting of mussels remained a major subsistence activity long after plant tending and horticulture, or even intensive agriculture, had become major elements of the subsistence pattern.

6) As indicated previously in the chapter, at least in the Wabash Valley there is little evidence for extensive silting during the Medithermal, and as we shall note subsequently in this chapter, silt tolerant species do not seem to increase significantly in the Wabash Valley until long after the onset of the Medithermal.

Thus, while we agree with Lewis and Lewis that intensive mussel collecting made a rather abrupt appearance in the Midcontinent area, we doubt that events of the Hypsithermal provide adequate explanation for the phenomenon or that there was any generalized abandonment of mussel harvesting throughout the area. Granted that there may have been localized declines in the exploitation of mussel beds and a general decrease in dependence on this resource, the causes for such shifts may have to be sought in new cultural configurations that arose from such factors as the introduction of domesticated plants, an event that was certainly under way in the Midwest by around 1000 B.C. (Watson and Yarnell, 1966). Our own surveys in Illinois (Winters, 1967) have shown that there was a general tendency for the smaller river valleys, with their narrow terrace systems, and the upper reaches of the larger river systems such as the Sangamon (Holland, 1965) to have been progressively abandoned by late Archaic or early Woodland times. Perhaps both the shift in land utilization and the intensity of mussel collecting relate to a common set of factors. The sites of the Riverton Culture are located in or close to a narrow, constricted sector of the valley, and these sites show little subsequent use. Shell middens in the lower portion of the valley where there is an extremely broad flood plain, seem to have sizeable Woodland occupations. One might suggest as an hypothesis that prior to the appearance of domesticated plants, site location for cultures relying heavily on shellfish was dictated in considerable part by the location of the mussel beds. After the introduction of domesticated plants, site location became, in part, a function of access to large expanses of land suitable for the growing of crops. If the locus of the mussel beds coincided with the locus of the latter areas, as in the case of the shell middens at the lower end of the valley, then continuous exploitation of the shellfish would be the pattern. If, on the other hand, the loci were widely separated, then one might expect more sporadic utilization of the mussel beds, as in the case of the Riverton Site itself.

But having expressed our doubt that climatic factors are the major determinant in the quantitative expansion of mussels as a food source, although granting that the establishment of a non-glacial climate in eastern North America was a prerequisite, is there any other variable that might have affected the propagation of mussels in post-glacial times?

First of all, we note that while there was some reduction in the number of North American species of nonmarine molluscs during the Pleistocene (Taylor, 1965: Table 4), all of the genera and most of the species of the Pleistocene are in existence today. At the same time, there is very little evidence for the evolution of new nonmarine molluscs during the Pleistocene (Taylor, 1965: 601). Thus nonmarine molluscs have tended to remain much more stable than mammalian species which have had a consistently higher extinction rate. So we can eliminate any sort of rapid evolutionary change as a significant factor, although *Lampsilis ovata* has disappeared from the Wabash Valley and *Plethobasus cicatricosus* is (Parmalee, Appendix I, infra), ". . .now absent in the Wabash River or is extremely rare and of local occurrence." (Of course, many species have disappeared since 1900 as a result of contemporary pollution and silting of the once clear river.) The other species present in the sites of the Riverton Culture were also present in historic times and, in general, they are species according to Parmalee that indicate ". . . .a river environment consisting of a coarse sand and/or gravel, swift current and a normal depth of two to five feet." On the other hand, species such as *Anodonta grandis, Leptodea fragilis*, and *L. laevissima*, which are common in the Wabash today are totally missing from the shell middens. Notably, these species are associated with mud bottoms and quiet or slow-moving water. Furthermore, they are also missing from the Middle Woodland Lowe Site (Allison Culture), the Gamble Site (extensive Middle and Late Woodland components, Gillman and Beeson, 1960) and the Mississippian Orr Site in Hardin County, Illinois. One specimen of *L. fragilis*, out of ca. 1900 valves, was obtained by Parmalee from the Little Chain Site on the Wabash in White County, Illinois, and one broken valve of *Anodonta* from the Equality Salt Springs in Gallatin County, Illinois (Parmalee, personal communication, 1967). The former site contains extensive quantities of Late Woodland Duffy Culture ceramics (Winters, 1967), along with earlier Woodland material, while the latter site has ceramics of both the late Woodland Yankeetown and Mississippian cultures.

It would seem that neither *Anodonta* nor *Leptodea* had appeared in the Wabash Valley much before 800 or 900 A.D., and that, even then, they were exceedingly rare. Of course, the fragility of the shells of *Anodonta* and *Leptodea* might lead to differentials in preservations, but in view of the excellent condition of the shell in the lenses and pits at all three of the Riverton Culture sites, we hardly think that sampling error can be the answer. Nor does selective gathering seem to be the significant factor, since Parmalee says, ". . . .valves of these two thin-shelled groups at several sites. . .along the Illinois and Mississippi rivers. . .are generally rare and amount to only a very small percent of the total number of valves. I suppose it is possible that the Indians may have avoided

using these thin-shelled mussels, but I somehow doubt this as they are fairly large (especially the *Anodonta)* and would certainly provide as much if not more meat than most of the others. I personally feel that they were simply not very common in prehistoric times since, judging from their present habitat requirements, they thrive best in little or no current on a mud bottom. I suspect they have become more numerous since European settlement and the change in the bottom composition of most of our rivers from pure sand and gravel to mud." Perhaps the shift from absent to rare, to common involved two steps: 1) the reduction of current rate in the still generally clear river, permitting the propagation of the two groups in still rare areas typified by mud bottoms, and 2) an explosive expansion of both *Anodonta* and *Leptodea* in historic times when the addition of tons of silt to the river annually made mud bottoms a typical feature of the river system.

What we are proposing, in short, is that there could not have been large mussel beds in interior North America prior to the stabilization of sea level at or near its present level. Prior to this time, while the interior river systems were still in their cutting cycles, one might expect river channels with steep gradients to have prevailed, with general current rates in excess of those most favorable for propagation of the species that are characteristic of the shell middens of the interior. If the date for the Eva Culture is representative, intensive utilization of mussels may have been somewhat earlier in the Mid-South than in areas farther to the north. Perhaps river gradients were stabilized earlier in the unglaciated Mid-South than in the Midwest, where continued uplift by isostatic rebound of land surfaces following the retreat of the Wisconsinian glacial fronts (King, 1965) could have delayed the establishment of the gradients and current rates suitable for the proliferation of the species of mussels that were so important in the Wabash Valley to both the prehistoric inhabitants and to the historic entrepreneurs who developed the thriving button industry of the nineteenth century.

An extension of the present hypothesis to coastal areas, where shell middens also occur, does not seem to be warranted, however. Salwen (1965) has argued convincingly that the presence or absence of marine molluscs in coastal sites may be the result of other than cultural variables. He suggests that earlier shell collecting stations comparable to later specialized components of this type in coastal settlement systems would have been submerged by rising sea levels, and that existing coastal Archaic sites without shell may have been inland components exploiting other subsistence resources at the time of their occupation. Furthermore, variations in proportions of molluscs such as oyster and clam at sites of the Orient Culture can be best interpreted as reflecting differential access to particular categories of marine resources at an earlier time when lowered sea level had resulted in coastal patterns much different from those of today (Salwen, 1962). Hence, while there are grounds for believing that intensive mussel collecting was a relatively late phenomenon for most Archaic cultures in interior North America, one must not assume *a priori* that a similar pattern of mollusc exploitation prevailed in the maritime regions.

One other thought occurs to us at this point. Caldwell (1958) has formulated the now well-known concept of Primary Forest Efficiency, which he posits as a stage in eastern North America typified by a maximum intensity of adaptation to a wooded environment, with the exploitation of the environment based upon hunting and gathering. Perhaps along with the perfection of man's cultural adjustment to the environment, it would be well to consider at the same time the possibility that the adaptation was occurring along with post-glacial changes in the availability of key natural resources. For example, it would be interesting to consider in detail the effects of shifts from stands of northern hardwood to forest dominated by oak, hickory, and other deciduous species in interior North America. Ultimately, it may be desirable to view the elaboration of cultural content characteristic of many late Archaic cultures in eastern North America as the result of both man's increasingly effective utilization of his environment and the appearance of an increasingly bountiful supply of such basic resources as acorns, nuts, and shellfish.

## CLIMATE

As Ridgway (1927) has pointed out, the climate of the Wabash Valley differs considerably from that of adjacent areas of the Midwest. Ridgway found that average temperatures, dates of killing frosts, and precipitation compared very favorably with records from the Middle Potomac Basin, and that for the lower Wabash Valley, "...the alleged 'climatic handicap' is rather insignificant and practically negligible as a factor affecting plant life." Denzil Stephens (personal communication, 1961) also reports that the growing season in the valley proper is from one to two or three weeks longer than that of the adjacent uplands. The factors producing the climatic anomalies of the Wabash Valley are undoubtedly very complex, but the heavy fringe of protective forest along the valley sides and the heat retaining qualities of the dark, siliceous soil may be among them. But certainly, the climate of the area is an important determinant of the floral and faunal peculiarities of the region to be discussed in subsequent sections of this chapter

Rainfall ranges from 30 to in excess of 40 inches for the central Wabash, while snowfall is from 15 to 20 inches (Poggi 1934: Figs. 4 and 20).The river sometimes freezes over in winter, but according to Volney (1804: 148) never for more than a few days or a couple of weeks.

The generally moderate climate and availability of the river throughout the year both for navigation and as a source of food may explain in part the strong cultural ties with and repeated intrusions from the South that have been noted for the lower and central Wabash during much of its prehistoric (and historic) occupation (Winters, 1967). That is, the north to south flowing Wabash forms a continuum with the Tennessee Valley both geographically and climatically.

## FLORA

While the Wabash Valley is placed within the Prairie Peninsula and the Hill Section of the Western Mesophytic Forest by Braun (1950) the lower and central Wabash have such peculiar floral characteristics that these sections are better interpreted as a separate floral area (Deam, 1940). The area within which the Riverton Culture is contained lies towards the northern margin of the "Indiana Pocket," an ecological zone which is typified by numerous plant and several animal species which represent extensions along the Wabash Valley of southern populations. These species generally are not found in adjacent areas of the Midwest. For example, Deam (1940: 18) lists a number of species of the lower Wabash Valley as belonging "to the flora of the Mississippi Valley and (finding) their northeastern limit in this area." And Ridgway (1927) lists 216 ligneous plants and 691 herbaceous plants for Richland County, Illinois, which lies immediately west of Lawrence County and is within the range of the Pocket. Thirty-eight of the ligneous plants, or 18%, and seventy-three of the herbaceous plants, or 11%, are stated by Ridgway (1927: 114) as being of southern range, i.e., species, "whose mass distribution is distinctly in the direction. . . ." (of the south). Eaton's (1931) list of ligneous plants for Lawrence County closely parallels that for Richland County, so that the previous percentages would be approximately correct for at least the southern portion of the zone occupied by the Riverton Culture.

Among the plants of southern range in the Wabash are the wooly pipe vine *(Aristolochia tomentosa)*, water violet *(Hottonia inflata)*, pinkroot *(Spigelia marilandica)*, the American mistletoe, *(Phoradendron flavescens)*, the possumhaw *Ilex decidua)*, the cypress *(Taxodium distichum)*, pecan *(Carya pecan)*, southern cane *(Arundinaria gigantea)*, overcup oak *(Quercus lyrata)*, Spanish oak *(Quercus flacata)*, Mississippi hackberry *(Celtis laevigata)*, the red maple *(Acer rubrum var Drumondii)*, waterlocust *(Gleditsia aquatica)*, Texas honeylocust *(Gleditsia texana)*, and *Forestiera* (Deam, 1940; Adams, 1949).

The Wabash drainage was very heavily forested in historic times, with one of the largest stands of hardwood in eastern North America along the Embarrass River. There were also extensions of the Prairie Peninsula along the central Wabash (Poggi, 1934: Fig. 5), with the upper Wabash being entirely within that botanical province, and smaller, isolated prairies were interspersed among the forests, becoming both smaller and more widely separated towards the southern portions of the valley. In the area of the Riverton Culture, the principal prairie zones were Oblong and La Motte prairies in Crawford County and Allison Prairie in Lawrence County. While these prairies were fairly extensive, Ridgway (1927) states that for Richland County, from one-half to two-thirds of the land was covered by timber, and these figures are probably suitable for Lawrence and Crawford counties, with perhaps somewhat higher percentages of prairies in Crawford County.

Worthen (1875: 22,30,43) writing in the nineteenth century describes the plant cover of Lawrence and Crawford counties as follows:

[Lawrence County] East of Lawrenceville, and lying between the Embarrass and Wabash rivers, there is an extensive marsh from two to four miles in width and about ten miles in length, called Purgatory Swamp. Surrounding this on the east and north, there is a considerable area of bottom prairie, the upper or northern portion being known as Allison's prairie, and the lower portion as the Russelville prairie. In addition to this there are some small prairies in the southern, and also in the northwestern portion of the county, but the greater portion of its area was originally covered with a heavy growth of timber.

The Wabash and Embarrass rivers are skirted with broad alluvial bottoms and level table lands, ranging from two to four miles in width. Some portions of the latter are quite sandy, and constitute the terrace prairies between the Purgatory swamp and the Wabash. The bottoms along the Embarrass are heavily timbered with all the common varieties of oak, hickory, ash, elm, maple, black and white walnut, coffeenut, persimmon, cottonwood, sycamore, hackberry, red birch, honeylocust, wild cherry, black gum, dogwood, etc. The uplands are generally rolling, and were originally covered with a heavy growth of timber, though much of the surface has been cleared. . .since the first settlement of the county. . . .There are some small upland prairies along the western borders of the county, the soil of which does not differ very much from that of the timbered lands adjacent.

[Crawford County] Located on the western side of the Wabash, and traversed by several small streams tributary thereto, the surface is generally rolling, and was originally mostly covered with timber. . . .The prairies are generally small, and are for the most part rolling, and are mainly confined to the northern and western portions of the county, and to the bottom and terrace lands adjacent to the Wabash river.

From Hutsonville south, there is a belt of alluvial bottom and terrace land, from one to three miles in width, extending to the mouth of La Motte creek, a distance of about ten miles. This is mostly prairie, and the soil is a deep, sandy loam. . . . The upland prairies have a chocolate-colored soil. . . . On the timbered lands the soil is somewhat variable. . . . The varieties of timber observed in this county were the common species of oak and hickory, black and white walnut,white and sugar maple, slippery and red elm, honey locust, linden, hackberry, ash, red birch, cottonwood, sycamore, coffee nut, black gum, pecan, persimmon, paw-paw, red thorn, crab apple, wild plum, sassafras, red bud, dog-wood, iron-wood.

Fortunately, we also have excellent 18th and early 19th century descriptions of the Wabash before the alterations effected by agriculture and timbering. Croghan's journal (1916) provides descriptions of the Wabash country from the mouth to the prairie areas, and this document can be supplemented by a memoir of 1718 (Anonymous, 1955) and Volney's (1804) observations, to cite only a few. We insert appropriate selections from the preceding authors at this point, with the citations from Croghan's journal

designed to give a general picture of the changes in flora as one progressed from the lower to the upper Wabash in 1765, the 1718 memoir to provide further information on the great prairies of the upper Wabash, and the Volney account to furnish detail for the Vincennes area where many sites of the Riverton Culture occur.

### George Croghan's Journal for 1765

[After leaving the mouth of the Wabash on the way to Vincennes] 8th June... Our Course was thro a thick Woody Country crossing a great many Swamps, Morasses and Beaver Ponds we traveled this Day about 42 miles.

9th An hour before Day we sett out on our March passed thro thick Woods some high lands and small Savannahs badly watered traveled this Day about 30 miles.

10th We sett out very early in the Morning and march thro a high Country extremely well timbered for three hours. Then came to a Branch of the Cuabache which we crossed the remainder of this Day we traveled thro fine rich Bottoms overgrown with Reeds which make the finest Pasture in the World. The young reeds being preferable to Sheaft Oats here is great plenty of Wild game of all kind Came this Day about 28 or 30 Miles.

11th at Day Break we set off making our way thro a thick Woodland intercepted with Savannahs.. . . .

13th About an Hour before Day we set out traveling thro such Bottoms as of Yesterday and some large Meadows where no Trees for several Miles are to be seen: Buffaloes Deers and Bears are here in great Plenty we traveled about 26 Miles this Day.

14th The country we traveled thro this Day appears the Same as described Yesterday excepting this afternoon Journey thro Woodlands to cut of a Bend of the River Came about 27 Miles this Day.

15th We set out very earley and about one o Clock came to the Caubache within 6 or 7 miles of Post Vincent [present-day Vincennes]....the East Side of this River being one of the finest Situations that can be found the Country is level and clear and the Soil very rich producing Wheat and Tobacco....Post Vincent is a place of great consequence for Trade being a fine hunting Country all along the Cuabache....

17th about Midday we set out travelling the first five Miles thro a fine clear wood. we traveled 18 miles this Day and encamped in a large beautiful well watered meadow.

18th and 19th we traveled thro a prodigious large Meadow called the Pyankeshas hunting ground here is no wood to be seen and the Country appears like an Ocean the groud is exceedingly rich and partly over grown with wild Hemp: The Land well watered and full of Buffuloes Deer Bears and all Kinds of Wild Game.

20th and 21st We passed thro some very large Meadows part of which belong to the Pyankeshaws on Vermilion River the Country and Soil much the same as that we travelled over for these Days' past wild Hemp grows here in Abundance the Game very Plenty at any time in Halfe an Hour we could Kill as much as we wanted.

22nd We passed thro' a part of the same Meadows as mentioned yesterday then came to a High Woodland and arrived at Vermillion River so called from a Fine red Earth found here by the Indians with which they paint themselves About halfe a Mile from the place we crossed this River there is a Village of Pyankeshaws....We travelled then about three Hours thro a fine clear high woody Country but a deep and rich soil then came to a large Meadow where we encamped.

23rd Earley in the Morning we sett out thro a fine Meadow then some clear woods in the afternoon came into a very large Bottom on the Cyabache within about 6 miles of Ouiatanon....the Distance from Post Vincent to Ouiatanon is 210 Miles this Place is situated on the Cuabache....On the South Side of the Cuabache runs a High Bank in which are Several fine Coal Mines and behind this bank is a very Fine Meadow clear for several Miles. It is surprising what False information we have respecting this Country some mention this Spacious and beautiful Meadows as large and barren Savannahs....These Meadows bear fine Wild Grass and wild Hemp 10 or 12 Feet High....

### Volney's Account

The country from the Ombra, about seven miles and a half from the Fort (Vincents or Poste Vincennes) is no longer a continuous forest, but a Tartarian meadow, interspersed here and there with little clumps of trees, flat, naked, windy, and cold in winter. In summer it is decked with high strong plants, which so rub against the rider's legs in the narrow path, through which he must travel, that the journey out and home will wear out a pair of boots. Water is very scarce....Thunderstorms, rain, flies, and horseflies are extremely troublesome in summer. Five years ago you could not cross these meadows without seeing herds of four or five hundred buffaloes; but now there are none. Annoyed by hunters, and still more by the bells of the American cows, they have gone to the other side of the Mississippi, swimming across the river [378].

Volney also notes [368] of the Vincennes area itself, that it is "...an irregular savannah, about eight miles long and nearly three broad, skirted on all sides by eternal forests and sprinkled with a few trees and an abundance of umbelliferous plants three or four feet high...."

### Memoir of 1718

"The river Wabash is the one of which the Outatanon are settled. They are five villages....who speak like the Miami....They have a custom that all the other nations do not have, which is to keep their fort very clean, not allowing a single plant. The entire fort is sanded as in the Tuileries....Their village is situated on a great elevation and has more than two leagues of open ground where they raise their maize, grounds, and melons. And from this elevation as far as one can see there are only prairies which are filled with buffalo." (Anonymous, 1955)

* * *

The question remains, of course, whether such conditions prevailed at the end of the second millenium B.C. That is, was the balance between prairie and forest about the same, and were the same plants present? We cannot

contribute appreciably to the answering of the second question, since from our excavations only pecan, walnut, hickory nut, hazel nut, butternut, and acorn have been identified.

For an answer to the first part of the question, we shall have to begin by considering the problem of the origin of the prairies themselves. There are two basic schools of thought on this problem: the ecological determinism of botanists and climatologists and some anthropologists (Gleason, 1922; Poggi, 1934; Weaver, 1954, Wedel, 1957) and the cultural determinism of some botanists, geographers and anthropologists (Sauer, 1927, 1950, Stewart, 1951, 1953, 1954, Wells, 1965). The former see the prairies as having a Tertiary origin as the result of the uplift of the Western Cordillera which led to changes in a set of variables, including temperature, wind, humidity, rainfall, and topography. These are then reduced to two major factors, evaporation and rainfall (Poggi, 1934). The pyrogenic theory of Sauer and Stewart, on the other hand, would attribute prairies to the cultural activities of the Indians and other people of the world. That is, they see the practice of burning ground cover for purposes ranging from hunting drives, to slash and burn agriculture, to mosquito abatement as the major determinant in explaining the appearance of prairies, the wooded areas having been destroyed and replaced by grasslands.

In support of the position of Sauer and Stewart there is abundant evidence from historic travel accounts (Stewart, 1951). Gentilcore (1957), for example, quotes Jared Mansfield's description of the prairies along the Wabash in Knox County, Indiana, and his statement that the prairies are fired every year, resulting in the total destruction of every growing thing. And Sauer (1927) cites examples from the Kentucky Pennyroyal that show that wooded vegetation rapidly encroached on the grasslands once the Indians stopped burning the area in their hunting drives. And these observations can be supplemented by observations in other areas of the Midwest.

More recently fire has also been suggested by Wells (1965) as a factor contributing to the present distribution patterns of grassland and nonriparian woodlands on escarpments and other topographic breaks. Wells denies that the climate of the Great Plains corresponds to a grassland or steppe climate, with precipitation and evapotranspiration constituting sufficient factors to explain the present limited occurrences of woodlands. Rather, he feels that grasslands are a comparatively recent phenomenon resulting from a combination of flat, unbroken topography, drouth conditions, high winds, and periodic devastating fires, all of which combine to discourage extensive stands of woodlands. In supporting his position, he cites a number of lines of evidence. For example, he indicates that the evidence for Tertiary grasslands is not entirely satisfactory, there being evidence for a Miocene flora containing leaves, fruits, and pollen from various trees, and that Miocene-Phocene deposits in the High Plains have quantities of hackberry along with fossil fruits of grasses. He also cites a number of recent pollen profiles from lake and marsh sediments that show high percentages of arboreal pollen in contrast to nonarboreal pollen, with the dating of these profiles ranging from a late Pleistocene age of some 17,000 years B.P. to around 5000 years B.P. Finally, Wells notes the success of local and even exotic species in recently planted woodlands such as the Nebraska National Forest.

While not dwelling on it, Wells points out that the incidence of fire as a contributory factor has been affected by the variable of man for at least the past 11,000 years. But in many respects, Wells' position parallels the conclusions of both Sauer and Stewart on the recency of the grasslands and the agency of man as an effective factor in the creation of the grasslands through his association with fire.

Davis (1965), in reviewing the literature and opinions relevant to the effect of man on the extent of forestation and the species represented within the forest areas in the Northeastern United States, reaches no firm conclusion about the effect of fire for this area. She points out that the same reports by early travelers of open stands of timber on the Maine coast and in the Mohawk Valley in New York can be used to support either the contention that fire was important as an ecological factor in the Northeast, with the open stands being the end product of repetitive burning by Indian inhabitants, or the position that such areas are simply the natural climatic and edaphic climax. Davis concludes that the controversy for this area can be resolved only by future studies of the fossil plant record.

Cushing (1965) comments in passing on theories concerned with the origins of the Prairie Peninsula, and states that although many of Gleason's premises remain untested, there is little reason for doubting that there was an expansion of the prairie peninsula into Indiana and Ohio during mid-postglacial times, and that the importance of fire in pushing back and maintaining the forest border is recognized. Cushing seems, then, to regard fire as one of the variables to be considered in connection with the expansion and maintenance of prairie areas, but he also cites the climatic interpretations of Transeau (1935) and Borchert (1950), the latter author having proposed on the basis of a model of the strength of mean westerly atmospheric circulation that climatic changes favored both a postglacial expansion of grassland towards the east and an increased frequency of fire. Cushing seems to accept both climatic factors and fire as elements basic to the interpretation of post-glacial prairies.

But ultimately we are forced to disagree with the interpretations of the foregoing authors and to accept the conclusions of Wedel and other proponents of the ecological school. Wedel provides a wealth of data, drawing on the record of buried Pleistocene soil profiles; examination of the evidence for reputed relict communities in the light of habitat requirements and the available historic record, the success, or lack thereof, of tree plantings nurtured and protected by man in the twentieth century, evaluation of the evidence for the encroachment of the forest upon the prairie with the cessation of burning; and climatological factors as they relate to the fringes of the prairie area and the prairie area proper. The

sum total of his evidence indicates that there may be local encroachment of the forests on the prairies in zones that are climatologically transitional between those of established woodland and permanent prairie, but that trees, even when carefully protected by man, disappear rapidly when left as abandoned stands in the latter zone; that there are excellent historic examples throughout the prairie area of the failure of trees to expand onto the prairies with the cessation of burning, and, indeed, records of actual retreats of wooded areas under present conditions; and a record of Pleistocene soil profiles correlating with all the interglacial periods, with those profiles showing the characteristics of present day prairie soils.

In support of Wedel's position, we shall introduce two items of evidence that may be germane to the argument. During the archaeological survey of the Wabash Valley (Winters, 1967), a remarkably consistent correlation was noted between the areas of the historic prairies (La Motte, Allison, and the Sand Barrens) and the lack of occupation of these areas by any prehistoric group from Paleo-Indian through Mississippian times. In all of these prairie zones, there were loci which should have been ideal for camps, hamlets and villages when viewed from the standpoint of topography, water supply, and accessibility.

In the presently or recently wood areas adjacent to these prairies, there are numerous sites, ranging from hunting and gathering camps to sizeable towns and from Paleo-Indian to Mississippian in cultural affiliation. We conclude that the total avoidance of the former areas and the concentrated utilization of the latter zone points to a floral configuration antedating the presence of man in the Wabash Valley, hence, assignment of the prairies to at least the Late Pleistocene in time.

Another line of evidence, less conclusive, but suggestive, involves the distribution of grooved axes in the State of Ohio. In 1960, during a study by the author of distribution patterns of full grooved and three-quarter grooved, Archaic stone axes, an analysis was made of the extensive collection of axes in the Ohio State Museum through the courtesy of Mr. Raymond Baby. Upon plotting the distribution of axes, a curious correlation was noted. The bulk of the axes were from the forested hill counties of southern and eastern Ohio, with very few from anywhere within the extension of the Prairie Peninsula into Ohio. Thus, there would seem to have been a pattern of association of woodworking tools with areas that are known to have been wooded in historic times, and a converse lack of association of these items with unwooded areas, during the time period from the fifth millenium to at least the first millenium B.C. Of course, it could be proposed that the distribution patterns reflect different techniques of tree felling, such as girdling as opposed to chopping, but we view such a suggestion skeptically, and feel that the burden of proof must be upon those who propose cultural differences as sufficient explanation, rather than a more obvious correlation with the existing floral patterns.

Other recent evidence also tends to cast doubt on the interpretations of the pyrogenic school. At the Domebo Site, a Paleo-Indian mammoth kill in Oklahoma (Leonhardy, 1966), pollen profiles show no major shift from woodland to prairie vegetation in that area of the Great Plains, although there was species replacement of plants within the wooded river valleys as climatic shifts occurred following the recession of the last major ice sheet of the Wisconsin.

Furthermore, Guilday and Tanner (1962) interpret the disappearance of the thirteen-lined ground squirrel (*Citellus tridecemlineatus*) from Pennsylvania, where it occurred in Pleistocene context some 12,000 years ago, as evidence of a shift from a treeless or parklike environment to decidious hardwood forest in that region. Such an interpretation, if generally applicable to the eastern fringes of the Midwest, would point to reforestation at a time when man was increasingly utilizing the area in post-Pleistocene times. Hence, for this area at least, the correlation would seem to be that the greater the utilization of the region by man, the greater the tree cover, without implying in any way that the one was dependent directly upon the other.

Other authorities in their analyses of Pleistocene and post-Pleistocene faunal remains also accept a Tertiary origin of the prairies. For example, Blair (1965) uses the interposition of arid grasslands of Tertiary origin to explain the dicentric distribution pattern of salamandrid and ambystomatid species along the west coast and in eastern North America. At the same time Blair accepts fluctuations in grass and tree cover and feels that the central United States may have been heavily forested during pluvial periods of the Pleistocene. In part, the latter conclusion is based on data from the Llano Estacado of western Texas and eastern New Mexico (Wendorf, 1961) and other parts of the Southwest (Martin, 1963a, 1963b). These sources do present evidence for a shift from open boreal woodlands to the contemporary arid short-grasslands. While not cited by Blair (1965), Wells and Jorgensen (1964) also present evidence for the Late Pleistocene of the presence of twigs and seeds of juniper in the middens of wood rat in the Mohave desert in southern Nevada, thus leading them to infer late Pleistocene changes in climate and in distribution of wood rat and juniper woodland.

Auffenberg and Milstead (1965) also accept alternating extensions of forests and grasslands (and attendant mesic and xeric conditions) in the Great Plains area as factors leading to the Pliocene, Pleistocene, and post-Pleistocene distribution patterns of such reptiles as box turtle. However, Auffenberg and Milstead (1965) point out that there is considerable disagreement about the extent of forestation during pluvial periods, with Blair taking an extreme position in respect to heavy reforestation during such intervals.

In a more recent publication of Martin's than those cited by Blair, Martin and Mehringer (1965) stress the difficulties in establishing correlations between continental glaciations and Southwestern pollen stratigraphy during the Early and Middle Pleistocene, citing among other items the Clisby and Sears 300 meter core from the San Augustin Plains. While an invasion of the currently arid

San Augustin Plains by spruce and other boreal conifers is evident in the section of the core correlating with the Wisconsin Stage, there is a surprising lack of evidence for previous boreal invasions that could be associated with pre-Wisconsin glacials. But as the authors caution, there is need for many more samples because of the, "... formidable regional variations in climate, vegetation, and therefore in local pollen rain. . . ." (Martin and Mehringer, 1965: 434). The present evidence, however, would seem to cast considerable doubt on extensive reforestation during earlier pluvials.

Finally, in the course of summarizing data on invertebrates in his essay on biogeography, Frey (1965: 621) states, "The record of molluscs for this region (Great Plains) indicates that climatic conditions gradually deteriorated after Miocene time, resulting at the end of the Pliocene in conditions probably more adverse to plants and animals than at any other time in the Cenozoic. . . Brachiate snails, which require permanent surface water, were absent. The snails that were present are kinds that can withstand long periods of desiccation.

At the beginning of the Pleistocene there was a marked climatic improvement, culminating in Kansan time. Brachiate snails reappeared, and there was a considerable increase in the total gastropod fauna. The terrestrial gastropods indicate a dominant prairie vegetation, with belts of trees and shrubs along the valleys. The large helicine gastropods that flourish in the deciduous forests a few hundred kilometers to the east of the Great Plains are not present, however, suggesting that at no time in the Quaternary were the southern plains forested.

In post-Kansan time the climate again deteriorated, until today it is considered to be almost as extreme as at the end of the Pliocene."

In retrospect, we feel that the authors who see the prairies as the result of man and fire have been overly eclectic in the selection of data. The papers of Sauer and Stewart offer voluminous records of man's utilization of fire, but largely ignore data derived from other lines of evidence. Wells, while offering data of considerable interest, from the fields of palynology and paleontology, also fails to consider adequately all lines of evidence in reaching his conclusions. For example, of the some fifty references cited by Wedel, Wells lists only ten, or 20%, thus omitting the work of a considerable number of authors whose data would have been damaging to his conclusions, including Wedel's 1957 paper, an item which can scarcely be ignored in such a discussion. Of course, in all fairness, it should be pointed out that some of these references were not directly relevant to the thesis being advanced, and that Wells did not list works which would have supported his position, such as those of Stewart, although citing the publications of Sauer.

In particular, we should fault Wells on his failure to consider all the evidence presented by Wedel in respect to the interpretation of artificially nurtured stands of trees, the extension of pollen profiles from Pleistocene and post-Pleistocene lakes and marshes associated with pluvial conditions to generalization about the Plains in general, without even raising the possibility of variation due to local habitat, and the citing of fossil plant records for the Miocene and Phocene, but the failure to consider the evidence for prairie conditions derived from buried Pleistocene soils.

But we should have to agree with the proponents of the "cultural school" to the extent that Indian hunting practices were undoubtedly extending the boundaries of the already extant prairies and preventing the further encroachment of forested zones in the prairie areas.

The mammalian fauna from the Riverton Culture sites certainly suggest extensive wooded areas. As Parmalee (Appendix I) has pointed out, "The predominance of gray squirrel over fox squirrel is indicative of heavy stands of timber with abundant ground cover and brush, as opposed to more open wooded sections." In absolute figures, there were 123 bones of gray squirrel and only 5 of fox squirrel from the three middens, a ratio of approximately 25:1. Parmalee also notes the presence of the snail *Triodopsis obstricta* at the Riverton and Swan Island sites, and states that "this snail is indicative of heavily forested areas with oak, elm, hickory and sycamore being the dominant trees."

As a final point, we shall simply mention that the evolutionary history of the horse, bison, and other grazing animals would be most difficult to explain if the prairie areas of North America had been extensively wooded until recent times. Following Simpson (1951), the transition from browsing forms such as *Parahippus* began early in the Miocene, with grazers such as *Merychippus* appearing later in the Miocene. The appearance of *Hipparion*, *Neohipparion*, *Nannipus*, and *Pliohippus* mark the further expansion of equine grazers during the Pliocene, and *Equus* was firmly established throughout the Pleistocene. Are we to believe that the grazing adaptations were without significance for tens of millions of years in North America, only to become important when widely dispersed bands of Paleo-Indians provided the setting for the long anticipated promised land of the North American horse? Apparently, the miracle must have been so traumatic that *Equus* could not abide the fulfillment of his millenia of waiting for the environment to which he was adapted, and promptly became extinct. Thus, we conclude that the vegetation, and the distribution thereof, were much the same in the second millenium B.C. as they were in historic times.

## FAUNA

As reference to Appendix I will show, a wide variety of mammals, birds, reptiles, fish, and mussels were present among the 26,838 bones recovered from the excavations at the the three sites. Among the mammals, only one, the porcupine, was not widely distributed in the Midwest in historic times (Parmalee, 1961; 1962b; Appendix I). The presence of opossum in all three of the Riverton middens is also somewhat surprising in view of their rarity or absence from the middens of later prehistoric, Midwestern cultures (Parmalee, Appendix I), although this animal was also present in some quantity at Modoc (Parmalee, 1959c).

These two occurrences of opossum may be the result of local conditions, rather than an indication of the general range of the opossum during Archaic times. Guilday (1958) lists Archaic sites from New York and West Virginia which lie within the present range of the opossum, but in which no remains of opossum were recovered. The presence of opossum in sites of the Riverton Culture may reflect no more than its position within the Indiana pocket, and, hence, faunal ties with the mid-South, and it is possible that a similar ecological situation prevails in the area of Modoc. Thus, if Guilday's sample of archaeological sites is adequate, we can suggest tentatively that the opossum was generally missing from areas north of the Ohio River during Archaic times,with isolated exceptions such as Riverton and Modoc, but that by Late Woodland and protohistoric times, the species had spread over a range close to its limits in the north. It should be noted that the opossum has been expanding its range northward during recent decades (Guilday, 1958), so that the archaeological evidence for fluctuations in the range of the opossum would in no way be contradictory in historic evidence for fluctuation in range.

The occurrence of *Lampsilis ovata* and *Plethobasus cicatricosus* (Appendix 1) is also rather surprising, since the former is now unknown north of the Ohio River, and the latter is unknown today even in the Ohio River, although *P. cicatricosus* has been recovered archaeologically at the Angel Mounds in Indiana. Parmalee interprets the presence of these mussels as indicating deep, swiftly flowing water, and a gravel bottom in the Wabash at the time of the occupancy of the three shell middens. Since there are few or no data for later occupations of the valleys, we cannot say whether the disappearance of the two mussels occurred in prehistoric times or whether they were rapidly eliminated in historic times by the addition of tons of silt to the river from farming (however, cf. Faux below). Apparently the general environment of the molluscs varied little between the second millenium B.C. and the 19th century A.D.

So far, among the abundant faunal remains, there has been no trace in the shell middens of such southern fauna as the swamp rabbit, *Sylvilagus aquaticus,* rice rat, *Oryzomys palustris,* spotted skunk, *Spilogale putorius,* Carolina parakeet, *Conuropsis carolinensis,* or the water turkey, *Anhinga anhinga,* all of which are known from historic records of the Wabash (Adams, 1949). But these species would probably have been of little economic importance to the people of the Riverton Culture, and there would be little chance of recovering their remains without a much larger sample from the middens.

## FLOODING

Since the pattern of flooding will be of considerable importance for later interpretations, we shall devote a separate section to this topic. One often hears both from laymen and professionals that the recurrent seasonal floods of today are the result of modern deforestation and agricultural practices, which permit rapid run-off of water. While such recent alterations of land cover may have led to an increase in severity and frequency of flooding, there is considerable evidence that seasonal flooding is a very old phenomenon in the Wabash, antedating any major alterations in land cover of the area. The evidence derives from two sources, archaeological data and historic records.

### Archaeological

Profiles of the eight foot deep midden of the Riverton Site (Cw170) show sequences of alternating midden deposits and flood silts. Thus, there is a record of numerous floods for this T-O site in the last half of the second millenium B.C. (see radiocarbon dates).

### Historic Documents

There are abundant records from the 18th and early 19th centuries of spring or winter floods, at a time when the population of the Wabash Valley was less than two per square mile (Poggi, 1934: Fig. 35) and as we have concluded in a preceding section, it is not likely that the prehistoric populations had altered the balance of forest and prairie to any considerable extent.

In order to show the nature of seasonal flooding, we have selected a series of excerpts from Clark (1912), Hamilton (1951), Gentilcore (1957), Birkbeck (Boewe, 1962), and Faux (1823). These accounts relate to the period from 1779 to 1819, and contain references both to specific floods, the repetitiveness of flooding, and the severity of flooding.

#### Hamilton's Account of 1779

Feb.

7th . . . The River Oubache rose to a great height–

9th . . . The river swelled considerably–

10th . . . The river continues to rise considerably–

12th . . . Lieutenant Chabert . . . reported the riviere embarras overflowed, and the low country entirely drowned–

13th . . . The Oubache continues to rise–

15th . . . The river continues rising–

16th . . . The White river rose very high, & from 250 yards, its common breadth extended to a league– The Ouabache also overflowed its banks, and many head of Cattle were lost by the low land being drowned–

18th . . . The Ouabache was risen so high as to hack the Water of the little river and prevent the Sawmill going– The river opposite the Fort being sounded, the depth was found to be 30 feet which in summer was but 10 in the same place– The Country people who had gone out to relieve their Cattle exposed to the Violence of the Flood in the meadows, brought several in from different distances, some from 20 miles off in their Pirogues– The Waters had risen the last year very high, but not within a foot of the present depth, when near 400 head of Cattle were lost– The South side of the river appears like a lake for two leagues below the fort

19th . . . The River falls a little

20th . . . The River had fallen a foot

21st . . . Rain which keeps up the river

Further observations by Hamilton on the flood stage of the Wabash were apparently terminated under pressure of his duties as commandant of the fort during the attack by George Rogers Clark on February 22nd.

This February flood is unusually early for the Wabash, but apparently the winter had been both warm and rainy, with peach trees reported by Hamilton as budding on the 18th of February.

It should be noted that Hamilton's diary also indicates heavy flooding in 1778.

Another account of the same flood is given by George Rogers Clark (1912) in his account of the capture of Vincennes in 1779.

> . . . the first obstruction of any consequence that I met with was on the 13th. Arriving at the two little Wabachees although three miles asunder they now make but one, the flood water between them being at Least three feet deep, and in many places four: Being near five miles to the opposite Hills, the shallowest place, except about one hundred Yards was three feet.

Gentilcore (1957) contributes further general and specific data:

> At both Vincennes and Kaskaskia, the rise and fall of water provided a constant hazard to activity on the flood plain . . . . Floods were a regular occurrence affecting even the lower parts of the grand terrace. In 1804, for example, the village (Vincennes) was surrounded by water . . . .

And Faux (1823) provides information on seasonal conditions of the river and the flooding of the Wabash and its tributaries:

> October 30th At eleven p.m., I reached Old Vincennes, the first and oldest town in this state, situated in a fine woodless Prairie on the banks of the big Wabash, a fine broad, clear, and generally deep stream, running to the Ohio by Shawneese town, but when its waters are low, weeds rise from the bottom, and grow, and rot, and impregnate the air with pestilence.
>
> November 2nd At noon, I rode through a large river-bottom valley, on the banks of the White River, and which in winter, is yet overflowed, from six to ten feet of water above the surface, as the trees prove by circles round their trunks, and by their boughs dipping and catching the scum of the surf.
>
> November 21st Crossed the Big river (Wabash) into Illinois, after being lost one hour. Started a fine buck, and rode along rich bottom land, ten feet deep of water, in winter, and passed some smoke-dried women and children [sic].
>
> November 24th On the Little Wabash, in one (settlement) of which he (Birkbeck) says Mr. Grant of Chatteris farms a part, very fine rich land, but rather sickly, and during the winter and spring inaccessible, by the overflowings of the Little Wabash, which then becomes five miles wide, imprisoning the settlement.

And finally, there are Birkbeck's remarks (Boewe 1962) about the Little Wabash:

> The Little Wabash, which we crossed in search of some prairies which had been described to us in glowing colors, is a sluggish, scanty stream at this season (summer); but for three months of the latter part of the winter and spring it covers a great space by the overflow of waters collected in its long course. The skillet ford is also a river of similar character, and the country lying between them must labour under the inconvenience of seclusion for many months every year, until bridges and ferries are established.

Quite obviously, the modern phenomenon of annual spring flooding (March through June) is not a recent development. And the lack of reference to summer or fall flooding point again to the flooding pattern of today.

In the preceding sections, we have considered a number of factors related to the environmental setting of the Riverton Culture. The Riverton sites are located on the glacial till or glacial terraces of the Mt. Vernon Hill Country and the southern fringes of the Springfield Plains. The climate of the area is much more moderate than that of adjacent areas of the Midwest today, and probably was so in the past. Both the historic and prehistoric ground cover consisted predominantly of thick forest, with prairies of varying size on the river terraces and in the uplands, which were gently rolling hills. An abundance of game and riverine species were available, although the Riverton people seem to have been rather selective in their choice of game, and presumably a great variety of vegetable products were available. All of these factors were undoubtedly important in permitting the marked degree of sedentism which we shall attempt to show for the Riverton Culture in Chapter VII.

## CHAPTER II

# Description of the Sites of the Riverton Culture and Excavation Procedures

Forming the core material for our subsequent analyses of the Riverton Culture will be the artifacts, features, and general cultural detritus of three large shell middens in the central Wabash Valley, the Riverton Site (Cw-28), the Swan Island Site (CW-77), and the Robeson Hills Site (Lw-1).* The following sections will provide descriptions of the sites and the areas in which they occur, excavation techniques and problems, and comments on adequacy of sampling.

Before proceeding to individual descriptions, we can characterize the sites briefly as follows, following their north to south alignment:

The Riverton Site is a partially artificial knoll resulting from prehistoric occupations on the T-O of the Wabash, and was adjacent to at least one channel of the Wabash at the time of its occupation. Cultural debris covers an area in excess of one acre, with the limits of the site obscured by flood deposited silts, and has a maximum depth of eight and a half feet.

Swan Island is on the top of a low sandstone ridge which is exposed on the T-O of the Wabash, providing an area for habitation which normally lies above flood level. Occupation debris extends over an area of some three acres and has a maximum depth in excess of five feet.

Robeson Hills, the southernmost site, is situated on a spur of an isolated hill mass, from which it takes its name. Unlike the two northern sites, Robeson Hills lies about a hundred feet above the valley floor, with the Wabash river flowing in a channel close to the base of the precipitous eastern slopes of the spur on which the site is located. The site, which has been almost completely destroyed as the result of road building activities, was originally about three acres in extent, with a maximum depth in excess of four feet in its central portion.

All of the sites are remarkable for their well defined stratigraphy and lack of admixture of materials from earlier, contemporaneous, and later occupations. Apparently, the Archaic shell gatherers of the Riverton Culture neither influenced nor were influenced by their contemporaneous neighbors of the "Wabash Valley Archaic," which is part of a cultural continuum that seems to have dominated large areas of the southern Midwest for several millenia. The remains of prior and subsequent cultures are attested only by a few artifacts at the very bottom of the middens in the case of the former, and in the upper one to one and a half feet of the middens in the case of the latter. But only the peoples of the Riverton Culture used these three loci as substantial residential areas, the other cultures having left only the sort of remains that one associates with sites classified as hunting and/or gathering camps.

## THE ROBESON HILLS SITE (Lw-1)

Excavations at the Robeson Hills Site were undertaken as a salvage excavation of a borrow pit area on private land. The author was preparing to excavate the Riverton shell midden some 26 miles north of the Robeson Hills Site at the time that Joseph R. Caldwell, Head Curator of Anthropology at the Illinois State Museum, was notified by the Illinois Archaeological Survey of the impending destruction of the latter site. Dr. Caldwell immediately arranged for the transfer of operations to Robeson Hills, since it was vitally important that the relationship of this large shell midden to others in the Wabash Valley be determined.

The Robeson Hills Site is located at 87° 31' 20" W. Long. and 38° 42' 31" N. Lat., in the N.E. 1/4 of the N.E. 1/4 of the S.E. 1/4, Section 9, Township 3 North, Range 10 West of the 2nd Principal Meridian (Fig. 2).

When first observed, about 1.5 of the 3 acres of the site were under cultivation. Most of the remaining area had been cultivated in the past, but had subsequently grown up in elm thickets. Indications that a deep shell midden existed were slight, since the sparsely scattered projectile points, chert flakes, and manos on the surface were in large part the remains of a late and intermittently occupied hunting and gathering camp. Only in areas where erosion had removed one to two feet of top soil were the thick shell lenses observable.

Flanking the site on the west and south are deep ravines containing intermittent streams, while the Wabash River flows close to the foot of the bluff on the east side. Thus the site occupies an isolated promontory, joined to the main hill mass only on its north side. The steep hill slopes and adjacent uncleared hill tops are covered with oak, ash, beech, maple, linden, tulip tree, coffee-nut tree, elm, walnut, and butternut, with an occasional hickory (Easton, 1931).

The site is atop the eastern perimeter of the Robeson Hills, an aggraded lowland. Underlying formations of shale and sandstone, which constitute probably the lower one-half of the hills' present elevation, are the

*Site designations in the Illinois Archaeological Survey system. The Illinois State Museum numbers are Cw170, Cw319/Lw319, and Lw1, respectively.

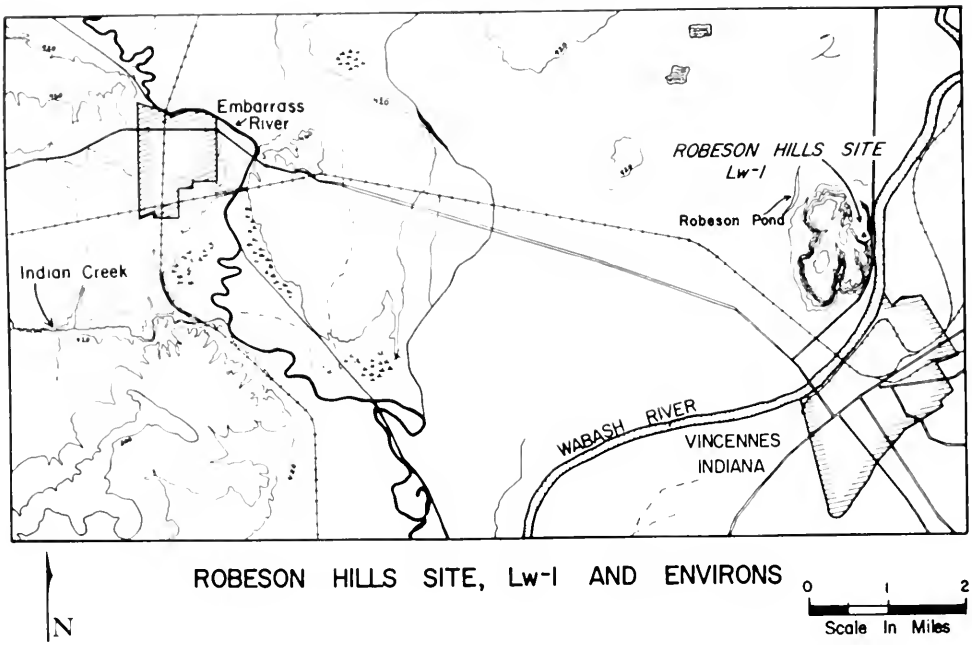


Fig. 2. Environs of the Robeson Hills site (Illinois State Museum site Lw1), Lawrence County, Illinois.

primary reason for its isolation and elevation in the alluvial flood plain. Yellow clay and loess overlie the shale and sandstone, and dune sand deposits are present on the western side of the hills. The aggraded area is roughly two miles north to south and one and one-fourth miles east to west in extent.

Lowland elevation around the hill mass is 409 to 416 feet above sea level, and the maximum height of the Robeson Hills is over 520 feet above sea level. The Robeson Hills Site itself is on the eastern bluff edge with an elevation of 100 to 110 feet above the T-O of the Wabash.

There are indications that following the glacial retreat, the Wabash River channel was near the west side of the eight mile wide, glacial flood plain, west of the Robeson Hills. Later a channel barely west of the hills was used, while at the present time, the river occupies a channel close to the east side of the Robeson Hills.

Information from the engineer in charge of bridge construction on the new U.S. Route 50 indicates that the present river bed and the intervening one-mile-wide eastern flood plain adjacent to the site is underlain by a shallow rock formation. Such a formation would form a shallow "riffle" favorable for shell fish, which are present at this location today (Paul Parmalee, personal communication).

Immediately west of the Robeson Hills are the remnants of Allison Prairie, described by Eaton (1931) as a "relatively barren area of some twelve miles extent [which was formerly] part marsh, part woodland, and part sandy prairie . . . [retaining from its former cover] only small willows, coral-berry, sassafras, and cornels. . . ." Serving as a barrier between the Robeson Pond, a remnant of an abandoned channel of the Wabash, Eaton (1931) describes the vegetation along Robeson Pond, which survives today only at its northern and southern extremities, as consisting mainly of willows, cottonwood, buttonbush, honey locust, and pecan.

In the bottomlands east of the Robeson Hills are various species of willow, cottonwood, walnut, pecan, beech, birch, oak, elm, sugarberry, sasafras, sycamore, locust, ash, and haw.

In various habitants around the Robeson Hills area are economically important species such as hickory, pawpaw, crab apple, wild plums, wild cherry, maple, persimmon, hazelnut, raspberry, blackberry, grape, and elderberry. Data are not available for non-ligneous flora in the area, but undoubtedly there were many species of value to the prehistoric inhabitants of the area.

While there are many species of animals native to the area, the Robeson Hills people seem to have been very selective in their harvesting of faunal resources. As Parmalee indicates in Appendix I, deer was of prime importance with small mammals, birds, reptiles, and fish providing supplements to the diet. Along with these, vast quantities of mussels were consumed, as indicated by 18,516 mussel shells saved as a sample from the test pits (Appendix I).

In short, the environs of the Robeson Hills site offered a rich and varied subsistence potential in historic times, and we assume that an equal potential was available to the prehistoric inhabitants of the Robeson Hills Site.

## Excavation

Excavation procedures were in large part controlled by the day to day exigencies of the highway construction schedule. Earth removal was scheduled to begin April 15th, and on April 13th excavation was begun on the expectation that it would be limited to a few stratographic tests and to watching the earth removal operations for features and cultural material.

Initially, five-foot squares were set up by local datum lines on three representative areas of the site (Fig. 3). Earth removal proceeded by arbitrary six-inch levels, with hand troweling in test pits B, D, and E, and shoveling and screening in pits A and C.

Rainy weather delayed the construction work repeatedly, while permitting our work to continue under somewhat inclement but operable conditions. As time permitted, on a day to day basis, seven additional pits were dug by shovel or with trowel and screen when features or other considerations warranted such control.

At an opportune interval a grid system was established, all features tied in, and vertical profile measurements recorded.

Earth removal by heavy machinery started April 28. As a caution to future archaeologists, we shall note that much of the midden was stripped from the site by bulldozer and piled along the ravine banks flanking the west edge of the site. However, the bulk of the midden was used as part of the fill in the ravine south of the site, and is now overlain by U.S. Route 50.

Once cleared of the two to four foot midden, the underlying yellow clay zone was found to be profusely covered with post molds and pits. Heavy machinery operators cooperated at all times by shifting operations to permit the excavation of refuse and burial pits, and an intensive investigation of an area for post molds and other features. This area fortunately included a major portion of our formal excavation units, permitting the tying in of subsoil features with our grid system.

After suspension of actual excavations, the author and Denzil Stephens of Annapolis, Illinois, returned for a day to watch removal of the midden and were able to salvage five pits and a burial. About a quarter of an acre of the site remained at the north end after borrow pit operations were terminated.

## Natural Zones

Two zones could be discerned in the pit profiles (Plate 1 and Fig. 4). The upper of these was about two

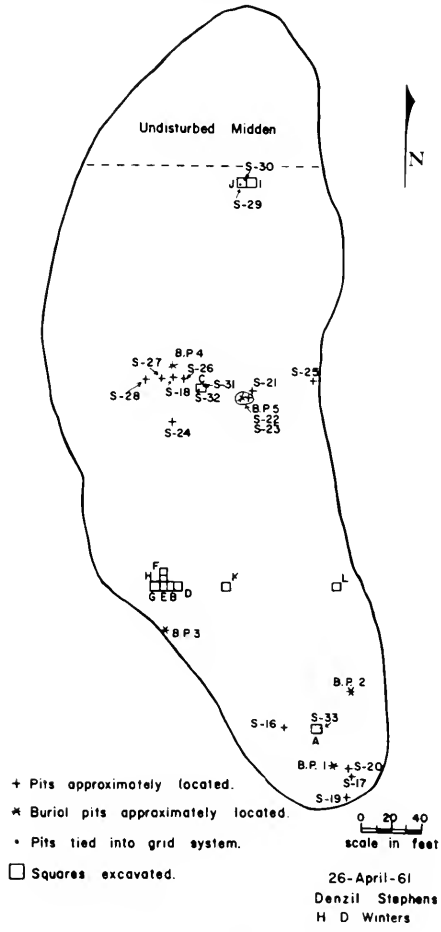


Fig. 3. Sketch map of the Robeson Hills site.

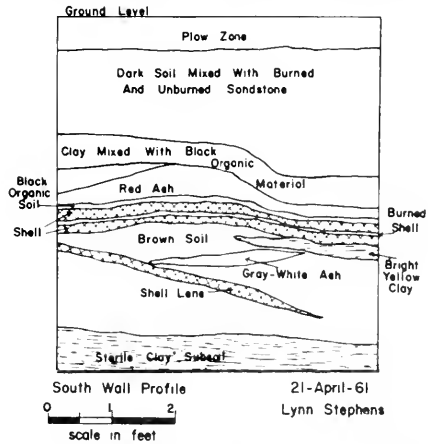


Fig. 4. Profile of the south wall of Test Pit C, Robeson Hills site.

feet thick and was typified by the scarcity of mussel shell. The lower zone, which was also two feet thick, contained numerous lenses of concentrated shell and pits filled with shell. Fortunately the limits of the natural zones corresponded closely to the arbitrary levels used in excavation, so that the reasonably satisfactory zonal association of the artifacts could be established subsequent to field work.

## THE SWAN ISLAND SITE (Cw-319)

The Swan Island shell midden, which was named after a nearby island in the Wabash River, is located in the SE¼ of the SE¼ of the SE¼ of Section 20, Township 5 North, Range 10 West and in the SW¼ of the SW¼ of the SW¼ of Section 20, Township 5 North, Range 10 West, at 87° 32' 12" West Longitude and 38° 51' 7" North Latitude. The midden lies in Crawford County, adjacent to the Lawrence County line, and is on the farms of Mr. Ross Goodwin and Mr. Victor Ross. (Figs. 1 and 5).

Two test pits were placed in the midden on the Ross Goodwin Farm by Mr. Denzil Stephens over several weekends during September 1961. One of these pits was subsequently used as the base for a grid system, and was designated Square 0/50 in the grid. During the period from October 3, through October 18, 1961, the author supervised the excavation of three additional squares west of Square 0/50. As in the other limited operations at Robeson Hills and Riverton, arbitrary six inch levels were used throughout the excavations.

The midden occupies a three to four acre knoll with an elevation of some five feet above the T-O of the Wabash River. At first glance, the knoll appears to be an erosional remnant of the T-1, but its height is the result of five feet of midden accumulation on a sandstone outcrop (Plate 2). This latter feature is an outlier of the large aggraded upland one quarter mile to the west of the site.

Although the Wabash River is only thirty feet north of the site, little evidence of flooding was found in the midden. The Riverton Site, which is only 11.8 miles north of Swan Island, has many alternating lenses of midden and flood deposited sand or clay (Figs. 9 and 10). Since the cultural content of the two middens is so similar, cultural contemporaneity is indicated, and other factors must be sought to explain the differences in flooding patterns between the two sites with their almost identical elevations above the T-O. Perhaps the most significant factor is the great difference in width of the T-O at the two sites. At Riverton, the flood plain is only about one and a half miles wide, while the T-O at Swan Island is five miles in width. Thus equal volumes of water could have greatly disparate depths in the two flood zones.

At the northern edge of the site is an abandoned channel of the Wabash. Whether this channel was active during occupation of the site we cannot say with any

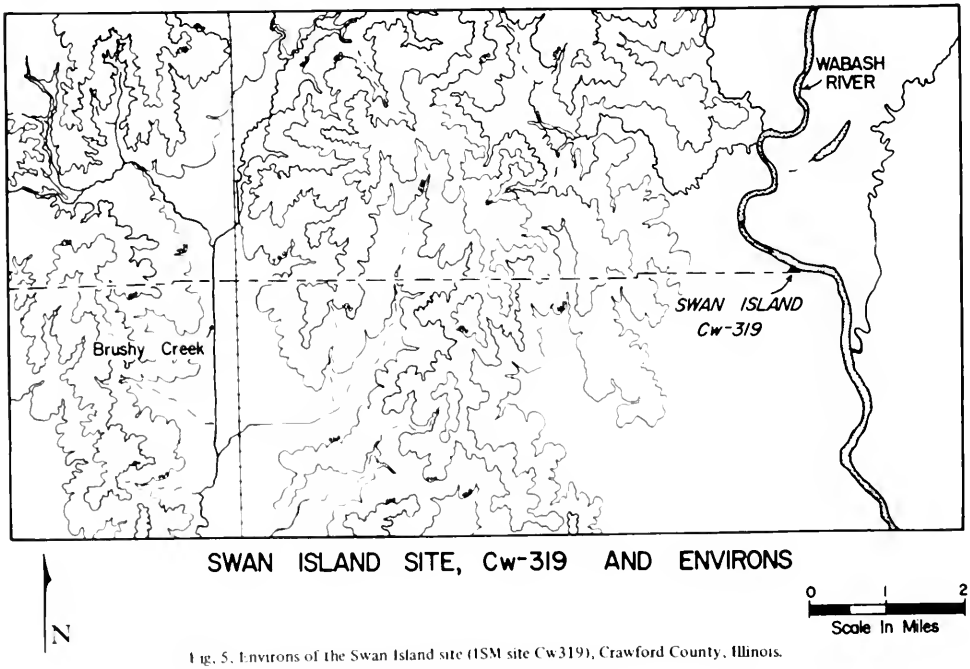


Fig. 5. Environs of the Swan Island site (ISM site Cw319), Crawford County, Illinois.

assurance. We suspect that it is part of an earlier system that occupied the western side of the valley during post-Wisconsin times, and that it had become a slough by Riverton times and remained as a slough until nineteenth and twentieth century drainage systems appeared in the area.

Insofar as general environment is concerned, Swan Island is intermediate between Robeson Hills and Riverton, with many characteristics of the "Indiana Pocket" retained. The valley growing season is fourteen days longer in the Swan Island area than in the adjacent uplands, for the reasons already mentioned in Chapter I.

Although arbitrary six inch levels were used in testing, six clearly defined natural or cultural zones could be distinguished in the profiles (Fig. 6 and Pl. 3). Clearly all of these shall middens, or the remnants thereof, can be excavated by zones and such cultural markers as clay floors, hearths, or horizontal concentrations of midden. Briefly summarized, the zones, their identifying characteristics, and the average depths of the zones are:

Zone I (c. 0-8"). A loose gray loam with considerable cultural debris, including Woodland, Mississippian, and Historic artifacts. Very little shell, but a fair quantity of bone. Probably identical with Zone II and altered only by plowing and minor historic occupation while in use as a river boat landing in the nineteenth century.

Zone II (c. 8-17"). A compact gray loam with cultural debris, including a small quantity of Woodland, Mississippian, and Historic material. Very few sandstone fragments or shell, but considerable bone. No pits, or post-molds, but a few hearths represented by patches of burned soil.

Zone III (c. 17-49"). Gray midden interspersed with clay floors and hearths, lenses of concentrated shell, and shallow, basin-shaped pits or hearths filled with shell. Numerous artifacts and concentrated areas of chert flakes.

Zone IV (c. 49-55"). Gray loam containing scattered shell, sandstone, bone, and artifacts, cultural features rarer than in Zone III.

Zone Va (c. 55-63"). Brown compact subsoil containing considerable midden debris. Subsoil suggests a type often found in wooded areas. Several narrow mouthed storage pits originate in Zone Va.

Zone Vb (c. 63-69"). Culturally sterile brown subsoil, which in all other respects is identical with the soil in Zone Va.

Zone VI (c. 69-73"). A sterile, yellow clay presumably produced from decomposition of underlying yellow sandstone, which appears at approximately 73 inches below the crest of the knoll.

## THE RIVERTON SITE (Cw-170)

The site is located about a mile and a quarter northeast of Palestine, Illinois (Figs. 1 and 7), at 39° 1' 0" North Latitude and 87° 34' 50" West Longitude, and is in the SE¼ of the SE¼ of the NE¼ of Section 25, Township 7 North, Range 11 West. The site area is known locally as Groundhog Hill, because of the numerous burrows of these animals on the knoll before clearing and cultivation. The burrows in the excavated areas were concentrated in the upper eighteen inches of midden, although one burrow was found at a depth of twenty-four inches. Apparently, the knoll did not become a favored habitat for groundhogs until fairly recent times.

The site is on the T-O of the Wabash River, and has a maximum elevation of six feet above the surrounding

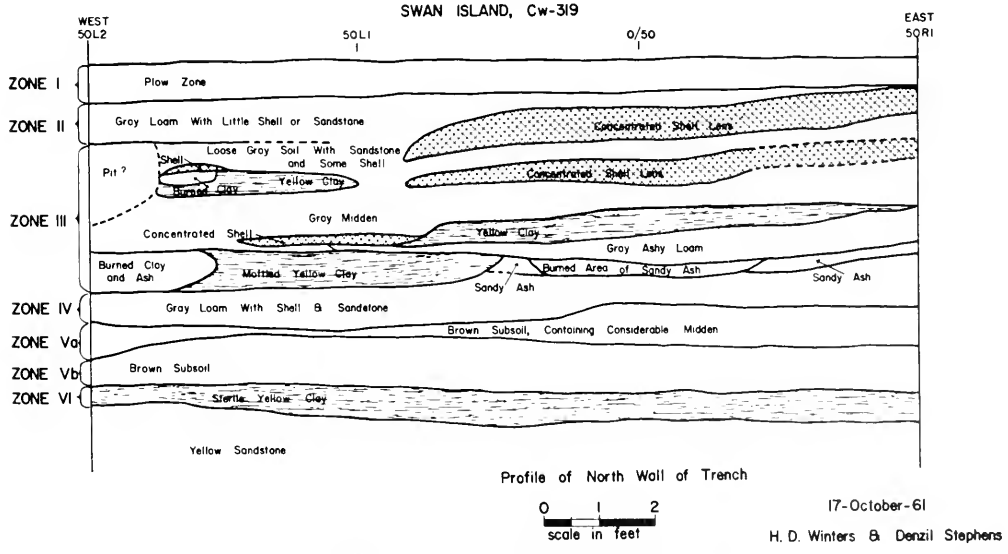


Fig. 6. Profile of the north wall of the test trench, Swan Island site.

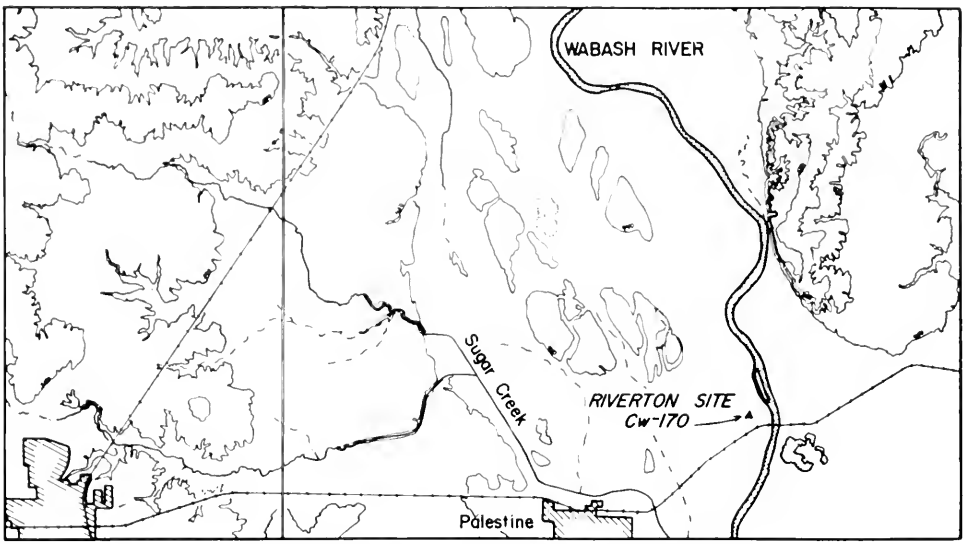


Fig. 7. Environs of the Riverton site (ISM site Cw170), Crawford County, Illinois.

flood plain. Total area is about two acres and the site is 470 feet in length and averages 220 feet in width. Prehistorically, both the elevation and area must have been greater. The midden, in Square 10R25S on the crest of the knoll, was 8½ feet deep, and the general slope of midden zones indicates a prehistoric contouring similar to that of the present surface, although there were shifts through time in the location of the crest of the knoll (Fig. 10). Thus, the site extends at least two and one-half feet below the surrounding ground level, which has been built up by repeated flooding. In prehistoric times the site area may have been twice that observable today.

To the west there is an abandoned channel of the Wabash, which today flows about a quarter mile to the east of the site. In prehistoric times, the site area would probably have been an island with the high ground of the T-1 some three quarters of a mile away. The abandoned channel is dry today, except during floods and heavy rains, but before modern drainage systems were installed, it was a slough known as Big Pond, which was locally important because of the great quantities of fish obtained therefrom. The fish were salted and stored in barrels, thus providing an important supplement to the winter diet of the nineteenth century inhabitants of the area.

In recent years, flooding of the site has been a recurrent spring phenomenon, with flood waters inundating the area three out of four years for protracted intervals from March through June, with the threat of flooding generally ending about the first of July. Winter flooding occurs about one year in ten, and fall flooding is very rare (Denzil Stephens, personal communication). The severity and frequency of contemporary flooding has

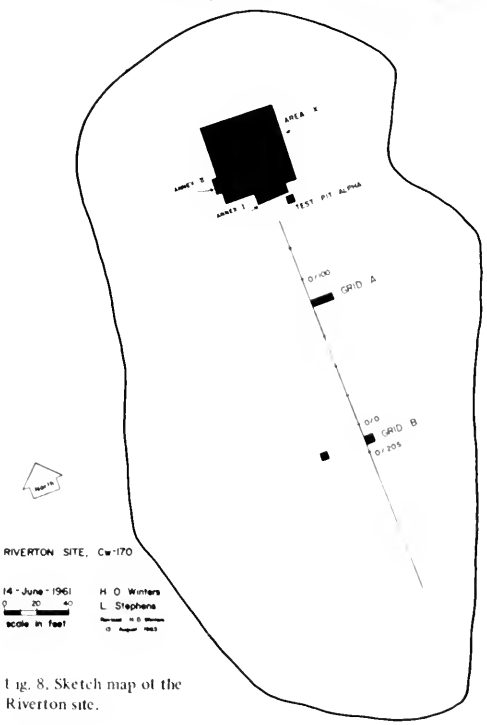


Fig. 8. Sketch map of the Riverton site.

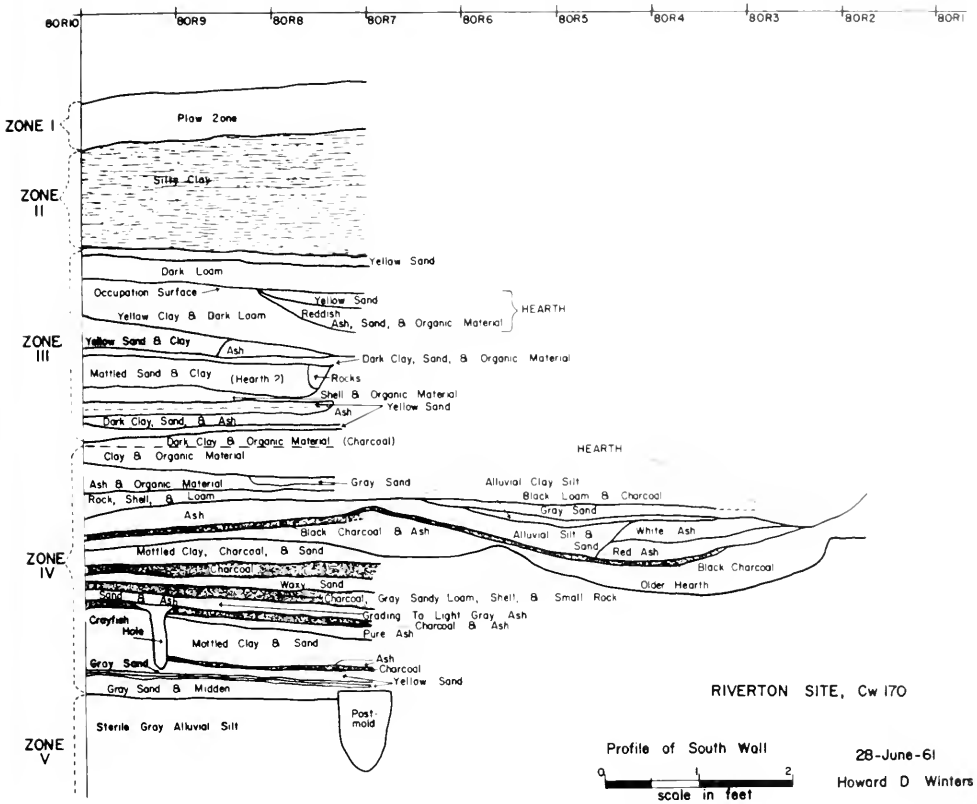


Fig. 9. Profile of the south wall of Grid A, Riverton site.

probably been increased by the silting of the Wabash channel, the rapid run-off of water from cultivated farm land, and the narrowness of the T-O in the Palestine area. While lenses of sand and silt (Figs. 9 and 10) in the site indicate repeated prehistoric flooding, such natural events may have been of lesser frequency and magnitude than the floods of today.

Cultivation and erosion have reduced the knoll about two feet in height since clearing of the land some sixty years ago. Flood waters have heavily eroded the western and northern slopes of the site, exposing shell lenses and clay floors probably assignable to Zone III of the site (see below). The eastern portion of the site is not being eroded, but instead, receding flood waters have left behind a six-inch concentration of silt, gravel, chert, bone, and artifacts over the undisturbed midden. The 1961 test pits were accordingly placed on the crest and the eastern slope where maximum depths of undisturbed midden were present.

Comparatively little specific information is available on the biota of the area in which the Riverton Site is located, but Bradley's (1932) thesis on forest distribution in Crawford County does provide some interesting data on ligneous plants of that area. In passing, he makes the rather ambiguous comment that the herbaceous flora does not differ from that of other parts of eastern Illinois. In view of some of the peculiarities of distribution patterns of herbaceous plants in eastern Illinois, the statement is not overly enlightening.

Bradley reports that there are two major patterns of plant cover in Crawford County: a west to east shift from upland prairie to forested land, and a south to north distribution pattern marked by the disappearance of the ligneous plants which distinguish the Indiana Pocket from adjacent areas of the Midwest. In respect to the east to west pattern, it should be noted that small prairies are interspersed among the once sizeable forests of the eastern portion of the county, occuring even on the flood plain of the Wabash River.

As indicated above, relict species of southern flora tend to drop out of the floral assemblage as one moves from southern to northern Crawford County, although

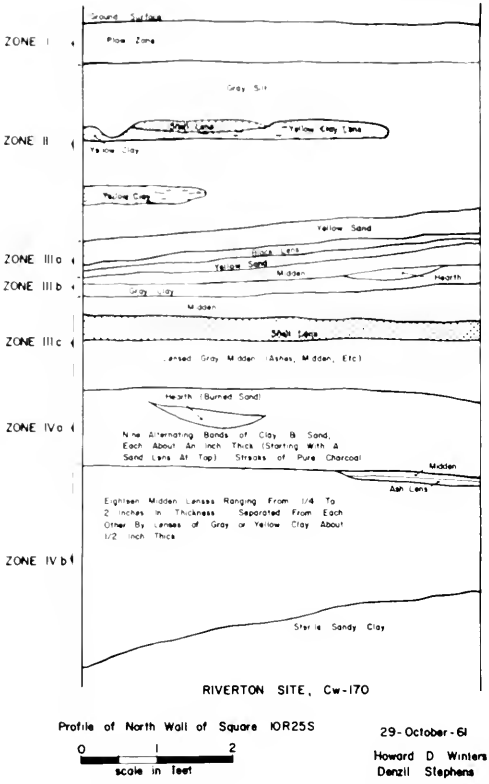


Fig. 10. Profile of the north wall of Square 10R25S, Riverton site.

pecan *(Carya pecan)* is found as far north as Old York and Schneck's red oak *(Quercus schneckii)* as far north as the junction of the two branches of Hutson Creek. Both Crawford County limits are at or very near the distribution limits for these plants in Illinois. Dogwoods such as rough-leaf dogwood *(Cornus asperifolia)* and pale dogwood *(C. obliqua)* are found only in the Embarrass bottoms *(C. asperifolia)* or the southern portion of the county *(C. obliqua)*. Pumpkin ash *(Fraxinus profunda)*, a southern species, has the same sort of distribution pattern, being limited primarily to the swampy lowlands of the Embarrass and Wabash in the southern townships of the county.

Bradley states that most of the Crawford County trees are duplicates of those on Eaton's (1931) list for Lawrence County immediately to the south, but some southern species such as Spanish oak *(Quercus lyrata)*, hackberry *(Celtis mississippiensis)*, cypress *(Taxodium distichum)*, and waterlocust *(Gleditsia aquatica)* are not found anywhere in Crawford County. These and the preceding data would indicate that Crawford County is at or near the northern terminus of the Indiana Pocket. In fact, the effective limits of the Pocket might well be considered as coinciding with the southern half of Crawford County, with a few species extending somewhat beyond this tier of townships.

With Riverton's location at the junction of the Indiana Pocket and La Motte Prairie, the site can easily be seen as occupying a fringe habitat and benefiting from edge effects. Such edge effects result from the fact that populations occupying fringe habitats have access to the resources of the juxtaposed zones, and that the fringe habitat itself differs from either of the major vegetation zones. In the case of Riverton, three life zones come together, namely the forest, the prairie, and the river, with the most striking feature of the latter zone at Riverton being the presence of extensive mussel beds. Robeson Hills and Swan Island present a similar picture, although the balance between forest and prairie is weighted towards forest for both of these sites. But one of the guiding principles in the location of a major site of the Riverton Culture would seem to be the selection of fringe habitats. Such selection may have been a critical factor for preceding Archaic and subsequent Woodland and Mississippian manifestations as well, but there are too few data to permit extrapolation of the hypothesis to include these cultures as well.

As for specific details of the plant cover of the area around the Riverton Site, Bradley (1932: Maps 1-4) shows La Motte Prairie as an area about three-eighths of a mile in width extending from Hutsonville to Palestine, Illinois, a distance of about six miles. West of La Motte Prairie were woods composed primarily of pin oak, post oak, swamp cottonwood, sweet gum, sugar maple, red maple, and pumpkin ash. South of the prairie in the Bristol Hill area, such trees as tulip tree, pin oak, Schneck's oak, sugar maple, red maple, pecan, black gum, sweet gum, beech, and basswood are indicated as the forest cover. For the Wabash bottoms east of the Riverton Site, only sugar maple is indicated.

Bradley's records are undoubtedly skewed by a century of clearing, lumbering, and drainage of the Wabash Valley. But they do provide some basis for evaluating the economic potential of the area for prehistoric hunters and gatherers, since, as indicated in Chapter 1, we doubt that any major alterations in plant cover of the Wabash have occurred in several millenia preceding European settlement.

As some measure of the quantitative relationships among the surviving ligneous plants, we present Bradley's tabulations (1932: 25-27) for wooded areas south of and west of the Riverton Site (Table 1).

Most of the above species have economic value, with the various species of *Quercus, Fagus, and Carya* probably being the most productive of food. But many of the others (e.g., *Acer saccharum, Prunus serotina, Celtis occidentalis, Asiminia triloba, Sambucus canadensis, Morus rubra)* could have also been important for their fruits or as the source for beverage flavorings. Still others could have been important as sources of raw materials, for use in other technological aspects, or as medicines. Most of the species of *Quercus* could have been used as dyes, many as the source of medicine. Historically, both *Acer*

*saccharum* and *Fraxinus americana* were important for their wood, and species of *Tilia* and *Morus* were used for thread and textiles, or in bag, basket and net making.

Undoubtedly, when herbaceous plants and fauna (See Appendix I) are added to the above resources, the central Wabash would appear as an area of very high potential for hunting and gathering groups. Perhaps such potential serves as partial explanation for the trend towards sedentism which we think is a characteristic of the Riverton Culture (see Chapter VII). The middens of the Riverton site are quite large when compared to those of other Archaic sites in the Midwest, and they were accumulated very rapidly over a two to five hundred year period, even granting that shell contributed a considerable amount of bulk in midden accumulation.

## Excavation

A test pit placed in the midden in April of 1959 by Joseph Caldwell and Denzil Stephens had shown that the site was in excess of six feet in depth, but none of the distinctive artifacts of the Riverton Culture so abundantly represented in the surface collections of Mr. Stephens were found during the 1959 testing operation.

In June and October of 1961, three weeks were spent by the author in excavating five five-foot squares at the shell midden known as the Riverton Site (Fig. 7). All of the midden was meticulously screened, since the micro-tools of the Riverton Culture are very difficult to recover by any other method, as Dr. Caldwell and Mr. Stephens had discovered in 1959.

Although six-inch levels were maintained throughout the 1961 testing operations, five natural or cultural zones (Fig. 9 and 10) were noted during excavation (Pls. 4 and 5). These could be correlated within all five squares, even though the two testing areas were separated by a hundred feet. Briefly summarized, these zones were:

Zone I (six inches thick). A dense concentration of pebbles, chert spalls and sandstone fragments. Artifacts, charcoal, and animal bone were sparse, and shell was extremely rare. Zone I consists in large part of recent, flood-deposited

TABLE 1

QUANTITATIVE RELATIONSHIPS AMONG LIGNEOUS PLANTS FOR WOODED AREAS SOUTH AND WEST OF THE RIVERTON SITE*

| Plant | 1 3/4 miles southeast of Palestine, Illinois | 1 3/4 miles northeast of Robinson, Illinois |
|---|---|---|
| *Platanus occidentalis*, sycamore | - | - |
| *Carya cordiformis*, bitternut | - | 1.3% |
| *Sassafras officinale*, sassafras | - | - |
| *Benzoin aestivale*, spice bush | - | - |
| *Gladitsia triacanthos*, honey locust | - | - |
| *Betula nigra*, black birch | - | - |
| *Quercus velutina*, black oak | - | 34.8% |
| *Acer saccharum*, soft maple | 26.0% | - |
| *Liriodendron tulipifera*, tulip tree | 16.0% | - |
| *Fagus grandifolia*, beech | 14.0% | - |
| *Quercus borealis maxima*, red oak | 9.0% | 1.3% |
| *Ulmus americana*, white elm | 5.0% | 5.2% |
| *Fraxinus americana*, white ash | 4.0% | - |
| *Nyssa sylvatica*, black or sour gum | 3.0% | 2.5% |
| *Carpinus caroliniana*, hornbeam | 3.0% | - |
| *Carya ovata*, shellbark hickory | 2.0% | 7.2% |
| *Fraxinus lanceolata*, green ash | 2.0% | - |
| *Tilia glabra*, basswood | 1.5% | - |
| *Prunus serotina*, black cherry | 1.5% | 15.9% |
| *Quercus alba*, white oak | 1.5% | 13.4% |
| *Quercus imbricaria*, shingle oak | - | 10.9% |
| *Celtis occidentalis*, hackberry | 1.0% | - |
| *Carya alba*, white hickory | 1.0% | 1.3% |
| *Quercus palustris*, pin oak | - | 1.3% |
| *Cornus florida*, flowering dogwood | 1.0% | "Frequent" |
| *Juglans cinerea*, butternut | 1.0% | - |
| *Juglans nigra*, black walnut | - | 1.3% |
| *Gymnocladus dioica*, Kentucky coffee tree | 0.6% | - |
| *Carya ovalis*, small-fruited hickory | 0.6% | - |
| *Cercis canadensis*, red bud | 0.6% | 2.4% |
| *Asimna triloba*, pawpaw | 0.6% | - |
| *Ulmus fulva*, red elm | 0.6% | - |
| *Sambucus canadensis*, elder | 0.6% | - |
| *Quercus muhlenbergii*, chinquapin oak | - | - |
| *Quercus macrocarpa*, bur oak | - | - |
| *Morus rubra*, red mulberry | - | 1.3% |

*From Bradley, pp. 25-27.

silts which have been repeatedly mixed by plowing.

Zone II (ten to twenty-eight inches thick). A gray, compact silt, which is in large part the result of prehistoric flooding. Animal bone was plentiful, with a scattering of mussel shells. Wood charcoal was present, but not in quantity. Artifacts were common, but no pits or postmolds were observed within this zone. Apparently, the site was being utilized repeatedly, but only for brief occupations.

Zone III (twenty-four to thirty inches thick). Alternating lenses of yellow sand, midden, and gray or yellow clay. The top of the zone is marked in all squares by two thick lenses of yellow sand, which apparently represent two heavy floods separated by debris from a short interval of midden accumulation. Mussel shell, animal bone, and charcoal (including nut shells) were plentiful. Hearths, scattered post molds, yellow clay floors, occasional pits, heavy lenses of midden and shell, and numerous artifacts suggest repeated and substantial occupations of the site.

Zone IV (twenty-one to forty-four inches thick). Thin lenses of heavily concentrated organic material (sometimes practically pure charcoal) separated by bands of sand or clay. Mussel shell, charcoal, and animal bone were plentiful, but artifacts were much scarcer than in Zone III. Pits, however, increased in number and size toward the bottom of the site, and a few postmolds were noted (Figs. 9 and 10). Repeated, short occupations are suggested, with intervening intervals indicated by the lenses of sand or clay.

Zone V. Sterile alluvial deposits which underly the site. These may be roughly described as gray or yellowish gray silts.

Zones III and IV can both be divided into sub-zones, on the basis of internal phenomena. Thus in Zone III, the upper lenses of yellow sand, a band of gray clay, and a thick zone of lensed, gray midden suggest internal divisions. In Zone IV, an upper sub-zone of alternating bands of midden and sand and lower sub-zone of alternating bands of midden and clay are suggested.

In July and August of 1963, a seven week excavation was undertaken under the direction of Joseph R. Caldwell. These excavations were the result of the observation by Mr. Stephens that several areas of yellow clay outlined by dark midden had been exposed at the north end of the site. Dr. Caldwell's careful excavations, designated Area X and Test Pit Alpha on Figure 8, exposed a series of nine clay living platforms pertaining to the Riverton Culture. Of these five were completely excavated, along with numerous surrounding features. The results were impressive indeed, in throwing light on the living arrangements of a late Archaic group, and contributing important information for interpretation of the Riverton Culture settlement system which will be discussed in Chapter VII. Test Pit Alpha was excavated to provide controls for tying Area X into the stratigraphy established by the 1961 excavations. Only eight six-inch levels were excavated in this test, sterile soil not being reached. But the four-foot profile exposed permitted a correlation with the upper portion of Zone III. Caldwell's excavations also added important information on artifacts and burials.

The plow zone of Area X was removed by pick and the underlying portions were troweled away. All features were hand-troweled, with the contents of several features being screened for the recovery of the small chert artifacts.

## CHAPTER III

# Natural Resources

In this chapter we shall discuss the natural resources that were available to the occupants of the central Wabash Valley as manifested by the artifacts recovered from the Riverton, Swan Island, and Robeson Hills sites. We shall also attempt to show that the Riverton Culture peoples were largely self-sufficient with respect to raw materials, depending on various rocks and minerals derived from the glacial gravels that fill the valley, exposures of the McLeansboro formation of the Pennsylvania series, and an assortment of mammals, birds, reptiles, fish, and molluscs taken locally.

Before commenting on raw materials by specific categories, we shall present a table listing the relative importance of general categories at each site. The percentages are based upon a total of 283 artifacts from the Robeson Hills Site, 275 artifacts from Swan Island, and 274 artifacts from Riverton, all of which are from the 1961 test pits. In all cases only artifacts which have been assigned to functional categories have been included. Other artifacts which could be classified only as "worked" have been excluded, since their use was either so problematical or they were so plainly a by-product of the manufacture of some other implement, that we could scarcely include them in the analysis without including such residual materials as chert flakes, thereby reducing the proportional data to meaningless figures.

As can be seen from Table 2, the importance of general types of raw materials varies considerably from site to site. We feel that these variations in themselves reflect differences in the types of activities that were emphasized at each component of the settlement system, a topic which will be developed at greater length in Chapter VII. But anticipating slightly, we shall note that the high percentage of river pebbles at Robeson relates to the presence of large numbers of manos (domestic activities), of sandstone, to large quantities of grooved sandstone abraders (fabricating and processing); while the low percentage of chert relates to the minor emphasis on the manufacture of projectile points, knives, and scrapers (weapons and general utility implements). At Riverton, the very high percentage of chert reflects the importance of projectile points, and the low proportion of river pebbles, the rarity of manos. At Swan Island, the low proportion of river pebbles again reflects the rarity of manos; the high incidence of chert, the importance of weapons; and the high proportion of bone, the importance of weaving and flensing tools. As activities varied during the seasonal cycle of the Riverton peoples in their movements from settlement, to transient camp, to base camp, to hunting and/or gathering camps, so did the need for particular types of raw materials for the manufacture of accessories.

We have not attempted to extrapolate our observations to any other Archaic cultures, but feel that it might be of considerable interest to see if such cultural regularities can be found in other systems where raw materials such as bone and shell are adequately preserved.

In the ensuing discussion of specific categories of raw materials, we shall combine data from all three sites, noting local variations where necessary.

## RESOURCES

### Chert

An analysis of chert artifacts and spalls indicates that this material was derived primarily from local gravels, numerous deposits of which were left larger than five or

TABLE 2

PROPORTIONS OF RAW MATERIALS USED IN THE MANUFACTURE OF CLASSIFIABLE ARTIFACTS EXCAVATED IN 1961 AT THE ROBESON, RIVERTON, AND SWAN ISLAND SITES

| Raw Material | Robeson Hills | | Riverton Site | | Swan Island | |
|---|---|---|---|---|---|---|
| | Number of Specimens | Percentage of Total | Number of Specimens | Percentage of Total | Number of Specimens | Percentage of Total |
| Bone and Antler | 94 | 33 | 92 | 34 | 124 | 45 |
| Chert | 79 | 28 | 148 | 54 | 118 | 43 |
| Miscellaneous River Pebbles | 56 | 20 | 14 | 5 | 11 | 4 |
| Sandstone | 40 | 14 | 15 | 5 | 13 | 5 |
| Mussel Shell | 9 | 3 | 3 | 1 | 5 | 2 |
| Miscellaneous Raw Materials (Quartzite, Indurated Shale, Clay and Shale) | 5 | 2 | 2 | * | 4 | 1 |
| Total | 283 | 100 | 274 | 99 | 275 | 100 |

*Less than 1%.

six centimeters in maximum dimension, characteristically show the rounding and polish of chert from the local gravel beds, and are grayish white, gray, tan, brownish pink, and deep blue, and combinations of these, in color.

Local cherts identical with those from the sites of the Riverton Culture were also favored by peoples of preceding Archaic cultures in the area, while Woodland sites produce a preponderance of cherts from the Mississippian formations of southern Indiana and Illinois. If chert preference can be a diagnostic determinant of cultural affiliation, we might assign the Riverton Culture sites to the Archaic on this basis alone in the central Wabash.

The local "Wabash" chert was used in the manufacture of a very wide variety of implements, including knives, choppers, drills, micro-perforators, projectile points, reamers, scrapers, shredders, and strike-a-lights.

As will become evident from our subsequent discussions of chert artifacts, all the chert implements of the Riverton Culture are notable for their small size. While such size characteristics may best be considered as derivative from cultural traditions, the nature of the raw material may also have imposed limitations on the actual expression of the range of variability possible within the technological aspect of the tradition. Nodules of Wabash chert are consistently small, making the manufacture of large chert implements possible only with considerable selection of the nodules present in the gravels.

Because illustrating that nodule size itself may be an important determinant of artifact size, we shall use an example from an earlier Archaic culture of the Wabash. Faulkner Side Notched points (Winters, 1967) were important both in the Wabash Valley and in the Cache Valley of southern Illinois, with those from the former area manufactured from Wabash chert. Points from the latter area were manufactured from the large chert nodules of the Mississippian formations of southern Illinois, cherts which we have termed the Dongola Series as a general rubric covering megascopically similar cherts from the formations of the Mississippian series in southern Indiana and Illinois, and large nodules of chert from Cretaceous deposits, which we have named Grand Chain chert.

The two groups vary significantly in respect to length and width, but not in respect to thickness, which we have found to vary little regardless of source or the size of the points within a type. The same pattern of significant variation could be demonstrated for other Archaic types shared between the two areas, with the only apparent variable being that of nodule size, unless we postulate that Archaic cultures of the Wabash had built into them a penchant for smallness. We should be reluctant to espouse such a variety of psychological determinism, particularly in view of the increase in sizes of Woodland projectile points in the same area once large nodules of imported Mississippian cherts became the basic raw material for the manufacture of projectile points.

Perhaps the type of raw material available, then, is one of the factors explaining why projectile points of the Riverton Culture are consistently smaller than other late Archaic points which have been pointed out as being quite small in comparison to earlier and later types. Lamoka points (Ritchie, 1961) and Dustin points (Harrison, 1966), both of which are very similar stylistically to types of the Riverton Culture, will serve for comparison to Merom points of the Riverton Culture (Table 4).

But we must also reiterate that variations in raw material are not sufficient explanation of size, since the peoples of the Riverton Culture did have supplies of Attica chert available to them.

The existence of deposits of the distinctive Attica cherts was reported to us by Mr. John Henry of Danville, Illinois, during the 1963 field season. These quarries are located about eighty-five miles north of the Riverton Site, and are situated on the south side of the Wabash River about eight and a half miles ENE of Attica, in Fountain County, Indiana. Mr. Henry also reported that many of the prehistoric quarry pits are still visible, with exposures of the tabular chert in limestone overlain by the Pennsyl-

TABLE 3

SOME METRICAL CHARACTERISTICS OF FAULKNER SIDE NOTCHED POINTS

| | Length | | Max. Width | | Max. Thickness | |
|---|---|---|---|---|---|---|
| | Range | Average | Range | Average | Range | Average |
| Wabash Valley | 3.0-5.0 cm | 3.9 cm | 1.8-2.9 cm | 2.1 cm | 0.6-1.0 cm | 0.8 cm |
| Cache Valley | 3.9-7.2 cm | 5.1 cm | 1.5-3.9 cm | 2.5 cm | 0.6-1.1 cm | 0.8 cm |

TABLE 4

A COMPARISON OF SOME METRICAL CHARACTERISTICS OF MEROM, LAMOKA, AND DUSTIN POINTS*

| | Length | | Width | | Thickness | |
|---|---|---|---|---|---|---|
| | Range | Average | Range | Average | Range | Average |
| Lamoka Points | 2.5-6.4 cm | 3.2-4.6 cm | - - - | - - - | - - - | 0.6-0.7 cm |
| Merom Points | 1.9-3.6 cm | 2.6 cm | 1.1-2.0 cm | 1.6 cm | 0.4-0.8 cm | 0.6 cm |
| Dustin Points | 3.0-5.05 cm | 3.81 cm | 1.25-1.75 cm | 1.51 cm | 0.5-1.45 cm | 0.75 cm |

*Based in part upon Ritchie (1961) and Harrison (1966)

vanian Mansfield sandstone. Lynn Stephens (personal communication, 1963) reports that a check of the local gravels in the area of the Riverton Culture failed to disclose any Attica chert among the cherts present in the gravels, so that any use of this raw material would have had to depend upon direct or indirect importation from the area of the Attica quarries.

Attica chert is very distinctive in appearance, with the most frequent color variations being a pale ice blue or green banded with gray. In texture, this chert is also unusual, having a very powdery, granular surface. It is possible, in fact to separate many nodules of Attica chert from other Wabash Valley cherts by tactile impressions alone.

No artifacts made from Attica chert were among the specimens from the excavations of either Robeson Hills or Swan Island, although a single Merom point from Robeson Hills, in the collections of Lynn Stephens, is made from what appears to be Attica chert. At Riverton several artifacts had been manufactured from this material. In the 1961 test pits there were two backed knives (Levels 7 and 8) and one chert drill (Level 7), and from the 1963 excavations there were two choppers from the plow zone, a single chopper from Level 1 of Test Pit Alpha, and a Merom Expanding Stem point from the plow zone. A spot check also disclosed that spalls of Attica chert were present in the Riverton Culture features 6A, 27, and 32 of Area X at Riverton. (No check has been made of spalls from Robeson Hills and Swan Island.) But quite apparently, Attica chert was not a favored material, since only 5 out of the 345 (or about 1%) chert artifacts assignable to the Riverton Culture from Area X and the test pits, were made from Attica chert.

It is equally obvious that Attica chert was used primarily for the cruder types of core tools, rather than for the tiny projectile points, microperforators, knives, etc. Perhaps the Riverton people did not care for its granular texture, although projectile points from earlier Archaic cultures in the Attica area demonstrate that it could be successfully manipulated in the manufacture of technically excellent implements. Or perhaps, its tendency to shatter into angular fragments made it unsuitable for a people who were accustomed to working with small flakes. Given such possible deficiencies, regular lengthy trips to obtain Attica chert might have seemed scarcely worthwhile when ample supplies were available locally. But had there been any element in the cultural tradition which emphasized the production of large points, the raw materials could have been obtained for their manufacture.

That Attica chert was not a generally desired raw material is reinforced from our observation of extensive collections from the Illinois, Kaskaskia, Big Muddy, Cache, and Wabash drainages. We have failed to note its presence in these areas in either Archaic or Woodland cultures, and even in the Wabash Valley its use seems to have been limited to a fairly small radius around the quarries. Such a distribution pattern stands in marked contrast to those of the Mississippian or Flint Ridge cherts, which were distributed to areas hundreds of miles from their sources during Woodland times. And in the area of the Riverton Culture, later Woodland cultures, such as Allison and La Motte (Winters, 1967), showed a decided preference for cherts of the Dongola Series, even though many of the sites are closer to the Attica quarries than any of the Mississippian deposits.

We are not quite certain as to why Attica chert is rare or missing at Robeson and Swan Island, but two explanations are advanced as possibilities which are not necessarily mutual exclusive:

1) Attica chert was obtained primarily by hunting parties spreading out from the summer occupied Riverton Site (see below).

2) According to the radiocarbon dates Riverton was still occupied after the other two sites had been abandoned (see below). Perhaps penetration of the upper Wabash did not become effective until the latter portion of the five hundred year span of the Riverton Culture.

There remains to be discussed a residuum of artifacts manufactured from chert of the Dongola Series or of unknown origin. At Robeson Hills, two Adena points (Level 1) and a Saratoga Broad Bladed point (on subsoil at base of midden) were made of Dongola chert. A "Marcos" Corner Notched point (Subsoil pit) and a bifurcated base point (Level 2) were made from cherts of unknown origin. Two drills (from the surface and a subsoil pit) were also made of Dongola chert, both being typologically unlike any of the drills normally associated with Riverton middens.

A single knife made from Dongola chert occurred in Level 9 of a 1961 test pit at Riverton, and from the plow zone of the 1963 excavations of Area X at the same site there was a single Adena point made from a banded chert resembling that from the Mississippian formations near Cobden in southwestern Illinois.

At Swan Island six artifacts of foreign cherts were found in levels 1, 2, 8, and 10. None were types characteristic of the Riverton Culture. Level 1 produced a typologically unidentified projectile point and a knife of Dongola chert; Level 2, a late Woodland corner-notched point; Level 8, a point of unidentified chert; and Level 10, two large point fragments of Dongola Chert.

The preceding data point to the general stratigraphic position of Dongola chert being either very early or very late in the middens, and to the only artifacts of Dongola chert being types associated either with alien Archaic or later Woodland cultures. Accordingly, we feel that Dongola chert was of no practical importance to the Riverton peoples, and that the few artifacts manufactured from this material are to be counted as the result of minor earlier Archaic or subsequent Woodland occupations of the sites.

### Sandstone

Sandstone outcroppings of the McLeansboro formation of the Pennsylvanian series occur at numerous locations in the central Wabash, including the east face of the bluff on which the Robeson Hills site is situated, and sandstone is also present as pebbles and boulders in the local gravels (Lynn Stephens, personal communication, 1962). These fine grained sandstones were used in the

manufacture of pipes, grooved abraders, files, grooved sinkers, "cupstones," hammerstones, manos, and anvils.

Considerable quantities of the same sandstone also occur in the middens as supplies for, or residues from, cooking activities. Some of the sandstone was probably used for stone boiling, while heavy concentrations in shallow pits suggest use in connection with baking or steaming of food such as mussels.

### River Pebbles

Natural pebbles from the glacial gravels were frequently employed as manos and hammerstones, or used as raw material for the manufacture of grooved axes or pebble pendants. It should be noted that ground stone axes and pebble pendants may not actually belong with the Riverton assemblage.

A sample consisting of the forty-one manos from Area X at Riverton was analyzed by Richard Leary of the Illinois State Museum. The results are given in Table 5.

TABLE 5

COMPOSITION OF A SAMPLE OF FORTY-ONE MANOS FROM AREA X AT THE RIVERTON SITE

| | Number | Percentage of Total |
|---|---|---|
| Quartzite | 7 | 17 |
| Granite | 3 | 7 |
| Sandstone | 3 | 7 |
| Limestone | 3 | 7 |
| Rhyolite | 2 | 5 |
| Quartz | 1 | 2 |
| Gneiss | 1 | 2 |
| Arkose | 16 | 39 |
| Diorite? | 5 | 12 |
| Total | 41 | 98 |

No very marked preference for any particular category is apparent. The term arkoses is so non-specific that as an interpretative unit it is of little use for our present purposes. Furthermore, we should have to have a similar analysis of the proportional representation of the various categories in the local gravels before we could even make a suggestion that there had been any selective sorting of the gravels for quartzite or any of the other categories listed.

### Indurated Shale

A fragment of a bi-lunate (?) atlatl weight from the surface at Robeson Hills had been made from gray banded indurated shale, a material which occurs in quantity as pebbles in the local gravels. This particular artifact is not regarded as belonging with the assemblage of the Riverton Culture, since atlatl weights have never been found in actual stratigraphical context in the Riverton middens, but are commonly associated with other Archaic manifestations in the area, even to their being consistently manufactured from indurated shale (Winters, 1967). No example is known of the use of indurated shale by peoples of the Riverton Culture.

### Shale

Outcroppings of shale occur along the sides of the ridge on which Robeson is located. Quantities of shale had been transported onto the site, where it seems to have been used in conjunction with hearths. A single projectile point, typologically Riverton, had been manufactured from shale.

### Limonite

Limonite was found only at the Riverton site, where it had been used in the manufacture of chipped and ground axes and a chopper, all of which were found around the living platforms of Area X. Limonite pebbles can be picked up along the river at numerous spots, and are known locally as mudstone.

Evidence from the Riverton site had also indicated limonite as the source of the red and yellow ocher for the Riverton Culture. According to *Dana's Manual of Mineralogy* (Hurlbut, 1959), "Limonite is the coloring material of yellow clay and soils, and mixed with fine clay makes what is known as yellow ocher," and the correct formula for the mineral, which is termed geothite in its crystalline form, is given by Berry and Mason (1959) as $HFeO_2$. In the central Wabash Valley, the mineral is often found solidified around a nucleus of siltstone.

On heating, the yellow limonite concretions disintegrate to a bright red powder (Denzil Stephens, personal communication), a reaction that one might expect, since red ocher, which is a "red earth variety of hematite," (Hurlbut, 1959) has the formula $Fe_2O_3$:

$$4HFeO_2 \longrightarrow 2Fe_2O_3 + 2H_2O.$$

In addition to the experimental evidence provided by Mr. Stephens, there is corroborating evidence from the site itself. A lump of limonite that had been partially coverted to red ocher was found on the chest of the Riverton Culture Burial 1 in Area X at Riverton, and Feature 23 in the same area consisted of a layer of red ocher powder underlain by a lens of ash. We have interpreted this latter feature as the remains of rather large scale manufacturing of red ocher.

Harrison (1966) has also recently noted the conversion of limonite to red ocher at the Schmidt site in Michigan. This site, at which there is a component of the Dustin Complex, also produces projectile points that are very similar to the Merom points of the Riverton Culture, although Harrison feels that the red ocher pertains to an earlier occupation at the site typified by broad-bladed corner-notched points. Of course, limonite need not have been the only source for red ocher, since Lynn Stephens (personal communication) reports that nodules of red ocher occur naturally in the local river gravels.

Limonite may also have had another function, namely as one element of a fire making kit. Ritchie has pointed out the association of limonite (from decomposed iron pyrites) and strike-a-lights in New York (Ritchie, 1944: 156), and at Riverton, a lump of limonite was found with Burial 1 in Area X near a cache containing a strike-a-light. But the evidence is inconclusive, since the

limonite may also have been the source of the yellow ocher which covered the upper portion of the lower limbs of the burial. As an afterthought, perhaps dual functions for the limonite are not necessarily contradictory in this situation.

## Clay

The common yellow clay found in many areas of the central Wabash was used both for preparing hearths and as the construction material for the clay floors found at all three sites.

An anomalous cylinder of baked clay was recovered at Riverton in the plow zone, thus making its cultural affiliation quite uncertain.

## Bone

Of the numerous species of mammals represented in the middens, only a few had any real importance as sources of raw materials, and the same thing could be said for birds, fish, turtles, reptiles and mussels.

Of the mammals, deer was overwhelmingly the most important at all three sites. Of the 266 mammal bone artifacts identifiable at least to genus, 234 (88%) were deer bone or antler. The remaining 12% included a miscellaneous array of other species such as mink, wolf, raccoon, bobcat, porcupine, beaver, and gray fox, and large mammals such as black bear and man.

### *Deer bone and antler*

Although deer was quantitatively by far the most important source of bone as a raw material, its applications were limited for the most part to the utilitarian groups of the functional categories which will be used in this report in the analysis of the assemblage. The scrapers, awls, shuttles, antler perforators, antler tine flakers, antler drifts, antler gouges, and antler punches all belong within the category of Fabricating and Processing Tools, antler points to Weapons, and the cut and perforated deer phalanges to Recreational Equipment. And in fact, deer bone or antler was the source for practically all bone items within the foregoing categories, the exceptions being beaver and porcupine incisor chisels, raccoon baculum flakers, and single example of raccoon fibula and gray fox ulna awls.

There was considerable selectivity in respect to the portions of deer skeletons used. Disregarding the cranium, of which only the antlers were utilized, only two bones of the post-cranial skeleton were quantitatively of any great significance. This is clearly indicated on Table 6, which is based on all artifacts identifiable to skeleton component.

If some of the unidentifiable bone could definitely be allocated to deer, and to some particular portion of the anatomy of the deer, the list might be expanded somewhat, but we doubt that the general percentages would change to any extent.

With the exceptions noted in the preceding discussion, the bones of other mammals were not used for utilitarian artifacts, and were limited instead to the categories which we have termed Ornamental or Ceremonial Equipment. Thus, we have found the canines of mink, wolf, bear, raccoon, and unidentified small and large carnivores, and a human incisor drilled for use as pendants. The bones of bobcat *(Lynx rufus)* apparently had some special significance, since the perforated and cut mandibles, the red ocher stained femur with Burial 1 at Riverton, and the perforated scapula from Riverton have no apparent attributes suggesting application to any utilitarian function.

TABLE 6

POST-CRANIAL DEER BONES UTILIZED FOR THE MANUFACTURE OF BONE ARTIFACTS IN THE RIVERTON CULTURE

| Bone | Quantity | Percentage of Total |
|---|---|---|
| Ribs (prob. deer) | 34 | 38 |
| Metacarpals | 31 | 35 |
| Metatarsals | 10 | 11 |
| Phalanges | 8 | 9 |
| Ulna | 3 | 3 |
| Scapula | 2 | 2 |
| Intermediate carpal | 1 | 1 |
| Total | 89 | 99 |

In addition to the foregoing, there are a number of bone artifacts such as shuttles, a "forked spatula," bone gouges, pendants, tallies, flakers, a pin, awls, tubular bone heads, and a disc that cannot be assigned to any particular genus since all diagnostic features have been eliminated during manufacture. Many of these are probably deer, however, although a few, such as the tubular bone beads, were obviously made from the bones of small mammals.

### *Bird Bones*

Bird bones were used in the manufacture of awls, "skewers," tubular beads, tubes, flutes, "needles," and shuttles, and an unmodified bird claw was associated with a burial at Riverton. Very few of these bones can be identified as to genus, with the exception of turkey tarsometatarsi which were used extensively as bone awls or skewers at Riverton. Flutes and tubes were made from the bones of large birds, some of which may have been turkey or crane. With the exception of three mammal bone heads, all tubular beads were made from bird bones of varying size, and probably, various species.

### *Turtle*

Carapaces and plastrons were rarely used as raw materials. Rattles were fashioned from the shell of box turtle, and a few anomalous fragments of turtle carapace had cut or smoothed edges. An unmodified section of snapping turtle carapace may have been used as a scoop in the excavation of the pit, Feature 11, in Area X at Riverton. At least, it was lying near the edge of the pit, and seemed to have use polish.

### *Fish*

In spite of the quantities of fish bone available to the inhabitants of the sites, only gar jaws show any evidence of having been a source of raw material. These

TABLE 7

A TABULATION OF PROPORTIONS OF CERTAIN ARTIFACTS AT EIGHT SELECTED ARCHAEOLOGICAL SITES*

| | BA | BU | CH | WA | CA | R | IK | K |
|---|---|---|---|---|---|---|---|---|
| Knives | 2.4% | 12.3% | 0.0% | 7.4 | 1.2% | 0.0% | 3.0% | 16.7% |
| Scrapers | 1.7 | 2.1 | 0.0 | 2.8 | 0.4 | 0.4 | 0.8 | 0.0 |
| Chert projectile points | 6.7 | 9.6 | 1.0 | 0.0 | 0.8 | 5.6 | 0.9 | 2.9 |
| Drills | 1.6 | 2.6 | 0.0 | 0.0 | 0.9 | 2.2 | 0.2 | 0.0 |
| Stone atlatl weights | 57.1 | - | 16.7 | 27.3 | 11.1 | 35.9 | 11.0 | 0.0 |
| Shell atlatl weights | | N.D. | 100.0 | | 100.0 | | 100.0 | N.D. |
| Awls | 39.1 | N.D. | 0.3 | 0.0 | 0.8 | 3.8 | 0.9 | N.D. |
| Fishhooks | 14.3 | N.D. | 0.0 | 0.0 | 0.0 | 1.7 | 1.2 | N.D. |
| Pestles | 10.3 | 3.6 | 0.0 | 0.0 | 1.1 | 2.3 | 1.6 | 4.8 |
| Axes | 12.5 | 0.0 | 0.0 | 7.8 | 4.2 | 2.7 | 1.7 | |
| Rattles | 100.0 | N.D. | - | | 75.0 | 75.0 | 100.0 | N.D. |
| Conch cups | 100.0 | N.D. | | | 100.0 | | 100.0 | N.D. |
| Stone beads | 85.7 | 100.0 | 66.7 | | 70.8 | 100.0 | 81.0 | |
| Bone beads | 37.5 | N.D. | | - | 14.3 | 100.0 | 0.0 | N.D. |
| Perforated canines | 100.0 | N.D. | 100.0 | 100.0 | 93.7 | 100.0 | 100.0 | N.D. |
| Hairpins | 0.0 | N.D. | | | 13.2 | 28.6 | 27.6 | N.D. |
| Disc shell beads | 98.8 | N.D. | 93.5 | 100.0 | 100.0 | 100.0 | 99.8 | N.D. |
| Tubular conch beads | 100.0 | N.D. | 100.0 | 40.0 | 100.0 | 100.0 | 98.5 | N.D. |
| Conch pendants | 87.5 | N.D. | 100.0 | | 100.0 | | 100.0 | N.D. |
| Conch gorgets | 100.0 | N.D. | 100.0 | 100.0 | | 100.0 | 100.0 | N.D. |
| Conch earplugs | | N.D. | 100.0 | | 100.0 | N.D. | 100.0 | N.D. |
| Copper bars | 100.0 | | | | | | 100.0 | |
| Copper pendants | 100.0 | | | | | | 100.0 | |
| Copper beads | | | | | 0.0 | | | |
| Copper pins | 100.0 | | | | 0.0 | | 100.0 | |

*From Winters (1968). BA=Barrett, BU=Butterfield, CH=Chiggerville, WA=Ward, CA=Carlson Annis, R=Read, IK=Indian Knoll, K=Kirkland, N.D.=no data, - = none present.

jaws were cut into sections of varying length for purposes unknown.

*Snail and Mussel Shell*

Of the tens of thousands of mussel and snail shells recovered from the middens, only thirteen had been altered or utilized in any recognizable way.

Single examples of *Ptychobranchus fasiolaris*, *Lampsilis ovata*, and *Campeloma* cf. *integrum*, and two *Actionomatas carinata* shells had been perforated for use as "pendants." A single *Actionomsis carinata* shell seems to have been altered for use as a spoon, and "hoes" or "rakes" had been manufactured by perforating four shells of *Actionomatas carinata* and two of *Lampsilis ovata*.

In addition 40 pearls with a burial at Riverton were presumably derived from river mussels.

### Copper

A few flecks of copper in the midden of Area X are the only certain indication that copper was known to the peoples of the Riverton Culture. Two small fragments, presumably the remains of awls, were in the plow zone of the same area, but may belong with later Woodland or Mississippian occupations, artifacts of which have been found in the plow zone.

As to source, one can only suggest that the copper may equally well have been imported in finished or unfinished form, or derived from local glacial gravels.

## SUMMARY AND INTERPRETATION

Local resources were basic to the technology of the Riverton peoples, and considerable selectivity was noted with respect to the utilization of faunal remains as raw materials. There seems to have been little experimentation with the bulk of the raw materials available. Whether such a pattern reflects only the accrued wisdom derived from experimentation during the preceding millenia or whether it reflects a fundamental technological conservatism are questions that we cannot deal with properly. Perhaps both elements are involved. On the one hand we have a highly efficient set of tools, on the other, remarkably little evidence for change in the use of faunal or mineral resources in the five hundred year period of occupation of the central Wabash and remarkably little anticipation of the proliferation of "ceremonial" artifacts or of the artistic experimentation that marks a number of succeeding Woodland cultures in the Midwest.

We have also presented a picture of a population totally dependent upon the raw materials available in the central Wabash area, with the exception of small quantities of Attica chert from the upper Wabash and, possibly, copper from other sources.

Here, however, a sampling error may have distorted the picture somewhat, due to the very small sample of burials recovered so far from the three sites. We suggest this on the basis of analysis of artifacts from eight sites of the Indian Knoll Culture along the Green River in

Kentucky (Webb 1946, 1950a, 1950b; Webb and Haag 1939, 1940, 1947). At these sites, general utility tools, weapons, fabricating and processing tools, and domestic implements are rarely found with burials, while conch shell and copper are generally present only with burials. A sample from the comprehensive analysis of burial associations shown in Table 7 will illustrate the point.

If the sites of the Riverton Culture should follow the disposition patterns indicated for Indian Knoll sites, we should not expect to have recovered items of conch shell or copper, or much in the way of ceremonial equipment, from the general midden and living areas. But we also should not have expected to recover canine pendants, items which were found in fair quantity in the excavations. And it would seem that some of the shell artifacts should have been exposed during the bulldozing of Robeson when the area was littered with artifacts during the heavy spring rains. But until a larger burial sample becomes available, we cannot be certain that we have presented an entirely accurate picture of the self-sufficiency of the Riverton Culture.

## CHAPTER IV

# The Assemblage of the Riverton Culture

Throughout the following analysis of the artifacts of the Riverton Culture, we have attempted to classify these items in terms of functional categories. Ideally, such a classification should be based on an experimental approach in which contemporary reproductions of prehistoric artifacts are subjected to a number of usages suggested by the form and use characteristics of the prehistoric objects. Such an approach would provide objective data for evaluating the functions of the prehistoric implements, and would certainly be far superior to the subjective evaluations that often pass for functional analysis. But having neither time nor budget for such experimentation, we have had to content ourselves with observations of the primary attributes (i.e. observable techniques of manufacture, the form of the object, and the use characteristics thereof) and secondary attributes (i.e. those of context) of the artifacts, supplemented by the citing of ethnohistorical parallels.

In our immediate emphasis on the assignment of artifacts to functional categories, we depart somewhat from contemporary theoretical orientation in the United States. For example, Hole and Heizer state (1965:121):

"The greatest pressure for giving functional names to artifacts comes from people who know the material the least. More and more, professional archeologists are shying away from such commitments *in their basic reports.* Interpretations about use should properly come after an artifact has been described in such terms that it can be readily comprehended and compared. After the basic descriptions have been made, the analyst should try to discover what functional types are represented. Only when the use of an artifact is unmistakable is it appropriate to name functional types. The distinction between basic description and interpretation of function should always be clearly made."

Although we are not quite certain what a basic report is, in large part, we are not in disagreement with the argument presented by Hole and Heizer. Our basic objection is simply that the two analytic steps advocated by them cannot be regarded as discrete and separable levels of analysis if one's objective is cultural interpretation. That this is the case has been all too apparent during the preparation of the present report. In searching for comparative material, we found no lack of archaeological reports giving basic descriptions of artifacts, but rarely any that included in these descriptions the attributes that are necessary for even the most general sort of functional interpretation. In many cases, copious quantities of metric data were included, none of which seemed to possess any foreseeable utility to the functional analyst. In other cases, ample descriptions of form were provided, apparently with a total unawareness that identical forms may have totally different functions. The latter statement applies in particular to those stemmed objects that are generally lumped within the category of projectile points. Such artifacts may in many cases be either projectile points or knives, with the essential distinctions being found in the chipping and use characteristics of the blade edges. In no publication that we have examined, were these essential attributes described or even mentioned. We would maintain that had the question of function been paramount during the preparation of basic descriptions that such lacunae would not and could not have occurred.

Accordingly, we have tried to combine both description and functional analysis throughout the discussion of the artifacts of the Riverton Culture. To accomplish this end, ten functional categories have been established: weapons, general utility tools, domestic implements, fabricating and processing tools, woodworking tools, agricultural or digging implements, ornaments, ceremonial equipment, recreational equipment, and fire-making equipment. Definition of the categories is deferred to the appropriate section within the body of this chapter. But we must note immediately, that the foregoing categories are not as free from subjective elements as one might wish. For example, woodworking tools might more appropriately be placed within the category of fabricating and processing tools, since this category does have a number of subdivisions (chert working implements, perforating tools, reamers, abrading tools, chisels, weaving implements, sewing implements, and flensing tools). Our only justification for separation of woodworking tools into a separate category is simply that we wished to give more emphasis to this major division of fabricating and processing operations. Again, general utility tools (knives, scrapers, choppers, hammerstones) could have been used for such a variety of operations that we have not seen fit to place them within any of the other possible categories, although they may well be linked to specific categories such as domestic implements, fabricating and processing tools, or even ceremonial equipment. And finally, it is entirely possible that a single item could well be placed within more than one category by virtue of its intrinsic nature. Thus, ornaments are rarely simply decorative baubles among primitive groups, since they usually have connotations that would link them strongly to the functional category that we have termed ceremonial items.

Of course, there is the inevitable residue of artifacts that we have not been able to assign to any category. This unhappy limbo of miscellaneous artifacts derives

from a variety of factors including the inability of the present observer to define attributes suitable for any functional assignment, small sample size for certain artifacts, and the generally fragmentary condition of still others.

At this point, it would be well to note that the very possibility of functional analysis is questioned by some archaeologists. One common objection is that one can never really know what a particular artifact was used for, a view that is then buttressed by the citing of an ethnographic example in which knives, projectile points, or other artifacts have been used for strange and exotic purposes which could not be deduced from the primary attributes of the specimen or even, in many cases, from the secondary attributes. But such an objection is not entirely logical, being based upon a confusion of a class of artifacts with the individual components of that class. And, indeed, we should be the first to agree that no *individual* artifact can be classified with any certainty as to function, but we should also maintain that as a representative of a class of artifacts which can be shown statistically to be made to a consistent pattern with characteristic evidence of usage and context, the individual specimen can be assigned to a class on the basis of statistical tendency rather than on the basis of absolute identification of the function of each specimen. If we may be permitted an analogy, the present sort of objection would lead to a comparable analytic impasse if physical anthropologists were to declare upon discovering that some groups used crania as bowls that it was impossible to determine the functions of bones of the cranium through analysis of their characteristics in general and those of the systems of which they are a part.

Following Turner (1964: 28), the problem posed by the foregoing objection can be expressed as the failure to distinguish analytically between *sign* and *symbol*, with sign taken to mean the expression of the known thing, symbol the expression of unknown fact.

In no way, however, do we intend to minimize the difficulties that pertain to functional analysis. Many raw materials are so slightly modified, either by preparation or use, and are so lacking in meaningful secondary attributes that they practically defy analysis. Or many artifacts may have undergone a series of modifications in function, with the net result that several conflicting attributes are present. But on the other hand, there are large quantities of artifacts which do conform to traditional patterns of primary attributes within and among cultures, and which do have informative contextual placement. Our own feeling is that the bulk of classifiable artifacts in any site fall into the latter group, and that we can legitimately define *classes* of objects which are designated as knives, manos, skewers, hammerstones, gouges, etc. through detailed inspection for both primary and secondary attributes.

A second objection to functional analysis is often posed when ethnohistoric data are introduced as comparative material in the analysis of prehistoric artifacts. Criticism here follows the line that historic artifacts. Criticism here follows the line that historic cultures in eastern North America either have not been or cannot be linked to continue extending into prehistory, and that, accordingly, historically identified functional classes cannot be related to prehistoric classes of objects. We consider the logic of this objection vulnerable.

One of the striking things about most of the historic cultures in eastern North America is that they were primarily those of hunters and gatherers, most of whom practiced agriculture in varying degrees of intensity. In terms of total allotment of time, only a few weeks in the summer and fall were spent by a few individuals in agricultural activities. Males were only slightly involved in the agricultural cycle, and the references to the prolonged hunting expeditions of males and to the gathering activities of the females are legion. We should expect, then, that the bulk of the various categories of utilitarian artifacts should be functionally identical to those developed through the experimentation of earlier hunters and gatherers such as the peoples of the Archaic. In fact, apart from pottery making equipment and bows and arrows, we have not been able to identify so much as one *new item of basic equipment* in eastern North American after the end of the Archaic. The spindle whorl may be an exception to this statement, but it is very possible that the ceramic spindle whorls of Late Woodland and Mississippian times replaced earlier forms made from a variety of perishable materials known from historic examples elsewhere in North America. Grooved axes may give way to celts; dart and spear points may be replaced by arrow points; ornaments may go through endless elaborations; leaf-shaped knives may be supplemented by lamellar flake blades; the simple "hoes" of the Indian Knoll Culture may be replaced by more elaborate Woodland and Mississippian types; simple Archaic dwellings and "ceremonial" structures may be replaced by elaborate structures on truncated pyramids; *ad infinitum ad nauseam;* but functional equivalences remain whether we are talking about pipes or pottery. Stylistic variations have been emphasized, the social systems of which the styles are a part, have not.

As far as we are concerned, the burden of proof must rest upon those who would maintain that the artifacts of historic hunting and gathering groups cannot be viewed as a heritage derived from the millenia of experimentation of then prehistoric predecessors. But since, such a position may well be viewed as too extreme, we have not depended upon historic parallels in the subsequent sections for the functional assignments of our Archaic artifacts. Instead, we have first reached a conclusion based on the primary and secondary attributes of the artifacts themselves, drawing, when necessary, on other Archaic cultures of the Midwest for supplemental data. Ethnohistoric data have then often been inserted where parallels with the prehistoric artifacts seemed indicated, or when it was felt that the historic material might provide a model for further investigation of the prehistoric artifacts. Essentially, we have taken the position of Clark (1964: 172) when he states, "Study of ethnography will not as a rule . . . give [the archaeologist] straight answers to his queries. What it will do is to provide him with hypotheses in the light of which he can resume his attack on the raw materials of his study. In fact, the great value of ethnography to the prehistorian is that it will often suggest to him what to look for."

## GENERAL UTILITY TOOLS

Within this grouping are tools of such generalized nature that they could have been used in connection with a variety of activities. Thus, the two most important categories, knives and scrapers, could have been associated with hunting, domestic, fabricating, or even wood working activities. Perhaps better techniques of evaluating their use characteristics would permit placement of general utility tools within the latter categories, but until such analytic refinements are developed, we have no alternative to using the admittedly unsatisfactory term of general utility tools.

### Knives

With a few exceptions all knives recovered from Robeson Hills, Riverton, and Swan Island were made of local cherts. Data on the utilization of exotic cherts are provided both in Chapter III and under the description of individual knife types in this chapter. With one exception, all are crudely chipped, with rarely any retouching of the blade edges. A full listing of knives from all sites is given in Tables 2, 3, and 4 with provenience data on artifacts from Area X at Riverton included within the text itself.

Distinction is made between knives and projectile points mainly upon the characteristics of the blade edge. Knives were usually fashioned by removing a series of alternate flakes from adjacent faces of a flake, thus producing a wavy, saw-like edge. If the knife had been used to any extent, the edges were dulled through wear and hinge fractures developed along the edges. Projectile points, on the other hand, showing chipping which tends to produce a straight, even edge. With the exception of very early and very late projectile points, projectile points were generally stemmed, while knives were much less frequently prepared for hafting in this fashion. Of course, many projectile points have been rechipped or show wear along the edges indicating use as a knife, and there are instances where chipping techniques have produced items which scarcely fall within either category.

Knives seem to have varied somewhat in importance within the sites. They were a consistent item in all levels at Riverton and Swan Island. But they do not seem to have been nearly so important a part of the assemblage in the lower midden of Robeson Hills, where shell concentration is heavy. (See Table 10 which includes all classifiable and unclassifiable Riverton type knives within zones. Excluded are the late triangular forms and those of unknown provenience).

*Triangular Knives (Plate 6 a-n)*

Robeson Hills

All triangular knives were found either on the surface or within the upper two feet of the midden. (See Tables 8, 9, and 10 for stratigraphic distribution of all knife types). While general stratigraphic data for triangular knives is not good in the southern Illinois area, they have so far been found in Archaic context only in sites of the Riverton Culture but are common in subsequent Woodland and Mississippian cultures.

I. Straight sides. Three knives were straight sided, with a convex base. The base was either completely unmodified or reduced to a thick edge. Only the tips were moderately well chipped. Two knives were lenticular in cross section and the third, plano-convex.

II. Convex Sided. A single convex-sided, irregular-based knife was found. The base was unthinned and the cross section might best be described as plano-triangular.

Riverton Test Pits:

The single, triangular, convex sided knife from the surface may well pertain to a late occupation (Woodland or Mississippian).

Riverton Area X:

Four examples were found in 1963, providing firmer evidence that the small triangular form does occur in association with the Riverton Culture. Since two were definitely present in Riverton features. This form is probably late in the culture, however.

Provenience: One each from the plow zone, Feature 18, Feature 21, and Level 1 (0-6 inches) of Test Pit Alpha.

TABLE 8

DISTRIBUTION OF KNIVES AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Zone | Level | Triangular | | Lanceolate Flattened Base | Leaf-shaped | | Backed Knives | Unclassifiable Riverton Types | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Straight Sided | Convex Sided | | Flat Base | Convex Base | | | |
| I | Surface | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| I | 0-12" | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 6 |
| I | 12-24" | 0 | 0 | 0 | 1 | 4 | 1 | 4 | 10 |
| II | 24-36" | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| II | 36-48" & Below | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| II | Subsoil Pits | 0 | 0 | 0 | 1 | 3 | 0 | 1 | 5 |
| | Junction of Midden & Subsoil | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | Uncontrolled Provenience | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Total | | 2 | 1 | 2 | 3 | 7 | 4 | 9 | 28 |

TABLE 9

DISTRIBUTION OF KNIVES AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Lanceolate | | Leaf-shaped | | Stemmed Knives | Backed Knives | Rectangular | Pentagonal | Triangular, Convex Sided Knives | Unclassifiable Riverton Types | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flat | Convex | Flat | Convex | | | | | | | |
| Surface | 5 | 1 | 2 | 1 | 1 | 1 (Rectanguloid) | 1 | | 1 | 6 | 19 |
| 1 | | | 1 | | | | | | | | 1 |
| 2 | | | | | | 1 (Triangular) | | 1 | | 1 | 3 |
| 3 | | | | | | 1 (Triangular) | | | | 3 | 4 |
| 4 | | | | | 1 | | | | | 3 | 4 |
| 5 | | | | | | | | | | 2 | 2 |
| 6 | | | | | | | | | | 4 | 4 |
| 7 | | | | | | 1 (Rectangular) | | | | 1 | 2 |
| 8 | | | | 1 | | 1 (Rectanguloid) | | | | | 2 |
| 9 | | | | 1 | 1 | 1 (ovoid) | | | | 4 | 7 |
| 10 | | | | 1 | | | | | | 2 | 3 |
| 11 | | | | | | | | | | | 0 |
| 12 | 1 | | | | 1 | 1 (Rectanguloid) | | | | | 3 |
| 13 | | | | | | | | | | 1 | 1 |
| 14 | | | | | | | | | | 1 | 1 |
| 15 | | | | | | | | | | | 0 |
| 16 | | | | | | | | | | | 0 |
| Total | 6 | 1 | 3 | 4 | 4 | 7 | 1 | 1 | 1 | 28 | 56 |

TABLE 10

DISTRIBUTION OF KNIVES AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Lanceolate | | Leaf-shaped | | Backed Knives | Tri-angular | Free Flake Knives | Unclassifiable Riverton Types | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Flat Base | Convex Base | Flat Base | Convex Base | | | | | |
| I | 1 | 1 | | 3 | 2 | | | | 2 | 8 |
| II | 2 | 1 | 1 | | | | 1 | | 2 | 5 |
| II | 3 | | | | 1 | 1 | | 1 | | 3 |
| III | 4 | | | 1 | 3 | | 1 | | 1 | 6 |
| III | 5 | 1 | | | 5 | | | | 4 | 10 |
| III | 6 | | | | 1 | | | | 2 | 3 |
| III | 7 | | | | 1 | 1 | | 1 | 1 | 4 |
| III | 8 | | | | | | | | 1 | 1 |
| IV | 9 | | | | | | | | 1 | 1 |
| V | 10 | | | | | | | | 2 | 2 |
| Total | | 3 | 1 | 4 | 13 | 2 | 2 | 2 | 16 | 43 |

Swan Island:

While two definitely triangular specimens were found, they probably are unrelated culturally. The specimen from Level 4 looks more like an unfinished example of a micro-point with the blade type of chipping along the edges. The triangular knife from Level 2 is a short, broad, convex sided form commonly associated with Late Woodland or Mississippian manifestations.

*Leaf Shaped Knives (Plate 7)*

Robeson Hills:

These knives are rather elongated in terms of length to width proportions, with maximum width well above the base. All are, accordingly, convex sided. All knives within the group occurred below the upper one foot of the midden, and there was a decided concentration in the second one-foot level within a chert workshop area found between twelve and eighteen inches in Test Pit D. Leaf shaped knives are extremely common in both the Archaic and Woodland Cultures.

1. Flat Base. The knives of this group are generally long and narrow. The base is either straight or slightly convex, and is thinned to a distinct edge. The cross section is lenticular (2 specimens) or triangular-convex (1 specimen).

TABLE 11

DISTRIBUTION OF ALL KNIVES AT THE ROBESON SITE BY ZONES

| | | Percentage of Total |
|---|---|---|
| Surface and 0-24". Zone I | 16 | 70 |
| Subsoil Pits and 24-48+". Zone II | 7 | 30 |
| Total | 23 | 100 |

II Convex Base. The proportions of these decidedly convex based knives range from long and narrow to short and broad. Of the eight examples, the bases of two were thinned, the remainder being unthinned or only partially so. In cross section, six were triangular-convex, one was plano-triangular, and another plano-convex.

Riverton Test Pits

Leaf shaped knives were a common form through the midden, with many of the unclassifiable fragments probably belonging within the descriptive category. As at Robeson, the knives were of micro-tool size, with lengths ranging from 2.2 to 3.8 cm. (average 3.3 cm.), widths from 1.4 to 2.1 cm. (average 1.8 cm.), and thickness from 0.6 to 1.0 cm. (average 0.9 cm.). Cross sections are usually triangular or lenticular.

Riverton Area X:

Eight leaf shaped knives were found. One of these, from the plow zone, was much larger than and shaped in a different fashion from the normal Riverton leaf shaped knives. Its general characteristics suggest an Adena knife, and it probably belongs with the minor Adena component at Riverton, traces of which have been found only in the upper six inches of the midden.

Provenience (Riverton knives): Five came from the plow zone, one from Feature 18, and one from Level 3 (12-18 inches) of Test Pit Alpha.

Swan Island

Leaf shaped knives were common in the midden, constituting about 63% of the classifiable forms, and many of the unclassifiable fragments probably were from leaf shaped knives. As at Riverton, the flat based forms were concentrated in the upper portion of the midden. One of the flat based knives from Level 1 was made from chert of the Dongola Series.

*Lanceolate Knives (Plate 8 a-f)*

Robeson Hills

Slender knives with straight, parallel sides are included within this category. There are three major varieties, one group having a straight to slightly convex base, another a markedly convex base,and a third a flat base. Knives of lanceolate shape are very common on Archaic sites, and the form persists into the Woodland Culture.

The two examples from the Robeson Hills Site (one from the surface and one of unknown provenience) have slightly convex, thinned bases and lenticular cross sections.

Riverton Test Pits

Flat-based, lanceolate knives were not found at Robeson Hills, but six examples occurred at Riverton. Five of these were from the surface and one from Level 12. Lengths ranged from 3.7 cm. to 5.2 cm., widths from 1.7 cm. to 2.3 cm. and thicknessess from 0.8 to 1.2 cm. In cross section, two of the surface specimens were lenticular, two were convex triangular, and one was lozenge shaped. The lanceolate knife in Level 12 had a lenticular cross section.

Riverton Area X

Eight lanceolate knives were recovered.

Provenience: Seven were in the plow zone and one came from Level 6 (30-36 inches) of Test Pit Alpha.

Swan Island

Lanceolate blades were concentrated within the gray loam of Zones I and II (Table 8), indicating that these knives were late at the site, as they generally seem to have been at Robeson Hills and Riverton.

*Pentagonal Knives (Plate 6 o-q)*

Riverton-Test Pits:

A single pentagonal knife from Level 2 had a concave, beveled base and a plano-triangular cross section. Length, 3.6 cm.; width, 1.8 cm.; thickness, 0.8 cm.

Riverton Area X:

Only two pentagonal forms occurred, with both coming from the plow zone. The general distribution pattern of this very small sample from the 1962 and 1963 excavations suggests that they were very late at the site and possibly not even Riverton Culture.

Robeson and Swan Island:

No examples of pentagonal knives were found at either of these sites.

*Stemmed Blades (Plate 8 k)*

Riverton Test Pits:

Four knives from the surface and levels 4, 9, and 12 have a very short, broad, crudely chipped, convex stem. Stem lengths of these micro-knives range from 0.4 to 0.8 cm., with an average of 0.6 cm. All cross sections are triangular.

Riverton Area X

A single example was recovered from the plow zone of Annex I. As with the plow zone of Annex I. As with the 1961 examples, the stem is simply a small rounded protuberance, set off from the blade by weakly developed shoulders.

Robeson and Swan Island:

No definite examples of stemmed knives were found at either of these sites, although two of the Robeson Contracted Stem projectile points from Zone II at Robeson might better be classified as stemmed knives.

*Ovate Knives (Plate 8 m-o)*

Riverton Area X

Only three of these were found, with one example being of the backed type. No doubt they actually belong

to the Riverton Culture, and if they were they must have been very late. None were found at either Robeson Hills or Swan Island.

Provenience: Two came from the plow zone and one from Level 1 (0-6 inches) of Test Pit Alpha.

*Backed Knives (Plate 9)*

Backed knives have one unthinned side which often has had its edges dulled by battering. Shapes of backed knives include ovate, rectangular, triangular, and irregular forms. The dull edged, unthinned side makes an ideal gripping surface for use as a hand tool.

While these tools are very common on Archaic sites in the Midwest, they are usually reported in the literature, if at all, as blanks, choppers, cores, rejects, spalls or unfinished tools.

Robeson Hills:

The four examples from Robeson Hills, all irregular forms, occurred primarily in the upper midden (two from 0-12 inches and one each from 12-24 inches and 24-36 inches).

Riverton-Test Pits:

The two triangular examples were found in Levels 2 and 3, perhaps indicating that they are late forms. Their respective dimensions are lengths, 2.5 and 3.8 cm; widths, 1.8 and 2.3 cm; thicknesses, 1.0 and 0.9 cm. In cross section the former is triangular and the latter is convex triangular.

Rectanguloid specimens are from the Surface and from Levels 7,8, and 12 (Zones III and IV). Dimensions: lengths range from 3.7 to 4.9 cm., with an average of 4.3 cm; widths, from 2.0 to 2.9 cm., with an average of 2.3 cm; thicknesses from 1.1 to 2.0 cm., with an average of 1.4 cm. Cross sections are lenticular, lozenge shaped, and triangular.

Swan Island:

Only two backed knives were recovered from widely separated levels of the midden. The uppermost of these (Level 3) was sub-rectangular in shape, with a single blade edge and two blunted sides. The lower example (Level 7) was avoid with a broad convex blade edge which had been formed by the removal of very large flakes in an alternate fashion from the two faces.

*Free Flake Knives*

Riverton Area X:

These were simply chert flakes with one or more edges chipped to a cutting edge. Six were recovered.

Provenience: One from the surface, three from the plow zone, one from Feature 17A, and one from Level 4 (18-24 inches) of Test Pit Alpha.

Swan Island:

The knife from Level 3 had a straight edge and the knife from Level 7, a convex edge.

*Unclassifiable Knife Fragments*

All Sites:

All of the twenty-three unclassifiable knife fragments from Area X at Riverton were from the microknives typical of the Riverton Culture, as were the nine unclassifiable fragments from Robeson, the sixteen from Swan Island and probably all or most of the forty-seven fragments from the test pits at Riverton, which could not be assigned to specific types.

Provenience in Area X at Riverton. One from the surface, twelve from the plow zone, one each from features 18, 21, and 26, and from Level 2 (6-12 inches) of Test Pit Alpha, and two each from Features 25 and 26, and from Level 1 (0-6 inches) of Test Pit Alpha.

## Scrapers

*Flake Scrapers (Plate 10 a-o)*

Robeson Hills.

Only two examples of scrapers were found in excavation (12-24 inches and 24-36 inches), and none were present on the surface. Both scrapers were made on free flakes, and have the steeply beveled edge typical of scraping tools. One scraper has a straight and convex scraping edge; the other concave and straight edges.

Riverton Test pits:

Seven flake side scrapers were recovered, with one each in Levels 4, 6, 7, and 8, and three from the surface. The scraper from Levels 4 and 7 are simply utilized flakes, with the example from Level 4 having a straight edge and that from Level 7 a convex edge. The specimen from Level 8 is a rock spall which has numerous file marks on one surface and a worn, straight sided, scraping edge. The three surface specimens and the scraper from Level 6 have retouched edges which are, in sequential order, straight (2), recurved, and convex.

Riverton Area X:

Scrapers were as rare in Area X as in other excavations in sites of the Riverton Culture. Of the total of eleven scrapers of all types found during the 1963 season, only two could be said to be definitely in association with Riverton artifacts, these being a free flake side scraper from Level 8 (42-48 inches) of Test Pit Alpha and a utilized fragment of greenstone in the cache with Burial 1.

The remaining seven flake scrapers were from the plow zone of area X, six of these being side scrapers and one an end scraper.

Swan Island:

As in the other shell middens, scrapers were very rare. A single flake scraper was found in Level 2, but since Level 2 contained a small amount of material from later cultures, this single edged, straight sided scraper could not be definitely associated with the Archaic occupation.

*Miscellaneous End Scrpaers (Plate 10 p, r-t)*

Riverton Test Pits:

A single end scraper came from Level 8 (Pl. 10 p). The scraper is a truncated triangle in shape and has a pentagonal cross section. Although common on Archaic sites in Southern Illinois, such end scrapers are represented in the shell middens of the Central Wabash by only this single specimen from Riverton. Use polish is

heavy on the convex side of the bit, rather than on the plano surface. Such use characteristics are encountered frequently on Southern Illinois specimens. As with other lithic implements in the shell middens, the triangular end scraper is a micro-tool, being only 2.1 cm. in length, 1.5 cm. in width, and 0.6 cm. in thickness.

A rectanguloid end scraper with a triangular cross section was found on the surface. Both shape and size (4.1 cm. long, 2.2 cm. wide) would argue against assignment of the specimen to the Riverton Culture occupation.

Riverton Area X

An end scraper from the plow zone of Area X was made on a lamellar flake (Pl. 10 s), a type generally found in Early or Middle Woodland context in the Midwest. Since neither lamellar flakes nor end scrapers made on lamellar flakes have ever been associated with the Riverton Culture, the present specimen is probably associated with one of the minor Woodland occupations known from surface collections at Riverton.

Swan Island

A micro-point fragment from Level 1 had been reworked into an end scraper.

Robeson Hills:

No end scrapers were recovered from the midden at Robeson Hills.

*V-Bit Scrapers (Plate 10 q)*

Riverton Area X:

One of the surface finds was an example of the V-bit variety, apparently used for making or scraping triangular grooves. Precise cultural association is unknown for the V-bit scraper, since it has never been found in Illinois in stratigraphic context. However, a number of variations of the form are known from Cache River sites having heavy Archaic occupations with some Woodland material. We doubt that it actually belongs with the Riverton assemblage since no examples of this form were found at either Swan Island or Robeson, and none have ever been found in good Riverton Culture context at the Riverton site.

*Shokeshaves*

Riverton Test Pits

A single chert spall from the surface had a chipped, concave depression on one edge. The diameter of 0.8 cm. would indicate usage as a scraper on comparatively small items. Since no comparable example has been found in any of the excavations, this particular artifact may well belong to one of the minor Woodland or Mississippian occupations of the Riverton Site.

## Choppers (Plate 11)

By a chopper we are referring to implements that have had one edge prepared by the removal of large flakes from alternate faces to produce a wavy convex or straight edge. The surface prependicular to the chopping edge is left unthinned, and often shows deliberate crushing of the sharper edge, providing a very effective area for gripping. The chopping edge is often blunted through use, with hinge fractures developed more heavily on one face than the other, since the blows struck with the chopper were apparently at an angle.

Ovoid, rectanguloid, and irregular forms are the commonest in the Midwest and it is possible that the first two style variations may have temporal significance. There are also trapezoidal choppers of unknown cultural affiliation and stemmed choppers which are probably late Archaic. Neither of the latter appear in the Riverton Culture.

Robeson Hills.

Two choppers were found in Test Pit D, one at 6-12 inches, the other at 18-24 inches. The former was simple a pebble which had alternate flakes removed to form the wavy bit which typifies chopping tools. The second was a more elaborately worked flat pebble (Plate 31 b) with a deep narrow groove encircling the pebble near the top, forming a poll. A second narrow groove had been cut across one face. The grooves were so narrow (3 to 4 mm.) that we doubt that they were intended for hafting. The bits of both showed considerable battering.

Riverton Test Pits:

A single fragment of a chert chopper was found on the surface.

Riverton Area X.

Thirteen choppers were recovered in 1963. Eleven of these were chert, and two were limonite with one of the latter having a sandy siltstone nucleus (Pl. 11 b). Two of the chert choppers from the plow zone were made from Attica chert, and a third from Level 2 of test Pit Alpha was made of the same material. All other examples were Wabash chert.

Provenience: Two of the chert choppers were from the surface, seven from the plow zone, one from Level 2 (6-12 inches) of Test pit Alpha, and one from an unknown provenience. The two limonite choppers came from the plow zone and from the clay platform, Feature 2. There was an obviously low correlation of choppers with the numerous clay floors and other features excavated in 1963.

In view of the rarity of choppers in previous excavations and the superficial position of the present specimens, it is entirely possible that most of the choppers belong with one of the later occupations rather than the Riverton Culture.

Swan Island

A sub-rectangular, convex-bitted, chert chopper of uncertain cultural affiliation was present in the surface collections.

## Hammerstones

Almost three decades ago Ritchie (1929) remarked, "Despite the real significance of the hammerstone, it has received scant attention from archeologists, partly, it may be suspected, because its abundance has bred a species of

contempt. So far as the writer can determine it has an almost negligible place in archeological literature." His remarks could well have been made today, since with rare exceptions, the hammerstone category remains a sort of catch-all for pebbles that show some degree of battering. If one is concerned only with space-time analyses perhaps it is not of great consequence that the hammerstone category receive specific attention, but if the objective is interpretation of the functioning of a prehistoric society, then it is of the greatest importance that pebbles that have been used only for hammering be differentiated from those that have hammering usage as an adjunct to some other function, as in the case of pebble manos. In the present report, the term hammerstone will be applied only to those specimens which show no utilization other than that of hammering.

Robeson Hills:

Five natural pebbles, two of sandstone and three of igneous (?) rock were recovered at various levels in the site (see Appendix III A). Four showed hammerstone usage on one end, one example on two ends. (See discussion of manos for other implements showing use as hammerstones.)

Riverton Test Pits and Area X:

As at all sites in the Midwest, hammerstones were quite rare in the Riverton Site. Two examples from Levels 4 and 9 were extremely unusual in that they were bi-pitted. The third specimen, from Level 5, was simply a utilized pebble.

No examples of hammerstones were associated with the living platforms of Area X, although a maul-like object was found in the plow zone near the platform, Feature 30 (Pl. 31 a).

Swan Island:

Two pebbles showing considerable battering at the ends were found in Levels 6 and 10.

## WEAPONS

By the term weapon we include any implement designed primarily for the killing or procurement of fauna, or any object which is a component part of such an implement. Thus the basic criterion is the possession of properties appropriate to the effecting of an untimely demise of some member of the faunal community, and we shall not attempt to interpret whether the intent of the maker towards fish, deer, mussels, and his fellow man was malicious or otherwise.

### Hunting Implements

*Projectile Points.*

Projectile points have been differentiated from knives by the straight chipping of the edges (see section on knives). Local river cherts were normally used for points throughout the Robeson midden, but two Adena points, a single Saratoga Broad Bladed point, a "Marcos" Corner Notched point, and a bifurcated base point were made from foreign chert. The Adena points and the Saratoga Broad Bladed point were made from blue-gray and gray chert of the Dongola Series.

The typology used in classifying the projectile points from all three sites is based on an analysis by the author of some 3000 projectile points from the Cache River Valley in southern Illinois. The "type" Adena Stemmed (Bell, 1958; Ritchie, 1961) is already in the literature, although a definitive statement has never been prepared in respect to cultural affiliation, physical attributes, temporal range, or geographical distribution. The only as yet unpublished type cluster names which we shall use in this report are Boaz Constricted Stem, Mounds Stemless, and Saratoga Stemmed. In addition the new types specific to the Riverton Culture will be described in detail.

Stratigraphic distribution of all projectile points is given in Tables 13-16.

Other small points somewhat similar to the points from the Robeson and Riverton sites have been found in Wisconsin (Durst Stemmed: Wittry, 1959a, b); Pennsylvania (Mayer-Oakes, 1955a); and West Virginia (Mayer-Oakes, 1955b, Dragoo, 1959). Durst Stemmed points (Wittry, 1959b, Fig. 10) resemble the sloping shoulder variety of Merom points in both form and size, although the former points tend to be slightly larger and to have decidedly longer stems. Robeson Constricted Stem, however, is not found in the Wisconsin sites and would seem to be rare or missing in the Pennsylvania and West Virginia area.

Points very similar to Merom Expanding Stemmed are reported for the preceramic levels of Signal Butte II (Strong, 1935). The Signal Butte points apparently differ from Merom in being slightly larger and thinner, having lenticular cross sections, and having a higher incidence of basal grinding.

But by far the strongest similarities of the small points from the sites of the Riverton Culture are to Ritchie's (1961) Lamoka points, Binford's Dustin points, Dragoo's (1959) small stemmed and notched points from the Dixon and Rohr rock shelters, and to unpublished points from Indian Knoll. Actually, the Riverton points can be distinguished easily from Lamoka specimens by the differences in basal preparation. Unthinned bases are one of the outstanding features of the Lamoka points, while the bases of Riverton points are almost always thinned (See Appendix V). But twenty-four Indian Knoll points, which also strongly resemble Lamoka, are identical to the Riverton specimens (Lewis R. Binford, personal communication). Perhaps the presence of such points at Indian Knoll should not be too surprising in view of the comparatively short distance between the central Wabash Valley and the Tradewater and Green Rivers in Kentucky. Furthermore, as we shall point out later there are grounds for including Riverton as one of the regional cultures, along with the Indian Knoll and Eva Cultures, of the Midcontinent Tradition. Dr. Douglas Schwartz of the Department of Anthropology of the University of Kentucky has kindly provided data on the provenience of these distinctive points at Indian Knoll (Table 12).

TABLE 12

VERTICAL DISTRIBUTION OF TWENTY-FOUR SMALL RIVERTON-LIKE CHERT PROJECTILE POINTS FROM INDIAN KNOLL

| Depth | Number |
|---|---|
| 0.0-0.5' | 7 |
| 0.5-1.0' | 4 |
| 1.0-1.5' | 2 |
| 1.5-2.0' | 4 |
| 2.0-2.5' | 1 |
| 2.5-3.0' | 2 |
| 3.0-3.5' | 1 |
| 3.5-4.0' | 3 |

All of these points were within the upper four feet of the midden, with about 70% in the upper two feet, and two thirds of them occur within a zone delimited by the 400 and 401 foot contour lines, with minor concentrations of the points in the southeast and northwest corners of the knoll. But the area of major concentration is only about five feet deep, so that the points were being introduced into the midden for about four-fifths of the period during which midden building occurred.

Dragoo (1959) has also dealt with the stratigraphic position of points similar to those of the Riverton Culture at the Indian Knoll and Carlson Annis sites. Dragoo found that these points, which he termed Lamoka-like were primarily concentrated in the upper midden at Carlson Annis. Of the thirty-seven "Lamoka-like" points, 72.9% were above the 1.5 foot level, 83.78% above the 3.5 foot level, with none in the lowest levels. Quite obviously these points are both quantitatively insignificant and late in time at Carlson Annis.

Recently, Rollingson and Schwartz (1966:10) have recorded additional occurrences of small projectile points from mixed component sites in the Cumberland and Tradewater River drainages in Kentucky. These are described as Lamoka points, although the authors note that the Kentucky specimens, unlike the Lamoka points described by Ritchie, do not have untrimmed bases.

Of the thirty-eight examples, one came from the Henderson Site located on a tributary of the Cumberland River, nineteen from the Morris Site situated on a tributary of the Tradewater River, and eighteen from the Parrish Site located on a tributary of the Tradewater River (Rollingson and Schwartz, 1966: Figs. 6 e, 49 e, 61 e). Notably, two of the sites, Henderson and Morris, produced "gravers" that appear from the illustrations (Rollingson and Schwartz, 1966: Figs. 8c, 58a) to be much like the Jaketown perforators of the lower Mississippi Valley and the Riverton Culture of the Wabash Valley, although the authors attribute those from the Morris Site to the Paleo-Indian component at that site.

From the brief description and few illustrations of the Kentucky specimens, it is not possible to make any exact comparison with the projectile points of the Riverton Culture. But, if the illustrations are representative of the range of variation of the small points, it would seem that the specimens from the Kentucky sites do not correspond precisely to either Merom Stemmed or Trimble

TABLE 13

DISTRIBUTION OF CHERT PROJECTILE POINTS BY ONE-FOOT LEVELS AT THE ROBINSON HILLS SITE

| Zone | Level | Robeson Constricted Stem | Trimble Side Notched | Merom Expanding Stemmed | "Saratoga" Broad Bladed | Bifurcated Base | "Matcos" Notched | Adena Stemmed | Mounds Stemless: Triangular, Beveled Base | Mounds Stemless: Lanceolate | Mounds Stemless: Leaf-shaped | Unclassifiable Riverton Points | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | Surface | 0 | 0 | 4 31% | 0 | 0 | 0 | 0 | 0 | 1 100% | 0 | 10 | 15 |
| I | 0-12" | 0 | 0 | 3 23% | 0 | 0 | 0 | 0 | 2 67% | 0 | 1 100% | 0 | 6 |
| I | 12-24" | 1 33% | 1 100% | 1 8% | 0 | 1 100% | 0 | 2 100% | 0 | 0 | 0 | 3 | 9 |
| II | 24-36" | 0 | 0 | 3 23% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| II | 36-48" & Below | 2 67% | 0 | 1 8% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| II | Subsoil Pits | 0 | 0 | 1 8% | 0 | 0 | 1 100% | 0 | 0 | 0 | 0 | 1 | 3 |
| | Junction of Midden & Subsoil | 0 | 0 | 0 | 1 100% | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Uncontrolled Provenience | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 33% | 0 | 0 | 3 | 4 |
| Total | | 3 | 1 | 13 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 19 | 46 |

TABLE 14

DISTRIBUTION OF CHERT PROJECTILE POINTS BY SIX-INCH LEVELS AT THE RIVERTON SITE

| Level | Trimble Side Notched | Merom Expanding Stemmed | Mounds Stemless | Antler Points | Miscellaneous | Unclassifiable | Total |
|---|---|---|---|---|---|---|---|
| Surface | 13 | 41 | 1 | 3* | | 21 | 79 |
| 1 | 1 | | | | 1§ | | 2 |
| 2 | | 4 | 1 | 1† | 1" | 2 | 9 |
| 3 | 1 | 3 | | 1 | | 1 | 6 |
| 4 | | 3 | | 2 | | 1 | 6 |
| 5 | | 3 | | | | 4 | 7 |
| 6 | 2 | 1 | | | | 6 | 9 |
| 7 | 3 | 1 | | 1‡ | | 2 | 7 |
| 8 | 4 | 5 | | 2 | | 1 | 12 |
| 9 | | 4 | | | 1" | 1 | 6 |
| 10 | | 2 | | | | 3 | 5 |
| 11 | 3 | 5 | | | | 1 | 9 |
| 12 | 3 | 1 | | | 2P | 2 | 8 |
| 13 | | 2 | | | 1** | | 3 |
| 14 | | | | | | 1 | 1 |
| 15 | | 1 | | 1 | | 1 | 3 |
| 16 | | | | | | | 0 |
| Total | 30 | 76 | 2 | 11 | 6 | 47 | 172 |

*1 Single Tanged and 1 Untanged †Double Tanged ‡Single Tanged §Adena Stemmed "Affinis Lowe Flared Base
PParallel Stemmed **Robeson? Stemmed

Side Notched projectile points. With very few exceptions, the Riverton specimens are triangular bladed and have well defined shoulders, and thus conform to the authors' type description of their Lamoka points (Rollingson and Schwartz, 1966: 10) as being lanceolate in form, with straight to convex edges, and a weak shouldered or shallow side notched stem. The same differentials exist between Ritchie's Lamoka points (1965: Pl. 14) and the Kentucky points, since the blades and shoulders of the former correspond much more closely to the Riverton examples than to the lanceolate points from the Kentucky sites.

Of course, the procedures of classification and the interpretation of typological similarities and dissimilarities depend on the objectives of the analyst. If the delineation of a tradition, following Caldwell's (1958) usage of the term, is the objective, then the recognition of a Lamoka "series" defined only on broad similarities, rather than exact correspondence of all attributes, may best serve the objectives of the classifier. If, on the other hand, delineation through space and time of the limits of specific cultural boundaries is desired, then the definition of local types based on minor attribute variation provides the

TABLE 15

DISTRIBUTION OF CHERT PROJECTILE POINTS AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Merom Expanding Stem | Trimble Side Notched | Robeson Constricted Stem | Antler Points | Late Corner Notched | Mounds Stemless | Unclassifiable | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Surface | | | | | 1 | | | 1 |
| I | 1 | 5 | 1 | | | | 1 | 4 | 11 |
| II | 2 | 2 | | | 1* | 1 | | 1 | 5 |
| II | 3 | 5 | 1 | | 1† | | | 4 | 11 |
| III | 4 | 2 | | | | | | | 2 |
| III | 5 | 4 | | | | | | 1 | 5 |
| III | 6 | 2 | 1 | 1? | 2‡ | | | 3 | 9 |
| III | 7 | 2 | 1 | | 2§ | | | 2 | 7 |
| III | 8 | | 2 | 1? | 1" | | | 4 | 8 |
| IV | 9 | | | | 3P | | | | 3 |
| V | 10 | | | | | | | 2 | 2 |
| Total | | 22 | 6 | 2? | 10 | 2 | 1 | 21 | 64 |

*=1Double Tanged, 1 Fragment; †=1 Double Tanged, ‡=1 Tanged Fragments; §=1 Single Tanged, 1 Plain; "=1 Plain; P=1 Double Tanged, with Notched sides, 1 Basal Notched, with Notched Sides, 1 Plain.

TABLE 16

DISTRIBUTION OF ANTLER PROJECTILE POINTS BY ONE-FOOT LEVELS AT THE ROBESON HILLS SITE

| Zone | Level | Quantity | Remarks |
|---|---|---|---|
| I | 0-12" | 0 | |
| I | 12-14" | 2 | 1 single tanged |
| II | 24-36" | 0 | |
| II | 36-48" | 0 | |
| II | Subsoil Pits | 1 | |
| | Uncontrolled Provenience | 1 | 1 double tanged, unsocketed, in midden at least 2' below surface |
| Total | | 4 | |

most satisfactory comparative units. And, as we move from gross space-time studies of isolated descriptive categories to the internal analysis of single cultural units, and comparisons among them, the latter approach to classifications will become more and more important. Accordingly, while we are willing to postulate, for the time being, a Lamoka series, embracing the projectile points of the Lamoka, Dustin, and Riverton Cultures, and the as yet undefined cultures within which similar forms occur in Kentucky and elsewhere, we cannot agree that the examples illustrated and described for the Kentucky area conform to Lamoka points, *in sensu stricto*.

If one can trust the C-14 dates on antler from Indian Knoll and Carlson Annis, one might assign a time range of approximately 3,000 to 2,000 B.C. for these points at Indian Knoll, actually making them from fifteen hundred to five hundred years earlier than the points at Riverton (See pages 104-5 for discussion of Riverton Culture dates) But these twenty-four "Riverton" points represent only 0.7% of the total 3,606 classifiable points at Indian Knoll, and the thirty-seven points at Carlson Annis only 1.8%. It does not seem likely that these points are a type being developed with the Indian Knoll Culture, but rather an intrusive type appearing consistently with the larger stemmed, corner notched, and side notched points which occur in great quantities in the midden. Obviously, we can do little more towards interpreting the meaning of these points at Indian Knoll and Carlson Annis, particularly since adequate comparative data are unavailable in any of the publications on Lamoka, the West Virginia rock shelters, and the sites of the Indian Knoll Culture. But as a hypothesis we shall propose the following: Only Merom, Trimble, and Robeson points appear with the Riverton Culture, with Merom predominant. The Indian Knoll points closely resemble the Riverton types. Therefore, the points should be intrusive into Indian Knoll from the Riverton Culture or a closely related culture. Three alternative conclusions then follow: 1) An undiscovered culture with points like those of Riverton existed during the period from 3,000 to 2,000 B.C., or 2) Riverton has an earlier unlocated antecedent, or 3) The already questionable Indian Knoll C-14 dates are incorrect and Riverton, or an equivalent cultural group, was the source of the points between 2,000 and 1,000 B.C. Only survey, excavation, and adequate C-14 dates can provide a basis for choosing among the alternatives, if ultimately there need be any single choice.

*Robeson Constricted Stem Points (Plate 12 a-g)*
Robeson Hills

During the initial analysis of projectile points from Robeson Hills, several bulbous base points were placed in a descriptive category termed Robeson Constricted Stem (Pl. 12 a-g) Since then, we have seriously come to doubt that the descriptive category is legitimate, although it cannot yet be dismissed from consideration. One of the reasons for the initial creation of the category was the resemblance of the base to projectile point types and categories described for other areas of the Midwest and South, to be summarized hereafter. Our present reason for doubting the parallels for most of the points in question, aside from their rarity in the Riverton sites, is that re-analysis of the points in question indicates that most of the Robeson points are probably nothing more than Merom or Trimble points that have been rechipped to form a bulbous base. Moreover, Merom and Trimble points were the only types recovered by Mr. Lynn Stephens in his sizeable collection from the bulldozed midden at Robeson. In fact, all of the Robeson points at Riverton and Swan Island may be examples of the latter sort, and of the three at Robeson Hills itself, the example from the 12-24 inch level may well be a reworked Merom or Trimble point, and the chipping of the remaining two (Pl. 12 a) is such that they might better be classified as stemmed knives than projectile points. However, since there is still an element of doubt about the reworking of some specimens, we shall retain the category of Robeson Constricted Stem for the time being.

The stem is characterized by a marked constriction at the top and a bulbous base. Bases are generally thinned, with basal or side grinding very rare on the stem. Serration or beveling are seldom found on examples within the type cluster. Shoulders can be straight, forward sloping, or barbed. In cross section the blade is either lenticular, plano-convex, or triangular. Blade shapes range from straight or convex sided triangular, to lanceolate with one form or the other characteristic of a given type category with the type cluster.

The examples which resemble Boaz points from Robeson Hills are extremely small in comparison to the type series, probably in part because of the very small size of the available chert pebbles. A comparable situation can be noted for the Raddatz and Durst Rock Shelters in Wisconsin (Wittry, 1959a, 1959b), where projectile points made of local cherts by peoples of both the Archaic and Woodland Cultures are extremely small in size.

Boaz Constricted Stem types appear late in the Archaic at Modoc Rock Shelter (Fowler, 1959) many specimens in Fig. 9A and B) and apparently persist into Early Woodland. The types comprising Boaz Constricted Stem occur in quantity in southern Illinois, with their northern limit as yet unknown, but perhaps occurring in quantity no farther north than the Kaskaskia River Valley. The distribution south of the Ohio River is unknown, but they are not illustrated for the Indian Knoll

sites. Points similar to one type of Boaz have been described for the lower Tennessee Valley (Lewis and Kneberg, 1959, among Fig. 1 of undifferentiated points of the Big Sandy Phase), the upper Tennessee Valley (e.g. Webb and DeJarnette, 1942: Pl. 159 and Fig. 32, Type 8), and the lower Mississippi Valley (Ford and Webb, 1956: Fig. 21, l-m and p. 63), where they are termed Palmillas Points after the descriptive category contained in *An Introductory Handbook of Texas Archaeology* (Suhm and Krieger, 1954). The general stratigraphic position of Webb's Type 8 points in the Albama shell middens, the Big Sandy Phase assignment of the Lower Tennessee Valley specimens, and temporal placement of Palmillas Points in the lower Mississippi Valley (Ford and Webb, 1956: Fig. 24) tend to reaffirm our conclusion that types of the Boaz type cluster are Late Archaic or Early Woodland.

So far the occurrence of Robeson Constricted Stem points in an area extending as far as thirty miles north of the Robeson Hills Site has been limited to rare occurrences at other shell middens ($Cw^V319$ and $Cw^V170$), where other artifacts are identical with those of Robeson Hills.

Riverton Site Test Pits:

Only two dubious examples of this category were found in Levels 2 and 13 of the test pits at Riverton.

Riverton Area X:

Four somewhat dubiously identified examples occurred, with one each from the plow zone and Features 2 (in floor), 11, and 17A. All were Wabash chert.

Swan Island:

There were two Robeson Constricted Stem in Zone III (Table 8). Swan Island obviously resembles Riverton more closely than Robeson in respect.

*Merom Expanding Stem (Plate 13)*

From 1.9 to 3.6 cm. in length and from 1.1 to 1.8 cm. in width. Light basal grinding, side grinding, and beveling of blade edges are rare; light to heavy serration of the blade edges is a fairly common attribute. Basal thinning is typical, but in some examples the base is unthinned or only partially thinned. In cross section the points are usually triangular, an attribute of Late Archaic projectile points, but some examples are plano-convex, lenticular, or lozenge shaped in section. Blades are always triangular in shape, with convex or straight edges. Bases are frequently convex, less commonly straight, and rarely concave. Beveling of the bases occurs in slightly over a third of the examples.

Robeson Hills:

Thirteen Merom Expanding Stemmped points were found in Zones I and II, thus establishing cross ties with the Riverton and Swan Island shell middens, where these forms are also common. All of the Robeson examples were manufactured from Wabash chert.

Riverton Test Pits:

Merom points are found throughout the midden and outnumber Trimble points about three to one in the surface collections (Table 4). Stratigraphically Trimble points seem to cluster in the lower part of Zone III and the upper part of Zone IV. Perhaps Trimble points have a more limited temporal range in the Riverton Component than Merom points.

Riverton Area X

The forty-seven examples of this type were identical to those from previous excavations. A single Merom point was made from Attica chert, the rest being made from the local Wabash cherts in nearby gravel deposits.

Provenience: Six from the surface; twenty-one from the plow zone of Area X; one each from Feature 1, 6, 6A sub, 15, 17A, and 32; three from Feature 27; one from general midden north of Feature 13; three from Burial 1, and one from Burial 2. In Test Pit Alpha, two came from Level 1 (0-6 inches), one from Level 5 (24-30 inches), one from Level 6 (30-36 inches), and two from Level 7 (36-42 inches).

Swan Island:

Merom Expanding Stem was by far the dominant projectile type at Swan Island, outnumbering Trimble Side Notched about four to one.

*Trimble Side Notched (Plate 14)*

From 2.1 to 3.5 cm. in length, and from 1.0 to 1.8 cm. in width. Basal grinding, side grinding, and beveling of the blade edges are rare. Serration of the blade edges is found in about one third of the specimens. Basal thinning is present in 94% of the examples. The points show a high incidence of triangular cross sections, but many are lenticular, and there are rare instances of rhomboidal and plano-convex sections. Blades are always triangular in shape, with straight or convex edges. Bases are usually convex, occasionally straight, and rarely concave.

Both Meron and Trimble points are notable for their extreme smallness, the largest points barely overlapping the dimensions of the smallest point types known for the Illinois area, with the exception of very late Woodland and Mississippian points.

Robeson Hills:

A single Trimble point manufactured from Wabash Chert was found in the 18-24" level of Zone I.

Riverton Test Pits:

Trimble points occurred at Riverton in considerable quantity. Although widely distributed vertically in the midden, somewhat greater concentrations seem to have been present in Levels 6-8 and 11-12 than in the lower and uppermost levels. All were manufactured from Wabash Chert.

Riverton Area X:

Only five Trimble points were found, with one each from the surface, plow zone, and Feature 15, 17A, and 25. All were Wabash chert.

Swan Island:

Although not uncommon in the midden, Trimble points were somewhat scarcer at Swan Island than at Riverton. At the former site the ratio between Merom

and Trimble was ca. 4:1, while at Riverton the ratio was only 2.5:1. All examples were manufactured from Wabash chert.

*Riverton Stemmed (Plate 12 h-l)*
Riverton Test Pits and Area X and Swan Island

This is a new and provisional type, although examples have been found previously. At Swan Island a point from Level 7 belongs in this group, and at Riverton two examples came from Level 12 and one example from Level 9 of the 1961 excavations. Two more examples were found in the 1963 excavations, one being in the plow zone of Area X and the other on the surface of Feature 7. Six points are hardly sufficient for establishing a type, but, even though rare, they have occurred consistently in Riverton Culture context. They may, however, been nothing more than heavily reworked Merom and Trimble points. All have very short, parallel sided or slightly contracting stems and are, with the exception of the Swan Island specimen, well within the range of the attributes of the other micro-points of the Riverton Culture.

The examples from Levels 9 and 12 at Riverton had triangular blade and the partially thinned bases were straight. In cross section the points were lenticular. Dimensions of one were: length, 1.9 cm., width, 1.3 cm., thickness, 0.5 cm., of those from Area X, length 3.1 cm., width 1.6 cm., thickness 0.8 cm., and 2.3 cm. by 1.3 cm. by 0.5 cm. The latter points had triangular cross sections.

The Swan Island specimen had a very short, parallel sided stem and a long triangular blade with a plano-triangular cross section (Pl. 12 h).

*Unclassifiable Projectile Points of the Riverton Culture*

Nineteen fragments form Robeson, forty-seven from the Riverton test pits, and sixteen from Swan Island were almost certainly Riverton types but could not be assigned to specific types. An additional twenty-three fragments were recovered from Area X as follows. One from the surface, fourteen from the plow zone of Area X, one each from Features 18 and 31, two each from Features 1 and 27, three from Level 1 (0-6 inches) of Test Pit Alpha, and one from Level 5 (24-30 inches) of Test Pit Alpha. All were made from local Wabash cherts.

*Adena Stemmed (Plate 15 g-i, k-l)*
Robeson Hills

Two projectile points from Level 3 of the site closely resemble Adena Stemmed. These points, made from cherts of the Dongola Series, have the short rounded base typical of Adena Stemmed. Neither is basally ground, a trait often noted for points of the Adena type.

Riverton Test Pits

A crude Adena Stemmed point was found in Level 1.

Riverton Area X

Two bases of Adena Stemmed points were in the plow zone of Area X. One of these was fairly well chipped from a piece of Cobden Banded chert, an obvious import into the central Wabash Valley. The other, a very crude example, was made from local Wabash chert. Neither specimen had any grinding of the stem.

*Bifurcated Base Points (Plate 15 n)*
Robeson Hills

A bifurcated base point of local chert was found at a depth of 12-18" in Test Pit D. The base was lightly ground, and beveling on two edges of the same face gave the blade a markedly trapezoidal cross section.

Similar points are illustrated from such Adena sites as the C and O Mounds (Webb, 1942: Fig. 7 d) and the Peter Village site (Webb, 1943: Fig. 22b). However, bifurcated base points are rare in both of these sites, and are apparently completely missing from other Kentucky Adena sites. Accordingly, we cannot assume Adena affiliation on the basis of the rather uncertain Kentucky data, particularly since similar points (Montell Points) are generally assigned to an Archaic context elsewhere (see e.g. Bell, 1958; Suhm and Krieger, 1954). Similar points are known from the Cache River Valley of southern Illinois, where they are few in number and widely dispersed, and are reported from New York (Ritchie, 1961), again as a readily distinguishable, but rare, type, the provenience and cultural affiliation of which is not established. Bifurcated base points are illustrated for the Allegheny drainage of Pennsylvania, where they are assigned to the Archaic (Mayer-Oakes, 1955b, P. 108). Variants of this form also occur in Virginia, where they seem to be early (Holland, 1955, Fig. 23). In Tennessee LeCroy points and related varieties may belong to a bifurcated base cluster, and are perhaps assignable to Woodland cultures (Lewis and Kneberg, 1957) although we doubt such an association.

*"Marcos" Points (Plate 15 j)*
Robeson Hills:

A single projectile point of foreign chert with light basal and side grinding, lenticular cross-section, and a convex sided blade strongly suggests a variant of Marcos Points (Bell, 1958; Ford and Webb, 1956; Suhm and Krieger, 1954). This point was found in subsoil Pit S-19, which was uncovered by grading operations and could not therefore be related to the controlled excavation units at the site.

*Saratoga Points (Plate 15 m)*
Robeson Hills

A parallel stemmed point (Plate 6 d) perhaps belongs within the type cluster, Saratoga Stemmed, variety Broad Bladed, which has been tentatively assigned to the Late Archaic. This point, of chert of the Dongola Series, was found at the junction of the midden and the sterile sub-soil. Another example of this variety was recovered in the bulldozed midden by Mr. Lynn Stephens of Robinson, Illinois. These Saratoga points probably do not belong with the major occupation at the site, since they differ markedly in size and form from the micro-points associated with the Riverton Culture.

*Twisted Blade Points*
Robeson Hills

These three points are very similar to the points named Pandale Twisted Blade by J. Charles Kelley (Bell, 1958; Suhm and Krieger, 1954). They have the pro-

nounced opposed beveling of blade and base which give the peculiar propellor like effect characteristic of the Pandale points. The twist was produced deliberately on these specimens and was not the result of the chipping of curved or twisted flakes. Blade and stem shapes and the poorly developed shouldering also correspond to the Pandale specimens illustrated by Bell (1958) and Suhm and Krieger (1954).

Points of this peculiar form are apparently quite rare in the Wabash Valley, since only two other examples are known. These latter are from $Lw^V224$ and $Lw^V225$ (Spellman No. 2 and Spellman No. 3), which are sites on adjacent knolls about seven miles southwest of the Robeson Hills Site (Winters, 1967). Unfortunately, the Robeson examples were recovered from bulldozed midden by Mr. Lynn Stephens, and their context in the site is unknown. They were undoubtedly produced locally, since one specimen was made from chert of the Dongola Series and the other two from local cherts. At present they must remain anomalies in terms of known projectile point types in the Midwest.

*Faulkner Side Notched*

Robeson Hills:

A single reworked Faulkner Side Notched pint was found by Mr. Lynn Stephens in bulldozed midden. It is reported as having come from near the junction of the midden and sterile soil.

*Lowe Flared Base Points (Plate 15 e)*

Riverton-Test Pits:

A base of an affinis Lowe Flared Base (Winters, 1967) point (Pl. 18 s) was also present in Level 2.

Swan Island:

This type (Winters, 1967) was represented by a single specimen found in Level 5 in a groundhog burrow along with a Late (?) Woodland, cordmarked sherd. The flat base and slightly expanding stem typify a form associated with the LaMotte Culture sites in the Central Wabash. The point is made from chert of the Dongola Series.

*Late Corner Notched Points (Plate 15 p-q)*

Swan Island:

Two fragments of points with narrow, diagonal notches, lenticular cross sections, and light basal grinding were recovered from the surface and Level 2. These cannot be related to any defined type, but their frequent occurrence on very late sites in the Wabash Valley suggests that they will eventually be assigned to a Late Woodland or Mississippian manifestation. The stratigraphic position of these points at Swan Island certainly would not contradict such an assignment, since both Late Woodland and Mississippian sherds are present in the upper one foot of the midden. One of the points is made from a foreign chert.

*Mounds Stemless (Plate 15 r-x)*

Robeson Hills:

A third group falls within a type cluster which we have termed Mounds Stemless. These are small triangular, lanceolate, and leaf shaped points, generally associated with Late Woodland and Mississippian sites in southern Illinois (Winters, 1967). All three forms generally appear together on late sites in the southern part of the state and apparently consititute types within a single tradition of projectile point manufacture. The triangular points at Robeson Hills all have beveled bases, the latter feature characterizing a variety within the triangular type of Mounds Stemless. Single examples of crude lanceolate and leaf shaped forms were also found. With the exception of a single specimen of uncontrolled provenience, all examples of this type cluster were found either on the surface or within the upper one foot of the midden, indicating a minor utilization of the site as a Late Woodland or Mississippian hunting camp. All the Mounds Stemless were made from local cherts.

Riverton Test Pits:

Examples of Mounds Stemless points were recovered from the surface and Level 2. The presence of Mounds points indicates a very minor late usage of the site by hunting parties of the Mississippian or Late Woodland culture. The point from Level 2 had been made on a flake, and the sides were lightly serrated. Dimensions were: Length, 2.3 cm.; width, 1.8 cm.; thickness 0.4 cm.

Riverton Area X:

Four points of the Mounds Stemless type cluster came from the site in 1963. Two came from the plow zone of Area X, while the other two of these were surface finds on other parts of the site. All were of the triangular Madison type (Scully, 1951), with minor variations in attributes, and all were made from local Wabash cherts. One had a lenticular cross section, straight base, straight sides, and serrated edge; a second, a convex-triangular cross section, eared base, and concave sides; a third, plano-triangular cross section, eared base, and concave sides; and a fourth, a plano-convex cross section, eared base, and concave sides. The feature of basal "earing" seems to be a common characteristic of this particular local variety of the Madison point. All probably represent a minor camp attached to the Riverton Bridge Site, a Mississippian hamlet lying due east of the Riverton Site, on the east side of the Wabash in Sullivan county, Indiana.

Swan Island:

A single triangular point of this type cluster was found in Level 1. The point has straight sides and base, one beveled edge, a steeply beveled base, and a plano-triangular cross section. Cultural assignment could be either to the Late Woodland or Mississippian components on the site, since the typology of triangular projectile points is still too poorly defined to permit specific assignment in most areas of the Midwest.

*Miscellaneous Unclassifiable Projectile Points (Plate 15 a-d)*

Swan Island

The four unclassifiable points are quite distinctive, both as to raw material and size. Two from Level 10 are made from chert of the Dongola Series. One of these is the top of a large projectile point, the other is a fragment

from the junction of the base and the stem. Another fragment of a point blade from Level 8 is made from a chert of unknown origin. A heavily battered projectile point blade of Dongola chert from Level 1 had been rechipped along the lower portion, producing a crude point with a deeply concave sided base.

*Antler Projectile Points (Plate 16)*

While we have interpreted these artifacts as projectile points, alternative explanations of function have been made for the tanged variety of socketed tine. Morse (1963: 34), for example, presents the view that the tanged variety is an atlatl hook, adducing as evidence the known existence of the atlatl in "Hopewell," the careful preparation of the barb, the positioning of the barb, and the occurrence of polish on the barb. Some tanged antler objects might have been satisfactory for such a purpose, but a considerable quantity have such slight, broadly rounded tangs that we do not see how they could possible have functioned as atlatl hooks. Neither would such an assignment of function explain why numerous examples have opposed pairs of tangs, or even triple tangs, nor why many specimens are deliberately filed to a very sharp tip. Careful preparation may reflect nothing more than standards of craftsmanship, and polishing of the tangs could just as easily result from wear from hafting materials.

Wright and Anderson (1963, Pl. XXVI) illustrate a tanged antler tine with a scraper inserted into the hollowed base, but the text states only that among the artifacts with Burial A, there were, ". . .two end scrapers (and). . .one antler handle into which one of the scrapers fits. (Wright and Anderson, 1963:7)" If we interpret the text correctly, the scraper was an object that could have been inserted into the antler artifact, rather than actually being found as part of the composite unit illustrated in Plate XXVI. It is rather surprising that if these conical objects were generally employed in eastern North America as handles for scrapers or other implements, there are not more composite units known in the literature from the numerous burials which included conical, socketed antler objects as part of the grave goods.

In respect to sites of the Riverton Culture, these antler objects are plentiful, having been recovered from all three sites, while scrapers of any type are rare. And only one of these, a triangular end scraper from Level 8 of the 1961 excavations at Riverton, could possibly have been fitted into the hollowed ends of the antler tines. Thus the quantitative data from the Riverton Culture sites give little support to the suggestion that antler tines with conical sockets are handles for scrapers.

A more subtle and difficult problem in the identification of the function of socketed tines is posed by items of recreational equipment known as snow snakes in historic times. Several varieties of these are illustrated by Culin (1907: Figs. 538, 540, 542), but are classifiable under two general categories of socketed tines. According to Culin (1907: 399), "the bone slider, in which a piece of bone or horn, stuck with two feathers, is made to slide along the ice. . . [and] a game in which a javelin, sometimes feathered and commonly tipped with horn, is made to slide along the ground or to dart through the air, after being made to glance by striking the earth or some other obstacle." Notably of the latter category Culin (1907:400) says, "The third form of darts is probably derived from arrows."

So far there are no definite criteria for identifying these conical, socketed items of recreational equipment in archaeological sites where accessory elements have not been preserved. Historic examples on display at the Museum of the American Indian in New York are larger than any of the prehistoric specimens that we have seen, but the size differential may be the result of selection for large examples deemed to be particularly suitable for museum display. It is possible that the punctated, incised, or painted designs mentioned for some historic examples may serve as clues in analyzing prehistoric examples, but we are hesitant to imply any necessary equation between form and function.

If the prehistoric pattern of use of these items of recreational equipment were the same as that of historic times, namely as a winter game played on snow or ice, there would be grounds for doubting that most of the socketed antler tips of the Riverton Culture were prepared for usage as snow snakes. Of the total of 54 such objects, 38 (70%) were recovered from the Riverton Site, 11 (20%) from Swan Island, and only 5 (10%) from Robeson Hills. As we shall show in Chapter VII, there are good grounds for linking Riverton with a summer occupation, Swan Island with a spring and/or fall occupation, and Robeson Hills with a winter occupation. Thus the objects are least common at the site occupied when snow and ice would have been present and most common at a site when neither would have been present. Unfortunately, exceptions to the general pattern of historic usage make the problem considerably more complex than the previous interpretation would indicate, since some of Culin's citations show that some groups such as the Teton Dakota and Omaha (1907: 418-19) used snowsnakes at other times of the year as well, there being, for example, an autumnal variant for the Teton Dakota. Accordingly, we cannot rule out the possibility that if the snow snake were an item of Riverton equipment, it would not necessarily have been used in association with snow and ice.

Perhaps the problem will never be adequately resolvable, if, as Culin suggests, the recreational equipment were derived from already standardized weapons hence, making identification of prehistoric snow snakes a difficult, if not impossible, task, since the weapon and the recreational equipment may have been one and the same object.

On the positive side, there is a considerable amount of evidence from ethnographic studies of historic Indians that socketed antler tines were actually used as projectile points. For example, Barrett (1933: 290, Pl. 59, figs. 1-3) illustrated three historic hafted antler points obtained from the Sauk Indians of Oklahoma by M. R. Harrington for the collections of The Museum of the American Indian, Heye Foundation. Two have blunted tips and plain bases. A third, hafted specimen has a sharpened tip

and a double tanged base, and is attributed to one of the Central or Eastern Algonquian tribes.

Skinner (1925: 148) also mentions antler arrowheads for the Sauk, and cites an informant who stated that he had such antler arrowheads using the following technique: "The antler was boiled in plain water for several hours, the addition of wood ashes being wholly unnecessary, until it softened so that it could be easily whittled into shape. The prongs were detached by girdling and breaking, and a conical opening was made in the porous base for the reception of the naked distal or striking end of the arrowshaft. The gluey substance which had been removed was then replaced, and the shaft thrust in. As it cooled, the point became very hard and firm and stuck tenaciously to the shaft. When hard once more, it was usually sharpened by grating on a rough stone, such as a block of sandstone."

Willoughby (1901, Pl. X, a-d) illustrated antler tipped arrow shafts from the Peabody Museum of Harvard University. These latter are attributed to unspecified southeastern Indians, with the comment that many of the specimens in the Peabody collection being discussed were obtained during the eighteenth and early nineteenth centuries. All four of the antler points are double tanged, and two of the four had been painted red.

There are also contextual data that point to the use of plain and tanged base antler objects as projectile points by prehistoric societies in eastern North America. Skinner (1947: 17-19) describes and illustrates numerous triangular stone, plain and tanged antler, and bone points that were found among the bones of a group of burials at the Burial Ridge Site near Tottenville, Staten Island, New York, with evidence in several instances that the points had been lodged in the body. In particular, one example is reported as follows: "The most interesting wound of all was one where an antler-tipped arrow had plowed through one side of the body and fully one-third of the point had passed through one of the ribs, making a hole, in which it remained."

In view of the flaws in and the lack of supporting evidence for the atlatl hook theory, the generally negative evidence for the handle theory, the contextual evidence for the use of antler tines as weapons prehistorically, and the historic examples of tanged and untanged projectile points, we shall continue until adequate evidence is presented to the contrary to term antler tines with conically socketed bases, tanged or untanged, projectile points. But we also recognize that these antler objects may have been recreational equipment, or weapons used for the latter purpose.

Robeson Hills:

Only five deer antler projectile points were present in the excavation and bulldozed midden, but were found in widely separated areas, indicating that they probably occurred throughout the site. Two of the points were tanged, one having a single tang and an unfinished example, a double tang. The bases of the remaining two were broken, but enough remained to show that if the points were tanged at all, they would have had to have been of the single tanged variety. The bases of the three finished specimens had been ground smooth. Additional antler points found during the final phase of midden destruction were all untanged, indicating that the latter variety was important within the site. A single untanged specimen found in bulldozed midden by Mr. Orlin Stephens of Robinson, Illinois, had two opposed groups of short notches rising vertically from and parallel to the base (Pl. 16 h). One group had six notches, the second group, seven notches.

Riverton Test Pits.

Most of the antler projectile points were found above Level 9, suggesting that this type of point may have been in common use only during the latter portion of the Archaic occupation of the site. In size, they ranged from 4.3 to 9.2 cm., with an average length of 6.7 cm. Thus, they are well outside the upper limits of the chert projectile points in respect to length. Concentric reaming marks are clearly evident in the conically socketed base.

A point from Level 4 had had two opposed groups of short, parallel grooves; both groups were parallel to the base, with each group having three irregularly spaced grooves (Pl. 16 k). Another point from Level 8 had two narrow, parallel lines engraved around the base (Plate 16 e). With one exception, the identifiable antler points were either double or single tanged.

Riverton Area X:

A total of twenty-seven antler points were present in the excavations. As in previous excavations they can be classified roughly in two categories: tanged and untanged.

Seven examples were of the tanged variety, with three having a single tang, two having opposed tangs, one having triple tangs, and the seventh being unclassifiable. The single tang points came from Feature 1, Feature 6A, and Burial 1. Double tang points were present in Feature 17A and the plow zone, and the triple tang point was found in Feature 6A. The unclassifiable point was from the plow zone.

Four of the tanged points had sharp tips, two had blunt tips, and one was unclassifiable. One of the sharp tipped points came from Burial 1, and was interesting in that it was an unfinished artifact. The base had been cut to shape, the tip sharpened, and boring of the hafting cavity had been completed. A simple chert drill from the same burial cache as the point fitted exactly the conical cavity. Only filing and polishing of the surface and base of the point remained as operations in finishing the point.

Only five plain base antler points were recovered. Three of these were from the plow zone, and the fourth was in Feature 32, about five inches below the north edge of Feature 2. Three points had sharp tips, and the tips of two were missing.

The remaining fifteen antler points were unclassifiable. Seven came from the plow zone, one each from Features 1, 16, 31, and 32, and three from Feature 6A. Feature 31 is a clay house floor, and the point was covered on its west edge by the midden of Feature 6.

Swan Island:

Tanged antler projectile points predominated in the midden, with the greatest concentration of all types in the lower half of the midden.

Two points with rows of notches on the side were recovered from a storage pit beginning at 54 inches in Square 50I 7. One of these had an arc removed from the base, producing a basally notched effect. Above the notch were two parallel grooves and on the opposite side of the point were 10 parallel grooves. The second point was double tanged with four parallel grooves incised on the side of the point between and above the tangs. On the opposite face two widely spaced arcs had been incised. The variable spacing, shortness, and narrowness of the grooves would argue against their being prepared for bindings around the points. The practice of placing such incised grooves on antler points is known from all three of the Central Wabash shell middens, although the practice is not common at any of the sites.

Any unfinished point from Level 2 illustrates very well the process of antler point manufacture. The tine had been filed down (probably with a sandstone file) prior to cutting a deep tanged groove around the tine and breaking the tine away from the rest of the antler. Subsequently, a depression had been hollowed out on the base (probably with a small knife) and drilling had been started (probably with a chert drill).

## Atlatl Weight

Robeson Hills.

Single fragment of a bilunate (?) atlatl weight (Pl. 17 o) made from an irregularly banded, gray indurated shale was found on the surface near the bluff line at the east edge of the site. The atlatl weight seems rather out of place in terms of the other artifact types on the site, and we shall tentatively interpret its presence as evidence of a very minor use of the area by peoples of the "Wabash" Archaic Culture.

Riverton and Swan Island:

No atlatl weights were found during any of the excavations, but a weight has been reported from a surface collection at Riverton.

In short, the atlatl weight is in all probability not an item pertaining to the Riverton Culture assemblage.

## Fishing Equipment

In spite of the importance of fishing at Riverton and Swan Island, few artifacts can be identified with this subsistence activity. Probably the fishing techniques of the Riverton people involved equipment of a perishable nature.

*Gorges (Plate 17 p)*

Robeson Hills

A single double pointed gorge was found in Test Pit B at a depth of 18-24 inches. The gorge was made from a well smoothed fragment of unidentifiable bone.

Swan Island

A sliver of bird (?) bone from Level 6 had been filed down to form a double pointed implement. One of the edges between the points showed a number of perpendicular, parallel abrasions of a type suggesting wear from usage, while the filing marks on the opposite edge were uninterrupted by an wear pattern. The unbroken tip shows some shattering, but not of the sort that would expect from repeated blows on the tip. Nor is there any use pattern or polish which would suggest that the implement was an awl. We can only make a tentative suggestion that the bi-pointed bone sliver may have been a gorge. Perhaps we should also consider the possibility that it may have been the pin for a cup and pin game, since three cut and perforated deer phalanges were found in Level 7 in an adjoining square.

*"Forked Spatulae" (Plate 17 e)*

Riverton Test Pits:

A single example of a bone artifact of the type often referred to as a forked spatula (Webb, 1946: 289, Figs. 45 B, D) was found in Zone IV in Level 8 (42-48"). Such bone splinters with their ground and forked tips have been convincingly demonstrated by Webb to be remnants left from fishhook manufacture. No example of the finished fishhooks have been recovered from any of the Wabash shell middens, and this is the single example of a "forked spatula" from any of the shell middens of the Wabash Valley. Quite apparently, the manufacture of fishhooks was not an important feature of the Riverton Culture.

*Sinkers (Plate 17 a-g)*

Robeson Hills:

Fourteen objects have been classified as sinkers. All were made from fine-grained, local sandstone, and ranged in shape from sub-spherical to rectangular. Each object had been fully grooved at the midsection. In view of the light weight of the objects (from 1/8 oz. to 7/8 oz., with an average of 3/8 oz.), we might suggest that they could have been used in multiple quantities on fishing nets. Sinkers never occurred in the site singly, but as clusters of 5, 7, and 2 in the excavation units. We know of no precisely comparable items in the archaeological literature covering adjacent areas of the Midwest, nor have they been found in any other site of the Riverton Culture. Since these objects would deteriorate rapidly in most sites, their absence from the literature may reflect unfavorable conditions of preservation.

Similar objects are illustrated from such shell middens as the Carlson Annis Mound in Kentucky (Webb, 1950a) and Site Lu$^{O}$ 86 in Alabama (Webb, 1939).

TABLE 17

DISTRIBUTION OF SINKERS BY ONE-FOOT LEVELS AT THE ROBESON HILLS SITE

| Zone | Level | Quantity | Remarks |
|---|---|---|---|
| I | 0-12" | 0 | |
| I | 12-24" | 5 | All of these were found between 18-24" in Pit D. |
| II | 24-36" | 0 | |
| II | 36-48" & Below | 0 | |
| II | Subsoil Pits | 2 | Both found in Pit S-22 above Burial Pit 5. |
| | Uncontrolled Provenience | 7 | All found in Test Pit K. Data on depth missing, but reported by excavator to have been from between 12-24". |
| Total | | 14 | |

## FABRICATING OR PROCESSING TOOLS

Included within the general category of fabricating or processing tools are any implements utilized primarily in the alteration or assembling of raw materials for use in the various stages of manufacture of other implements or equipment. Again we face numerous classificatory dilemmas. While we can easily include chert flaking tools within the above category, we are considerably more uneasy about itesm such as bone awls. If our classification were based upon sexual division of labor and we were to assign the awls to females for use in house maintenance, we might shift these items to domestic implements. However, such assignment is not possible at present, and we prefer to include them within a category the minimal qualifications of which they meet.

### Chert Working Implements

*Flakers (Plate 18 c-h, j-k)*

Robeson Hills:

Five deer antler tines (Plate 18, d) and two splinters of animal bone (Plate 18, c) showed evidence of use as flaking tools. An additional three tines may have been so used, but the alterations are so slight on the tips that they have not been included as definite tools. One of the flakers may have been socketed, another has two deep incisions near the base, and a third has a polished and beveled area near the base. Two tines were neatly cut at the base, the other three broken unevenly.

The bone flaker has a filed, polished, and blunted tip, and was found atop a sandstone anvil in a workshop area in Test Pit D, at a depth of 6-12 inches.

Riverton Test Pits:

Only five flakers were found. Two of these were unidentifiable slivers of bone, a third from Level 9 was possibly a baculum of the raccoon *(Procyon lotor)* and two were filed and blunted antler tines from Levels 6 and 8. Flakers were concentrated in Zones III and IV.

Riverton Area X:

A total of thirty-six blunted antler tines and one bone flaker were recovered from the 1963 excavations. All the tines seemed to have more wear than that resulting naturally from the rubbing of tines against trees. At the same time, we are not absolutely certain that all of these tines were flaking tools, even after careful inspection of their surfaces under a binocular microscope. Therefore, we cannot offer a precise figure as to just how many flaking tools were in association with the features and midden deposits of Area X.

Obviously more sophisticated analytic techniques are needed for precise identification of this important fabricating tool. Since most flakers were nothing more than utilized tines, identification will have to be in terms of the differential wear patterns produced by the rubbing of the tine against wood or by pressing against chert.

Fifteen of these putative antler flakers came from the plow zone, and hence cannot definitely be assigned to the Riverton Culture. The remaining twenty-one were all in good association with features or definite Riverton deposits. The proveniences of the latter were: two from Feature 1, five from Feature 6A, one from Feature 16, one from Feature 18 sub, two from Feature 21, three from Feature 25, one from Feature 26, two from Feature 27, one from Feature 30 (in postmold on west edge of platform), one from Feature 32, and two from the General Midden. The bone flaker was found in Feature 1.

Seemingly, flakers were much more plentiful in the 1963 excavations than in the 1961 test pits, only five having been recorded for the latter. But since many of the blunted tines from Area X may not be flakers at all, the actual quantities, absolutely and proportionately, may not differ so much as the gross quantities indicate. Notably, however, not a single tine remotely classifiable as a flaker came from Test Pit Alpha only a few feet from the platforms and midden of Area X. Perhaps, chert working was a more important activity in the immediate vicinity of the living platforms than in other areas of the site.

The bone flaker was simply a blunted section of animal bone, probably a fragment of a raccoon baculum.

Swan Island:

Chert working implements were limited to fifteen flakers. Level 7 had four flakers; Levels 3, 4, 6, 8, and 9 had two flakers each; and Level 5, one flaker. Thirteen of the flakers were blunted antler tips, and two from Levels 8 and 9 were blunted slivers of unidentifiable bone.

*Antler Drifts or "Punches" (Plate 18 b,i,l)*

Robeson Hills:

Four pieces of deer antler have flattened, slightly convex tips, and may have been utilized in chert working as drifts. The base of one has a shallow conical socket, and three, including the socketed antler, show evidence of battering on the base, indicating some use as a hammer. All had been cut at the base.

Three additional deer antler sections have rounded, narrow tips; these latter have been called "punches" for want of a better term, and they may or may not have been associated with chert working. The bases of all again show evidence of battering. All were evidently cut from larger sections of antler, rather than broken off.

Table 18 would seem to indicate that the flakers were primarily found in the upper midden, the drifts or punches in the lower midden.

TABLE 18

DISTRIBUTION OF FLAKERS, DRIFTS, AND PUNCHES BY ONE-FOOT LEVELS AT THE ROBESON HILLS SITE

| Zone | Levels | Flakers | Drifts | "Punches" or Drifts | Totals |
|---|---|---|---|---|---|
| I | 0-12" | 2 | 0 | 0 | 2 |
| I | 12-24" | 4 | 0 | 1 | 5 |
| II | 24-36" | 0 | 0 | 0 | 0 |
| II | 36-48" | 0 | 0 | 0 | 0 |
| II | Subsoil Pits | 1 | 2 | 1 | 4 |
| | Uncontrolled Provenience | 1 | 2 | 1 | 4 |
| Total | | 8 | 4 | 3 | 15 |

TABLE 19

DISTRIBUTION OF FLAKERS AND DRILLS AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Flakers | Drills | Total |
|---|---|---|---|
| Surface | - | - | - |
| 1 | - | - | - |
| 2 | - | - | - |
| 3 | 1 | - | 1 |
| 4 | - | - | - |
| 5 | - | - | - |
| 6 | 1 | - | 1 |
| 7 | 1 | - | 1 |
| 8 | 1 | - | 1 |
| 9 | 1 | - | 1 |
| 10 | - | - | - |
| 11 | - | - | - |
| 12 | - | 1 | 1 |
| 13 | - | - | - |
| 14 | - | - | - |
| Total | 5 | 1 | 6 |

Riverton Test Pits.

A single drift of deer antler was found in Level 12. One end had been modified only by the cutting and breaking of the antler from the original tine.

*Anvils*

Robeson Hills:

A flat slab of the local, fossiliferous sandstone was found between 6 and 12 inches in Test Pit D. A bone flaking tool was lying on the slab and the area surrounding the slab contained a number of manos, abraders, and a thick concentration of chert flakes. The area in general has been interpreted as a workshop. Wear on the upper flat surface of the slab may indicate some use as a metate.

## Perforating Tools

Within this group are included all implements whose primary function seems to be that of producing a hole by either piercing or drilling.

*Bone Awls*

While we represent all the following implements as bone awls, we do so with the realization that such a functional assignment may be open to question. For example, Kroeber (1925: Fig. 67 a-h) illustrates deer ulna and cannonbone and other types of awls similar to the Wabash Valley specimens, and refers to them as being used both in sewing and basket coiling.

Perhaps more careful examination of specimens of known function from historic sources would provide criteria for differentiating awls used in sewing from those used in basketmaking, if the two categories are mutually exclusive. But since we have no such criteria for making functional distinctions at the present time, we have followed the traditional pattern of placing all of the "awls" under the category of perforating implements. We shall, however, raise a question about the legitimacy of such a procedure in the case of turkey tarsometatarsal awls, for which there is more evidence for their being skewers and, hence, an item of domestic equipment than for their being perforating implements and an item of fabricating or processing equipment.

*Deer Cannon Bone Awls (Plate 19)*

We have termed these implements awls on the basis of their form and use characteristics. At the same time, it is possible that they served some other function. For example, Kroeber and Barrett (1960 Pl. 20) illustrate very similar implements made by historic Indians of Northwest California, and identify them as eel slitters. An identification with fishing activities is scarcely indicated for the Riverton Culture, however, since these artifacts do not correlate well with the relative importance of fishing at the three sites, either in absolute or proportional quantities of the various types of awls present in the sites of the Riverton Culture. Only three such implements were recovered at Swan Island, the site where fishing was most important, and twelve from Robeson, where fishing was least important. At Riverton, four were found in the 1961 excavations and twenty-two in the 1963 excavations of Area X (house platforms) and Test Pit Alpha. The relative proportions of classifiable awls are given in Table 20.

TABLE 20

DISTRIBUTION OF CLASSIFIABLE AWLS FROM CENTRAL WABASH VALLEY SHELL MIDDENS

| | Deer Cannon Bone | Turkey Tarsometatarsus* | Splinter | Misc. |
|---|---|---|---|---|
| Riverton | 40% | 20% | 37% | 3% |
| Swan Island | 33% | 11% | 56% | -- |
| Robeson | 32% | -- | 61% | 7% |

*Includes those specimens listed as probably turkey tarsometatarsus, since these belong typologically within this group.

Such proportions assign to cannon bone awls an equal importance at Swan Island and Robeson, although fish bone constituted 17% of the total bone at the former site, and only 5% at the latter. At both of these sites, splinter awls were by far the most important, and splinter awls generally would seem to be too delicate to be very efficacious in processing fish. For the present, we must reject bone "awls" of any type as showing any specific linkage with fishing activities in the Riverton Culture.

But the foregoing tabulations do indicate that there are major differences between Robeson and Swan Island, on the one hand, and Riverton, on the other hand. No turkey metatarsus awls are known from Robeson and only one from Swan Island, while they are quantitatively important at the latter site. Since the type of perforation of each of the typological categories differs, we can only attribute the proportional differences as indicating activity differences of an unknown nature.

A final point that can be made about deer cannon bone awls is that there is some evidence for sex linkage in other late Archaic sites. In the eight Green River sites of the Indian Knoll Culture, these artifacts are reported as being in association with male burials, with one exception at Indian Knoll itself. Such data much be used cautiously since many bone awls with burials are not identified as to type in the

burial tabulations. Nor can the data in its present form tell us whether these awls were included as representative of items used by males or because they were artifacts manufactured by males for subsequent distribution to other members of the group.

Robeson Hills:

Of the twelve examples of cannon bone awls, seven were made from mature and five from immature individuals. All showed heavy surface polish up as far as the foramen on the distal end, although the narrow tips showed heavier polish. Apparently these awls were used for producing both very small and quite large holes. Two of the awls were made from half sections, while the remainder were from bones with the distal end intact.

The distribution of awls, both vertically and horizontally within the site, seems to be rather bland, and we do not feel that any definite trends are shown. Possibly the use of immature cannon bone may be more typical of the middle portion of the midden, and cannon bone awls in general seem to be concentrated within Zone II of the site.

Riverton Test Pits:

Three metacarpal and a metatarsal awl were found in Zone III of the midden. We cannot be sure that such a limited distribution in the site is meaningful, since unclassifiable fragments from Zone IV (Levels 9 and 12) are probably the tips of cannon bone awls.

The awl shafts had heavy use polish as far up as the foramen on the distal end, indicating that the Riverton specimens were used in the same fashion as the Robeson cannon bone awls. The metacarpal awls had lengths of 10, 9.4, and 11 cm., and widths of about 2.5 cm. at the foramen, while the metatarsal awl had equivalent dimensions of 14 cm. and 2.5 cm.

Riverton Area X

The same types of awls reported from previous excavations were found in 1963. However, several types

TABLE 21

DISTRIBUTION OF BONE AWLS BY ONE-FOOT LEVELS AT THE ROBESON HILLS SITE

| Zone | Level | Deer Metacarpal | | Deer Metatarsal | Deer Ulna | Bird Bone | Splinter Type | Unclassified | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Mature | Immature | Immature | | | | | |
| I | 0-12" | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| I | 12-24" | 2 | 0 | 0 | 0 | 1 | 3 | 1 | 7 |
| II | 24-36" | 1 | 2 | 1 | 1* | 0 | 5 | 1 | 11 |
| II | 36-48" | 1 | 0 | 2 | 0 | 0 | 7 | 1 | 11 |
| II | Subsoil Pits | 1 | 0 | 0 | 1 | 0 | 5 | 0 | 7 |
| | Uncontrolled Provenience | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 5 |
| Total | | 7 | 2 | 3 | 2 | 1 | 24 | 4 | 43 |

*20-30"

TABLE 22

DISTRIBUTION OF BONE AWLS BY SIX-INCH LEVELS AT THE RIVERTON SITE

| Level | Splinter Type | | Gray Fox Ulna | Raccoon Fibula | Deer | | Unclassifiable | Total |
|---|---|---|---|---|---|---|---|---|
| | Animal | Bird | | | Metacarpal | Metatarsal | | |
| Surface | | 1 | | | | | 3 | 4 |
| 1 | | | | | | | | 0 |
| 2 | 2 | | | | | | 1 | 3 |
| 3 | 1 | | | | | | 1 | 2 |
| 4 | 3 | 1 | | | 1 | | 1 | 6 |
| 5 | 1 | 1* | | | | 1 | 1 | 4 |
| 6 | 1 | | | | | | | 1 |
| 7 | 1 | | | | 2‡ | | 1 | 4 |
| 8 | 1 | | | | | | 2 | 3 |
| 9 | 1 | 1 | 1 | | | | 2 | 5 |
| 10 | 1 | | | | | | 1 | 2 |
| 11 | | | | | | | 1 | 1 |
| 12 | 2 | | | | | | 2 | 4 |
| 13 | | 2* | | 1 | | | 2 | 5 |
| 14 | | | | | | | | 0 |
| 15 | | | | | | | | 0 |
| 16 | | | | | | | 1 | 1 |
| Total | 14 | 6 | 1 | 1 | 3 | 1 | 19 | 45 |

*Turkey tarsometatarsus ‡ 1 from immature individual

TABLE 23

DISTRIBUTION OF BONE AWLS BY SIX-INCH LEVELS AT THE SWAN ISLAND SITE

| Zone | Level | Metacarpal Awls | Splinter Awls | Unclassifiable Fragments | Total |
|---|---|---|---|---|---|
| I | 1 | | 1* | 3 | 4 |
| II | 2 | 1 | 1 | 1 | 3 |
| II | 3 | 1* | | 5 | 6 |
| III | 4 | | | | 0 |
| III | 5 | | 1 | 1 | 2 |
| III | 6 | | | 3 | 3 |
| III | 7 | 1 | 1 | | 2 |
| III | 8 | | 2 | 1 | 3 |
| IV | 9 | | | | 0 |
| V | 10 | | | 1 | 1 |
| Total | | 3 | 6 | 15 | 24 |

*Immature individual ÷Turkey tarsometatarsus

which were rare in the test pits were fairly common on or around the clay platforms. Thus there were many more turkey tarsometatarsus, deer metacarpal, and deer metatarsal awls.

Ten specimens were definitely deer metacarpal awls, and an additional six awl fragments were probably in this category.

Provenience: (Definitely identified), one from Feature 18, one above Feature 4, three from Feature 27, one from the midden beneath Burial 2, three from the plow zone, and one in the cache of Burial 1. (Probables), one each from Features 1, 25, and 27, two from the plow zone.

Three awls were definitely deer metatarsals, and three fragments were probably metatarsals.

Provenience: (Definitely identified), two were found together in Level 2 (6-12 inches) of Test Pit Alpha, and one came from the plow zone. (Probables), one from Level 3 (12-18 inches) of Test Pit Alpha and two from the plow zone.

Swan Island

Only three metacarpal awls were recovered. As usual, use polish extended up the awl shaft as far as the foramen on the distal end, giving maximum perforating diameters of 2.3 cm.

*Deer Ulna Awls (Plate 20 f)*

Robeson Hills

Two examples made from deer ulnae were present in the excavation. Both would have produced rectangular slits rather than circular perforations. Use polish was moderate on one, heavy on the other, but in both it extended up the shaft to the condyle.

*Bone Splinter Awls (Plate 20 g-k)*

Robeson Hills

With two exceptions these were simply sharpened slivers of unclassifiable bone. The remaining two were sharp ended fragments of bone which showed use wear around the pointed end. One of these latter was a fragment of a polished bone tube or bead. Unlike the preceding groups, splinter awls showed use polish only along the narrow tips, indicating that they were used for piercing very small holes.

Riverton Test Pits

Splinter awls constituted 79% of the total classifiable awls recovered from the excavations. Most of the splinters were probably deer bone, but three were made from unidentifiable bird bones, and three were made from turkey tarsometatarsi. Distribution throughout the zones was fairly even.

Modification of the splinters was normally limited to the preparation of a sharp tip. Use polish on the top shows that the splinter awls were used for perforations from 0.3 to 0.8 cm. in diameter, with an average of 0.5 cm. Lengths ranged from 5.3 to 11.5 cm. with an average of 7.5 cm.

Riverton Area X

Six complete splinter awls, of unidentifiable animal bone, were recovered.

Provenience: Four of these were in the plow zone, and one each came from Features A and 18.

Swan Island

Splinter type awls were surprisingly rare. Three of the bone splinters were probably from animals. The remaining three were made on a turkey tarsometatarsus (Level 1), an unidentifiable bird bone (Level 2), and on the distal end of a deer ulna (Level 8).

*Turkey Tarsometatarsus Awls (Plate 20 a-c)*

The absence of turkey tarsometarsal awls at Robeson and rarity at Swan Island is somewhat mystifying, even granting that Riverton, where they constitute 20% of the total awls, only partly overlap the former two sites in time. We do not feel that the presence or absence of these artifacts signifies only a change in the content of the Riverton Culture through time, although one cannot exclude this possibility, nor is there any reason to assume sampling error, particularly at Robeson and Riverton where extensive excavations were made both in the general midden and residential zones.

In dealing with this problem, we shall note first of all comments by Webb on a group of Indian Knoll bird bone awls which included examples of the tarso-metatarsal type (Webb, 1946: 285-86): "Many bird bone awls, while sharp, were relatively fragile because of the thin wall of bird bones. One wonders if these thin-walled, pointed hollow cylinders were awls in the sense that they were used as perforators. These bird bone awls could have been clothing pins or hair pins, and they might have served as forks or skewers in cooking around the camp fire. It is to be noted that many bird bone awls are found damaged by fire, and they are often found in ash beds where fires were used for cooking."

We should be inclined to dismiss the suggested usage as clothing pins or hair pins, at least for the Riverton specimens, on the grounds that their very short tips and long shafts would be poorly suited and cumbersome for usage as pins for clothing, and that they do not particularly suggest items designed for use as hairpins, at least when compared to specimens having specific functional assignment to such usage from their burial contexts at Indian Knoll.

But Webb's latter suggestion of utilization as forks or skewers may have considerably more merit. As at Indian

Knoll, there is evidence for raising questions about their function as awls in the Riverton Culture. In the 1961 test pits in the general midden at Riverton, tarsometatarsal awls constituted only 12% of the total classifiable awls recovered. Around and on the living platforms of the 1963 excavations of Area X, on the other hand, these types accounted for 28% of the classifiable total. Such disparities would point to a very specific type of usage more heavily linked with activities centering on the platforms, rather than activities that occurred at random throughout the site area. Webb's suggestion of use as forks or skewers seems enticing at this point, particularly since structurally identical implements made of wood are known historically to have been used as meat roasting sticks in Canada (Johnson and Raup, 1964: Figs. 47 h and 48 e). We, of course, realize the dangers of extrapolating data are not contradictory to our hypothesis based on archaeological evidence.

The Iroquois also used similar implements of bone or wood for skewering meat, dumplings and other edibles served on trays (Waugh, 1916: 70, 85 x; Fig. 1). The particular example figures by Waugh is reported as being about 22 cm. in length, which would make it rather longer than the Riverton skewers, which are 10 to 13 cm. long. Probably the variability in size of skewers is in part a function of the raw material. Obviously, wooden skewers can vary in size at the whim of the manufacturer, while turkey tarso-matatarsal skewers could vary only within a limited range.

Obviously, with our present data we cannot advance our functional analysis of these artifacts much further, and must remain content with our observations that in both the Indian Knoll and Riverton Cultures, there is evidence for the association of turkey tarso-metatarsal awls with living platforms and/or hearths, and that identical wooden implements are known to have been used as meat roasting sticks by historic Indians. Our present inclination is to remove these "awls" from the category of Fabricating and Processing Tools and to place them within the category of Domestic Implements, but we shall adhere to the conventional designation until more evidence is available.

But we must also face the problem of the absence of the pointed tarso-metatarsal implements from the extensive living area excavated at Robeson and the test pits at Swan Island. One might postulate that they relate to the preparation of foods not present at either Robeson Hills or Swan Island or to the preparation of foods by different cooking techniques at the latter two sites. In respect to the first postulate, we shall be able to show in Chapter VII that Riverton was occupied during the summer, Robeson during the winter, and Swan Island during the spring and fall, and the disparties among the sites may reflect different sets of seasonal activities. Presumably, there would have been a much wider range of vegetable products available at Riverton than at the other two sites, but the same general range of meat sources, differing among the sites only quantitatively in respect to the proportions of deer, fish, birds, and small game that were consumed. We cannot think of any summer comestibles that would particularly require the use of forks or skewers, however.

As for the second postulate, there is no evidence one way or the other at the various sites. All have numerous hearths, and at all sites there are quantities of buried sandstone, indicating stone boiling as a food preparation technique.

Riverton Area X:

Five awls from Area X were definitely identified as turkey tarsometatarsi, and an additional six specimens were probably made from the same bone. Unlike the two 1961 specimens, the condyle had been left intact on the definitely identifiable specimens.

Provenience: (Definitely identified), one each from Features 17A, 25, and 31, and the plow zone. Feature 31 is a yellow clay platform, and the awl was lying on its surface. (Probables), one each from Features 1, and 1B, and 6A, and three from the plow zone.

*Miscellaneous Bone Awls (Plate 20 d-e)*

Riverton Test Pits:

An awl made by filing and sharpening a gray fox ulna came from Zone IV in Level 9, and a raccoon fibula awl was from Zone IV in Level 13. The latter specimen was 8.7 cm. in length and had use polish on most of the shaft. Maximum perforating diameter would have been 0.4 cm. The fox ulna awl would have had a perforating diameter of 0.8 cm.

*Unclassifiable Awl Fragments*

Robeson, Riverton, and Swan Island:

Seventeen awl fragments from Area X at Riverton were unclassifiable. Of these, three were bird bones from the plow zone, and the remainder were animal bone fragments.

Proveniences of Animal Bone Fragments: One came from the surface; seven from the plow zone; one each from Features 1, 18, and 21; two from Feature 25, and one from Level 5 (24-30 inches) of Test Pit Alpha.

Nineteen awl fragments were unclassifiable from the Riverton test pits, four from Robeson, and fifteen from Swan Island.

*Antler Perforators*

Swan Island:

An antler tine from Level 8 had been worked down to a very sharp point. The base of the tine retained the jagged and rough edges left in breaking the tine from a larger section of antler.

*Drills (Plate 21)*

Robeson Hills:

Only two chert artifacts which were definitely drills were found in the excavations. Three additional specimens from the surface may have been drills. One of the specimens from the surface is a small drill-like object (Pl. 21 u) trapezoidal in cross-section, made from local chert, and reminiscent of the "micro" drills found on some Mississippian sites. One of the other "micro" drills may have been made on a Merom Expanding Stemmed point fragment, while the third (Pl. 21 t) is simply a chipped flake.

A single drill of the simple tapered type (Pl. 21 i) was found in the 42-48 inch level, and a reworked projectile

TABLE 24

DISTRIBUTION OF SHUTTLES AND NEEDLES BY SIX-INCH LEVELS AT THE RIVERTON SITE

| Level | Shuttles | Needles | Total |
|---|---|---|---|
| Surface | 1* | - | 1 |
| 1 | 1† | - | 1† |
| 2 | 1 | - | 1 |
| 3 | - | - | 0 |
| 4 | 1† | 2† | 3 |
| 5 | - | - | 0 |
| 6 | - | - | 0 |
| 7 | 2 | - | 2 |
| 8 | - | - | 0 |
| 9 | - | - | 0 |
| 10 | 1 | - | 1 |
| 11 | 1 | 1† | 2 |
| 12 | 1 | - | 1 |
| 13 | - | - | 0 |
| 14 | - | - | 0 |
| 15 | 1 | - | 1 |
| 16 | - | - | 0 |
| Total | 10 | 3 | 13 |

*Tubular type †Tubular ?

point of a non-Riverton Culture type came from the subsoil pit S-20.

Riverton Test Pits

Drills seemed to be more plentiful at Riverton than at Robeson. Of the five specimens found at Robeson, only two could be associated with the Robeson Component of the Riverton Culture.

Considerable variation was noted in the sample of eleven drills, with five examples of simple tapered, 1 "O head," 2 "V head," 1 side notched, and micro-drill forms. No clear pattern of distribution was discernable in the midden.

The simple tapered drills had lengths of 4.9, 4.2, and 3.1 cm., and perforating diameters of 1.0 and 1.1 cm. In cross section four were lozenge shaped, and a surface specimen had a pentagonal cross section. The "V head" drills were 3.2 and 3.3 cm. long, lozenge shaped in cross section, and had perforating diameters of 1.0 cm. The side notched drill (Pl. 21b) was 5.2 cm. long, lozenge shaped in cross section, and had a perforating diameter of 1.1 cm. The later

TABLE 26

DISTRIBUTION OF CHERT DRILLS BY ONE-FOOT LEVELS AT THE ROBESON HILLS SITE

| Zone | Level | Quantity | Remarks |
|---|---|---|---|
| | Surface | 3 | 3 "micro" drills of local chert, including 1 Mississippian type |
| I | 0-12" | 0 | |
| I | 12-24" | 0 | |
| II | 24-36" | 0 | |
| II | 36-48" | 1 | Simple tapered type found between 42-48". Local chert. |
| | Subsoil Pits | 1 | Reworked projectile point of foreign chert. |
| Total | | 5 | |

specimen had heavy basal grinding. Dimensions of the "O head" drill were: 2.7 cm. in length, and 0.5 cm. in perforating diameter.

Two micro-drills had lengths of 2.2 and 1.7 cm., with perforating diameters of 0.7 for both specimens. The former, which was an "O head" type, had a trapezoidal cross section, and the latter, which was a simple tapered drill, had a triangular cross section.

Riverton Area X:

Only six drills were recovered in 1963. Five of these were simple, tapered drills made from Wabash chert. One of these, from the surface, was so small that it should probably be called a micro-drill. The sixth was an "O head" drill, also of Wabash chert. Notably, no drills were in any of the features associated with the clay platforms of Area X.

Proveniences of the simple drills: 1 from the surface, two from the plow zone, and two from the cache associated with Burial 1.

Provenience of the "O head" drill: Level 2 (6-12 inches) of Test Pit Alpha.

Swan Island:

Three of the four drills were found in Zone III. A simple tapered drill and two "flake" drills (Pl. 21o-p) were present in Level 8. The flake drills were simply free chert spalls which had had a drill tip fashioned on one end. A "V head" drill with light basal grinding came from Level 2.

TABLE 25

DISTRIBUTION OF SHUTTLES AND NEEDLES AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Simple Shuttles | Open End Shuttles | Expanded Head Shuttles | Unclassifiable Shuttles | Needles | Total |
|---|---|---|---|---|---|---|---|
| I | 1 | | | | | | 0 |
| II | 2 | | | 1 | | | 1 |
| II | 3 | 1 | | | 1 | 2 | 4 |
| III | 4 | 1 | | | | | 1 |
| III | 5 | | | | | | 0 |
| III | 6 | 2* | | 1 | 1 | | 4 |
| III | 7 | | | | | | 0 |
| III | 8 | 4 | | | | | 4 |
| IV | 9 | 1 | | | | | 1 |
| V | 10 | | 1 | | | | 1 |
| Total | | 9 | 1 | 2 | 2 | 2 | 16 |

*1 Sharpened deer intermediate carpal

TABLE 27

DISTRIBUTION OF CHERT DRILLS BY SIX-INCH LEVELS AT THE RIVERTON SITE

| Level | Simple Tapered | "O" & "V" Head | Side Notched | Unclassifiable | Total |
|---|---|---|---|---|---|
| Surface | 2 | | | 1 | 3 |
| 1 | | | | | 0 |
| 2 | | | 1 | | 1 |
| 3 | | | | | 0 |
| 4 | | | | | 0 |
| 5 | 1 | | | | 1 |
| 6 | | | | | 0 |
| 7 | | 1* | | | 1 |
| 8 | | | | | 0 |
| 9 | 2‡ | | | | 2 |
| 10 | | 1† | | | 1 |
| 11 | | | | 1 | 1 |
| 12 | | 1† | | | 1 |
| 13 | | | | | 0 |
| 14 | | | | | 0 |
| 15 | | | | | 0 |
| 16 | | | | | 0 |
| Total | 5 | 3 | 1 | 2 | 11 |

*"O" Head †"V" Head ‡One used as a reamer.

## Sewing Implements

*Needles*

Robeson Hills:

A sharp pointed, perforated sliver of bird bone has been termed a needle. Use polish is heavy on all exposed surfaces. The needle was found between twenty to thirty inches in Test Pit J.

Riverton Test Pits:

Three very slender, sharply pointed polished bone fragments may be remnants of needles. However, they may simply be unusually sharp tips from shuttles.

Swan Island:

Two very sharply pointed objects from Level 3 have been interpreted as needles. One of these, however, is flat in cross section and may simply be the tip of a sharply pointed awl. The other specimen with its circular cross section, suggests more strongly a piercing implement of the needle type.

## Micro-Perforators and Gravers

*Micro-Perforators (Plate 22)*

Riverton Test Pits:

Eleven "micro-perforators" were found well distributed throughout the midden. In general appearance and size, the Riverton micro-perforators correspond closely to the "Jaketown Perforators" from the Jaketown and Poverty Point Sites (Ford, Phillips and Haag 1955: Fig. 56; Ford and Webb 1956: Figs. 25 and 26). The examples from Riverton can be divided into two categories: Group I (Pl. 22), slender tipped perforators with an ovate or irregular head formed by the unmodified portion of the flake. Concave scraping surfaces are present at the junction of the head and the perforator tip. Group II (Pl. 22), ovate or triangular forms in which the edges of the triangular tip are continuous with the edges of the unmodified portion of the flake which constitutes the head of the implement. The straight or slightly convex edges of the tips were also used as scrapers.

Unlike the Jaketown and Poverty Point perforators, which were made on prismatic flakes struck from cores, the Riverton specimens seem to have been made on free flakes. At Riverton, a single example of what might havy been a core was found, along with two or three examples of flakes which might have been prismatic blades. Apparently, the core and blade tradition was not an important feature of the Wabash shell middens. At the same time, we should note that the typically triangular cross sections of the projectile points and leaf-shaped blades in the shell middens strongly suggest preparation on prismatic flakes. The lack

TABLE 28

DISTRIBUTION OF MICRO-PERFORATORS AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Group I | Group II | Total |
|---|---|---|---|
| Surface | 1 | - | 1 |
| 1 | 1 | - | 1 |
| 2 | - | - | 0 |
| 3 | - | - | 0 |
| 4 | - | 1 | 1 |
| 5 | - | 1 | 1 |
| 6 | 2 | - | 2 |
| 7 | 1 | - | 1 |
| 8 | - | - | 0 |
| 9 | - | - | 0 |
| 10 | 1 | - | 1 |
| 11 | 3 | - | 3 |
| 12 | 1 | 2 | 3 |
| 13 | - | - | 0 |
| 14 | - | - | 0 |
| 15 | - | - | 0 |
| 16 | - | - | 0 |
| Total | 10 | 4 | 14 |

of such cores and flakes certainly cannot be the result of inadequate processing of material, since all chert was saved during screening, regardless of the size of the flake. Perhaps, horizontal sampling error is involved, with cores and blades present elsewhere in the site area. We do not advance the latter suggestion with any great enthusiasm.

The Riverton micro-perforators were pressure flaked only along the edges of the perforator spur, with the pressure applied from the plano surface of the flake. The chipped edges were quite steep, and in cross section, the perforator spurs were triangular (62%), trapezoidal (23%), or lozenge shaped (15%). Cutting into the conchoidal fractures left from pressure flaking were numerous small hinge fractures originating from the plano surface. Blunting and use polish is generally limited to the lower one-fourth of the spur. In size the perforators ranged from 1.5 to 2.2 cm in total length, with an average of 1.7 cm; perforator spurs were from 0.5 to 1.3 cm long, with an average of 0.8 cm.

The experiments of Ford and Webb (1956: 77-81) have provided very enlightening data on the use of the implements which they term Jaketown Perforators. However, we find a certain inconsistency in their analysis, if we interpret their observations correctly. While we have no doubt that use can produce "worn-out knives" (Ford and Webb, 1956) having the pointed tips of the Jaketown Perforators (Ford, Phillips, and Haag, 1955), the latter authors clearly indicate in the Jaketown report that the tips were produced by pressure flaking, and the Poverty Point specimens are described as being "identical in form." Certainly, our Riverton specimens had been deliberately pressure flaked to a sharp tip.

But as Ford and Webb observed on their specimens, there are numerous hinge fractures along the concave edge of the perforator spur. Clearly the sides were quite as important functionally as the sharp tips, with hinge fractures overlaying the conchoidal fractures as a result of the use of the sides in a scraping fashion subsequent to the prepration of the tip.

Another important characteristic of the perforators used as "drills" at Poverty Point was that 29.9% had a "red or reddish brown stain on the abraded areas, which seems to have some connection with the use that produced the wear" (Ford and Webb, 1956: 81). But these drills" also have chipping indicating use as scrapers, and it is suggested that "perhaps the form of these worn scrapers suggested their use as drills to the Indians" (Ford and Webb, 1956: 81). But the pointed tips of the Riverton Culture specimens were produced by pressure flaking prior to the chipping from use along the edges.

Our problem then seems to be the functional definition of a tool which has a perforating, or possibly a graving, spur with scraping edges, pigment stains on some specimens, and use polish confined to the tip. The idea of use as tattooing or scarifying by implements does not seem very satisfactory, although such usage must remain a possibility. Certainly none of the Riverton perforators showed any trace of pigment on microscopic examination, nor does the heavy hinge fracturing of the sides of the spur seem consistent with the use of such implements as scarifiers.

A description of arrow shaft fabrication among the Omaha (Fletcher and LaFlesche, 1911: 448-52) outlines a series of operations which might provide a function for "microperforators," particularly in sites which have only "micro-points" such as Robeson Hills, Swan Island, and Riverton. Fletcher and LaFlesche note that "The first process in making arrows was to whittle the shafts down to a proper size. . . . Next, all the knots in the wood were cut out or scraped down level with the surface and the shafts rounded on a sandstone. . . . After the arrowheads were attached, waving lines or grooves were made along the length of the shafts. This was done in order to prevent the wood from springing back to its natural bent and not, as has sometimes been stated, to allow the blood to flow along the arrowshaft, or for a symbol of the lightning. Arrowshafts were straightened by passing them through a hollow bone."

Group I micro-perforators would be well suited to performing two steps in the operations. The concave scraping edge formed by the junction of the perforator spur and the head would be useful in scraping down the convex shaft surfaces, while the sharp tip could have been used for making the waving lines or grooves along the shafts. One might also note that the grooves in arrowshafts were sometimes filled with pigment. Thus the stains noted on many of the Poverty Point "drills," might have resulted from the tamping of pigment into incised lines. We wish to emphasize that we are not implying that the micro-perforators and micro-points were used in conjunction with the fabrication and furnishing of atlatl dart shafts. The sandstone abraders with broad, concave grooves might also have been associated with the making of dart shafts. However, no implements have been found in any of the Wabash shell middens which could have been used as shaft straighteners, unlike the Tennessee shell middens where antler shaft straighteners are fairly common.

It is equally possible that these tools were used with a variety of raw materials in scraping, graving, or perforating their surfaces. For example experiments have been performed with perforators or gravers from an Archaic site in Wisconsin (Nero, 1957). Nero found that "gravers" could be used in the manner of a gouge for incising lines on a variety of raw materials.

In recent months, Mr. Lynn Stephens of Robinson, Illinois, has experimented with the manufacture and utilization of micro-perforators of the Riverton type. The results of Mr. Stephens' experiments will be published by him at a later date, but we shall summarize some of his findings. Micro-perforators can be manufactured quite easily by pressure flaking applied to a free chert flake. These implements can be used for incising lines as indicated by Nero, but are also very useful in drilling holes in such materials as bone, indurated shale, and shell. The holes experimentally produced by the micro-perforators are duplicates of the small holes found on shuttles and needles from the shell middens. Perhaps it is significant that both perforators and perforated bone implements are rare at the Robeson Hills Site and common at the Riverton Site.

Obviously, considerably more experimentation with these implements is a necessity, as well as a more extensive search of the ethnological literature and collections, and

examination of perforated archaeological specimens made from perishable materials.

Distribution data for these implements remain little changed from the summary by Ford, Phillips and Haag (1955). Unfortunately we have not seen the perforators mentioned therein as having been collected by Vernon Helmen in Owen County, Indiana, along the Eel and White River tributaries of the Wabash River some fifty miles east-northeast of the Riverton Site. Reference to Helmen's publication on the Owen County survey (Helmen, 1950) provided little illumination, although perforators and gravers are mentioned from Sites $Ow^V75$ and $Ow^V77$.

Micro-perforators are known from Modoc Rock Shelter (Fowler, 1959: Fig. 11, Appendix 1), where they are limited to the upper seven feet of the midden. In veiw of the small quantity of micro-perforators and the presence of sherds in the upper levels, one cannot definitely assign the Modoc micro-perforators to the Archaic occupations of the site.

We have also examined micro-perforators recovered by Dr. C. G. Holland from test pits at two sites during his 1963 field work in southwestern Virginia. They are identical to our Riverton Culture specimens; and at Gy10, a site on the New River in Grayson County, were found in a midden also containing Merom points. The other site, Pl. 24, from which a single microperforator was recovered, is reported as being predominantly an Archaic site on the Mayo River in Patrick County. Both sites are near the North Carolina border.

Similar, or identical perforators, also seem to have been present in mixed component sites of the Tradewater and Cumberland drainages of Kentucky. Rollingson and Schwartz (1966) illustrate two examples (Fig. 8 c) from the Henderson Site, which is located on a tributary of the Cumberland River, and has components ranging from Paleo-Indian to early, Middle, and Late Archaic. Others are illustrated for the Morris Site (Fig. 58 a), which is located on a tributary of the Tradewater River, and has components running the gamut from Peleo-Indian to Mississippian. Although the authors assign the small "gravers" from the Morris Site to their Paleo-Indian component, it is not entirely clear why they are so referred. Typological comparisons would seem to be in order between these specimens and the Jaketown perforators published previously by Ford and others for the Jaketown and Poverty Point sites (Ford, Phillips, and Haag, 1955; Ford and Webb, 1956).

TABLE 29

DISTRIBUTION OF MICRO-PERFORATORS AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Micro-Perforators |
|---|---|---|
| I | 1 | 1 |
| II | 2 | 0 |
| II | 3 | 2 |
| III | 4 | 2 |
| III | 5 | 2 |
| III | 6 | 0 |
| III | 7 | 4 |
| III | 8 | 0 |
| IV | 9 | 2 |
| V | 10 | 0 |
| Total | | 13 |

Riverton Area X:

Nine of these tiny perforating implements were recovered. They duplicated previously described micro-perforators in every respect. Eight of the perforators were definitely made from chert from the Wabash gravels, while a ninth from Feature 15 may be Attica chert.

Provenience: One each from Features 7 and 15, one from Level I (0-6 inches) of Test Pit Alpha, five from the plow zone, and one from the surface.

Swan Island:

Eleven of the thirteen micro-perforators from Swan Island were of the Group I variety. Use characteristics and method of manufacture were identical with those from Riverton. Two perforators from Level 7 were triangular forms of the Group II micro-perforators. Micro-perforators were well distributed throughout the midden, with their heaviest concentration in Zone III.

While micro-perforators are a normal part of the assemblage at Swan Island and Riverton, they were not found at Robeson Hills, although the two micro-drills might be included with the Group II micro-perforators. The reasons for such variation are not clear, but there is no reason to assume sampling error. Perhaps the answers lies in a particular type of activity that was common at the first two sites and comparatively rare at the third. We shall note without further comment the comparative rarity of weapons at Robeson Hills as contrasted to the other two sites, and the comparative abundance of bone shuttles at Riverton and Swan Island.

*Gravers (Plate 23 h-l)*

Riverton Area X:

Five small, irregular cores were in the plow zone of Area X. None, of course, can definitely be assigned to the Riverton Culture. All had a short spur projecting from a steeply keeled face. We suspect that these "gravers" are simply damaged shredders, with the other spurs removed by use or damage during cultivation of the site.

## Reamers (Plate 24 m-p)

Swan Island:

Superficially, these implements resemble simple or simple tapered drills, but the tip is blunt and without the numerous hinge fractures which are found along the heavily utilized edges. Single specimens came from Levels 3, 5 and 6 (Pl. 24 m-p). The reamers from Levels 3 and 6 were of the simple parallel sided type, while the reamer from Level 5 was a simple tapered form, without any sign of wear from use.

Implements specifically designed as reaming tools were not found at Riverton and Robeson, although one drill from Level 9 at Riverton seems to have been used as a reamer, and one Merom and two Robeson projectile points from Level 3 at Robeson showed very heavy usage as reaming tools. The latter points were all from a single workshop area in Test Pit D.

A large, stemmed reamer (Pl. 24 m) found on the surface at Swan Island had had the edges and tip worn completely smooth. The size and form of this reamer suggest that it should be included with one of the later components on the site.

## Abraders (Plate 25 a-d)

Robeson Hills

Of the twenty sandstone abraders excavated, 18 had narrow triangular grooves suggestive of use as awl sharpeners. The remainder had broad concave grooves which could have been used for smoothing either bone or wood. With one or two exceptions, the abraders were made from the fine grained sandstone underlying the site. The other abraders were made from coarse grained sandstone of unknown origin. Vertical distribution indicates that abraders were in use from the earliest occupation of the site.

Abraders have been reported in the Illinois area in contexts ranging from mid-Archaic (Fowler, 1959: Appendix I), to Crab Orchard Tradition (Neumann and Fowler, 1952: Pl. LXIX), to Late Woodland (Maxwell, 1951: Pl. XVIII). Thus grooved abraders do not seem at present to be useful as temporal or cultural "markers."

TABLE 30

DISTRIBUTION OF ABRADERS AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Zone | Level | Quality | Remarks |
|---|---|---|---|
| | Surface | 0 | |
| I | 0-12" | 3 | |
| I | 12-24" | 6 | 2 broad grooved |
| II | 24-36" | 0 | |
| II | 36-48" | 2 | |
| | Subsoil Pits & Postmolds | 6 | |
| | Uncontrolled Provenience | 3 | |
| Total | | 20 | |

Riverton Test Pits.

Ten of the sandstone abraders had the narrow, triangular grooves generally thought to be associated with the sharpening of bone perforating tools while three had broad concave grooves. Most of the abraders had one or two grooves, but two examples had 14 and 15 grooves. These implements were well distributed throughout the midden.

Riverton Area X

The four sandstone abraders were all of the narrow, triangular groove type. Two occurred in the plow zone, and one each in Features 21 and 27.

Swan Island

As Table 32 shows, abraders were a standard item in the Swan Island assemblage. The seven abraders with narrow, triangular grooves outnumbered the three examples of broad, concave grooved type, thus conforming to the pattern noted for Robeson Hills and Riverton.

TABLE 31

DISTRIBUTION OF ABRADERS AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Number |
|---|---|
| Surface | 3 |
| 1 | - |
| 2 | 1* |
| 3 | 1 |
| 4 | 1 |
| 5 | 1 |
| 6 | - |
| 7 | 2 |
| 8 | 1 |
| 9 | - |
| 10 | 1 |
| 11 | 1* |
| 12 | - |
| 13 | - |
| 14 | 1* |
| Total | 13 |

*broad, concave groove.

## Files (Plate 25 f-h)

Robeson Hills:

A single file of local sandstone was found in the workshop debris in Test Pit D at 12-18 inches. The file is a convexly sided triangle in cross section, and shows considerable use. The only other published examples from the Illinois area are from the Wilson Mound Group (Neumann and Fowler, 1952: Pl. LXII). However, since these objects would deteriorate rapidly under unfavorable conditions, perhaps they were more common than the archaeological literature would indicate.

Riverton Test Pits and Area X:

No files were present in the 1961 excavations, and the single specimen found in 1963 was an abraded, trapezoidal piece of sandstone from the cache associated with Burial 1. However, the apparent scarcity may be misleading, since these items would survive in recognizable form only if they were in a protected situation in the midden. Otherwise, they would probably differ in no way from the thousands of fragments of sandstone present in the midden.

TABLE 32

DISTRIBUTION OF ABRADERS AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Abraders |
|---|---|---|
| I | 1 | 0 |
| II | 2 | 0 |
| II | 3 | 2 |
| III | 4 | 2* |
| III | 5 | 1 |
| III | 6 | 1* |
| III | 7 | 1 |
| III | 8 | 3* |
| IV | 9 | 0 |
| V | 10 | 0 |
| Total | | 10 |

*1 broad grooved

Swan Island:

A multi-faceted, sub-rectangular piece of sandstone from Level 1 showed heavy use as a file. Another trapezoidal fragment of sandstone from Level 6 showed file usage on a single plano face.

## Chisels (Plate 24 a-e)

A clue to the function of beaver and porcupine incisor chisels is provided by ethnographic data.

Captain John Smith (1612) remarks:

". . . To make the nock of his arrow hee hath the tooth of a beuer set in a sticke, wherewith he grateth it by degrees."

Another remark in the same source suggests that beaver teeth may have been used in a similar fashion in the working of bone.

"Their hookes are either a bone grated, as they nock their arrows, in the form of a crooked pinne or fishhook. . . "

Such usages would be compatible with the attributes of the Archaic incisor chisels, since many are thinned for almost a third of their lengths and half of their thicknesses. Such thinning would decrease the strength of the chisel, but would make the implement better suited to the production of deep, narrow grooves.

Tooker (1964: 24, 67) mentions that the Huron used beaver teeth in preparing the lower wooden member of a fire making set, and also mentions specifically that incisors were used in scraping the bowls that were manufactured from tree knots.

Other data which may be germane derive from an analysis of burial data from sites of the Indian Knoll Culture and Frontenac Island which reveals that among adults, beaver incisor chisels were associated only with males at the former sites and predominantly (80%) with males at the latter site. The burials from the Riverton Culture are too few in number of permit any reliable conclusions about sex linkage of incisor chisels, but at Riverton, three beaver incisor chisels were associated with Burial 1, tentatively identified as that of an adolescent male.

Our limited data suggest as an hypothesis that beaver incisor chisels were woodworking, or boneworking, tools used primarily by males in the manufacture of weapons and other wooden, and possibly bone, artifacts.

Robeson Hills:

A heavily worn beaver incisor was found in Test Pit C around 24" below the surface. The top had been shaped to a convex chisel edge, and the base had been cut and the irregular edges subsequently worn.

Riverton Test Pits:

One beaver incisor chisel was found on the surface and another in Level 13.

Riverton Area X:

Fourteen of these chisels came from the excavations. Twelve were beaver incisors *(Castor canadensis)* and two were porcupine *(Erethizon dorsatum)*. All had had the natural, chisel-like incisor tip cut and/or filed, with some tips cut back almost a third of the length of the incisor. A specimen from Level 1 of Test Pit Alpha was heavily stained with red ocher, suggesting that it may have derived from burial association. All were obviously used in a chiseling or gouging fashion.

The large number of incisor chisels from the 1963 excavations contrasts rather markedly with the two specimens from the previous excavations at Riverton. In view of the large number of chert and antler points, antler and bone flakers, and incisor chisels around the living platforms of Area X, it is possible that one of the major activities associated with these platforms was the fabrication of weapons.

Provenience: Beaver incisors—one each from Features 25, 27, and levels 1 (0-6 inches) and 4 (18-24 inches) of Test Pit Alpha; one on the west edge of the clay floor, Feature 31; three in the cache associated with Burial 1; and four from the plow zone. Porcupine incisors—one each from Features 13 and 15.

Swan Island:

A single, beaver incisor chisel came from Level 10. File marks on the leveled tip indicated sharpening of the bit.

## Weaving Tools

*Simple Shuttles (Plate 26 h-s)*

Robeson Hills:

Three flat, slender, pointed and perforated bone objects have been classified as shuttles. All show extensive use polish over their entire surfaces, and were plano-convex in lateral cross-section and concavo-convex in longitudinal cross section. The double perforations of one shuttle were drilled at an angle from one side and considerably off center. While there are too few specimens to make interpretation more than speculation, all specimens were found between eighteen and thirty inches, perhaps indicating a concentration in the middle portion of the midden.

Riverton Test Pits:

Nine simple shuttles were distributed throughout the four zones of the site. The fragment from Level 1 is a filed fragment of rib which cannot definitely be identified as a shuttle, but the others have such typical features of shuttles as blunt tips, perforations, a high use polish, and use striations perpendicular to the long axis of the implement. All were made from the ribs of unidentified animals (possibly the ribs of deer). Lengths could not be obtained, but widths ranged from 0.6 cm. to 0.9 cm., and thicknesses franged from 0.3 cm. to 0.4 cm. In cross section, the shuttles were either rectangular or plano-convex. Five of the fragments had perforations.

Riverton Area X:

Fourteen simple shuttles came from Area X excavations. Two of these were complete examples from Feature 17A and Levels 1 and 2 (0-12 inches) of Test Pit Alpha.

Proveniences of other simple shuttles: One each from Features 1, 1B, 15 and 18, Levels 1 (0-6 inches), 2 (6-12 inches), 8 (42-48 inches) of Test Pit Alpha, and seven from the plow zone.

Swan Island

The prevalence of shuttles at Swan Island indicates a strong emphasis on weaving. The sample from Swan Island is of particular importance because of the presence of complete specimens, or large fragments thereof, and a variety of types of shuttles, thus permitting a better description of the weaving implements in central Wabash shell middens.

As at Riverton and Robeson, all shuttles are elongated rectangles made by filing animal ribs or bone slivers into shape. The likeliest source of the ribs would be deer, since deer bone is by far the most plentiful of the large animal bones in the shell middens.

A complete example of the simple shuttle was found in Level 8. Total length was 19.5 cm., although the original length was somewhat greater prior to warping in the ground. Thicknesses ranged from .2 to .3 cm., and maximum width was .9 cm. File marks were numerous and deep, indicating the use of a coarse grained file in the manufacture of the implement. Use polish occurred over the entire implement, with file marks nearly obliterated on both the blunt end and the pointed tip. The cross section was plano-convex.

The shuttle had no perforation, and apparently perforations were not a common feature of the Swan Island shuttles, with only one fragment from Level 4 having such a feature. However, near the blunt tip, a series of diagonal lines had been worn along one edge as though rough thread had been wrapped around the shuttle in a diagonal fashion. Perhaps a perforation was an optional feature of these implements.

A special type of a simple shuttle is a deer intermediate carpal which had been sharpened to a point (Pl. 26e). Such shuttles may be fairly common although it is difficult to make identification from illustrations in published reports. Similar implements are illustrated for Indian Knoll in the upper left hand corner of Fig. 43c (Webb, 1946). Brown also reports such an implement (Brown, 1961: Fig. 18e) from the Zimmerman Site. The object was not available for examination, but the round headed implement reported by Sears and Shalkop (Brown, 1961: 57) is probably the unmodified head of a deer intermediate carpal, with alteration limited to the sharpened tip. Brown (personal communication, 1961) feels that classification as a shuttle may be a more realistic interpretation of the implement's function. If the identification of the Zimmerman specimen is correct, this particular form of shuttle may have a considerable range in space and time.

In reviewing the literature during preparation of the present report, the author has come to the conclusion that many of the artifacts classified as awls, perforated awls, needles, and perforators may well be shuttles. Obviously, a complete re-examination of classificatory procedures for bone implements is needed.

*Tubular shuttles (Plate 26b,f)*

Riverton Test Pits

One complete example of a tubular shuttle was found on the surface, and a fragment from Level 4 is probably from a tubular shuttle. The former was made from bird bone, the latter from bone of an unidentified animal. Tubular shuttles may have been designed for the utilization of wide strips of material in weaving. The complete shuttle is 8.7 cm. in length and 1.3 cm. in diameter.

*Expanded Head Shuttles (Plate 26 c-d)*

Swan Island.

Two flat bone slivers had been filed into implements with broad, flat heads and tapering, flat tips. No evidence for awl usage is present on the implements and use polish extends over the entire surface and edges. Such a use pattern has been observed to be a characteristic of many shuttles.

*Open End Shuttles (Plate 26a)*

Swan Island

The single example of the "open end" shuttle was made from a long bone of a small mammal. The surface of one end of the bone had been hollowed out so as to leave a small recess with two prongs. Use polish was extremely heavy over the entire surface. Such a shuttle would have been useful in weaving wide strips of fabric or other raw materials. Shuttles of this type are quite thick (0.8 cm.) in comparison to the other forms.

In addition to the specimen from Level 9 cited above, a thick shuttle tip from Level 6 may have come from an open end shuttle.

## Flensing Tools

If any one artifact may be said to be typical of the shell middens in the central Wabash Valley, the deer antler gouge is outstanding. Thirteen antler gouges were found in the Robeson Hills excavations and several examples have been found on the surface of the Riverton Site and Swan Island Sites. To the most common form we have given the name "Robeson Gouge" after the site where it was first recovered in excavation.

*Robeson and Other Antler Gouges (Plates 27 and 28)*

Robeson Hills:

So far as is known, examples of antler gouges similar to the Robeson Gouge (Pl. 27) are represented in other Illinois sites by only a single example from the Fisher Site in Will County, where it is not certain as to which of the four components at that site the gouge belongs (J. W. Griffin, 1944; 1946; Parmalee, 1962a). Webb illustrates "chisels" from the Long Branch Site ($Lw^{9}67$) and the Mulberry Creek Site ($Ct^{9}27$), shell middens on the Tennessee River in norther Alabama, which strongly resemble the Robeson gouge (Webb and DeJarnette, 1942; Pl. 221, Fig. 2; Pl. 291, Fig. 2). One of these at least was in definite Archaic context. Sixteen "chisels" are reported from the Perry Site ($Lu^{9}25$), but none of these are illustrated (Webb and DeJarnette, 1948c).

"Chisels" are comparatively rare in the Indian Knoll Sites, but three examples are illustrated from the Parrish Village (Webb, 1951: Fig. 6 e) which apparently are identical to the Robeson Hills type. All were in burial association, with five reported from Burial 69 and one from Burial 75. The former burial was that of a mature adult male, who was

buried with a considerable quantity of grave goods; the latter burial was that of a young adult male, who also had additional grave goods. At least at Parrish, the Robeson gouge would seem to be a tool associated with male activities. Both burials were at depths (6 and 4.6 feet below the surface, respectively) which would indicate the presence of the Robeson gouge at Parrish from near the beginning of the occupation of the site. The Parrish Village is the westernmost known site of the Indian Knoll Culture, and is located close to the Tradewaters River, which empties into the Ohio some fifty miles from the mouth of the Wabash. Thus one might raise the question of the source of the Parrish Village gouges. Are they the result of exchange with the Riverton Culture or some of the Tennessee Valley sites, or are they of local manufacture? Since the Robeson gouge has not been reported from any of the ten other Indian Knoll sites and the occurrence of this utilitarian artifact only with "status" burials at Parrish, we conclude that they were imports at Parrish or that they pertain to an unrecognized component at that site. Antler "chisels" are reported for Carlson Annis (6 specimens), the Read Shell Midden (2), and Indian Knoll (3), but one of these are remotely similar to the Robeson Hills specimens.

Nor are any of the wide bit scrapers (gouges) from Eva (Lewis and Lewis, 1961: Pl. 42 a-e) in any way similar to the Robeson Gouge.

Inspection of unpublished material in the McClung Museum of the University of Tennessee from nearby Archaic sites revealed that gouges of the Robeson type were present at West Cuba Landing (2 examples), Kays Landing (2 examples), and the McDaniel Site (1 definite example, others possibly of the Robeson type). Kays landing and McDaniel are both close to the junction of the Big Sandy and the Tennessee rivers, while West Cuba is a few miles south of Eva on the Tennessee river. Lewis and Kneberg (1959) place West Cuba and Kays Landing in their Eastern Tradition and McDaniel in their Midcontinent Tradition of the Archaic. Thus, seemingly, the Robeson gouge appears late in two different traditions of the Archaic in Tennessee, namely the Ledbetter Phase of the Eastern Tradition (1200 B.C. - A.D. 500) and the Big Sandy Phase of the Midcontinent Tradition (1200 B.C. to 1 A.D.). However, we feel that Lewis and Kneberg's statistical model is misleading. Rather than showing two different traditions through their statistical analysis, they have probably shown only the statistically significant differences that can be derived by comparison of the assemblages of the various types of sites occupied by a single group of people in their seasonal round. That is, the assemblage left by a single group of people at a settlement differs considerably from the assemblages left by the same group at a transient, base, or hunting camp. There is no firm indication of the existence of these two separate traditions in Tennessee, and the apparently anomalous situation of interdigitated contemporaneous traditions within a small area of the Tennessee Valley probably does not exist. We categorically reject the terminal date of A.D. 500 for the Ledbetter Phase, since it is apparently based on the presence of Copena points, Baumer Fabric Marked, Long Branch Fabric Marked, Mulberry Creek Cordmarked, and sherds of the Alexander series. The sites are obviously multi-component, whatever sort of continuum from Archaic to Woodland may have been involved at some or all of them. Before abandoning this digression, we shall simply point out that one of the striking differences between the Mid-continent and Eastern Traditions (Lewis and Kneberg, 1959: Table 1) is the rarity or absence of houses and rarity of storage and cooking pits in the latter and the prevalence of such features in the former. Such lacunae in a tradition situated in an area rich in subsistence potential and having a climate tending to be invigorating during the winter months can only make one ponder the lack of diffusion from the Midcontinent Tradition and the massive resistance to the introduction of items basic to comfort and survival on the part of the peoples of the Eastern Tradition, to say nothing of their impoverished assortment of domestic equipment, numerous categories of fabricating and processing tools, and ceremonial equipment. In short, the Robeson gouge appears in the Midcontinent Tradition of the Archaic in Tennessee somewhere around A.D. 1200.

As Figure 12 indicates, the known distribution range of the Robeson gouge seems to be limited to a general north-south axis along the Tennessee and Wabash drainages.

In summary some of the essential features of the Robeson Gouge are: socketed poll; heavy use polish on the convex side of the bit and lighter use polish on the straight or concave side; flat or concave surface of the bit sloped at

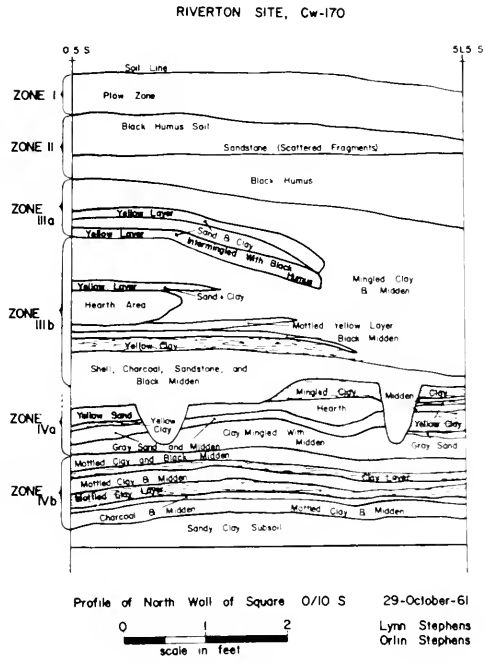


Fig. 11. Profile of the north wall of Square 0/10S, Riverton site.

an angle of 30 to 45 degrees with the convex face, shaft usually unaltered except for wear on the high points of the rough surface, the basal portion of a tine left protruding from the shaft, light wear at the junction of the tine with the shaft, generally straight to slightly convex edge on bit. Oriented with the flat side of the bit up and away from the observer, five of the tines are on the right side of the shaft, and three on the left.

As far as use is concerned, we feel that the bit characteristics are very revealing. The heavy use polish on the convex side of the bit and steep beveling of the opposite face indicate a tool of the gouge type. The bit, however, shows no trace of battering or resharpening, but instead is smoothly and heavily worn. Usage as a woodworking tool, then, is practically ruled out, even if the gouge were being used only to remove charred wood. The use polish is certainly not that of a hoe, either in intensity, type of lustre, or evenness of coverage. But such an instrument would make an ideal flensing tool, and we shall tentatively assign it to that category.

We cannot evaluate the function of the sockets in the base, since they are so variable in size, shape, and depth.

Three other antler gouges do not conform to the Robeson type. One of these is a thin tongue-shaped gouge (Pl. 28 b); the other two are half sections (trough-shaped gouges) of antlers (Pl. 28 c) which have had the cancellous material removed in a manner that would suggest that they were prepared for hafting.

Robeson Gouges are common only in Zone II or in subsoil and burial pits, perhaps indicating that the Robeson Gouge may be assignable to the early occupation of the site, or that Zone I represents a different type of utilization of the site by people of the Riverton Culture. Two of the aberrant forms are definitely in the upper two feet of the midden, perhaps indicating that these appear later in time than the Robeson gouges.

Since the Robeson Gouge is a newly defined and diagnostically important implement both culturally and functionally, we have included an analysis of the attributes of individual specimens as Appendix IV.

Riverton Test Pits:

No Robeson Gouges were found in the excavation, but at least six have been found on the surface of the site. Two fragments of antler gouges were found on the surface during work at the site.

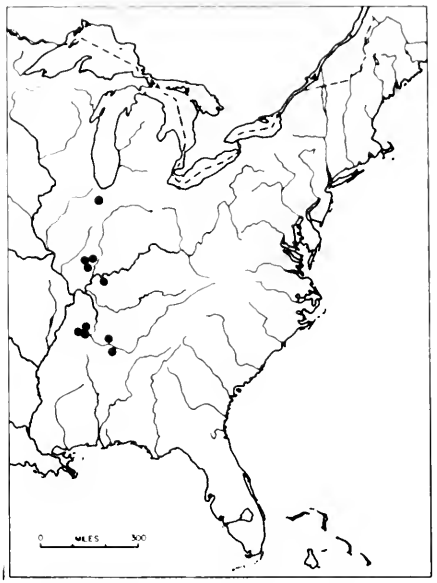


Fig. 12. Distribution pattern of the Robeson gouge.

Riverton Area X:

Although three antler gouges, of the simple trough type (Plate 28 c-d), were found, none were directly in association with Riverton features. Two were in the plow zone, and the third was directly beneath the plow zone and may belong with the Riverton Culture component at the site. No examples of the Robeson Gouge, or any other gouge type, were found in the extensive 1963 excavations of midden deposits associated with the clay floors.

However, Robeson gouges continue to be reported from the site in surface context. These specimens all seem to be coming from a small area of heavy shell deposits on the west and southwest edges of the site. Perhaps at Riverton, these gouges are associated only with a specialized activity area devoted to the dressing of skins. Certainly, however, these items still seem to be much more poorly represented at Riverton, than at either Swan Island or Robeson Hills.

TABLE 33

THE DISTRIBUTION OF GOUGES AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Zone | Level | Robeson Gouges | Aberrant Gouges | Unclassifiable Fragments | Total |
|---|---|---|---|---|---|
| | Surface | 0 | 0 | 0 | 0 |
| I | 0-12" | 0 | 1* | 0 | 1 |
| I | 12-24" | 0 | 1** | 0 | 1 |
| II | 24-36" | 3 | 0 | 1 | 4 |
| II | 36-48" | 0 | 0 | 0 | 0 |
| | Burial Pits & Subsoil Pits | 4 | 0 | 1 | 5 |
| | Uncontrolled Provenience | 1 | 2** | 0 | 3 |
| Total | | 8 | 4 | 2 | 14 |

* 1 Spatulate type ** Trough shaped type

TABLE 34

THE DISTRIBUTION OF GOUGES AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Robeson Gouges | Eccentric Antler Gouges | Hemi-cylindrical Bone Gouges | Unclassifiable Fragments | Total |
|---|---|---|---|---|---|---|
| I | 1 | 2 | | | | 2 |
| II | 2 | | 1 | | | 1 |
| II | 3 | 2 | | | | 2 |
| III | 4 | | | | | 0 |
| III | 5 | | | | | 0 |
| III | 6 | | | | 1 | 1 |
| III | 7 | | | 1 | | 1 |
| III | 8 | | | 1 | | 1 |
| IV | 9 | | | | | 0 |
| V | 10 | | | | | 0 |
| Total | | 4 | 1 | 2 | 1 | 8 |

Swan Island:

Four of the distinctive Robeson Gouges were found in Zones I and II. One might be tempted to make a correlation of the upper portion of the Swan Island midden with Zone II of Robeson Hills on the basis of the zones of concentration of the Robeson gouge at the respective sites. However, an immediately apparent alternative suggests caution in such correlation. Perhaps presence or absence is a function of the type of occupation of the site.

*Hemi-cylindrical Gouges (Plate 28 f-g)*

Swan Island:

These gouges were made of sections of the long bones of large mammals, and the two specimens from Swan Island are the only examples known from the Wabash shell middens. However, similar gouges made of antler were found in Zone I at the Robeson Hills Site and in the plow zone at the Riverton Site in 1963.

Originally the gouges would have been practically rectangular in form, with a steeply beveled bit on one end of the concave inner surface. A very high use sheen was present on all surfaces, although there was a lessening of intensity towards the blunt end. Heavy striations on the bit suggest that resharpening was done with a file.

A bone gouge from Frontenac (Ritchie, 1945: Pl. 10, Fig. 31) resembles the Swan Island specimens somewhat.

*Simple Antler gouges (Plate 28 a)*

Riverton Test Pits:

A single, rectangular deer antler gouge was in Zone II in Level 3 (12-18"). The straight bit was very sharp, and file marks were numerous on the bit and butt ends. Apparently the gouge had not been used to any extent. Dimensions were: Length, 11.0 cm; maximum width, 3.8 cm; width of bit, 3.5 cm; maximum thickness, 3.5 cm.

*Eccentric Gouges (Plate 28e)*

Swan Island:

An irregular sliver of antler from Level 2 had been filed into a pointed gouge form. No precisely comparable example is known, but this specimen suggests an extremely flattened and thin version of the Robeson Gouge.

*Chert Gouges (Plate 9 j)*

A single, rectangular gouge made of local chert was found on the surface, but as a unique specimen from a culturally mixed zone, it is doubtful that it belongs with the Riverton assemblage. Such gouges are very common on sites in southern Illinois, where they are found frequently in Archaic context. The rectangular form may have persisted long after the Archaic, however. The present example has such typical features as dulling and smoothing of the sides, blunting of the base, a bit without use polish on the beveled side of the bit, and use polish on the convex lower face of the bit. One unusual feature of this gouge was its convexo-triangular cross section. Dimensions are: Length, 3.8 cm.; width, 2.7 cm.; thickness, 1.2 cm. These dimensions are unusually small for chert gouges.

## DOMESTIC EQUIPMENT

Domestic implements would include any items designed for use in processing, consuming, or storing food, or whose normal function would be concerned with the maintenance of dwelling or clothing, and items of household equipment.

*Manos*

Our criteria for identifying pebble manos are as follows: 1) battered ends or edges; 2) uniform breaking or erosion of the patina over the entirety of flat or slightly convex surface; 3) erosion of the edges of minute, natural pits on the same surfaces, so that the edges become square rather than rounded as they are in the natural state; 4) occassionally striations developed on the mano surface from abrasion against a metate or other lower grinding element. Cursory inspection will not suffice for most examples, since usage was generally not sufficiently heavy to produce massive areas of erosion. The presence of battered ends is, of course, readily observable, and it is usually on the basis of this single attribute that most pebble manos are erroneously classified as hammerstones - no minor error if one is concerned with functional analysis rather than the compilation of unanalyzable lists of things.

Single or bi-pitted manos must also be distinguished from stones which have been utilized as anvils, which have pits developed from activities such as the percussion chipping of chert. As Ritchie (1929) notes, "Anvils may easily be distinguished from pitted hammerstones by two fundamentally contradistinguishing features. The periphery of

the anvil is frequently irregular and shows no battering; the pits, often on both faces, are commonly shallow and constitute rather areas of marring or variable patches of scarred surface." The Riverton Culture specimens do not conform well to the aforementioned characteristics of anvils.

Ample evidence is available for the use of both pitted and unpitted manos well into historic times in eastern North America, with such usage persisting, in fact, into the nineteenth century. For example, Waugh (1916: 59, Pl. 14, figs. c, d) states for the Iroquois that, "A very crude or primitive method of grinding corn was by means of two medium-sized pebbles of a flat round shape, the lower one pitted slightly in the centre to hold the grains." While pitting of opposed faces may also have facilitated the gripping of the mano while being used for pounding, the preceding remarks clearly indicate that a pitted and unpitted mano constituted a set designed for grinding. Such sets would explain the association of both forms in midden deposits and caches such as that on the edge of a house platform in Area X at Riverton.

Waugh (1916:60, Pl. 15) also remarks that the pebbles, one of which was generally somewhat larger than the other, were used in a large wooden bowl which caught the cracked grain, ground meal, or cracked nuts. Such a combination should offer a useful analogy for interpreting mano usage in the Riverton Culture, where manos are plentiful, but metates are missing from the assemblage.

Both the ethnohistoric data and the primary attributes of these implements provide clear evidence that the mano is another item which remained little changed either in function or form from Archaic into historic times in North America.

Pebble manos are quite frequently noted in ethnohistorical literature as implements used by females in the grinding of corn and other vegetable foods. Such a linkage might reasonably be proposed for similar artifacts from Archaic sites, even though it cannot be substantiated as yet by archaeological data. But ethnohistorical data have also given us pause in advancing such a correlation as absolute. Among the Huron (Tooker, 1964), for example, manos were certainly used by females in the villages, and there is no indication of male linkage.

But in other situations, another picture emerges. Tooker (1964: 23) relates that when men were traveling, a lean-to was erected at the overnight camp, and that two flat stones would be sought for crushing corn carried with them for the trip. Such historic pattern raises questions about the proper identification of small sites which are generally termed gathering camps in the Midwest, on the basis of the presence of considerable numbers of manos and little else in an area covering only a few hundred square feet. If Archaic males on hunting or trading expeditions also carried supplies of seed requiring grinding, it might well be that favored bivouac areas would accumulate a considerable quantity of pebble manos.

Undoubtedly we need to investigate such sites more thoroughly to see if distinctions can be made between sites on the basis of quantities and types of associated refuse. As a hypothesis, we should suggest checking for chipping debris and projectile points, with careful attention to the time spans indicated by the latter. Such associations might indicate bivouacs of male hunting parties as opposed to the gathering camps of females where one would expect the refuse to consist almost entirely of food preparing equipment.

Of course, in the large, heavily occupied Archaic sites such as Perry (Fowler, 1957) and the Riverton Culture sites discussed in this report, we should favor a linkage to females, food grinding being a normal task of the female in the sexual division of labor in North America in historic times, whether the people were sedentary Cherokee or nomadic Chiricahua Apache.

Robeson Hills

By far the most numerous items of domestic equipment were manos, both pitted (19) and unpitted (34), with 6 unclassified specimens. Over half of the manos were found in the upper two feet of the midden, perhaps correlating with decreased emphasis upon mussel gathering and increased dependence upon other types of collecting. Only three of the manos were sandstone, the remainder being assorted igneous, sedimentary, and metamorphic river pebbles. Manos in the Midwest are very common on Archaic and Early through Middle Woodland sites, less common in Late Woodland and Mississippian. They are often reported in the literature, if mentioned at all, as hammerstones. We shall not comment at length on the problem of the faulty identification of this particular significant artifact except to say that results of a careful analysis by the author of over 1200 such pitted and unpitted objects from the Kaskaskia, Big Muddy, Cache, Ohio, Mississippi, and Wabash drainages indicated that nearly a thousand were pebble manos, usually with hammerstone usage, and that a simple hammerstone is a comparatively rare object.

TABLE 35

THE DISTRIBUTION OF MANOS AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Level | Simple | Bipitted or Multiple Pitted | Single Pitted | Unclassifiable | Total |
|---|---|---|---|---|---|
| Surface | 1 | 6 | 0 | 1 | 8 |
| 0-12" | 8 | 4 | 0 | 2 | 14 |
| 12-24" | 6 | 4 | 1 | 2 | 13 |
| 24-36" | 5 | 1 | 0 | 1 | 7 |
| 36-48" | 2 | 2 | 0 | 0 | 4 |
| Subsoil Pits | 5 | 1 | 3 | 0 | 9 |
| Uncontrolled Provenience | 7 | 1 | 0 | 0 | 8 |
| Total | 34 | 19 | 4 | 6 | 63 |

Riverton Test Pits

Simple pebble and pitted manos were not numerous in the site. Twenty-three pebbles of granite, quartzite, gneiss, limestone, fine grained sandstone, rhyolite, and arkoses with flat surfaces were utilized without alteration, but five were of the pitted variety. As usual, the manos showed battering on one or more ends. Manoes were much rarer at Riverton than at Robeson, and no manos were

found below Level 10. Apparently grinding activities were of little importance during the accumulation of most of Zone IV.

TABLE 36

THE DISTRIBUTION OF MANOS AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Simple | Pitted | Unclassifiable | Total |
|---|---|---|---|---|
| Surface | 5 | 9* | | 14 |
| 1 | 1 | 2† | | 3 |
| 2 | | | | 0 |
| 3 | | | | 0 |
| 4 | 1 | | | 1 |
| 5 | | | 1 | 1 |
| 6 | 1 | | | 1 |
| 7 | 3 | | | 3 |
| 8 | 3 | | | 3 |
| 9 | | 1† | | 1 |
| 10 | | 1‡ | | 1 |
| 11 | | | | 0 |
| 12 | | | | 0 |
| 13 | | | | 0 |
| 14 | | | | 0 |
| 15 | | | | 0 |
| 16 | | | | 0 |
| Total | 14 | 13 | 1 | 28 |

*Single pitted; 2 bi-pitted. †Single pitted. ‡Bi-pitted.

Riverton Area X:

Thirty-seven simple and nine pitted manos were present in Area X, including a cache of ten manos, designated Feature 1A, off the southeast corner of the clay platform, Feature 2. All manos were natural river pebbles altered only by use, with the exception of pitting on one or two faces of several specimens. The pebbles included a diverse range of igneous and sedimentary rocks, as follows: simple manos-granite (1), quartzite (4), rhyolite (2), gneiss (1), sandstone (3), limestone (3), arkoses (14), unclassifiable (9), single pitted manos-granite (1), quartzite (2), arkoses (2), bi-pitted manos–quartzite (1), arkose (1); unclassifiable pitted manos–granite (1).

Manos do not seem to have been relatively more plentiful in the 1963 excavations than in the previous test pits, since the 1963 total was raised considerably by the single cache of ten manos. Fewer than 30% were in association with features, the rest being in the culturally mixed plow zone. Two manos were found in the clay floor designated Feature 3f.

Provenience: Simple manos - nine from Feature 1A, two from Feature 3f, one from Feature 6A, and twenty-five from the plow zone. Single-pitted manos - one each from Features 1A and 15, and four from the plow zone. Bi-pitted manos - two from the plow zone. Unclassifiable pitted mano - one from the plow zone.

Swan Island:

Manos were present at Swan Island in lesser quantity than at Riverton, eleven having come from the former excavations, twenty-eight from the latter. Swan Island and Riverton, however, had respectively only about one-sixth to one-half the quantity of manos recovered from Robeson Hills.

About 90% of the excavated manos came from the bottom half of the midden in Zones III, IV, and V, paralleling the vertical distribution pattern at Robeson. Perhaps the concentration of manos correlates with the occurrence of storage pits, which have a similar distribution.

As usual, the manos were generally pebbles of igneous or metamorphic rock, which had been altered only through wear on the mano faces, slight battering on the ends, or the pecking of pits into the mano faces. One pitted mano from Level 7 was sandstone and two others from Levels 1 and 6 were pebbles of unidentified sedimentary rock.

*Metates*

Robeson Hills:

In view of the large number of manos from all levels and areas of the site, the scarcity of metates is very striking. None were recovered in initial surface collections or in excavation. A single example, found after most of the midden had been bulldozed away, came from the junction of the midden with the sterile yellow clay, and may have been associated with an earlier Archaic occupation. Concave depressions had been worn on both faces of the metate and there were two "nutting stone" pits on one face and three pits on the other.

Riverton Test Pits and Area X:

A single, small, flat surfaced boulder of rhyolite showed metate usage. Since this artifact was from the plow zone, specific cultural assignment cannot be made.

TABLE 37

THE DISTRIBUTION OF MANOS AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Level | Simple Uni-faced Manos | Simple Bi-faced Manos | Single Pitted Manos | Bi-Pitted Manos | Unclassifiable | Total |
|---|---|---|---|---|---|---|
| 1 | – | – | | | 1 | 1 |
| 2 | | | | | | 0 |
| 3 | – | | | | | 0 |
| 4 | – | | | | | 0 |
| 5 | – | | | | | 0 |
| 6 | – | – | | | 2 | 2 |
| 7 | | | 1 | | | 1 |
| 8 | – | 1 | | | | 1 |
| 9 | 3 | | | | | 3 |
| 10 | 2 | | | 1 | | 3 |
| Total | 5 | 1 | 1 | 1 | 3 | 11 |

It has become quite clear, however, that the metate is not a part of the Riverton assemblage

Swan Island

No metates were recovered either from the excavations or the surface collections

*Nutting Stone (Plate 29 c)*

Riverton Area X

A boulder of very fine quartzite from the plow zone of Area X had two pits on one face and a single pit on the opposite face.

Nutting stones have not previously been found in association with Riverton Culture sites, although nuts were obviously a very important part of the diet of these peoples. Quite possibly the present example does not belong with the Riverton assemblage, since the bases of two Adena points were found in the plow zone not far from the nutting stone.

*"Cupstones"*

Robeson Hills:

These problematical artifacts are pebbles with one or more broad, shallow, concave depressions covering a considerable portion of one face of the pebble. The wear pattern suggests use as a metate, and perhaps these objects are merely miniature versions of the latter, with an unknown and specialized function. The two examples from the site both came from Pit S-23 and the 24-36 inch level.

*Spoons (Plate 18 a)*

Robeson Hills:

One dubious example of a shell "spoon" was found in Test Pit A in a lens of shell near a hearth. Two "spoons" hollowed out of deer antler (Pl. 18a) were also recovered from the site. The deer antler spoon seems to be unique to the Riverton Culture, no examples having been reported elsewhere to our knowledge. One of these was in Burial Pit 4 near the right side of the skull. The other was found by Mr. Lynn Stephens in bulldozed midden material.

Riverton Area X

No deer antler spoons were recovered from the 1963 excavations but Mr. Dwight New of Robinson, Illinois, has in his collection a specimen from the Riverton Site almost identical to the Robeson spoons.

*Pottery (Plate 30)*

Riverton Test Pits:

Two sherds of "Fayette Thick", three cordmarked Middle or Late Woodland sherds, one plain Late Woodland (?) sherd, and one plain Mississippian sherd were found on the surface.

Riverton Area X

Only six sherds were found in Area X. One of these was a perforated, cordmarked grit tempered sherd (Pl. 30 e), which is probably a Middle Woodland sherd. This sherd was in a groundhog burrow in Area X. Another small grit tempered, cordmarked sherd from the surface was classifiable only as falling in the general range of Late Woodland cordmarked pottery.

The four remaining sherds were all surface finds of Mississippian Plain. A total of five plain Mississippian sherds, all from the surface, are now in the Illinois State Museum collections. These along with the five Mounds Stemless points, probably represent a transient use of the knoll by peoples of the Mississippian Vincennes Culture (Winters, 1967), who had a hamlet on the east side of the Wabash. This hamlet, the Riverton Bridge Site in Sullivan County, Indiana, is due east of the Riverton Site and about three quarters of a mile distant.

Robeson Hills

Three sherds (Pl. 30 d) were found on the surface of the site. All were thick (1.2 to 1.4 cm.) and liberally tempered with crushed quartz. Heavy amounts of sand were also observed in the paste, but since pottery from other cultures in the area has a very sandy texture, the sand may simply have been a normal constituent of the pottery clays in the central Wabash Valley. Surfaces and cores of all sherds were buff in core interior of one sherd having a narrow, reddish band through the center.

Two sherds were fabric impressed on the interior, with the exterior treatment uncertain. The surfaces of the third sherd were extremely weathered.

Of the pottery types currently recognized in the Midwest, Fayette Thick (Griffin, 1952, 97) would seem to resemble closely the sherds from the Robeson Hills Site. We certainly cannot place the pottery within Crab Orchard Fabric Marked (Maxwell, 1951) as currently defined.

Swan Island:

A single, heavily eroded piece of baked clay from Level 10 had impressions of widely spaced cords, which at one point had clearly been knotted together. The general appearance suggests the impress of a piece of netting. However, no trace of tempering could be found, nor was there any indication of an interior surface. We hesitate to classify this item as a sherd, since it might just as easily be a piece of accidentally baked clay which retained the impression of a fabric with which it had been in contact.

Two sherds of Middle Woodland? cordmarked and an unclassifiable cordmarked sherd occurred in Level 1. A sherd of Late Woodland (?) cordmarked was found in a groundhog burrow in Test Pit A, and two sherds of plain Woodland pottery came from Level 2.

Five sherds of plain Mississippian pottery tempered with coarsely crushed shell were found at the site. Three of these were surface finds, and single sherds occurred in Levels 2 and 3 (Pl. 39a).

As in the other shell middens of the Central Wabash, no definite association of pottery can be made with the major occupation of the site. The Woodland and Mississippian sherds occur only in a superficial position, and are the residue of brief occupations by the later groups which also left behind triangular and corner notched projectile points.

## WOODWORKING TOOLS

*Grooved Axes*

Robeson Hills:

Woodworking tools are represented by a single excavated fragment of the poll of a grooved axe (Pl. 31 c) found between 18-24 inches in Test Pit E, and by two fragments of full grooved axes found in bulldozed midden material. The latter have tapered bits and no flanges along the edge of the groove. The axes were heavily polished below the tops of the polls.

Grooved axes have also been reported from surface collections from Riverton and Swan Island. At present their cultural significance for these sites cannot be fully evaluated, but in the southernmost part of Illinois, grooved axes apparently disappeared during the transition between the Archaic and the Woodland Cultures. In the Illinois River Valley, on the other hand, three-quarter grooved axes are said to have persisted well into the Hopewellian Phase of the Havana Tradition (Griffin 1955), a contention open to considerable challenge in view of the multi-component nature of the sites where the specimens occur, including, generally, an Archaic component.

We do not feel that the full grooved axes in our shell midden are a part of the major cultural complex, but, rather, that they pertain to another Archaic or Early Woodland component, particularly since the source for so many of the axes has been the surface rather than Riverton Culture midden deposits.

Riverton Test Pits:

No woodworking tools were found in the test pits, but both full grooved axes and celts made from various igneous rocks have been collected from the surface in previous years.

*Grooved Limonite Axes. (Plate 31 d-f)*

Riverton Area X:

Prior to the 1963 excavations, no examples of these chipped axes had been recovered from any of the sites, nor had they been noted in any of the local collections. However, in Area X they occurred in some abundance, with two examples found in the plow zone, one in Feature 1 ( a midden concentration), one in Feature 27 (a sandstone concentration containing a quantity of artifacts), and one on the surface of Feature 28 (a yellow clay platform). Their association with the Riverton Culture is thus unquestionable.

We have referred to these axes as chipped, but actually their preparation involved two techniques. The bit was prepared by percussion flaking, but the grooves were prepared by grinding, with the grooves showing considerable variation in preparation. One of three specimens sufficiently intact to permit satisfactory typing, one axe was full grooved, another axe had a groove on one face and two edges, and the third axe was side notched. The two badly damaged specimens were definitely grooved, rather than notched, and they may well have been full grooved.

Four of the five specimens were limonite concretions, with three of them having a siltstone nucleus. The fifth was made from an unidentified sedimentary material. The choice of material is very puzzling, since the limonite is built up in layers which tend to shatter away from the nucleus quite easily. But the heavy battering of the bits show extensive use as chopping tools, and it may have been that the Riverton people were simply taking advantage of a plentiful local resource from which axes could be manufactured easily and quickly.

No examples precisely comparable to these Riverton axes have been found anywhere in the literature. Ungrooved chert axes with notched sides are common on Archaic sites in Southern Illinois, where they appear in early Archaic context at the Duran Rock Shelter (SIU24D2-137) in the Cache River Valley, and these may be the prototypes from which the Riverton form derived. Many of the hoes illustrated and described for the Indian Knoll and Tennessee Valley sites bear superficial resemblance to the Riverton axes, but lack the encircling groove. Probably some of the side notched artifacts illustrated for Carlson Annis (Webb, 1950a: Fig. 12e) are actually axes, judging from the description on page 314: "Some of the blades show polish from use as if used to dig in the earth, but many show fractures as if they might have been used and broken by percussion . . . A number of specimens had grooves which showed polish as if the thong used in attachment had moved." Certainly the Riverton specimens are not digging tools. The only polish on the bits is on the ridges left by flake removal, a use characteristic which would never be typical of the latter implements. Furthermore, the battering of the bit is much more pronounced than that associated with hoes or digging tools.

It is possible that the "iron carbonate," full grooved axes mentioned for Parrish Village (Webb, 1951: 431) are comparable to the Riverton specimens, but these items are not illustrated in the report.

At present it would seem that the Riverton specimens are unique, not only in terms of the other sites of the Riverton Culture but in respect to eastern North America generally.

Swan Island:

No woodworking implements were present in the midden, but a full grooved axe in the possession of the owner of the land is reported as coming from the area of the site.

We are, however, becoming more and more dubious that *ground stone axes* are a legitimate part of the Riverton Culture assemblage.

## "DIGGING" IMPLEMENTS

*Shell "Hoes" (Plate 32 a-b)*

Robeson Hills:

The five shell "hoes" (Pl. 32 c,e) found in the midden were possibly used for digging pits or raking shells from hearth areas. There is no evidence for agricultural usage, since no remains of cultivated plants were found anywhere in the site. Two mussel shell "hoes" (One *Lampsilis ovata*) were found in Test Pit A in the 12-18" level and had central perforations about 2 cm. in diameter. Both were in concentrations of shell near hearths, suggesting that the implements were either used in preparing clay hearths or in

taking the mussel shells from such features. A single (*Actinonaias carinata*) example from Pit S-15 at the bottom of Test Pits E and G shows that perforated shells were in use from the earliest occupation of the site.

The holes in the shell were placed either in the center or near the hinge, and were apparently cut rather than drilled.

In connection with the suggested use of shell hoes for digging pits, we should point out that the shells do not show earth polish, and that during excavations clear evidence was noted on some pit walls that they had been gouged out with pointed digging sticks. The evidence from Robeson suggests that the perforated shells were primarily an item of hearth equipment, and that they might well be classified with domestic implements.

It is even possible that some of the perforated mussel shells (Pit S-15) were ornaments and that they should be included with the small shell "pendants" discussed under the category for ornaments.

Riverton Test Pits and area X

No items of this category were found, nor have they ever been reported from the site. This lack would tend to argue against our suggestion that at Robeson Hills they were used as rakes in connection with hearths, since these features are quite plentiful at Riverton. Perhaps the actual correlation is with pit excavation, the latter features being plentiful at Robeson and rare at Riverton.

Swan Island:

Three shell "hoes" were present in the lower midden. As has been noted in the Robeson Hills report, these perforated shells show no use characteristics which could be definitely associated with use as digging implements. However, there does seem to be wear along the ventral edge, again suggesting usage as "rakes" perhaps in connection with the hearth areas. But as noted for the Riverton Site, their usage as pit digging equipment cannot be ruled out. All shell hoes at Swan Island were found in the lower midden where storage pits are present. Two shell "hoes" (Pl. 32 a-b) were found in a storage pit beginning at 48 inches in Square 50L7. One of these was a *Lampsilis ovata* shell with two holes cut from the interior, the other an *Actinonaias carinata* shell with a single hole cut from the interior. An *Actinonaias carinata* shell from Level 6 had had a hole cut from the interior near the center of the shell. Holes in the three shells ranged form 1.0 to 1.3 cm. in diameter.

## ORNAMENTS

*Tubular Bone Beads (Plate 33)*

Robeson Hills

Ornaments of all types were generally scarce throughout the excavations. Three tubular beads of cut and polished sections of bird bones closely resemble beads from Indian Knoll sites in Kentucky (Webb, 1946; 1950) and from the Eva Site in Tennessee (Lewis and Lewis, 1961).

Riverton Test Pits

Tubular, bird bone beads were fairly common in the midden but were concentrated in Zone IV. Lengths ranged from 2.7 to 4.3 cm., with an average of 3.4 cm., and the edges of all but two had been ground smooth. A single example from Level 1 had a row of parallel, incised lines perpendicular to the end, but this artifact was more likely a flute fragment.

Riverton Area X

The thirteen tubular bone beads were all plain, with ends ranging from highly polished to roughly cut. Ten of the beads were bird bone, one of which was probably a turkey ulna, and three were made from bones of small unidentifiable mammals.

Provenience: Three of the bird bone beads came from the plow zone, three from Feature 1, one from Feature 6A, two from Feature 15, and one each from Levels 1 (0-6 inches) and 7 (36-42 inches) of Test Pit Alpha. All three mammal bone beads were found in Feature 15.

Swan Island:

Beads and pendents were relatively plentiful in the midden with the types, distribution, and quantities of ornaments very similar to those at Riverton. Probably the quantitative differences between these two sites and Robeson, from which there were only nine ornaments, are not so great as the tabulations would indicate. The low count at Robeson may be directly correlated with the scarcity of tubular bone beads, which would likely have been used in multiple groupings in necklaces.

Tubular bird bone beads were evenly distributed throughout the lower four zones of the site. Two fragments from Level 2 had a single groove parallel to the end. A similarly grooved bead is illustrated from Indian Knoll (Webb, 1946: 291, Fig. 43). One unusually large bead had been made from the humerus of a large bird, possibly goose (Pl. 34 s). In Level 6 there were two fragments which had a series of parallel notches cut perpendicularly to their ends. Similarly notched specimens were found at Robeson Hills in Hearth S-18 and in Level 1 at Riverton, and all may actually be notched end fragments of flutes.

The remaining bone beads were plain, differing only from the Riverton tubular beads in having a much greater range of variation in size. Swan Island beads range from 1.5 to 7.7 cm. in length with an average of 2.8 cm., contrasting markedly with the Riverton range of 2.7 to 4.3 cm. and average of 3.5 cm.

Two other fragments may be those of very large tubular beads, bone tubes, or flutes. The two fragments come from Levels 5 and 7, and are plain, although, polished, fragments of bird bone.

*Crinoid Beads (Plate 34 l)*

Swan Island

A thin segment of crinoid stem from Level 3 seems to have been altered by reaming out the central perforation for use as a bead.

*Pendants (Plate 34 a-i,m)*

Robeson Hills:

Two drilled canines of young bear were recovered. One (Pl. 34b) was in the general refuse filling Pit S-14, which began at 48 inches in Test Pits B and D and penetrated the sterile subsoil to a depth of 71 inches below

datum. The second (Pl. 34 c) was at the neck of Burial 5, the pit for which was dug into sterile yellow clay some three or four feet below midden surface (approximate depth based upon estimated ground surface before bull dozing of midden). The enamel of both specimens was highly polished. The cylindrical perforation of the former seems to have been drilled from one side, of the latter from both sides. While perforated animal teeth are fairly common in Late Archaic and Woodland sites, so far perforated bear teeth seem to be rare in Late Archaic context. Webb (1946: 303) says of Indian Knoll, "Bear canines seemingly were not used by these people." However, this does not seem to be correct, since the description on page 210 of artifacts illustrated in Figure 24B for Burial 842 specifically mentions that a necklace is composed of shell beads and drilled bear canines. Bear canine pendants are noted for sites of the Archaic Culture during the Eva Phase in Tennessee, (Lewis and Kneberg, 1959; Lewis and Lewis, 1961), the Frontenac Focus in New York (Ritchie, 1944), and two drilled bear teeth are reported from Burial 23 in the Archaic zone of the Little Bear Creek site in Northern Alabama (Webb and DeJarnette, 1948d). The first culture is currently dated as beginning before 5,000 B.C. and persisting until perhaps 3,500 B.C., the second culture dates from around 2,000 B.C., but there is no dating for Little Bear Creek, although on various typological grounds it is probably late in the Archaic (For further data on bear canines see Parmalee, 1959a).

A small perforated fragment of highly polished bone of indeterminate geometric shape (Pl. 34k) also occurred. Two other specimens were found, both unperforated, which may have been intended as pendants. One was a spatulate piece of cut mussel shell (Pl. 34q), the other a highly polished hemi-cylindrical piece of bone, with one end cut in trident shape (Pl. 34 o). Another object, which may have been a pendant is highly polished fragment of bird bone, with a row of short vertical incisions perpendicular to the polished end and what is probably the remains of a perforation at the broken end, but these latter attributes are actually more characteristic of flutes.

Two *Actinonaias carinata* shells from Level 8 (Pl. 32 q) had had holes, with diameters of 1 and 1.5 cm., drilled from the outside close to the hinge. Both the small size of the shells and the perforations would argue against their being hafted digging implements or "rakes." Probably they are pendants of some sort.

Riverton Test Pits:

A drilled canine of small carnivore was found in Level 9, and a drilled lower right canine of a young raccoon (Pl. 34 f) came from the surface. Drilling of the single perforations had been from both sides.

A perforated and cut jaw of a bobcat (*Lynux rufus*) was found on the surface (Pl. 34 t) and hence cannot be assigned with any certainty to the Riverton Culture. The ramus had been cut diagonally and the edges polished. The portion of the mandible beyond the molars had been cut away but the edges were left unpolished. A single perforation had been made below the ramus, but it was impossible to determine whether drilling had been from one or both surfaces.

A small *Ptychobranchus fasciolaris* shell (Pl. 32 f) from Level 14 had been perforated from the exterior with a hole 0.7 cm. in diameter.

Riverton Area X.

Four pendants were found, with two of these, a wolf canine (*Canis lupus*) and a human incisor, constituting new traits for the Riverton Culture. The wolf canine (Pl. 34 a) was found at the edge of Feature 2 (a yellow clay platform) about 1/4" below the surface, and is probably associated with that feature. Wolf bones of any kind are rare in the sites of the Riverton Culture, with a total of two dubiously identified bones from previous excavations at Riverton.

The human incisor (Pl. 34 r) was found about 1/4 to 1/2 inch above Feature 2 in Annex 1, and may well have been associated with Feature 2. Pendants made from human teeth are very rare in Archaic context, but Webb and Haag (1940: Fig. 24) illustrate four such pendants from the Ward Site. None of these appears to be an incisor. And Webb and DeJarnette (1941: Pl. 153 no. 1) illustrate an assortment of drilled human teeth from a late Archaic burial (No. 60) at the Bluff Creek Site, Lu°59, in the Tennessee Valley in northern Alabama.

The remaining two pendants were drilled canines tentatively identified as mink (Fea. 21; Pl. 34 h) and raccoon (Fea. 18; Pl. 34 g).

All of the above pendants had holes through the roots, with drilling from both sides.

Swan Island:

A lower right raccoon canine (Pl. 34 e) from Level 6 had been perforated for suspension by drilling a hole from one side through the tip of the root. Another canine fragment from a pit beginning at 48 inches had portions of two perforations which had been drilled from both sides. Not enough of the canine remained for identification but it was obviously from a large carnivore.

Shell "pendants" were represented by two specimens. The example from Level 2 had a single perforation drilled near the hinge (Pl. 32 f). Deterioration of this shell was too advanced to permit identification. A *Lampsilis ovata* shell from Level 10 had been perforated from the outside near the center of the shell (Pl. 32 d).

A pebble pendant from Level 2 was simply a natural pebble which had been altered by drilling a hole from one side (Pl. 34 m). Since Level 2 was a mixed zone and no other pebble pendants were found in the shell middens, this particular specimen cannot be definitely assigned to the "shell midden" Archaic. However, there is ample evidence for association of such pendants with the Archaic (See Fowler, 1959: Appendix I).

*Shell Beads.*

Riverton Test Pits.

A single shell of *Campeloma* cf. *integrum* from Level 8 (Pl. 34 n) had been perforated through one side for use as a bead.

*Pearl Beads.*

Riverton Area X:

At least forty badly deteriorated pearl beads were in the red ocher covered cache associated with Burial 1. Some

of the beads may have been shell rather than pearl, and one associated fragment seems to have been the remains of a small, rod-like shell pendant. Presumably, all were part of a single necklace. The perforations of the spherical beads were cylindrical.

Pearl beads are generally rare in Archaic sites, perhaps because of their fragility, but at Indian Knoll occurrences are noted for the infant burials 63 and 747 (Webb, 1946).

*Miscellaneous Ornaments*

Riverton Test Pits

A fragment of cut and highly polished bone came from Level 12 of the 1961 excavations. A triangular projection on the base (Pl. 34 p) suggests that it came from a bone object similar to the one from Robeson Hills illustrated in Plate 34 o.

Ornaments reported from surface collections but not found during excavation include drilled bear canines and stone gorgets. We doubt that the latter are part of the Riverton assemblage.

## CEREMONIAL EQUIPMENT

Probably any definition of a category such as ceremonial items will be unsatisfactory. In the first place, any artifact may have been utilized ceremonially, but such use is rarely inferrable from archaeological context. Secondly, artifacts which we have good reason to classify as ceremonial may have served utilitarian or aesthetic functions as well. For example, we have included a number of objects under the heading of ornaments. While personal adornment may have been the only function of these artifacts, there are so many instances in the ethnological literature of similar objects as status symbols or the carriers of varieties of supernatural power that we might easily have included ornaments as one type of ceremonial object.

We shall define our category as composed of artifacts the use of which can be assumed from primary and secondary attributes to be associated with sacred or secular rituals, either personal or communal, or to be symbols of status within an organized group.

*Pipes (Plate 35)*

Robeson Hills:

The pipe (Pl. 35 c) was found in refuse pit S-14 which began at 48 inches below datum in Test Pits B and D and had been cut into the sterile clay subsoil. Its contents have been dated by C-14 at 3490 ± 200 B.C.

In cross section, the pipe is a convex-sided, trucated cone, with the following dimensions:

Length: 8.2 cm.
Maximum Diameter: 4.2 cm.
Outside Diameter of Base: 1.4 cm.
Outside Diameter of Mouth: 3.0 cm.
Thickness of Walls: 0.7-1.0 cm.

A fine grained, reddish sandstone had been used, and both the interior and exterior were well smoothed. The interior of the tube is heavily blackened, and a faceted clay pellet (2.0 cm. in diameter) found within the pipe is similarly coated with carbonaceous material. The latter item was presumably a prehistoric type of filter.

While the use of sandstone pellets for blocking the mouths of tubular pipes of various types has been known for some time from Adena sites in West Virginia (Solecki, 1953) and Ohio (Webb and Baby, 1957), we are not aware that such a feature has previously been reported for Archaic tubular pipes. But the charring of both the Robeson and Cordray Mound pellets (Webb and Baby, 1957: 22) clearly indicates that the primitive filter developed by Archaic peoples was still in use in the Midwest some thousand to fifteen hundred years later.

Of course, evidence for smoking as indicated by the blackening of the interior of the pipes or the pellets contained therein does not by any means indicate the use of tobacco. Yarnell (1964: 86) has listed seventeen wild plants, ranging from sumac leaves to fleabane flowers, which were smoked by historic Indians of the upper Great Lakes region. He further states that, ". . . . from present evidence, no antiquity can be attributed to tobacco in the East. Even if it arrived as early as corn, it would still be antedated by pipes" (Yarnell, 1964: 85-86).

Similar pipes of the "cloudblower" type have been reported by Webb with Burial 127 at Archaic Carlson Annis Site in Kentucky and for Archaic sites in the Pickwick and Guntersville basins of Alabama, and by Lewis and Kneberg for Archaic sites in Tennessee (Webb and DeJarnette, 1942: Pl. 37, fig. 2; Pl. 94, fig. 1; Webb and DeJarnette, 1948a: Fig. 20; Webb and DeJarnette, 1948b: Fig. 11b; Webb and DeJarnette, 1948c: Fig. 14b; Webb, 1950a: Fig. 8A; Webb and Wilder, 1951: Pl. 66; Lewis and Kneberg, 1959: Fig. 3g; Lewis and Lewis, 1961: Pl. 30). These pipes seem to be especially common in the Guntersville Basin in Northern Alabama, with fifteen from the Flint River Site (1 with Burial 53, 3 with Burial 142, 1 with Burial 195, 1 in Zone A, 1 in Zone B, 3 in Zone C, 1 in Zone D, and 4 in the general refuse), and eleven from Whitesburg Bridge (1 from Zone F, 7 from trenches, and 3 from general refuse). Oddly enough they have not been reported for the Wheeler Basin, which lies between the Pickwick and Guntersville basins. Perhaps there were two separate zones of occupation in this part of the Tennessee Valley at the time that cloudblower pipes were in use.

During inspection by the author of collections from Archaic sites in the McClung Museum at the University of Tennessee, a very large limestone cloudblower pipe (17 cm. in length) was noted from the Cherry Site (Bn 74 and 75), which is located in Benton County on the Tennessee River (see Lewis and Kneberg, 1959, for general data on the site). Dan Morse also reports (personal communication) a pipe of fine grained, tan sandstone from Burial 5 at the Robinson Shell Mound (40 SM 4), an Archaic site on the Cumberland River in Smith County, Tennessee. The latter specimen is virtually identical to the Riverton Culture pipes, with the exception that the interior of the Robinson specimen is a straight-sided, truncated cone, rather than the convex-sided, truncated cone typical of the Riverton specimens.

Webb in the description of the pipes from the Carlson Annis Mound states (Webb, 1950: 315-16), "Stone tubular

pipes have been recently reported from several shell middens in Kentucky. They are frequently found in the shell mounds along the Tennessee River in Alabama . . . . . They definitely belong to the later levels of the sites in which they are found both in Alabama and Kentucky." It is not entirely clear, however, where the aforementioned shell middens are in Kentucky, since no pipes are reported for Ward, Barrett, Butterfield, Kirkland, Smith, Reynerson, Read, Indian Knoll, Chiggerville, or Parrish, leaving only the complete and two fragmentary specimens from Carlson Annis mentioned in publication. Lewis and Kneberg (1959) also indicate that pipes of the "cloudblower" type do not appear until the Big Sandy Phases in Tennessee. Thus, present evidence would indicate that the cloudblower pipe in the Midwest is Late Archaic.

Other examples of cloudblower pipes similar or identical ot the example from Robeson Hills are reported from the multi-component Feurt Site (Mills, 1917: Fig. 59) in southern Ohio and from the multi-component Raaf (Crib Mound) Site (Scheidegger, 1962: Fig. 3, bottom) in southern Indiana (Kellar, 1956). The former site is very complex, having Archaic, Early Woodland, Adena, and Fort Ancient occupations, while the latter is primarily a site of the Indian Knoll Culture. Lack of provenience data forbids assignment of the pipes to any specific component at either of the sites, although they may perfectly well be Archaic.

It is also interesting to note that cloudblower pipes of the Robeson Hills type are known from Glacial Kame sites such as Mulen in Randolph County, Indiana (Cunningham, 1948: Pl. VII, fig. 5), and the B. L. Shrider Kame in Allen County, Ohio (Personal observation of a collection in the Ohio State Museum). In view of the probable temporal position of Glacial Kame (Ritzenthaler and Quimby, 1962: 256-57), our previous remarks about the Late Archaic, or Early Woodland, cultural affiliation of the cloudblower pipe gain added support. During the summer of 1963, Lewis R. Binford also recovered a cloudblower pipe of tan sandstone from the Hatchery Site, which is located immediately east of Carlyle, Illinois, on the east side of the Kaskaskia River. Since the latter site includes both Archaic and Woodland components, the pipe, being a surface find, cannot be assigned to any specific component, but it may well be Archaic, since the area from which it came had many Archaic stone artifacts and only a few sherds (Lewis R. Binford, personal communication). The Hatchery specimen, is almost identical to the Riverton Culture type. It should be noted that the Hatchery Site has also produced quantities of simple stamped pottery which are quite similar to Embarrass Simple Stamped (Winters, 1967), and that this area of the Kaskaskia Valley may have been involved in some sort of interaction with the Wabash Valley over a period of several hundred years.

One might also note that stylistically the pipes from Smithsonia Landing (Webb and DeJarnette, 1942), the Raaf Site, Carlson Annis, the Feurt Site, the Hatchery Site, and the Mulen Site resemble most closely the Robeson Hills specimen. The other examples noted differ somewhat in having either striaight, rather than rounded, sides or interiors, a slight constriction near the base which gives a stemmed effect, or incised decoration. In other words, more of the typologically identical examples are from sites north of the Ohio river.

As noted previously, the Robeson Hills pipe was in a context indicating that it had been deposited near the beginning of occupation of the site. Perhaps we can infer than that the beginning of the major occupation of the Robeson Hills Site should be on a time level equivalent to the occurence of cloudblower pipes elsewhere, barring the possiblity that a homotaxial situation exists.

In Figure 13 we have indicated the geographical distribution patterns of cloudblower pipes for eastern North America. A major north-south distributional axis occurs along the Tennessee and Wabash river systems, and a minor east-west axis, along the lower Ohio valley. A definite concentration is indicated in the Midcontinent area for the general type. Undoubtedly, a more refined typological analysis will permit the assignment of specific types to local cultural units when sufficient data become available. There are already indications that such a refinement of typology will help in the interpretation of the inter-cultural trade systems which are now recognized for the Late Archaic.

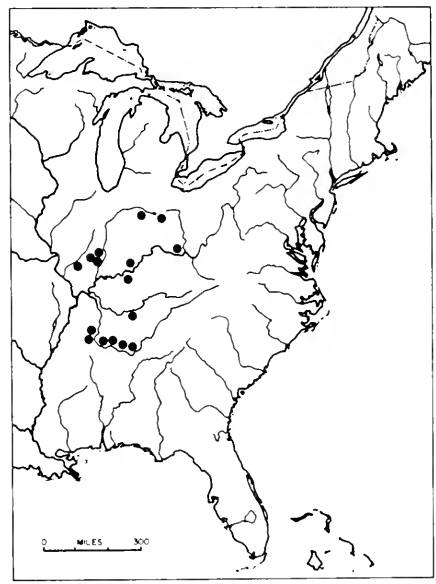


Fig. 13. Distribution pattern of the Archaic cloudblower pipe.

Riverton Test Pits:

Two fragments of tubular sandstone pipes were found in Levels 1 and 6 (Pl. 35 b). Reaming marks were clearly evident on the interior of the tubes, and the interior of the specimen from Level 6 was heavily blackened. The latter artifact was clearly an example of the "cloudblower" type of tubular pipe.

Riverton Area X

A single sandstone pipe (Pl. 35 d) was found on the south edge of Feature 2 (a yellow clay platform). The pipe was standing upright in the midden, so that the base was inadvertently broken while the plow zone above Feature 2 was being removed. The pipe was made from a bright yellow, rather coarse grained sandstone, and was identical in every respect to the pipes previously reported from Robeson Hills, Swan Island, and Riverton. As with the pipe from Robeson Hills a carbonaceous film lined the interior of the 1963 specimen, thus providing additional evidence that the cloudblower forms were truly pipes and not shaman's sucking tubes.

Swan Island

No pipes were recovered from the excavation, but a sandstone pipe identical to the cloudblower type from the other sites of the Riverton Culture is in the collection of Mr. Donald Mefford of Lawrenceville, Illinois, who reports that it comes from the surface of the Swan Island Site.

*Flutes*

Robeson Hills

In defining the category of flutes, we have been guided by the criteria mentioned by Schweinsberger (1950: 32), who remarks that in addition to the presence of holes that can be used in producing musical notes, the cylindrical tube must have a curvature, since, ". . . . no musical note can be attained from a perforated tube which is straight . . ."

The flute or whistle fragment (Pl. 36 b) from Robeson Hills had been fashioned from a bird leg bone, both the exterior surface and the end having been well polished. Portions of two circular perforations remained, and the interiors of these also showed heavy polish. Narrow polished zones adjacent to the exterior and the interior margins of the perforations suggested that a thong or some other pliable substance had been drawn diagonally through the perforations. The significance of the polish is obscure. Certainly, the delicacy of the bone tube and perforations would preclude intensive use as a thong stropper.

Another object from Pit S-18, originally classified as a pendant, is probably a flute fragment. Bird bone flutes or whistles have been found over wide areas of North America,

TABLE 38

THE DISTRIBUTION OF PERFORATED SHELLS AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Zone | Level | Quantity | Remarks |
|---|---|---|---|
| I | 0-12" | 0 | |
| I | 12-24" | 4 | Two each from Test Pits A and B (12-18"). Central perforations, ca. 2 cm. in diameter. |
| II | 24-36" | 0 | |
| II | 36-48" | 0 | |
| II | Subsoil Pits | 1 | From Pit S-15 at bottom of Test Pits F and G. Perforation near hinge. |
| Total | | 5 | |

TABLE 39

THE DISTRIBUTION OF ORNAMENTS AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Levels | Tubular Bird Bone Beads | Pendants | Remarks |
|---|---|---|---|
| Surface | 0 | 0 | |
| 0-12" | 1 | 0 | |
| 12-24" | 0 | 1 | Perforated, geometric shaped fragment of polished bone. Actual depth 20-30" |
| 24-36" | 1 | 0 | |
| 36-48" | 1 | 3 | 1 unperforated, spatulate piece of cut mussel shell. 2 perforated mussel shells. |
| Subsoil pits | 0 | 3 | Bear canine in Pit S-14 at 48-71" below datum. Incised bird bone in Pit S-18, a hearth occurring at depth of about 3' in midden. Cut and polished bone in Pit S-23. Trident-shaped end. |
| Burial pits | 0 | 1 | Bear canine at neck of Burial 5, which was below Pit S-22 and above Pit S-22. |
| Total | 3 | 8 | |

including such sites as Pictograph Cave in Montana (Mulloy, 1952); the Iamoka and Frontenac Sites in New York (Ritchie, 1944); the Barrett, Carlson Annis, Read Shell Midden, and Indian Knoll sites in Kentucky (Webb, 1946; 1950a; 1950; Webb and Haag, 1940); and Archaic sites of the Big Sandy, Weldon, and Ledbetter Phases in Tennessee (Lewis and Kneberg, 1959). In view of the C-14 dates for some of these sites, the bird bone flute could not have appeared much before 3,000 B.C. and many of the dates would fall after 2,000 B.C. thus indicating a generally Late Archaic cultural affiliation for the earliest known examples of bone flutes.

One should also note that flutes similar or even identical to Archaic types persisted very late in the Midwest (e.g. see Mills, 1917 for examples from a Fort Ancient Culture site in Ohio.) and Schweinsberger (1950: 28-33) cites a number of examples from Mississippian, Fort Ancient, and Late Woodland sites.

Riverton Test Pits:

No flutes were found in the test pits but at least four have been reported from surface collections.

Three polished fragments from the Museum surface collections may be from bird bone flutes or tubes. Two of these fragments had punctations near the polished tube ends, and one had a notched end.

Riverton Area X:

Much new information was gained on the typology of Riverton flutes, with the recovery of five flute fragments from Area X (Pl. 36 a, d, g). An additional three fragments from the same area and another specimen from Level 2 (6-12 inches) of Test Pit Alpha may be those of flutes, but identification is not absolutely certain. Surface specimens from the private collections of Mr. Gregory Helm (Pl. 37 e) and Mr. Dwight New (Pl. 37 b), both of Robinson, Illinois,

TABLE 40

THE DISTRIBUTION OF ORNAMENTS AT THE RIVERTON SITE BY SIX-INCH LEVELS

| Level | Tubular Birdbone Beads | Shell Beads | Shell Pendants | Canine Pendants | Bone Pendants | Cut Mandibles | Total |
|---|---|---|---|---|---|---|---|
| Surface | – | – | – | 1 | – | 1 | 2 |
| 1 | 1* | – | – | – | – | – | 1 |
| 2 | – | – | – | – | – | – | 0 |
| 3 | – | – | – | – | – | – | 0 |
| 4 | 1 | – | – | – | – | – | 1 |
| 5 | – | – | – | – | – | – | 0 |
| 6 | 1 | – | – | – | – | – | 1 |
| 7 | 2 | – | – | – | – | – | 2 |
| 8 | 3 | 1 | – | – | – | – | 4 |
| 9 | 1 | – | – | 1 | – | – | 2 |
| 10 | 1 | – | – | – | – | – | 1 |
| 11 | 4 | – | – | – | – | – | 4 |
| 12 | 1 | – | – | – | 1 | – | 2 |
| 13 | 3 | – | – | – | – | – | 3 |
| 14 | – | – | 1 | – | – | – | 1 |
| 15 | – | – | – | – | – | – | 0 |
| 16 | – | – | – | – | – | – | 0 |
| Total | 18 | 1 | 1 | 2 | 1 | 1 | 24 |

*May be a flute or tube fragment.

and from the collection of Mr. Denzil Stephens (Pl. 37 a) were also made available for examination. These latter examples are practically intact, and provide full data on the attributes associated with flutes.

In Area X, two flute fragments came from the plow zone and the three remaining fragments from Features 1, 6A, and 41. Two of the dubious fragments from Area X were from the plow zone, and the third from Feature 1.

The flute from Feature 1 and the three flutes from private collections throw considerable light on Riverton flutes in general. All have two features in common: Leg bones of large, but unidentifiable, birds, (possibly crane), were used; and in all instances, there were only two perforations, which were closely and vertically spaced along the long axis of the tube. In other details, there is considerable variation. Lengths vary from 7 to 13.7 cm. and diamters from .75 to 1.7 cm. Notching of the tube end is a feature of some flutes as shown in Plate 37 b. In addition, the notched end tubes may have either an incised groove close to the end of the tube, or there may be a row of punctations below the band of notching. Most examples, however, have plain ends, which range from highly polished to indifferently smoothed. A similarly notched-end bird bone, with encircling groove, from Swan Island has been tentatively identified as a flute fragment, and this identification has been reinforced by the new examples, since no other bone artifact with notched ends and grooving has been noted for any of the Riverton Culture sites. Further variation is shown in the manner of perforation of the tubes. Some examples have two neatly drilled and polished, circular or slightly elliptical holes, while others have two openings which are nothing more than rectangular slits.

Oddly enough, there are no examples precisely comparable to these stylistically simple Riverton flutes (or whistles) in such Late Archaic sites elsewhere in eastern North America as Barrett (Webb and Haag, 1939) Carlson Annis (Webb, 1950a), Read Shell Midden (Webb, 1950b), Indian Knoll (Webb, 1946), Lamoka (Ritchie, 1944), Frontenac (Ritchie, 1944; 1945), and Cherry, Kays, and Oakview (Lewis and Kneberg, 1959).

At Barrett, the five examples illustrated in Fig. 8A either have two opposed perforations or a single perforation, and none have any decoration. Three flutes, or whistles, are reported from Carlson Annis, and are illus-

TABLE 41

THE DISTRIBUTION OF ORNAMENTS AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Level | Tubular Bone Beads | Crinoid Beads | Shell Pendants | Canine Pendants | Pebble Pendants | Total |
|---|---|---|---|---|---|---|
| 1 | 1 | – | – | – | – | 1 |
| 2 | 4 | – | 1 | – | 1 | 6 |
| 3 | 3 | 1 | – | – | – | 4 |
| 4 | 4 | – | – | – | – | 4 |
| 5 | 3 | – | – | – | – | 3 |
| 6 | 3 | – | – | 1 | – | 4 |
| 7 | 2 | – | – | – | – | 2 |
| 8 | 2 | – | – | – | – | 2 |
| 9 | 2 | – | – | 1 | – | 3 |
| 10 | 1 | – | 1 | – | – | 2 |
| Total | 25 | 1 | 2 | 2 | 1 | 31 |

trated in Figs. 8A, 6C, and 15 bottom, (with a much better illustration of the latter specimen in the Indian Knoll report, Fig. 51C), and Fig. 14D). The former two are in association with Burials 42 and 381, and the latter figure apparently illustrates an example from general excavation. Again, these specimens have either a single hole or opposed perforations, and one specimen is elaborately engraved with a rectilinear scroll motif. Webb also notes in the same report that the engraved bird bone fragments shown in the third row from the top of Fig. 15 may be flute fragments. If so, there may have been six or seven flutes at Carlson Annis, several of which had distinctive geometric decoration. A single example came from Indian Knoll (Fig. 51C), where it was found in association with Burial 59. Both the Indian Knoll flute and the one from Burial 381 at Carlson Annis have similar large rectanguloid holes with small side holes below the main perforation. A single flute is reported from the general excavation at the Read Shell Midden, but it is neither illustrated nor discussed.

No flutes were found in the other Indian Knoll Culture sites, Parrish (Webb, 1951), Chuggerville (Webb and Haag, 1939), or the Butterfield, Smith, Reynorson, Ward, and Kirkland sites in McLean County (Webb and Haag, 1940; 1947).

In Lewis and Kneberg's comparative study (1959) of Archaic sites in the middle south, whistles or flutes are listed in Table I only for the Cherry Site (Big Sandy Phase of the Midcontinent Tradition), Kays II (Weldon Phase of the Eastern Tradition), and Oak View (Ledbetter Phase of the Eastern Tradition). A single illustration in the article (Fig. 41) shows an example of what is apparently a two hole tube, although one of the holes seems to be T shaped. No scale is given, but apparently it is quite small and appropriately referred to as a whistle. But, it is the only specimen that shares with the Riverton flutes the feature of two vertically oriented perforations.

A search of the literature on the upper Tennessee Valley failed to disclose any record of flutes, although Table 44 in the Pickwick Basin report (Webb and DeJarnette, 1942) lists "whistles" for that area. It would seem that this is a misprint, since there is no mention of them in the text.

Nor are the Lamoka (Ritchie, 1944) and Frontenac specimens (Ritchie, 1945) from New York very closely similar to the Riverton type. Of the eighteen flutes at Lamoka, 13 are described as having a single oval perforation, variously situated on the tube (Pl. 160, fig. 12) and five as having multiple round perforations (Pl. 160, fig. 13) shows an example with four perforations).

Similar types occur at Frontenac, with one flute having a single oval perforation (Ritchie 1945: Pl. 11, figs. 29-31) and five with multiple perforations (Pl. 11, figs. 32-34).

In short, there are no other examples of two hole flutes, either with notched or unnotched ends, precisely comparable to those of the Riverton Culture from any of the Late Archaic sites in eastern North America, with the possible exception of sites of the Midcontinent tradition. Furthermore, present evidence indicates the possibility of a rather sensitive typology linking particular flute forms to specific regional Archaic manifestations.

The possibility that many flutes simply have not been preserved is suggested by the recovery of a cane flute and whistle from Ozark Bluff Dweller levels in Breckenridge and Bushwhacker shelters in Arkansas (Harrington, 1960), and our sample may be skewed for eastern sites by preservation of bone flutes and the total disappearance of any other forms in the shell middens. As for the dating of flutes, the following data are relevant:

(1) In the Tennessee area flutes occur only in the Weldon (2000-1200 B.C.) and Ledbetter (1200-500 B.C.) Phases of the Eastern Tradition (Lewis and Kneberg, 1959), and in the Big Sandy Phase (2000-1000 B.C.) of the Midcontinent Tradition (Lewis and Lewis, 1961. Note, however, that the Lewis and Kneberg 1959 publication gives dates of 1200 B.C. to A.D. 1 for the same phase.)

(2) The Lamoka flutes should date between 3500 and 3000 B.C. (Ritchie, n.d.).

(3) The Frontenac flutes should date sometime

(4) A single flute occurred at Indian Knoll at a depth of 7.3 feet below the surface, placing it within the very early occupation of the site. Since the Indian Knoll dates range between 3300 and 2000 B.C., the flute may date around 3000 B.C. Of course, the Indian Knoll C-14 dates are on antler and they may well be too early.

(5) Carlson Annis flutes ranged in depth from 3 to 6.6 feet below the surface, with a maximum site depth of around eight feet. Based on a maximum date of ca. 3000 B.C., the specimens might range in age from ca. 2800 to 2000 B.C. Again there may be considerable question about the C-14 dates, which are based on shell and antler.

(6) At Riverton all the flutes recovered from excavation have come from Area X, which has been assigned to Zone III at the site and should date around 1100 B.C. on the basis of extrapolation from the uppermost C-14 date at the site. On the other hand, the flute from Robeson Hills was found between 24-36 inches from the surface. Thus the Robeson specimen may date around 1300 B.C. and the Swan Island flute fragment came from Level 5, or about midway in the midden. The sample is, of course, too small to permit any sort of statement about the time of earliest appearance of flutes in the Riverton Culture, and they may perfectly well have been present throughout the duration of the culture.

At any rate, the earliest known dates for flutes are those from Lamoka and Indian Knoll, and we shall simply say that the flute became important in eastern Archaic sites after 3000 B.C. and that it persisted relatively unmodified for some four thousand years.

Excavation data do not establish so clearly special contexts for the flute as in the case of turtle shell rattles. At Indian Knoll, the single flute was found with Burial 59, a female child about 12 years old, who was also accompanied by a large chert knife (Webb, 1946: Figs. 30B, 51C). At Carlson Annis, two of the three flutes were in burial association. One of these was with Burial 42, a sub adult female, between 19 and 20 years old, who was also accompanied by two chert drills and a deer ulna awl. The other flute was the single artifact with Burial 381, that of a male (?) child, about 11 years old. At Barrett, two of the five

flutes were reported in burial association, both of which were young adult males. Burial 52 was a male about 28 years old, who in addition to the flute, was buried with twenty disc shell beads. Burial 398 was that of a 26 year old male, who had as grave goods, the flute, a bird bone awl, a perforated deer ulna "flaker," and two disc shell beads.

Obviously, neither sex nor age are the specific determinants for association of flutes with burials at Indian Knoll sites, nor are the burials with flutes notable for unusually large quantities of beigaben, although they were part of a rather select group, 55 to 75% of the burials at these sites having no grave goods at all.

But a very high percentage of the total number of flutes do occur in burial association in these sites, particularly when they are contrasted with the general utility tools, weapons, fabricating and processing tools, domestic implements, and woodworking tools in these sites. Most of the foregoing artifacts are represented in burial association by only one to five per cent of the total quantity recovered (Winters, 1968), while flutes have percentages of forty, sixty-seven, and a hundred per cent of the total number in burial association at Barrett, Carlson Annis, and Indian Knoll. The figures for Carlson Annis are, of course, only an approximation, since the provenience of the four engraved "tube" fragments, which may or may not be flutes, is given as general excavations, and we should also point out that the single flute from Read is not in burial association.

None of the Riverton flutes have been found in burial association, and have occurred, instead, in ordinary midden deposits. The burial sample, of course, is still very small. But many of the flutes in the midden have very peculiar breakage patterns, as though they had been deliberately rendered useless.

Published data are lacking on the flutes from sites of the Midcontinent and Eastern Traditions, but all eight of the Frontenac specimens were found in association with the burials of adult males (Ritchie, 1945: Table 3). None of the specimens from Lamoka (Ritchie, 1932) were in burial association, but burials were few in number and badly disturbed at this site.

Thus, we shall continue the placement of flutes in the ceremonial category, as opposed to utilitarian, ornamental, or recreational equipment. But at the same time, it is obvious that flutes were not regarded in precisely the same manner as turtle shell rattles, which in most Archaic cultures were rarely discarded in the midden. It may well be that the flute was employed for purposes of a more secular nature.

In passing we shall note a few items about the functions of the flute in historic contexts, not to bolster our previous contentions, but to provide models for further comparative studies of their Archaic contexts and functions.

Swanton (1925b: 521) states of the Creek Indians that, "Their musical instruments were the drum, rattle, and a kind of flute . . . The flute was used only by individuals and was never employed in ceremonies, as was constantly the case with the drum and rattle. The Alabama flute was made of two pieces of cedar hollowed out and fastened together with buckskin. There were six holes along the sides toward one end and on top toward the other was placed a separate piece of cedar covering two additional holes. All were bound with buckskin at frequent intervals. Flutes were sometimes made of cane."

Swanton further remarks (Swanton 1925a: 703) that, "The native Virginia rite is probably exemplified by Powhatan when he came to meet the Virginia colonists at head of his men blowing upon a flute, and this is one of the few places in which the flute appears as an adjunct of a social ceremony. Ordinarily, it was employed as an individual means of expression, especially of amorous sentiments."

Of the Choctaw (Swanton, 1931): Swanton cites a statement by Cushman (1899) that, ". . . . their genius, in the invention of musical instruments never extended beyond that of a cane flute and a small drum."

And in another source, Swanton (1922) says of the Creek and neighboring tribes that, "The chiefs, chiefs' wives and other principal persons were, on occasions of state, carried in litters, borne on the shoulders of several men. All early Spanish travelers among the southern Indians speak of these, and Le Moyne (Lorant, 1945:109) illustrates one in which a woman is being borne on the shoulders of four men. She is placed on a raised seat covered with a decorated skin, and protected from the sun by a structure of green boughs. . . Before march two men blowing on flutes. . .the use of flutes before such personages is well attested." Apparently, the Le Moyne illustration represents a wooden or reed flute, rather than one of bone.

And finally, in Swanton's general work on the Indians of the Southeast (Swanton 1946), he states that, "Over much of the Gulf area. . .it was customary to welcome strangers of quality coming in peace by sending men forward, usually the chief himself, blowing upon flutes, or rather flageolets." He then cites numerous references to flutes of cane, reeds, or bark, with only a single reference to a Creek bone flute made from the tibia of a deer.

It is fairly evident from the foregoing that in the Southeast in historic times, flutes were primarily associated with ceremonies of a secular, rather than a sacred, nature, that they were both associated with individual and group activities, and that they were usually made of cane, reeds, wood, or bark. Apparently, there was considerable variation in technical features of the flutes from area to area.

Among references to historic flutes of perishable materials in eastern North America, is Raudot's 29th letter (Kinietz, 1940) which states in connection with Indians of the Great Lakes area that, "Sometimes they play a sort of flute made of reeds, the sound of which is disagreeable."

Densmore (1929: 97) also states in reference to love songs of the Pawnee that, "Songs of this class were preceded by the syllable ee-ee in a low tone in imitation of a flute," and that an informant asserted that, "The flute is courting medicine of a bad kind." In respect to the Chippewa, Densmore (1910: 11-12) notes that ". . .the Chippewa lover intersperses his songs with the music of the flute. . .The courting flute of the Chippewa is usually made of cedar and is similar to the flutes of the Indian tribes." And Kurath (1953) cites Texier's (1940) reference to the

Medicine de Charbon of the Osage, a ceremony in preparation for war during which charcoal blackened warriors danced with "maniacal contortions. . .beating drums or blowing tsu-tsehs (reed flutes) . . ."

There are also indications that bone flutes differed functionally from the flutes made of perishable materials. For example Swanton (1942), says of the Caddo, "Flutes, or rather flageolets, of carved crane or heron bone are several times reported and others of carved reeds with necessary holes . . . These (flageolets) are said to have been used in the dances in which case their customs differ from those of the more eastern tribes and by doctors."

And it should be noted that in historic times bone "whistles" were important components of medicine bundles among tribes such as the Crow, with examples of flutes known from the Sun Dance, War Medicine, and Healing Medicine bundles, while wooden flutes were important only in connection with Love Medicine (Wildschut, 1960). That is bone flutes were associated only with the very sacred medicine bundles, while the wooden type was associated with ceremonials of a more personal, secular nature.

In short, flutes of perishable materials pertained to secular ceremonials, magic, or recreation in both the Southeast and the Plains, and bone flutes, which were missing in most southeastern cultures, appeared elsewhere in ceremonial contexts which emphasized the sacred rather than the secular.

While the foregoing generalizations about distinctions between bone and wooden flutes (or comparable musical instruments) may hold for much of eastern North America, they cannot be extended indiscriminately to other areas. Morris (1959) in drawing parallels between wooden Basketmaker III and Hopi flutes notes of the latter that, "Ethnographic data from the Hopi villages of northern Arizona describe flute societies which include flutes of several varieties in their ceremonies. . . These rituals are associated with worship of the sun and with the summer and winter solstice ceremonies. Although flutes are used in other ceremonies of these people, there is apparently no secular use of the instruments. It is possible to infer that the wooden flutes had a similar functional significance in Basketmaker III cultures. . . ."

Such historic differentials may reflect much older patterns in eastern North America, although, obviously, such data cannot be held directly relevant to the interpretation of an eastern culture such as Riverton, which was earlier by some three to four thousand years. At the same time, the data are not contrary to our original hypothesis, and add to the growing evidence for a remarkable continuity in general form for several Archaic ceremonial items such as flutes, rattles, and tubular pipes, into succeeding Woodland cultures, or even into historic Indian cultures.

Swan Island

A tubular fragment of polished bird bone from Level 5 has a perpendicularly notched end and a groove incised around the body of the tube. The large diameter of the specimen and the decorative treatment both indicate the strong possibility that this is a flute fragment. Another fragment of bird bone from Level 4 is probably from a flute.

*Rattles (Plate 38).*

Riverton Area X

Prior to the 1963 field season, turtle shell rattles had never been reported from any of the sites of the Riverton Culture, either from the Illinois State Museum excavations or from local surface collections.

Two examples were recovered from Area X, one being designated Feature 33 (Fig. 17) and the other being from the pit wall of Burial No. 1.

Feature 33 consisted of the badly crushed rattle fragments, which were surrounded by charcoal and dark organic material, with the entire mass enclosed in a matrix of yellowish clay which began about seven inches below the surface of the field. Only one-half to one inch of undisturbed clay separated the rattle from the thoroughly mixed plow zone. The rattle was contained within an area having dimensions of five and one-half inches, north to south, and five inches, east to west, and the deposit was only two inches thick. Undoubtedly, historic or prehistoric crushing accounts for the rather small area within which the rattle was contained.

Only about two thirds of the carapace and plastron remained (Pl. 38 a,d), and the edges of the carapace on one side and at the rear showed considerable charring. Obviously, a portion of the rattle had been exposed to fire for a short period of time, but not for long enough for the major portion of the rattle to be damaged in any way. Perhaps the charcoal around the rattle came from a fire elsewhere, there being no signs of a hearth area around the artifact, or perhaps the charcoal was the residue of something that had been associated with the rattle, with both being differentially exposed to a fire. At any rate, it would seem that the charcoal and the rattle had been intentionally deposited together in sterile clay.

Both the plastron and carapace had been perforated with elliptical holes (1.3 mm. in major axis, and 1.2 mm. in minor axis) in a fashion that suggests that they were openings through which a stick was inserted for use as a handle.

The plastron and carapace were still together in their natural relationship, with the plastron resting on the inverted carapace. Inside the rattle were eighty-two small, carefully selected pebbles of white or cream colored milky quartz (Pl. 38 b). Whether there were more pebbles originally, is a question impossible of answer, since one-third of the rattle was missing.

The second specimen, which was found on the southeast wall of the pit containing Burial 1, consisted only of a fragment of the carapace with a portion of the characteristic oval hole (Pl. 43 t). Red ochre covered the outer surface of the fragment, suggesting that it was an intentional inclusion placed outside the large cache of grave goods found with the burial. Both rattles were made from box turtles, *Terrapene* sp.

A search of the literature indicates that the only sites in which rattles identical to those of Riverton occur are some of the Indian Knoll sites. Descriptions in the various reports are not sufficiently detailed to permit determination of the quantity of rattles having both plastron and carapace perforated and contents of milky quartz pebbles,

but the description in the Indian Knoll report (Webb, 1946: 300) would indicate that such features were common, and such a rattle is clearly illustrated from Indian Knoll (Webb, 1946: Fig. 50). Another rattle from Burial 217 is described as having holes through both the plastron and carapace (Webb, 1946: 213, Fig. 25C, a). A plastron from a rattle found with Burial 57 (Webb, 1946: Fig. 29B, c) also clearly shows a central perforation. References to pebbles are common in tabulations of rattles in burial association. Perforated rattles are also illustrated for the Carlson Annis Site (Webb, 1950a: Figs. 8A, 9C). However, Webb's remarks would indicate that other rattles at Indian Knoll do not have double perforations or any perforations (Webb, 1946: 300) "Sometimes the plastron has a central perforation about 14 mm. in diameter. . . .Often the carapace is also perforated in the center with the same size hole. When both carapace and plastron are perforated, the holes are symmetrically placed. . . ."

Rattles were found in greatest quantity at Indian Knoll itself, where thirty-two rattles were found with twenty-three burials, with none reported as having come from the general midden. Nine were associated with burials at Carlson Annis, with three from the general excavations (Webb, 1950a). Only five of the nine were listed in individual tabulations of burial data, however. At Read Shell Midden, three were reported in burial association, and a single example was listed as being from the general excavations (Webb, 1950b: 377, 382). A single rattle was noted for Butterfield, McL-7 (Webb and Haag, 1947), but its provenience was not given, although it may be that the carapace near the skull of Burial 63 is the specimen in question. Three rattles were reported with burials at the Barrett Site, McL-4 (Webb and Haag, 1947), but only two were listed as such in the burial tabulations. Perhaps, again, one of the references to turtle carapaces may refer to the unlisted specimen. The only indication of a rattle at the Parrish Site, where bone was poorly preserved, is a reference to six small pebbles with Burial 81 and a notation that these may have been rattle contents. No rattles were recovered at the Chiggerville Site (Webb and Haag, 1939), the Kirkland (McL-11) and Ward (McL-12) sites (Webb and Haag, 1940), or the Smith (McL-5) and Reynerson (McL-8) sites (Webb and Haag, 1947).

At both Indian Knoll and Carlson Annis, the rattles were well distributed vertically within the midden. At Indian Knoll, the burials having rattles ranged in depth from 1.5 to 8.5 feet below the surface. At Carlson Annis, depths ranged from 2.8 to 5.0 feet below the surface, while the specimens at Barrett were towards the bottom of the midden. The samples from the other middens are, of course, too small to have any real distributional significance. But generally speaking, the Indian Knoll type of rattle seems to have been an important item throughout the duration of the Indian Knoll Culture. We are assuming that the sites where the rattles do not occur are contemporaneous with, but functionally distinct from, sites such as Indian Knoll and Carlson Annis, a conclusion anticipated by Fowler (1959: 52-54).

Turtle carapace rattles are also known from Archaic sites in New York and Tennessee, but generally these do not resemble the perforated type found at Riverton and in Indian Knoll sites. Five rattles are reported from Tamoka (Ritchie 1944: Pl. 160, fig. 34), with one reported as having a single large perforation in the plastron in the manner of the Indian Knoll specimens, the only such example from New York in any cultural context (W.A. Ritchie, personal communication). It should be noted, however, that Ritchie in a later publication (1965) states that ". . .the few fragments of perforated box-turtleshell rattles may well have belonged to the later comers to this site." At Frontenac, the two rattles are described as having multiple perforations of the carapace (Ritchie, 1945: Pl. 12, fig. 25). As for Tennessee, only three examples were found at Eva (Lewis and Lewis, 1961: Pl. 41), and these lack perforations of the Indian Knoll type. A single fragment from Kays Landing, a site a few miles from Eva, had a small perforation near the base of the carapace (Personal examination of specimen at McClung Museum, University of Tennessee).

No turtle rattles are reported for the sites of the upper Tennessee valley in the Pickwick Basin (Webb and DeJarnette, 1942), the Norris Basin (Webb, 1938), the Wheeler Basin (Webb, 1939), the Flint River and Whitesburg Bridge sites in the Guntersville Basin (Webb and DeJarnette, 1948b, 1948c; Webb and Wilder, 1951), or the remaining sites of the Guntersville Basin (Webb and Wilder, 1951). Nor are any rattles known from such major northern Archaic sites as Modoc (Fowler, 1959), Graham Cave (Logan, 1952), and the Raddatz Rock Shelter (Wittry, 1959a).

But that the Indian Knoll type of rattle survived for a very long time is evident both from archaeological and ethnographic data. In Plate 38 a rattle from the Sister Creeks Site, FV47, Fulton County, Illinois, is illustrated through the courtesy of Mr. Lawrence A. Conrad. Both the plastron and carapace of the box turtle have the central perforations typical of the Indian Knoll rattles, and the pebbles are white quartz. The only change from the Archaic Indian Knoll rattles is the addition of lacing holes. Exact cultural affiliation is uncertain, since Conrad reports that the site has both Middle Mississippi and Upper Mississippi components, but the "refuse" pit in which the rattle was found is reported as having contained shell-tempered sherds, thus indicating a survival of the Indian Knoll type of rattle in the Illinois Valley to a time subsequent to A.D. 900.

Perhaps, the doubly perforated rattle, then, is a diagnostic of the Indian Knoll, Riverton, and later Midwestern cultures. Furthermore, the general archaeological distribution of turtle shell rattles indicates a concentration of these items in the Midcontinent area of eastern North America (Fig. 14). Perhaps such an apparent concentration is a result of sampling error and the vagaries of preservation, but one must still recognize that these items are either typologically different or are missing from very large sites in other areas, where excavation has been extensive and preservation of bone has been excellent.

As for the temporal position in the Archaic of turtle shell rattles in general, the following points are relevant:

(1) At Eva (Lewis and Lewis, 1961), two rattles are associated with the Three Mile Phase (4000-2000 B.C.), one

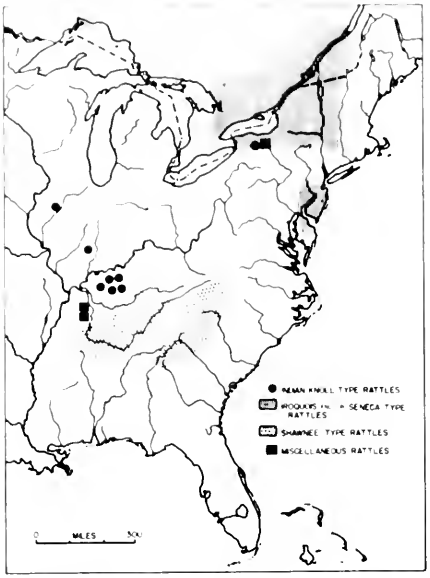


Fig. 14. Distribution pattern of turtle shell hand rattles.

being in Feature 2 at the bottom of Stratum II and the other with Burial 142. A third rattle was with Burial 62 in the plow zone, and has been assigned to the Big Sandy Phase (2000-1000 B.C.). Thus, a time span between 4000 and 1000 B.C. is indicated.

(2) Rattles at the Lamoka site may date around 2500 B.C. (Ritchie, 1965) although they may belong to a later component.

(3) Indian Knoll dates to the second millenium B.C. Since shell and antler were used for Indian Knoll and Carlson Annis C-14 dates with, in some cases, dates inconsistent with the stratigraphic position of the sample, there remains a question as to the reliability of these dates.

(4) Carlson Annis has a maximum dating of 3000 B.C., but probably belongs primarily within the second millenium B.C.

(5) The Frontenac rattles may date around 2000 B.C. on the basis of the C-14 dates, although an earlier date of around 3000 B.C. was obtained using the solid carbon method (Ritchie, 1965).

(6) Extrapolating from previous C-14 dates, the Riverton specimens should date around 1100 B.C. on the basis of their stratigraphic position in the site.

(7) The Sister Creeks specimen should date ca. 1000 A.D.

Thus, there is currently no evidence for the turtle shell rattle prior to 4000 B.C., and no dates for the Indian Knoll type prior to 3500 B.C. Provisionally, the doubly perforated Indian Knoll type can be assigned a time range from ca. 3000 B.C. to 1000 A.D.

Perhaps a few words should be said on our reasons for placing rattles in the functional category of ceremonial items. There is, of course, abundant ethnohistorical evidence for considering such items ceremonial. But, of more importance is the internal evidence from the Indian Knoll, Riverton, and Frontenac Cultures supporting such a placement. An examination of the contexts of the rattles shows the following.

TABLE 42

THE CONTEXT OF RATTLES FOUND AT VARIOUS ARCHAIC SITES

| Site | Quantity | In Midden | In Special Features | With Burials |
|---|---|---|---|---|
| Barrett, McL 4 | 3 | | | 100% |
| Carlson Annis | 12 | 25% | | 75% |
| Read Shell Midden | 4* | 25% | | 75% |
| Indian Knoll | 32 | | | 100% |
| Riverton | 2 | | 50%† | 50% |
| Eva | 3 | | 33%‡ | 67% |
| Frontenac | 2 | | | 100% |
| Lamoka | 5 | 100% | | -- |

*Tabulation in Webb (1950b) on page 382 is incorrect. See page 377 of same publication.

†In midden, but very good possibility of special interment.

‡In Feature 2.

Of the total of 63 rattles for which there are adequate provenience data, 52, or 82%, are in burial association. Of those listed as being in the general midden two received special treatment. The single seeming exception to the general rule, Lamoka, may reflect other cultural activities. That is, Ritchie (1932) describes the burials as being "largely of a fragmentary nature, consisting in seventeen instances solely of individual cranial sections." Illustrations in the same report also indicate either redeposition or considerable disturbance of the remains. Thus the question must be raised as to whether the thirteen complete Archaic and Woodland burials recovered at the site accurately reflect the traditional behaviour of either group in respect to the placement of particular artifacts in burial context.

But the high percentages of rattles in burial association, or with special treatment, in the various Midwestern sites, contrast markedly with other categories of artifacts. In the Indian Knoll sites, only shell and copper artifacts, rattles, flutes, and medicine bags show consistently high percentages of special handling, with the bulk of the other artifacts present in burial association in percentages normally ranging from one to five per cent of the total recovered from the site (Winters, 1968). In the absence of contrary evidence, we shall, then assign turtle shell rattles to the functional category of ceremonial items.

In connection with our analysis of Archaic turtle shell rattles, it may be interesting to note a few items about their mode of usage in historic times.

As a general summary statement on historic rattles, we shall cite Swanton (Hodge, 1907-1910), who states that the rattle is ". . . an instrument for producing rhythmic sound, used by all Indian tribes except the Eskimo. It was generally regarded as a sacred object, not to be brought forth on ordinary occasions, but confined to rituals, religious feasts, shamanistic performances, etc. This character is emphasized in the sign language of the plains where

the sign for rattle is the basis of all signs indicating that which is sacred. Early in the 16th century Estevan, the negro companion of Cabeza de Vaca, traversed with perfect immunity great stretches of the country occupied by numerous different tribes, bearing a cross in one hand, and a gourd rattle in the other. . ."

Although in historic times turtle shell ratles had a wide distribution in eastern North America (Roberts, 1936: Fig. 4), the hand rattle was limited primarily to the Northeast and Midwest. The item seems to be missing in the Southeast, although Swanton notes several examples of turtle shell (Swanton, 1925b: 1928; 1946). Speck and Broom (1951:Pl.16b) also illustrate a handled box turtle rattle for the Cherokee, but note only that it was used by medicine men.

And from the area where the hand rattle of turtle shell occurred in historic times, no historic examples of the Indian Knoll type have been reported. Instead, the historic examples might be grouped into the Iroquois type (Morgan, 1951:279; Fenton, 1936; 1941: Pl. 20, no. 2, Pl.23, no.1, Pl.24, no.1; Conklin and Sturtevant, 1953: Figs. 1, 2), which was also used by the Delaware (Harrington, 1921, Pl. II, Fig. 2; Speck 1931) and the Huron, (Kinietz, 1940: 49); the Seneca type (Speck, 1931, Fig. 15; Speck, 1937: Pl. 4); and the Shawnee type (Voegelin, 1942; Speck and Broom, 1951).

By the *Iroquois type* we are referring to the rattle made from the complete shell of a snapping turtle, with the head and neck stretched over a stick to serve as a handle. No examples of this type have ever been recovered in archaeological excavations, and it is possible that the Iroquois type did not appear until early historic times (Ritchie, 1954; Speck, 1931), Champlain, (1922) for example illustrates a rattle which is clearly the Iroquois type.

The *Seneca type* has sets of small paired holes in the carapace of a box turtle, with a leather thong being fastened through these holes as a handgrip. The paired sets range from two to three on the carapace, with as few as a single perforation in the plastron or as many as two pairs placed at opposite ends of the plastron, and quartz pebbles were used as filling. Comparable examples are known archaeologically. For example, Ritchie (1954: Pl. 10, nos. 1, 2 and 3) illustrates rattles with three sets of paired holes from the Dutch Hollow site and quartz pebble filling which he assigns to an occupation of the early historic Seneca, although present day Seneca deny using such rattles (Conklin and Sturtevant, 1953: 283) on the grounds that "that's not our way here." However, such a statement is hardly convincing evidence that the Seneca type was not used by the Seneca two or three hundred years ago, particularly since the Seneca still use an unperforated version of the box turtle hand rattle, and Bleakney (1958) reports two box turtle rattles of Seneca origin in the Canadian National Museum collections, while Conklin and Sturtevant (1953: 283) mention an old Cayuga rattle with two perforations in each end. Wintemberg (1931: Pl. 15, no. 22) illustrates a rattle of the Seneca type from an historic site near Lake Medad, Nelson Township, Halton County, Ontario, which he assigns to an Iroquoian occupation and prehistoric rattles from the Uren and Roebuck sites (Wintemberg, 1928; 1936), which are respectively located in Oxford and Grenville counties, Ontario. Bleakney (1959) mentions additional perforated box turtle rattle fragments from prehistoric Ontario sites, and these may well be of the Seneca type.

Finally, it should be noted that there may be a considerable time depth for rattles of the Seneca type. Rattles of the same basic pattern are reported from the Archaic Frontenac site (Ritchie, 1945: Pl. 12). Ritchie (1965) also notes for the Middle Woodland Cain Mound, ". . . .portions of a turtle carapace preserved by copper salts, and a cluster of eight quartz pebbles, probably from a decayed turtle-shell rattle." He also reports rattles of box turtle shell at Kipp Island and Felix which are assigned to the Middle and Late Middle Woodland Kipp Island and Hunter's Home Phases, with the latter phase being interpreted as antecendent to Owasco. Of Owasco itself, Ritchie states that, "The multiperforated rattles made from the carapace and the plastron of the box turtle (*Terrapene carolina*) and the painted turtle (*Chrysemys picta*) likewise hint at Iroquois ceremonialism of a subsequent day. Although the preceding data are defective for establishing that these Woodland rattles are definitely the Seneca type, the evidence strongly suggests that they form a link between the typologically similar Archaic rattles of Frontenac and the protohistoric rattles of the Seneca, and indicate a time span for the type of some three thousand years.

The Seneca type is also known in archaeological context from a site near the confluence of the Chemung and Susquehanna rivers near Athens, Bradford County, Pennsylvania. These rattles (Wright, 1885; Wren, 1909), which were found on the right and left sides of the skull of a burial, were described by Wren as being made from tortoise carapaces and plastrons and as having each contained four small siliceous pebbles about the size and shape of "marrowfat peas." The perforations of the rattles differed somewhat, the larger rattle having four holes in both the carapace and plastron (two in front and two in back), the smaller rattle having a carapace perforated by ten holes (two in front, two in back, and six down the middle) and a plastron perforated by seven holes (two in front, five in back).

The aforementioned burial is probably relatively late, since a "finely wrought discoidal stone" (Wright, 1885) was found about three inches to the right of the skull. Also, if the burial can be considered to be contemporaneous with adjacent burials, pottery associations would suggest a temporal position after A.D. 1000.

As for the *Shawnee type*, Voegelin (1942: 467) describes in her paper on historic Shawnee musical instruments rattles that are quite similar to the Iroquois type and still in use today: "Both plastron and carapace (of a wood turtle) were sun dried, and small holes were drilled around the edges; the two pieces were tied together with buckskin thongs which passed through the holes. An opening about 1 inch wide was bored in the center of the bottom end, and another about 1/2 inch or less in the center of the top end. Quartz crystals were put inside the shell. A round stick which tapered to a point was run through the bottom and

top openings and fitted with a wooden peg above the top end of the shell. The handle proper measured about 6 inches. Such an instrument was kept in a medicine bundle in charge of a shaman." These rattles duplicate other rattles of the Iroquois type with the exception that the carapace of a wood frog box turtle, since the wood turtle *Clemys* does not occur in the area and is not known to have been used for rattles anywhere) turtle is used instead of that of a snapping turtle. Snapping turtle rattles are unknown archaeologically in any area and their historic occurrence coincides with areas in which the box turtle is rare or missing. But the Shawnee rattles do correspond to the archaeological examples in respect to the use of raw materials such as box turtle and white quartz pebbles. Even though the Iroquois and Shawnee rattles are typologically almost identical, for the time being we shall designate the turtle rattles used by the Shawnee and Choctaw as the Shawnee type.

There would also seem to have been a rather marked preference in the Midwest and Northeast for quartz pebbles as filling for rattles through time. In addition to the previously cited examples of the prehistoric and historic use of quartz pebbles are reported by Ritchie (1965) with a copper "boat-shaped" object, by Mills (1922) as the filler for the 18 copper turtle effigy rattles at Mound City, and by the same author in connection with copper "boatstones" and a copper cone taken from the Tremper Mound (Mills, 1916: Figs. 94, 96, 98). All of the foregoing might best be interpreted as being rattles, rather than subsumed under the amorphous concepts of the boatstone and cone.

As for the function of these rattles in historic times, it is fairly evident, first of all, that they were usually items of personal ceremonial equipment. For example Speck (1931: 101) says of the Delaware, "And besides, everyone who is to relate a vision and lead a dance, if he has prepared his rattle of turtle shell, shall see to it to bring it with him for the ceremony." And Fenton (1941: 423-24) states of the Iroquois, "Men belonging to the Society of Faces usually own a bundle containing a turtle rattle and one or more masks decorated with bags of sacred tobacco. . . . In the evening one may meet an Indian bearing. . . a turtle. . . .; he is bound to the house of a friend who 'can fix it' for a rattle." Fenton (1953: 44) states of the Seneca man, Corn-husker, "He makes turtle rattles. . . ." Evidently the manner of preparation varied, with the Delaware man preparing his own and the Iroquois utilizing the services of a secular specialist in rattle making (Conklin and Sturtevant, 1953: 264). Not all rattles were individual possessions however, since some could be communal property of the longhouse (Conklin and Sturtevant, 1953: 270).

Secondly, among the eastern groups, the turtle shell rattle appeared in the context of some of the most important sacred ceremonies. Conklin and Sturtevant (1953: 209) state, however, that, "for the more secular individual dances of the Common or Beggar Faces, the Seneca prefer smaller (turtle) rattles." Thus it would appear that rattle size, not just raw material, was a factor in selecting a rattle for sacred or secular purposes. But Morgan (1951) notes the ceremonial association of the snapping turtle rattle, stating, "Second in the public estimation, but first intrinsically, stood the great Feather dance, Ostowehgowa, sometimes called the Religious dance, because it was specially consecrated to the worship of the Great Spirit." And Speck (1937) notes the association among the Delaware of turtle hand rattles with the very important Big House Ceremony, and also with the Corn Harvest Ceremony, the Doll Dance (a ceremony to appease "the ill-will of the spirit of corn and avert sickness"), the Opossum Dance ("a dance to satisfy the guardian spirit of opossums"), the Mask Dance Ceremony, and the Grease Drinking Ceremony. Bear and Otter Rites (both to immunize against sickness). All of the foregoing dances belong much more in the realm of the sacred than the secular.

In contrast, gourd rattles were employed for such secular, social dances as the Delaware Drunken Dance (Speck, 1937: 98) and the "Iroquois . . . concerts, which occupy a conspicuous place in their amusements. . . ." (Morgan, 1951: 288).

Kinietz (1940: 144) cites a reference from Sagard which mentions turtle shells as part of the equipment of the "apothecaries" of the Huron medicine men, but it is not clear whether the turtle shells were employed as rattles or not.

Finally, to give an idea of the mode of employment of turtle shell rattles in sacred ceremonies we cite Luckenbach's (1938) account of an early nineteenth century Delaware performance of the Big House Ceremony while they were still located on the White River in Indiana: "The dances of the Indians are generally held in honor of their protecting deities, concerning whom they declared that they once upon a time appeared unto them in a dream, in one or another form, for example, in that of a large bird; that they talked with them, told them their future fate for better or worse; that they either would have great Chiefs or Warriors who would do great deeds, great witchdoctors who would deal in supernatural things, or that they would possess great riches and many relatives, or the contrary. If the latter was the case, however, they did not sing their dreams but sadly related them. Those who had the former dreams, on such occasions step forward, holding the shell of a land turtle containing a number of beans or kernels of corn (Cf., however, where Luckenbach (1938:350 says that the rattles were filled with a few small stones). Then the one who is to lead the dance, in honor of the protecting deity, advances. After he has rattled the turtleshell with his hand amid many grimaces, he stops, and speaking in a loud tone of voice, he relates, by fits and starts, the contents of his dream, or the manner in which his god appeared and what he told him. When he is finished with it, he turns about and faces those who want to join him in the dance."

Speck also describes a very similar ceremony (the Big House Ceremony) for the Delaware in the twentieth century (Speck, 1931; 1937), and illustrates the rattles (Speck 1931: Fig. 15) used in the ceremony. While the ethnographic data are of great interest, we find it even more important that the ceremony could have survived with so little change among the Delaware during their migration from Indiana, and possibly even longer, since there are comments as early as 1670 (Speck, 1937) which indicate that such a ceremony existed prior to the removal of the Dela-

ware from the east coast. Thus the Big House Ceremony has survived Iroquois warfare, colonial aggression, forced migration, and the pressures of prolonged contact with both European and alien Indian groups.

Obviously, the foregoing brief sketch can at best be considered preliminary research, but at least it provides a basis for a hypothesis that in northern societies which possessed both the turtle and gourd hand rattles, the turtle shell rattles were items of sacred, personal equipment in historic times, as contrasted with gourd rattles which were found more often in secular contexts.

One of the interesting things about the preceding comparative material is the extreme conservatism associated with certain features of turtle rattles over a time span of some four to five millenia. With the exception of the Iroquois rattles, only box turtle was used, although many other species would have been available. White quartz pebbles were selected as filling, although items such as drumfish pharynegeal teeth might also be included with the pebbles (Lewis and Lewis, 1961: 89, Pl. 41). And the Seneca type rattles of the historic Iroquois and Delaware were stylistically almost exact counterparts of those from the Archaic Lamoka and Frontenac sites.

Another important fact is that the distributional pattern of the turtle shell hand rattle in historic times was approximately that of the late Archaic (Fig. 14). Apparently, there was a considerable barrier to experimentation with this item of equipment in both the Northeast and the Midwest. And such experimentation as did occur may have been a matter of necessity rather than any great pressure for change. As Ritchie has observed, box turtle are missing from the Iroquois area, and Conklin and Sturtevant (1953) noted the recent shipment of box turtles to that area by a soldier who was aware of their intrinsic value to the Iroquois. Probably, Ritchie is right in his conclusion that the appearance of the snapping turtle rattles reflects a lack of the proper raw material more than anything else.

In view of our conclusions about the ceremonial nature of the Archaic examples and similar documentation for historic rattles, we suggest that the turtle shell rattle was a basic item of ritual equipemnt that had strong connotations of the sacred from its earliest appearance until the present time.

*Red and Yellow Ocher.*

Riverton–Test Pits and Area X:

Red and yellow ocher have been included under ceremonial items at Riverton because of its secondary attributes, those of context. During the spring survey of the Wabash in 1962, an infant burial covered with red ocher had been exposed at the north end of the site. At the beginning of the 1963 season, bones of another infant burial coated with red ocher were found on the surface near the north end of the site. Thus there was already good indication that red ocher might have been used in the Riverton Culture for ceremonial purposes in connection with burial rites. (It scarcely seems necessary to point out the abundant evidence for the ceremonial utilization of red ocher in many parts of the world and in Archaic and Woodland cultures in other parts of eastern North America, although a thorough comparative study has never been made for any part of the world.)

During the 1963 season, several occurrences of red ocher were noted in definite Riverton Culture context. The skull, ribs, and upper portion of the legs of Burial 1 were heavily coated with powered red ocher and the artifacts of the cache with the burial were embedded in red ocher. The lower legs were coated with yellow ocher. In addition, a lump of red ocher had been placed on the chest, and a lump of yellow ocher lay in the burial pit close to the left side of the trunk. The cremated Burial 2 had also been covered with copious quantities of red ocher which had stained the bones a brilliant red.

Field observations of Burial 1 indicate, provisionally, that it was an adolescent male, while neither sex nor age has yet been determined for the cremation, but there are reasons for believing that it was either a sub-adult or adult. Thus the application of red ocher does not seem to have been specifically a function of age, although the sample is far too small for any definite conclusions, particularly since the superficial infant burials cannot definitely be identified as Riverton.

Another occurrence of red ocher is also of interest. In the midden and sediment filled, natural depression designated Feature 32, there was a roughly oval patch of red ocher about 21-1/2 inches of maximum diameter. The one-quarter-inch-thick red ocher deposit was underlain by a lens of ash. This deposit is probably the residue from the heating of limonite during the manufacture of red ocher.

There was also an area of red ocher on the north side of the natural depression, Feature 26. Here, the thin film of red ocher seemed to be only the result of the spilling of some of the powder down a natural slope while the clay floor, Feature 17, was in use.

We have noted elsewhere the use of mussel shells as containers for powdered red ocher, and perhaps these items should also be included as ceremonial items.

There was also a solid piece of red ocher in the plow zone of Area X, but the cultural affiliations of this item are not certain.

Since there are insufficient data from the Riverton Culture to make any valid generalizations about the function of red ocher, we decided to see if any conclusions could be derived from the better documented Indian Knoll Culture, which probably belongs within the same tradition as the Riverton Culture. For this purpose, data on 2329 burials from Webb's Indian Knoll, Parrish, Carlson Annis, Chiggerville, Barrett, Read, and Butterfield sites were available. We have eliminated from consideration those burials at Indian Knoll having only black stains. Webb (1946) has suggested on the basis of Gardner's chemical analysis that these iron stains are evidence "that the use of red ocher as a burial accompaniment was very common at this site, maybe almost universal, but. . .observable as a red stain only where excessive amounts were used." Our reasons for rejecting this conclusion are that Gardner's analysis indicated more than normal iron in the soil of the site, with stained and unstained bones giving positive results for iron, and the simple fact that of the thirty-six burials with red ocher, twenty-two (61%) do not have associated black stains,

suggesting that the staining is the result of other chemical reactions.

Brothwell (1963: 131) also notes the problem of the iron staining of bone in his discussion of blood-stained bones. "In the case of skeletal material, a very serious complicating factor is the fact that some soils produce patches of darker staining of bone through heterogeneous concentrations of ferruginous material."

Those burials definitely associated with red ocher were then analyzed in terms of total population, sex, age, burial accompaniments, variation in placement of red ocher, depth distribution patterns, and miscellaneous cultural data.

TABLE 43

PERCENTAGES OF TOTAL POPULATION WITH RED OCHER IN INDIAN KNOLL SITES

| Site | Total Burials | Burials with Red Ocher | Percentage with Red Ocher |
|---|---|---|---|
| Parrish | 133 | 17 | 12.8% |
| Indian Knoll | 880 | 36 | 4.1% |
| Chiggerville | 114 | 4 | 3.5% |
| Carlson Annis | 390 | 13 | 3.3% |
| Barrett | 412 | 7 | 1.7% |
| Read | 247 | 3 | 1.2% |
| Butterfield | 153 | 0 | --- |
| Total | 2329 | 80 | 3.4% |

At Table 22 clearly indicates, only a very small percentage of the total population was buried with red ocher. Some of the variations may reflect differentials in site function, with large base camps such as Indian Knoll and Carlson Annis showing higher percentages than seasonal camps such as Barrett, Read, and Butterfield (cf. Fowler, 1959). Perhaps there was simply more time for appropriate ritual activities at the former than at the latter more sporadically occupied sites. The unusually high percentage at Parrish certainly cannot be explained on such a basis, but, then, Parrish is distressingly inconsistent in many ways when compared to the Green River sites. (Only a complete reanalysis can determine whether Parrish belongs with the Indian Knoll Culture, a closely related culture, or possibly with several late and early Archaic cultures.) But regardless of the Parrish anomaly, only a very small number of individuals at each site was selected for treatment with red ocher. And a very similar ratio also pertains for other late Archaic cultures such as Eva (Lewis and Lewis, 1961) where only 5.5% of the 198 burials had red ocher, and Frontenac (Ritchie 1945), eleven, or 7.5%, or the total burials had red ocher.

Another line of evidence is indicated from the analysis by age categories for those sites where such data were available (see table).

Using the combined age group totals for the sites,

TABLE 44

PERCENTAGES OF INDIAN KNOLL BURIALS WITH RED OCHER BY AGE GROUPS

| | Indian Knoll | Chiggerville | Carlson Annis | Barrett | Read | Total |
|---|---|---|---|---|---|---|
| New Born | | | | | | |
| Total | 55 | 0 | 3 | 0 | 0 | 58 |
| With Red Ocher | 3 | 0 | 1 | 0 | 0 | 4 |
| Percentage | 5.5 | 0 | 33.3 | 0 | 0 | 6.9 |
| Infants | | | | | | |
| Total | 209 | 31 | 61 | 101 | 6 | 408 |
| With Red Ocher | 15 | 2 | 5 | 2 | 0 | 24 |
| Percentage | 7.2 | 6.5 | 8.2 | 2.0 | 0 | 5.9 |
| Children | | | | | | |
| Total | 75 | 9 | 48 | 41 | 41 | 214 |
| With Red Ocher | 3 | 2 | 1 | 2 | 1 | 9 |
| Percentage | 4.0 | 22.2 | 2.1 | 4.9 | 2.4 | 4.2 |
| Adolescents | | | | | | |
| Total | 52 | 4 | 184 | 0 | 43* | 283 |
| With Red Ocher | 4 | 0 | 1 | 0 | 1 | 6 |
| Percentage | 7.7 | 0 | 0.5 | 0 | 23 | 2.1 |
| Subadults | | | | | | |
| Total | 29 | 0 | 7 | 0 | 0 | 36 |
| With Red Ocher | 0 | 0 | 0 | 0 | 0 | 0 |
| Percentage | 0 | 0 | 0 | 0 | 0 | 0 |
| Adults | | | | | | |
| Total | 388 | 20 | 36 | 237 | 150 | 831 |
| With Red Ocher | 10 | 0 | 5 | 4 | 1 | 20 |
| Percentage | 2.6 | 0 | 13.9 | 1.7 | 0.7 | 2.4 |
| Middle Aged | | | | | | |
| Total | 36 | 37 | 1 | 0 | 0 | 74 |
| With Red Ocher | 0 | 0 | 0 | 0 | 0 | 0 |
| Percentage | 0 | 0 | 0 | 0 | 0 | 0 |
| Old Adults | | | | | | |
| Total | 3 | 10 | 0 | 0 | 0 | 13 |
| With Red Ocher | 0 | 0 | 0 | 0 | 0 | 0 |
| Percentage | 0 | 0 | 0 | 0 | 0 | 0 |

* "Juveniles"

there seems to be a decrease in the proportion of individuals with red ocher as age increases:

| | |
|---|---|
| Newborn | 6.9% |
| Infants | 5.6% |
| Children | 4.2% |
| Adolescents | 2.1% |
| Young Adults | 2.4% |
| Middle Aged | — |
| Old Adults | — |

And while there is a considerable fluctuation among age groups within any given site, there is still a stonger tendency for individuals below the age of twelve (6% of the total individuals for that age group) to have red ocher than the higher age groups (3% of the total individuals). Thus age of the individual would seem to be a variable involved in the selection of individuals for treatment with red ocher.

Unfortunately, sex identifications are far from complete for the Indian Knoll sites, with only Indian Knoll itself having been adequately analysed. But such identifications as are available are summarized in Table 45. Of these twenty-seven burials, seventeen or 63% are female, and ten, or 37% are male. On the basis of this sample of a third of the total burials with red ocher, it would seem that females received some preference. That such might be the case is also indicated by comparative figures within the two categories at Indian Knoll, where there were 329 males and only 253 females in the three age groups. Thus at Indian Knoll, only 1.0% of the males had red ocher, while 2.8% of the females were so treated. A similar pattern can be noted for the Eva Site (Lewis and Lewis, 1961), where of the 198 burials, 37 were identified as female and 32 as males. Of these, red ocher burials numbered five females and one male, with an additional six red ocher burials unidentified as to sex. In both the Indian Knoll and Eva Cultures, then, sex seems to be one of the variables entering into the problem of interpretation.

TABLE 45

NUMBER OF INDIAN KNOLL BURIALS WITH RED OCHER BY AGE GROUP AND SEX

| Site | Children | | Adolescents | | Adults | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| | | | | | 3 | 7 |
| Indian Knoll | 1 | | 2 | 2 | | 6 |
| Read | | 1 | | | 1 | |
| Parrish | | | | | | 2 |
| Barrett | | | | | 1 | 2 |
| Carlson Annis | | | | | 2 | 3 |
| Total | 1 | 1 | 2 | 2 | 7 | 20 |

Another test that was made was to see if burials with red ocher were more frequently associated with grave goods, with the results clearly indicating a significantly high degree of such association for red ocher burials.

At the same time, it is necessary to note that many burials with considerable quantities of artifacts had no red ocher at all, and that most red ocher burials had only from one to four artifacts with only four such burials having ten or more artifacts. But the 53-100% range of the red ocher burials does contrast markedly with the 25-43% range of those without red ocher. Similar percentages occur at Eva, with 54.6% of the eleven red ocher burials and only 24.6% of the 187 burials without red ocher having grave goods.

Apparently red ocher burials merited grave goods more frequently than other burials. But the grave goods were largely personal items with exchange value, and most of the ceremonial equipment and items with exchange value occurred with burials without red ocher (Winters, unpublished research). Furthermore, there was no apparent correlation between any particular type of artifact and sex or age. Thus, the red ocher burials seem usually to have been equipped with appropriate personal items rather than with symbols of wealth or of particular status. Briefly summarized, the items in the three classes of artifacts with the red ocher burials are:

*Class I* (Personal items without exchange value)
- General Utility Tools-mauls, choppers, hammerstones, scrapers.
- Weapons-Antler atlatl hooks, stone atlatl weights, projectile points.
- Fabricating and Processing Tools—bone awls, drills, beaver incisor chisels.
- Domestic Equipment-pestles.
- Ornaments—Stone beads, anculosa beads, hairpins, tubular bone beads.

TABLE 46

ASSOCIATION OF ARTIFACTS WITH BURIALS WITH AND WITHOUT RED OCHER IN INDIAN KNOLL SITES

| Site | With Red Ocher | | | Without Red Ocher | | |
|---|---|---|---|---|---|---|
| | Total | With Grave Goods | Percentage | Total | With Grave Goods | Percentage |
| Read | 3 | 3 | 100 | 244 | 73 | 29.9 |
| Chiggerville | 4 | 4 | 100 | 110 | 31 | 28.2 |
| Carlson Annis | 13 | 11 | 84.6 | 377 | 161 | 42.7 |
| Barrett | 7 | 5 | 71.4 | 405 | 102 | 25.2 |
| Parrish | 17 | 11 | 64.7 | 116 | 29 | 25.0 |
| Indian Knoll | 36 | 19 | 52.8 | 844 | 235 | 27.8 |
| Total | 80 | 53 | 66.3 | 2,096 | 631 | 30 |

Miscellaneous: terrapin carapaces, bone tubes, animal canines, clay pigments, dog burials.

Raw Materials: chert flakes, antler sections and tines, asphalt.

*Class II* (Personal items without exchange value, but of a "ceremonial" nature)

Carapace rattles, medicine bags.

*Class III* (Personal items, with special value)

Disc shell beads, conch pendants, conch discs, conch gorgets, conch ear plugs, tubular shell beads, marginella beads, copper pendants.

In Table 47 information on the association of red ocher and certain Class II and Class III artifacts for which adequate data are available have been summarized for Indian Knoll, Barrett, Chiggerville, Carlson Annis, Parrish, and Read. Since red ocher burials constituted only 3.7% of the total at these sites, there are indications that unusually high percentages of certain categories were associated with burials of this type. But it is equally evident that the majority of these items were placed with burials not having red ocher. So possession of ceremonial equipment or wealth cannot in itself be indicative of a status automatically linked with red ocher.

Burials indicating death by violence were also checked, and only two such (Burial 146 at Carlson Annis and Burial 98 at Parrish) were found to be associated with red ocher. Burial 146 is especially interesting since it was one of a group of three adult males and a juvenile who presumably died violently and were buried in the same pit. Three of the four, including Burial 146, had important grave goods, with Burials 147 and 149 respectively having a medicine bag and a turtle shell rattle. The indications are that all four met similar fates at the same time, and that three of the four had received special burial treatment. But we are left with the engama as to why only one received red ocher.

TABLE 47

CLASS II AND CLASS III ARTIFACTS WITH RED OCHER IN INDIAN KNOLL CULTURE SITES*

| Artifacts | Total | With Red Ocher | Percentage of Total |
|---|---|---|---|
| Class II | | | |
| Medicine bags | 38 | 3 | 7.9% |
| Rattles | 47 | 9 | 19.1% |
| Class III | | | |
| Conch shell gorgets | 37 | 7 | 18.9% |
| Conch shell pendants | 61 | 7 | 11.5% |
| Tubular conch beads | 1464 | 1 | T |
| Disc shell beads | 18409* | 519 | 2.8% |
| Copper artifacts | 8 | 2 | 25.0% |

*Indian Knoll, Barrett, and Chiggerville.

This brings us to the consideration of multiple burials. Other than the burials noted for Carlson Annis in the last paragraph, only three red ocher burials at Indian Knoll were part of multiple interments. These were the infant burial 271, associated with the adult male 272, an adult female, with burial 378, which had no data on sex or age; and the newborn infant 607, which was in the same pit as the infant 606. In each instance, the accompanying burial was without red ocher.

The rather small number of multiple burials with red ocher at Indian Knoll was rather surprising since there were 63 groups including at least 146 individuals (16.6% of the total burials). Notably, the latter group included females with unborn infants in their pelvic cavities, new born infants, and infants. Red ocher apparently was not specifically connected with birth or the relationship of mother and child.

Data from paired burials offer little evidence for or against hypotheses that the individuals belonged to the same primary family or lineage. But there are other data that would indicate the implausibility of the latter hypothesis. Indian Knoll was occupied for perhaps some five hundred years, extrapolating from the accummulation of rates of bottomland shell middens such as Riverton and Swan Island, and only thirty-six burials had red ocher. Of these, 21, or 58.3% were new born, infants, or children. This leaves a balance of ten adults, four adolescents, and one unknown distributed from the top to the bottom of the midden. The ages of this group range from fifteen to thirty-seven, with an average for the entire group of only twenty-two years. Even allowing for the possibility that some kin may have been buried at ancillary sites, it hardly seems probably that such a small number of individuals could have perpetuated a lineage half a millenium, particularly since in a unilineal system some descendants are excluded from the lineage in each generation. That is, the sum of the life spans of all females is only 162 years and that of all males, 143 years, and of the two combined only 305 years. These figures make no allowance for overlap of generations, and we are not quite willing to assume a lineage in which the appearance of one generation coincides with the demise of the previous one. Of course, if there is some principle operative by which only certain individuals are provided with red ocher by virtue of their position within the lineage, the preceding argument would be vitiated.

A bilateral system involving the application of red ocher to a group of consanguine relatives would seem even more improbable, since we should expect the percentage of the population so treated to be even higher than might be expected with a unilateral system.

Finally, there is the question of how the red ocher was being used with the burials. For most burials, data on exact location of the red ocher is not given, but in Table 48 available information is summarized for Barrett, Carlson Annis, Read, Parrish Vaillage, and Indian Knoll. The general impression that this table conveys is that of randomness in distribution pattern, both in general and in respect to sex. (A similar analysis was made by age groups, but no patterning was apparent.) Such a diverse array of loci suggests that the red ocher was intentionally applied to a selected locus on each individual. From this, one might further speculate that the application reflected a specific condition of the individual at time of death.

As a preliminary hypothesis, then, it is suggested that the application of red ocher to burials of the Indian Knoll Culture was dependent on certain unknown physical conditions at the time of the death of the individual, mediated by variables of sex, age, status, and role.

TABLE 48

LOCUS OF RED OCHER ON INDIAN KNOLL BURIALS

| Locus | Male | Female | ? | Total |
|---|---|---|---|---|
| Over all | 1 | | 4 | 5 |
| From elbow to knees | | 1 | | 1 |
| About skull | | | 2 | 2 |
| Under skull | | 1 | 1 | 2 |
| On skull | 1 | 1 | | 2 |
| At face | | 1 | | 1 |
| Under canine teeth | 1 | | | 1 |
| On front teeth | 1 | | | 1 |
| On chest | 1 | | | 1 |
| Over upper part of torso | | | 1 | 1 |
| Over abdomen | 1 | | | 1 |
| On left side | | 1 | | 1 |
| At right side | | 1 | | 1 |
| On left hand | 1 | | | 1 |
| Beside lower right arm | 1 | | | 1 |
| Near right elbow | | | 1 | 1 |
| Lumbar region | | | 1 | 1 |
| Near pelvis | | 1 | | 1 |
| Under pelvis | | | 1 | 1 |
| Over pelvis | | | 1 | 1 |
| On right femur | | 1 | | 1 |
| On legs | | | 1 | 1 |
| Carapace of ocher | | | 1 | 1 |
| Lumps of ocher | | | 4 | 4 |
| In grave | | 2 | 1 | 3 |
| Total | 8 | 10 | 19 | 37 |

## RECREATIONAL EQUIPMENT

As is the case with such arbitrary categories as ceremonial equipment and ornaments, or, indeed, with any of our functional categories, the very concept of a category of recreational equipment derives from a defective and particularizing view of the nature of such artifacts in primitive societies. Our own secularized concepts of gaming cannot be extrapolated directly to other societies, since in many, or even most, societies, games and dancing may be an integral part of other activites, including the most sacred ceremonies and rituals associated with the supernatural. To paraphrase Bohannon's (1963) discussion of the problems inherent in contrasting tribal religions and our own universal religions, one of the basic difficulties for prehistorians in dealing with the material remains of primitive societies is avoiding interpretations stressing distinctions between the natural world and the supernatural world, since such distinctions are a standard feature of our intellectual training. But as far removed as our present category may be from any realistic reflection of either social or cultural fact, it is more effective as a unit for cultural analysis than the neutral and safe confines of an industry.

The objects included within the category of recreational equipment for the Riverton Culture are, perforce, assigned thereto by virtue of their resemblance to ethnohistoric counterparts, rather than on the basis of adequate identification through either primary or secondary attributes. And, indeed, as Guilday (1963) has pointed out, our first item, perforated deer phalanges, has appeared in the literature under a variety of sobriquets, including pendants, perforated phalanx tinklers, amulets, gaming objects, jinglers, phalange beads, tinklers, and cup-and-pin game pieces. Thus our own assignment is somewhat eclectic, being based on the very exact parallels between historic items of known recreational function and our prehistoric artifacts. In addition, the Riverton Culture specimens do not show any evidence of utilization that would point to any other category, and at least at Swan Island, the phalanges tended to occur together, as though they might have been part of a set. But the latter clustering, admittedly, might as easily have pertained to a set of ornaments as to a set of gaming pieces. All that we can say at present is that the similarity of these items to ethnohistoric examples of recreational equipment seems to provide a better basis for inclusion of these artifacts in the latter category than in any other.

Robeson Hills:

No recreational equipment was recovered at this site.

*Cut Deer Phalanges*

Riverton Test Pits:

The three examples of cut deer phalanges had had the proximal end removed and the edges cut or ground smooth. Two specimens (Levels 7 and 9) had also been perforated longitudinally through the distal end, while the third specimen (Level 13) was unperforated. Webb (1946) illustrates identical specimens from sites of the Indian Knoll Culture and suggests after Willoughby (1935) that these cut deer toes were used in games (cup-and-pin game) by stringing them in a graduated series (Webb, 1946: 291, Fig. 48C; 1950: 318, Fig. 9A). The elements of the Assiniboin cup-and-pin game illustrated by Lowie (1963: Fig. 34) also seems to be identical to the archaeological specimens from the Riverton site.

Culin (1907: 527-561) discusses at length the distribution of the ring and pin game, noting that rings are less widely used than other varieties of targets. We prefer to use the term "cup and pin" as a descriptive category for games employing imbricated, cut phalanges with a pin (Fig. 15).

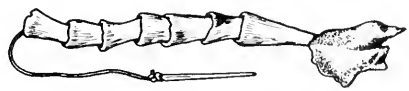

Fig. 15. Cup and pin game of the Winnebago Indians of Wisconsin. After Culin 1907, Fig. 740.

The historic distribution of the cup and pin game of the phalangeal type covered a northern range of Algonquian, Athapascan, and Siouan speaking peoples. Prehistorically, the range must have been somewhat greater, since perforated or cut phalanges are known archaeologically from Kentucky (Webb, 1946; 1950); northern Alabama (Webb and DeJarnette, 1942: 123, Pl. 147, fig. 1); southern Illinois at the Middle Woodland Twenhafel Site (Joseph Caldwell, personal communication, 1961); northern Illinois at the Fisher Site (John W. Griffin, 1946); Pennsylvania (Guilday, 1963); Late Woodland and Owasco sites in New

York (Ritchie, 1965: 268, 288, 293, Pl. 92); and Signal Butte II in Nebraska (Strong, 1935). (For a recent discussion of the distribution of these perforated phalanges, see Morse and Morse, 1963). Apparently the cup and pin game is quite old in eastern North America, dating from at least the latter portion of the Archaic.

Riverton Area X:

A single fragment of a deer phalange from Feature 21 had a perforation through the distal end, and possibly is the remnant of a unit from a cup and pin game set.

Swan Island:

Three cut deer phalanges were found in Level 7 in midden around a large hearth. All had been hollowed out and perforated longitudinally through the distal ends. One of the phalanges had been cut diagonally, rather than perpendicularly, across the long axis.

An unperforated, cut deer phalange came from Level 5. The interior had been hollowed out and the cut edge ground smooth, but there had been no attempt at perforation of the distal end.

*Bone "Tallies"*

Riverton Test Pits:

A sliver of bone from Level 3 had been filed into a rectangle with rounded ends with one end slightly tapered and beveled. The term tally is undoubtedly unfortunate, although it is widely used for such worked pieces of bone, some of which were probably used for gaming pieces.

Riverton Area X:

A single fragment has tentatively been identified as a bone "counter," since its general dimensions and appearance are those of counters previously found at Riverton and Swan Island. The specimen was from the plow zone, and cultural association cannot be certain.

Swan Island:

Rectangular pieces of filed and polished bone occurred in Levels 3 and 6. The example from Level 3 had been broken, but the "tally" from Level 6 was complete. The latter specimen was obviously much smaller than either the Level 3 or Riverton tallies. Dimensions were: length 2.0 cm.; width 0.7 cm.; thickness 0.5 cm. Rounding and polishing of the ends was pronounced and the faces were convex.

It is noteworthy that identical gaming pieces were still being manufactured by the Fort Ancient Culture inhabitants of the Hardin Site (Hanson, 1966), which is assigned by Hanson to a sixteenth and seventeenth century occupation of the Shawnee. As in the case of previously discussed items of ceremonial equipment, common items of recreational equipment such as the perforated deer phalanges and the bone "tallies" seem to have remained stylistically stable for some three thousand years in the Midwestern area. Like the Riverton Culture specimens, the Fort Ancient Culture gaming pieces seem to have had a rather casual disposition, since of the 113 examples, 71% came from the general midden, 12% from features that might be considered refuse pits, and 17% from burial associations. Most of the other scattered records of gaming equipment from Middle and Late Woodland sites seem to indicate similar casual disposition. Perhaps, gaming equipment tended to be viewed throughout its history in the Midwest primarily as items of secular equipment, no matter what other relationships may have pertained between gaming and other spheres of activity.

## MISCELLANEOUS ARTIFACTS

*Perforated Bobcat Scapula (Plate 34j)*

Riverton Test Pits:

A fragment of a *Lynx rufus* scapula from Level 9 had a single perforation drilled from both sides. There are also several areas showing file marks, and some polishing on high spots. The function of this artifact must remain problematical, although one might suggest that it was used as a pendant.

*Cut Bobcat Mandible (Plate 34 t).*

Riverton Test Pits:

A *Lynx rufus* mandible had been cut through the mid-point of the second pre-molar, the front half of the root of which remained in its socket. One side of the mandible was broken, but the other side showed very heavy wear, with the cutting marks practically worn away. No suspension holes were present, and we can only suggest that the cut mandible may have been part of a "medicine bag" as postulated for similar cut jaws and other animal remains at the Indian Knoll and Carlson Annis sites (Webb, 1950a: 336-43). The mandible was found in Square 0/10 S in a pit which began at 54 inches.

*Bobcat Femur (Plate 43f).*

Riverton Area X:

An unaltered femur of *Lynx rufus* was in the red ocher covered cache associated with Burial 1 in Area X.

*Deer Scapula Scrapers (?) (Plate 43 b).*

Riverton Area X:

These artifacts have been termed scrapers with the greatest misgivings. Previous to the 1963 season, when two examples of this artifact were recovered from Area X at Riverton, no deer scapula artifacts had been found at any of the sites of the Riverton Culture. They are simply sections of deer scapula showing scattered file marks and heavy wear along one edge.

Provenience: One each from the plow zone and the cache associated with Burial 1.

*Engraved Deer Phalange (Pl. 39 e)*

Riverton Area X:

A longitudinally split section of a deer phalange from Feature 17A had a simple engraved design on the exterior consisting of a "V" crossed by a single vertical line producing a bird track or fork-like design. The surface showed considerable polish of a sort that might develop through repeated handling. In respect to function, the artifact must remain problematical.

*Bone Disc (Plate 39 h).*
Riverton Area X:

A single, oval piece of unidentifiable animal bone from Feature 1 of Area X had been cut to shape. The function of this item is unknown and no comparable examples are known from any other site in eastern North America.

*Bird Claw*
Riverton Area X:

An unaltered claw of an unidentified bird was among the bones of Burial 2, a cremation. The claw was heavily stained with red ocher, and may well have been an intentional inclusion with the burial.

*Cut Turtle Shell (Plate 24 q).*
Riverton Area X:

Two fragments of turtle shell from Levels 4 and 8 had one or more smoothed edges.

*Cut Gar Jaws (Plate 17 h-q)*
Swan Island

Seven jaw gar pieces bore cutting marks on their ends. The cut sections ranged from 2.6 to 8.4 cm. in length, with an average length of 4.4 cm. Four examples still retained many teeth, while three small specimens were without teeth. At present, we are unable to suggest any function for these artifacts, but their wide vertical distribution at the site would indicate that they were being prepared during most of the occupation of the site.

A cursory examination of ethnohistorical data reveals that among the Delaware, "the bill of a gar-fish wrapped in a thin rag so that the teeth projected through" was used to score the thighs and legs of boys being punished (Speck, 1937: 107). Speck also indicates that a similar item may have been used in the purification ritual of men preparing for war or physical contests. It does not seem profitable to press the analogy between Archaic and ethnographic artifacts, particularly in view of their rarity at the Riverton Site and their complete absence in the sample from the Robeson Hills Site. If one were to postulate that the cut gar jaws at Swan Island were used for the disciplining of youths, it would be necessary to make an additional behavioural interpretation that children were rarely in need of disciplining at Riverton and that they were models of deportment at Robeson Hills. If the gar jaws are accepted as items used in ritual purification, then Swan Island would stand as the center for a ceremonial activity which was either rare or non-existent at the other sites. Such an interpretation might be possible, but, as we shall indicate in a later chapter, Swan Island was probably a transient camp with a foraging type of subsistence pattern, and little to suggest other complex patterns of behavior not directly related to subsistence activities. It would seem best, then, to leave these artifacts in the limbo of miscellaneous artifacts, albeit of considerable importance in this particular site of the Riverton Culture.

Riverton Area X:

Although several of these cut sections of gar jaw (*Lepisosteus* sp.) were found at Swan Island, none had previously been reported from the test pit Riverton. Two specimens, identical to those of Swan Island, were recovered, with one each in the midden deposits, Features 1 and 6A of Area X.

*Shell Paint Cups.*
Riverton Area X:

These were simply mussel shells, apparently unaltered, which had been used as containers for red ocher. Only two were found, with one in the midden of Feature 18 and another on the clay floor, Feature 30, near a postmold.

*Crinoid Stem (Plate 43d)*
Riverton Area X:

A single, unaltered crinoid stem was in the red ocher covered cache associated with Burial 1.

*Copper Artifacts (Plate 24 h).*
Riverton Area X:

Copper is included under miscellaneous artifacts simply because none of the copper items could be definitely identified as to function.

No trace of copper had been reported prior to 1963 from any of the sites of the Riverton Culture, but three copper artifacts, or residues thereof, were recovered from Area X. One small, somewhat pointed rod may well have been an awl fragment, another, possibly, an awl fragment, with the third find consisting simply of small, amorphously shaped flakes of copper.

The two putative awl fragments were in the plow zone of Annex II, and accordingly may belong with one of the minor Adena, Woodland, or Mississippian occupations of the site. But there latter occupations seem to have been nothing more than hunting camps, and copper artifacts have rarely been reported in the Midwest from such elements of the settlement systems of these cultural manifestations. Of course, all too rarely is such an element of a settlement system excavated, or in some areas, even recorded. Perhaps our sample of data from hunting camps is hopelessly skewed at present. And it is equally possible that these two copper artifacts were from the midden off the west edge of Feature 13, a platform of the Riverton Culture.

The copper flakes, however, were definitely in Riverton Context, being found off the north corner of Feature 30, a clay floor, at a depth of one foot below the surface of that feature. The copper fragments, thus, were deposited in midden predating construction of Feature 30. There were no signs of disturbance in the recovery area, so that the association of copper on a modest scale with the Riverton Culture is indicated.

*Baked Clay Cylinder (Plate 24 k-l)* Riverton Area X:
Riverton Area X:

This enigmatic item was found in the plow zone of Area X. As indicated, it was simply a small cylinder of untempered, baked clay. What its function, if any, and cultural affiliation might be are questions which remain in the realm of the imponderable.

*Strike-a-lights (Plate 23 m-q)*
Riverton Area X:

These artifacts had not been identified until they

were noted among the material from the general survey of the Wabash Valley (Winters, 1967). Shapes are often quite irregular, although the first examples noted were small rectangles of chert which at first glance were thought to be imitations in local chert of gun flints. Closer examination showed that their attributes were not those of true gun flints. One or more edges of these rectangles had numerous minute hinge fractures similar, except in size, to those that appear on choppers. But the very small size of these artifacts would preclude their use as chopping implements, and their general attributes could very well be those of a piece of chert prepared for and used as strike-a-lights.

It is quite possible that examples of strike-a-lights had been recovered previously in sites of the Riverton Culture, but were unnoted during checking of the chert spalls. But lack of time has prevented a re-analysis of chert spalls from the previous excavations at the three sites of the Riverton Culture.

Four good and three dubious examples were recovered in 1963. Of these only two good examples could definitely be associated with the Riverton Culture, these being from Feature 15 and the cache with Burial 1. Both were Wabash cert, and the latter was simply a utilized blade fragment. Four of the remaining specimens came from the plow zone of Area X, with three of these being Wabash chert and the fourth, Attica chert. The seventh strike-a-light was a surface find. With the exception of the utilized blade fragment, all were irregular chert spalls.

We propose ultimately to place strike-a-lights in a separate functional category of fire-making equipment.

*"Shredders" (Plate 23 a-g)*

Robeson Hills:

These are crude implements which were formed by removing parallel flakes from one steep sided face of a chert nodule, thus producing a toothed edge. Superficially, they resemble scrapers, but in use they would have had a tearing rather than a scraping action.

"Shredders" are quite common in Archaic sites in the southern Illinois area. Some illustrations in reports on Archaic sites in the Midwest could possibly be those of shredders. They are usually designated scrapers, choppers, cores, blanks, or crude blades.

The single example from Robeson Hills came from the surface and could not be assigned to any cultural component at the site.

Riverton Test Pits:

These steeply sided, toothed implements strongly suggest an implement which could have been used for shredding plant fibers or other natural materials. Some examples have numerous hinge fractures on the concave surfaces between the teeth, suggesting that the implement was drawn through a very resistant material. Three shredders came from the surface, another from Level 14, and a fifth, dubious example from Level 4.

Swan Island

All four of the shredders occurred in the bottom half of the midden. Single specimens were found in Levels 5, 7, 8 and in a storage pit originating in Level 10. The shredders were all steep sided with a serrated edge chipped from a plano surface. Hinge fractures in the concave areas between the teeth indicate that the implement was used with the plano surface down.

While these implements were not common in the shell middens, the data from Riverton and Swan Island clearly indicate the association of these shredding implements with the shell midden Archaic of the Central Wabash.

*Bone "Tube"*

Robeson Hills:

A single fragment of a large, polished bird bone from bulldozed midden may have been from a bone tube, or possibly, from a flute. The large diameter and thickness would argue against its having been a bead fragment.

*"Polishing Stone"*

Robeson Hills:

A limestone pebble found between 24 and 36 inches in Test Pit E had had one plano face worn quite smooth. Examination under a binocular microscope revealed a few shallow striations, but the general appearance was that of a pebble which had been rubbed over a soft and non-abrasive surface.

*"Pins" (Plate 24 j)*

Swan Island:

A small mammal phalange from Level 10 had been sharpened to a point. The artifact might as easily be designated a miniature bone awl as a pin.

*Worked Antler, Bone, and Shell (Plate 24 q-z)*

Robeson Hills:

Cut antler midsections and tines and unclassifiable bone artifacts are summarized in Table 49. One example of a bone fragment which had been ground smooth is shown in Plate 24 s.

TABLE 49

THE DISTRIBUTION OF WORKED ANTLER AND BONE AT THE ROBESON HILLS SITE BY ONE-FOOT LEVELS

| Zone | Level | Worked Antler | Worked Bone | Total |
|---|---|---|---|---|
| I | 0-12" | 2 | 1 | 3 |
| I | 12-24" | 3 | 6 | 9 |
| II | 24-36" | 5 | 3 | 8 |
| II | 36-48" | 3 | 3 | 6 |
| | Subsoil Pits | | 1 | 1 |
| | Uncontrolled Provenience | 16 | | 16 |
| Total | | 29 | 14 | 43 |

Riverton Test Pits:

Included within this category are cut antler midsections, cut antler tines, and miscellaneous problematical pieces of worked bone. Most of the latter are unclassifiable fragments of broken artifacts.

Riverton Area X:

Seven fragments of worked bone and seven antler tines with filing striations were unidentifiable as to specific function.

TABLE 50

DISTRIBUTION OF WORKED ANTLER, BONE, AND SHELL AT RIVERTON SITE BY SIX-INCH LEVELS

| Level | Antler | Bone and Shell | Total |
|---|---|---|---|
| 1 | 1 Cut Tine | | 1 |
| 2 | | | 0 |
| 3 | 3 Midsections | | 3 |
| 4 | 3 Midsections | 1 Awl? | 4 |
| 5 | | 1 Smoothed Fragment | 1 |
| 6 | | | 0 |
| 7 | 3 Midsections | 2 Cut Tines | 5 |
| 8 | 2 Midsections | 1 Awl? | 3 |
| 9 | 4 Cut Tines | 1 Worked Shell | 5 |
| 10 | 2 Cut Tines | 1 Bone Object | 3 |
| 11 | 1 Midsection | 1 Pendant? | 2 |
| 12 | 2 Midsections | 1 Awl? 1 Shuttle? | 4 |
| 13 | 1 Midsection | | 1 |
| 14 | 1 Cut Tine | 1 Awl? | 2 |
| 15 | | | 0 |
| 16 | 1 Midsection | | 1 |
| Total | 24 | 11 | 35 |

Three bone fragments, including a section of highly polished raccoon baculum, came from the plow zone, one fragment from Feature 6A sub, a cut section of turkey tarsometatarsal from Feature 17A, and one from Feature 25. A highly polished fragment of a bird long bone from Level 2 of Test Pit Alpha may be from a bone flute or a bone tube.

The antler tips may well have been fragments of partially finished antler points or perforators, which had been filed, but not polished. One of these was from the Plow Zone, one from the General Midden, one from Feature 1, three from Feature 6A, and one from an unknown locus.

Cut antler sections were very numerous, a total of 91 having been recovered. Most of these were antler midsections.

Proveniences: 41 from the Plow Zone; 3 from the surface; one each from Features 8, 11, 16, 17A, 26, 30 (In postmold), and 41 from Levels 4, 6, 7, and 8 of Test Pit Alpha; two each from Features 1B, 4, 6, 18, and 31 (In floor and on floor); three each from Features 21 and 35, and from Level 1 of Test Pit Alpha; four each from Features 6A, 27, and 32, and five from Feature 1.

A *Lampsilis ovata* shell from Level 9 had had the pseudocardinal teeth ground off.

Swan Island:

Rejects from manufacture and unclassifiable artifact fragments are summarized in Table 51.

*Unclassifiable Worked Chert*

Riverton Area X:

Thirteen fragments of chert artifacts from the 1963 excavations were totally unclassifiable even in terms of general categories. Five of these came from the plow zone, one each from Features 1, 25, and 27, and five from the cache associated with Burial 1.

TABLE 51

DISTRIBUTION OF WORKED ANTLER AND BONE AT THE SWAN ISLAND SITE BY SIX-INCH LEVELS

| Zone | Level | Worked Antler | Worked Bone | Total |
|---|---|---|---|---|
| I | 1 | 1 Midsection | 1 awl? | 2 |
| II | 2 | | | |
| II | 3 | 2 Midsections | 1 Shuttle? 1 Bone Object, 2 Cut Gar Jaws, 3 Cut Bird Bones (1 Hawk) (1 Mallard), 1 Cut Squirrel Tibia | 10 |
| III | 4 | 1 Midsection | 1 Awl? (Turkey) 2 Cut Bones | 4 |
| III | 5 | 3 Midsections 2 Hollow Tines | 1 Cut Gar Jaw, 1 Tube? | 7 |
| III | 6 | 1 Cut Tine 4 Midsections | 1 Gouge?, 1 Cut Bird Bone | 7 |
| III | 7 | 2 Midsections | 1 Tube? | 3 |
| III | 8 | | 1 Cut Bone, 1 Shuttle? 1 Cut Swan Bone, 1 Pendant? | 4 |
| IV | 9 | 2 Cut Tines 1 Base | 1 Worked Bone Fragment, 1 Cut Gar Jaw 1 Engraved Bird Bone | 6 |
| V | 10 Unknown Provenience | | 3 Cut Gar Jaws | 3 |
| Total | | 19 | 27 | 46 |

## Chapter V

# Features

While Riverton Culture features are often difficult to excavate by virtue of the plasticity of their construction media, the sites of this culture have generally produced more satisfactory results than most of the sites in the Midwest. At all sites the 4 to 8 feet deep middens were built up rapidly, with none of the midden deposits probably encompassing much more than a five hundred-year time span. Thus, covering of features tended to be rather rapid, particularly at Riverton where regular spring floods covered previous occupation levels. Only at Robeson were features difficult to detect in the dark midden, and even there, numerous unbroken layers of shell and other debris gave considerable assurance that pits and other features were not being missed in the excavation units. Furthermore, the use of bright yellow clay for floors and many hearths made identification of these features quite easy against the dark background of the midden. An additional element of very great importance at all sites was the lack of extensive utilization of site areas by earlier and later cultures, these being limited to the very lowest and uppermost levels which contained artifacts suggesting transient occupations of the hunting and/or gathering camp type. The bulk of each midden consisted entirely of a single component, the Riverton Culture. Such deposits are an exceeding rarity in the Midwest, where multi-component middens are the rule.

Six descriptive units have been employed in the analysis of the features: pits, hearths, workshop areas, postmolds, clay and stone floors, and burials. For the 1961 test pits, features for each site are discussed under the appropriate heading, with the 1963 burials at Riverton incorporated into that section. In respect to the other 1963 features from Area X at Riverton, a unified treatment of all features has been used, since our objective has been to interpret the area as a complex of interrelated features. Furthermore, the features of the latter area correspond typologically to those described for the previous season, so that no particular advantage would be gained by including them with the descriptive categories.

Only one term, narrow mouthed pits, needs defining. Any pit having an orifice smaller in diameter than the body of the pit, a slight neck area, and generally globular body has been included within this category.

## 1961 FEATURES PITS

### Robeson Hills

Our general impression is that storage or refuse pits were limited primarily to the lower two feet of the midden, although some may have been missed in the upper zone where shell lenses and other debris was present in much lesser quantity, making pit detection difficult.

Shapes varied from narrow mouthed to conical or cylindrical, and in those pits which were sufficiently intact to permit measurement, the size ranged from 2 to 4 feet in width and from 1.5 to 2.5 feet in depth. Frequently, pit walls showed irregularities indicating the use of a pointed digging stick in excavating the pits. Some pits contained practically nothing but mussel shell, others considerable bone mixed with a little shell. Data on the various pits and the artifacts contained therein are included as Appendix II. Missing information in the chart is the result of the exegencies of the salvage operation, many pits having been excavated during earth moving operations.

### Riverton

The twelve pits in the Riverton test pits were either flat or convex bottomed cylinders or shallow basins. The cylindrical pits were concentrated in the lower part of Zone III and the upper part of Zone IV. Basin shaped pits predominated in the lowest levels of Zone IV. In size, five cylindrical pits ranged from 30 to 35 inches in diameter and from 10-1/2 inches to 4 feet 9 inches in depth, with an average depth of 2 feet 8 inches. The five basin shaped pits, on the other hand, were broad and shallow, with diameters ranging from 8 inches to 2 feet 7 inches, and depths from 4-1/2 inches to 13 inches. Average diameter was 19 inches and average depth, 9 inches.

The very different shapes and dimensions of the two types of pits would indicate different functions. Pits of the basin type rarely contained anything besides shell and, occasionally, ashes. Perhaps these pits were used primarily in connection with the processing of mussels for consumption.

The function of the cylindrical pits remains an enigma. While contents varied considerably, usually quantities of bone and shell were present, along with a few chert flakes and bone or chert artifacts. However, the deep, cylindrical pits had quite complex cross sections. For example, a pit in Square 80R10, which was at least 57 inches deep and only 30 inches in diameter, was first noted at a depth of 42 inches below the surface. At this point it appeared to be a hearth, and its true nature was not evident until about 60 inches below the surface. Below this depth, the cylindrical pit was filled with a gray ashy material which contained little cultural debris. The flat bottom of the pit was covered with sandstone fragments to which quantities of dark organic material adhered. Apparently, the pit had nearly been filled with ashy material before utilization as a deep hearth. But the original function is not

TABLE 52

COMPARATIVE TRAIT LIST OF THE ROBESON HILLS, RIVERTON AND SWAN ISLAND SITES
ARTIFACTS OF THE RIVERTON CULTURE

| | Robeson Hills | Riverton | Swan Island |
|---|---|---|---|
| GENERAL UTILITY TOOLS | | | |
| Blades | | | |
| Leaf-shaped | C | C | C |
| Lanceolate | R | C | S |
| Rectanguloid | | R | |
| Stemmed | | S | |
| Triangular | | S | |
| Pentagonal | | R | |
| Random Flake | R | | R |
| Backed | R | C | R |
| Scrapers | | | |
| Flake | R | S | R |
| End, triangular | | R | |
| End, reworked projectile point | | | R |
| Choppers | R | R | |
| Hammerstones | R | S | R |
| WEAPONS | | | |
| Hunting Equipment | | | |
| Projectile points | | | |
| *"Robeson Constricted Stem" | R | R | R |
| * Merom Expanding Stemmed | C | C | C |
| * Trimble Side Notched | R | C | C |
| * Riverton Parallel Stemmed | | R | R |
| Antler points, tanged | S | C | C |
| Antler points, untanged | C | S | S |
| * Antler points, notched sides | R | R | R |
| Fishing Equipment | | | |
| Gorges | R | | ? |
| *Sinkers, grooved | C | | |
| Spatulas, forked | | R | |
| ORNAMENTS | | | |
| Beads, tubular, bone | S | C | C |
| Beads, perforated *Campeloma* shells | | R | |
| Beads, pearl | | R | |
| Pendants | | | |
| Bear canine | R | X | ? |
| Wolf canines | | R | |
| Miscellaneous carnivore canines | | R | R |
| Incisor, human | | R | |
| Shell | S | R | R |
| Pebble | | | R |
| Bone | R | R | |
| Mandibles, cut and perforated | | R | |
| CEREMONIAL | | | |
| *Pipes, tubular, sandstone | R | R | X |
| *Flutes, double perforation | R | C | R |
| *Rattles, perforated turtle carapace | | R | |
| Ocher, red and yellow | ? | C | R |
| DIGGING IMPLEMENTS | | | |
| Hoes, shell | S | | S |
| WOODWORKING TOOLS | | | |
| Axes, full grooved | R | X | X? |
| *Axes, grooved, chipped limonite | | C | |
| FABRICATING OR PROCESSING TOOLS | | | |
| Chert Working Implements | | | |
| Flakers | C | C | C |
| Drifts or punches | R | R | |
| Anvils | R | | |
| Perforating Tools | | | |
| Awls | | | |
| Deer metacarpal | C | C | S |
| Deer metatarsal | R | S | |
| Deer ulna | R | | |
| Miscellaneous long bone | R | R | |
| Splinter | C | C | C |
| Copper | | R | |

| | Robeson Hills | Riverton | Swan Island |
|---|---|---|---|
| FABRICATING OR PROCESSING TOOLS (continued) | | | |
| Drills | | | |
| Simple | R | R | R |
| "O" Head | | R | |
| "V" Head | | R | R |
| Flake | | | R |
| Side-notched | | R | |
| Micro | R | R | |
| *Micro-perforators | | C | C |
| Reamers | S | R | S |
| Abrading Tools | | | |
| Abraders, sandstone | | | |
| Narrow-grooved | C | C | C |
| Broad-grooved | R | S | S |
| Files, sandstone | R | R | |
| Chiseling Tools | | | |
| Chisels, beaver incisor | R | S | R |
| Chisels, porcupine incisor | | R | |
| Weaving Tools | | | |
| Shuttles | | | |
| Simple | R | C | C |
| *Open End | | | R |
| *Tubular | | R | |
| *Expanded head | | | R |
| Sewing Tools | | | |
| Needles | R | R | R |
| Flensing Tools | | | |
| Antler | | | |
| Gouges | | | |
| *Robeson | C | X | S |
| *Simple | | R | |
| *Hafted | R | | |
| *Tongue-shaped | R | | |
| Bone | | | |
| *Gouges, hemicylindrical | | | R |
| RECREATIONAL EQUIPMENT | | | |
| "Tallies" | | R | R |
| Deer phalanges, cut and perforated | | S | S |
| Deer phalanges, cut but unperforated | | R | R |
| DOMESTIC EQUIPMENT | | | |
| Manos | | | |
| Simple | C | C | C |
| Pitted | C | C | R |
| Cupstones | R | | |
| Spoons | | | |
| Shell | R | | |
| *Antler | R | X | |
| FIRE MAKING EQUIPMENT | | | |
| Strike-a-lites | ? | S | ? |
| FEATURES | | | |
| Single postmolds | C | S | S |
| Floors, clay | C | C | C |
| Floors, sandstone | C | | R |
| House patterns | C | | |
| Hearths, clay lined | C | C | C |
| Hearths, sandstone | C | | |
| Hearths, unprepared | C | C | C |
| Pits, storage | C | R | S |
| Workshop areas | R | | S |
| BURIAL COMPLEX | | | |
| Burials, extended | C? | ? | |
| Burials, flexed | R? | C | |
| Burials, cremated | | R | |
| Burials, in refuse pits | C? | | |
| Burials, in special pits | R? | C | |

TABLE 52 (continued)

| | Robeson Hills | Riverton | Swan Island |
|---|---|---|---|
| BURIAL COMPLEX (continued) | | | |
| Red Ocher on burials | R | C | |
| Grave goods with burials | C? | R | |
| MISCELLANEOUS | | | |
| "Polishing" stones | R | | |
| "Shredders" | R | S | S |
| "Pins," bone | | | R |
| Mandibles, cut and polished | | R | |
| MISCELLANEOUS (continued) | | | |
| Turtle carapaces, cut or ground | R | R | |
| Antler mid-sections and cut tines | C | C | C |
| Cut Gar Jaws | | R | C |
| "Tubes," bone | R | | R |
| Dises, bone | | R | |
| Paint cups, mussel shell | | R | |

R = Rare S = Scarce C = Common X = Reported ? = Association or identification uncertain * = "Diagnostic" artifacts

at all obvious. The narrow diameter and considerable depth would not have been ideally suited to storage of food, although similar pits of shallower depths may have served as storage units.

Perhaps the ashy contents of the pit were essential to its function, rather than being later fill. For example, an ash filled pit could have been used in the processing of skins or the leaching of acorns. Actually, surprisingly little is known about the preparation and utilization of acorns in eastern North America. Gifford (1936) mentions roasting, boiling, and pulverizing as techniques for acorn processing in the former area, and Swanton's (1928a) remarks on the preoccupation with the extraction of oil in the southeastern area are noted. Reference is also made to the practice in the northeastern woodlands of leaching with lye made from ashes prior to pulverizing. Of the Southeast, Gifford (1936: 88) states that ". . .the interest in extracting oils and the development of agriculture may have obliterated an earlier leaching complex. With the development of agricultural products a people would hardly resort to leaching acorns, except in time of famine."

The accumulating evidence for the importance of the acorn in the Midwest for both Archaic and Woodland cultures demonstrates the need for both more refined techniques for the checking of acorn residues in archaeological deposits and a search of ethnographic sources for more information bearing on the problem.

At present we can only suggest that the cylindrical and conical, ash-filled pits of the Riverton Culture would not have been functionally unsuitable for the immersion or burial technique of acorn preparation mentioned by Gifford (1936.87) for several Californian tribes. A remote possibility is that the pit was dug as a well. But even though the pit penetrates the sterile subsoil to a depth of 2 feet, it is above the present water table except at flood stage of the river. There is no reason to assume that the water table was higher during occupation of the site, or that the inhabitants ignored the abundant supply of water in the adjacent slough.

Another pit beginning at 84 inches below the surface in Square 10R25 also was complex in section. About 2 feet of gray, ashy muck was in the bottom of the pit. Above the gray ash was a lens of yellow sand, which was overlain by 2 inches of solidly packed mussel shell. Over the mussels was a dense concentration of charcoal, which included sizeable charred and uncharred twigs. The general appearance of the latter was that of a fire which had been quenched abruptly. Filling the top 3 inches was a gray silt commonly found in many areas of the site. Apparently, after the deposition of the ashy material and the overlying yellow sand, the partially filled pit had been used for the steaming of mussels, with the final silt layer perhaps representing flood deposits.

Distribution of the pits was as follows: Single cylindrical pits in Levels 6 and 7, two cylindrical and a basin shaped pit in Level 8, a basin shaped pit in Level 9, a pit of uncertain shape in Level 14, a basin shaped and a cylindrical pit in Level 15, and two basin shaped pits in Level 16. Clearly, there are two loci of concentration: an upper locus in Levels 6 to 9, and a lower locus in Levels 14 to 16.

No narrow mouthed storage pits of the type found at Robeson Hills or Swan Island were present in the Riverton Site in the 1961 or 1963 excavations.

## Swan Island

Pits were comparatively rare in the midden, only four definite pits being located. In addition, another pit may have been present in Square 50L2 (Fig. 6), where a loosely compacted midden area adjacent to a hearth and a clay floor may have been a pit intrusive into Zone III from Zone II. Since features were easily observable in the midden, we feel that the rarity of pits and postmolds must be assigned to a cultural factor rather than to any technical difficulties or inadequacies in excavation.

One edge of a basin shaped pit filled with shell and some animal bone was discovered at 26 inches below the ground surface in Square 50L2. The portion of the pit in the latter square was 12 inches deep and had a maximum diameter of about 40 inches. Since most of the pit lay in the unexcavated square to the west, an accurate determination could not be made of the shape. But it was very likely circular or oval. Quantities of ash and charcoal in the bottom of the basin may indicate usage as a hearth.

Three narrow mouthed circular storage pits were found in widely separated squares. All of these originated in the compact brown soil of Zone Va or immediately above it, indicating that narrow mouthed storage pits were utilized at the site only for a short period after its initial occupation. A complicating factor in the excavation of one of these pits was added by a subsequent utilization of the pit area. Apparently after the pit had been abandoned, a depression remained, either as the result of settling or only partial filling in of the pit. The depression was lined with yellow clay, thus creating a shallow basin shaped pit over

the top of the original storage pit. All three of the pits had been excavated down to the yellow sandstone underlying the site.

A narrow mouthed pit in Square 50L2 began at about 58 inches below the surface in Zone Va. It was about 33 inches in diameter and 2 feet deep. The east side of the pit wall rose vertically, in contrast to the sharply undercut shoulder typical of narrow mouthed pits. In addition to quantities of ash, shell, burned and unburned sandstone, animal bone, chert flakes, and charcoal, the pit contained two chert projectile point fragments, the base of a chert blade, and a cylindrical piece of fired clay.

A similar pit in Square 50L7 began slightly above 50 inches in Zone IV. The western side of this pit rose vertially, instead of being shouldered. Besides the usual midden, the pit contained two antler projectile points, one Robeson Constricted Stem projectile point, a tubular bird bone head, a fragment of a canine pendant, two shell "hoes", and a cut antler tine.

A pit beginning above 42 inches in Zone Va in Test Pit A on the north slope of the site was found to be 34 inches in diameter and about 38 inches deep. As with the other two narrow mouthed pits, one side was vertical. An antler flaker and a splinter type bone awl were found in the midden filling the pit.

## HEARTHS

### Robeson Hills

Three different forms of hearths were observed, with their distribution ranging over the entire area of the site. Excavation was insufficient to permit any firm conclusion about density of concentration, but data from test pits and visual inspection during bulldozing indicated that there may have been a higher concentration of hearths on the north, west, and south portions of the site, with a less marked occurrence of such features on the east and east central portions of the site.

*Clay Lined Hearths and Clay Floors*

In the lower two feet of the midden, concave basins around 3 feet in diameter and 3 to 6 inches deep had been prepared by placing over an inch of bright yellow clay in a shallow depression in the black midden. No examples of the concave basin type of hearth were noted in the upper 2 feet of midden. The clay was often burned bright red from heat, and quantities of fine ash and a little charcoal were the normal contents. Sometimes a layer of yellow clay extended for an unknown distance beyond the hearth, indicating the preparation of either a working area or house floor around the hearth. Surrounding the clay hearths were heavy concentrations of shell and cracked and burned sandstone. Shell was rare in the hearths, and the shell only occasionally showed evidence of having been burned. Perhaps the fresh mussels were steamed or baked in the hearth on a bed of hot sandstone, with the contents of the hearth subsequently being raked out.

A quotation from Webb and Dejarnette (1942: 238) on the use of clay at the Mulberry Creek Site, Ct°27, in northern Alabama is singularly apropos, since it could just as easily be applied to our findings at Robeson Hills. "Clean clay was often brought on to the shell midden and spread in layers several inches thick to cover an irregular area 6 to 10 feet in diameter. It is difficult to tell whether or not this clay was puddled but it was spread in thin layers from 3 to 6 inches thick, worked to a fairly smooth surface on top, and then fires were built on it. The clay was hardened and usually burned a bright red. These fire areas must surely have been the centers of occupation levels, for all about are ashes, charcoal, and black earth filled with bones of deer, bird, fish and chips of stone and broken flint".

A variant of the clay hearth was noted in the excavation of subsoil refuse pits. Apparently, the shallow depressions left when the pits had been almost completely filled with rubbish were utilized as hearths.

*Sandstone Hearths*

In the upper 2 feet of midden, horizontal layers of burned sandstone were noted. These concentrations ranged from irregular patches covering 2 or 3 square feet to solid concentrations extending beyond the limits of the test pits. The burning indicates use as a hearth, but many problems remain from the present excavations as to interpretation. We still cannot say whether the large areas of sandstone represent accretion as the result of continually extending the hearth area, the raking out and spreading or piling of burned rock from single hearths, or possibly a combination of hearth building and the preparation of working surfaces or house floors although the 1963 excavations at Riverton indicate that the second of the possibilities is the more likely.

*Unprepared Hearths*

Several examples of fires built directly on shell lenses or midden soil were uncovered. No formal preparation seems to have been involved, the presence of the hearth being indicated principally by ash lenses overlying burned shell or dark midden material.

### Riverton

The 34 hearths were spaced rather evenly throughout the midden (Figs. 9 and 10), and no zone seemed to differ from any other zone either in quantity or types of hearths represented. Hearths ranged from fire reddened patches of midden a couple of feet in diameter to rare examples of large clay or sand lined basins of the Robeson Hills type, as much as 5 feet in diameter. In depth, these latter basin type hearths ranged from 3 to 6 inches.

### Swan Island

Swan Island hearths were identical with those of Robeson Hills and Riverton. As usual they ranged from small patches of burned earth to well prepared, large basins of yellow clay (Fig. 6). Hearths were extremely rare in Zones I and II, and were indicated only by three areas of heat discolored midden and ash. No hearths were found in Zones Va and b, and hearths were also rare in Zone IV where they were represented by two examples of the unprepared type.

The greatest concentration of hearths was within Zone III, where thirteen basin shaped hearths of yellow clay and unprepared hearths were distributed throughout Levels 4 to 7. The prepared basin type hearths were from 2 to 2-1/2 feet in diameter and about 6 inches deep. One of these basin hearths had been used repeatedly, with clay and ash accumulating to a depth of 18 inches.

The general quantitiative distribution of hearths would indicate that Zone III may represent a more intensive occupation of the site than the other zones.

## WORKSHOP AREAS

### Robeson Hills

In the 6-12 and 12-18 inch levels of Test Pit D, a concentration of raw materials was found which strongly suggested a "workshop" area. In addition to a flat sandstone anvil with a bone flaking tool resting on it, 10 manos, 2 sandstone abraders, a chopper, a blade, and a projectile point were within the 6-12 inch level. Within the succeeding level were 3 manos, a hammerstone, 3 sandstone abraders, a sandstone file, 2 bone awls, 4 antler falkers, a fragment of a bone pendant, 7 chert projectile points, 5 chert blades and a chert side scraper. A total of 524 flakes of local chert were in the two levels, or 96 of all spalls recovered from the site.

## POST MOLDS

### Robeson Hills

Some 130 postmolds were found in the sterile yellow clay under and adjacent to Test Trench 1, in an area approximately 30 by 40 feet in diameter (Fig. 16). The posts varied in size from 2 to 11 inches in diameter, and penetrated the ground from 2 to 10 inches. An additional 21 postmolds were located in Test Pits I and J, and another group of 12 postmolds was in Test Pit L, indicating that structures were scattered over a sizeable portion of the site.

Some segments of ares would suggest circular or oval houses ranging in size from 7 to 30 feet, with a spacing from 1 to 2 feet between posts. Other alignments of small posts or poles suggest small rectangular structures. Posts were usually set into the ground vertically, although rare occurrences of slanted posts were noted. Some posts were

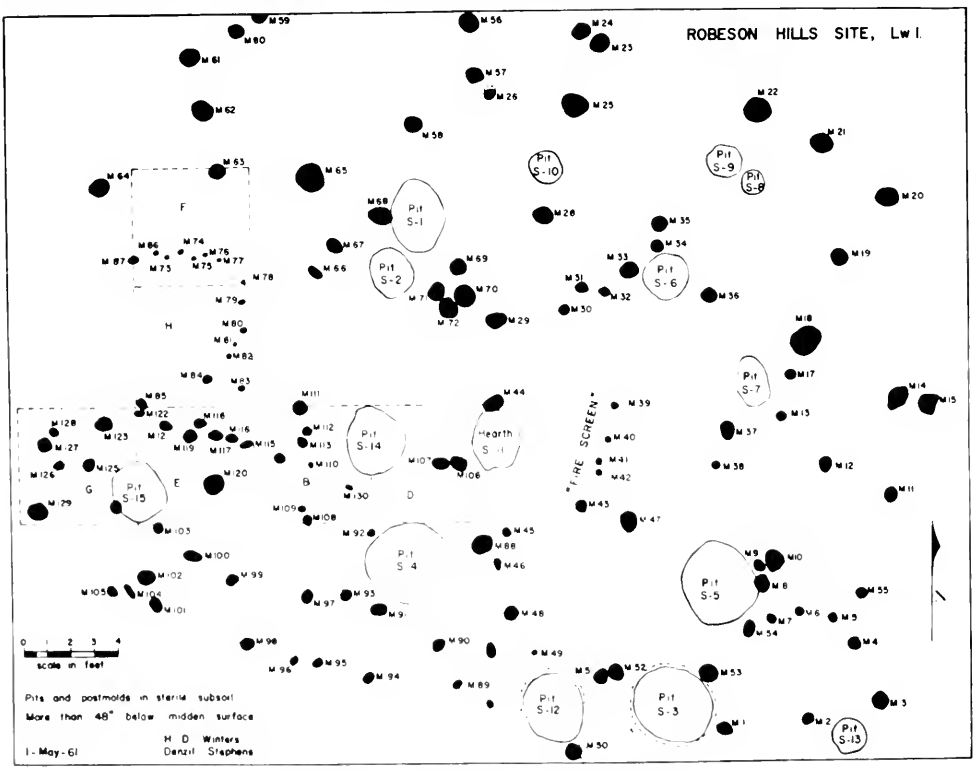


Fig. 16. Postmolds in sterile subsoil, Robeson Hills site.

sharpened, others had a rounded base, and occasionally small pieces of sandstone and other midden debris had apparently been tampped into the hole around the post.

One straight alignment of slanted poles about 3 inches in diameter, had been placed about 3.5 feet from a circular subsoil basin which was 28 inches in diameter by 3 inches deep. The basin (designated Pit S-11 on Fig. 16) was filled with charcoal, and the clay had been heavily burned, indicating a hearth. Thus we might designate the pole alignment as a fire screen.

Fifteen storage or refuse pits were interspersed among the postmolds.

### Riverton

Only seven postmolds were noted in the five squares excavated. Two of these were in Square 0/80, one in 80R5, one in 80R10, and three in 0/10S. Four postmolds were in Level 9, and one each in Levels 7, 12, and 14. Sizes varied considerably, with diameters ranging from 3.25 to 12 inches, and depths from in excess of 2.5 inches to 12 inches. In average dimensions, the seven postmolds were about 6 inches in diameter and 7 inches deep. In shape, five of the post holes were cylindrical and two were conical.

Although many of the molds indicate posts of size suitable for use in house walls, there was no concentration or patterned arrangement which would indicate that the posts had been so used. Six of the seven postmolds occurred in Zone IV, one in Zone III, and none in Zones I and II. Since the occurrence of pits roughly parallels that of the postmolds, perhaps these features together indicate more protracted periods of site occupation while Zones III and IV were accumulating.

### Swan Island

Only three definite postmolds were noted in the excavation. One of these occurred at a depth of about 2 feet in Square 50L7. In size, the postmold was 6 inches in diameter and more than 5-1/2 inches deep. Another postmold in Test Pit A was found in a lens of concentrated shell in Level 7. This postmold was 4 inches in diameter. Total depth could not be ascertained, but it was in excess of 6 inches.

A third postmold, and possibly a fourth, were found along the edge of a sandstone floor in Square 0/50 (vide infra).

## CLAY AND STONE FLOORS

### Robeson Hills

For a discussion of clay floors at Robeson Hills see the preceding section on hearths at that site.

### Riverton

Several areas of yellow clay (other than flood deposited clays) occurred in Zones III and IV in the 1961 excavations. At least some of these were occupation surfaces surrounding hearths, but the maximum extent of the clay floors could not be determined from the limited areas opened in the test pits. Nor could all the clay lenses be checked to determine if they were floors or not.

### Swan Island

Yellow clay floors were found only in the upper half of Zone III. As usual these floors consisted of about four inches of yellow clay which had been spread evenly over the midden. Maximum extent of these clay floors could not be determined in the limited areas open, but one of them was over 9 feet long (Fig. 6).

Numerous patches of yellow clay in the site probably pertained to floors of this type, but two well defined examples were noted in Levels 5 and 6 in widely separated squares.

A very unusual variety of floor was encountered in Level 8 of Square 0/50. The floor had been constructed of two inch thick slabs of the local sandstone. One and possibly two postmolds were noted between the sandstone slabs. Unfortunately, only a corner of the floor projected into Square 0/50, where it ran for 3-1/2 feet along the south wall and 4 inches along the east wall of the square. Such an architectural feature might well be worth thorough investigation in the future. A comparable example was apparently uncovered at Read Shell Midden, since Webb (1950) reports among the features an area 8 feet by 10 feet floored with flat stones.

## BURIALS

### Robeson Hills

Burials were apparently scattered throughout the site (Fig. 3) with no concentration in any area. All burials except one were at least in part exposed by grading operations and the data on burial practices are accordingly far from complete. Skeletal material was usually badly disturbed and crushed, with numerous bones missing. Accurate determination has not been made of sex or age, but we shall summarize the information now available. Approximate locations of the burial pits are shown in Figure 3.

Burial Pit 1 was located about 25 feet south and 10 feet east of Test Pit A. The remaining portion of the pit was about 3 feet long and 2 feet wide, and 4 inches deep. Original depth was not inferrable. The bones in the southern portion of the pit show evidence of burning, but one cannot assume that such charring is evidence of crematory practices. In other areas of the site, charring of bone and shell was clearly the result of heat from super-imposed hearth areas. Orientation and position of the skeletons could not be ascertained, but the pit probably contained the bodies of an adult male and a child.

Burial Pit 2 was located about 30 feet northwest of Test Pit A. About 18 inches of midden had been removed when the pit was noted in the subsoil. The remaining portion of the pit which was about 6 inches deep and 4 feet wide contained the badly crushed bones of two individuals

buried in a semi-flexed position in the pit, with their heads oriented to the NNW. Both burials had been placed on their sides, and were facing each other. Bones of a third burial were recovered in the pelvic region of the other two, but relationship was uncertain. The third burial may have been intrusive, or most of it may have been removed by prehistoric or modern activities. An intrusive hearth covering the northwestern portion of the pit had charred the bones of both burials, and activities connected with the preparation and use of the hearth may account for the missing skull of the westernmost burial.

The bit of a heavily burned antler gouge was found near the southeastern edge of the burial pit, but again the gouge fragment probably belongs with a refuse pit intrusive into the eastern side of the burial rather than in burial association.

Burial Pit 3 was about 30 feet south of Test Pit E. Few data were recovered, except that the remaining crushed bones were in a basin shaped area about 14 inches in diameter and about 2 inches deep.

Burial Pit 4 was found partially intact. A bulldozer had removed the feet, lower legs, and portions of the femora. The burial had apparently been placed in a refuse pit, the top of which began 42 inches below the surface of the ground. The pit had a maximum depth of 8 inches. Midden material was removed rapidly from above the burial, exposing the extended skeleton of an adult male (Pl. 40), which had been placed on its left side, with the skull oriented to the northeast. The hands were folded near the pelvic region. Near the occiput was an antler "spoon" (Pl. 18 a).

Burial Pit 5 (Fig. 16) lay beneath Pit S-22, which was located about 30 feet east of where Test Pit C had been. Pit S-22, which was filled with dark midden, lay over Burial Pit 5, but did not seem to have penetrated it. Burial 5 was in an oval pit about 5 feet 3 inches long, 2 feet wide, and 15 inches deep. Depth below the original midden surface was estimated at 3 to 4 feet, allowing for 2 to 3 feet of bulldozed midden.

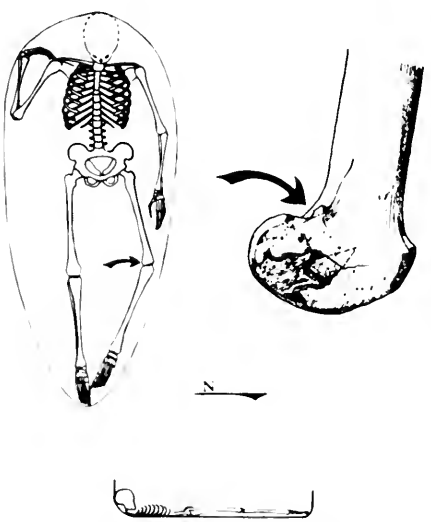


Fig. 17. Sketch of Burial 5, Robeson Hills site.

The skull of Burial 5 had been badly crushed by grading activities, since the burial had been placed in the pit with the head propped against the pit wall, thus raising it above the remainder of the burial, which otherwise was unusually well preserved. orientation of the skull of the extended burial was slightly south of west. The lower right arm was folded back, with the fingers touching the shoulder, and the legs were slightly akimbo, with the toes touching.

Casual inspection in the field indicated that the burial was that of a young adult male. At the neck of the burial was a perforated bear canine. Also in the light brown pit fill was a pebble mano, but the latter could not be said to be in direct association with the burial. Deeply imbedded in the cancellous tissue of the internal tuberosity of the interior condyle of the distal end of the left femur was a projectile point of the type Trimble Side Notched. The angle at which the point had penetrated the lower extremity of the femur would indicate that the individual either had been standing higher than and with his back to his assailant or had been lying on the ground.

Below the south end of the burial pit was Pit S-23 containing mixed loess and organic material, along with some animal bone, a "cupstone", a mano, and a bone "pendant" (Plate 8, c). The pit began at the bottom of the burial pit, and was about 32 inches in diameter and about 10 inches deep. Complete investigation of the latter feature was terminated by the rapid advance of a turnapull.

During final bulldozing of the site, an infant burial was uncovered, all the bones of which were heavily stained with red ochre.

## Riverton (1961)

Burials have been reported as having been washed or plowed out in the northern portion of the site, and during the 1961 excavations, a single fragmentary, plow disturbed burial was removed from the northern periphery of the site. Most of the burial had been destroyed, but enough remained to suggest that it had been fully flexed on its right side, with the head to the north. No trace of a pit was found, but the burial seemed to have been covered with yellow sand. No grave goods were in definite association, but a portion of a deer cannon bone awl was found about a foot away from the upper torso and a bone "gorge" was found in the vicinity of the burial.

The area in which the burials are being exposed in heavily eroded, and the burials are probably assignable to Zone III.

A few pieces of human bone were also found in the midden of the test squares. Three skull and two pelvis fragments of an infant came from Level 4 of Square 0/80. A single phalange was present in Level 1 of Square 80R5. In Level 4 of Square 0/10S., there were two teeth, and in Level 8 of the same square a single tooth was found. Two

incisors were in the midden in Level 11 of Square 10R25S. Perhaps these human remains pertain to burials disturbed by the inhabitants of the site or by the activities of burrowing animals.

In April of 1962, the author and Mr. Lynn Stephens revisited the site during the Wabash Valley survey, and discovered an infant burial exposed by spring flooding. Since the burial, which was located at the north end of the site, had already been disturbed by plowing, little could be ascertained about the mode of interment. All the bones were heavily stained with red ocher, and there were quantities of the same substance in the surrounding soil. No grave goods were found in the area.

## Riverton (1963)

Three complete burials were uncovered in Area A (Fig. 18). In addition, there were miscellaneous fragments of human bone in the plow zone of the same area, presumably the remnants of burials destroyed over the years by plowing. A few red ocher stained bones of an infant were found on the surface southeast of Area X, and fragments of human skull had been plowed out about twenty feet east of the southwest corner of Area X. Both of the latter areas were checked, but the burials from which they came were not located.

*Burial 1.*

This fully flexed burial (pl. 41) has been identified by Mr. Robert Blakely of Indiana University as probably being that of an adolescent male approximately 12-13 years in age. The slightly oval pit containing the burial was very small, being only 34 inches in length and 33 inches in width. The burial pit had been cut through both the yellow clay floor, Feature 9, and the hearth area, Feature 10, but the actual point of origin had apparently been destroyed by plowing. Since the pit was directly beneath the plow zone, a few of the arm and leg bones had been disturbed by the plow and all bones were fragmented, presumably by the weight of farm machinery.

Orientation data are:

General orientation—East south east
Head—East south east
Face—East north east
Rigth arm—East north east
Left arm—East north east
Legs—East south east

The skull, ribs and upper end of the legs had been covered with generous quantities of red ocher, with yellow ocher on the lower part of the legs. In addition there was a lump of limonite, which had been partially coverted to red ocher, on the chest, and an unaltered lump of yellow limonite south of the torso.

A cache of 24 very compactly grouped artifacts drenched with red ocher lay south of the burial (Pl. 42). Included in this pile of items, which may have been together in a bag, were the following items (Pl. 43): 1 unfinished, single tanged, antler projectile point; 2 simple drills, 3 beaver incisor chisels; 1 deer metacarpal awl; 2 Merom projectile points; 1 "greenstone", flake scraper; 2 leaf shaped, chert knives; 1 chert knife fragment; 1 chert strike-a-lite; 5 fragments of worked chert; 1 sandstone file, 1 deer scapula "spoon" or scraper; 1 unaltered bobcat femur; 1 fragment of worked bone; 40 pearl beads, with a fragment of a shell pendant. In general, the cache contents indicate a kit of tools for projectile point manufacturing, fire making, and miscellaneous operations.

In addition there was a fragment of a drilled carapace from a turtle shell rattle (Pl. 43) in the pit wall near the rear of the skull. This fragment had traces of red ocher on its outer surface.

Another Merom point (Pl. 43) was found among the finger bones of the right hand and the ribs. It was not possible to say definitely whether the point came from something held in the hand, or whether it might have been a factor in the death of the individual.

On the right side of the torso, there was a single, unaltered, flat, oval, river pebble (Pl. 43). Its function is entirely problematical, but it seems to have been an intentional inclusion in the grave pit.

The presence of the three Merom points and the typical Riverton blades clearly link this burial to the Riverton culture.

*Burial 2.*

Burial 2 consisted of the cremated remains of a single individual. Sufficient portions of a femur, the pelvis and teeth remained to permit tentative identification as a subadult or adult. It was certainly not that of an infant or child, and probably not that of an adolescent.

The cremation (Pl. 44) had been placed in a nearly circular pit with dimensions of 19 by 20 inches, and a maximum depth of 4 inches. The burial pit had been cut into the clay floor, Feature 13, and was overlain by midden associated with the occupation of the site by peoples of the Riverton Culture.

Cremation had probably taken place elsewhere, since there was little ash or charcoal among the bone, and the small pit would hardly have been suitable for use as a crematory. Cremation had taken place in the flesh, as evidenced by the deep, transverse cracking of the longbones (Binford, 1963a; 1963b; Baby, 1954) and the lack of burning on the articulated lower lumber vartebrae and portions of the pelvis. In general, the calcined bone was thoroughly fragmented, with only the lower torso having any observable orientation, this being in a NNE line.

Copious quantities of red ocher covered the bones, and the only artifact definitely in association was a Merom projectile point which showed the spalling typically associated with the exposure of chert to heat. Probably the point was present with the body during cremation. Whether it represented grave goods or had been present in the body must remain unanswered questions although the rather slight alteration of the surface of the chert suggests that the point was not directly exposed to the crematory fire. If this point, and the point in the rib cage of Burial 1 were the causes of death, there would seem to have been a rather peculiar pattern of demise within the Riverton Culture, particularly when one recalls the presence of a Trimble point in the leg of Burial 5 at Robeson Hills. Such an incidence of internecine strife in a very small burial sample

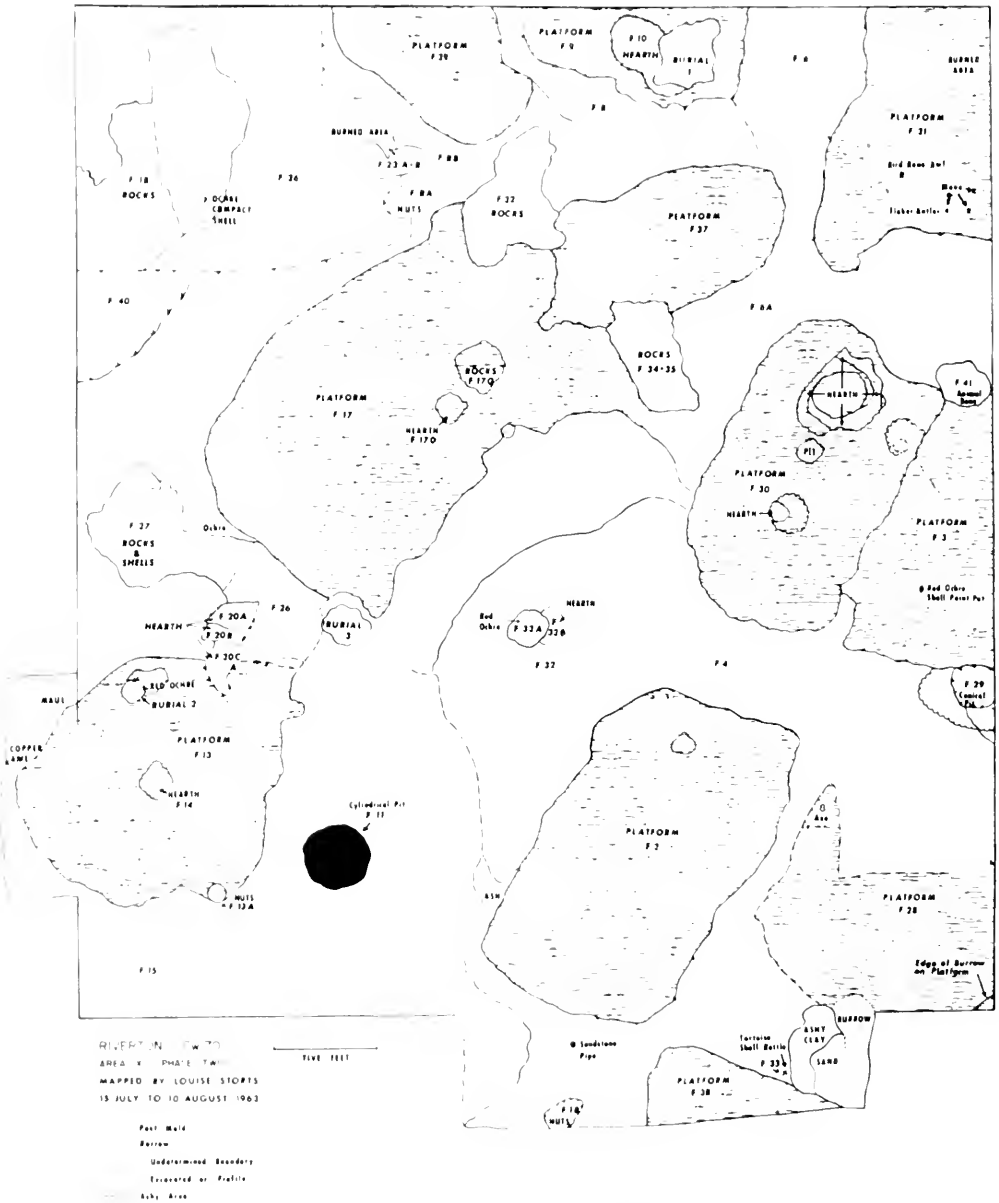


Fig. 18. Plan of Area X, Riverton site (ISM site Cw170).

would indicate a most unstable set of internal relationships within the culture or some rather intriguing pattern of "ceremonial" activity. But the evidence is dubious, and only a much larger population sample could have any meaning.

There was also an unburned claw of an unidentified bird among the calcined bones and a knife fragment in the soil covering the burial. Both may have been accidental inclusions.

*Burial 3*

This flexed burial had been placed in an oval pit which was 32 inches in length, 20 inches in width, and 5 inches deep. The pit had been dug into the sloping midden area, Feature 26, and was overlain by lenses of Feature 16, another midden concentration. Thus, association of the burial with the Riverton Culture is definite.

Orientation data are as follows:
General Orientation–West north west
Head–North north east
Face–West north west
Torso–West north west
Arms–North north east and North north west
Legs–West and West north west

No grave goods were found with the burial (Pl. 45), which was identified by Mr. Robert Blakely of Indiana University as that of a male approximately 50 years in age.

Burial patterns differ at Riverton and Robeson Hills. All burials at Robeson were either extended or only slightly flexed, while all those at Riverton were tightly flexed. Naturally, the burial pits at Robeson were much larger than those at Riverton, but the differential in size may be explained in part by the frequent use of "refuse" pits at Robeson for burials and the general scarcity of such features for re-use at Riverton.

## Swan Island

No burials were encountered in the site, but fifteen human bones were scattered in the midden. By squares and levels these were: Square 0/50, Level 5, 1 femur section, Level 9, 1 tarsal and 6 phalanges; Square 50L1, Level 9, 1 tarsal and 1 infant incisor; Square 50L2, Level 9, 1 phalange; Square 50L7, Level 5, 1 tooth section, Level 9, 1 phalange, Level 10, 1 incisor; Test Pit A, Level 3, 1 skull section.

Eighty percent of the human bones, which may have derived from scattered burials, were found in Levels 9 and 10 in Zones IV and Va.

# 1963 EXCAVATIONS IN AREA X AT RIVERTON

By far the most important results of the excavation of Area X was the uncovering of a series of closely spaced clay platforms with their attendant features (Fig. 18), which provided information permitting a considerable refinement of our interpretation of living arrangements at the Riverton Site. Excavation of the area was facilitated by the excellent stratigraphy produced by the deposition of alternating layers of flood silts and midden debris. The only serious disturbance of the site, other than that of modern cultivation, was that produced by groundhogs, and their burrows could generally be traced quite accurately.

Twelve general categories of features were recorded as follows: Clay floors, midden concentrations, concentrations of carbonized nut fragments, hearths, ash areas, burned clay areas, burned sandstone concentrations, storage pits, miscellaneous pits, artifact caches, red ocher concentrations, and sand deposits.

## Clay Floors (Pl. 46 and 47)

A total of ten clay floors were discovered in Area X, five of which were completely excavated, and five only partially, since they lay mainly beyond the excavation area (Fig. 18). Those completely excavated were Features 2, 13, 17, 30, and 37, while those partially excavated were Features 9, 28, 31, 38, and 39. Feature 36, a mottled clay surface, may also have been part of a clay floor, but little excavation was attempted on the latter feature which was not discovered until near the end of the season.

Structurally, all floors were the same, consisting simply of a platform of yellow clay, or in the case of Feature 38, sand and clay, placed directly upon the midden of the site. The clay was rarely more than 4 to 6 inches thick. Occasionally, there was evidence for patching of the floor, probably to replace portions damaged by erosion. For example, the south edge of Feature 31 had a number of lenses of clay separated by what seemed to be brownish traces of organic material. But, it would be impossible to say from the available evidence whether the patching occurred at intervals during a season's occupation or over a period of several years.

In shape, the floors were generally rectanguloid, but, as in the case of Features 17 and 37, oval patterns were also followed. Regardless of shape, all of the platforms were rather small (Table 53). But actually, these clay platforms

TABLE 53

DIMENSIONS AND AREA OF CLAY FLOORS AT THE RIVERTON SITE

| Feature | Length | Width | Square Feet |
|---|---|---|---|
| 2 | 18.5 feet | 11.0 feet | 203.5 |
| 13 | ca. 13.0 feet | 12.0 feet | ca. 156.0 |
| 17 | ca. 20.0 feet | 13.0 feet | ca. 260.0 |
| 30 | 14.2 feet | 8.4 feet | 119.3 |
| 37 | 10.5 feet | 6.5 feet | 68.3 |

are not much smaller than the rather substantial houses found at other Archaic sites, and are larger than those reported by Webb and DeJarnette (1942: 238) at Mulberry Creek. For example the rectangular Archaic houses at Lamoka were only sixteen feet long and eleven to thirteen feet wide (Ritchie, n.d.), with areas of 176 to 208 square feet. And the patches of laminated refuse cited by Ritchie (1932: 87) as indirect evidence of structures at Lamoka Lake were only 12 by 18 feet in size, with an area of ca. 216 square feet. At Jaketown, the single oval house pattern had a diameter of approximately ten feet, with an area of

some 80 square feet (Ford, Phillips, and Haag, 1955). However, the circular houses at Wapanucket No. 6 (Robbins, 1959) had average diameters of 35 feet, with floor areas in excess of 900 square feet. Obviously, there was considerable variation in late Archaic times in both house styles and sizes. At present, there are not enough data to assess the meaning of such variations, even though Archaic structures are known from many sites in eastern North America. That is, do the variations reflect absolute cultural differences, variations related to the functions of the sites, or combinations of these two?

And we certainly cannot answer questions about style and function for Riverton living accomodations as yet, although adequate excavation of the Riverton Culture middens, with their well preserved, easily distinguishable, and sharply demarcated features would provide an admirable opportunity for investigating such problems. But with only our present data we can note the following: Some alignments of postmolds at Robeson Hills (Fig. 16) suggest small rectangular structures with about the same area as the clay platforms of Riverton. But, at Riverton, there is no evidence of a superstructure on or around the platforms. The few postmolds associated with these platforms (Fig. 18), could have served no function beyond that of anchors for a lean-to and/or storage facilities. We emphasize that had postmold patterns been present, they could have easily been detected in the yellow clay of the floors and with somewhat more difficulty in the lensed midden adjacent to the floors. The search for postmolds was intensive, and they simply were not there. It would seem fairly evident that protection from the elements was not a major consideration at Riverton, while rather substantial structures were the rule at Robeson.

For a valid interpretation of the clay platforms at Riverton, the temporal factor must also be considered. Obviously, all the platforms were built on the rapidly accumulating midden within a short time of each other. That is, all of these platforms lie within a foot below the present ground surface. But there were apparently slight differentials in time of construction. Feature 37 is probably slightly earlier than the other platforms, since it was overlain by several inches of the midden deposits, Features 6, 6A, 7 and 8. Feature 9 is later than Feature 39, since the former feature lies on the midden deposit, Feature 8, which in turn overlaps and covers the edge of Feature 39. Feature 36, a putative clay floor, also overlies Feature 39. Features 2, 30, and 31 should be roughly contemporaneous, since all are overlapped by the upper portion of the conjoined midden deposits, Features 4 and 6A, the lower portions of which run under the platforms. Features 9, 13, 17, 28, and 38 should all be nearly contemporaneous, since they lie directly beneath the plow zone, with little evidence for superposition of midden deposits such as Features 4, 6, 6 A, and 8. (Such evidence may have been obliterated by plowing, however.) In actuality, we should be very surprised if any of the platforms differed in age by more than a few years in view of the small amount of overburden separating any of the clay platforms from one another. But such a conclusion is little comfort, since we still do not know whether the occupations of the platforms coincided in part or whether there was a sequential preparation and use of the platforms, nor do we know what sort of social units were involved in their occupation. But if we are correct about the rectangular shape and size of some of the more permanent structures at Robeson, and can assign a primary family to these very small living units, then it may be that a clay platform at Riverton also corresponds to a primary family. Furthermore, at Riverton the platforms seem to have been aligned in orderly rows rather than being scattered randomly. Only extensive stripping of the platform area can demonstrate whether such a pattern of alignment actually exists, or whether the seeming order is a vagary forced upon the observer by the small area uncovered. Hesitantly, then, we suggest that a clay platform corresponded to the living accomodations of a primary family living in close association with an unknown number of other primary families on nearby platforms, which were possibly arranged in an orderly alignment.

As for the sorts of activities that were taking place on and around the platforms, there are the following items of evidence. On Feature 2, there was a cloudblower pipe, a chopper, and a Robeson (?) point. Near the edge of the platform was a wolf canine pendant. Cutting into a corner of the platform was a cache of ten manos. Extensive quantities of charred and crushed nut shells (Feature 1B) were found off the south side of the platform. On Feature 31, the artifacts were a turkey tarsometatarsus awl, a Riverton point fragment, two simple manos, one cut antler section, with another such section in the floor. On Feature 31, a mussel shell paint cup was found near a postmold, an antler flaker in a postmold, and a cut section of antler in another postmold. On the surface of Feature 28, there was a side-notched, limonite axe. A single porcupine incisor chisel occurred on Feature 13, which also had penetrating into its surface a small pit (Feature 13A) filled with charred nut shells. Near both Features 31 and 9, there were also small concentrations of nut shells (Feature 8A and a small area within Feature 6). Adjacent to Feature 17 was a burned sandstone concentration, which was probably earlier than Feature 17, however, since it was contained within the midden deposit, Feature 17A, and was overlain by another midden deposit, Feature 25. Within the sandstone concentration, was a group of artifacts consisting of 2 antler flakers, 4 deer metacarpal awls, 1 grooved sandstone abrader, 1 beaver incisor chisel, 1 grooved limonite axe, 3 Merom points, 2 Riverton point fragments, and a fragment of worked chert. These items had all the appearance of being a concealed cache of tools.

The artifacts in the house platforms area do not indicate any particularly specialized sort of activity, but are instead the sort generally associated with routine household activities and fabricating or processing operations. In fact, the entire inventory from the site conveys a similar impression. Only the flutes, pipes, the turtle shell rattle, and the manufacture of red ocher (Feature 32A) give much evidence for ceremonial activities beyond normal burial procedures. Nor are there many indications of very specialized secular activities.

One obvious way in which to clarify the nature of the activities associated with the platforms would be to con-

TABLE 54

DISTRIBUTION OF ARTIFACTS CONNECTED WITH BASIC SUBSISTENCE AND SURVIVAL ACTIVITIES AT THE RIVERTON SITE BY AREA OF EXCAVATION

| | General Utility | Weapons | Fabricating, Processing | Domestic | Woodworking |
|---|---|---|---|---|---|
| Area X | 10% (13) | 29% (39) | 43% (58) | 15% (21) | 2% (3) |
| Test Pits | 28% (44) | 37% (83) | 37% (81) | 6% (14) | |

Note: Number in parentheses indicate number of artifacts. Turkey tarsal-metarsal "awsl" have been included with domestic equipment, and incisor chisels with fabricating and processing, as nocking tools, rather than woodworking.

trast the artifacts from Area X, excluding the plow zone, with those from the general midden of the test pits, excluding surface material and artifacts from the mixed levels 1 and 2. In respect to general categories connected with basic subsistence and survival activities, the following results emerge in Table 54.

Using categories pertaining to supra-subsistence activities, the pattern obtained is shown in Table 55.

And breaking down fabricating and processing Tools into components gives the pattern shown in Table 56.

Comparing only the general categories of artifacts associated with subsistence activities and those of a supra subsistence nature, the obtained results are shown in Table 57.

Before we discuss the significance of the variations we must issue a *caveat lector*, since there are potential sources of error in the results:

1) The test pits were excavated by screening, Area X by hand troweling, with some screening of features. Recovery of small chert items, such as blades, scrapers, projectile points, and micro-perforators may not have been complete. We should not expect any error for bone artifacts of any sort, however, in either excavation.

2) The propriety of including the cache of manos from a house platform in Area X might be questioned. But it can be argued that their evident usage points to intimate association with the activities carried out within Area X.

3) Identification of all of the antler tines included as flakers from Area X was not certain.

4) Some of the material from the test pits probably derives from house platforms as well as general midden deposits.

With these cautions, we shall interpret the data as follows: Compared to the test pits both domestic and manufacturing activities are somewhat more important around the living platforms than activities involving general utility implements (knives and scrapers, primarily) and weapons. Although the relative proportions of subsistence and supra-subsistence artifacts are almost identical for both units, specific categories within the latter group do show some variation. Ceremonial objects are commoner around the platforms, than in the general midden, perhaps reflecting storage patterns rather than the specific locus of any particular ritual. Games seem to have relegated to areas away from the actual living quarters, although such a conclusion is dubious in view of the very small sample available. The differences in the percentage of ornaments cannot readily be explained. In the case of specific categories of fabricating and processing tools, a major emphasis on chert working (flakers) and the working of small pieces of wood (nocking implements) is indicated for Area X. Together, these may indicate that the fabrication of weapons occurred primarily around the house platforms, since projectile points are the only chipped implements occuring in any quantity at the site, and incisor chisels have been interpreted as having the notching of weapon shafts as one of

TABLE 55

DISTRIBUTION OF ARTIFACTS PERTAINING TO SUPRA-SUBSISTENCE ACTIVITIES AT THE RIVERTON SITE BY AREA OF EXCAVATION

| | Ornaments | Ceremonial | Recreational |
|---|---|---|---|
| Area X | 56% (10) | 39% (7) | 5% (1?) |
| Test Pits | 81% (21) | 4% (1) | 15% (4) |

Note: Numbers in parentheses indicate number of artifacts.

TABLE 57

DISTRIBUTION OF ARTIFACTS ASSOCIATED WITH SUBSISTENCE AND WITH SUPRA-SUBSISTENCE ACTIVITIES AT THE RIVERTON SITE BY AREA OF EXCAVATION

| | Subsistence Artifacts | Supra-Subsistence Artifacts |
|---|---|---|
| Area X | 134 (88%) | 18 (12%) |
| Test Pits | 219 (89%) | 26 (11%) |

TABLE 56

DISTRIBUTION OF ARTIFACTS CONNECTED WITH FABRICATING AND PROCESSING ACTIVITIES AT THE RIVERTON SITE BY AREA OF EXCAVATION

| | Perforating | Abrading | Weaving | Flensing | Nocking | Flaking |
|---|---|---|---|---|---|---|
| Area X | 33% (19) | 5% (3) | 12% (7) | 2% (1) | 10% (6) | 38% (22) |
| Test Pits | 66% (57) | 12% (10) | 13% (11) | 1% (1) | 2% (2) | 6% (5) |

Note: Numbers in parentheses indicate number of artifacts. Turkey tarsal-metatarsal "awls" have been included with domestic equipment, and incisor chisels with fabricating and processing, as nocking tools, rather than woodworking.

their important functions. Activities involving perforating and abrading tools (grooved abraders, presumably for sharpening or manufacturing the perforators) obviously tended to take place away from the living area. Note that the proportions of these units of fabricating and processing tools are the least subject to sampling error of the three analytic groupings, since chert implements are a very minor item, manos are not included, and the identification of flakers is the only unsatisfactory element within the functional category as a whole.

But it does seem that activity areas can be defined for the site, particularly when one remembers that other data are suggestive of such differential usage. We have noted earlier that Robeson gouges are limited in surface collections to a small area on the southwestern corner of the site, and that the chipped axes have been encountered only on the surface and in the excavations at the north end of the site. We predict that with controlled excavations over the entire site area living and working arrangements could be defined with considerable precision.

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The presence of occasional postmolds on the platforms has already been mentioned. In addition, one or more unprepared hearth areas (Features 10, 14; 17B, C, D, E, F) were a standard feature of all the completely excavated platforms (Fig. 18). That these hearths were used intensively and repeatedly is evident from the reddening of the underlying clay for 2 to 3 inches below the surface. Hearth areas were generally quite clean, with little ash or burned sandstone in or around them. Apparently, housekeeping standards tended towards those approved today, at least in respect to the surface of the platform itself. However, tidiness and sanitation seem to have stopped at the platform edge, with refuse disposal being handled with a minimum of effort. After all, a few more aromas in what must have been an interesting melange of ripening mussel shells, aging meat, and decaying vegetable products, would have had little effect on the general atmosphere of the area. But the platforms would have provided a minimal haven for the performance of household duties, manufacturing activities, and repose.

Of course, not all hearths were on the clay platforms. For example, the hearth, Feature 20, was superimposed on the midden area. Feature 26, the double hearth, Features 23 and 23A were superimposed on the midden deposit, Feature 25 North, the hearth, Feature 24, on the midden, Feature 25, the hearth, Feature 32B was in the midden area. Feature 32 and another hearth was contained within the south end of the midden deposit, Feature 21.

As indicated previously, there were dense concentrations of midden around the platforms. Many of these which were given separate feature numbers at the time of discovery were found to be linked on excavation. Thus, Features 4, 6, 6A, 8, 8B and 41 were all part of a continuous system around the living platforms, Features 2, 30, 31 and 9. Features 16 and 26 represented a continuous distribution of midden beginning in a level area and sloping down a natural declivity between the clay platforms, Features 13 and 17. And the midden concentration, Feature 25, was superimposed on 17A, with the former overlain by the midden deposit Feature 21. Feature 32, a natural depression underlying, in part, the clay platform, Feature 2, was filled with alternating lenses of midden and flood silts containing impressions of leaves and other vegetable material. Feature 32 was probably continuous with the lower portion of the midden deposit, Feature 1B on the south side of the platform, Feature 2.

The contents of these midden areas were remarkably homogeneous. All consisted of a number of lenses of organically stained soil and sterile sand or clay, with the latter undoubtedly derived from flooding. As an example of the contents of a typical midden area we shall list the contents of Feature 6A. (Analyses of the faunal content of all features are on file at the Illinois State Museum.)

Faunal material: Mussels (sample saved, but not analyzed or counted); 288 unidentifiable large mammal bones, 6 unidentifiable bird bones, 12 deer, 2 beaver, 2 elk (1?), 17 raccoon (1?), 4 turkey (3?), 8 turtle sp., 8 box turtle, 1 Pseudemys-Graptemys-Chrysemys group of the turtle, 1 snapping turtle, 1 soft shelled turtle, 6 channel/blue catfish, 1 catfish sp., 1 gar.

Artifacts: Chert flakes, 1 cut gar jaw, turkey tarsometatarsus (?) awl, 1 splinter awl, 1 tubular bird bone bead, 5 antler tine flakers, 3 filed antler tine fragments, 4 cut deer antler sections, 1 pebble mano.

Another important type of feature found around, or occasionally on, the clay platforms are the concentrations of burned and fragmented sandstone, a typical deposit of which was found to weigh in excess of 60 pounds. In addition to the sandstone, which may occur without other associations, there may be considerable amounts of ash along with miscellaneous animal bone, mussel shell, and artifacts. At first, it was thought that these might be some sort of area for baking or cooking foods. But on closer examination, it was found that these features were very irregular and without any sharply defined limits, with the rock simply becoming more widely spaced on the peripheries of the main concentration. A more likely explanation of these features (Nos. 15, 17G, 18, 19, 22, 27, and the conjoined pair 34 and 35) is that they represent debris cast out from the hearth areas on the clay platforms, i.e., the residues from the hearth and from stone boiling. Perhaps they were concentrated in specific locales so as to make them readily available for re-use. The size of these features varies considerably, with Feature 18 having dimensions of ca. 8.5 x 7.5 feet and a depth of 8 to 9 inches, and Feature 19, dimensions of only 2.3 x 1.8 feet and a depth of only 2 to 3 inches.

We list the contents of two of these burned sandstone concentrations:

Feature 22:

Faunal material: 32 unidentifiable large mammal bones, 1 unidentifiable fish bone, 5 unidentifiable bird bones, 3 deer, 1 porcupine, 1 opossum, 1 raccoon (?), 2 snake, 2 snapping turtle, 1 bowfin. (None burned.)

Artifacts: None

Feature 18:

Faunal material: 181 unidentifiable large mammal bones, 9 unidentifiable fish bones, 12 unidentifiable bird bones, 40 deer (7?), 2 raccoon, 1 mink, 5 squirrel sp., 5 gray squirrel, 3 opossum, 1 cottontail, 1 porcupine (?), 1 gray fox, 1 elk, 1 woodchuck, 5 turkey (1?), 3 Pseudemys-Graptemys-Chrysemys group of turtle, 5 box turtle, 8 turtle sp., 1 snapping turtle, 8 channel/blue catfish, 1 Pylodictis, 2 catfish sp.

Artifacts: 2 cut antler sections, 2 splinter awls, 1 triangular chert blade, 1 leaf shaped blade, 1 unclassified blade fragment, 1 shell paint cup, 1 simple shuttle, 1 raccoon (?) canine pendant, 1 Riverton point fragment.

Pits were quite rare in Area X. Of the four pits, only one was a storage pit (Feature 11). This feature was oval, with vertical side walls and a flat bottom. The pit, which had dimensions of 39 by 36 inches, had a filling of sandy brown clay down to about 7 inches below the mouth. At this point there was an undisturbed plug of yellow clay about 2 inches thick. Below the plug, there was more brownish clay and an ash lens just below the clay plug. Finally, at the bottom there was about an inch of organically stained soil (saved but not analyzed). Near the rim of the pit, there was a section of a snapping turtle carapace, which may have been used as a scoop, perhaps in excavating the pit. In the brown clay above the plug, there were 13 unidentifiable large mammal bones, 3 unidentifiable fish bones, 8 unidentifiable bone fragments, 3 deer, 1 beaver, 6 frog sp., 2 turtle sp., 1 Pseudemys-Graptemys-group, 1 Robeson (?) projectile point, and 1 cut antler section. In the brown clay below the yellow clay plug, there were 8 unidentifiable large mammal bones, 2 unidentifiable fish bones, 1 unidentifiable bird bone, and 1 deer bone. At present, the nature of the material stored in the pit and the reason for its remaining unopened must remain mysteries.

Another pit (Feature 29) was a circular, sub-conical pit, with a diameter of 3.9 feet and a depth of 18 inches. The entire pit was filled with fine, gray ash, apparently mixed with some clay. There was also a heavy concentration of ash along the edge of the pit, but no indication that there had ever been a fire in or around the feature. The only other contents of the pit were 4 unidentifiable large mammal bones and 1 deer bone. A comparable example, although cylindrical and much deeper, was found in Square 80R10 during the 1961 season. Denzil Stephens (personal communication, 1961) also reports having noted a large conical, ash filled pit at the Robeson Hills site after excavation had ceased. But, we are no closer to defining the function of these pits than we were in 1961, and can only repeat our previous suggestion that they may have been connected with hide processing or the leaching of vegetable materials. (Perhaps a fairly simple chemical analysis of the contents could resolve the issue.)

The third "pit" (Feature 13A) was simply a 10 by 12 inch oval cylinder, with vertical sides and a depth of 8 inches, in the clay platform, Feature 12. Within the cylindrical depression was a quantity of carbonized nut fragments. The feature does not lend itself well to interpretation.

A fourth example is a depression in a clay platform (Feature 30), but it was so small and so shallow that it scarcely qualifies as a pit in any formal sense.

The final example (Feature 12) may or may not have been a pit. The south half of this feature was definitely a groundhog den, but the north half contained a large quantity of burned sandstone, which may simply represent an accumulation of rock shoved aside by the groundhog during excavation of the den. At any rate, the feature is intrusive into the clay floor, Feature 13, whether it be the handiwork of lower or higher fauna. And since its origin must have been in the plow zone, it certainly cannot be specifically assigned to the Riverton Culture.

In earlier discussions, we noted the presence of caches of artifacts, and we refer the reader to the sections in Chapter IV on manos, turtle shell rattles, and features around clay floors, where there is a discussion of the contents of Features 1A, 27, and 33. Nor shall we discuss Feature 32A here, since it is covered under the appropriate topic of red ocher on another page.

This leaves us with a few anomalous features: Feature 3, an area of sandy clay, which on further investigation turned out to be a composite feature including portions of Features 17, 30, and 31; Feature 5, an area of burned clay immediately beneath the plow zone; and Feature 7, an ashy deposit, also immediately beneath the plow zone. We suspect that the latter two are remnants of features destroyed by plowing. One area, designated Feature 40 (Fig. 18) consisted of almost pure sand. Lack of time prevented exploration of this area, which underlies portions of Features 18 and 36, but it is probably a flood deposit in a natural depression.

To recapitulate, our impressions of Area X from the foregoing and other data are as follows:

Area X was primarily a "residential" zone, with clay platforms of a size suitable only for accomodating a single primary family. These platforms may have been arranged in an orderly alignment, rather than in haphazard dispersal. Little attempt was made to provide permanent shelter, but a few posts were set up on the platforms, probably to provide supports for lean-tos and/or storage facilities. Activities on and around the platforms, with their unprepared hearths, consisted of routine household tasks and fabricating and processing of raw materials. In addition, a number of items of ceremonial equipment were located in the area of the house platform. The diverse representation of functional categories (General Utility, Weapons, Fabricating and Processing Implements, Domestic Equipment, Woodworking Tools, Ornaments, Ceremonial Items, and, possibly, Recreational Equipment), however, make manifest that the site as a whole as much more than a hunting or gathering camp. Instead, the wide range of activities indicated and the living facilities would point to the site's being a base camp.

Stone boiling was apparently a common cooking technique for the preparation of mussels and deer, which were supplemented by a variety of small game, birds, fish, and turtle (Appendix I). Vegetable resources were also utilized as evidenced by the presence of charred fragments of walnut, hickory nut, hazel nut, butternut, acorn, and pecan in the midden (Richard Yarnell, personal communication, 1963).

There is no substantial evidence from Area X, or any site of the Riverton Culture for the domesticated dog, since the four bones of *Canis* sp. from these sites cannot be assigned either to wolf or dog.

Lack of substantial housing, rarity of storage pits, and complete absence of ducks or geese suggest that Area X was occupied during a season of the year when the climate was mild, food was readily available, and migratory birds were not passing through the Wabash Valley. Accordingly, our preliminary interpretation is that Riverton was a base camp occupied during the summer and early fall, and after the spring floods which would have inundated the site annually, a proposition that will be discussed at great length in Chapter VII.

Chapter VI

# Cultural Affiliations of the Central Wabash Valley Shell Middens

## MINOR OCCUPATIONS

Evidence for minor occupations by groups of the "Wabash" Archaic, Early and Middle Woodland, and Late Woodland or Mississippian Cultures is summarized in Table 58. Quantitatively, the artifacts would indicate only very transitory usage of the sites by small groups of the aforementioned cultures while engaged in hunting or gathering activities.

"Wabash" Archaic is probably closely related to such Archaic manifestations as Indian Knoll, some of the Archaic components at Faulkner and the Ferry Site, and numerous sites in the Cache River Valley. The affiliations, thus, are with the Lower Ohio Valley Archaic, rather than the northern Mississippi Valley Archaic as typified by Modoc, Graham Cave, and Raddatz.

Where stratigraphic position could be determined at Robeson Hills and Swan Island, the artifacts of the Wabash Archaic were associated only with the midden material at the very bottom of these sites. The absence of Wabash Archaic at Riverton, with the possible exception of a V-Bit end scraper, is not surprising, since the exposed location on the T-0 is not the sort of locus that would have fitted into the rather decided ideas of groups of this culture about the proper mode of life as reflected in their settlement patterns.

"Early Woodland" occupations were attested by the presence of "Fayette Thick" pottery and four Adena Stemmed points, both of these again indicating cultural affiliations with the Lower Ohio Valley area. All of the Fayette Thick sherds were surface finds and the five Adena points were in the upper six inches of the Riverton Site, and the 6-12 inch level of Robeson Hills. Early Woodland occupations were obviously very late in the accumulation of the midden deposits. [Since Adena points apparently appear in Archaic context in Tennessee sites (Lewis and Kneberg, 1959), the Adena points may represent a minor occupation by a very late "Archaic" group.]

Middle Woodland occupations were rather more sparsely represented than Early Woodland, being indicated only by five dubiously identified cordmarked sherds, a sherd tentatively identified as Havana Cordmarked, and two Lowe Flared Base points (Winters, 1967). All of these were either surface finds or within the upper six inches of midden, with the exception of one Lowe point from Swan Island and the Havana sherd from Riverton which were found in ground hog burrows.

Late Woodland and Mississippian occupations are also present, but a total of 34 artifacts from the three sites is still not very impressive quantitatively. As with the preceding minor components, ceramics, blades, and points were concentrated on the surface and in the upper one foot of the midden. The late Woodland ceramics cannot be equated with any particular areal manifestation, but the Mississippian sherds probably pertain to one of the Wabash Valley variants of the Tennessee-Cumberland Tradition of the Mississippian Pattern.

## THE RIVERTON CULTURE

In evaluating the temporal position of the Riverton Culture, we have used both relative and absolute dating, although the latter would have sufficed, since it seemed profitable to explore typological comparisons as a technique

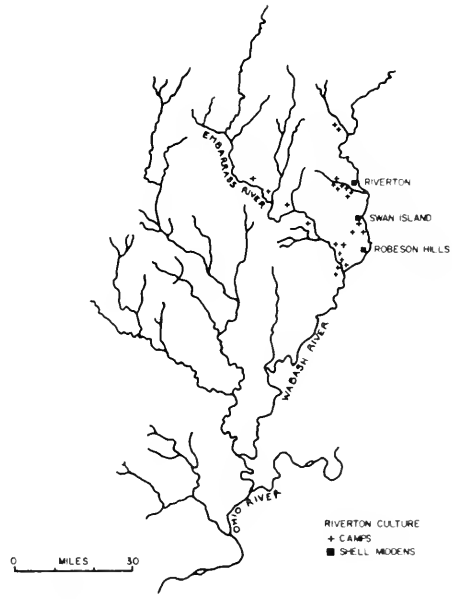


Fig. 19. Distribution of the Riverton Culture.

for dating the thousands of Archaic sites in the Midwest for which there is little chance of obtaining materials suitable for use in absolute dating by currently available methods.

## Relative Dating

1. Artifacts of the Wabash Archaic occur at the bottom of the middens. The presence of such a point type as Saratoga Broad Bladed at the junction of the midden and the sterile subsoil at Robeson Hills would indicate that the Wabash Archaic occupation could not have been much earlier than 3000 B.C.

2. "Fayette Thick" pottery was present only at Robeson Hills and Riverton, where it was found only on the surface. The context of these sherds would suggest a terminal date for the occupation of the sites by peoples of the Riverton Culture between 2000 and 1000 B.C.

3. Adena Stemmed points were found in the plow zone at the Riverton Site and in Level 3 at the Robeson Hills Site, Adena Stemmed apparently appears in western Tennessee as early as the Big Sandy Phase of the late Archaic (Lewis and Kneberg, 1959). Thus the upper midden could not have been deposited much before 2000 B.C.

4. Projectile points which are diagnostic of the Riverton Culture, such as Robeson Constricted Stem, Merom Expanding Stem, and Trimble Side Notched, have form and preparation characteristics which may relate them, respectively, to the type clusters Boaz Constricted Stem and Tamms Flared Base, and possibly, to the type Faulkner Side Notched. Boaz points appear late in the Archaic and early in Woodland contexts in the upper Tennessee, lower Mississippi Valley, and southern Illinois. Boaz Constricted Stem points are also clearly represented among the "undifferentiated" types, which Lewis and Kneberg indicate as markers of their Big Sandy Phase (Lewis and Kneberg, 1959: 169, Fig. 1). Tamms points also do not appear until late in the Archaic, at least in the Midwest, with some types reaching quantitative maxima during Early and Middle Woodland times. Some types of side notched points, of course, appeared very early in the Archaic, but Trimble points may be considered to be late in the Archaic on the basis of such attributes as high incidence of triangular cross sections and low incidence of basal and side grinding (Winters, unpublished research). These latter attributes are also typical of Robeson and Merom points. Again, a time range is indicated for the Riverton Culture from before 2000 B.C. to not much later than 1000 B.C.

5. Houses or "leantos" are common in late Archaic sites, but so far there is no evidence for such structures prior to 3000 B.C. In summary, evidence for late Archaic structures is known from the Carmen I site in the Cache River Valley of Southern Illinois (Winters, 1958), the Alger and Kubinski sites in the Illinois River Valley (Bareis, n.d.; Bluhm, n.d.), the Oconto site in Wisconsin (Wittry and Ritzenthaler, 1956), the Wapanucket No. 6 site in Massachusetts (Robbins, 1959), the Lamoka site in New York (Ritchie, n.d.), sites of the Big Sandy Phase in Tennessee (Lewis and Kneberg, 1959), the Jaketown site in Mississippi

TABLE 58

EVIDENCE FOR MINOR CULTURAL COMPONENTS OF THE CENTRAL WABASH VALLEY SHELL MIDDENS

| | Wabash Archaic | Woodland | Late Woodland or Mississippian |
|---|---|---|---|
| Robeson Hills, Lw1 | 1 Faulkner Side Notched projectile point<br>1 "Marcos" projectile point<br>2 Saratoga Broad Bladed projectile points<br>1 Bi-lunate atlatl weight<br>1 Metate | 3 "Fayette Thick" sherds<br>2 Adena Stemmed projectile points | 3 Triangular blades<br>5 Mounds Stemless projectile points<br>1 Micro-drill? |
| Riverton, Cw170* | 1 V-bit end scraper? | 2 "Fayette Thick" sherds<br>1 Havana (?) Cordmarked sherd<br>4 Cordmarked Middle or Late Woodland sherds<br>3 Adena Stemmed projectile points<br>1 Lowe Flared Base projectile point<br>1 Lamellar flake end scraper<br>1 Leaf shaped blade | 1 Plain Late Woodland sherd<br>6 Mounds Stemless projectile points<br>5 Plain Mississippian sherds<br>1 Triangular blade |
| Swan Island, Cw319 | 3 Unclassifiable projectile point fragments | 2 Middle Woodland? cordmarked sherds<br>1 Lowe Flared Base projectile point | 2 Plain Lake Woodland? sherds<br>1 Late Woodland? cordmarked sherd<br>5 Plain Mississippian sherds<br>1 Mounds Stemless projectile point<br>2 Corner notched projectile points<br>1 Triangular blade |
| Total | 16 | 21 | 34 |

*1961 and 1963 excavations combined

(Ford, Phillips, and Haag, 1955), the Lake Springs site in northeastern Georgia (Joseph R. Caldwell, personal communication), and the Craig site in northeastern Oklahoma (Shaeffer, 1960).

6. "Cloud blower" pipes were found at Robeson Hills in a pit beginning near the bottom of the midden, at Riverton in Levels 1 and 6, and on the edge of Feature 63-1, and have been reported from the surface at Swan Island. Such pipes appear late in the Archaic zones of the Green River and Tennessee River shell middens. Lewis and Kneberg (1959) report pipes of the cloudblower type for their Big Sandy Phase but not for the Eva and Three Mile Phases, suggesting a date not earlier than 2000 B.C. The association of cloudblower pipes with Glacial Kame sites (Cunningham, 1948) suggests a temporal position betwen 1500 and 500 B.C. (Ritzenthaler and Quimby, 1962).

7. In Illinois, full grooved axes are the dominant form south of the Kaskaskia drainage, but three-quarter grooved axes predominate in the Illinois River Valley (Winters, unpublished research). While the three-quarter grooved axe may have been used well into Middle Woodland times in the Illinois River Valley (Griffin, 1955), the full grooved axe of the southern zone is apparently replaced by the celt about the time of the introduction of pottery. Thus, full grooved axes, in the Wabash shell middens if they are really an element of the Riverton Culture, would indicate both a mid-southern cultural orientation and a pre-Woodland temporal placement.

8. Gouges of the Robeson type are known from the Archaic zones of the shell middens of the Tennessee River in northern Alabama and Tennessee and the Parrish Site in Kentucky, where they are probably late in the Archaic. While these gouges are common in the central Wabash shell middens, only one other example of the Robeson Gouge is known from Illinois. The latter is a specimen from an unknown component of the Fisher site.

Simple antler gouges would seem to have less diagnostic significance, since they have been reported from sites ranging from late Archaic in the Tennessee River Valley to the Fort Ancient Culture in Ohio.

9. Grooved sandstone "sinkers" resemble similar items from the shell middens of Kentucky and Alabama, where they are probably late Archaic in age.

10. Micro-perforators can be assigned to the latter portion of the Archaic at Jaketown, Poverty Point, and, possibly, Modoc.

We thus feel that the Riverton Culture cannot be earlier than the latter portion of the Archaic or later than Early Woodland, inasmuch as the preceding traits place limitations on the range of temporal positioning. Since the evidence for an Early Woodland placement is very slight indeed, we assign the Riverton Culture to the latter part of the Archaic, with a terminus ante quem of 3000 B.C. We shall, accordingly, make guess dates of 2000-1000 B.C. for the termporal span covered by the Wabash shell middens.

## Absolute Dating

Subsequent to the writing of the preceding section, the following C-14 dates were obtained by the Phoenix Memorial Laboratory at the University of Michigan (Crane and Griffin, 1963) and Isotopes, Inc. (Robert L. Hall, personal communication).

A surprisingly small time span for the Riverton Culture middens is indicated, with an indicated range from somewhat before 1500 B.C. until around 1000 B.C. based upon extrapolations of midden accumulation rates to the tops and bottoms of the Riverton and Swan Island middens (Fig. 21).

Obviously, more dates are needed, both to explain the anomalous date for Level 7 at Riverton and to ascertain the length of occupation at Robeson Hills. Both of the dates from the latter site are from pits near the base of the lower midden, thus providing only dates early in the utilization of Robeson Hills by Riverton peoples.

Sample M-1288 from Pit S-14 at Robeson Hills was selected not only to provide a date for the early occupation of the site but also to provide a firm temporal context for the sandstone cloudblower pipe, with its spherical filter, and for the bear canine pendant found in the pit.

Another point to be noted about the absolute dates is that they are very close to the dates predicted using relative dating techniques. Obviously, with a sufficiently refined typology many undated sites in the Midwest can be fitted into a chronological framework provided by absolute dates elsewhere.

## External Comparisons

Somewhat hampering to our consideration of the topic of the external relationships of the Riverton Culture is the scarcity of sites of comparable age in the Midwest.

TABLE 59

RADIOCARBON DATES FOR SITES OF THE RIVERTON CULTURE

| Site | Sample No. | Level or Feature | Years B.P. |
|---|---|---|---|
| Riverton, Cw170 | M-1284 | 4(18-24") | 3110±200 (1169 B.C.) |
| Riverton, Cw170 | M-1285 | 7(36-42") | 3460±250 (1510 B.C.) |
| Riverton, Cw170 | M-1286 | 11(60-66") | 3200±200 (1250 B.C.) |
| Riverton, Cw170 | M-1287 | 14(78-84") | 3270±250 (1320 B.C.) |
| Riverton, Cw170 | I-1463 | Pit II(84-123") | 3320±140 (1370 B.C.) |
| Robeson Hills, Lw1 | M-1288 | Pit S-14 | 3490±200 (1540 B.C.) |
| Robeson Hills, Lw1 | M-1289 | Pit S-3 | 3440±200 (1490 B.C.) |
| Swan Island, Cw319 | I-1461 | Pit II, 60" | 3450±125 (1590 B.C.) |
| Swan Island, Cw319 | I-1462 | 6(30-36") | 3450±120 (1500 B.C.) |

There are a number of dated sites from the third and first millenia B.C., but the second millennium is remarkably devoid of sites suitable for comparative purposes. Probably the Big Sandy Phase of the Eva Culture in Tennessee is somewhere in the range covered by the Riverton Culture (Lewis and Lewis, 1961: 173), but of this we cannot be certain. The Archaic occupations of the Rohr Shelter in West Virginia are either earlier or later (Dragoo, 1959: 238). Acceptable dates for sites of Indian Knoll and Lamoka Cultures are within the third millenium, and the undated late Archaic levels at Modoc provide only a scattering of hunting camp debris.

That equivalent types of floors may have been widespread during Archaic times is indicated by Ritchie's (1965: 34, 74, 96) remarks about the spreading of sand and gravel as floors on midden surfaces of sites of the Lamoka and Brewerton phases.

Our comparisons will inevitably suffer from the lack of synchronism of comparative units, and it may well be that where we point out cultural differences, we are actually showing cultural change. With this warning to the reader, we venture on the primrose path to the Boasian morass.

While a number of traits are shared with the shell middens of Kentucky, including a few Riverton points and the Indian Knoll type of rattle, such diagnostic items as the Riverton micro-tool industry in chert (apart from points), antler spoons, grooved sandstone sinkers, and several forms of shuttles were not found in the extensive excavations conducted in the Kentucky sites, and cloudblower pipes, perforated bear canines tubular bone beads, grooved abraders, and Robeson gouges were rare. Nor are a number of projectile point types, notched drills, atlatl weights, atlatl hooks, atlatl handles, pestles, cylindroids, stone beads, fish hooks, conch shell ornaments and containers, anculosa shell beads, olivella beads, marginella beads, and disc shell beads, all of which are quantitatively important in the Kentucky shell middens, present in sites of the Riverton Culture. Perhaps we can eventually demonstrate definitely that the Indian Knoll sites and the Riverton Culture are parts of a single Archaic tradition, but there is no evidence for derivation of one from the other, nor any indication of extensive interaction between the two. We shall suggest, then, that the Lower Ohio Valley Archaic, as exemplified in the Kentucky shell middens and the Riverton Culture, are two distinct cultural units within the Mid-continent Tradition of the Archaic (Lewis and Kneberg, 1959), and that their similarities are in part the result of their sharing in that tradition and in part, the result of similar adjustments to an existence closely tied to the exploitation of mussels as a basic subsistence item.

Such multi-component sites of the Lower Ohio Valley Archaic as Terry (Fowler, 1957), Faulkner (MacNeish, 1948, Cole, 1951) and McCain (Miller, 1941; Dragoo, 1959) and the several hundred Cache River sites can also be discounted as having any direct relationship with the Riverton Culture. The lithic artifacts from these culturally mixed sites show few specific typological relationships to the chert industry of the Central Wabash shell middens. But sites with projectile points similar to Merom and Lamoka points are now being reported for the State of Michigan. These Dustin points (Ritchie, 1961) from the Eastport Site (Binford and Papworth, 1963), the Hart Site (Wright and Morlan, 1964), and the Schmidt Site (Harrison, 1966) do differ in certain respects from Merom points, however. While there is an overlap in metric attributes, Dustin points from the data presented by Harrison (1966) tend to be somewhat longer, narrower, and thicker as a class than Merom points, and to appear much more frequently with unthinned bases (43% for Dustin points at Schmidt) than in our sample of Merom points (13% unthinned). The raw materials are also different, of course, with Dustin points being made from Bayport and local Michigan gravel cherts and Merom points from the local gravel cherts of the Wabash Valley.

Further comparison of the complex associated with the Dustin points and the Riverton Culture is difficult at the present time due to the lack of bone implements at sites of the Dustin complex, but the data on the lithic artifacts presented by Wright and Morlan for the Hart Site, a fishing camp, and by Harrison for the Schmidt Site suggest that the Dustin complex differs in a number of ways from the Riverton Culture. Stone wedges, which Harrison points out are similar to the Upper Palaeolithic *pièce esquillée* of Sonneville-Bordes and Perrot, are a common artifact at Schmidt, 52 having been recovered in excavation, while they are unknown from any of the sites of the Riverton Culture. Chert scrapers of various types are also common at Schmidt, while these artifacts are extremely rare in Riverton sites. Missing from the Dustin Complex sites so far are such stone artifacts of the Riverton Culture as cloudblower pipes, chipped limonite axes, micro-perforators, sandstone abraders, and sandstone files.

Of course, we may be dealing with a monotaxial situation, since Harrison feels that the Dustin Complex will date somewhat earlier than the Riverton Culture. So again, we cannot rule out the possibility that the dissimilarities between Dustin and Riverton reflect culture change rather than separate lines of development for the two areas.

Harrison (1966: 68) seems to feel that the Dustin Complex is Lamoka-like in nature, but with actual relationships to Lamoka unclear. So far, the convincing similarities between Dustin and Lamoka derive only from the projectile points, the remainder of the two lithic industries being either quite dissimilar or linked only by artifacts that are so generalized that they could pertain to almost any area of eastern North America over several millenia. This is not to deny that Harrison may well be right in looking to Lamoka for the origin of the Dustin Complex, but at present the evidence is too scanty to go beyond her present cautiously stated position. Another factor obscuring the relationship, of course, may well be that present comparisons are based upon different settlement system units, hence lithic industries differing both absolutely and proportionately.

It does not seem profitable to extend our search for cultural affiliations much farther afield at present. Both Riverton and Lamoka share superficially similar small points, but however, the differences in the Lamoka and Riverton assemblages are vast. Totally missing from the sites of the Riverton culture are such important Lamoka

items as beveled adzes, notched netsinkers, socketed deer astragali, deer scapula and turkey radius awls, antler shaft straighteners, bone projectile points, bone daggers, bone knives, cylindrical pestles, rectanguloid choppers, metates, celts, antler pendants, and perforated deer syliform bones and turtle femurs, and items such as fishhook blanks (and inferentially, fishhooks) and gorges, important within the Lamoka Culture, are quantitatively insignificant in sites of the Riverton Culture. Artifacts that are functionally equivalent in both cultures, but typologically different, include weaving implements, many types of awls and the bone flutes. And apart from small projectile points, Lamoka lacks the elements of the Riverton micro-tool industry in chert, the cloudblower pipe, and antler spoons.

Other Archaic cultures in the New York area bear even less resemblance to the Riverton Culture.

Hunting camps such as the Rohr and Dixon shelters (Dragoo, 1959) have such a limited inventory that comparisons would mean little, even though many of the small points illustrated for these sites resemble those of the Riverton series.

Points recovered by Holland in southern Virginia in association with micro-perforators are very similar to the Riverton types, and Coe (1964) illustrates points from North Carolina that are not too dissimilar. But in neither case is there an adequate basis for an effective cross cultural comparison. Moreover, there is nothing at other published Archaic sites in Illinois, Missouri, Indiana, or Wisconsin which even remotely reminds us of the Riverton assemblage.

On the other hand, resemablances of the bone industry of the Lamoka Culture to that of sites of the Indian Knoll Culture have long been noted (Byers, 1959), although the dissimilarities in the lithic industry (exluding the small Lamoka-like points which occur in small quantities in sites of the Indian Knoll culture) preclude any reconstruction of the processes that account for the parallelism in the bone industry. Byers (1959) suggests that, ". . . .Lamoka represents a blend of Kentucky Archaic - a generalized Indian Knoll focus - and certain elements which found expression in Coastal Archaic. Where and when this blend occurred is not known." We should be inclined to agree that Lamoka has in many respects more of the flavor of the mid-South than of the Northeast. Beyond this point we cannot go at present. Confronting us are all of the imponderables of the origins and external relationships of Lamoka, Dustin, and Riverton, and such enigmatic items as the association of Merom-like points with micro-perforators in southwestern Virginia. Perhaps the mid-South is the font to which all of these will be traced, either directly or indirectly, but any really persuasive answers must await the results of campaigns that must be practically pan-Eastern in their scope.

A more profitable search for the sources of Riverton culture might be directed towards the Tennessee River Valley, since in the shell middens of this drainage occur such items diagnostic of the Riverton Culture as Boaz (Robeson) Constricted Stem projectile points, grooved sinkers, bear canine pendants, cloudblower pipes, and Robeson and simple antler gouges. But we still cannot imply any direct linkage with the northern Alabama shell middens or sites of the Eva, Three Mile, and Big Sandy Phases in western Tennessee, since so many traits characteristic of these sites are missing from the Riverton Culture (e.g. Eva, Ledbetter, and Frazier points, atlatl weights, gorgets, pestles, mortars and metates, fish hooks, atlatl hooks, shaft wrenches, marine shell ornaments and vessels, disc shell beads, and copper ornaments), and the Tennessee sites do not have grooved sinkers and no chert micro-tools have been reported.

While we cannot indicate any specific source in the Tennessee Valley for the derivation of the Riverton Culture, we can tenatively indicate the temporal relationship between the central Wabash shell middens and the phase sequence of the Middle South Archaic as established by Lewis and Kneberg (1959). Houses, storage pits, cloudblower pipes, flutes, and points of the Adena and Boaz type cluster do not appear in western Tennessee until Big Sandy Phase. Only one of these items, Adena points, is late in the middens of the Riverton Culture. Thus, barring a homotoxial situation, the Riverton Culture should be more nearly equivalent in time to the Big Sandy Phase than to either the Eva or Three Mile Phases. If such a correlation is correct, we might again suggest that the Riverton Culture appeared around 2000 B.C. and persisted until after 1000 B.C. on the basis of a rather cautious interpretation of the chronology proposed by Lewis and Kneberg (1959) for their Midcontinent Tradition of the Archaic and the C-14 dates for the Riverton Culture sites themselves.

Whatever the origins of the Riverton Culture may be, they certainly cannot be traced to any earlier Archaic occupation of the Wabash Valley on the basis of the present evidence. Admittedly, our data on earlier Archaic manifestations is derived from examination of surface material and not from any stratified sequence in excavation, but so far there is nothing remotely reminiscent of the Riverton Culture in these collections.

In view of the cultural disparity of the Riverton Culture with other Archaic remains in the central Wabash, we shall suggest for the time being that the central Wabash shell middens represent the intrusion from the south of a hitherto undefined branch of the Midcontinent Tradition of the Archaic. We shall also note that in the same area of the Wabash there are many La Motte Culture sites with considerable quantities of simple and check stamped pottery (Winters, 1967). Perhaps the initial intrusion of mussel gatherers paved the way for subsequent penetrations of ideas or peoples into the central Wabash from the south, with a partial fusion of regional traditions occurring in the Wabash Valley after the development of what has been termed the Woodland Culture.

## Chapter VII

# The Settlement System and Pattern of the Riverton Culture

In the preceding chapters, we have discussed the environment and the natural resources of the central Wabash Valley, the artifacts and features, and the cultural affiliations of the Riverton Culture as exemplified in the excavations at Robeson Hills, Swan Island, and Riverton. As we have indicated, the Riverton Culture is unknown in other areas of the Midwest although oddly enough, all the artifacts of the Riverton Culture are known from sites of other cultures with the exception of antler spoons, Riverton flutes, and antler projectile points with notched sides. But nowhere beyond the central Wabash Valley do we find the distinctive combination of these artifacts that typify the Riverton assemblage. That is, no other culture combines into a single assemblage a micro-tool industry in chert (projectile points, knives, and microperforators), Robeson gouges, grooved sinkers, chipped limonite axes, cloud-blower pipes, and the Indian Knoll rattle, along with many other less distinctive items of material culture (Table 52), and features such as clay floors. But, we might have had some difficulty in delineating the uniqueness of the assemblage had we not had three deep stratified middens which had been built up in the relatively short time between 1500 and 1000 B.C., with admixture of extraneous cultural material only at the very bottom and the very top of the sites.

But aside from the intrinsic interest in defining a new and exotic culture, the sites of the Riverton Culture offer an opportunity for investigating the settlement system and pattern of an entire late Archaic culture. At this point it is advisable to emphasize that we use the term late Archaic because it is conventional although we are convinced that the differences between late Archaic and middle Archaic are at least on the order of the differences between Mississippian and Woodland. A more realistic taxonomy would link late Archaic and early Woodland as a series of regional phases within a larger taxonomic unit. Although it was obvious both in the field and the laboratory that all three sites were parts of the same culture, it was equally obvious that there were absolute and proportional differences. For example, only 35% of the 80 traits in the ten functional categories of the Riverton Culture were common to all three of the middens, and paired middens were found to share only 37-1/2% to 45% of their traits. Unique traits ranged from 7-1/2% of the total traits at Swan Island to 24% at Riverton. If gross functional units (34 items) are used, rather than the array of stylistically variant elements within those units, the sharing of traits among the sites is much higher, with 56% shared by all the sites, and from 59% to 68% by paired sites. Unique traits would range from none at Swan Island to 8% at Riverton and 11% at Robeson Hills. In addition, it had been noted in the field that Robeson Hills had numerous house patterns and pits, and that these features were either very rare or totally lacking at the other two. Obviously, considerable differences existed among the sites, and in view of their assumed contemporaneity and limited geographic range, we hypothesized that they were elements within a single settlement system. As the following discussion will show, various analytic techniques seem to indicate that our original hypothesis was justified, and that in the Riverton Culture, there was a well defined settlement system, with a marked degree of sedentism, and an organization quite similar to that known for historically documented Midwestern cultures.

But, before we can interpret successfully either settlement patterns or systems, we must establish the certainty of cultural contemporaneity as well as cultural identity. The C-14 dates listed in Chapter VI demonstrate that the Riverton Culture persisted for some five hundred years in the central Wabash, and the dates for the bottoms of the Swan Island and Robeson middens show that occupation of these sites probably began between 1600 and 1500 B.C. But the earliest date for Riverton from a pit about a foot above the bottom of the midden is a century and a half later than the preceding dates (Fig 20).

In order to see what the degree of overlap might actually be, we have attempted an extrapolation of the C-14 dates for Swan Island and Riverton on the basis of midden accumulation rates. Obviously, no such extrapolation is possible for Robeson, both dates from this site being from pits at the midden base.

For Swan Island, an interval of some 90 years may be indicated for the accumulation of the bottom 27 inches (measuring from the mid-point of Level 6), or about 0.3 of an inch per year. Using this accumulation rate, an estimated 110 years is shown on Fig. 21 for the minimal span of the top 33 inches of the midden.

At Riverton, the accumulation estimates shown in Table 60 can be derived, again calculating from the mid-points of levels if the charcoal sample was not from a specific feature, and using different combinations of depths and time spans.

Obviously, the Riverton midden did not accumulate at a uniform rate for its entirety. Using the accumulation rates obtained for various segments of the lower 2 feet of

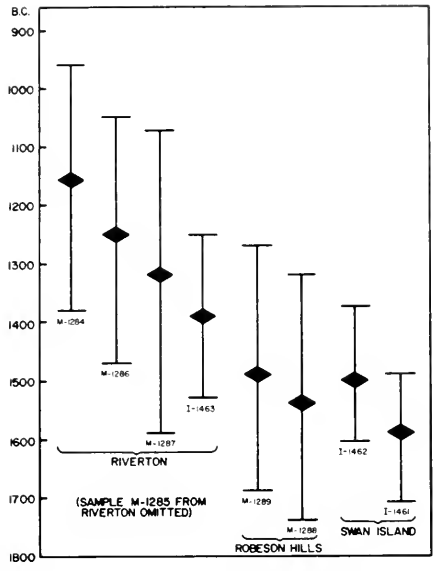


Fig. 20. Riverton Culture radiocarbon dates.

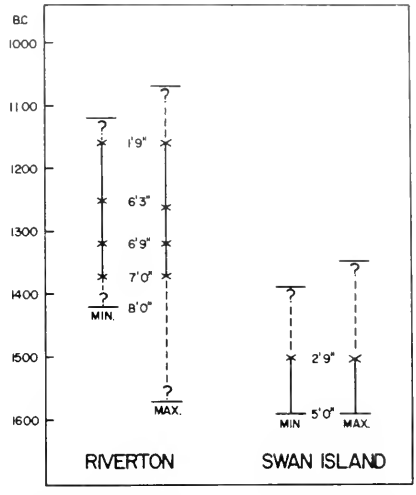


Fig. 21. Span of occupation of the Riverton and Swan Island sites.

the dated midden deposits, the following durations for the undated one foot of the lower midden were derived: if the time span was 200 years the accumulation rate was .06 in. each year; if 71 years the rate was .17 in. each year; if 49 years the rate was .25 in. each year.

As to which of these time spans, if any, is correct, we are unable to state conclusively. Neither the dating method, nor the statistical expression of its results, nor the small series dated permit precise selection, within the very small time span involved, of any estimate. There is also the unsatisfactory evidence of Sample M-1285 from Level 7 which shows that there is charcoal at Riverton dating some 140 years earlier than any of the other samples from still lower levels. It corresponds in age to samples from the bottom of Robeson Hills and the mid-portion of Swan Island. Since we cannot explain its presence in Level 7, we cannot state definitely that this sample is directly relevant to the dating of the site. We can only speculate that it may represent charcoal dredged up from a lower level during some activity occurring during the occupation of that level, such as the digging of one of the deep cylindrical pits that are known at the Riverton site.

TABLE 60

ESTIMATED ACCUMULATION RATES FOR THE RIVERTON SHELL MIDDEN

| Depth | Time Span | Accumulation Rate |
|---|---|---|
| 84-81" | 50 years | .06" per year |
| 84-63" | 120 years | .17" per year |
| 81-63" | 70 years | .25" per year |
| 63-21" | 90 years | .47" per year |
| 84-21" | 210 years | .30" per year |

In Fig. 21 we have plotted estimates of minimal and maximal durations of occupation for both the Riverton and Swan Island middens, using C-14 dates without their standard deviations and extrapolation of deposition rates. For Riverton, the minimal range was obtained by using a .25 accumulation rate for the lower one foot of midden and a .47 rate for the upper 21 inches, but without any correction for the approximately 2 feet eroded from the midden in the past century. For maximal range, a .06 accumulation rate has been used for the bottom and a .47 rate for the upper midden with correction for the 2 feet of erosion.

At Swan Island, both the minimal and maximal spans had to be based upon an estimated 0.3 inch per year accumulation rate for the bottom 27 inches of the midden. Of course, assumption of a constant accumulation is not realisitic, but in the absence of any basis for finer quantification, we must let this estimate stand until additional dates are obtained for Swan Island. Maximal span at Swan Island was obtained simply by making allowance for one foot of erosion. Here again, the validity of the procedure may be questioned, since neither at Swan Island nor Riverton, do we know what proportion of the eroded midden actually pertained to the Riverton Culture.

Having noted possible sources of error, it only remains to point out that minimal overlap may be on the order of 30 years, maximal overlap 220 years.

Thus, the early occupation of Riverton may have overlapped with most of the two century occupation of Swan Island, or there may have been scarcely any overlap at all. If the .17 rate had been used for Riverton, overlaps of 50 and 90 years would result, and it may be that these intermediate figures are more realistic than either of the sets plotted in Fig. 21. Obviously, a very large number of dates from well defined contexts is needed for middens that

have accumulated as rapidly in a short period of time as Riverton.

For the present, we feel that there was considerable overlap in the occupations of the two sites, although Riverton was almost certainly utilized for some time after the abandonment of Swan Island.

Finally, we must deal with the problem of Robeson Hills, where the dates of 1490 and 1540 ± 200 B.C. derived from subsoil pits at the base of the midden point to near contemporaneity for the initial occupation of both Robeson Hills and Swan Island. But we cannot assume identical rates of midden accretion, since as we shall show later in this chapter, Robeson was occupied during the winter, Swan Island, during spring and/or fall, and Riverton during summer, late spring, and early fall. Thus, at Robeson, midden deposits should have been derived in large part from animal and mussel shell waste, rather than quantities of plant remains, which would appear at the site mainly in storage pits. And even debris from animal remains may have accumulated rather slowly at Robeson in comparison to the other two sites. Ratios based on counts of animal bone from controlled excavation units at the three sites are as follows: Riverton 9050 bones in 69 units equals 131 bones per unit; Swan Island 6164 bones in 49 units equals 125 bones per unit, Robeson 1069 bones in 26 units equals 41 bones per unit. Since preservation of bone was excellent at all sites by virtue of the extensive inclusions of mussel shell lenses, we cannot assume that the foregoing differences are the result of differentials in the preservation of bone. Moreover there was no deposition of river silts at Robeson as at Riverton.

Our guess, then, is that midden accumulation proceeded at a much slower rate at Robeson than at either of the other sites, and that the overlap between Robeson and Riverton was considerably greater than that of Swan Island with the latter site. In short, we feel that there was overlap among all three sites, but that ultimately Riverton may have remained as a base camp after other elements of the settlement system had disappeared.

## THE SETTLEMENT PATTERN

Our data will be considered under two major analytic units, settlement pattern and settlement system. By the former is meant the geographic and physiographic relationships of a contemporaneous group of sites within a single culture. The latter term refers to the functional relationships among the sites contained within the settlement pattern.

Excavation and surface reconnaissance provided the following points relevant to delineation of a settlement pattern. Major midden concentrations were present only at the three excavated sites, which averaged from 2 to 3 acres in extent. Of these, two, Riverton and Swan Island, were on the T-O of the Wabash immediately adjacent either to the present channel or a slough of the river, while Robeson Hills, the southernmost site, was also immediately adjacent to the present river channel, but was located atop a hundred foot bluff. There is another small bluff top shell midden [Road's End No. 1, Cw-320] about one and a half miles north of Swan Island. The site has an elevation of about eighty feet above the T-O, and covers about a half a acre. No artifacts of the Riverton Culture were recovered during surface collecting on the site, but a local collector reports that projectile points of the Riverton type have come from this site. The affiliations of the site must remain in abeyance for the time being, since only Late Woodland pottery and triangular points are in the Illinois State Museum collections from the site. Major middens were in a north to south alignment and separated by ten mile intervals.

The survey also disclosed twenty-two small sites on the T-1 (Fig. 18) which could be related to the Riverton Culture only by the presence of the diagnostic Robeson, Merom and Trimble points: Lowe No. 2 (Cw-365); Stoner, (Cw-109), Fox-McCarty, (Cw-125); Barbee South, (Cw-364), Fox Creek No. 2 (Cw-328); Middle Fork Site (Cw-x), Prather No. 2 (Cw-331); Ralph Phillips (Cw-131); Greenbriar (Cw-178), Middle Mill Creek (Cl-132); Etchinson (Cl-118); Doll No. 2 (Lw-195); Purgatory Swamp (Lw-95), Beard (Lw-206), Gognat (Lw-231), Pinkstaff No. 4 (Lw-263); Ross Goodwin (Lw-294); Bond School (Lw-189); Otter Pond (Lw-125), Russellville No. 1 (Lw-X); Dhom (Jp-135); St Marie (Jp-131).* It was also noted that these latter sites, which generally covered only a few hundred square feet, either as independent sites or within a large, multi-component site, were concentrated around the southernmost and northernmost of the shell middens, with only two in the area of the Swan Island site. The sites on the T-O and the bluff top were also marked by large concentrations of mussell shell and cultural debris, while the sites on the T-1 showed no trace of shell, and very little cultural debris.

In respect to total area for the Riverton Culture, present data would indicate a maximum north to south dimension in the central Wabash of some forty miles, or from the southern side of Mill Creek to the southern side of the Embarrass. East to west dimensions vary somewhat, with most of the sites being contained within a 10 mile strip along the Wabash. However, camps are known along the Embarrass as far as 30 miles from its mouth. Thus, the total area utilized by peoples of the Riverton Culture of the Illinois side of the Wabash was approximately 500 square miles, but with only 250 square miles being used intensively. Since we have not investigated the Indiana side of the river, we cannot say with certainty what portion of the eastern side of the valley was included within the area of effective exploitation by the Riverton peoples, but we can note that reconnaissance by trained and competent local amateurs has failed to disclose any sites of the Riverton Culture on the Indiana side to date. Perhaps the maximum concentration of sites, then, is on the Illinois side. We have also received reports, however, from Mr. John Henry of Danville, Illinois, that there are hunting camps with Riverton Culture points some 80 miles north of the Riverton Site on the Wabash River. These sites are described as being small, without mussel shell, and lacking all other artifacts of the Riverton Culture. Perhaps these represent a wide dispersal into seasonal hunting camps or camps that are linked with trips to the Attica chert quarries.

*Site numbers are recorded in the Illinois State Museum System

With these data in mind, we shall suggest that the settlement pattern of the Riverton Culture is typified by arrangement of sites in a dispersed linear pattern along the river margins with distances of ten miles between major loci. The latter sites may be on either the T-O or high bluff tops, and may have numerous ancillary sites on the nearby T-1, with the group formed by a major midden and its ancillary dependencies constituting a single matrix within the settlement pattern itself. Furthermore, in view of the small area within which the Riverton Culture is contained, we shall suggest that the settlement pattern as a whole might be termed an involuted type to contrast with the earlier extended and dispersed patterns known for the Early Archaic in other areas of Illinois, or the patterns of extended nexuses of Late Woodland or Mississippian times. The dispersed and extended patterns of the Early Archaic, we might explain, are characterized by widely separated, small, functionally undifferentiated sites along stream systems, with no clearly definable cultural boundaries within areas sometimes covering thousands of square miles, while the Mississippian pattern involves a complex network of interrelated towns, hamlets, farmsteads, and camps, usually covering several hundred square miles.

In many respects, the settlement pattern just defined for the Riverton Culture anticipates the settlement patterns of later Woodland cultures in the Midwest, but, as we shall see shortly, differing in the time of the year during which a particular segment of the pattern was utilized.

## THE SETTLEMENT SYSTEM

Let us emphasize again that by settlement system we refer to the functional relationships among a contemporaneous group of sites within a single culture. Several units of data (seasonality, technology, features, subsistence pattern, the systemic index, triangle diagrams, and geographic data) will be employed, which, when combined with our inferences on the settlement pattern, should permit an interpretation of the settlement system of the Riverton Culture.

### Evidence of Seasonality

One of the first requirements in interpreting the settlement system for a hunting and gathering society is the determination of degree of permanence in habitation of a site. For the Riverton Culture these points have been noted at the three excavated middens:

*Migratory Birds.*

Passenger pigeons, ducks, geese, trumpeter swan, the pied-billed grebe, great blue heron, common loon and coromorant are all migratory birds, passing in a regular seasonal pattern through the Wabash Valley, which is one of the major tributary flyways of the giant Mississippi Flyway (Lincoln, 1939: Fig. 17), or remaining there during a particular season.

The presence or absence of these species in the middens of the Riverton Culture is obviously one of methods of evaluating season of occupation. Of course, the unqualified equation of the absence of a particular migratory species as indicative of a specific seasonal utilization of the site would be naive. Such absence might be the result of food tabus or special arrangements for the disposal of bones for a particular species examples for both of which are well known from contemporary societies. But we hardly think that the data which will be presented herewith can be interpreted as prehistoric examples of such behaviour patterns, since we shall be dealing with situations in which one would have to assume total avoidance or special disposal arrangements for *all* species within groups of seasonally migratory birds, with the avoidance patterns and disposal arrangements varying rather remarkably from site to site within the small area occupied by the culture. Nor will such behavioural patterns be of much help in explaining the marked differentials in representation of the migratory species that are shared between sites. In the present case, then, the best interpretation of the presence or absence of migratory birds within a site seem to be as a function of their seasonal representation within the Wabash Valley.

The foregoing factors may, of course, be relevant to the interpretation of the absence of local, non-migratory animal species that might potentially have played an important role in the subsistence pattern of the Riverton peoples. For example, the rarity of bones of the black bear is a curious feature of the middens, there being only one bone from the Robeson midden, three from the Riverton midden, and none from Swan Island. Bear canines, on the other hand, were utilized as pendants, but occur in association with burials or within special features rather than as part of the general midden debris. Perhaps the bear was either not utilized as food, or special arrangements were made for the disposition of its bones if it was so used, or the bear was important only for its canines, which were subsequently disposed of in special ways rather than being casually discarded.

Porcupine also shows considerable variation among the sites, none having been recovered from Robeson Hills and Swan Island but the rather considerable number of 21 (4 prob.) having been obtained from Riverton. Neither seasonality, nor tabu, nor special disposition need be invoked to explain the differentials in species representation, since the Riverton Site is located near the fringe of the effective range of the porcupine in historic and, presumably, the last several millenia of prehistoric times (Parmalee, 1962 b).

For another species, elk, the variations among sites may be the result of seasonal movements of a species permanently resident within the area, the social habits of the species, and the hunting practices of the human inhabitants. In other words, great care must be exercised in interpreting presence or absence or differential representation of even non-migrant species within the sites of a single culture.

But to return to our discussion of migratory species of birds, there are also other variables that must be considered when using data on such species. One of these stems from the unpredictable migratory habits of the birds themselves, since many species are inclined to follow a particular isotherm as climatic conditions become favourable or unfavourable (Lincoln; 1939: 30, 55, Fig. 2), rather than

adhering to the rigid schedule of the faithful swallows of Capistrano. And sometimes they failed to migrate at all. Schorger (1956: 66) states that, "The passenger pigeon was so hardy a bird that it sometimes met disaster by attempting to winter in the north or by migrating too early in the spring. . . The combination of a mild winter and abundance of mast might hold some birds in the northern states, but there was no consistency in the behavior under these conditions."

That not all birds migrated from the Wabash Valley in winter is documented by Ridgway (1889) who reports passenger pigeon, ducks, snow or blue goose, and trumpeter swan as winter residents over the greater part of Illinois. Passenger pigeon, ducks, and Canada goose are also reported by Ridgway as summer residents of general distribution, and the Wabash Valley, in fact, constitutes one of the boundaries for summer nesting areas for passenger pigeon (Schorger, 1955: Fig. 22).

Ridgway's preceding observations bring us to the consideration of other variables. Nineteenth century ornithologists, and even those of the twentieth century, were very much concerned with the reporting of first sightings and the plotting of new records frequently omitting to note when actual flocks were present or whether a bird would normally be found within a particular geographic unit. As Schorger (1955: 267) notes, "The earliest dates of arrival frequently had no bearing on the main migration that followed." Thus, many earlier ornithological records are quite misleading, in that they report sightings of individual specimens and the exceptional rather than the normal distribution pattern of the birds.

And for our present purposes, the important consideration is when large flocks appeared, not when stragglers or a scatter of birds were present. As reference to Appendix I will show, it is clearly manifest that the peoples of the Riverton Culture were selective in their hunting

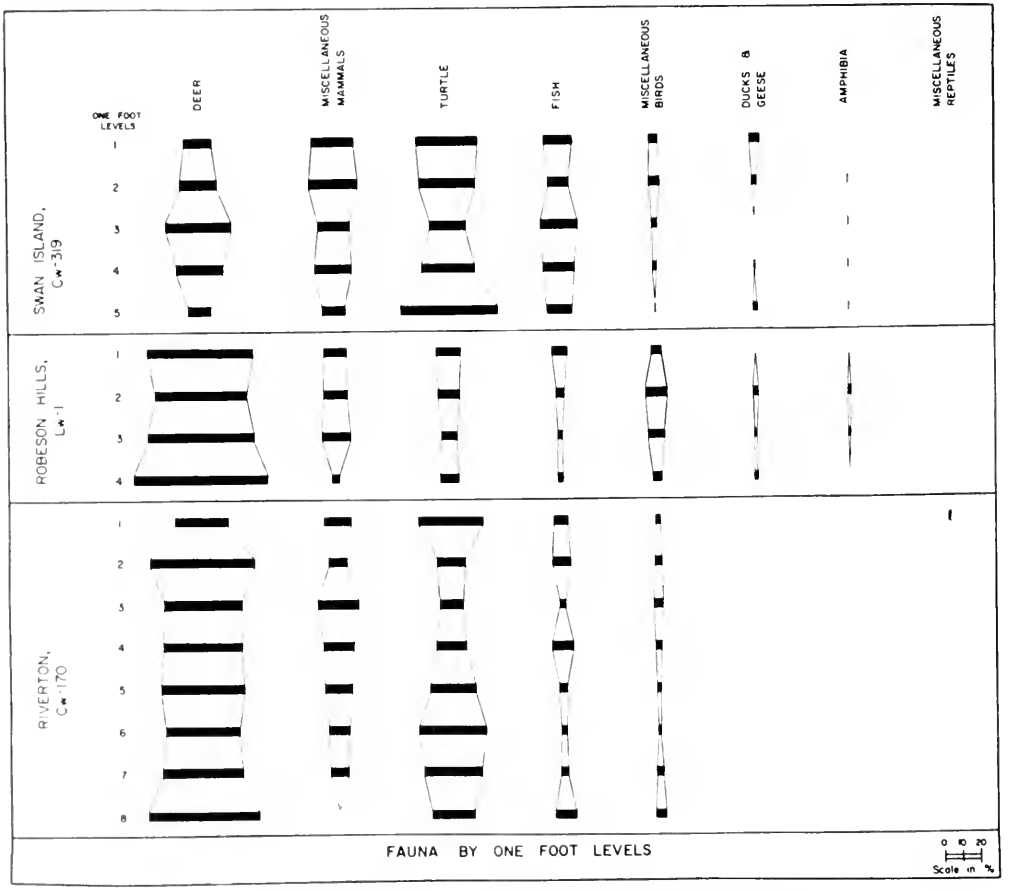


Fig. 22. Proportions of faunal remains within 1-foot levels, Central Wabash Valley shell middens.

practices, with emphasis placed on a few species rather than the total range available in the Wabash Valley. This is true even of Swan Island, where the taking of small mammals, turtle, and fish were very important activities. It would seem that the Riverton people practiced selective hunting of only those species that were both abundant and productive of a high food yield per individual taken. If such be the general pattern, we shall propose that migratory birds would have been taken only when they were present in quantity and easily harvested, and that the strays and stragglers would have been disregarded in large part.

If we examine data on the passenger pigeon, for example, Ridgway (1889) gives arrival dates of January 15th to February 25th, establishing a mid-winter entry into the valley for the passenger pigeon. But if we go to the extensive data collected by Schorger (1955: 270-272) on the time of appearance of flocks of passenger pigeon in the Wabash, a very different picture appears. Of the twenty-nine sightings of flocks, 31% appeared in February, 62% in March, and 7% in April. For the southward migrations, 12% occurred in August, 59% in September, and 29% in October, with only one flock reported after October 15th. In terms of real economic importance, then, the passenger pigeon would be associated with late winter and early spring, and late summer to early fall.

A final difficulty in using ornithological data is the vagueness of the ornithological literature on the correlation of geographic area and season of the year. Most publications use such massive units as northern Illinois, southern Illinois, or simply Illinois. Obviously, such general statements lack the precision that one would prefer when dealing with seasonality within a specific area such as the Wabash Valley, which is itself climatically and ecologically aberrant in respect to surrounding areas.

But even with all the difficulties arising from the behavioural patterns of the birds and their human observers, some clear patterns and contrasts have emerged from analysis of the remains of migratory birds in the Riverton Culture middens. First of all, we shall summarize the general seasonal patterns for the migratory species found in the middens, utilizing Cory (1909) as a general source, with other sources noted in the descriptions:

*Aythya* sp. - Migratory in spring and fall, with some species breeding in Illinois in summer, and the possiblity of some individuals remaining all year.

*Anas platyrhynchos* - Migratory in spring and fall; a number remain to breed in suitable localities.

*Chen* sp. - Generally to be expected only during migrations, although reported by Ridgway (1889) as a winter resident.

*Branta canadensis* - Generally to be expected only during migrations, although reported by Ridgway (1889) as a winter and summer resident.

*Olor buccinator* - Generally to be expected only during migrations, although reported by Ridgway (1889) as a winter resident.

*Gavia immer* - Summer resident, arriving early in spring and leaving late in fall.

*Ardea herodias* - Summer resident, usually arriving from the south in March or early April.

*Ectopistes migratorius* - Generally to be expected in quantity only during migrations, but also breed and winter in the Wabash (Ridgway, 1889; Schorger, 1955).

*Podilymbus podiceps* - Summer resident, with spring and fall migration.

*Phalacrocorax auritus* - Migratory only, with some moving south early in late summer (Paul Parmalee, personal communication).

Of these, only three species occur at Robeson (*Chen* sp., *Branta canadensis*, and *Olor buccinator*), all of which are fall or spring migrants and are reported as having been observed during the winter in the Wabash. Swan Island has six migratory species (*Aythya* sp., *Anas platyrhynchos*, *Chen* sp., *Branta canadensis*, *Ectopistes migratorius*, and *Podilymbus podiceps*). Of these, only the pied-billed grebe normally would not have been present in the winter. At Riverton, only four migratory species (*Gavia immer*, *Ardea herodias*, *Phalacrocorax auritus* and *Ectopistes migratorius*) were recovered. Of these, common loon and cormorant definitely would not be found in the winter and great blue heron and passenger pigeon would appear only exceptionally. Exceptions are one probable duck and two are probable trumpeter swan bones that were found in the mixed Archaic, Woodland, and Mississippian deposits of the plow zone of Area X, but none were found among the 14,174 bones associated with the unmixed midden of the Riverton Culture.

Even with a simple listing of migratory species, there are readily apparent differences among the three sites. In terms of number of species represented, Robeson has the least, and Swan Island the most, with Riverton intermediate. On the basis of a simple numerical count, we suggest that Swan Island should correlate with spring and/or fall when the greatest number of migratory species would be present, and Robeson, with winter, when the smallest number would be expected.

Two of the three species found at Robeson were also present at Swan Island, and none were shared between Robeson and Riverton. Swan Island also had quantities of passenger pigeon, while Robeson had none, and one species appeared at Swan Island that could not have been present during the winter. All of the species at Riverton would normally be associated with spring, summer, or fall, with only passenger pigeon shared with Swan Island.

While both Swan Island and Robeson have a set of migratory birds that could be indicative of a winter occupation, the importance of passenger pigeon at Swan Island and the lack thereof at Robeson points to late winter and spring (or fall) as a better fit for Swan Island and full winter as the appropriate seasonal linkage for Robeson, particularly since the migrations of passenger pigeon preceded that of ducks and geese in the fall, and overlapped considerably in the spring. As for Riverton, the total absence of ducks, geese, and swans practically eliminates spring and fall from consideration. In general, the set of migrants present, common loon, cormorant, great blue heron and passenger pigeon point to only one season - early to late summer.

The contrast among the sites can be easily demonstrated quantitatively by the analyses shown in Table 61.

TABLE 61

QUANTITATIVE VARIATION OF BIRD BONE BY CATEGORIES BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Robeson | Swan Island | Riverton |
|---|---|---|---|
| Turkey (% of all birds) | 56% | 35% | 93% |
| Ducks and geese (% of all birds) | 23% | 26% | 1%* |
| All migratory birds (% of all birds) | 27% | 47% | 5% |

*In culturally mixed plow zone.

As the preceding section shows, migratory birds constitute nearly one half of the total birds at Swan Island, only a quarter at Robeson, and only one twentieth at Riverton, even with inclusion of the duck and swan bones from the plow zone. Turkey is very decidedly the only bird of any economic importance at the latter site.

One can also consider the relative importance of ducks and geese as contrasted to that of passenger pigeons at Robeson and Swan Island. At Swan Island the two groups are of nearly equal importance - 58 per cent of the combined total are ducks and geese, 42 per cent are passenger pigeons. At Robeson, on the other hand, there were no passenger pigeons.

In summary, both qualitatively and quantitatively, the migratory species at each site point to different seasons of occupation:

Riverton Summer. No ducks, geese, or swan. Summer and late summer vistors such as common loon, cormorant, and Great Blue Heron. One passenger pigeon bone. Turkey only economically important.

Swan Island Spring and/or Fall. High percentage of both passenger pigeon and ducks and geese. Richest assortment of migratory species at any of the three sites. One species, pied-billed grebe, that could not have been present in winter.

Robeson Hills Winter. A depauperate migratory fauna. Passenger pigeon missing from the valley, but ducks, geese, and swan present. Lowest number of migratory species of any of the three sites. No migrants that are common summer residents.

Sampling error can scarcely be introduced as a factor to explain the differences between Riverton and the other two sites, since the Riverton sample is almost double the size of the sum of the other samples. The samples of bone are quite sizeable from Swan Island and the area excavated at Robeson was about equal to the area excavated at Riverton. The sample at Robeson may be small, but it should be representative of the site contents. At all sites the bones of the migratory birds are well distributed vertically and horizontally throughout the midden, with no special areas of concentration at any site.

*Turtle*

Marked differentials in the utilization of turtle exist among the three sites, both qualitatively and quantitatively. At Swan Island, turtle accounted for 31% of the bone, 24% of the bone from the 1961 test pits at Riverton, but only 8% at Robeson Hills. A figure of 21% was obtained from Area X at Riverton in 1963, with the culturally mixed plow zone and the partially completed Test Pit Alpha excluded. There would seem to be little difference in proportions of turtle remains at Riverton whether one is dealing with general midden material or the zone around the living platforms. Or expressed in another form, the ratios between the first two sites and Robeson are on the order of 4:1 and 3:1.

It was also observed that there were differences in the proportions of land and water turtle (Table 62).

TABLE 62

PROPORTIONAL VARIATION OF LAND AND WATER TURTLE BONE BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Riverton* | Swan Island | Robeson |
|---|---|---|---|
| Land turtle | 70% (281) | 52% (91) | 40% (17) |
| Water turtle | 30% (120) | 48% (83) | 60% (25) |

( ) = actual counts from Appendix I
* = 1961 and 1963 counts combined.

Even though the actual quantity of turtle at Robeson was small (42 pieces from identifiable genera, 9 identifiable only as turtle), the sample should reflect an accurate picture of the genera present at the site in view of the diverse loci of the excavations in the deep midden.

Our initial reaction to the quantitative differentials was that both Swan Island and Riverton were being occupied at some time other than winter, on the basis that the taking of both hibernating land and water turtle would have been more difficult in winter, and that the very low quantity at Robeson should accordingly correlate with a winter occupation. At the same time, there was a question as to why a winter occupation at Robeson should lead to the emphasis on the taking of water species which presumably were buried in the mud of the river and slough bottoms. Closer inspection of the data placed our initial hypothesis well within the realm of the naive generalization.

First of all, we might examine the turtle remains in terms of the proportions of actual species being taken at each site, following this with comments on sundry important features pertaining to the ecological niches occupied by the various species and their ways of life therein.

TABLE 63

PROPORTIONAL VARIATION OF TURTLE BONE BY SPECIES BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Riverton | Swan Island | Robeson |
|---|---|---|---|
| *Chelydra* | 10.7% | 5.7% | 19.0% |
| *Graptemys/Chrysemys/ Pseudemys* | 12.0% | 12.0% | 31.0% |
| *Trionyx* | 7.2% | 16.7% | 9.5% |
| *Sternotherus* | | 13.2% | |
| *Terrapene* | 70.0% | 52.3% | 40.5% |

Obviously, the pattern of collecting differed remarkably from site to site, although *Terrapene* was the most important single genus at all of the sites. It will be our

contention that these differences derive for the most part from the seasonal habits of the various species, although other variables must also be considered. For example, the high percentage of softshell turtle remains at Swan Island probably reflects local ecological conditions which lead to a greater abundance of *Trionyx* in the area of Swan Island. Within this group, *Trionyx mutica* has as a preferred habitat of streams with considerable current, clear water free from plant growth, and a sandy bottom without rocks, while *Trionyx spinifera* prefers the shallow waters of lakes, ponds, and rivers without much current, and sandy or muddy bottoms without gravel, rock, or much vegetation (Cahn, 1937). Either set of conditions could be found within the vicinity of Swan Island, but there is evidence that there were extensive riverine areas that would have been favourable for *Trionyx mutica* in particular. Parmalee points out that the mussel *Dysnomia perplexa* is about twice as abundant at Swan Island as at the other two sites (Appendix 1), and that this species is associated with a river habitat typified by a coarse sand-gravel bed, two to four feet of water, and fast current. Such a habitat would come close to the specifications for *Trionyx mutica*, assuming that clear water was typical of the Wabash during the second millenium B.C. (see Chapter 1). Thus, the molluscan evidence would point to there having been more extensive areas suitable for a particular species of turtle at Swan Island than at the other two sites, and that the higher percentages may largely be the result of greater local availability. We are at a loss to explain why *Sternotherus odoratus* should have been taken at all at Swan Island, and not the other two sites, since the species is described by Cahn (1937) as, ". . . never eaten because of the musky flavor. . ." There is no evidence that either the carapaces or plastrons of *Sternotherus* were ever used as raw materials. Perhaps the site was occupied during a time of the year when foods that normally would have been avoided were welcome.

Salient characteristics of each species that are germane to our present search for factors relating to seasonality of occupation are as follows, following Cahn (1937) except as noted:

*1. Terrapene carolina carolina* – Habitat in deciduous woods. Generally found as isolated individuals, but more concentrated in summer and autumn. Hibernate from late October to April, with increasing depth from 2 inches in late October to as much as 18 inches in February. Aestivate during dry periods of summer, with a number of individuals often found clustered in mud puddles. Edible.

2. *Terrapene ornata* – Prairie habitat. Otherwise rather similar to *Terrapene carolina*. Too rare to be of any economic importance, although edible.

3. *Chelydra serpentina*. Lives in stagnant ponds, weed grown lakes or rivers. Generally solitary, being clustered only during periods of hibernation, which lasts from mid-October to mid-May, with river mud or muskrat burrows preferred. May congregate in large numbers in latter during winter. No aestivation. Edible and extremely important as a food turtle in historic times.

4. *Sternotherus odoratus*. Lives in small lakes and slow moving, muddy bottomed streams and semi-stagnant sloughs with abundance of aquatic vegetation. Occasionally solitary, often found clustered locally in suitable habitats. According to Risley (1933) emerges from hibernation in mud beneath heavy vegetation during the last week of March. No aestivation. No historic value as a source of food.

5. *Graptemys geographica*. Prefers lakes and backwaters of large rivers with abundant aquatic vegetation. No data on population patterns. Hibernates from mid-fall to late March in mud, soft banks, or muskrat runways. No aestivation. Excellent as food, but very small yield per individual.

6. *Graptemys pseudogeographica*. Habitat consists of lakes, ponds, sloughs, and slow moving large rivers. Very gregarious. Hibernates from October to warming of waters in spring in 4 to 12 inches of mud or in muskrat burrows. No aestivation. Important as a food item.

7. *Chrysemys picta marginata*. Prefers small lakes, ditches, ponds, sluggish backwaters. Sometimes solitary in summer and fall, although found clustered during same period. Hibernates from mid-October to mid-April in mud, banks, and muskrat burrows. No aestivation. Excellent food, but small yield per individual.

8. Softshell *(Trionyx mutica)*. Preferred habitat, streams with considerable current, clear water free from plant growth, and a sandy bottom without rocks. No data given on population patterns or hibernation, but is reported as burying itself in the sandy bottoms of rivers. Very palatable, but of small size.

9. Softshell (*Trionyx spinifera*). Lives in shallow lakes, ponds, and rivers with sandy or muddy bottoms. Avoids rivers with current and rock or gravel bottoms. No data on population patterns. Hibernates from the end of October to late April or early May in from 2 to 4 inches of mud in lakes or rivers. Edible and important as a food source.

One further item should be noted about these species in general. Cahn (1937) reports that *Terrapene* does not reappear after the beginning of hibernation, but in the southern part of the state individuals of all the riverine species, with the exception of *Chelydra*, may either avoid hibernation, or go into partial hibernation. We should, accordingly, expect that there would always be a few non-hibernating individuals of the riverine species in the Wabash Valley during the winter.

But what are the implications of the foregoing data? First of all, it is evident that *Terrapene* could have been taken only with considerable difficulty from the frozen ground during winter, and that it would have reached maximum availability during summer, particularly when clustered during aestivation. *Chelydra*, on the other hand, would be most readily available during the winter when it abandoned its solitary existence and gathered with other members of its species in the mud or in muskrat burrows. The latter were especially productive sources of snapping turtle during the winter in historic times. Cahn (1937: 41) reporting that, ". . . five tons of snappers (were) taken from (muskrat) burrows at Muscatine, Iowa, in a single season. Twenty-six large snappers were removed from a single burrow, and from another runway 1420 pounds of

snappers were removed." Snapping turtle can also be located during hibernation in the mud by probing and can be removed with a hooked implement. Since the *Graptemys* and *Chrysemys* species follow the same general hibernating patterns as *Chelydra*, these shy species also should be most readily harvestable during hibernation, not during late spring, summer, or early fall, unless one resorts to nets, the draining of their habitats, or poisoning.

*Sternotherus*, on the contrary, with its pattern of winter hibernation in mud beneath heavy vegetation, might be quite difficult to obtain during the winter season. In short, the riverine species, with the exception of *Sternotherus*, should be most important economically from a period beginning in October and continuing to April or May, while box turtle should be of little importance during precisely the same period.

Referring to our breakdown by species again, it will be seen that at Riverton, box turtle is by far the more important species (70%) at the site, constituting more than double the percentage of the rest of the species combined. Such an emphasis on the taking of box turtle points strongly to a time period from late spring to early fall when box turtle is at a maximum of availability and the riverine species at a minimum. Swan Island, while it has a high percentage of box turtle (52.3%), has only a slightly lower percentage of riverine species (47.7%), which includes a significant percentage (13.2%) of *Sternotherus*. Such a pattern may reflect the taking of turtle during a period when *Terrapene* are still available, and when the solitary or shy riverine species, including *Sternotherus*, are easily procurable - namely early to middle spring or early to late fall. Robeson Hills, on the other hand has only 40.5% box turtle, with the riverine species most important. It must be remembered that box turtle would be only a few inches deep in the unfrozen ground during the early and late fall, so that with sufficient searching, individuals of this species could be recovered. But 50% of the turtle remains at Robeson are those of species that congregate in burrows or in the mud during winter, and it would seem that a winter correlation would be most suitable for a site which emphasizes *Chelydra* and *Graptemys/Chrysemys/Pseudemys* at the expense of *Terrapene*. *Trionyx* sp. has not been included since we lack data on the hibernation pattern, although one might expect that it would correspond to those of other riverine species, hence raising the figure for winter congregating species to 60%.

Of course, as we have already remarked, turtle was of relatively little importance at Robeson, regardless of species. But we suspect that this de-emphasis of turtle is part of a larger problem relating to social organization rather than to a simple matter of availability or non-availability of particular species of turtle. Briefly, we shall ultimately postulate that Robeson was used as a base for the exploitation of game in the Embarrass Valley and that, accordingly, small local species tended to be accorded less prominence than at the other sites with their more restricted hinterlands.

As a check, an analysis of the 1691 fragments of turtle shell identified as to genus at Modoc showed that 1375 (79%) were from aquatic species (Pseudemys, Chrysemys, Graptemys, Trionyx, Chelydra), while only 21% were from land turtle. Thus the turtle percentages for Modoc would not be out of line with those for our postulated winter occupation at Robeson, since Fowler (1959; Fowler and Parmalee, 1959) had assigned a fall and winter occupation to Modoc on the basis of migratory birds and quantities of fully formed deer antler.

Summarizing at this point, the proportions of various species of turtle suggest a summer occupation at Riverton, a spring/fall occupation at Swan Island, and a winter occupation at Robeson.

*Flooding.* Evidence for repeated flooding was found at Riverton in the form of numerous sterile bands of riverine silts between occupation layers. Thus, the possibility of occupation at Riverton is eliminated during a period extending from March through May, occasionally during early flooding in January and February, and more rarely during October and November. As noted in connection with the Riverton Site, the danger of flooding is very slight from July through September. Even though Swan Island is on the T-O, there is little indication of flooding, a pattern consistent with the considerable width of the valley in the vicinity of Swan Island

*Post Molds.* Post mold patterns indicating substantial dwellings were found at Robeson, while at Swan Island post molds were rare and there were only one sandstone and a few clay platforms. At Riverton, there were numerous clay platforms, but no indication of substantial superstructures thereon.

Pits of all types, including storage, were common at Robeson, rare at Riverton, and apparently rare, except in

TABLE 64

RATIOS OF POSTMOLDS AND PITS TO AREA OF EXCAVATION AT THE RIVERTON AND ROBESON HILLS SITES

| | | | |
|---|---|---|---|
| Robeson Hills | 130 post molds / 1312 square feet | = | 1 = 100/thousand square feet |
| Riverton | 3 post molds / 2400 square feet | = | .001 = 1/thousand square feet |
| Robeson Hills | 14 pits / 1312 square feet | = | .01 = 10/thousand square feet |
| Riverton | 2 pits / 2400 square feet | = | .0008 = ca. 1 thousand square feet |

the very bottom of the site, at Swan Island. In addition, the Riverton pits were all cylindrical or conical, with the constricted mouth storage pit of Robeson and Swan Island completely absent.

In order to quantify the above relationships, we have computed post mold and pit to area ratios for Test Trench 1 at Robeson Hills and Area X at Riverton, where large residential areas were stripped. All pits were counted regardless of point of origin if they intersected the surface of these areas, with the exception of the anomalous Features 12 and 13A at Riverton with the following results shown in Table 64.

That is, pits were ten times as plentiful and postmolds one hundred times as plentiful at Robeson as at Riverton! Apparently both the placing of posts and the excavation of pits were a considerably more important activity at Robeson than at Riverton.

*Nuts.* Carbonized nut shells were present at all levels in all three sites, but ethnographic data would cast doubt on the possibility of interpreting seasonality from the presence of such items. For example, the Caddoan Indians (Swanton, 1942) gathered nuts in the fall, stored them, and used them continuously until the following August. Among the Caddoans, at least, nuts would have been missing from the diet during only a single month of the year.

Similar problems would arise in respect to the use of other food plants for identifying season of occupation. Yarnell (1965: 75-76) states that, "About 40 of the (116) plant foods in the list are said to have been dried and stored for later use, especially during the winter. They include 23 fruits and berries, 6 bulbs and tubers, 5 nuts, wild rice, milkweed flowers, a tree lichen, and maple sugar. Five of these foods are available in the winter including 3 tubers, a cranberry, and a tree lichen. The fruits and berries that were stored include strawberries, juneberries, currants, gooseberries, raspberries, blackberries, currants, blueberries, plums, grapes, thornapples, and cranberries in order of seasonal availability. The nuts are hazelnut, beechnut, butternut, hickory nut, and acorn. The bulbs and tubers are onion, *wonkapin* (*Nelumbo*), *pin* or groundnut (*Apios*), 2 species of *wapato* or duck potato (*Sagitarria*), and crow potato (*Lycopus*)." Obviously, considerable caution should be used in assigning season of occupation on the basis of plant remains alone, and it would be highly desirable to use for such purposes those plants that generally were not stored for future consumption.

Watson and Yarnell (1966) further illustrate this point by stating of the plant associations of Salts Cave, Kentucky, that, "The 'all or nothing' distribution of Maygrass (either very abundant or very scarce) may mean that this species was not stored to any great extent. It is associated in a statistically significant way with the spring and summer species: strawberry and blackberry respectively. Interestingly enough, this associative group - maygrass, strawberry, and blackberry - also includes the very few remains of acorns. The distribution of the scanty acorn remains and their possible association with Maygrass and strawberry suggest that acorn utilization was considerably greater than indicated by the feces, and that stored acorns were an important food source."

During the 1963 field season at Riverton, Professor Richard Yarnell of Emory University collected samples from features that were primarily general midden areas around the living platforms of Area X. Pending the release of the final report, Yarnell (Personal communication, 1967), has courteously made available a preliminary statement on his analysis. Carbonized plant remains included hickory nutshell, walnut shell, acorn, hazelnut, "pignut," butternut shell, Chenopod, *Polygonum*, elderberry, persimmon, wild sunflower, and a bulb (possibly onion or lily). In commenting on these, Yarnell states: "it is not unlikely that chenopod, *Polygonum*, and sunflower are not food remains. All three are somewhat weedy and may have grown on the site during occupation. This is especially likely because of the disturbance indicated by the living floors. . .It would appear that the only important plant foods (quantitatively) were nuts with hickory nut, walnut, and acorn of major importance and "pignut," hazelnut, and butternut of minor importance. Persimmons and elderberries probably were eaten, and chenopod may have been used. Elderberry and perhaps *Polygonum* indicate late summer occupation. Otherwise, autumn occupation is indicated."

In some ways the assortment of plant remains seems a rather curious one, being notable for the lack of diversification, considering the number of potentially edible species available in the area during late summer and fall, and the degree of emphasis on three types of nuts. Elderberry, *Polygonum*, persimmon, and sunflower can only be described as rare, with the former appearing in three features, the last three in only one feature each, and the respective number of seeds for each being 6, 11, 1, and 1. To what extent this particular configuration may represent selective gathering, storage arrangements, natural accumulations of some seeds preservation factors, sampling error, or various combinations of these factors is not clear at present. If taken literally, the plant remains would tend to emphasize a fall harvesting period, with minor harvesting of late summer species, but considerable caution should be observed in advancing such an interpretation.

*Deer Antlers.* Few inferences could be made for seasonality from analysis of deer skulls, since very few suitable examples were found in the excavations. However, at Riverton two sections of skull with the bases of antlers, artifically broken, were found in Feature 32, in Area X. Deer have shed their antlers by late December or early January (sometimes two to four months later for those in captivity), the growth of new antler starts in May and full growth of the new antler is usually completed by the end of August in Illinois. The animals in Feature 32, then, should have been taken somewhere between the end of the summer and early winter.

A single skull section with antler attached was present at Robeson, with possible killing dates in a range from September to December (Paul Parmalee, personal communication), again pointing to a range anywhere from late summer to early winter.

There had also been hope that the data provided by Parmalee on the ages of deer teeth would provide clues to the season of occupation of the three sites, but this hope

vanished in a cloud of nebulous imponderables.

1. Only 30 jaws (7 from Robeson, 21 from Riverton, and 2 from Swan Island) were sufficiently intact to permit approximate aging, hardly providing an adequate sample. The amount of shattering in the massive sample of bone recovered from these sites was quite remarkable.

2. Ages were rarely expressible in less than five to six month units. Coupled with the protracted span of time for births in the spring and early summer (April-June), it would be possible to place a single specimen within any of three seasons. For example, a specimen indicated to be from eighteen to twenty-four months old could have been taken during the months of September, October, November, December, January, February, March, April or June, with only July and August excluded (provided that the bone wasn't actually somewhere between seventeen and twenty-five months old). Such a range hardly encourages one to assign it to a particular season.

## Interpretation of Seasonality

How can we interpret these bits of evidence, then? At Swan Island, there is little evidence of substantial shelter, few storage pits, high percentages of passenger pigeon, ducks and geese, and a balanced assortment of land and riverine species of turtle. If we regard these items as a linked set, then the only portions of the year which would accomodate the set as a whole would be spring and fall. Flooding would have prevented the occupation of Riverton in the spring, quite often in the winter, and occasionally in the fall. Riverton had no houses, very few pits, storage or otherwise, few migratory birds other than summer visitors, but deer skulls with attached antlers, and large quantities of land turtle. The plant remains are those of varieties that ripen in the late summer or early fall, with an emphasis on the latter. Again, taking these as a linked set, the most satisfactory correlation would be with summer and early fall. Robeson Hills, on the other hand, had numerous substantial houses, a plethora of pits, including the storage type, some migratory birds, and little turtle but with riverine species emphasized. In addition, the absence of muskrat, mink, otter, fox, and chipmunk, all of which were present at the other sites, might indicate occupation of Robeson Hills was occupied at a period when substantial shelter was desirable, storage of food emphasized, a small number of migratory birds were present in the Wabash Valley, and land turtle could not so readily be taken as riverine species. In short, the most likely season of occupation would be the winter.

Another curious anomaly exists which may be related to seasonal factors as reflected in subsistence and technological data. Deer constitutes 68% of the animal bone (52-75% in the various levels) (Fig. 21, 28) at Robeson and only 47% (31-63% in the various levels) at Riverton, while weapons constitute only 6-27% (Fig. 23) of the artifacts at Robeson, and 20-43% at Riverton. Thus, there would seem to be an inverse relationship between hunting and weapons at Robeson and a direct relationship between the corres-

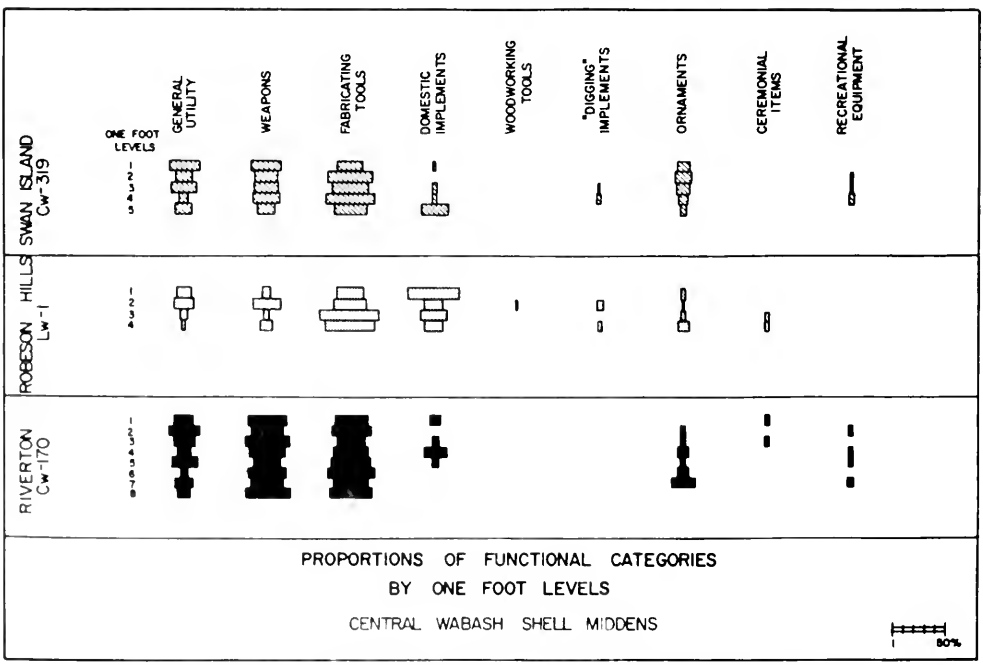


Fig. 23. Proportions of functional categories of artifacts by 1-foot levels, Central Wabash Valley shell middens

ponding items at Riverton. Perhaps these relationships can be explained as follows: Rue (1962: 94) states, "Yarding-. . .is. . .the best means of winter survival in the North. . . . Deer behave somewhat differently where the winters are mild. The nearest approach to yarding in the southern Appalachians is a gathering of deer in coves (large open places in wooded valleys) and on hillsides on which there are thickets of laurel and rhododendron." We shall assume that the winter pattern for deer in the Wabash is somewhere between that of the yearded deer of the North and the gathering in coves of the southern Appalachians. Now, Riverton is adjacent to La Motte Prairie and deer could have been taken only in the wooded valley bottoms or in the narrow wooded valleys cutting through the T-1, with few nearby areas suitable either for deer yarding or gathering in coves in the winter. Robeson, on the other hand, is in a hill zone typified by heavy wooded cover in both valleys and upland areas, with only minor prairie zones, and, presumably, with numerous sheltered glades suitable for concentrations of deer. We propose that at Robeson the large quantity of deer and the low number of projectile points may reflect group hunting or concentrations of deer during the winter, while the large quantities of deer and high number of projectile points at Riverton may indicate the taking of deer by individual hunters during the summer, at which time the deer are widely dispersed.

That variations in types of hunting procedures could be of seasonal nature is known from historic sources. For example, Newcomb (1956) states of the Delaware that, "Individual hunting seems to have been confined primarily to the winter months; communal hunts, however, took place in the spring, summer, and fall." Such a hunting pattern correlates with seasonal concentrations and dispersals of populations, and one would not expect precisely the same pattern for the Riverton hunters and gatherers that one finds for the agricultural Delaware. Perhaps a more appropriate example would be that of Mistassini (Rogers, 1963b:51) who are contemporary hunters and gatherers. For these people Rogers notes that hunting camps are established in late winter and that, "Whenever possible, all the men co-operate in making the kill (of caribou)."

That such an explanation is not implausible is indicated by other ethnohistoric data which provide models that could well lead to such artifact differentials in sites occupied by a single group of people. DeForest (1851) relates of the Indians of Connecticut that they followed a seasonal pattern involving fortified villages, summer fishing camps, winter hunting camps, and spring fishing camps on the seacoast for the taking of anadromous fish (shad and lamprey eels). It is not possible from the limited data provided by DeForest to go much further in providing the system with firm outlines, but such reconstruction is not essential to our present purposes. Instead, we wish to note variations in hunting practices which accompany the seasonal cycle.

DeForest (1851) remarks that the historic Indians used arrows tipped with points of chert, so that we should expect to find abundant evidence of their presence in the habitation areas. But that such would not necessarily be the case, is clearly indicated by subsequent statements.

"The Indians did most of their hunting alone, each man supplying himself and his family; but occasionally they united, and pursued the chase with twenty-five or thirty or even two or three hundred in company. . . . Another method of hunting was as follows: having, during the spring, taken notice of the haunts of the deer, they repaired to them, in bands of ten or twenty. . .if the distance was not too great, they were accompanied by their women and children. On arriving at the localities already marked, each man selected a district of two or three miles in extent, and built for himself a small hunting house of bark and rushes. His traps, thirty or forty in number, he set in the deer paths, and near the springs in his district; and, every two days, went the rounds to visit them. . . .When winter came on, the trappers left their rush houses, shouldered the dried meat which they had collected during their stay, and returned to their wigwams or villages, sometimes travelling fifty or sixty miles through the snow." (DeForest, 1851: 7-8).

In an even more extreme example, Cressman (1964: 54) observes that among the sedentary fishers of the Columbia River "Hunting was of little importance. Lewis and Clark saw bands returning from the hunt empty handed. Hunters were most often successful when they followed deer in deep snow and, overtaking the exhausted animals, clubbed them to death."

Hunting systems of these types with modifications, might well be used to explain how both Robeson and Riverton could show the same emphasis on the taking of deer, but decided differentials in the production of projectile points. That is, following our previous suggestions, summer hunting at Riverton may have emphasized individuals using chert tipped weapons; winter hunting at Robeson, either group hunting away from the settlement, or utilization of traps or clubs rather than darts and spears. Particularly in the latter case, we should expect the manufacture of projectile points to be a very minor activity at the settlement, even though deer meat provided one of the two major sources of animal protein in the diet.

We pray leave for one further speculation on the nature of the differentials observed between Robeson and Riverton, drawing on Hickerson's (1965) observations on the role of buffer zones in intertribal relationships in the Midwest. Hickerson notes that a buffer zone existed between the Santee Sioux and the Chippewa in Minnesota and Wisconsin. This contested area was rich in game both as the result of favorable ecological conditions and the inability of either group to maintain more than transitory exploitation of its resources because of the dangers of attack within the zone. During the winter, when the taking of deer in the zone became a matter of survival, deer could be most easily taken by fence surround during migration to the yarding area or by hunting of the deer in the relatively confined area of the yards. But as Hickerson (1965:43) notes, such hunting was undertaken only with considerable risk, and that the zone could not be entered in safety except by war parties or large hunting partiess prepared at a moment's notice for war."

We have pondered the possiblity that similar factors may also have been important in the Wabash-Embarrass

dramages during the winter occupation at Robeson. Such speculation has been engendered by hypothesising that deer would have been more important for actual survival during the winter months than at other times of the year when alternative foods would have been available in greater quantities, by noting that the area of the Riverton Culture is surrounded by sites with artifacts that pertain typologically to alien late Archaic and early Woodland cultures; and by hypothesizing, finally, that necessity may have led to greater competition during the winter in areas common to the frontiers of the Riverton Culture and their alien neighbors. In such a situation, communal hunting of the surround type could have been dicated not only by the seasonal habits of the deer themselves but also by the dangers of exploiting a zone not noramlly utilized nor controlled during other seasons of the year.

While the foregoing speculations may be plausible and not inconsistent with patterns known for historic times, we reiterate that our data are insufficient to go beyond the level of conjecture. Only more sophisticated research techniques will provide suitable data from intensive excavation and reconnaissance in the area of the Riverton Culture and its neighbors to permit verification or rejection of our hypotheses about the meaning of the dissimilarities in projectile point concentrations at Riverton and Robeson and the similarities in the importance of deer as a major food item, and the similarities in projectile point concentration at Swan Island and Riverton and the dissimilarities in subsistence pattern. But two very simple operations might throw considerable light on the possibility of a buffer zone around the Riverton Culture, namely an intensive reconnaissance of the area to see if the peripheral areas are devoid of sites indicating prolonged occupation by any of the cultures involved and sufficient excavation in sites of the alien cultures to permit their dating as being either contemporaneous or non-contemporaneous with Riverton.

Turkey also follows a seasonal pattern, with the birds coming together as winter flocks, which separate into widely scattered nesting pairs in the spring (Parmalee, 1963). Perhaps the percentages of turkey at Swan Island (35%), Robeson (56%), and Riverton (93%) are in part the result of such seasonal patterns. One might interpret the low percentage at Swan Island as being a result of the spring scattering of turkey and the presence of large numbers of migratory birds, the midium percentage at Robeson as reflecting the presence of large numbers of migratory birds, the medium percentage at Robeson as reflecting the presence of a residue of ducks and geese in the area and winter flocks of turkeys, and the very high percentage at Riverton as simply being the result of the virtual absence of migratory birds, with turkey the only bird having economic importance even though they were widely scattered in summer.

At this point, we shall draw upon our previous data and proceed to slide down Occam's Razor to produce the following seasonal round:

Riverton — mid-May to late September occupation
Swan Island — late September to mid-November occupation
Robeson Hills — mid-November to mid-March occupation
Swan Island — mid-March to mid-May occupation

For comparative purposes, we shall introduce data on the seasonal round of the Cree-Ojibway, a contemporary hunting and gathering group of northern Ontario (Rogers, 1963a). This group is representative of a large area of northeastern North America with very similar patterns found among the Mistassini (Rogers, 1963b: Chart 1), the Montagnais (Leacock, 1954) and even the agricultural Huron (Tooker, 1964). The contrast, in some ways will be quite marked, since the Ojibway occupy a very marginal area in comparison to the rich potential of the Wabash Valley.

Traditionally the Ojibway spent most of their time as isolated hunting groups and, "Only in summer did the members of the band usually come together for any length of time. . . . With the approach of fall, the people separated, each hunting group moving to its accustomed hunting area. . . . Each hunting group appears to have been quite small, being composed of two to four closely related nuclear families numbering in all ten to fifteen people under the direction of the eldest male. The hunting group may have closely corresponded to or been identical with the extended family. Camps were first established near rapids where fish traps could be built. Large quantities of white fish were caught and dried for the winter. After this the hunting group as a rule moved again, this time to a suitable place for hunting. . . . Immediately after freeze-up the members of the band gathered for a feast. Or they waited until the latter part of December when they moved back to the place where they had spent the summer, where feasts were held and in general a festive few weeks ensued.

"After the first of the year the people separated once more into their respective hunting groups. . . . The women and old people fished while the more actives went hunting. . . . With the arrival of spring, life became easier. Fishing was highly productive, large numbers of waterfowl returned from the south and bear were occasionally killed. During this period, the hunting groups moved to the place where they had left their canoes in the fall, to insure themselves a means of travel once the ice melted. Immediately after break-up the people gathered at the summer encampment for a feast at which they danced and sang to the rhythm of a drum (Rogers, 1963a:71-72).

"In the past, band leaders lived in log cabins, but only at the summer encampment. Other individuals usually lived in one of three types of conical lodges, the particular variety depending upon the time of year. Large lodges, in the form of a doubled pitched roof with a door at each end, were built when several families wished to live together, when a man had several wives or when a dance or feast was held. During the times that people were on the move or the men were hunting, they sometimes built an open topped shelter for the night (Rogers, 1963a: 70)."

Rogers concludes "The Round Lake Ojibway over the years have undergone two major changes, which have taken place concurrently. First, the Round Lake Ojibway have moved from a state with a high degree of mobility to one in which there is a considerably lessened degree of mobility.

With a reduction in mobility there was a concomitant change from rather temporary encampments to semi-permanently occupied villages. Second, group size has increased both through amalgamation of former bands and through natural population increase.

"These changes can be seen as arising in the following manner. First, focal points were established by Euro-Americans–stores, churches and schools–each of which had something to offer that the Indians either independently desired or were convinced they needed."

Today the Ojibway remain in villages eight to nine months of the year, in some cases for the entire year, and the "Construction of homes gave a permanence to the village that the summer encampment with its temporary shelters never had (Rogers, 1963a: 81)."

In the foregoing account, we have sites that are roughly comparable to those of our seasonal round of the Riverton Culture, which, to anticipate, we have termed settlements, transient camps, base camps, and hunting camps. The major difference lies in the season of occupation. That is, the Riverton settlement was occupied in winter, the Ojibway in summer; the Riverton base camp in summer, the Ojibway in winter. But the difference, we feel, can be explained on the basis of subsistence potential. The Ojibway could come together only during the summer; when there was sufficient food, animal and vegetable, to support a concentration of population. With the Riverton people, mussels would have served as a mainstay of diet throughout the year, but it might have been quite advantageous to assemble larger populations during the winter for group exploitation of the abundant game resources. During the summer, the rich natural harvest would have permitted smaller Riverton groupings to detach themselves from the winter "togetherness" and to provide quite amply for themselves. The Ojibway, on the other hand, could not have remained together for the winter, but were forced to scatter widely into base camps in order to exploit the scarce and widely dispersed game.

Another important point in the Ojibway account is the mechanism by which sedentism appeared. With the appearance of the store, subsistence in one spot could be assured through an economic system of exchange of natural products and labor. Shell middens apparently stood in the same relationship to numerous late Archaic groups as stores, without the necessity of any economic exchange. But the recognition of the economic importance of concentrations of river mussels probably accounts for the introduction into the seasonal round of sites which were occupied for months at a time, with the rapid accretion of deep midden deposits. Prior to this time, Archaic sites were very shallow, indicating repeated sporadic occupation, with the exception of some rock shelters, which were occupied much more intensively because of the natural protection that they provided.

One of the interesting items in the Cree-Ojibway account is the mention of the association between summer and communal activities of a ceremonial nature, since such an association is common in eastern North America in historic times from the Plains to the Atlantic and from southern Canada to the Gulf of Mexico, with, of course, an extension to include late spring and early fall. Out of curiosity, we decided to see if a similar pattern might be present in the Riverton Culture. One might expect to find greater quantities of the artifacts that we have termed ceremonial (turtle shell rattles, flutes, and pipes) in sites with intensive ceremonial activities, lesser quantities in sites where these activities were not being emphasized. The results are shown in Table 65.

TABLE 65

PROPORTIONAL VARIATION OF CEREMONIAL EQUIPMENT BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Pipes* | Rattles | Flutes |
|---|---|---|---|
| Riverton | 3 | 2 | 15 |
| Swan Island | 1 | | 2 |
| Robeson | 1 | | 1 |

*Totals include probable examples and specimens from private collections.

Of the twenty-five items assignable to this functional category, twenty, or 80% were recovered at Riverton, which we have already decided was a summer base camp. Since the quantity of midden excavated at Robeson was considerably in excess of that at Riverton, we doubt that sampling error can be invoked to explain the very sizeable differences between the two sites. It would seem that there is a very good possibility that the association between summer and intensive ceremonial activity is a very old one in North America, with such a linkage hardly being surprising, of course, when one considers the exigencies of life among hunting and gathering groups during the winter, late fall, and early spring, with summer probably being the only season during which prolonged population concentrations were feasible.

## Subsistence Pattern

We have already commented briefly on migratory birds, turtle, deer, and the importance of river mussels at the large sites. But there are other important facets to be noted about the subsistence pattern. In tabular form, the faunal data (Appendix I) can be summarized as shown in Table 66, excluding mussels and the quantitatively insignificant reptile and amphibians.

TABLE 66

PROPORTIONAL VARIATION OF CATEGORIES OF FAUNAL REMAINS BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Robeson | Riverton | | Swan Island |
|---|---|---|---|---|
| Deer | 68% | 47%* | 40%† | 27% |
| Misc. Small Mammals | 10% | 17% | 24% | 20% |
| Turtle | 8% | 24% | 21% | 31% |
| Fish | 5% | 9% | 10% | 17% |
| Birds | 7% | 3% | 5% | 5% |

*1961 Test Pits.

†Area X, excluding the culturally mixed plow zone, the surface, and Test Pit Alpha.

TABLE 67

PROPORTIONS OF FAUNAL REMAINS IN CENTRAL WABASH VALLEY SHELL MIDDENS BY ONE-FOOT LEVELS

| Level | Deer % | | | Misc. Mammals % | | | Misc. Birds % | | | Ducks Geese % | | | Turtle % | | | Fish % | | | Amphibia % | | | Reptilia % | | | % Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ro* | Sl* | Ri* | Ro | Sl | Ri | Ro | Sl | Ri | Ro | Sl | Ri | Ro | Sl | Ri | Ro | Sl | Ri | Ro | Sl | Ri | Ro | Sl | Ri | |
| 1 Ro | 59 | | | 14 | | | 4 | | | - | | | 14 | | | 9 | | | - | | | - | | | 100 |
| 1 Sl | | 17 | | | 24 | | | 5 | | | 5 | | | 33 | | | 16 | | | - | | | - | | | 100 |
| 1 Ri | | | 31 | | | 18 | | | 3 | | | - | | | 37 | | | 9 | | | - | | | 2 | 100 |
| 2 Ro | 52 | | | 13 | | | 12 | | | 2 | | | 13 | | | 6 | | | 2 | | | - | | | 100 |
| 2 Sl | | 21 | | | 26 | | | 7 | | | 2 | | | 31 | | | 12 | | | + | | | - | | | 99+ |
| 2 Ri | | | 59 | | | 10 | | | 3 | | | - | | | 18 | | | 10 | | | - | | | - | 100 |
| 3 Ro | 60 | | | 16 | | | 9 | | | 1 | | | 10 | | | 3 | | | 1 | | | - | | | 100 |
| 3 Sl | | 37 | | | 19 | | | 3 | | | - | | | 19 | | | 21 | | | + | | | - | | | 99+ |
| 3 Ri | | | 46 | | | 26 | | | 6 | | | - | | | 16 | | | 6 | | | - | | | - | 100 |
| 4 Ro | 75 | | | 4 | | | 7 | | | 1 | | | 10 | | | 3 | | | - | | | - | | | 100 |
| 4 Sl | | 29 | | | 20 | | | 3 | | | 1 | | | 29 | | | 18 | | | + | | | - | | | 100+ |
| 4 Ri | | | 45 | | | 19 | | | 4 | | | - | | | 18 | | | 13 | | | - | | | - | 99+ |
| 5 Ro | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 5 Sl | | 14 | | | 14 | | | 1 | | | 2 | | | 53 | | | 16 | | | + | | | - | | | 100+ |
| 5 Ri | | | 47 | | | 18 | | | 2 | | | - | | | 26 | | | 6 | | | - | | | + | 99+ |
| 6 Ro | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 6 Sl | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 6 Ri | | | 43 | | | 14 | | | 1 | | | - | | | 37 | | | 5 | | | + | | | - | 100+ |
| 7 Ro | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 7 Sl | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 7 Ri | | | 46 | | | 13 | | | 4 | | | - | | | 32 | | | 5 | | | - | | | - | 100 |
| 8 Ro | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 8 Sl | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| 8 Ri | | | 63 | | | - | | | 6 | | | - | | | 25 | | | 6 | | | - | | | - | 100 |
| Area X Ro | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| Area X Sl | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | - | | | |
| Area X Ri | | | 40 | | | 24 | | | 5 | | | - | | | 21 | | | 10 | | | - | | | - | 100 |

*Ro = Robeson Hills Sl = Swan Island Ri = Riverton

As one would expect, deer is very important at all three of the sites, but there would seem to be considerable variation in the degree of importance among the various sites, with a remarkably low quantity being taken at Swan Island. On the other hand, turtle and fish, which could be obtained in the river and nearby sloughs, accounted for 48% of the animal bone at Swan Island, 33% at Riverton (31% in Area X), and only 13% at Robeson. And small mammals were 20% at Swan Island, 17% at Riverton (24% in Area X), and only 10% at Robeson. Thus the subsistence pattern at Swan Island would seem to reflect a foraging pattern emphasizing locally available fish, turtle, raccoon, squirrel, and rabbit. Perhaps strengthening this conclusion, is the considerable quantity of musk trutle at Swan Island, a species not taken at the other two sites, and one which is described by Cahn (1937) as being inedible by virtue of its unpleasant taste and aroma. Please note, that we are not minimizing the absolute significance of the quantities of food provided by deer and river mussels at any of these sites.

Another way to show the contrast among the various categories of vertebrates at the three sites is to compute the ratios of important categories (Table 68).

TABLE 68

PROPORTIONAL VARIATION OF INTER-CATEGORY RATIOS OF FAUNAL REMAINS BETWEEN COMPONENTS OF THE RIVERTON CULTURE

| | Riverton | Swan Island | Robeson |
|---|---|---|---|
| Mammals/Birds | 24.5 | 15.8 | 14.6 |
| Fish/Birds | 0.7 | 1.9 | 0.4 |
| Turtle/Birds | 1.0 | 1.1 | 0.3 |
| Deer and Elk*/ Other Vertebrates | 0.6 | 0.2 | 1.2 |
| Mammals/Fish | 25.8 | 8.5 | 40.4 |
| Mammals/Turtle | 24.9 | 14.3 | 49.1 |

*The counts used here (Appendix 1) are too low, since many deer and elk would be included among the unidentified large mammal bones, but we assume that the amount of error would be consistent for all three sites. Other categories of bones include both bone unidentifiable as to species and those assigned to species.

Each site has a very distinctive pattern and contrasts well with the other two sites. At Robeson, the marked emphasis on mammalian species, particularly deer, is shown, as well as a lesser emphasis on birds, and relatively small dependence on fish and turtle.

TABLE 69

NUMBER OF SPECIES PER ONE-FOOT LEVEL IN THE CENTRAL WABASH VALLEY SHELL HEAPS

| Level | Robeson | Swan Island | Riverton |
|---|---|---|---|
| 1 | 5 | 22 | 12 |
| 2 | 16 | 27 | 22 |
| 3 | 10 | 28 | 18 |
| 4 | 7 | 29 | 21 |
| 5 | - | 25 | 16 |
| 6 | - | - | 20 |
| 7 | - | - | 14 |
| 8 | - | - | 4 |
| Average | 9.4 | 25.9 | 16 |
| Range | 5-16 | 22-29 | 4-22 |

The number of species present at a site also shows considerable range: 4-19 per level at Robeson, with an average of 9 species; 3-25 at Riverton, with an average of 16 species per level; 19-30 at Swan Island, with an average of 26 per level. We shall reiterate at this point that Swan Island has only one or two ancillary camps, in contrast to Robeson and Riverton. In short, the subsistence and settlement pattern data suggest that Swan Island was occupied for relatively short intervals as a center for foraging, and that Robeson and Riverton were occupied for somewhat more lengthy periods, with the establishment of dependent camps and an emphasis on larger camps at the expense of small game, fish, and turtle.

Unfortunately, little has been done as yet with the interpretation of molluses, of which very considerable samples were saved at all three sites. Parmalee (Appendix 1) reports that this very important item in the diet of the Riverton peoples was obtained from a very wide range of aquatic habitats, including both deep and shallow water. Apparently, no possible source of molluses was left unexploited. Riverine snails such as *Campeloma* sp. may also have been eaten, although the harvesting of such food may have been incidental to the gathering of mussels. Land snails, which are quantitatively insignificant, probably are present only as inhabitants of the site, rather than as any major food source.

We shall anticipate our final interpretation by characterizing the subsistence pattern at Swan Island as the sort one might associate with a transient group, that at Riverton as that of a group based at one site for a rather lengthy period of hunting and gathering, and that at Robeson as that of a rather settled group pursuing specialized subsistence activities, perhaps in part through communal effort.

## Features

We shall not repeat previous comments on houses and pits of various types from the section on seasonality. Hearths, both of the unprepared and shallow clay basin types, are present in profusion at all three of the sites and probably indicate only the need for constant preparation of mussels and other items of the diet. In respect to burials, three were excavated at Riverton, none at Swan Island, and five at Robeson. None of the sites could be considered a cemetery, although visual impressions at Robeson as the bulldozers swept by left us with a feeling that Robeson may have had a considerable number of burials. It would seem, then, that Robeson was used rather frequently for burials, Riverton less frequently, and Swan Island seldom, if at all. At the latter site there were a few stray phalanges and other fragments in the midden.

Since deer was such an important component of the subsistence pattern, it seemed desirable to see what could be learned about the deer population available to the Riverton peoples and their preferences in harvesting this resource. While our sample of mandibles for estimating the age of deer is very small, we do have data provided by Parmalee on thirty mandibles that were sufficiently intact to permit approximate aging.

TABLE 70

DISTRIBUTION OF AGES OF DEER MANDIBLES FROM CENTRAL WABASH VALLEY SHELL HEAPS

| Age in Years | Quantity | Percent of Total |
|---|---|---|
| 0-0.5 | | |
| 0.5-1.0 | 9 | 30 |
| 1.0-1.5 | 3 | 10 |
| 1.5-2.0 | 4 | 13 |
| 2.0-2.5 | 3 | 10 |
| 2.5-3.0 | 2 | 7 |
| 3.0-3.5 | - | - |
| 3.5-4.0 | 3 | 10 |
| 4.0-4.5 | 1 | 3 |
| 4.5-5.0 | 3 | 10 |
| 5.0-5.5 | 1 | 3 |
| 5.5-6.0 | 1 | 3 |
| Total | 30 | 99 |

It would seem that there was an emphasis on the taking of deer between the ages of six months and a year, with other age groups being harvested in about equal proportions, but with declining frequencies in several of the age groups above the age of three.

Such a distribution pattern differs considerably from that obtained by McGinnes and Reeves (1957) for their sample of nineteen jaws from two late prehistoric sites in Virginia. They point out that 37% of the mandibles were from deer five years of age or older, which would point to a deer population that, "...was not thrifty or growing, as is indicated by a lack of numerous individuals in the younger age groups so characteristic of an expanding herd." Our Riverton Culture sample would, in fact, correspond to that expected from a thriving deer population, although we cannot accept this conclusion too literally, since our figures are based on combined samples from all levels at all sites. If there were sufficient mandibles to undertake an internal analysis of sites by sequential strata, we might find a very different picture through time as the local population continued to exploit this resource. But had older deer been present in any quantity in the middens, they should have appeared in higher proportions in the sample, since there would have been equal chance for their representation. Accordingly, we conclude that while there may have been fluctuations in the age proportions of the deer population, it would not have been a declining population of the sort associated with the sites in Virginia.

McGinnes and Reeves (1957) also point out that in modern deer herds, fawns account for the greatest number of deer killed. These are the easiest to kill, and as McGinnes and Reeves (1957) state, "...the Indian was an indiscriminate hunter...", killing for food whenever it was available and needed. Thus Riverton hunting practices seem to conform closely to contemporary and historic hunting patterns associated with the proliferating deer herds of today.

We conclude, therefore, that deer were a stable, and even expanding, food resource for the Riverton peoples, and that their main selectivity in the hunting of deer was in the taking of the youngest and most easily killed deer that would provide an adequate source of meat.

There is additional evidence that they were not excessively exploiting important food resources. Parmalee (Appendix I) reports that there is no change in size of mussel shell from top to bottom of the middens. One would expect a decrease in size if the mussel beds were being too heavily collected over a several hundred year period. Originally we had thought that such might be the case, since identifiable shell is virtually missing from the upper two feet of all three sites, but we are now inclined to view this anomaly simply as the result of the leaching of the upper portions of the middens since there are numerous fragments of shell in these same zones.

Perhaps the most important conclusion that can be drawn from the foregoing is that two basic subsistence items, deer and mussels, were present in sufficient quantity that normal harvesting would not seriously diminish the subsistence base necessary for sustaining a population organized as a semi-sedentary group.

Assuming a relatively stable deer population, we can now attempt to explain another curious anomaly in subsistence pattern among the sites, namely the gross differences in quantity of elk, utilizing in our interpretation previous inferences about seasonality, types of hunting techniques, differences in subsistence patterns, and differences in the habits of elk and deer. At Swan Island three probable elk bones were recovered (0.3 percent of identifiable bone) while at Robeson only a single example was found (0.2 percent of identifiable bone). At Riverton, on the other hand, 60 bones (2.0 percent of the identifiable bone were widely distributed within the site *both* horizontally and vertically, with only 16 of these being listed as probably elk (Appendix I). Even allowing for the much larger sample of bone from Riverton, it still does not seem likely that sampling error can be invoked as an explanation in view of the wide coverage of the midden area at Robeson Hills and the rather sizeable samples of bone that were obtained from both Robeson Hills and Swan Island. If one were to compare only the five test pits at Swan Island and the five test pits at Riverton from the 1961 season, there was available for analysis a total sample of 7,420 bones from Swan Island and 9,176 bones from Riverton. From these samples, only three possible elk bones were noted at Swan Island, while 21 elk bones were identified for Riverton, a ratio of 7:1 for the two sites.

Since the range of *C. canadensis* extends well into southern Tennessee (Hall and Kelson 1959: II, Map 489), all of the Wabash Valley was within the normal distribution pattern of elk in historic times, and elk should generally have been as numerous in the areas around both Swan Island and Robeson Hills as in the area around Riverton, the general ecological conditions being the same throughout the relatively small territory occupied by peoples of the Riverton Culture.

Why, then, would not the proportions of elk be much the same as those for deer, since the habits of the two species are similar and an elk yields far more meat and raw materials than a deer? Following Jackson (1961), one might note the following differentials:

1. The habitat of deer is variable, but it prefers woodland borders. Of the habitat of elk, Jackson states that

it consists of, "Woodlands, forest borders, and openings, bushland, and edges of grasslands and prairies, showing some preference for the vicinity of lakes, bogs, and marshes."

2. In respect to seasonal movement, it is stated of the deer, "No true migrations are performed by the whitetail. It goes to and from its feeding ground each day. During winters of heavy snow it sometimes travels a considerable distance to a feeding ground. . . ." Of the elk, "We do not know that the eastern elk performed. . . extensive migrations. There is reason to believe however, that in smaller numbers it engaged in a seasonal movement to and from its feeding grounds."

3. Major differences are noted for subsistence pattern, the deer being described by Jackson as being primarily a browser, with only a small proportion of its food obtained by grazing. For the elk, "Some seasonal preferences mark the food habits of the elk. It both grazes and browses. In the spring it grazes extensively on grasses, sedges, and weeds. During the summer and autumn it grazes some on grass and browses on shrubs and trees. During the winter it procures most of its food by browsing on shrubs and trees."

4. In respect to population pattern, the deer is said to be ". . .not strictly a colonial animal, though it gathers in small groups. It is much less socially inclined than the elk. . . ." which is, ". . . .the most highly social of any of the deer that have in recent times inhabited Wisconsin. It is colonial in habits, and there is little fighting in the herd. . ." But Cory (1912) also notes that, "In summer the (elk) herds are much smaller, the animals being scattered in wandering bands over a much larger territory."

Thus the elk might be characterized in contrast to the deer as having a more variable habitat, being more prone to seasonal movement and shifts in population pattern, having a seasonal subsistence cycle based upon different types of food plants, and as being more social and colonial than the deer.

We might conjecture, then, that the elk during their winter browsing phase may have moved as colonial units from the confines of the valley to interior woodlands as browse became scarce, while the more sedentary and less social deer remained more or less within the same area throughout the year. If we are correct in our assumption of a communal hunting pattern at Robeson during the winter, it might follow that more deer would be taken in local hunting drives than elk. It should be remembered that deer constituted 68 percent of the vertebrates at Robeson, and, certainly, if elk had been present in any number in the area, it should have been taken in quantity as well.

During the browsing and grazing phase of summer and autumn, one might expect to find the dispersed bands of elk in the mixed prairie and woodland areas of the valley and its borders, i.e., in close proximity to the summer occupied Riverton Site, where it could be easily taken by individual hunters, since Jackson (1961) states of the elk that "It is easily approached and, once located, easily shot."

There remains the problem of the scarcity of elk at Swan Island, since one might expect that elk during their spring grazing and autumn grazing and browsing would have been in the vicinity of the prairies and woods not far from the site. We can only reiterate that a different subsistence orientation apparently prevailed at Swan Island, having previously pointed out the decreased emphasis on the taking of deer at this site and the increased emphasis on small game and the resources of the river and its sloughs.

## Technology

Throughout the preceding chapters, artifacts have been classified under the functional categories of general utility tools, weapons, fabricating and processing tools, domestic implements, woodworking tools, "digging" tools, ornaments, ceremonial items, and recreational equipment. Each of these was further divided into items of specific function; e.g., general utility tools into scrapers, knives, etc., weapons into hunting and fishing equipment, fabricating and processing tools into chert working implements, flensing tools, chiseling implements and micro-perforators. (The latter item undoubtedly belongs within the larger category of perforators, but we were interested in seeing its distributional pattern as contrasted to the other items within the category.)

For our present purposes, we shall disregard the major functional categories of woodworking tools, digging implements, ornaments, ceremonial items, and recreational equipment, since all of these were numerically small and only moderately informative as to the nature of the settlement system.

General utility tools were fairly important, constituting from 10 to 20% of the various levels at Riverton, from 9 to 28% at Swan Island, and from 7 to 20% at Robeson, but the weapons, fabricating and processing tools, and domestic implements showed more interesting variations.

## Weapons

At Robeson Hills, weapons were present in quantities ranging from 4 to 13% of the total artifacts (excluding a workshop area), at Swan Island from 17 to 27%, at Riverton from 29 to 43%. In preceding sections we have already suggested what these variations might mean in terms of other cultural factors: high percentages at Swan Island correlated with extensive hunting of small game: low percentages at Robeson, with group hunting of deer; and at Riverton, high percentages correlated with the individual hunting of deer and game. We should also point out that projectile points and blades are the only implements definitely associated with the ancillary camps near Robeson and Riverton, e.g., one of these latter camps, Lowe No. 2 (Lw-365), has been actively collected by Mr. Orlin Stephens of Robinson, Illinois. Of the twenty-two Riverton artifacts, 18 (82%) were Riverton points, and 4 (18%) were Riverton knives. (Practically all of these ancillary camps have artifacts from earlier and later cultures, but here again, the artifacts are usually limited to projectile points, knives, scrapers, and an occasional drill. Obviously, these sites have functioned as camps throughout their history.)

### Fabricating and Processing Tools

At Robeson Hills these artifacts were 27 to 56% of the total artifacts, 29 to 44% at Riverton, and 30 to 44% at Swan Island. These percentages do not seem significantly different, although the high proportions of 48 and 56% in the bottom two levels of Robeson may ultimately prove to have some interpretative importance. And it is no surprise to learn that there were no chert working implements recovered from the bottom levels and sub-soil pits of Robeson, although it is comforting to observe that there were only five chert projectile points and very few other chert implements or chert flakes in these same bottom levels.

But certain notable differences do appear in connection with specific categories of fabricating and processing tools. As one might expect, perforating implements and the putatively associated grooved sandstone abraders constitute a high percentage of the total artifacts in this category at all sites, with the former ranging from 50 to 75% at Robeson, from 15 to 50% at Swan Island, and 25 to 70% at Riverton. Perforating implements, then, seem to have rather more significance at Robeson than at the other two sites. But the really striking differences are in connection with sewing and weaving implements, flensing tools, and micro-perforators.

Thirteen bone shuttles were found at Swan Island (7 to 25% in the various levels), twenty-four at Riverton (0 to 25% in the various levels of the 1961 test pits), but only three specimens (5% of Level 2 and 11% of Level 3) at Robeson Hills. Might these weaving implements, then, correlate in part with the weaving of nets for the taking of fish, in view of the lack of fishhooks and the importance of fish at the first two sites? Certainly, they are conspicuous for their rarity at Robeson, where fishing was of little importance.

The distribution of flensing tools also shows considerable variation. At Robeson, they were common (5 to 24%), at Swan Island somewhat less common (0 to 22%), but only one example (7%) was recovered from the stratigraphic pits at Riverton, and remains the sole example definitely in Riverton Culture context from the now extensive excavations at Riverton, other than surface or plow zone finds.

While the quantitative differences among the sites in respect to gouges might mean nothing more than differing degrees of emphasis on the manufacturing of the implement at one or more of the sites, we do not believe that such a factor alone can constitute sufficient explanation for the variability. All of the gouges, with the exception of a simple gouge from Riverton, show wear resulting from considerable usage. Thus quantitatively, the activity associated with the artifact also varied from site to site as can be shown by comparing the ratios of shuttles (weaving) to gouges (hide-working), omitting from our calculations examples from the surface and the plow zone:

| | Shuttles | Gouges | Ratio |
|---|---|---|---|
| Robeson Hills | 3 | 10 | 3.33 |
| Swan Island | 13 | 6 | 0.46 |
| Riverton (1961, 1963) | 13 | 2(1?) | 0.15 |

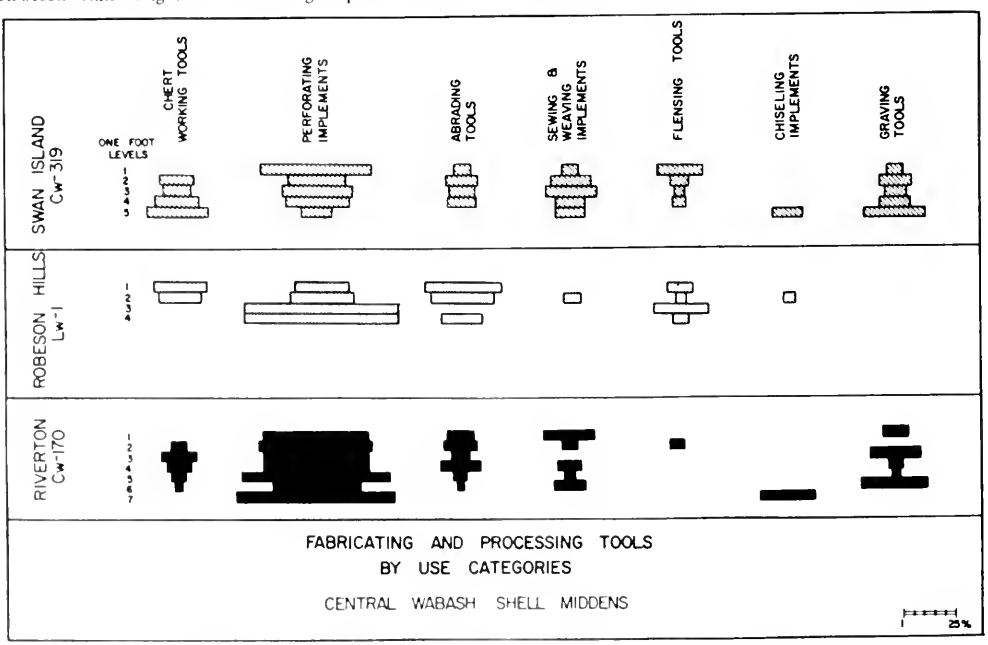


Fig. 24. Proportions of use categories of fabricating and processing tools within 1-foot levels, Central Wabash Valley shell middens.

At both Swan Island and Riverton weaving implements are quantitatively and relatively more important than those relating to hideworking, although there is somewhat greater emphasis on the latter activity at Swan Island than at Riverton. This is not to say that weaving activities were identical at the two sites, since as we have mentioned earlier, the weaving implements at Riverton consist primarily of simple shuttles, while those at Swan Island include a diversified array of types, with the implication that the products may have included a range of items such as cloth, nets, and mats.

Perhaps seasonality must again be invoked to furnish a basis for constructing a hypothesis relating to the quantitative variation of gouges among the sites. First of all, there is good documentation historically for seasonal variation of clothing in eastern North America, both in type and in quantity. (See, e.g., Rainey, 1956: 15-17). Thus summer garb was frequently no more than a breech cloth or a skirt, supplemented by a skin cloak, while lists of winter clothing include leggings, mantles, robes, and mocasins, with animal hides being a favored raw material for these items among many tribes. Furthermore, animal skins are in their prime condition during the winter season. Perhaps the differentials between Robeson Hills, a winter site, and Riverton, a summer site, derive from differences in basic clothing needs and seasonal variations in the quality of the requisite raw materials, namely the skins of the animals being utilized. Swan Island, with a spring and/or fall occupation, would be intermediate between the former sites as the result of lesser demand for heavy clothing and the lesser availability of prime raw materials than at Robeson.

The preceding comparisons between weaving and hideworking implements may also be useful in determining the function of items such as bone awls which are sometimes interpreted as equipment associated with hideworking. If bone awls are linked primarily to hideworking, then they should show approximately the same ordering of proportional relationships to weaving implements as do the gouges, the function of which has been determined by the primary attributes of the implements.

First of all we shall simply compare the proportions of all awls regardless of type, excluding examples from the surface and plow zone:

| | Shuttles | Awls | Ratio |
|---|---|---|---|
| Robeson Hills | 3 | 40 | 13.3 |
| Swan Island | 13 | 20 | 1.5 |
| Riverton (Combined) | 13 | 59 | 4.5 |

Using individual types, the following results were obtained:

| | Shuttles | Cannon Bone Awls | |
|---|---|---|---|
| Robeson Hills | 3 | 7 | 2.3 |
| Swan Island | 13 | 3 | 0.2 |
| Riverton (Combined) | 13 | 17 | 1.3 |

| | Shuttles | Splinter Awls | |
|---|---|---|---|
| Robeson Hills | 3 | 20 | 6.7 |
| Swan Island | 13 | 5 | 0.4 |
| Riverton (Combined) | 13 | 18 | 1.4 |

| | Shuttles | Turkey Bone Awls | |
|---|---|---|---|
| Robeson | 3 | 1 | 0.3 |
| Swan Island | 13 | 0 | 0.0 |
| Riverton (Combined) | 13 | 9 | 0.7 |

The results of the foregoing comparison are inconclusive. The highest ratios for cannon bone awls, splinter awls, and for awls in general are those obtained for Robeson, but Swan Island, where hideworking was also important, consistently has the lowest ratios. And the ratios for Riverton, where hideworking was of minor importance, are from three to six times greater than those for Swan Island. Generally speaking, awls may have been of lesser importance at Swan Island than at the other two sites since only 17% of the sample of 119 awls used in our calculations came from this site, while Robeson accounted for 34% and Riverton for 49%. It must be remembered, however, that while the areas sampled at Robeson and Riverton are roughly comparable both quantitatively and qualitatively, the excavations at Swan Island were less extensive, so that the low percentage may in part derive from differential sampling.

But in speculation, we shall propose that cannon bone and splinter awls do not relate exclusively to hideworking and that they instead pertain to another activity (or activities) more important at Robeson and Riverton than at Swan Island. As a wild guess, one might explain the variation in cannon bone awls, with their long use polished shafts, as resulting from differentials in emphasis on basket weaving. The preceding surmise derives from a question that we have pondered for some time - namely, whether one might expect the emphasis on basketweaving to vary in proportion to other activities among the seasonally occupied sites of a hunting and gathering group as the need for containers and permanent storage facilities changed during the year. Only adequate identification of the function of the types within the present amorphous category of bone awls will provide a basis for deciding whether our preceding speculations about basketweaving warrant development into testable hypotheses.

In the preceding discussion, we have not mentioned the turkey bone awls. Again, the results are inconclusive, but the low ratios for both Robeson and Swan Island would tend to rule out any considerable linkage to hideworking. Perhaps, as have already suggested in our previous discussion of bone awls in Chapter IV, this particular type may be an item of domestic equipment that for some reason is linked primarily to Riverton.

As a final category, we shall consider micro-perforators. None were found at Robeson, while they were fairly common at Riverton (5 to 30%) and Swan Island (8 to 29%). From the analysis of the form of these instruments, the use characteristics, and experimental data, it is quite probable that these implements served as a combination perforating and scraping tool. The only artifacts which have perforations that could have bee produced by these micro-perforators are a pebble pendant, several canine pendants of small mammals, and perforated simple shuttles and needles. An ideal correlation would have been between micro-perforators–shuttles–fishing. But closer examination

of such a correlation revealed a distressing flaw: only one of the thirteen shuttles from Swan Island was perforated (some fragments, of course, were from areas of the shuttle below the normal perforation area) and all of the shuttles and the needle at Robeson Hills were perforated, but there were no micro-perforators. And if such a correlation were to hold, the Swan Island, rather than the Robeson, shuttles should have been perforated, since this site emphasized fishing more than the other two. All that can be said is that there are micro-perforators that could have been used for perforating small objects such as shuttles.

## Domestic Equipment

Only manos and skinners, which have been discussed in Chapter IV, have been included within this category since there are no stone metates or other artifacts which can be identified with the domestic activities of the females of the Riverton Culture. Of course, many of the fabricating and processing tools and general utility tools might well be assigned to domestic operations, but since these latter can also be identified with other than domestic activities, they have not been included in the present functional category.

Mano distribtuion shows wide variation among the three sites. Manos were present in only four of the eight levels at Riverton, but were present on or near two of the clay platforms in Area X. There were no manos at all in the bottom one-third of the Riverton midden, and manos ranged from only 4 to 11% of the total artifacts in the levels where they were present. However, at Swan Island, manos were found in four of the five levels, with manos ranging from 2 to 3% of the total artifacts in the upper levels and 26% in the bottom-most level. Significantly, at Swan Island constricted mouth storage pits were present only in the lower portion of the site, and most of the pits at Riverton occurred in the same middle levels as the bulk of the manos. Thus, there is a correlation between the occurrence of pits and manos at the two sites, even though both pits and manos are comparatively rare. However, at Robeson, manos were present in all levels, with percentages ranging from a minimum of 16% to a maximum of 47% of the total artifacts. Obviously, grinding operations were an important activity at Robeson, as were storage operations. Perhaps the high proportion of manos provides indirect evidence for a winter occupation of Robeson, since extensive use of stored vegetable products might be expected in a site occupied for lengthy periods during the winter and provided with storage facilities.

Perhaps a more effective way to present the contrasts in the functional categories among the sites would be to compute gross ratios between several of the functional categories. The quantitative data have been derived from data with non-Riverton artifacts excluded.

The ratios for Robeson present a very different picture from those of either of the other two sites. The relative importance of domestic implements, fabricating and processing tools, and general utility tools (in that order) are obvious, as is the relative unimportance of weapons.

At Riverton and Swan Island, on the other hand, weapons are very important and domestic implements are of minimal importance. Fabricating and processing tools are rather more important at the latter site than at Riverton, domestic implements and weapons, less important.

TABLE 71

GROSS RATIOS OF FUNCTIONAL CATEGORIES OF ARTIFACTS FROM COMPONENTS OF THE RIVERTON CULTURE

| | Robeson | Riverton | Swan Island |
|---|---|---|---|
| W/D* | 0.5 | 6.5 | 5.7 |
| F&P/D | 1.7 | 6.5 | 8.7 |
| GU/D | 3.4 | 1.0 | 1.5 |
| F&P/W | 5.4 | 1.2 | 1.7 |
| F&P D/W | 1.7 | 0.5 | 0.7 |
| F&P/GU | 2.0 | 2.0 | 2.0 |
| GU/W | 0.9 | 3.2 | 4.3 |

*W = Weapons; D = Domestic Implements, F & P = Fabricating and Processing Tools; GU = General Utility Implements.

## Geographic Distinctions.

Other important differences among the sites relate to the patterning of the geographical distribution. Both Robeson Hills and Riverton are near waterways which give access to extensive hinterlands. Eleven camps of the Riverton Culture have been recorded along the Embarrass River (Fig. 19), showing that the Robeson Hills people were penetrating at least thirty miles up the Embarrass Valley, although two-thirds of these camps are located in the lower six miles of the valley. Riverton also had access to the extensive hill area on the west side of the Wabash Valley via Sugar Creek, although, here again, the hunting camps are densely concentrated along the lower ten miles of the creek. But Swan Island has access only to the sloughs of the Wabash bottoms and Busseron Creek, a short stream in Indiana, which parallels the east side of the Wabash River. Busseron Creek probably occupies an old channel of the Wabash, and it certainly provides access only to a small area of the Wabash bottoms. There are two small streams, one and a half and two miles north of Swan Island, with a small upland shell midden between them (Road's End No. 1, Cw-320), but these are insignificant streams today, and probably would not have served too effectively as communication arteries into the upland areas which they penetrate. Thus, Robeson and Riverton both have access to large wooded hunting areas, particularly the former, while Swan Island would have had to depend on the Wabash bottom, with its many sloughs, and to a limited exploitation of the hill mass abutting the site on the west. Geographical factors may also explain why so few ancillary camps are in the vicinity of Swan Island. The slough system around the site is linked to other sloughs, permitting quick forays into the surrounding areas, with no need to establish camps away from the main site. And the wealth of fish and turtle in these sloughs would have cut down on the necessity for prolonged trips for larger game, a particularly important factor when extensive areas of the bottoms were covered with the shallow spring flood waters.

Actually, the geographic positioning of Riverton and Robeson follows a principle first noted by the author during the survey of the Cache River valley in southern

Illnois: late Archaic base camps, or settlements, are located on a major stream or river at a point where a navigable tributary joins the main channel, with hunting camps located along the tributary or tributaries.

## Intensity of Occupation

In Figures 25 and 26, we have plotted the proportions of the total artifacts and total chert flakes in each level. At both Riverton and Swan Island, greater concentrations of artifacts (Fig. 25) are shown for the middle portions of the midden, with gradually increasing proportions below and gradually decreasing proportions above the former point. The remarkably high percentage of artifacts for Level 2 at Robeson is in part the result of the numerous blades, projectile points, and manos recovered from a work shop area. If this factor were eliminated, we suspect that the proportional pattern for all levels would show a rather bland range of variation, with no marked increase or decrease in intensity of occupation.

At both Swan Island and Robeson Hills, distribution of chert flakes (Fig. 26) parallels that of artifacts, with the very high percentage in Level 2 at Robeson again being the result of the recovery of large numbers of flakes from the

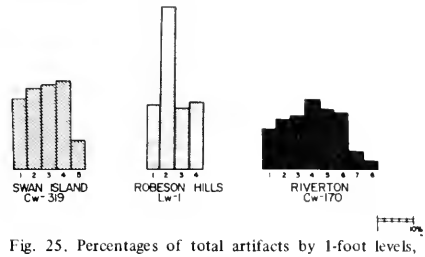


Fig. 25. Percentages of total artifacts by 1-foot levels, Central Wabash Valley shell middens.

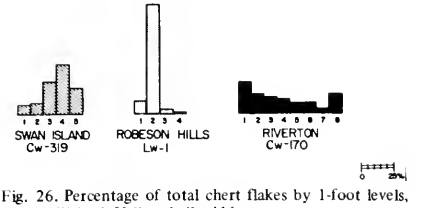


Fig. 26. Percentage of total chert flakes by 1-foot levels, Central Wabash Valley shell middens.

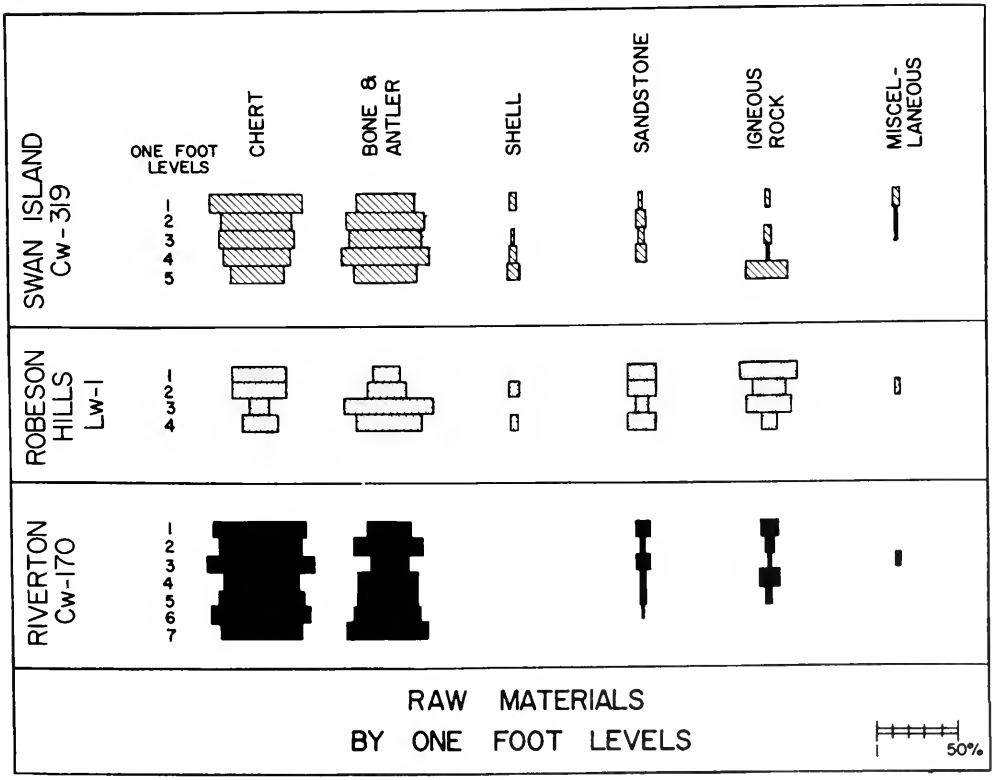


Fig. 27. Proportions of raw materials within 1-foot levels, Central Wabash Valley shell middens.

work shop area. A rather peculiar pattern appears at Riverton, showing a trend exactly the reverse of that for artifacts. However the variations among the levels are not very great, ranging from a minimum of 5% to a maximum of 25%, and probably do not contribute greatly to the interpretation of demographic problems at the site. One explanation, a shift of types of raw material utilized in the various levels, is ruled out by the data in Fig. 27, which shows the proportions of types of raw materials used for artifacts in each level.

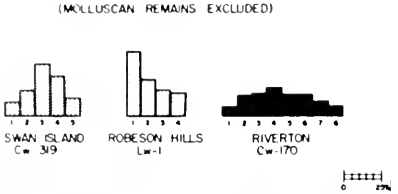


Fig. 28. Proportions of total faunal remains within 1-foot levels, Central Wabash Valley shell middens.

In summary, there is probably little change in the intensity of occupation at Robeson, and only gradually increasing and declining intensity at Riverton and Swan Island.

## Population Size

It is difficult to comment on this because of the lack of suitable data for the Riverton Culture. Elsewhere, Howells (1960) estimated a population of some 50 individuals for the Indian Knoll site on the Green River in Kentucky basing his estimate on mortality rates. Since Indian Knoll is similar in many ways to the Riverton site, with both probably being base camps and having a subsistence pattern emphasizing deer and mussels, it might be useful to consider the possibility of extrapolation of the Howells figure to the Riverton Culture were it not for the fact that there are serious objections to the estimate. The assumption by Howells that he is dealing with the entire population is inadmissable, since there are grounds for believing that Indian Knoll is only one element in a settlement system similar to that of the Riverton Culture. The total population would have to include the additional burials that were present in the other units of the settlement system. Actually the estimate of 100 individuals cited by Howells using the Cook-Treganza tromula (Cook and Treganza, 1950) may be a much more realistic approximation to the figure for a single unit of the Indian Knoll settlement system, and it may well be that a similar figure would not be too unrealistic for the Riverton Culture, although the areas of the Riverton sites (2-3 acres) tend to be somewhat greater than those of the Indian Knoll sites (ca. 2 acres), and the population might have been somewhat greater. At present we do not know whether the Cook-Treganza formula can be extrapolated to the shell middens of the East, and we present the foregoing figures only as suggestive.

But even though we cannot deal adequately with population size, there are other inferences that can be made about the organization of the Riverton Culture population. Both Robeson and Swan Island have nearly equivalent areas, and Riverton may approach the area of the preceding sites if allowance is made for the peripheries buried under silt. In view of the absence of other substantial midden areas, one can suggest that there was relatively little fractionation of the population into smaller units as shifts were made from one site to another during the seasonal round, i.e., equivalent site areas were occupied during the winter, spring, and fall, and possibly during the summer. There should, of course, have been a constant movement of hunting and/or gathering parties to and from the small sites ancillary to both Robeson and Riverton. Probably access to the mussel beds was a major factor leading to the maintenance of large, stable units rather than seasonally dispersing units, or as Dr. Robert Hall has so ably expressed the situation, "The Riverton Culture was mussel bound."

One might make a further observation on the relationship of the Riverton population to adjacent late Archaic populations. It would seem that the Riverton peoples were essentially endogamous. Our reason for this conclusion is simply that there is so little evidence for artifacts typical of other late Archaic cultures of the Wabash Valley in the Riverton Culture middens. If alien males of sufficient age to have acquired the traditional patterns of their own cultures were consistently entering the Riverton society through marriage (or through any other mechanism, for that matter), one might expect their presence to be manifest in the appearance of foreign styles of artifacts in the midden. Similarly, if enculturated females were entering the society, one might expect to find evidence of artifacts such as the metate, an artifact very common on sites of other Archaic cultures in the area. Conversely, if Riverton males were marrying outside the group, one would expect the distinctive Riverton microtool industry in chert to be widely distributed throughout the areas occupied by other cultures, rather than being sharply delimited to the area around the Riverton Culture sites themselves.

Obviously, we can make no claims that the marriage pattern was exclusively oriented toward endogamy, since vast areas of the sites are still unexcavated, and we cannot exclude the possibility that very young non-enculturated individuals were being taken into the society. In the latter case, the individuals could be considered as effectively members of the Riverton Culture by virtue of their subsequent training, no matter what the ultimate effects on the population might have been in terms of gene flow.

Perhaps some of the extraneous artifacts of the lowest and uppermost levels reflect early and late orientations towards exogamy, but most of these artifacts derive from periods that either precede or follow Riverton in time, and are best interpreted as residues from earlier or later components associated with other groupings of people, particularly in the case of the early artifacts which so far are missing from the early levels of the Riverton Site although present at Robeson and Swan Island.

## THE RIVERTON SETTLEMENT SYSTEM

In conclusion, we shall present a model which we think best fits the distinctions among the sites in the preceding analyses. We shall then investigate the possibility of showing the differences among the sites by a simple ratio and triangle diagrams. Following this section will be a preliminary statement of the characteristics of the various types of sites proposed for our settlement system.

In Figure 29, is delineated a seasonal system utilizing all known types of Riverton sites. In this figure, Robeson is characterized as a settlement, Swan Island, as a transient camp, Riverton, as a base camp, and the numerous T-1 sites as hunting camps. In addition, gathering camps and sites termed bivouacs are placed in the figure, but so far these sites cannot be related definitely to the Riverton Culture. They are merely in the area of known Riverton sites, and may or may not be parts of the same system.

In an attempt to see if the differences among these types of sites within the proposed settlement system could be shown mathematically, a ratio was computed, using the proportion of Fabricating, Processing, and Domestic Implements to Weapons. The hypothesis, here, was simply that if the sites actually differ in their functions, then these differences should be reflected in the proportions of the various functional categories of artifacts present in the three sites. Fabricating, processing, and domestic implements were selected as one unit of the ratio, since they were plentifully represented in the middens and should indicate to a certain extent the degree of sedentism of the population occupying the site. As a second unit, weapons were chosen, again a well represented category, and one which might be associated with a higher degree of mobility through hunting activities than the first unit. The ratio would then be: $\frac{F + P + D}{W}$. Computations are based upon the functional categories of Table 71, the tabulations given in Appendix III, minus the Wabash Archaic, Woodland, and Mississippian artifacts listed in Table 58. Gorges and sandstone sinkers are also omitted, the former being rather dubiously identified and the latter being difficult to assess in terms of proper counting units.

On application of the ratio to the three shell middens, the results were obtained for one foot levels shown in Table 72.

TABLE 72

RATIOS OF FABRICATING, PROCESSING, AND DOMESTIC IMPLEMENTS TO WEAPONS FOR COMPONENTS OF THE RIVERTON CULTURE BY ONE-FOOT LEVELS

| Level | Riverton | Swan Island | Robeson Hills |
|---|---|---|---|
| 1 | 1.2 | 1.0 | 8.0 |
| 2 | 1.4 | 2.0 | 4.3 |
| 3 | 0.8 | 1.6 | 6.2 |
| 4 | 1.1 | 2.2 | 4.3 |
| 5 | 1.5 | 4.3 | |
| 6 | 1.1 | | |
| 7 | 1.8 | – | – |
| 8 | 0.7 | – | – |
| Average | 1.2 | 2.2 | 5.7 |

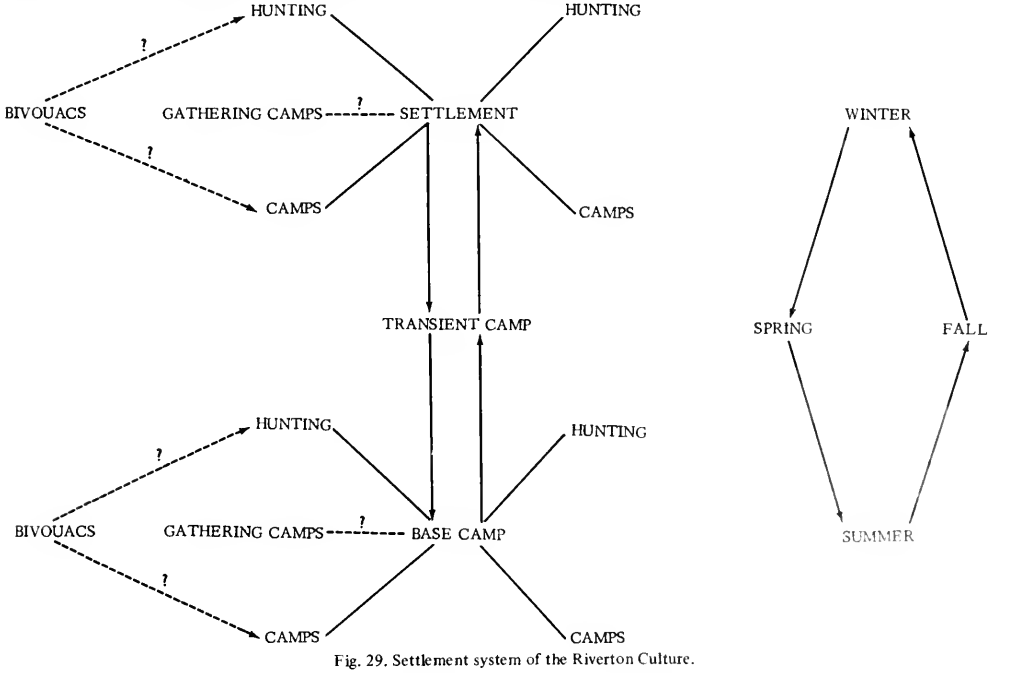


Fig. 29. Settlement system of the Riverton Culture.

The amount of overlap in the ratios for the various sites is surprisingly small. Perhaps, the ratio has some pragmatic value, although we are not quite sure as to its theoretical significance. However, we suspect that the second part of our original hypothesis was incorrect. These ratios do not directly indicate degrees of sedentism or mobility, but rather variations in types of activities at the sites. And since we cannot as yet make precise correlations between several subdivisions of our fabricating and processing tools and specific activities, we cannot ascertain the real meaning of the variations implied by what we have termed the systemic index.

As a test of the wider applicability of such an index, we have selected three other deep, stratified middens for which authors have advanced hypotheses about the nature of the occupations. These are Modoc Rock Shelter in southwestern Illinois, the Eva Site in the central Tennessee valley, and the Stanfield-Worley Rock Shelter in northwestern Alabama.

Fowler (1957: 56-57) says of Modoc, "This initial occupation (ca. 8,000 B.C.) was by peoples who utilized every type of animal available to them. . . . Their tools included projectiles, hammerstones, scraping tools, perforators, grinding tools, and some ornaments. . . . Shortly after 7,000 B.C. the site was reoccupied by Archaic peoples whose subsistence began to be more selective. . . . The assemblage from this time period indicates that many different activities were carried on at the site. . . . The site was apparently a general habitation site. . . . After 3,500 B.C. there are indications that the nature of the occupancy changed. . . . The Modoc Rock Shelter changed from a domestic habitation to a specialized hunting camp."

In our terms, Fowler's three occupational phases would be termed a generalized hunting camp, a base camp, and a specialized hunting camp.

The results of the application of the systemic ratios are as shown in Table 73.

The index for the zone of specialized hunting is obviously quite different from that of any of the Riverton shell middens. The average of 0.5 is, however, about what we would expect if adequate samples were available from the Riverton hunting camps, where projectile points are the only implement found in quantity in our surveys. The average of 1.1 for the general habitation zone, or base camp, corresponds very closely to the average for the Riverton site, which has also been identified as a base camp. Thus there is a harmonious correlation for the systemic indices from the base camp at Modoc and the base camp at Riverton.

For Eva (Lewis and Lewis, 1961: 5-23), there is no attempt at systemic or pattern analysis, but instead, the strata are considered only as componenets of the three phases set up by Lewis and Kneberg (1959) in their definition of the Midcontinent Tradition. Variations among these components are then considered in terms of shifting patterns of subsistence items and frequencies of standard artifact categories or types, to which an occasional functional interpretation is linked. For example, ". . . the percentage of projectile points (imply ing hunting activities) appears to be much lower than in the later compenents" (Lewis and Lewis, 1961: 25). But in general, the basic divisions are made in terms of form variations within a particular category of raw material.

TABLE 73

RATIOS OF FABRICATING, PROCESSING, AND DOMESTIC IMPLEMENTS TO WEAPONS IN MODOC ROCK SHELTER* BY ONE-FOOT LEVELS

| Years B.C. | Depth in Feet | Systemic Index |
|---|---|---|
| | 5 | .3 |
| | 6 | .5 |
| | 7 | .7 |
| 2000 | 8 | .4 |
| | 9 | .3 |
| | 10 | .3 |
| 3300 | 11 | .3 |
| | 12 | .9 |
| 3500 | 13 | .7 |
| | 14 | .5 |
| | 15 | .9 |
| 3800 | 16 | 1.3 |
| 4000 | 17 | .9 |
| | 18 | .9 |
| 5000 | 19 | .6 |
| | 20 | 1.3 |
| | 21 | 2.6 |
| 6200 | 22 | .7 |
| 7000 | 23 | .8 |

*24-28 foot zone eliminated because of small sample size. All hammerstones have been classified as manos under domestic implements on the basis of a re-analysis of a sample of these artifacts at the Illinois State Museum.

For our present purposes, we have sorted the artifacts into our own functional categories on the basis of the excellent illustrations, the descriptive data, and examination of the actual artifacts at the University of Tennessee. The results of the application of the ratio are as shown in Table 74.

The results for the long occupation of this site from 6,000 to 500 B.C. (Lewis and Lewis, 1961: 173) are consistently the ratio that we should expect for a hunting camp. But such results are quite at variance with the diversified range of activities indicated from the artifacts, the considerable number of burials in several strata, and the indications of great intensity of site utilization in most strata of this seven foot deep midden. Only one stratum of the Eva Phase (V) has the characteristics of a hunting camp, with its sparse representation or total lack of general utility tools, fabricating and processing implements, domestic equipment, ceremonial items, ornaments, etc. All of the

TABLE 74

RATIOS OF FABRICATING, PROCESSING, AND DOMESTIC IMPLEMENTS TO WEAPONS AT THE EVA SITE BY STRATA

| Phase | Stratum | Systemic Index |
|---|---|---|
| Big Sandy | I | .8 |
| Three Mile | II, top | .6 |
| Three Mile | II, middle | .6 |
| Three Mile | II, bottom | .6 |
| ? | III | |
| Eva | IV, top | .5 |
| Eva | IV, top | .5 |
| Eva | V | .3 |

other strata have a rich and varied assortment of these functional categories, with the exception of two: domestic and recreational equipment. While the lack of the latter is not surprising, since these items are generally rare in late Archaic sites, the rarity of the former is indeed notable, since pebble manos occur in such quantities in other Midwestern and Mid-southern sites. The alternatives are that they are truly missing from the Eva Site, that perishable substitutes were used, or that some sort of sampling error occurred in connection with pebble manos. Whatever the answer, we do not feel that the systemic indices for Eva, in spite of their internal consistency within the strata, indicate the appropriate functional type of utilization of the site, with the exception of the index for Zone V.

If forced to an evaluation of the components of the Eva Site, we should have to say that the first four strata pertain to base or transient camps. But satisfactory interpretations of the system, of course, would have to be based on internal analyses and comparisons of the Eva, Cherry, Kays, Big Sandy, Frazier, Thomas, Ledbetter, Oak View, and West Cuba sites in the Tennessee and Big Sandy drainages.

Another site suitable for comparative purposes is the Stanfield-Worley Shelter (DeJarnette, et. al., 1962) in northern Alabama, which is interpreted by the authors as follows:

"During the Mississippian and Woodland periods, the site seems to have served as a temporary hunting camp. . . . During the Archaic stage, however, the indications are that the site was more of a habitation area than a temporary hunting camp. This does not necessarily mean that the Archaic hunters and gatherers at the site did not employ seasonal migratory habits. . . . The Archaic remains at the shelter include a fairly complete list of the more common traits found on other Archaic sites in the area. . . . The two definitive aspects of Archaic economy, both hunting and collecting, are represented. . . . The Dalton Complex. . .is roughly contemporaneous with early components classed as Archaic at other sites such as the Modoc Rock Shelter, Graham Cave and Russell Cave. Three differences are found between these early Archaic components and the Dalton component at Stanfield-Worley: (1) the relative strength of the lanceolate projectile point tradition in the Dalton component; (2) the absence of evidence for seed-gathering or processing, such as nutting stones. . .and (3) the preponderant importance of hunting as shown by the number and variety of cutting and scraping tools, the uniform nature of projectile points present in the early hunter tradition, and the preliminary analysis of the faunal remains. (DeJarnette, et. al., 1962:87)."

The results of an application of the systemic index to Zones B and D of the site (the "Archaic" and "Dalton" zones) are shown in Table 75.

In each instance where zero is recorded, the result comes from the total lack of fabricating, processing, or domestic equipment. Our interpretation of these results is that both the Archaic and Dalton zones are generalized hunting camps *par excellence.* While there may be a wide range of Archaic traits for these zones, the only well represented functional categories are General Utility Tools and Weapons. Fabricating and Processing Tools, Domestic Equipment, Woodworking Tools, Ornaments, Ceremonial Equipment, Digging Implements, and Recreational Equipment are either poorly represented or not at all. And according to Fig. 17 (DeJarnette, et al., 1962) all of the eleven burial pits, Archaic or otherwise, were first detected in the uppermost, or A, zone, a general melange of Archaic, Woodland, and Mississippian materials. And the faunal remains for the Dalton Zone (DeJarnette, et. al., 1962; Table 32) may indicate a hunting camp (57% deer, 24% small mammals, 7% birds, 12% turtle) rather comparable in this cultural aspect to Fowler's specialized hunting camp in the upper levels at Modoc. Thus, the Stanfield-Worley shelter seems to have served as a hunting camp throughout its Dalton and Archaic occupations by diverse groups as indicated by the heterogeneous assortment of projectile points in Zones B and D.

As a final test of the index, we decided to make gross calculations of the index for the Indian Knoll sites in the Green River Valley counties of McLean, Butler, and Ohio (Webb, 1946, 1950 a, 1950b; Webb and Haag, 1939, 1940,

TABLE 75

RATIOS OF FABRICATING, PROCESSING, AND DOMESTIC IMPLEMENTS TO WEAPONS IN THE STANFIELD-WORLEY ROCK SHELTER

| Zone | Locus | Level | Systemic Index |
|---|---|---|---|
| B | 110 Trench | 1 | 0.0 |
| | | 2 | 0.0 |
| | | 3 | 0.0 |
| D | | 1 | 0.0 |
| | | 2 | 0.0 |
| | | 3 | 0.0 |
| | | 4 | 0.0 |
| | | 5 | 0.0 |
| | | 6 | 0.0 |
| B | Block 2 | 1 | 0.0 |
| | | 2 | 0.0 |
| | | 3 | 0.0 |
| D | | 1 | 0.0 |
| | | 2 | 0.0 |
| | | 3 | 0.3 |
| | | 4 | 0.2 |
| | | 5 | 0.1 |
| | | 6 | 0.2 |
| | | 7 | 0.3 |
| | | 8 | 0.0 |
| | | 9 | 0.0 |
| | | 10 | 0.0 |
| | | 11 | 0.0 |
| | | 12 | 0.0 |
| B | Block 3 | 1 | 0.0 |
| | | 2 | 0.7 |
| | | 3 | 0.0 |
| D | | 1 | 0.04 |
| | | 2 | 0.0 |
| | | 3 | 0.0 |
| | | 4 | 0.0 |
| | | 5 | 0.0 |
| | | 6 | 0.0 |
| B | 145 Trench | 1 | 0.1 |
| D | | 1 | 0.0 |
| | | 2 | 0.0 |
| | | 3 | 0.0 |

1947). We say gross, because none of the sites have been published with stratigraphic data adequate for deriving the index level by level. Accordingly, the present ratios are based simply upon total quantities of fabricating and processing tools, domestic implements, and weapons at each site. Such a procedure, of course, means the inclusion of varying quantities of earlier Archaic material present in these multi-component sites. But the bulk of the artifacts from each site seems to consist overwhelmingly of Indian Knoll types, and the error from extraneous components should be modest, with the possibility of the exception of Butterfield, for which a number of earlier Archaic projectile points are illustrated (Webb and Haag, 1947).

Another problem was the conversion of the Indian Knoll artifact categories to our own functional categories. For instance, we have made the assumption that the items reported as ordinary hammerstones are actually manos. We do not feel that there is much danger in such an assumption, being familiar with the tendency in the Midwest to classify pebble manos as hammerstones, in spite of the fact that actual hammerstones tend to be a rather rare item in Archaic sites in the Midwest. Other items such as chipped rectangles also were difficult to convert, but from the illustrations and descriptions, these would seem to be gouges or adzes, items which we have included with woodworking tools and have kept separate from fabricating and processing tools, although recognizing that they might better be placed within our definition of fabricating and processing tools.

A computation was not attempted for the Reynerson Site, since no bone or shell was preserved, but on the basis of the sparse lithic material, it has been tentatively designated a hunting and gathering camp.

But while there are obvious sources of error, we do not feel that they are of sufficient size to distort the ratios unduly.

A further reason for using the Indian Knoll sites as a final test is that Fowler (1959) has already arrived at conclusions about the functions of the Butterfield, Kirkland, and Barrett sites by contrasting the percentages of projectile points, hammerstones, milling tools, knives, scrapers, perforators, flakers, fish hooks, hammerstones, and chopping tools. Thus, these three sites should make a good test case for seeing if similar results can be obtained both by the systemic index and another method of functional evaluation. The results are shown in Table 76.

The agreement between the results obtained by the two methods if quite good. While Fowler does not assign a specific function to Ward, by implication his remarks might be interpreted to imply something similar to a settlement. He states (Fowler, 1959:54), "The Ward Site assemblage is characterized by the small proportion of projectile points (20%) and the large representation of general manufacturing tools such as perforators (37%), flakers (14%), and knives (6%). Both Ward and Barrett are the larger sites, and Butterfield (hunting camp) and Kirkland (seed collecting camp) are smaller."

The only advantage that we can see for the systemic index over Fowler's method of comparing categories is that the former is simpler and, possibly, more precise, although the latter characteristic remains to be demonstrated by more extensive sampling of adequately analyzed sites. On the other hand, Fowler's method is far superior for showing the importance of particular types of activity within a site. As with all analytic tools, it is ultimately a matter of selecting the method that best serves the objective of the analysis, rather than the fitting of the objective to an arbitrary analytic device.

One thing that has occurred to us as a result of the calucation of the systemic indices for the Indian Knoll sites, is that these sites represent portions of settlement systems pertaining to three geographic zones of the Green River Valley, and that both the settlement system and pattern of the Indian Knoll sites is remarkably like that of the Riverton Culture.

For example, all of the base camps (Barrett, Carlson Annis, and Indian Knoll) are on the T-O. One of the settlements (Ward) is reported as being on a ridge. Camps of various types (Kirkland, Butterfield, Smith Rock Shelter, Reynerson) are all in locations described as being above the T-O and ranging from the T-1 (?) (Kirkland) to bluff top locations (Reynerson). Only Chiggerville and Read Shell Midden diverge from the settlement pattern of the Riverton Culture, since the former, a settlement, is on the T-O and the latter, a transient camp, is atop a 70 to 80 foot bluff. In view of the crude method used in calculating the index for the Indian Knoll sites, the latter assignments might change if a more refined analysis were possible. At the same time, there are other reasons for viewing Read as a possible transient camp, namely the large number of fish hooks and residues from the manufacture thereof at the site. As we have already seen, an emphasis on fishing is one of the

TABLE 76

FUNCTIONAL ASSIGNMENTS AND SYSTEMIC INDICES OF TEN INDIAN KNOLL SITES

| Site | Systemic Index | Functional Assignment | Fowler (1959) |
|---|---|---|---|
| Indian Knoll | 1.2 | Base Camp | --- |
| Chiggerville | 2.7 | Settlement | --- |
| Ward | 2.6 | Settlement | Settlement? |
| Barrett | 0.7 | Base Camp? | Base Camp? |
| Kirkland | 0.9 | Base Camp | Seed Collecting Camp |
| Smith Rock Shelter | 0.7 | Camp | --- |
| Butterfield | 0.5 | Hunting Camp | Hunting Camp |
| Reynerson | ? | Hunting & Gathering Camp | --- |
| Carlson Annis | 1.2 | Base Camp | --- |
| Read | 1.8 | Transient Camp? | --- |

important characteristics of a transient camp in the Riverton Culture. Still a certain caution must be observed, since Carlson Annis, a base camp, also has very large numbers of these items, and it may be that we are dealing with a general orientation towards fishing in a limited geographic area in Butler County.

Before we leave the subject of the Indian Knoll Culture, we should also like to comment on some peculiarities of the distribution patterns of certain artifacts among the sites. Of the 106 "ceremonial" artifacts from all the of the sites (51 rattles, an estimated 42+ medicine bags, 10+ flutes, and 3 pipes), only base camps ever possessed these items in quantity (Barrett –11, or 10% of the total; Carlson Annis–30, or 28%; Indian Knoll–54, or 51%), with settlements and transient camps accounting for the remainder (Ward-4 or 4%; Read-7, or 7%). Such a distribution pattern would fit very nicely with our hypothesis that summer occupied base camps could be expected to have a higher proportion of such items, basing our predictions on both the contents of the middens of the Riverton Culture and ethnohistorical parallels which mark summer as the season of large scale ceremonial activities of all sorts among hunting and gathering groups in northeastern North America.

There are other notable peculiarities among sites: only base camps have mauls (Barrett, 1% of the total; Carlson Annis, 91%; Indian Knoll, 8%); 93% of the adzes or gouges ("chipped rectangles") are from the two base camps, Carlson Annis and Indian Knoll; and 72% of the axes are from base camps, with 54% of total from Indian Knoll alone. That is, woodworking seems to be an activity of considerable, but varying, importance in base camps, and of relatively lesser importance in other components of the system.

Ultimately, only adequate dating, publication of excavated but unreported Green River shell middens, reanalysis of the already published shell middens including determination of season of occupation, and excavation of additional sites mentioned by Webb can determine whether the preceding hypotheses are justified in the case of the Indian Knoll Culture. At the present we do not even have adequate chronological control of any of the excavated sites.

In summary, there is sufficient evidence from the preceding sites to suggest that further experimentation with the systemic index as an analytic tool is warranted. But it is already equally obvious that experimentation would be useless, with our present level of technical analysis, for shallow multi-component sites, for sites where bone artifacts have not been preserved, or for sites where inadequate functional analyses of artifacts have been made.

As a further experiment with proportional data as a means of illustrating functional variation among sites, we have used triangle diagrams for the same sites. General Utility Tools, Weapons, and Fabricating, Processing, and Domestic implements were totaled by levels or strata, and the percentage of each group computed for each level or stratum (as in the case of Systemic Index, gorges and sandstone sinkers have been omitted). The plot for these percentages in Figure 30 is by one foot levels for Riverton and Modoc (27 to 5 feet), by subdivisions of strata for Eva, and by levels within zones for Stanfield Worley. Remarkably consistent clusterings are apparent for any given site, or for zones within a site. The idiosyncratic behaviour of some levels is probably the result of sampling error, actual shifts in type of occupation within the site, or erroneous decisions in compiling the totals to be used in the computations.

From the data in Figure 30, we have estimated central tendencies and general proportional ranges for the functional categories within the various elements of the Riverton settlement system (the figures for specialized and generalized hunting camps are little better than guesses based on extrapolation of data from Modoc and Stanfield-Worley).

TABLE 77

ESTIMATED CENTRAL TENDENCIES AND PROPORTIONAL RANGES FOR FUNCTIONAL CATEGORIES WITHIN ELEMENTS OF THE RIVERTON SETTLEMENT SYSTEM

| | General Utility | Weapons | Fabricating, Processing, Domestic |
|---|---|---|---|
| 1. Settlements | 10 ± 5% | 15 ± 5% | 75 ± 5% |
| 2. Transient Camps | 15 ± 5% | 30 ± 5% | 55 ± 5% |
| 3. Base Camps | 15 ± 10% | 40 ± 10% | 40 ± 5% |
| 4. Specialized Hunting Camps | 25 ± 5% | 55 ± 10% | 20 ± 10% |
| 5. Generalized Hunting Camps | 55 ± 20% | 35 ± 10% | 10 ± 10% |

Only further experimentation can show whether, with standardization of analytic units, these proportions and the Systemic Index will be useful in other Archaic sites, or whether it will be necessary to compute the proportions for each particular culture area. Actually, we predict that both suggestions will apply: that closely related cultures within small geographic areas and similar ecological zones will have very similar ratios, but that more distantly related cultures within larger areas and unlike ecological zones may show quite different proportions of the various functional categories within a particular unit of the settlement system. And we sincerely hope that our present proportions and ratios will not be used uncritically and without further testing, and that adequate consideration, in any case, will be given to the other functional categories, faunal remains, features, and general occupational debris. But at least, there are indications that functional units within a settlement system can be subjected to quantifying procedures for analysis and illustration, and that further experimentation would be profitable.

As an example of the problems that might be encountered when attempting to apply the systemic index to cultures geographically remote from the area for which it has been derived, we can cite the complications that arose with Wittry's (1959a) Raddatz Rock Shelter. The ratios were consistently higher than expected, generally being in the transient camp, or even settlement, range. Our subjective impression was that such functional assignments were simply not possible for Raddatz.

Our source of difficulty was easily isolated: turtle shell bowls and shell spoons are quantitatively important

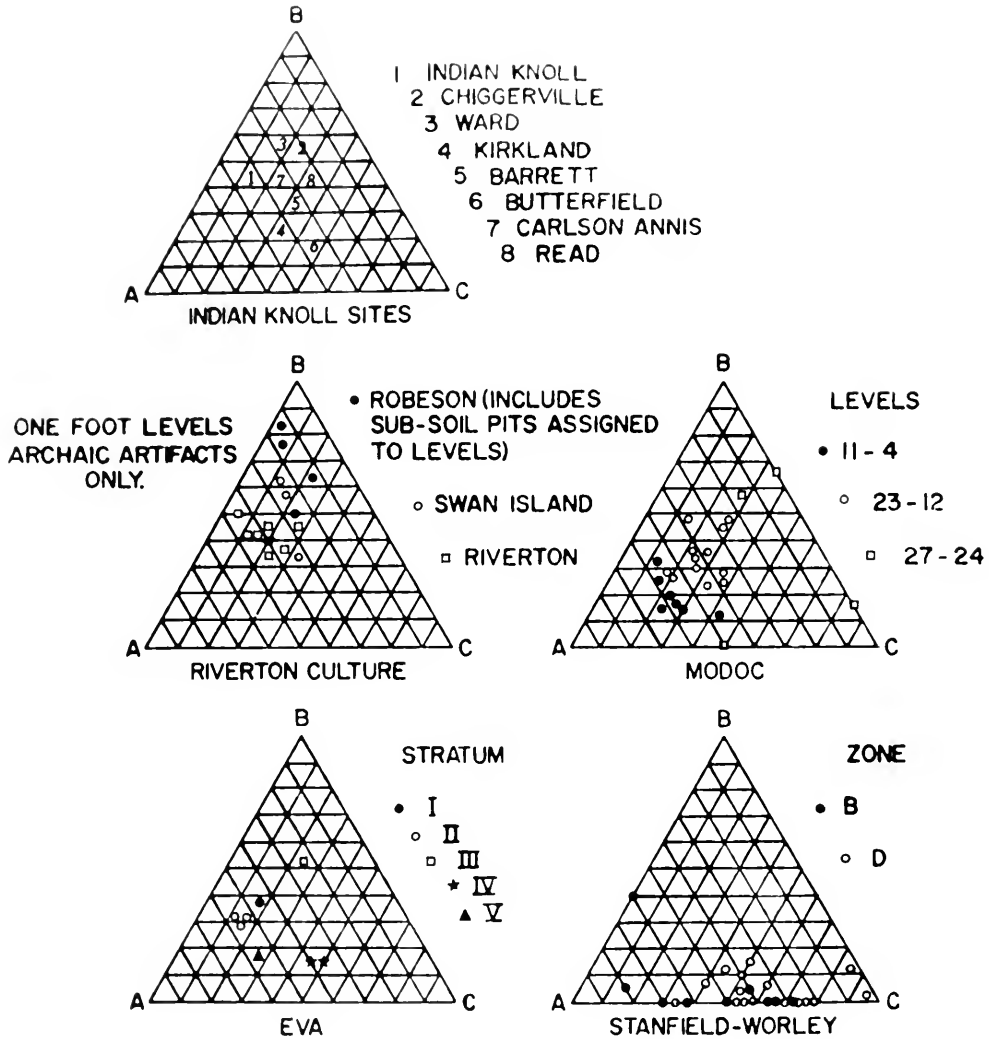


Fig. 30. Triangle diagrams of selected categories of artifacts for various Archaic sites.

items in nine of the ten uppermost levels at Raddatz. Containers are not a part of the assemblage recovered from the Riverton sites, and shell and antler spoons are very rare. Undoubtedly, the Riverton people used containers of some sort, and may well have made spoons from perishable materials, or simply used unaltered mussel shells. But as it stands, the data from the two sites are simply not comparable, with two important classes of artifacts well represented at the one site and completely missing or inadequately represented at the other. If the indices for Raddatz are computed after removing turtle shell bowls and shell spoons, the indices consistently correspond to those for base camps in four of the ten levels and to hunting camps in five of the ten levles, with only Level 2 remaining with the range of the transient camp. (Such a situation should not be confused with one in which artifact classes may be missing by virtue of lacunae within the culture.)

But even granting that a late spring or summer occupation is indicated by the quantities of passenger pigeon and deer skulls without antler, Raddatz is still not very convincing as a base camp in view of the comparatively scanty faunal remains, chipping debris, and stone, bone, and shell artifacts that represent an accumulation beginning in the ninth millenium B.C. and continuing up into Woodland times. Our view is that the systemic index would have to be derived independently for the Wisconsin, and probably, the Great Lakes area. On the other hand, one might expect the index as computed for Riverton to remain effective well into the mid-South in view of the cultural ties between the areas and the general similarities in subsistence patterns and settlement patterns.

With the data presented in preceding sections of this chapter, we can now briefly delineate the salient characteristics of the various components of our Riverton settlement system

1. Settlement - Two to three acre area on a bluff top, permanent houses in quantity, and clay platforms, numerous storage pits, many burials, specialized hunting practices, few projectile points, emphasis on hide working, many domestic implements, relatively few general utility tools. Systemic indices of ca. 4-8. Winter occupation.

2. Transient Camp - Two to three acre area on T-O, few or no houses, clay platforms, few storage pits, no (?) burials, a foraging type of subsistence pattern, many projectile points, heavy emphasis on hide preparation, weaving important, few domestic implements. Systemic index of ca. 2.0. Spring and fall occupation.

3. Base Camp - Two acre area on T-O, no houses, numerous clay platforms, few storage pits, few burials, selective hunting practices, many projectile points, considerable ceremonial equipment, little evidence of hide preparation, much weaving, greater emphasis on woodworking (axes), few domestic implements. Systemic Index of ca. 1.0. Summer occupation.

4. Hunting Camp - Small area on T-1. Only associated artifacts for Riverton Culture are projectile points and knives. (However, there has been no excavation of these sites.) No features known. Season of utilization should correspond to that of settlement, transient camp, or base camp to which site is ancillary. Systemic Index of ca. 0.5 for specialized hunting camp or of zero to 0.2 for generalized hunting camp, which rarely has fabricating, processing, or domestic implements.

5. Gathering Camp - Small area on T-1. Cannot be assigned to Riverton Culture, or any other culture, at present. Pebble manos are generally only artifacts on these sites. Systemic Index of infinity (total lack of weapons). Season of occupation should correspond to that of the site to which gathering camp is ancillary.

6. Bivouacs - Rarely cover more than one hundred to four hundred square feet. On T-1. Cannot be linked definitely to Riverton or any other culture, since only chert spalls have been found on these sites. Might be linked to hunting camps.

## SUMMARY

In the present chapter data on the settlement pattern and system have been presented, with conclusions that a seasonal cycle existed for the culture, and that each of the middens was occupied during a specific portion of that cycle. Among other conclusions, a definite system could be defined for the culture, with at least four units identifiable: settlements (winter occupation), transient camps (spring and fall occupation), base camps (summer occupation), hunting camps (season of site to which camp was ancillary). Possibly two additional units are involved, gathering camps and bivouacs, but these unexcavated units cannot as yet be assigned to any culture. Each unit of the settlement can be allocated to specific geographic and physiographic features.

Attempts were also made to provide techniques for quantifying formally the distinctions among these elements of the settlement system. These were expressed as pit/area ratios, postmold/area ratios, the Systemic Index, and triangle diagrams, which express the proportions of General Utility Tools, Weapons, and Fabricating, Processing and Domestic Implements within the combined total of the preceding functional categories. It was also suggested that these ratios may be applicable over larger areas where cultures are closely related and occupy similar ecological zones.

A number of conclusions and suggestions were presented as to the types of activities associated with each unit of the settlement system through comparison of the artifacts and features associated with each type of site.

We have also concluded that most of the elements of later Woodland settlement systems had appeared by late Archaic times, probably as a result of a high degree of sedentism based upon a maximal exploitation of concentrated natural resources such as river mussels, deer, and unknown vegetable products.

## Appendix I

# Animal Remains From the Archaic Riverton, Swan Island and Robeson Hills Sites, Illinois

by

Paul W. Parmalee

## Part I

## VETEBRATES FROM THE RIVERTON, SWAN ISLAND AND ROBESON HILLS SITES, ILLINOIS, 1961 AND 1963

Over 18,000 bone remains were recovered during the April, May, June and October, 1961 archaeological excavations at these three sites; an additional 8,648 bones were removed from the Riverton Site during the 1963 summer excavation. Nearly 22,000 of the total (approximately 26,700) were pieces of bone too fragmentary for specific identification; however, with few exceptions these pieces and fragments were from a large mammal, in all probability the white-tailed deer. Of the 4,763 identified remains (see Table A), approximately 63 percent were mammals, 5 percent birds, 22 percent turtles, and 10 percent were fishes. At least 22 species of mammals, 18 birds, 8 turtles, 2 snakes, 1 amphibian and 12 species of fishes were represented.

*Mammals* As a group, mammals were the most important source of food to these peoples, and the white-tailed deer constituted the basic meat staple in their diet. Remains of the deer were more numerous than any single species, and in most instances any group (birds, fish, turtles), at all three sites. It is of special interest to note that the percentage of deer remains was highest (67.26%) at the Robeson Hills Site and lowest at the Riverton (44.80%) and Swan Island (28.32%) sites. Correlated with these percentages is the fact that the largest number of species was identified from the Riverton and Swan Island middens while the smallest number was recorded for the Robeson Hills Site.

These data suggest a more concentrated effort at hunting deer by the inhabitants of the Robeson Hills Site, while a more general use was made of the smaller mammals, birds and fish at the other two sites. Bones of the raccoon were the second most numerous of the mammals at two of the sites (third at Swan Island), and remains of beaver, muskrat, mink and otter attest to the Indian's hunting of the Wabash River and its backwaters for game. The predominance of gray squirrel over fox squirrel is indicative of heavy stands of timber with abundant ground cover and brush, as opposed to more open wooded sections. Again, the species represented lend evidence to the effect that the majority of the hunting and gathering by the Indians occupying all three sites was concentrated locally along the river and its adjoining flood plain forest.

The paucity of canid remains is noteworthy, although possibly to be expected considering the culture involved. Separate or deliberate interment of dogs is a known Archaic trait and, like human burials, they would not be expected in the general refuse and midden deposits. Bones of the opossum at all three sites are of interest and establish this animal in eastern Illinois in very early times. Except for the Archaic Modoc Site in the southwestern part of the state, opossum remains have been found wanting or of rare occurrence in Illinois sites of later time periods (Parmalee, 1959c).

Sections of femora, humeri, radius, skull and eleven lower jaws (at least eight individuals) of the porcupine from the Riverton Site constitute an important zoological record from this area (Parmalee, 1962b). Prior to this material, the porcupine had been reported in the state only from a cave deposit in southwestern Illinois, (Parmalee, Bieri and Mohrman, 1961). In this instance, however, the question arises as to whether Indians obtained the porcupine on the Illinois side of the Wabash River (Bristol Hill area?) or across the river in Indiana (Merom Bluff area?). Lyon (1936) lists early historic records of the porcupine from three southwestern Indiana counties, but not the county immediately opposite the Riverton Site. As evidenced from few remains recovered, the porcupine was of little significance to these Indians, but the distributional record from Crawford County, Illinois-Sullivan County, Indiana is noteworthy.

*Birds* At each of the sites bird bone accounted for less than six percent of the total identified vetebrate remains. Bones of the turkey were the most numerous of the birds at all three sites, and the percentage of turkey to all birds varied from 35 percent at Swan Island to 56 percent at Robeson Hills and 93 percent at Riverton. There were 521 unidentifiable bird bone fragments at Riverton, 264 at Swan Island, and 123 at Robeson Hills; the majority of these splinters and fragments were those of large birds, in all probability turkey. Since the turkey is a local and non-migratory species, they were present at all seasons and the Indian apparently not infrequently hunted them whenever they were available.

Although at least 17 other species of birds were recorded from these sites, the number of remains of each is

TABLE A

VERTEBRATES FROM THE ARCHAIC RIVERTON, SWAN ISLAND, AND ROBESON HILLS SITES, 1961 AND 1963

| Species | Riverton | Swan Island | Robeson Hills |
|---|---|---|---|
| MAMMALS: | | | |
| White-tailed Deer, *Odocoileus virginianus* | 1,344 | 317 | 408 |
| Racoon, *Procyon lotor* | 206 | 34 | 19 |
| Beaver, *Castor canadensis* | 117 | 17 | 13 |
| Gray Squirrel, *Sciurus carolinensis* | 76 | 40 | 7 |
| Elk, *Cervus canadensis* | 60 | 3? | 1? |
| Squirrel, *Sciurus* spp. | 58 | 32 | 3 |
| Porcupine, *Erethizon dorsatum* | 21 | | |
| Opossum, *Didelphis marsupialis* | 15 | 13 | 4 |
| Bobcat, *Lynx rufus* | 12 | 4 | 2 |
| Cottontail, *Sylvilagus floridanus* | 12 | 25 | 8 |
| Woodchuck, *Marmota monax* | 11 | 7 | 2 |
| Muskrat, *Ondatra zibethica* | 9 | 16 | |
| Gray Fox, *Urocyon cinereoargenteus* | 5 | 1? | |
| Canid, *Canis* sp. | 5 | 2 | |
| Striped Skunk, *Mephitis mephitis* | 5 | | |
| Mink, *Mustela vison* | 3 | 3 | |
| Small Rodents | 3 | 1 | |
| Otter, *Lutra canadensis* | 3 | | |
| Fox Squirrel, *Sciurus niger* | 3 | 1 | 1? |
| Black Bear, *Ursus americanus* | 3 | | 1 |
| Canid: Gray Wolf, *Canus lupus* (probably) | 2 | | |
| Chipmunk, *Tamias striatus* | 2 | 9 | |
| Coyote, *Canis latrans* (probably) | 1 | | |
| Weasel, *Mustela* cf. *frenata* | 1 | | |
| Eastern Mole, *Scalopus aquaticus* | | 13 | |
| Plains Pocket Gopher, *Geomys bursarius* | | 4 | |
| BIRDS: | | | |
| Turkey, *Meleagris gallopavo* | 115 | 20 | 27 |
| Trumpeter Swan, *Oler buccinator* | 2 | | 2 |
| Common Loon, *Gavia immer* | 1 | | |
| Hawk: Red-shouldered Hawk (?), *Buteo lineatus* | 1 | | |
| Prairie Chicken, *Tympanuchus cupido* (probably) | 1 | 5 | 5 |
| Great Blue Heron, *Ardea herodias* (probably) | 1 | | |
| Passenger Pigeon, *Ectopistes migratorius* | 1 | 11 | |
| Double-crested Cormorant, *Phalacrocorax auritus* | 1 | | |
| Duck: Lesser Scaup or Ring-necked Duck, *Aythya* sp. (probably) | | 4 | |
| Mallard, *Anas platyrhynchos* | | 3 | |
| Duck spp. | | 3 | |
| Snow or Blue Goose, *Chen* sp. (probably) | | 3 | 1 |
| Bobwhite, *Colinus virginianus* | | 2 | 1 |
| Goose sp. | | 1 | 1 |
| Canada Goose, *Branta canadensis* | | 1 | 9 |
| Crane, *Grus* cf. *canadensis* | | 1 | |
| Pied-billed Grebe, *Podilymbus podiceps* | | 1 | |
| Hawk: Red-tailed Hawk, *Buteo jamaicensis* (probably) | | 1 | |
| Hawk sp. | | 1 | |
| Flicker, *Colaptes* cf. *auratus* | | | 1 |
| Grackle, *Quiscalus quiscula* | | | 1 |
| REPTILES: | | | |
| Snake sp. | 5 | | |
| Snake: Family Crotalidae | 2 | | |
| Snake: Family Colubridae | 1 | | |
| Box Turtle, *Terrapene* sp. | 281 | 91 | 17 |
| Turtle spp. | 253 | 181 | 9 |
| Snapping Turtle, *Chelydra serpentina* | 43 | 10 | 8 |
| Turtle: *Pseudemys, Graptemys, Chrysemys* group | 42 | 19 | 13 |
| Soft-shelled Turtle, *Trionyx* sp. | 29 | 29 | 4 |
| Pond Terrapin, *Pseudemys* cf. *scripta* | 3 | 1 | |
| Painted Turtle, *Chrysemys picta* (probably) | 1 | 1 | |
| Map Turtle, *Graptemys* sp. | 1 | | |
| Mud Turtle, *Kinosternon* sp. | 1 | | |
| Musk Turtle, *Sternotherus odoratus* | | 23 | |

TABLE A (continued)

| Species | Riverton | Swan Island | Robeson Hills |
|---|---|---|---|
| AMPHIBIANS: | | | |
| Frog sp. | 8 | 1 | 3 |
| Bullfrog, *Rana catesbeiana* | | 3 | 1 |
| FISHES: | | | |
| Bowfin, *Amia calva* | 68 | 49 | 9 |
| Channel/Blue Catfish, *Ictalurus* spp. | 56 | 14 | 8 |
| Bullhead, *Ictalurus* sp. | 32 | 25 | |
| Gar, *Lepisosteus* sp. | 18 | 28 | 3 |
| Catfish spp. | 16 | 20 | |
| Fresh-water Drum, *Aplodinotus grunniens* | 13 | 20 | 3 |
| Buffalofish and Suckers, Catostomidae | 11 | 15 | 1 |
| Redhorse, *Moxostoma* sp. | 4 | 4 | |
| Buffalofish, *Ictiobus* sp. | 4 | 2 | 3 |
| Walleye or Sauger, *Stizostedion* sp. | 3 | | 2 |
| Bass, *Micropterus* sp. | 2 | 9 | 1 |
| Bigmouth Buffalofish, *Ictiobus cyrprinellus* | 1 | | |
| Pike, *Esox* sp. | 1 | 3 | |
| Flathead Catfish, *Pylodictis olivaris* | 1 | | 1 |
| Crappie, Sunfish, Bluegill group, Centrarchidae | | 5 | |
| Longnose Gar, *Lepisosteus osseus* | | 5 | |
| Sturgeon sp. | | 1 | |
| Total | 3,000 | 1,156 | 607 |

so few that they were of little or no consequence compared with mammals. The Indian occasionally took birds other than turkeys when they became available, most probably during migration, but the paucity of avian remains suggests that little effort was directed at hunting birds. The now-extinct passenger pigeon once migrated through this region in tremendous numbers, and the spring and fall waterfowl migrations along the Wabash River were also probably extensive, but in spite of this abundant source of food, it was little utilized.

*Turtles* A large number (about 44 percent) of the turtle remains were too fragmentary for specific identification, but bones of at least eight species, terrestrial and aquatic, were recognized. Box turtles were taken in larger numbers than the aquatic species, but the apparent absence of worked shell (as bowls or dishes) indicates that turtles were used only for food. Turtle remains comprised less than nine percent of the identified bone from Robeson Hills, while they amounted to approximately 22 percent at Riverton and 31 percent at Swan Island. The large percentage of deer remains, compared with the small percentage of fish, turtle, bird and small mammal bones, recorded for Robeson Hills emphasizes the preference (or availability?) for deer over these other groups (Table B). Although the quantity of turtle remains from Riverton and Swan Island seems large, the probable number of individuals represented is small and the actual meat derived from turtles would be extermely small compared, for example, with the deer.

*Fishes* At least 13 species of fish were identified from the midden deposits at the three sites, the largest variety of species occurring at Swan Island. Remains of the common bowfin were the most numerous of any single species at all three sites, but as a group the catfishes and bullheads (29 percent of the total) were probably the most important as food fish. In addition to the bowfin, several other species of "rough" fish (suckers, buffalofish, gar) were taken, gars being the most common of this group. It is of interest to note that several cut mandible sections of the gar (probably *L. osseus*) were recovered at the Swan Island Site; the function or purpose of these artifacts is questionable. With few exceptions, fish, as represented by bones from these sites, had been small.

Fish, turtles, birds and many of the small mammals were utilized by the Indians and, as in the case of the mussels, together formed an important portion of their diet. As previously noted, this was particularly evident at the Riverton and Swan Island sites. During the summer

TABLE B

PERCENT OF DEER AND OF VERTEBRATE GROUPS TO THE TOTAL

| | Riverton | Swan Island | Robeson Hills |
|---|---|---|---|
| % of deer of all vertebrates | 44.8 | 28.3 | 67.2 |
| % of deer of mammals | 68.0 | 58.7 | 86.9 |
| % of mammals of all vertebrates | 65.5 | 46.7 | 77.2 |
| % of birds of all vertebrates | 4.1 | 4.9 | 7.9 |
| % of turtles of all vertebrates | 21.8 | 30.7 | 8.4 |
| % of fish of all vertebrates | 7.7 | 17.3 | 5.7 |
| Total | 99.1 | 99.6 | 99.2 |

months mussels from the Wabash River provided an abundant and easily available source of food. The quantity of remains of the white-tailed deer at the three sites, however, establish it as the most important single source of meat in the food economy of these Archaic peoples.

## Part II

### MOLLUSKS FROM THE RIVERTON, SWAN ISLAND AND ROBESON HILLS SITES, ILLINOIS, 1961.

*Snails* Four species (four genera) of aquatic snails and eight species (three genera) of terrestrial gastropods were identified from the midden deposits of these three sites (Table C). Species or forms of the large river snail *Campeloma* comprised approximately 88 percent of the total, the dominant species being *C. ponderosum.* The occurrence of this large aquatic snail throughout most levels of the midden at all three sites points to the possibility that they were gathered for food along with the mussels. A similar inference has been made in the case of large quantities of *Campeloma* shells recovered at the Archaic Modoc Site (Parmallee, 1959c).

Terrestrial snails were most common at the Swan Island Site, but in the case of all three sites, their presence is probably the result of natural habitation of the area and they became a part of the midden deposit while seeking food. Except for one species, all are fairly common in the area.

Of special interest was the recovery of a single specimen of *Triodopsis obstricta* at the Riverton Site and at the Swan Island Site, both located in Crawford County. It has been recorded (Baker, 1939) in Illinois only from the forested valley of Big Creek, a tributary of the Wabash River, in Clark County, the county adjacent to Crawford County on the north. In Indiana this snail is known only from Posey County (Goodrich and van der Schalie, 1944), approximately 50 miles southeast of the Riverton - Swan Island sites. Evidence based only on these two specimens is inconclusive, but their intermediate position between the two present known localities of *T. obstricta* suggests a more continuous range along the Wabash River in prehistoric times. This snail is indicative of heavily forested areas with oak, elm, hickory and sycamore being the dominant trees.

*Fresh-water Mussels* Over 33,000 shells were identified from the midden deposits of these three sites, and 37 species were recorded (Table D). The sites are spaced at nearly equal distances from one another along the Wabash River. Riverton is the most northern, and is 2 miles northeast of Palestine, Crawford County; Swan Island is situated at the Crawford-Lawrence county line, and Robeson Hills is about 2 miles north of Vincinnes (Lawrence County, Illinois). The section of Wabash River along which these sites are located has a current of about one foot per second, averages approximately 500 feet in width, with the main channel six to eight feet deep during normal stage levels. There is a large amount of sediment carried by the river and, except for small local sand and/or gravel beds, most of the bottom is mud covered.

Valves of four species – *Actinonaias carinata, Elliptio dilatatus, Dysnomia perplexa* and *Pleurobema cordatum* – were the most numerous and comprised over 70 percent of the identified shells at all three sites. Although several species determined from these sites are typically deep water, large river forms (e.g. *P. cordatum, E. carssidens, Plethbasus*), the majority occur in medium sized rivers in three to six feet of water. From the variety of species found in these midden deposits, it is apparent that the deeper portions of the river as well as the shallows were hunted by Indians. Although valves of most of the species recorded were thick and characteristic of a large river habitat, evidence suggests that this section of the Wabash River was, during occupancy of these sites, fairly shallow.

Nearly all valves of *Amblema* from these sites had the depressed, flattened beaks typical of the shallow, headwaters or small river form *A. costata.* Presently the larger, thick-shelled form *A. peruviana,* which is usually restricted to the lower reaches of the river system of large proportions, predominates. The abundance of shells of *D. perplexa* is indicative of a river habitat with a coarse sand-gravel bed, two to four feet of water, and fast current. These environmental conditions would be most suitable for other species

TABLE C

SNAILS FROM THE ARCHAIC RIVERTON, SWAN ISLAND, AND ROBESON HILLS SITES, ILLINOIS, 1961

| Species | Total Number | | |
|---|---|---|---|
| | Riverton | Swan Island | Robeson Hills |
| *Campeloma ponderosum* | 360 | 296 | 486 |
| *Campeloma* spp. | 45 | 44 | 32 |
| *Campeloma subsolidum* | 15 | 6 | 10 |
| *Pleurocera canaliculatum* | 6 | 19 | 18 |
| *Helisoma trivolvis* | 2 | 1 | |
| *Lymnaea* sp. | 1 | | |
| *Anguispira alternata* | | 53 | 1 |
| *Anguispira kochi* | 1 | 28 | 2 |
| *Mesodon clausus* | | 24 | |
| *Mesodon elevatus* | | 10 | 2 |
| *Mesodon thyroidus* | 1 | 5 | |
| *Triodopsis albolabris* | | 2 | 1 |
| *Triodopsis multilineatus* | 1 | | |
| *Triodopsis obstricta* | 1 | 1 | |

TABLE D

FRESH-WATER MUSSELS FROM THE ARCHAIC RIVERTON, SWAN ISLAND AND ROBESON HILLS SITES, ILLINOIS, 1961

| Species | Site | | | | | |
|---|---|---|---|---|---|---|
| | Riverton | | Swan Island | | Robeson Hills | |
| | No. | % | No. | % | No. | % |
| *Actinonaias carinata* | 2,543 | 31.25 | 974 | 14.85 | 4,506 | 24.34 |
| *Elliptio dilatatus* | 1,399 | 17.20 | 970 | 14.79 | 2,874 | 15.52 |
| *Dysnomia perplexa rangiana* | 990 | 12.17 | 1,854 | 28.27 | 2,689 | 14.52 |
| *Pleurobema cordatum* | 866 | 10.64 | 827 | 12.61 | 3,617 | 19.53 |
| *Ptychobranchus fasciolaris* | 305 | 3.75 | 224 | 3.41 | 775 | 4.18 |
| *Dysnomia* spp.: cf. *perplexa* | 253 | 3.11 | 98 | 1.49 | 66 | .30 |
| *Lampsilis ovata* | 232 | 2.85 | 76 | 1.15 | 80 | .43 |
| *Quadrula pustulosa* | 222 | 2.72 | 209 | 3.18 | 460 | 2.48 |
| *Obovaria subrotunda* | 218 | 2.68 | 137 | 2.09 | 687 | 3.71 |
| *Plethobasus cicatricosus* | 184 | 2.26 | 105 | 1.60 | 559 | 3.01 |
| *Cyclonaias tuberculata* | 153 | 1.88 | 151 | 2.30 | 327 | 1.76 |
| *Cyprogenia irrorata* | 124 | 1.52 | 347 | 5.29 | 466 | 2.51 |
| *Quadrula cylindrica* | 90 | 1.10 | 42 | .64 | 82 | .44 |
| *Amblema costata* | 81 | .99 | 45 | .68 | 220 | 1.18 |
| *Obovaria retusa* | 79 | .97 | 224 | 3.41 | 241 | 1.30 |
| *Fusconaia undata* | 75 | .92 | 27 | .41 | 259 | 1.39 |
| *Ligumia recta* | 52 | .63 | 28 | .42 | 42 | .22 |
| *Plethobasus cyphyus* | 36 | .44 | 11 | .16 | 36 | .19 |
| *Truncilla truncata* | 36 | .44 | 24 | .36 | 72 | .33 |
| *Tritogonia verrucosa* | 34 | .42 | 13 | .19 | 28 | .15 |
| *Proptera alata* | 30 | .36 | 13 | .19 | 9 | -- |
| *Lasmigona costata* | 30 | .36 | 8 | .12 | 36 | .19 |
| *Elliptio crassidens* | 17 | .21 | 18 | .27 | 49 | .26 |
| *Dysnomia triquetra* | 13 | .15 | 52 | .79 | 67 | .36 |
| *Strophitus rugosus* | 11 | .13 | 1 | -- | 4 | -- |
| *Obovaria olivaria* | 11 | .13 | 15 | .22 | 49 | .26 |
| *Carunculina glans* | 10 | .12 | 12 | .18 | 52 | .28 |
| *Obliquaria reflexa* | 10 | .12 | 6 | -- | 28 | .15 |
| *Plagiola lineolata* | 8 | -- | 14 | .21 | 51 | .27 |
| *Quadrula metanevra* | 7 | -- | 26 | .39 | 54 | .29 |
| *Quadrula nodulata* | 4 | -- | 1 | -- | 10 | .05 |
| *Dysnomia sulcata* | 4 | -- | 2 | -- | -- | -- |
| *Fusconaia ebenus* | 2 | -- | -- | -- | 9 | -- |
| *Lasmigona complanata* | 2 | -- | -- | -- | -- | -- |
| *Lastena lata* | 2 | -- | 1 | -- | 5 | -- |
| *Quadrula quadrula* | 1 | -- | -- | -- | 7 | -- |
| *Micromya fabalis* | 1 | -- | -- | -- | -- | -- |
| *Lampsilis orbiculata* | -- | -- | 2 | -- | -- | -- |
| Total | 8,135 | 99.52 | 6,557 | 99.67 | 18,516 | 99.60 |

Please note that the quantities of molluscan species from Riverton and Swan Island are derived from total sampling of all features and selected squares, while the figures from Robeson Hills represent all shell from all excavation units, with minor exceptions. Data on sampling procedures are available in the files of the Illinois State Museum.

such as *E. dilatatus, P. fasciolaris, C. irrorata, T. verrucosa, A. costata, Q. pustulosa, D. triquetra* and *O. reflexa.*

The mucket (*A. carinata*) may occur at variable depths, but it is often found most abundantly in the deeper protions of medium to large rivers. It is of interest to note that the percentage of *A. carinata* is considerably less at Swan Island than at Riverton and Robeson Hills while, conversely, the percentage of *D. perplexa* at Swan Island is about twice that of the other two sites. These differences may indicate that a more extensive section of shallow riffles formerly existed near the Swan Island Site. Valves of the deep water species *P. cicatricosus* were more abundant at Riverton and Robeson Hill, as were shells of *F. undata* at the latter site, thus suggesting deeper water at these two sites-or more extensive collecting in the greater depths.

Shell in the upper two feet (Levels I - IV) of all three sites was, for the most part, fragmentary and poorly preserved. Valves occurring from about 36 inches to the 84 inch depth (Levels VII to XIV), and in the storage-refuse pits within these levels, were in excellent condition. With but few apparent exceptions, a wide variation from very small young to large adult valves was noted for most species. There appeared to be no general change in size of any species from the upper levels to the lower levels, or vice versa, suggesting some possible major environmental change in the river during that period. Probably the majority of mussels were collected in direct proportion to their abundance and availability.

Compared with adult specimens presently found in the Wabash River, shells of *C. irrorata, Q. pustulosa* and *O. subrotunda* from these three sites ran consistantly small. Valves of *L. ovata*, however, were predominately those of large adult mussels, with very few young individuals represented. These large specimens may indicate selective gathering in the case of this species since the pseudocardinal teeth of at least two valves had been ground down, these shells

(and the unworked valves?) probably having been used as spoons. The early occurrence of *L. ovata* in this section of the Wabash River is of special interest since this form is now restricted to the Ohio River in southern Illinois. The sharp posterior ridge of the true *L. ovata*, a deep water species of large rivers, rounds off as one progresses towards the headwaters, and the form becomes *L. ventricosa*. Presently *L. ventricosa* is common throughout this portion of the Wabash River. Surprisingly, shells of *L. ovata* occurred in larger numbers at the most northern (Riverton) of the three sites, suggesting again a section of deep channel at this site or more extensive gathering by the Indian in the deep water.

There has been a major change in the mussel fauna of the Wabash River since these three sites were occupied, the greatest change occurring probably after 1900. Polution, industrial waste and silting have drastically altered the chemical composition of the water and replaced or covered much of the early sand-gravel river bed with silt and mud. With this physical change there has been an alternation of the mussel fauna; species intolerant to polution and silting have disappeared, become greatly reduced in numers, or localized in areas of occurrence, while other forms better able to adjust to such conditions have increased in numbers and in their distribution.

Call (1898) stated that *D. perplexa* ". . . is abundant in the White, Ohio, Wabash and Eel rivers,. . ." *C. irrorata*, Call indicated, "Numerous specimens may be taken in the White, the Wabash and the Ohio." *O. subrotunda* is "also numerous in the lower Wabash," and with reference to *P. fasciolaris*, "This is an abundant shell in both the Wabash and the Ohio." These species were abundant in prehistoric times, judging by the quantity of their shells recovered in the midden deposits of these three sites, but now they are uncommon to rare in this section of the Wabash River. Other species such as *Q. cylindrica*, *O. retusa*, *P. lineolata*, *D. sulcata* and *P. cyphyus* are also rare or absent in the Wabash River at these site localities.

The number of shells of *P. cicatricosus* recovered at these sites is of particular interest; this species is now absent in the Wabash River or is extermely rare and of local occurrence. Parmalee (1960) reported it from the Angel Site, a Middle Mississippi site located along the Ohio River in Vanderburgh County, Indiana. Previously it was unknown from that section of the Ohio River, but the quantity of shells recovered from the Angel Site and these three Archaic Illinois sites indicates a greater range and population size of *P. cicatricosus* in the lower Wabash and Ohio rivers in prehistoric times.

*Actinonaias carinata* and *P. cordatum* are still fairly common in the lower Wabash River, but apparently less so than in prehistoric times. Other mussels collected in limited numbers by the Indians occupying the Riverton, Swan Island and Robeson Hills sites, species such as *T. verrucosa*, *Q. quadrula*, *Q. metanevra*, *O. olivaria* and *O. reflexa*, are presently common in the river; these species can better adapt to conditions of pollution and silting. No specimens of *Anodonta grandis*, *Leptodea fragilis* or *L. laevissima* were recovered in the midden deposits; these forms are tolerant of and typically inhabit a mud bottom in quiet or slow-moving water, and they are now very common and widely distributed through the Wabash River.

The paucity of worked shell implies that mussels were gathered primarily for food. The species composition of the shell middens was indicative of a river environment consisting of a coarse sand and/or gravel bed, swift current and a normal depth of two to five feet. Evidence of a deeper channel is suggested by shells of *P. cicatricosus*, *L. ovata*, *P. c. pyramidatum* and *E. crassidens*. Major changes in the mussel fauna of the lower Wabash River have taken place mainly during the past 50 years.

# Appendix II

PITS AND OTHER FEATURES
ROBESON HILLS SITL, Lw-1
(Measurements Given Only for Undisturbed Pits)

| Pit No. | Type | Depth of Mouth Below Surface | Depth of Pit | Width of Pit Mouth | Maximum Width | Remarks |
|---|---|---|---|---|---|---|
| S-1 | | | – | – | – | |
| S-2 | | | – | – | – | 2 Sandstone abraders. |
| S-3 | Circular, Narrow-mouthed | Over 48" | 30" | 36" | 45" | Splinter awl. |
| S-4 | | | – | – | – | Splinter awl. |
| S-5 | | | – | – | | |
| S-6 | | | – | – | – | Mano, chert projectile point, 2-leaf-shaped blades. |
| S-7 | Oval Sloping Sides | Over 48" | 9½" | 27" | | Drift or punch. Chert blade. |
| S-8 | | | – | – | – | |
| S-9 | | | – | – | – | |
| S-10 | | | – | – | – | |
| S-11 | Circular, Basin-shaped | Over 48" | – | – | – | Hearth filled with charcoal. |
| S-12 | Circular, Narrow-mouthed | Over 48" | 18" | 25" | 27" | Hammerstone, sandstone abrader, worked antler, deer metacarpal awl. |
| S-13 | | | – | – | – | |
| S-14 | Circular, Narrow-mouthed | 48" | 24" | 34" | 38½" | Tubular pipe, bear canine pendant, sandstone abrader, mano, worked antler. |
| S-15 | Circular, Narrow-mouthed | 48" | 13" | 31" | 33" | Riverton gouge, splinter awl, antler projectile point, shell "hoe," leaf-shaped blade, sandstone ball, worked antler. |
| S-16 | | | – | – | – | |
| S-17 | | | – | – | – | 2 Manos, worked antler. |
| S-18 | Circular, Basin-shaped | | 5" | 30" | 30" | Hearth, bone pendant or tube. |
| S-19 | | | – | – | – | "Marcos" projectile point. |
| S-20 | | | – | – | – | Bone awl, chert drill (Boaz Constricted Stem). |
| S-21 | | | – | – | – | Worked turtle carapace. |
| S-22 | | | – | – | – | 2 Riverton gouges, punch or drift, worked bone, 2 sandstone sinkers, hammerstone, mano, worked antler. |
| S-23 | Circular | | 10" | 32" | – | Cupstone, mano, bone pendant. |
| S-25 | Circular? | About 6" | 30" | 48" | – | Socketed antler. |
| S-26 | Oval | | – | – | | |
| S-27 | Circular | | – | – | – | |
| S-28 | Circular | | – | – | | |
| S-29 | Circular Basin-shaped | 36" | 6" | 31" | 31" | |
| S-30 | Circular | 36" | 6" | | | |
| S-31 | Circular, Basin-shaped | 54" | 5" | 18" | 18" | |
| S-32 | Circular | 54" | 11" | 15" | 15" | |
| S-33 | Conical shape | 14" | 13" | 31" | – | |

# Appendix III

TABLE A

ROBESON HILLS SITE, Lw-1
ARTIFACTS BY LEVELS OR FEATURES, 1961 EXCAVATIONS
(Does Not Include Artifacts Collected After Excavation)
(All Cultures)

| | Surface | 0-12" | 12-24" | 24-36" | 36-48" | Pits, etc. | Uncontrolled Provenience | Total |
|---|---|---|---|---|---|---|---|---|
| Knives | 3 | 6 | 10 | 1 | 0 | 5 | 3 | 28 |
| Scrapers | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| Choppers | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Hammerstones | 0 | 1 | 2 | 0 | 0 | 2 | 0 | 5 |
| Projectile Points | | | | | | | | |
| Chert | 15 | 6 | 9 | 4 | 4 | 4 | 4 | 46 |
| Antler | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 5 |
| Atlatl Weights | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Gorges | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Sinkers | 0 | 0 | 5 | 0 | 0 | 2 | 7 | 14 |
| Tubular Beads | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 3 |
| Pendants | 0 | 0 | 1 | 0 | 1 | 4 | 0 | 6 |
| Pipes | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Flutes | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Hoes | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 5 |
| Grooved Axes | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Misc. Worked Bone & Antler | 0 | 1 | 3 | 4 | 4 | 10 | 9 | 31 |
| Anvil | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Flakers | 0 | 2 | 4 | 0 | 0 | 1 | 1 | 8 |
| Drifts & Punches | 0 | 1 | 0 | 0 | 0 | 3 | 3 | 7 |
| Awls | 0 | 2 | 7 | 11 | 10 | 7 | 5 | 42 |
| Drills | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 4 |
| Abraders | 0 | 3 | 6 | 0 | 2 | 6 | 3 | 20 |
| Shuttles | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| Chisels | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Needles | 0 | 0 | 0 | 1* | 0 | 0 | 0 | 1 |
| Gouges | 0 | 1 | 1 | 4 | 0 | 5 | 3 | 14 |
| Tubes | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Manos | 8 | 14 | 13 | 7 | 4 | 9 | 8 | 63 |
| Cupstones | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Spoons | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 2 |
| Pottery | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Total | 32 | 40 | 75 | 38 | 27 | 64 | 48 | 324 |

Includes the following non-Riverton artifacts: Surface, all sherds, 1 projectile point, 2 drills, 1 atlatl weight; Level 1, 3 projectile points; Level 2, 3 projectile points; Pits, 1 projectile point, 1 drill.

*20-30 Inches.

TABLE B

RIVERTON SITE, Cw-170
ARTIFACTS BY SIX-INCH LEVELS, 1961 EXCAVATIONS
(All Cultures)

| Artifacts | 16* | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Surface | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Knives | – | – | 1 | 1 | 3 | – | 3 | 7 | 2 | 2 | 4 | 2 | 4 | 4 | 3 | 1 | 19 | 56 |
| Scrapers | – | – | – | – | – | – | – | – | 2 | 1 | 1 | – | 1 | – | – | – | 4 | 9 |
| Hammerstones | – | – | – | – | – | – | – | 1 | – | – | – | 1 | 1 | – | – | – | | 3 |
| Choppers | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 1 | 1 |
| Projectile Points: | | | | | | | | | | | | | | | | | | |
| Chert | – | 2 | 1 | 3 | 8 | 9 | 5 | 6 | 10 | 6 | 9 | 7 | 4 | 5 | 8 | 2 | 76 | 161 |
| Antler | – | 1 | – | – | – | – | – | – | 2 | 1 | – | – | 2 | 1 | 1 | – | 3 | 11 |
| Forked "Spatulae" | – | – | – | – | – | – | – | – | 1 | – | – | – | – | – | – | – | – | 1 |
| Beads | – | – | – | 3 | 1 | 4 | 1 | 1 | 4 | 2 | 1 | – | 1 | – | – | 1? | – | 19 |
| Pendants | – | – | 1 | – | 1 | – | – | 1 | – | – | – | – | – | – | – | 1 | – | 4 |
| Perforated Mandibles | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 1 | 1 |
| Pipes | – | – | – | – | – | – | – | – | – | – | 1 | – | – | – | – | 1 | – | 2 |
| Flakers | – | – | – | – | – | – | – | 1 | 1 | 1 | 1 | – | – | 1 | – | – | – | 5 |
| Drifts | – | – | – | – | 1 | – | – | – | – | – | – | – | – | – | – | – | – | 1 |
| Awls & Perforators | 1 | – | – | 3 | 4 | 1 | 2 | 5 | 3 | 4 | 1 | 3 | 6 | 2 | 3 | – | 4 | 42 |
| Drills | – | – | – | – | 1 | 1 | 1 | 2 | – | 1 | – | 1 | – | – | 1 | – | 3 | 11 |
| Micro-perforators | – | – | – | – | 3 | 3 | 1 | – | – | 1 | 2 | 1 | 1 | – | – | 1 | 1 | 14 |
| Abraders | – | – | 1 | – | – | 1 | 1 | – | 1 | 2 | – | 1 | 1 | 1 | 1 | – | 3 | 13 |
| Chisels | – | – | – | 1 | – | – | – | – | – | – | – | – | – | – | – | – | 1 | 2 |
| Shuttles | – | 1 | | | 1 | 1 | 1 | – | – | 2 | – | – | 1 | – | 1 | 1? | 1 | 10 |
| Needles | – | – | – | – | – | 1? | – | – | – | – | – | – | 2? | – | – | – | – | 3 |
| Gouges | – | – | – | – | – | – | – | – | – | – | – | – | – | 1 | – | – | 3 | 4 |
| Skewers | – | – | – | 2 | – | – | – | – | – | – | – | 1 | – | – | – | – | – | 3 |
| Manos | – | – | – | – | – | – | 1 | 1 | 3 | 3 | 1 | 1 | 1 | – | – | 3 | 14 | 28 |
| Cut Deer Phalanges | – | – | – | 1 | – | – | – | 1 | – | 1 | – | – | – | – | – | – | – | 3 |
| "Tallies" | – | – | – | – | – | – | – | – | – | – | – | – | 1 | – | – | – | – | 1 |
| Perforated Scapulae | – | – | – | – | – | – | – | 1 | – | – | – | – | – | – | – | – | – | 1 |
| Cut Mandibles | – | – | – | – | – | – | – | 1 | – | – | – | – | – | – | – | – | – | 1 |
| Cut Turtle Shell | – | – | – | – | – | – | – | – | 1 | – | – | – | 1 | – | – | – | – | 2 |
| Shredders | – | – | 1 | – | – | – | – | – | – | – | – | – | 1? | – | – | – | 3 | 5 |
| Worked Antler, Shell and Bone | 1 | – | 2 | 2 | 4 | 2 | 3 | 5 | 3 | 5 | – | 1 | 4 | 3 | – | 1 | – | 36 |
| Pottery | | | | | | | | | | | | | | | | | | |
| Woodland | – | – | – | – | – | – | – | – | – | – | – | – | | – | – | – | 6 | 6 |
| Mississippian | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 1 | 1 |
| Total | 2 | 4 | 7 | 16 | 27 | 23 | 19 | 33 | 33 | 32 | 21 | 19 | 32 | 18 | 18 | 12 | 144 | 460 |

Includes the following non-Riverton artifacts: Surface, 1 perforated mandible, all sherds, 1 gouge, 1 projectile point; Level 1, 1 projectile point; Level 2, 1 projectile point.

*Lowest Level.

TABLE C

SWAN ISLAND SITE, Cw-319
ARTIFACTS BY SIX-INCH LEVELS, 1961 EXCAVATIONS
(All Cultures)

| Artifacts | 10* | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Surface | Unknown Provenience | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Knives | 2 | 1 | 1 | 4 | 3 | 10 | 6 | 3 | 5 | 8 | 3 | – | 46 |
| Scrapers | – | – | – | – | – | – | – | – | 1 | 1 | – | – | 2 |
| Hammerstones | 1 | – | – | – | 1 | – | – | – | – | – | – | – | 2 |
| Choppers | – | – | – | – | – | – | – | – | – | – | 1 | – | 1 |
| Chert Projectile Points | 2 | – | 7 | 5 | 7 | 5 | 2 | 10 | 4 | 11 | 1 | – | 54 |
| Antler Projectile Points | – | 3 | 1 | 2 | 2 | – | – | 1 | 2 | – | – | – | 11 |
| Gorges | – | – | – | – | 1? | – | – | – | – | – | – | – | 1? |
| Beads | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 1 | – | – | 26 |
| Pendants | 1 | 1 | – | – | 1 | – | – | – | 2 | – | – | – | 5 |
| Flutes | – | – | – | – | – | 1 | 1 | – | – | – | – | – | 2 |
| "Hoes" | – | 2 | – | – | 1 | – | – | – | – | – | – | – | 3 |
| Flakers | – | 2 | 2 | 4 | 2 | 1 | 2 | 2 | – | – | – | – | 15 |
| Awls and Perforators | 1 | – | 4 | 2 | 3 | 2 | – | 6 | 3 | 3 | – | – | 24 |
| Drills | – | – | 3 | – | – | – | – | – | 1 | – | – | – | 4 |
| Reamers | – | – | – | – | 1 | 1 | – | 1 | – | – | 1 | – | 4 |
| Micro-perforators | – | 2 | – | 4 | – | 2 | 2 | 2 | – | 1 | – | – | 13 |
| Abraders | – | – | 3 | 1 | 1 | 1 | 2 | 2 | – | – | 1 | – | 11 |
| Files | – | – | – | – | 1 | – | – | – | – | 1 | – | – | 2 |
| Chisels | 1 | – | – | – | – | – | – | – | – | – | – | – | 1 |
| Shuttles | – | 1 | 4 | – | 4 | – | 1 | 2 | 1 | – | – | – | 13 |
| Needles | – | – | – | – | – | – | – | 2 | – | – | – | – | 2 |
| Antler & Bone Gouges | – | – | 1 | 1 | 1 | | – | 2 | 1 | 2 | – | – | 8 |
| "Tallies" | – | – | – | – | 1 | – | – | 1 | – | – | – | – | 2 |
| Cut Deer Phalanges | – | – | – | 3 | – | 1 | – | – | – | – | – | – | 4 |
| Skewers | – | – | – | – | – | – | – | – | – | 1 | – | – | 1 |
| Manos | 3 | 3 | 1 | 1 | 2 | – | – | – | – | 1 | 9 | – | 20 |
| Shredders | 1 | – | 1 | 1 | – | 1 | – | – | – | – | – | – | 4 |
| "Pins" | 1 | – | – | – | – | – | – | – | – | – | – | – | 1 |
| Worked Antler and Bone | – | 5 | 4 | 3 | 7 | 6 | 4 | 8 | – | 2 | – | – | 39 |
| Cut Gar Jaws | – | 1 | – | – | – | 1 | | 2 | – | – | – | 3 | 7 |
| Red Ochre | 5 | 2 | – | – | – | – | 3 | 1 | – | – | – | – | 11 |
| Woodland Pottery | – | – | – | – | – | – | – | – | 2 | 3 | – | – | 5 |
| Mississippian Pottery | – | – | – | – | – | | – | 1 | 1 | – | 3 | – | 5 |
| Total | 19 | 25 | 34 | 33 | 42 | 35 | 27 | 50 | 27 | 35 | 19 | 3 | 349 |

Includes the following non-Riverton artifacts: Surface, 3 sherds, 1 projectile point, 1 reamer, 1 chopper; Level 1, 2 sherds, 2 projectile points, 1 knife; Level 2, 3 sherds; Level 3, 1 sherd; Level 8, 1 projectile point; Level 10, 2 projectile points.

*Lowest Level.

# Appendix IV

ROBESON HILLS SITE, Lw-1
ROBESON GOUGES

| Provenience and (No.) | Length | Maximum Width | Shaft Width | Bit Width | Average Thickness | Remarks |
|---|---|---|---|---|---|---|
| Pit S-15, 30-36" in Test Pits E & G. (145) | 16.1 cm. | 4.4 cm. | 2.7 cm. | 3.3 cm. | 2.9 cm. | In sterile subsoil at bottom of midden. Straight bit. |
| Test Pit E, Level VI, 30-36". (159) | 18.3 | 5.6 | 3.0 | 3.9 | 3.3 | Close to specimens 160 and 191. Straight bit. |
| Test Pit E, Level VI, 30-36". (160) | 14.6 | 4.4 | 3.1 | 3.3 | 3.4 | Close to specimens 159 & 191. Convex bit. |
| Test Pit H, Level VI, 30-36". (191) | 17.2 | 4.5 | 3.1 | 3.5 | 3.2 | Close to specimens 159 & 160. Straight bit. |
| Test Pit K, 0-36". (216) | 15.4 | – | 3.2 | – | 2.6 | Bi-convex bit. |
| Burial Pit 4 Below 42" from surface. (255) | 13.4 | 4.0 | 2.6 | 3.4 | 2.4 | Not definitely associated with burial. In pit fill. Convex bit. |
| Pit S-22, Subsoil but depth below surface not certain (probably 2-3'). (310) | 15.8 | 6.2 | 3.5 | 4.1 | 3.7 | Specimen 311 also in pit. Triangular bit, convex and straight sided. |
| Pit S-22, Subsoil, but depth below surface not certain (probably 2-3') (311) | 16.3 | 5.6 | 3.0 | 3.7 | 3.3 | Specimen 310 also in pit. Convex bit. |
| **Other Antler Gouges** | | | | | | |
| Test Pit A, Level II, 6-12" (16) | 11.2 | 4.6 | | 4 2 | 1.1 | Spatulate form. Plano-convex cross section. Convex bit. |
| Northeast Midden. About 2-3' below ground surface. (326) | 10.5 | 4.6 | 4.4 | 3.6 | 1.7 | Serrated base. Trough-shaped form. |
| Test Pit D, 12-18". (303) | 14.6 | 3.5 | 3.2 | 3.3 | 2.4 | Trough-shaped form. Convex bit. |
| **Unclassifiable Gouge Fragments** | | | | | | |
| Test Pit D, 24-30". (132) | – | – | – | – | – | |
| Burial pit 2. (253) | – | – | – | – | – | Charred fragment of bit in pit fill. |

ROBESON GOUGES

| Number | Type of Socket in Base | Use Polish on Convex Side of Bit | Use Polish on Flat or Concave Side of Bit | Use Polish on Shaft | Polish at Junction of Shaft & Tine |
|---|---|---|---|---|---|
| 145 | Cylindrical | Heavy | Light | Light | Light |
| 159 | Conical. Edge battered by hammering | Heavy | Light; some file marks remain | Light | Light |
| 160 | Conical | Heavy | Heavy | Light | Light |
| 191 | Cylindrical | Heavy | Heavy | Heavy | Light |
| 216 | Cylindrical | Light, heavy file marks | Both faces are convex | Light | ? |
| 255 | Conical | Heavy | Light | Heavy | Light |
| 310 | Conical | Heavy | Heavy | Heavy | Light |
| 311 | Cylindrical | Heavy | Heavy | Heavy | Light |
| | | Other Antler Gouges | | | |
| 16 | None | Heavy | Light | – | – |
| 326 | Open Groove | Heavy | Heavy | Heavy | – |
| 303 | Open Groove | Heavy | Heavy | Light | – |
| | | Unclassifiable Gouge Fragments | | | |
| 132 | – | Heavy | Light | – | – |
| 253 | – | Heavy | Heavy | Heavy file marks | – |

## Appendix V

# Some Projectile Point Descriptions

### MEROM EXPANDING STEMMED PROJECTILE POINTS

The category is named after the town of Merom, Indiana, which is close to the Riverton Site. Only specimens from the 1961 field season were used in preparing a description of the type.

*Sample Size.* A sample of 91 specimens from the Riverton and Robeson Hills sites was used in defining Merom Expanding Stem. Seventy of these were from Illinois State Museum collections, and twenty-one were from the collections of Mr. Lynn Stephens of Robinson, Illinois.

*Description.* A number of attributes are summarized in Table A. Examples of Merom Expanding Stemmed from the Swan Island Site are identical with the range of attributes of specimens recorded from Riverton and Robeson Hills.

Apart from their very small size, salient characteristics include high incidence of triangular cross sections (78%) light serration (45%) and basal beveling (30%), and low incidence of basal and side grinding. Even when present, the latter attribute is generally indicated only by a smoothing of irregularities on the edges, rather than massive smoothing of the surfaces.

Stems range from markedly flaring to slightly flaring, with a high proportion of convex bases. Blades are always triangular and are frequently convex sided (67%).

The triangular cross sections of the points indicate that they were made on flakes. The latter were probably struck off unaltered nodules since only two dubious examples of "cores" were recovered from the excavations at all three sites.

Secondary chipping is rare, and serrated edges are sometimes produced by the removal of widely spaced flakes during the basic operation of shaping the points.

Aesthetically, the final product leaves something to be desired, but functionally the result indicates considerable skill in handling very small nodules of low grade chert.

*Varieties* Possibly several varieties will be established when a larger sample is available. At present the variable attributes listed in Table B cannot be shown to correlate definitely with any temporal sequence or any intra or inter-site distributional patterns. Perhaps the variations are expressions of differentials in technology, function of the points, stylistic preferences, or combinations of the foregoing.

One variety, tentatively sorted out during analysis, has a short, broad blade. The length to width ratio averages 1.4 instead of the 1.9 for the major group, and the length of blade to length of stem ratio is 2.9, instead of 3.9. At Riverton, the short, broad bladed variety seems to occur more frequently in the upper midden than in the lower. We feel that the present sample is not adequate for formally establishing such a variety.

*Typological Relationships.* In terms of form and proportions, Merom Expanding Stemmed strongly suggests a minature version of one of the types within the Tamms Type Cluster as defined for the Cache River Valley (Winters, 1963; Winters, unpublished manuscript).

Only a few of the largest of the Merom points overlap in absolute dimensions with the smallest "dart" points in the Tamms Cluster, and not at all with the commoner "spear" points of the latter group. Tamms Flared Base points apparently appear very late in the Archaic, and at least two types persist through Middle Woodland. Total geographic range is unknown, but types within the cluster are common in the Wabash, Cache, and Big Muddy drainages. So far, only one type of the cluster is known from the Illinois drainage, where it is localized around the Kamp Mound Group and is the dominant projectile point at the sites typified by an abundance of Pike Ware (Stuart Struever, personal communication). Present evidence would indicate that the Tamms Cluster had its heaviest concentration in the lower Ohio and Mississippi Valleys and adjacent tributaries. Motley Points (Bell 1958; Ford, Phillips, and Haag, 1955) apparently correspond to one of the types within the Tamms Cluster, although published descriptions do not permit equation of the two forms at present.

We have already noted in Chapters IV and VI that resemblances exist, both in size and form, between Merom points and points in New York, Michigan, Kentucky, Wisconsin, Nebraska, and western Pennsylvania. With the exception of Wittry's excellent description of Durst Stemmed (Wittry 1959a), the published descriptions for other areas are much too inadequate to permit proper comparison with Merom Expanding Stemmed. We also hesitate to imply any direct relationship between Merom and Durst, since the latter type apparently differs significantly in stem lengths and cross section (Warren Wittry, personal communication).

*Distribution.* Merom Expanding Stemmed is known in the central Wabash valley from the Riverton, Swan Island, Robeson Hills, Lowe, Stoner, Purgatory Swamp, Middle Mill Creek, Etchinson, Fox-McCarty, Otter Pond, Phillips, Lowe No. 2, Doll No. 2, Beard, Gognat, Pinkstiff No. 4, Barbee South, Ross Goodwin, Prather No. 2, Fox Creek

No. 2, and two unnamed sites in the central Wabash Valley. Merom points do not occur on most of the hundreds of "Wabash Valley Archaic" sites in the surrounding area.

A few specimens are recorded for the Cache River drainage, and others have been reported for the Kaskaskia drainage (Lewis R. Binford, personal communication) and for the lower Illinois Valley (Stuart Struever, personal communication). So far, the quantities outside the Illinois Valley are small, with no indication of any occupation greater than that of a hunting camp.

*Age and Cultural Affiliation.* Merom Expanding Stemmed points probably appear around 2,000 B.C. and persist until sometime after 1,000 B.C., since they are present throughout all levels of the shell middens. The points can be assigned to the Riverton Culture, which is within the nexus major of the Midcontinent Tradition of the Archaic.

## TRIMBLE SIDE NOTCHED PROJECTILE POINTS

The category is named after the town of Trimble, Illinois, which is close to the Riverton Site.

*Sample Size.* Thirty-six points from the Riverton, Swan Island, and Robeson Hills sites were available for definition of Trimble Side Notched points.

TABLE A

MEROM EXPANDING STEMMED

ATTRIBUTES I

| | Range | Average |
|---|---|---|
| Length | 1.9-3.6 cm. | 2.6 cm. |
| Maximum Width | 1.1-2.0 | 1.6 |
| Maximum Thickness | 0.4-0.8 | 0.6 |
| Blade Length | 1.2-2.8 | 2.1 |
| Stem Length | 0.4-1.0 | 0.6 |
| Stem Width, Top | 0.6-1.1 | 0.8 |
| Stem Width, Base | 0.7-1.7 | 1.2 |
| Blade Width, Base | 1.1-2.0 | 1.6 |

ATTRIBUTES II by percentages

| | | | |
|---|---|---|---|
| Basal Grinding | 10% | Side Grinding | 10% |
| Blade Beveling | 5% | Basal Beveling | 30% |
| Serration | 45% | Basal Thinning | 87% |

ATTRIBUTES III by percentages

| Cross Section | | Blade Edges | | Base Edges |
|---|---|---|---|---|
| Convex-triangular | 53% | Convex | 67% | 61% |
| Plano-triangular | 25% | Straight | 32% | 38% |
| Lozenge | 3% | Concave | 1% | 1% |
| Hexagonal | | Recurvate | – | – |
| Lenticular | 9% | Unclassifiable | – | – |
| Trapezoidal | 2% | | | |
| Plano-Convex | 8% | | | |
| Unclassifiable | | | | |

| Shoulders | | Blade Shape | |
|---|---|---|---|
| Sloping | 40% | Lanceolate | – |
| Square | 29% | Triangular | 100% |
| Barbed | 31% | Ovate | – |
| | | Pentagonal | – |
| | | Unclassifiable | – |

ATTRIBUTES IV Chert Source or Other Raw Material by percentages

| | | | |
|---|---|---|---|
| Dongola | – | Banded Gray | – |
| Grand Chain | – | Wabash | 100% |
| Kaolin | – | Attica | – |
| Mill Creek | – | Unclassifiable | – |
| Cobden | – | | |

RATIOS

| | Range | Average |
|---|---|---|
| Length/Width | 1.3-2.9 | 1.8 |
| Length of Blade/Length of Stem | 1.5-6.2 | 3.9 |
| Length of Blade/Width of Blade | 0.8-2.5 | 1.4 |
| Length of Stem/Width of Stem | 0.3-0.8 | 0.5 |
| Top Width of Stem/Bottom Width of Stem | 0.6-0.9 | 0.7 |
| Width of Blade/Width of Stem | 0.9-2.2 | 1.4 |
| Width/Thickness | 1.7-3.3 | 2.4 |

*Description.* These very small points have notches placed close to the base and generally perpendicular to the long axis of the points. The notches were not very carefully chipped in some examples and may, accordingly, have a superficial resemblance to Merom Expanding Stemmed in form.

Unlike Merom points, Trimble points rarely have basal beveling, and there is a lower incidence of serration of the blade (Tables A and B). Trimble points are much more frequently lenticular in cross section than Merom points, and have a higher proportion of straight sided blade edges. The blades of Trimble are also generally longer and narrower than the blades on Merom points, with corresponding differences in the ratios of blade to stem, length of blade to width of blade, and width of blade to width of stem.

*Varieties.* No evidence for definable varieties were found during analysis, although some of the variable attributes

TABLE B

TRIMBLE SIDE NOTCHED

ATTRIBUTES I

| | Range | Average |
|---|---|---|
| Length | 2.1-3.5 cm. | 2.7 cm. |
| Maximum Width | 1.0-1.8 | 1.4 |
| Maximum Thickness | 0.5-0.8 | 0.6 |
| Blade Length | 1.6-3.2 | 2.2 |
| Stem Length | 0.3-0.7 | 0.5 |
| Stem Width, Top | 0.5-1.2 | 0.8 |
| Stem Width, Base | 0.9-1.5 | 1.2 |
| Blade Width, Base | 1.0-1.7 | 1.4 |

ATTRIBUTES II by percentages

| | | | |
|---|---|---|---|
| Basal Grinding | 12% | Side Grinding | 6% |
| Blade Beveling | 4% | Basal Beveling | 3% |
| Serration | 36% | Basal Thinning | 94% |

ATTRIBUTES III by percentages

| Cross Section | | Blade Edges | | Base Edges |
|---|---|---|---|---|
| Convex-triangular | 44% | Convex | 41% | 60% |
| Plano-triangular | 20% | Straight | 55% | 30% |
| Lozenge | – | Concave | 4% | 10% |
| Hexagonal | – | Recurvate | – | – |
| Lenticular | 28% | Unclassifiable | – | – |
| Trapezoidal | – | | | |
| Plano-Convex | 4% | | | |
| Unclassifiable | – | | | |

| Shoulders | | Blade Shape | |
|---|---|---|---|
| | | Lanceolate | – |
| | | Triangular | 100% |
| Sloping | – | Ovate | – |
| Square | – | Pentagonal | – |
| Barbed | – | Unclassifiable | – |

ATTRIBUTES IV Chert Source or Other Raw Material by percentages

| | | | |
|---|---|---|---|
| Dongola | – | Banded Gray | – |
| Grand Chain | – | Wabash | 100% |
| Kaolin | – | Attica | – |
| Mill Creek | – | Unclassifiable | – |
| Cobden | – | | |

RATIOS

| | Range | Average |
|---|---|---|
| Length/Width | 1.6-2.8 | 2.0 |
| Length of Blade/Length of Stem | 2.7-10.7 | 5.1 |
| Length of Blade/Width of Blade | 1.2-2.5 | 1.7 |
| Length of Stem/Width of Stem | 0.3-0.7 | 0.4 |
| Top Width of Stem/Bottom Width of Stem | 0.6-0.8 | 0.7 |
| Width of Blade/Width of Stem | 1.0-1.5 | 1.1 |
| Width/Thickness | 1.6-2.8 | 2.2 |

recorded in Table B may eventually have significance on the variety level when a larger and more widely distributed sample is available. At present the differing attributes would seem to represent only a normal range of variation within a single descriptive category.

*Typological Relationships.* While side-notched points are common on hundreds of Archaic sites in southern Illinois, there is little evidence at present for relating Trimble Side Notched to such types as Faulkner, Raddatz, and Modoc Side Notched within the Cairo Type Cluster (Winters, unpublished manuscript). Trimble Side Notched differs markedly in size, high incidence of serration and convexity of the blade edge, and in low incidence of basal and side grinding in comparison to these types. However, the ratios for Trimble are virtually identical with those for Faulkner Side Notched, with the exception of the Width/Thickness ratio, which is about 50% higher for the latter type. One should again note the close similarity to the small, side notched points at the Lamoka Site in New York.

On the basis of limited stratigraphic data, it would appear that the side notched base does not appear in Illinois south of the Kaskaskia River before 5,000 B.C. Perhaps Trimble Side Notched represents a local adaptation of the Archaic side notched tradition of basal prepartion during the latter protions of the spread of that tradition into the Midcontinent area. Thus the answer to the typological relationships of Trimble Side Notched may lie in the lower Tennessee or Cumberland valleys, and Trimble may be related to such types as Faulkner or Raddatz only indirectly through intermediate forms of the side notched tradition not present in southern Illinois.

*Age and Cultural Affiliation.* Trimble Side Notched seems to occur somewhat more frequently in the lower than in the upper portions of the Riverton and Swan Island middens. At Robeson, the category is represented by only a single example from the upper midden. Perhaps Trimble should be assigned to the earlier portion of the Riverton Culture, with its appearance dating before 2,000 B.C., and its popularity declining rapidly after 1,500 B.C.

However, we feel that much more data is needed before we can assess the meaning of the Trimble points in the Riverton Culture. At present we cannot say whether we are dealing with simple style changes through time, overlapping occupations of closely related groups, or functional and technological changes.

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Plate 1

**Robeson Hills Site** (Illinois State Museum site Lw1). Lawrence County, Illinois. View of the midden near the center of the site.

Plate 2

**Swan Island Site** (ISM site Cw319). Crawford County, Illinois. General view of the site. Wabash River just beyond the trees.

**Plate 3**

**Swan Island Site** (Cw319). Midden profile near the south end of the site.

Plate 4

**Riverton Site** (ISM site Cw170). Crawford County, Illinois. South wall of test trench A.

**Plate 5**

**Riverton Site** (Cw170). West wall of test trench A.

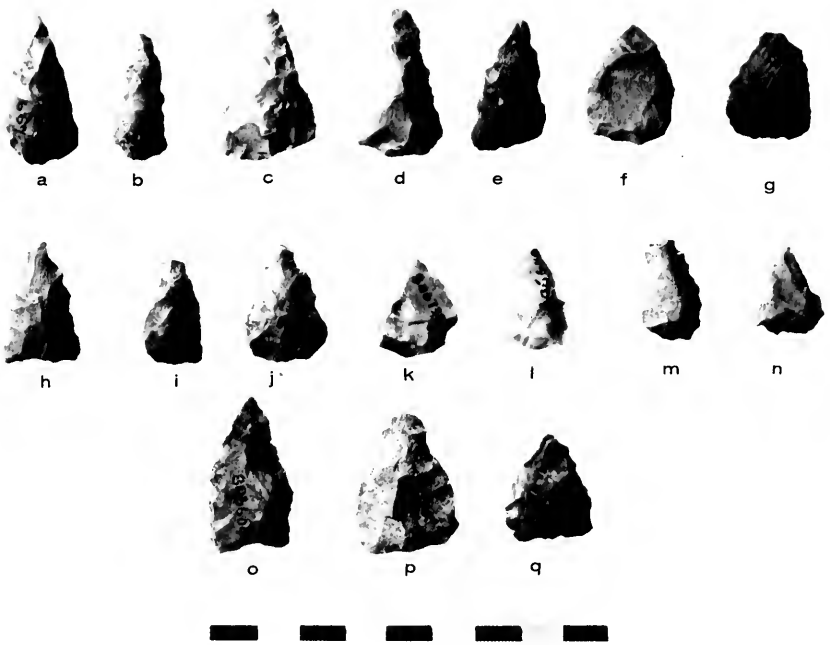


Plate 6

**Knives.** Triangular, a-n; pentagonal, o-q. (Robeson Hills site, c, f, i, m-n; Swan Island site, g; Riverton site, a-b, d-e, h, j-l, o-q.)

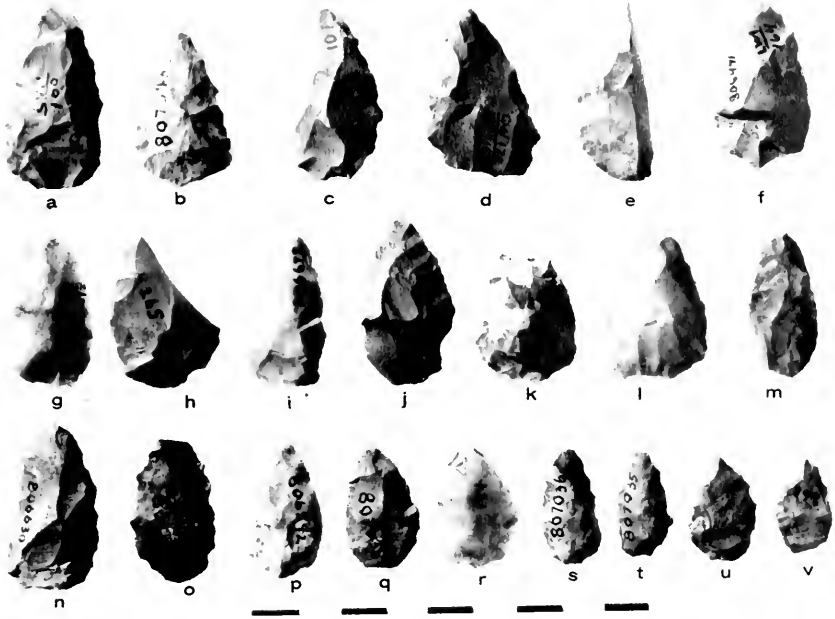


Plate 7

**Leaf-shaped Knives.** Robeson Hills site, a, j, l, u; Swan Island site, b-e, q-t; Riverton site, d-i, k, m-p, v.

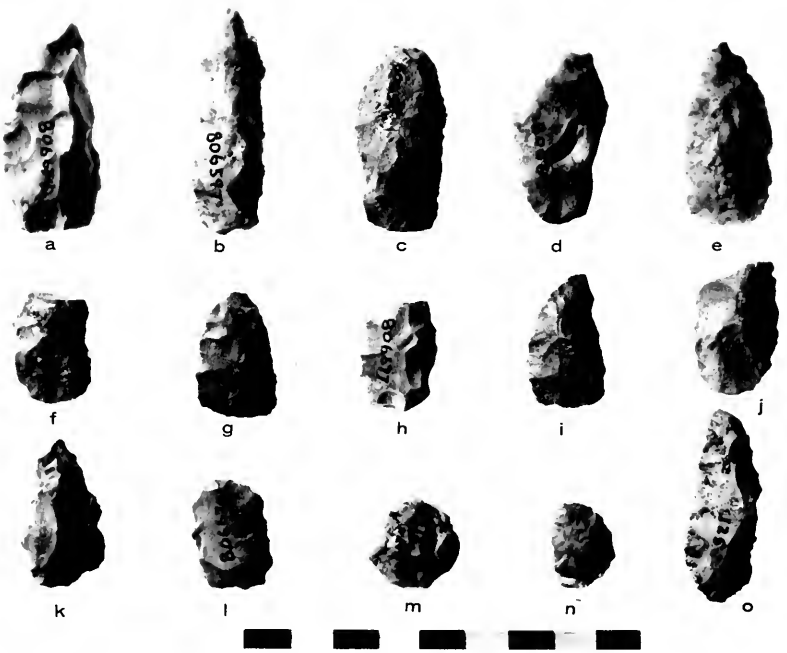


Plate 8

**Knives.** Lanceolate form, a-j; stemmed triangular, k; rectanguloid, l; ovoid, m-o. (Robeson Hills site, c, f; Riverton site, a-b, d-e, g-o.)

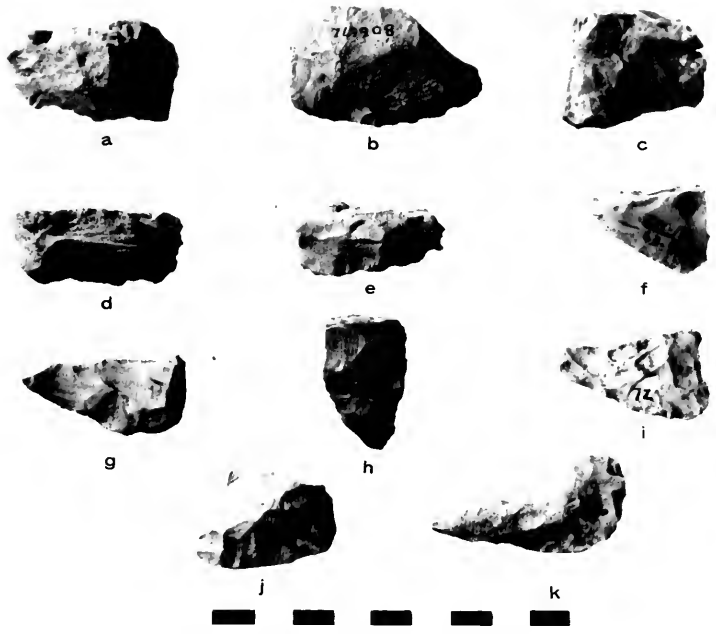


Plate 9

**Knives and Gouge.** Backed knives of various shapes, a-i; eccentric knife, k; gouge, j. (Robeson Hills site, g; Swan Island site, c, h; Riverton site, a-b, d-f, i-k.)

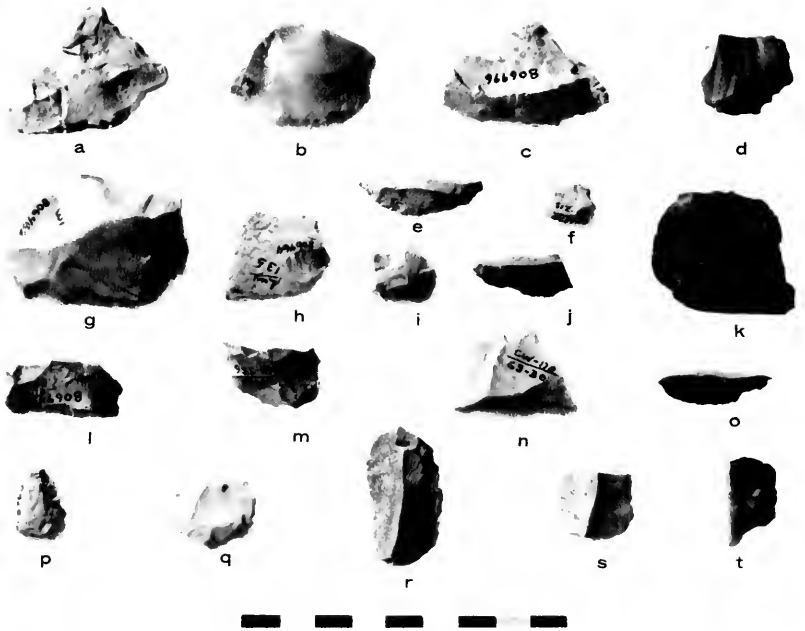


Plate 10

**Scrapers.** Flake scrapers, a-o; triangular end scraper, p; V-bit scraper, q; end scrapers on prismatic flakes, r-s; end scraper on flake, t. (Robeson Hills site, e, g-h, k; Swan Island site, t; Riverton site, a-d, f, i-j, l-s).

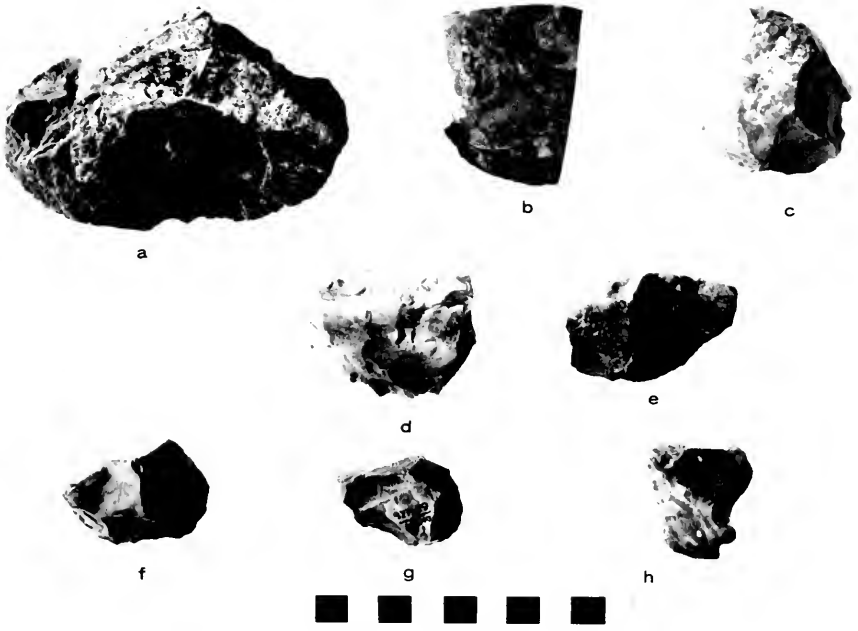


Plate 11

**Choppers.** Swan Island site, c, e; Riverton, a-b, d, f-h.

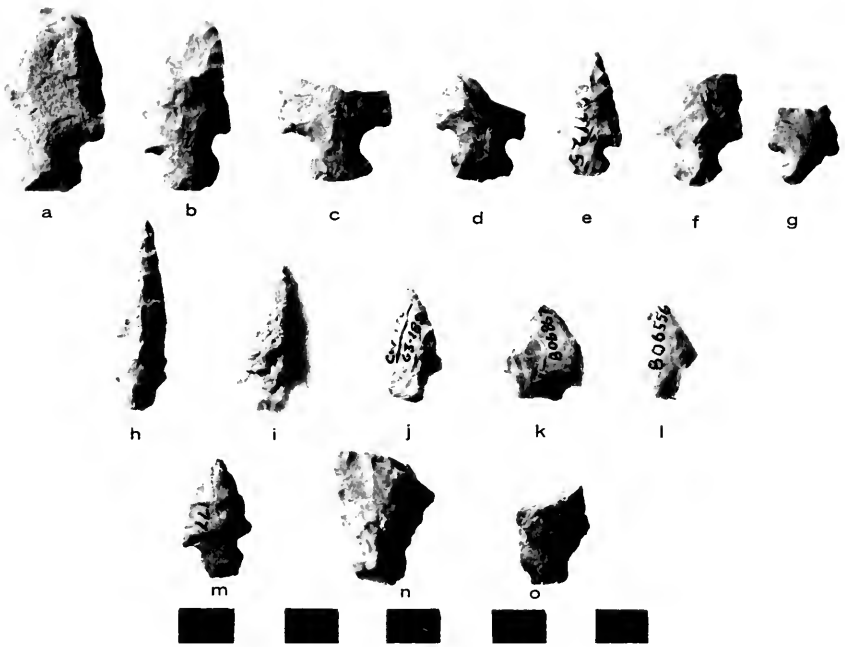


Plate 12

**Projectile Points.** Robeson Constricted Stem points, a-g; Riverton Stemmed points, h-l; unclassified micro-points, m-o. (Robeson Hills site, a-d, f; Swan Island site, e, h; Riverton site, g, i-o.)

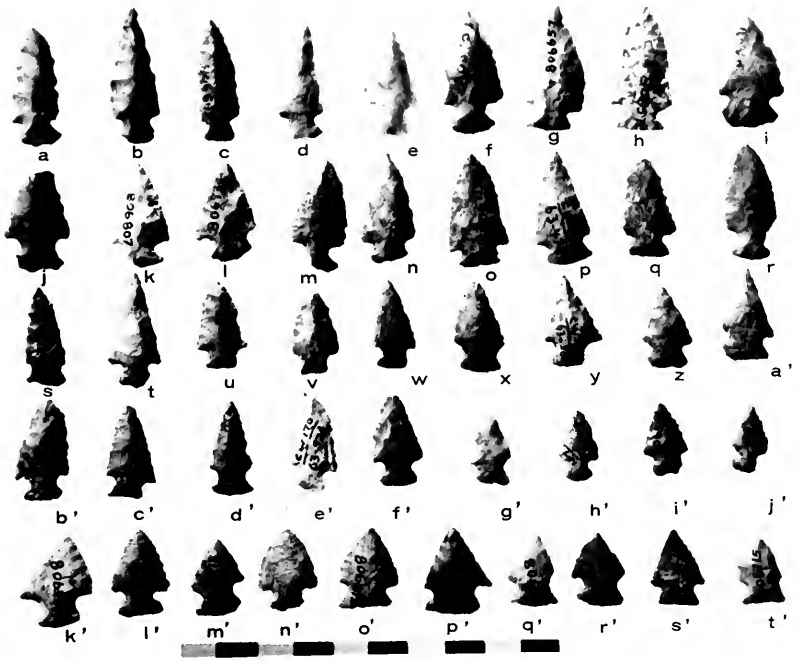


Plate 13

**Merom Expanding Stem Projectile Points.** Robeson Hills site, a, e, h,; Swan Island site, b, l-n, c'-d', l'-n'; Riverton site c-d, f-k, o-z, a'-b', e'-g', i'-k', o'-t'.

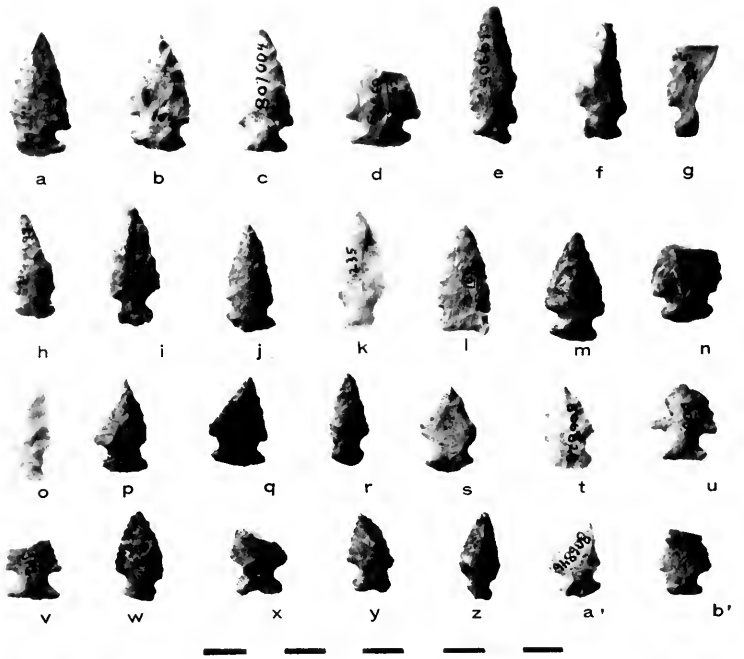


Plate 14

**Trimble Side-notched Projectile Points.** Swan Island site, a, g, w-z; Riverton site, b-f, h-v, a'-b'.)

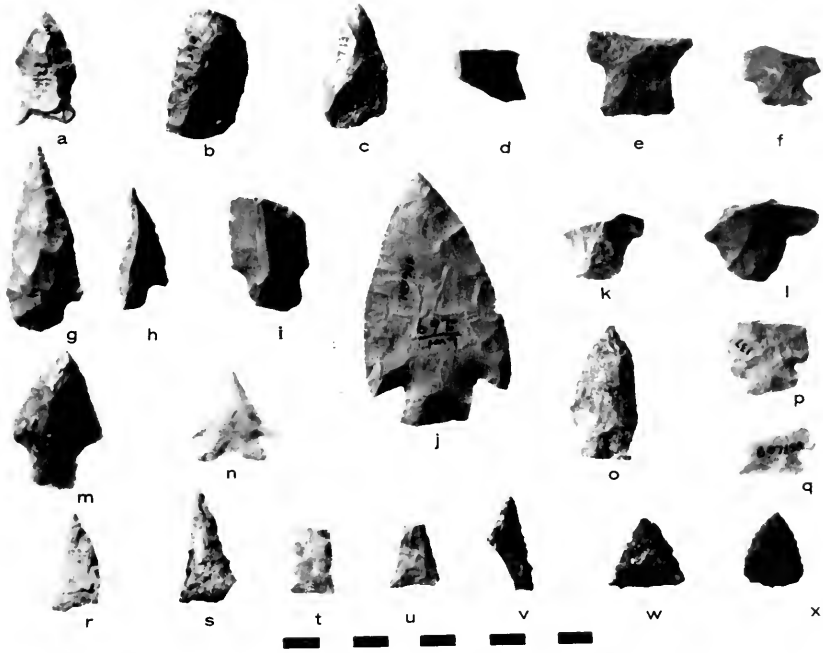


**Plate 15**

**Miscellaneous Projectile Points.** Unclassified, a-d, o; Lowe Flared Base, e; *Affinis* Lowe Flared Base, f; Adena points, g-i, k-l; "Marcos" point, j; Saratoga Stemmed, m; bifurcated base point, n; Late Woodland points, p-q; Mounds Stemless, Group I, including Madison points (Scully), r-x. (Robeson Hills, g-h, j, m-n; Swan Island site, a-e, p-q, v; Riverton site, f, i, k-l, o, r-u, w-x.)

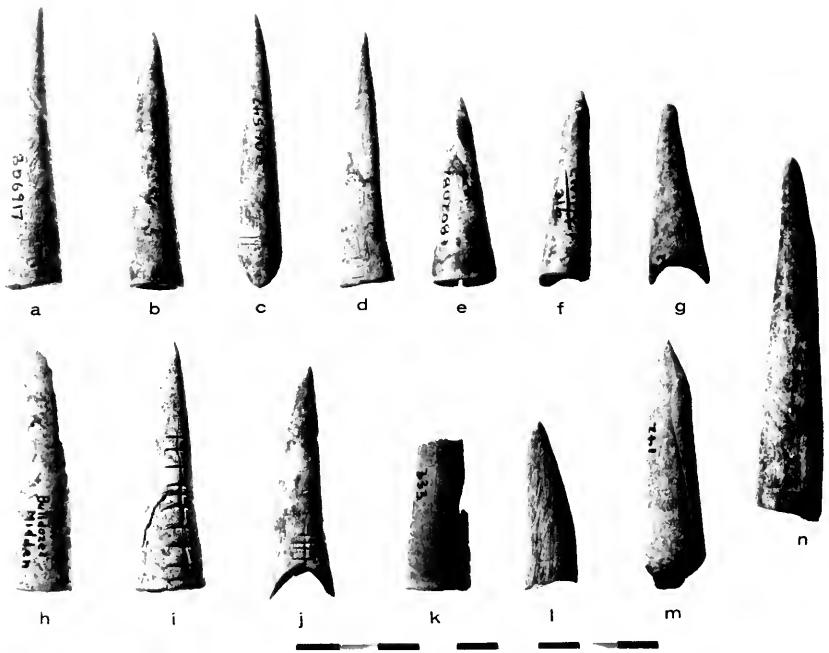


Plate 16

**Antler Projectile Points.** Robeson Hills site, h; Swan Island site, e, i-j, l; Riverton, a-d, f-g, k, m-n.)

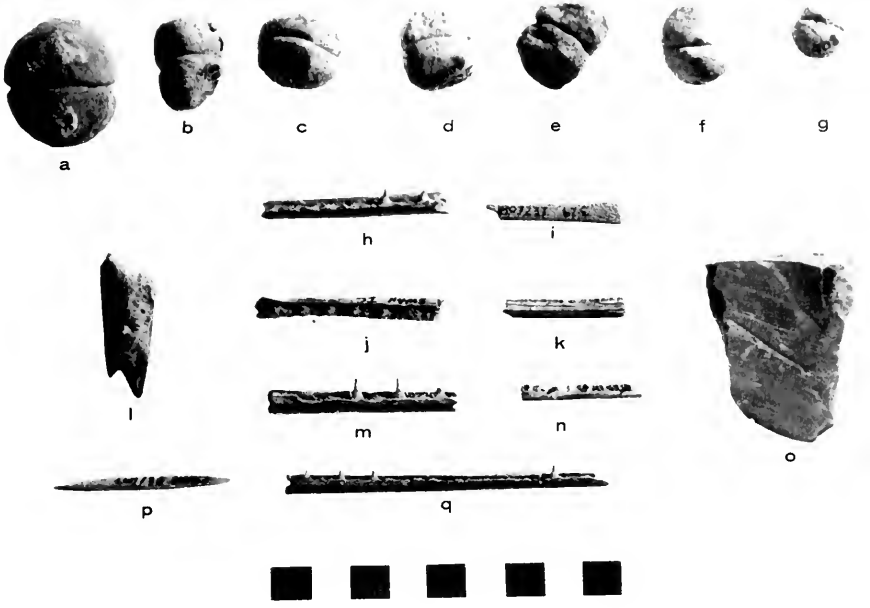


Plate 17

**Miscellaneous Artifacts.** Sandstone sinkers, a-g; forked spatula, l; gorge, p; cut gar jaws, h-k, m-n, q; atlatl weight, o. (Robeson Hills, a-g, o-p; Swan Island, h-k, n, q; Riverton site, l-m.)


Plate 18

**Miscellaneous Artifacts.** Deer antler spoon, a; antler drifts, b, i, l; antler and bone flakers, c-h, j-k. (Robeson Hills site, a-b, d, g, i; Swan Island site, f; Riverton site, c, e, h, j-l.)


Plate 19

**Deer Metacarpal and Metatarsal Awls.** Robeson Hills site, e-f, h-i; Swan Island site, d; Riverton site, a-c, g.


Plate 20

**Miscellaneous Awls.** Turkey tarsometatarsal awls, a-c; gray fox ulna awl, d; raccoon fibula awl, e; deer ulna awl, f; splinter awls, g-k; splinter awl or distal end of deer ulna, l; antler awl, m. (Robeson Hills site, f, k; Swan Island site, c, j, l-m; Riverton site, a-b, d-e, g-i.)

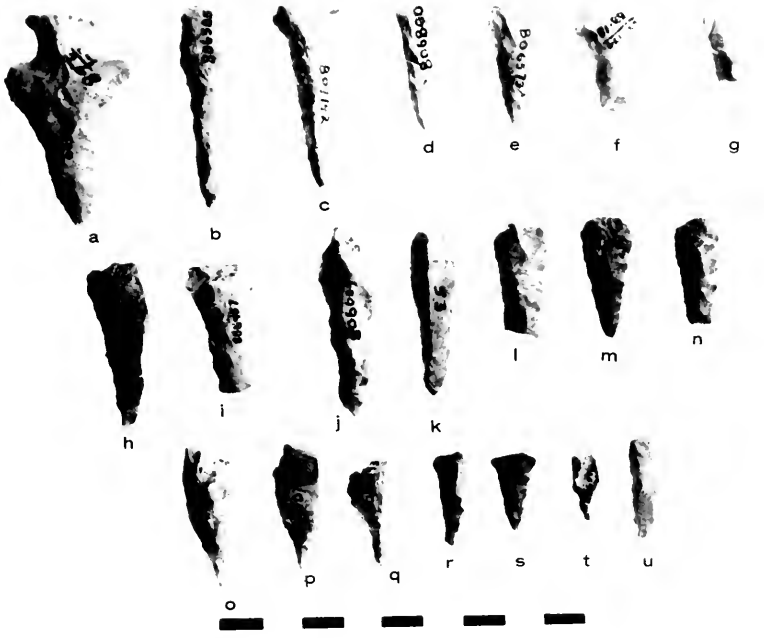


Plate 21

**Miscellaneous drills.** Reworked projectile point (foreign chert; typologically not Riverton Culture), a; side-notched drill b; V-head drills, c-d; O-head drills, e-g; simple tapered drills, h-n; flake drills, o-p; micro-drills, q-t; Mississippian type of drill, u. (Robeson Hills site, a, i, t-u; Swan Island site, c, k, n-p; Riverton site, b, d-h, j, l-m, q-s.)

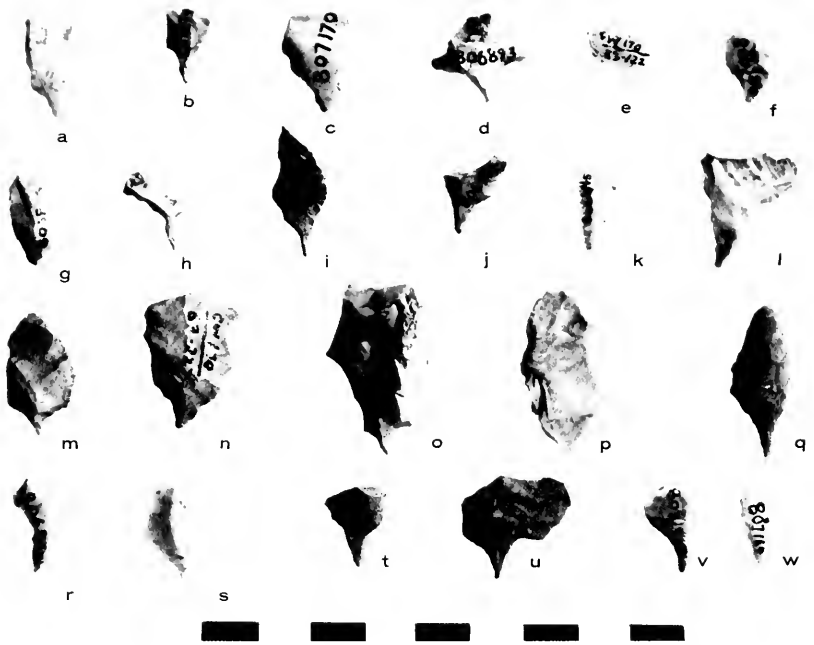


Plate 22

**Micro-Perforators:** Groups I and II. Swan Island site, c, h-i, o, q, t-w; Riverton site, a-b, d-g, j-n, p, r-s.

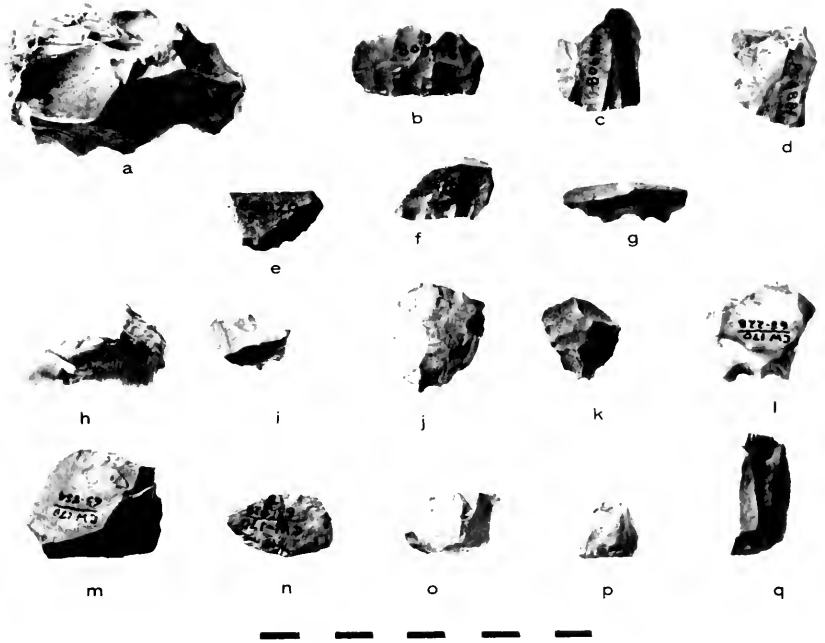


Plate 23

**Miscellaneous Artifacts.** Shredders, a-g; gravers, h-l; strike-a-lights, m-q. (Swan Island site, e-g; Riverton site, a-d, h-q.)


Plate 24

**Miscellaneous Artifacts.** Beaver incisor chisels, a-e; porcupine incisor chisels, f-g; copper "awl," h; cut bobcat mandible, i; phalangeal pin, j; clay cylinders, k-l; reamer (not Riverton Culture type), m; reamers, n-p; miscellaneous examples of worked turtle, animal bone, and bird bone, q-z. (Robeson Hills site, o, s; Swan Island site, d-f, j-k, m-n, q, t-u, y; Riverton site, a-c, g-i, l, p, r, v-x, z.)


Plate 25

**Abraders and Files.** Narrow, triangular grooved abraders, a-c, e; broad, concave grooved abrader, d; files, f-h. (Robeson Hills site, b-d, h; Swan Island site, e-g; Riverton site, a.)

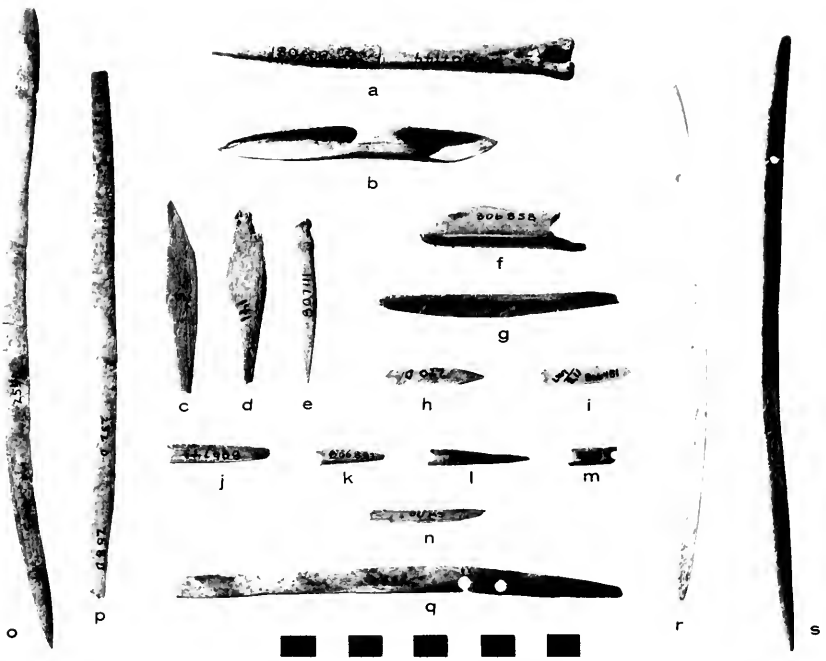


Plate 26

**Miscellaneous Shuttles.** Open end shuttle, a; tubular shuttles, b, f; expanded head shuttles, c-d; deer intermediate carpal shuttle, e; splinter shuttle, g; simple shuttles, h-s. (Robeson Hills site, i, q; Swan Island site, a, c-e, g-h, o-p; Riverton site, b, f, j-n, r-s.)


Plate 27

Robeson Gouges. Robeson Hills site.

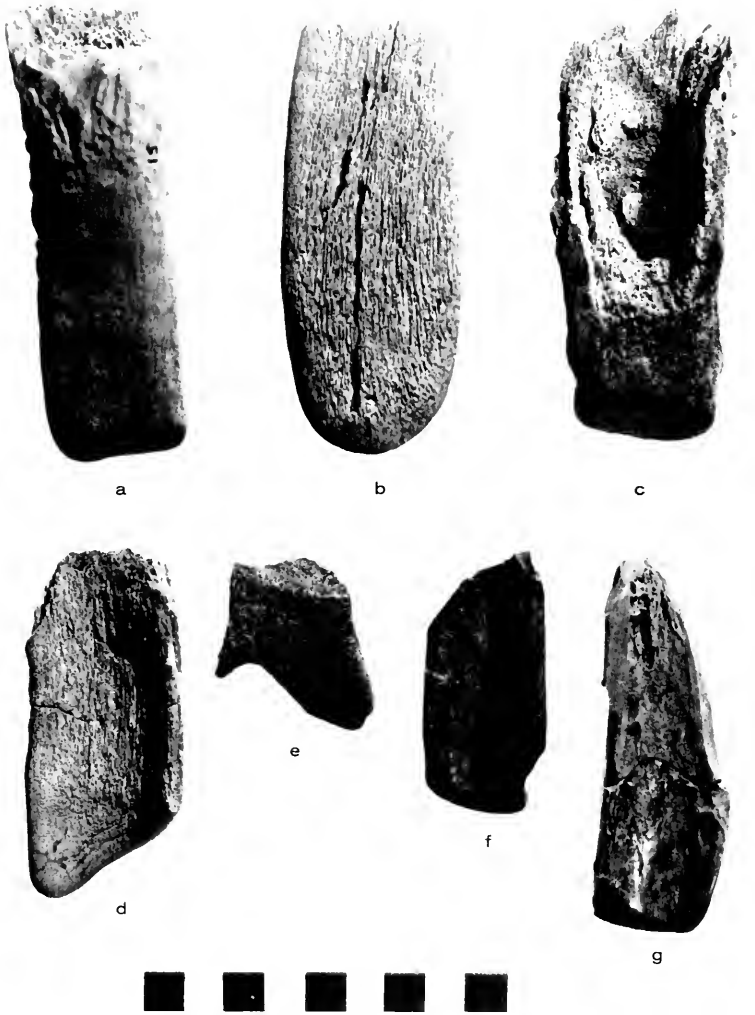


Plate 28

**Miscellaneous Gouges.** Simple antler gouge, a; spatulate antler gouge, b; trough antler gouges, c-d; eccentric gouge, e; hemicylindrical bone gouges, f-g. (Robeson Hills site, b-c; Swan Island site, e-g; Riverton site, a, d.)

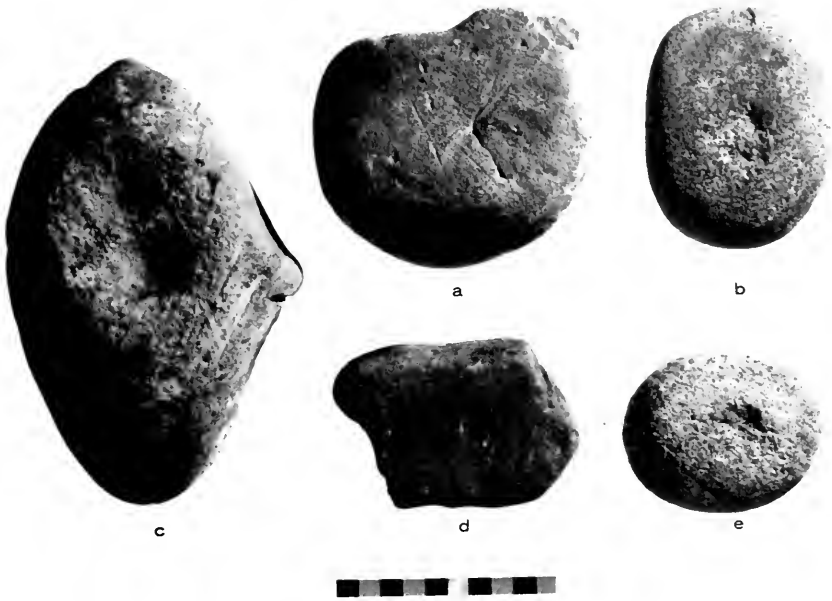


Plate 29

**Nutting Stone and Manos.** Simple manos, a, d; pitted manos, b, e; nutting stone with metate usage, c. (Robeson Hills site, b; Riverton site, a, c-e.)

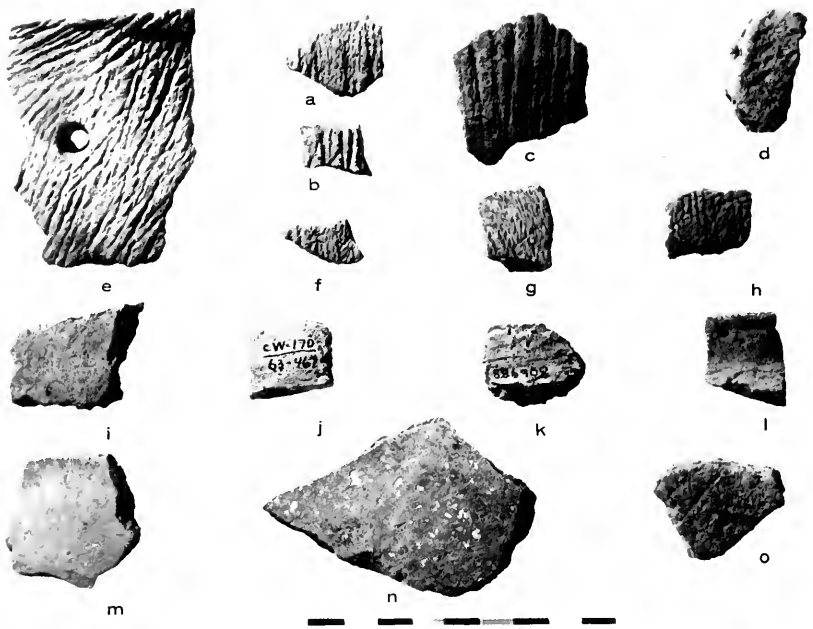


Plate 30

**Potsherds.** Unclassified Late Woodland sherds, a-e, f-h; Fayette Thick sherd, d; Middle Woodland sherd, e; Mississippian sherds, i-o. (Swan Island site, e, g-i, l-n; Riverton site, a-b, d-f, j-k, o.)


Plate 31

**Maul, Chopper and Axes.** Notched maul, a; grooved chopper, b; grooved axe fragment, c; limonite axes, d-f. (Robeson Hills site, b-c; Riverton site, a, d-f.)


Plate 32

**Shell Pendants and "Hoes" or "Rakes."** Shell "hoes" or "rakes," a-c, e; shell pendants, d, f-h. (Robeson Hills site, c, e-g; Swan Island site, a-b, d, h.)

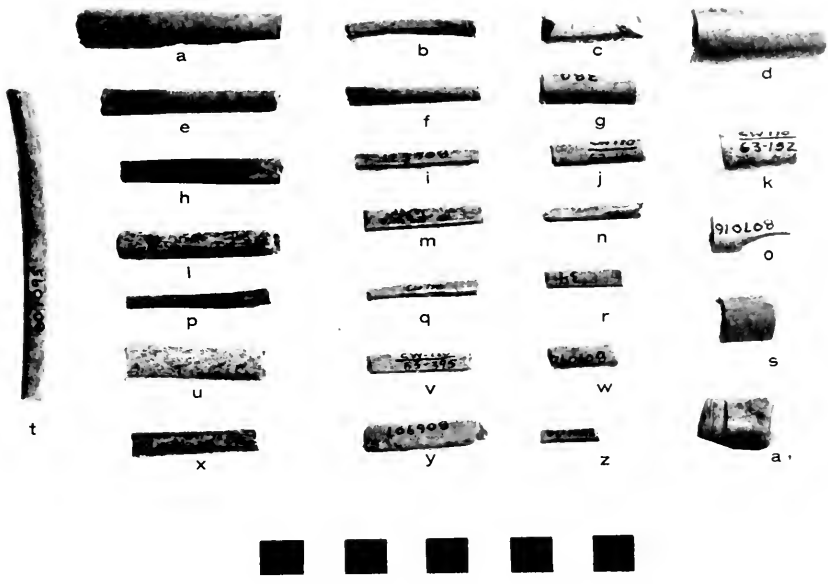


Plate 33

**Tubular Bird and Mammal Bone Beads.** Robeson Hills site, c, m; Swan Island site, a, n-o, r, t, w, z, a'; Riverton site, b, d-l, p-q, s, u-v, x-y.

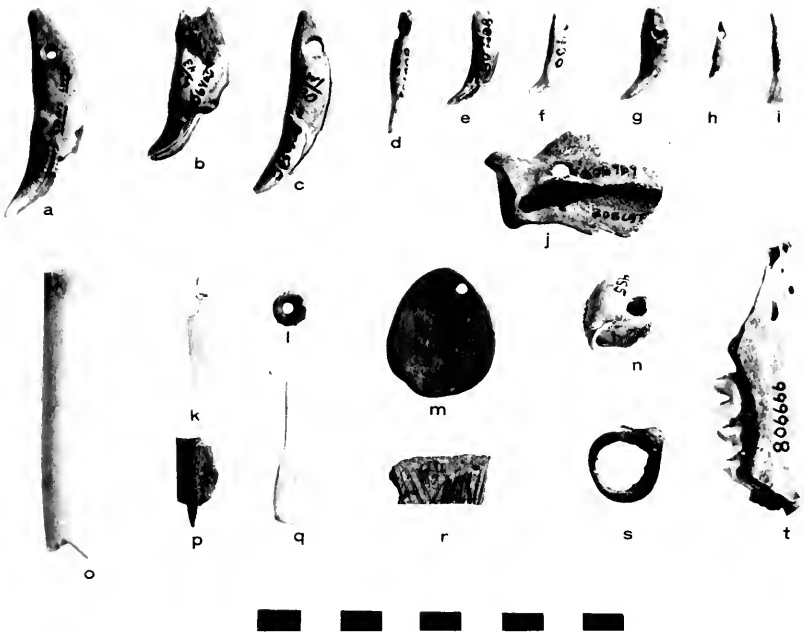


Plate 34

**Miscellaneous Ornaments and Other Artifacts.** Wolf canine pendant, a; bear canine pendants, b-c; unidentified canine pendant, d; raccoon canine pendants, e-g; mink canine pendant, h; human incisor pendant, i; perforated bobcat scapula, j; perforated bone, k; crinoid bead (?), l; pebble pendant, m; perforated *Campeloma* shell, n; trident-ended bone, o; trident-ended (?) bone, p; spatulate piece of mussel shell, q; incised bone fragment, r; large bone bead, s; perforated and cut bobcat mandible, t. (Robeson Hills site, b-c, o, q; Swan Island site, e, l-m, r-s; Riverton site, a, d, f-k, n, p, t.)


**Plate 35**

**Cloudblower Pipes and Faceted Filter.** Filter, a; pipes, b-d. (Robeson Hills site, a, c; Riverton site, b, d.)


Plate 36

**Flutes.** Robeson Hills site, b; Swan Island site, c, f; Riverton site, a, d, g.

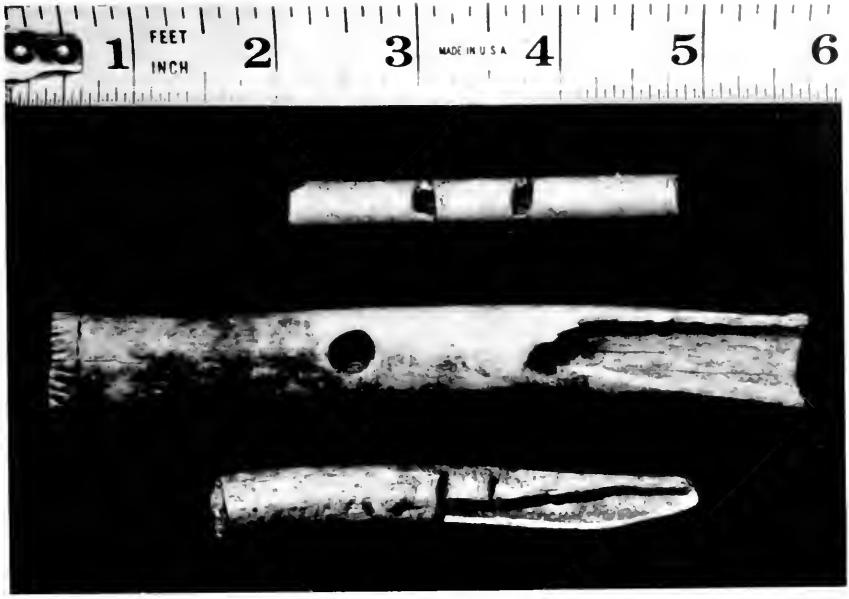


Plate 37

**Flutes.** Flutes in private collections from the Riverton site (Denzil Stephens collection, a; Dwight New collection, b; Gregory Helm collection, c.)

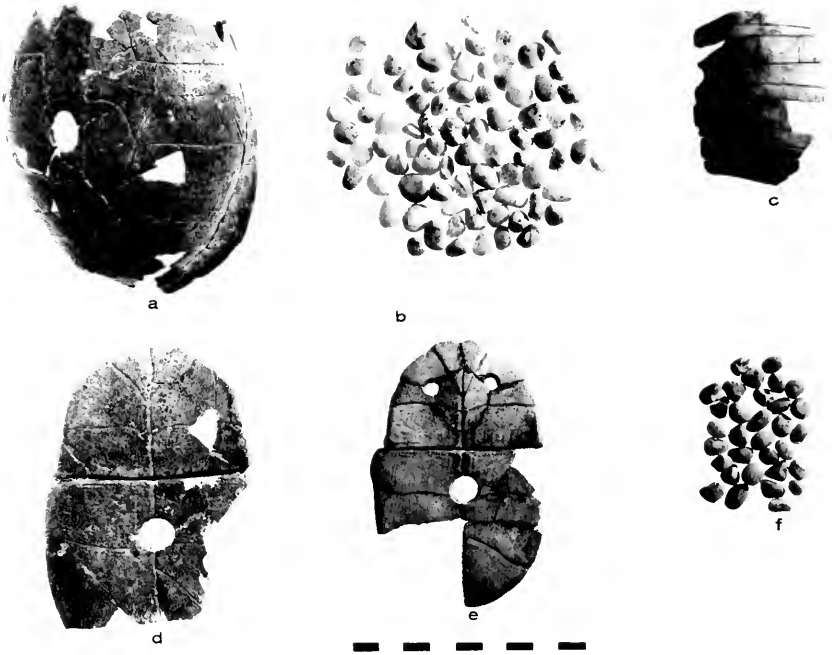


Plate 38

**Indian Knoll Type of Rattle.** Riverton Culture association, a-b, d; Mississippian cultural association, c, e-f. (Riverton culture, a-b, d; Illinois State Museum site $F^V47$, Fulton County, Illinois c, e-f.)


Plate 39

**Recreational and Miscellaneous Equipment.** Cut and perforated deer phalanges, a-d, g, i, j; cut and engraved deer phalange, e; cut but unperforated deer phalange, f; bone disk, h; bone "counters." (Swan Island site, b, f-g; l-m; Riverton site, a, c-e, h-k.)

Plate 40

Burial. Burial 4 from the Robeson Hills site.

**Plate 41**

Burial. Burial 1 from Area X, Riverton site. The cache appears in top center and the pebble at left center of the photograph.

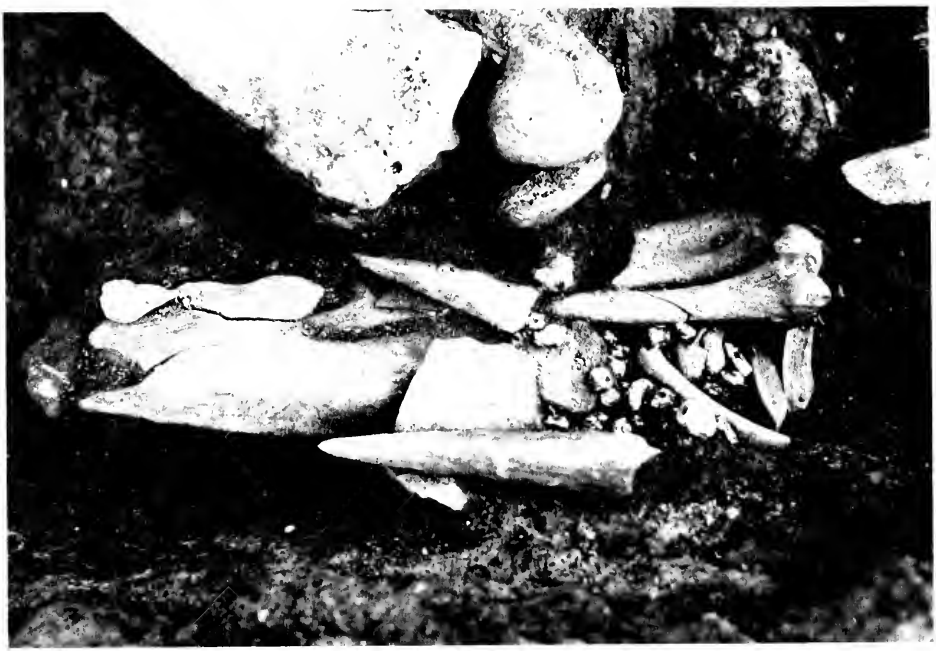

Plate 42

**Cache.** The cache with Burial 1, Area X, Riverton site. Note the pearl beads.

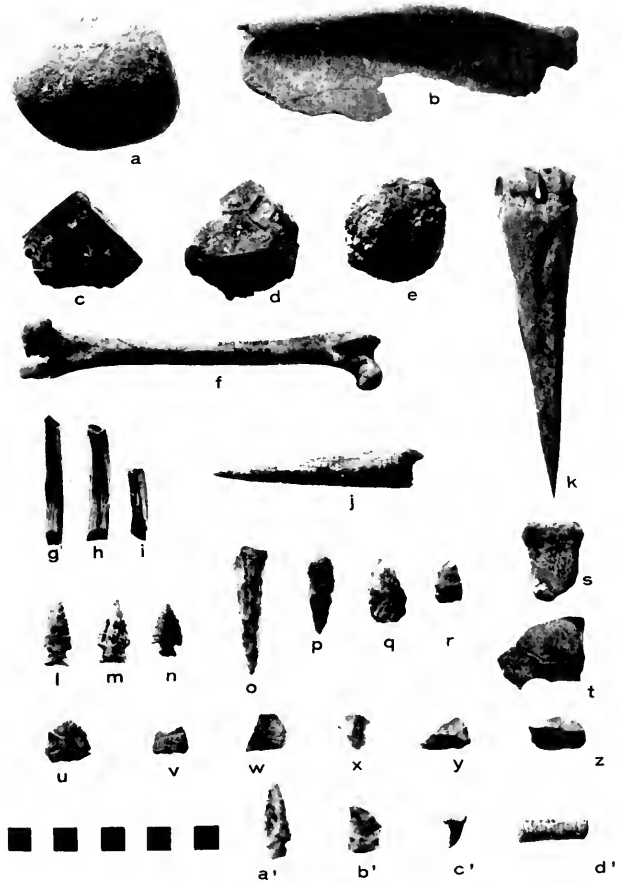


**Plate 43**

**Grave Goods.** Artifacts associated with Burial 1 (a-z, d') and Burial 2 (a'-c') in Area X of the Riverton site. Unaltered river pebble, a; deer scapula "scraper," b; greenstone scraper, c; limonite partially converted to red ocher, d; limonite, e; bobcat femur, f; beaver incisor chisels, g-i; tanged antler point, j; deer metacarpal awl, k; Merom points, l-n, a'; simple drills, o-p; chert knives, q-r; sandstone file, s; box turtle rattle fragment, t; worked chert, u-x; knife fragment, y; strike-a-light, z; knife fragment, b'; bird claw, c'; crinoid stem, d'.

Plate 44

**Cremation.** Burial 2, Area X, Riverton site.

**Plate 45**

**Burial.** Burial 3, Area X, Riverton site.

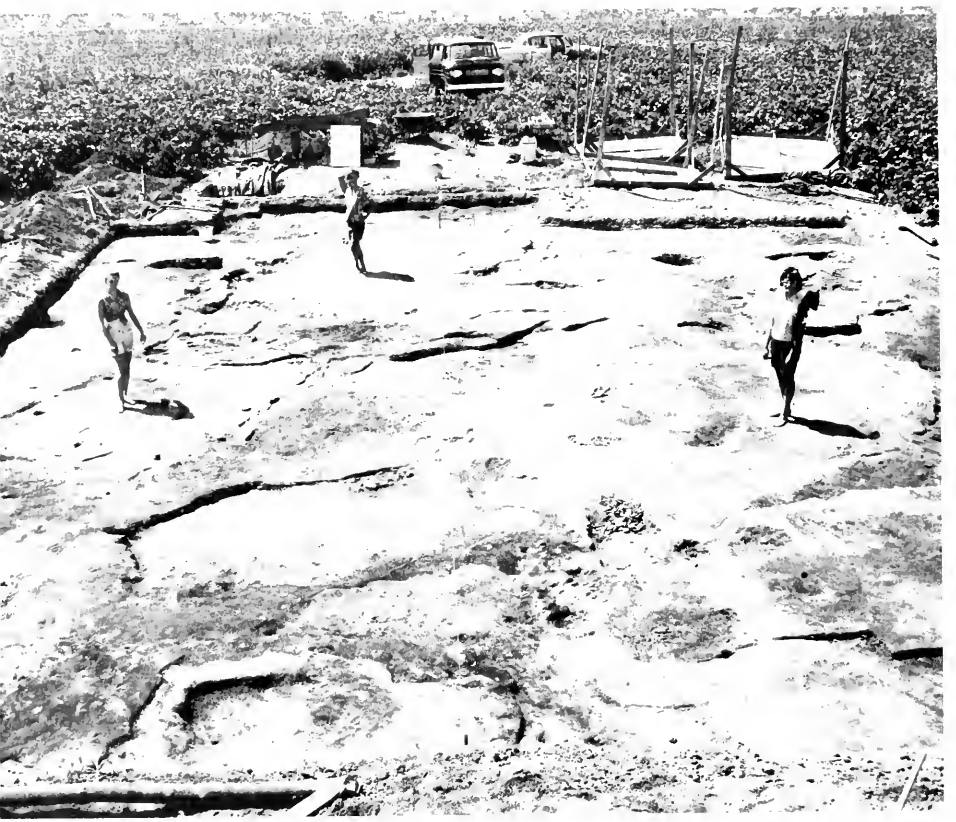

Plate 46

**Riverton Site Area X.** General view of the excavations, Area X, Riverton site. The crew members are standing (left to right) on clay platforms designated Features 30,2, and 17.

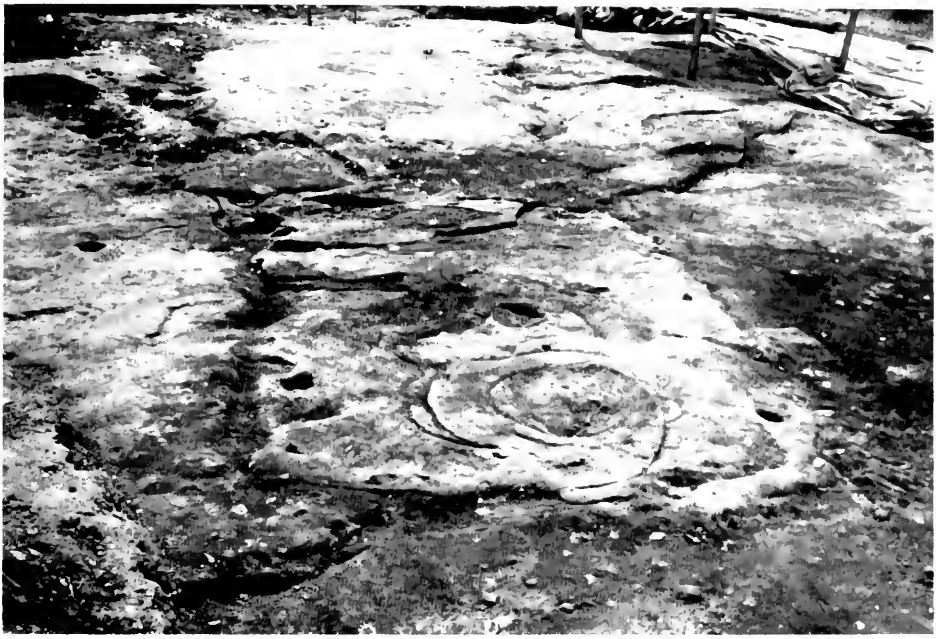

**Plate 47**

**Clay Platform.** Detailed view of a clay platform (Feature 30), Area X, the Riverton site.

Plate 48

**Riverton Feature 11.** Cylindrical pit, Feature 11, Area X, the Riverton site, sectioned by excavation with the clay plug still intact in one half of the pit.


BOUND BY