# THE DEVELOPMENT OF THE FT. ANCIENT TRADITION IN NORTHERN KENTUCKY

by

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A dissertation submitted in partial fulfillment

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We have carefully read the dissertation entitled The Development of the Ft. Ancient Tradition in Northern Kentucky

submitted by Janet E. Jeffrey Rafferty in partial fulfillment of the requirements of the degree of Doctor of Philosophy and recommend its acceptance. In support of this recommendation we present the following joint statement of evaluation to be filed with the dissertation.

The Reading Committee is in uniform agreement in recognizing that this dissertation represents a significant contribution to archaeology and is thoroughly acceptable as a dissertation. The Committee in its deliberations noted the high quality of scholarship, the exceptionally thorough literature research that attended both the substantive and conceptual elements of the work, and the degree to which the writer integrated material from different areas, done at different times, and taken from different intellectual contexts. It is the view of the Committee that the dissertation not only makes important contributions to the culture history of the Fort Ancient, but also provides a model for the modernization of the whole of culture historical method and will in no small measure provide the basis of a renewed interest in this kind of archaeological approach. It is outstanding as an archaeological synthesis.

The only deficiencies noted were minor omissions and items of a technical nature. The candidate clearly demonstrates her control of the substantive materials and the relevant portions of archaeological theory and method. The dissertation is, in our view, publishable either as a unit or in sections.

DISSERTATION READING COMMITTEE: Robert C Dunnell

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Doctoral Dissertation

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Date March 22, 1974

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# INTRODUCTION

There are presently few published site reports that deal either with modern excavations of Ft. Ancient sites or with recent analysis or re-analysis of the artifacts from older excavations. The reports that do fall under these headings include The Hardin Village Site (Hanson 1966), Blain Village (Prufer and Shane 1970), and papers written on work at Fishtrap Reservoir, especially at the Slone site (Dunnell, Hanson, and Hardesty 1971; Dunnell 1972). These studies cover sites widely separated in time and space: Hardin Village is on the Ohio River in eastern Kentucky and is dated c. A.D. 1500; Blain Village is in Ohio near Chillicothe and dates from c. A.D. 900; and the Slone site, in eastern Kentucky near the Virginia border, dates to c. A.D. 1200. Although valuable for the areas and times covered, they do not represent the whole of Ft. Ancient, as is indicated by referring to the other major source of information on the tradition, James B. Griffin's The Fort Ancient Aspect (1943). In it, assemblages from Ohio, Kentucky, and West Virginia are described, with no attempt made to place them in time beyond noting that a few contain European contact materials. However, an examination of the material presented by Griffin, which is divided among four foci on the basis of differences in ceramics, readily shows that Ft. Ancient varies from area to area and undoubtedly also over time within each area. This impression of variability is the chief contribution of the book; the classification and quantification of artifacts is inadequate and does not allow comparison of the described assemblages with one another or with new information. This problem is compounded by bias in the collections on which the descriptions are based, which often represent only a part of the artifacts found at a site.

The other site reports mentioned above do not exhibit most of the shortcomings of Griffin's work, at least as far as their descriptive value

is concerned. But it is also evident that there is more variety subsumed within the Ft. Ancient tradition than is covered in these studies. Further support for this assertion comes from an unpublished paper (Dunnell 1961) in which two new Kentucky foci are added to the four proposed by Griffin for Ft. Ancient in Ohio and Kentucky. One of these is the Mayo focus, located in eastern Kentucky and now known as the Woodside phase (Dunnell 1972). The other is the Yates focus, an analysis of which has yet to appear in print. One of its important components is the Cleek-McCabe site on which the present report concentrates.

It is clear that there is a great need for new fieldwork and new analyses of extant material before the origins and development of the Ft. Ancient tradition can be understood in any detail. However, much can be demonstrated about the broader aspects of these questions by analyzing published and unpublished information.

The main problem of interest to this study is the origin of the tradition, with particular reference to the northern Kentucky-southeast Indiana-southwest Ohio region. This important problem has previously neither been systematically confronted nor used to view the available data. Rather, writers have touched on the origins of the phenomena only in passing and made little effort either to demonstrate their conclusions by reference to data or to consider alternative explanations. The only exceptions occur in discussions of the origin of particular components. Prufer and Shane (1970) and Dunnell (1972) propose migration as the best explanation for their respective components; McKenzie (1967) lists several hypotheses that might explain the data from Graham village, but fails to specifically test any of them.

The problem-oriented approach taken here goes beyond site description in providing a meaningful analysis of the artifacts in the context of examining several alternative hypotheses about the origins of the Ft. Ancient

tradition. In this report they are tested most extensively for the northern Kentucky area, but the literature from other Ft. Ancient areas is also surveyed. The conclusions reached should thus be applicable to more than one component or area.

The value of an approach that utilizes the formulation and testing of alternative hypotheses lies in its ultimate ability to provide scientific explanations of archaeological data analagous to those it produces in biology, geology, and chemistry. The procedure works by testing hypotheses on relevant data, either reinforcing or disconfirming them. The hypotheses to be tested may be mutually exclusive, so that after testing only one will remain as the best current explanation of the data, the others having been disconfirmed. This explanation will stand until replaced by a new hypothesis that better accounts for the extant information. The archaeological literature contains several discussions of this method and its value, notably Binford (1968a, 1968b), Dunnell(1971), and Tuggle et al (1972).

This study has two main goals: to test three hypotheses on the origin of the Ft. Ancient tradition, both in northern Kentucky and other areas; and to provide a description of the Cleek-McCabe site, thus adding to the limited number of reports dealing with specific Ft. Ancient sites. A description of the Cleek-McCabe site is justified because it makes available information on an unpublished Ft. Ancient site in a poorly known area. As indicated, such descriptions are important because they provide data on which one may base or test hypotheses; they also have value in providing the reader with a general feel for the differences and similarities between components and phases within the tradition. But beyond that, this site has some particular importance of its own. Since it appears to be early in the Ft. Ancient sequence in this region and since some of the later Ft. Ancient occupations are already known, if poorly, from descriptions of Madisonville and Anderson

phase sites in nearby Ohio (Hooton 1920; Griffin 1943), it helps fill a gap and make this one of the better known sequences in the Ft. Ancient tradition.

Although its descriptive value is important, the Cleek-McCabe site has been chosen for analysis chiefly because of its potential usefulness in solving the problem of the origin of Ft. Ancient in this area. This value lies in the age of the assemblage, since an early site is most pertinent to the question of the origin of the tradition. This site does appear to be early in the Ft. Ancient sequence in northern Kentucky. There also are enough data available from the site to allow comparison with other known components in the area, which is necessary for successful testing of the hypotheses.

Because the problem-oriented aspect of this study is viewed as most important, the descriptive and analytic parts are not systematically separated. Description is a kind of categorization, but the particular categories chosen to present the description are arbitrary or unreasoned ones. It therefore seems reasonable to use the analytic classes formulated to solve a particular problem as the basic descriptive groups as well. Each such class, in addition to being defined for analytic purposes, is also characterized by other attributes chosen solely to provide a more detailed description than definitions alone allow. Photographs, drawings, and tables supply the rest of the descriptive detail.

Providing description by way of analysis serves both the purposes of this report, while placing emphasis on the problem orientation and the testing of several hypotheses proposed to solve that problem. This is the correct weighting in view of the increasingly recognized importance in prehistory of attempting to go beyond description to explanation.

## FORMULATING THE PROBLEM: UNITS AT THE SCALE OF ASSEMBLAGE

### Development of Methods of Unit Formation

The problem of interest to this study is the development of the phenomena grouped as Ft. Ancient, especially in the northern Kentucky-southeast Indiana-southwest Ohio area. This problem can be couched in terms of studying the origins of Ft. Ancient or the nature of the transition to Ft. Ancient from earlier phases. However, until one has some grasp of the meaning of "Ft. Ancient," it is not possible to identify the phenomena that are relevant to solving the problem. A number of other similar units--Adena, Hopewell, Late Woodland--have also been applied to the material to be examined in this study. It is necessary to understand what these names mean to determine if any of the established units are useful for studying the development of the Ft. Ancient phenomena.

The development of cultural manifestations can be studied using the archaeological record from any area. However, there are important practical differences between addressing this problem in an area whose prehistory is little known and one the prehistory of which is believed to be well understood. The main difference is that in a previously-investigated region the data will already be categorized, with traditional phases that are well-established in the literature. In less well known areas one is free to classify the archaeological data in ways most useful to solving the problems at hand, without need to consider or justify the classes in light of existing units. The practical effect of this difference is to cause investigators in known areas to automatically classify data in the same ways as their predecessors, with the result that the developmental sequence is assumed rather than investigated. The earliest units and developmental scheme used in a region tend to persist with only slight modifications because

new data is viewed in terms of the old concepts.

These difficulties are magnified when a region with an established culture history is studied using pre-existing data rather than information newly gathered expressly for that study. New material may be studied in terms of the problem, without reference to older units until the results of the study are integrated with previous knowledge of the area. The traditional units nonetheless exert a strong pressure on the study to cast itself in their terms. When previously classified data forms the basis of the study, the old units must be confronted immediately. If they are not useful for examining the problem at hand, they should be discarded; however, too often they are used without questioning their appropriateness. Antecedent units may thus greatly limit the significance of new research.

Archaeological interpretation in the central Ohio valley has suffered from the persistence of assemblage-scale units created when the area was first investigated. Ft. Ancient is one of these units, existing as a vaguely formulated "culture" until its description was refined and detailed (Griffin 1943). The resulting units, their purpose, and the way they were created have strongly influenced the nature and direction of subsequent Ft. Ancient studies. Because the northern Kentucky region is part of the central Ohio valley, the substantial amount of archaeological work done there has fallen into the same pattern: sites have been categorized as Ft. Ancient, Adena, Hopewell, or Late Woodland because these units already existed and problem-oriented studies have consequently suffered.

The present study makes use of some previously-gathered, and thus previously-classified, data. It is therefore necessary to consider the existing units and how they were created and justified before turning to the question of their usefulness to the work at hand. They cannot be ignored, for they have influenced the way the data used here has been viewed and that

in turn has affected the study of cultural development in the area. In particular, adherence to the traditional unit "Ft. Ancient" has caused reluctance to examine the development of the phenomena it encompasses. This is a result chiefly of the unsuitability of such units for problem-oriented studies, coupled with resistance to abandoning them for more useful classes. The procedure here will be to examine the rationale for the established units first, then the way they were actually formed. This discussion will serve as a basis for justifying the method of classification used in the current study.

A variety of units have been employed in prehistory to group assemblages. In the eastern United States those most frequently used have been the focus (McKern 1939) and its successor, the phase (Willey and Phillips 1958). The focus began its history as part of the Midwestern Taxonomic System, devised by W. C. McKern and other Midwestern archaeologists in response to a need to organize the great amounts of data becoming available in the 1930's. Assemblages are grouped together hierarchically according to the degree of similarity between them, measured by counting the number of traits held in common by two collections and figuring that as a percentage of the total traits tabulated for them. The more traits held in common, the more similar are the assemblages. There is no stipulation of a minimum number of traits that must be discriminated for each assemblage, nor is there detailed discussion of how specific the traits used to measure similarity must be for each level of the hierarchy. McKern observes that groups at higher levels have to be based on fewer, increasingly more general traits (1939:307). The system answered the initial need for a descriptive framework to accomodate accumulating data. For such use, there was no need to justify the choice of particular traits over others to measure similarity; any traits would do equally well for description in the absence of a particular archaeological

goal.

The Midwestern Taxonomic System creates five units of increasing inclusiveness. These are the focus, aspect, phase, pattern, and base. Those of real concern here are the focus and aspect. Foci are groups of assemblages holding nearly all traits in common. Aspects are groups of foci that share a clear majority of traits. The other three units follow the same pattern, being groups of the next lower unit in the hierarchy, with the degree of similarity required among members of the groups decreasing as the level increases.

All the units in the McKern system, although referred to as classes, are actually groups of assemblages, themselves collections of objects. Units created by measures of similarity must be groups, since similarity can only be measured by reference to particular phenomena, which then become the members of each group. Although all the units in the McKern system are groups, only the focus has as members physical objects: assemblages of artifacts. The members of all higher units are constructed, although they are still treated as objects. Thus, an aspect has as its members groups of objects called foci rather than individual objects.

Archaeologists were not content to limit themselves to description of their data. With time, temporal and "genetic" relationships became a practical interest. The Midwestern Taxonomic System is not suited to such study, since its units are based purely on formal similarity, without any attention to the temporal or spatial distance between assemblages. However, the McKern system had been designed for neither purpose. Temporal relationships are not incorporated, and McKern admits that they cannot be without substantially changing the membership of the similarity-based groups (McKern 1939:312). Further, the taxonomic structure of the groups does not imply evolutionary relationships (1939:312).

Such a formulation in the 1930's, when time control was poor, is understandable. However, this limitation makes the system useful only for description, since developmental or "genetic" links cannot be examined without knowledge of the placement of units in time (Rouse 1955). That is, it is not possible to know whether a similarity arose independently or through contact without knowing if the units are contemporary, sequential, or separated in time. Also, as long as the units are treated as groups rather than classes, the legitimate use of the McKern system in temporal or genetic studies is precluded. This is the case because only classes can have distributions in either time or space; groups have locations, that of their members, and cannot recur, since they are tied to the objects of which they are composed. In contrast, a class is a definition rather than a set of phenomena and therefore is not restricted to the time and space of its original members, but may recur as often as its defining traits recur (Rouse 1939:11, 1955:714; Dunnell 1971:89).

Even though the units in the McKern system were not designed for chronological or developmental studies, there is a device for transforming them from groups into classes. While not overtly acknowledged, the structure of the system presupposes that groups will be created by similarity measures and then converted to classes by isolating determinants. A determinant is "any culture trait when and as used as a marker for any specific culture division" (McKern 1939:305), and they serve as the defining attributes that change the units from groups to classes. In any comparison between two units, the determinants of each must be chosen from unshared traits. Thus the defining attributes of any particular unit may change as the unit with which it is being compared is replaced by a different one.

One reason that the transformation of units from groups to classes is necessary is the recognition that one site may be occupied two or more times

by people of different foci or aspects. The component, a manifestation of a focus at a particular site, is the concept designed to clarify the number of foci represented at one site. However, the component presupposes the existence of foci as classes, not groups. Identification of components in a multi-occupation site can only occur if classes already exist with which to identify them. Because of the confusion natural to a system whose units change from groups to classes largely unremarked, components are treated as both groups and classes. Since components have to be recognized as phenomena before they can be grouped, but have to be identified with a class before they can be recognized as phenomena, use of the concept is a manifestation of circular reasoning (Dunnell 1971:183).

Functional differentiation of assemblages, part of the experience of nearly every archaeologist, is another dilemma for the users of the Midwestern Taxonomic System. Sites used by the same group of people may have been employed for different purposes, so that the assemblages from those sites will be dissimilar. If the units in the Midwestern Taxonomic System are treated as groups, each kind of occupation will be put into a separate focus, the members being more similar to one another than to other kinds of occupations produced by the same group of people. For example, burial sites might show little similarity to hunting camps in total traits shared even though they were produced by the same cultural group and would therefore be placed in a different focus. At the same time, burial sites produced by various groups might be quite similar to one another and thus be grouped together.

To avoid this, McKern advocates that communities, not just single components, be included in foci (1939:310). This cannot be done unless some way is found to link the different kinds of occupations as members of the same community. McKern is not explicit as to how this is to be accomplished, but the only way it can be is for the focus to become a class with a

definition shared by each member assemblage, but with the occupations no longer constrained to exhibit nearly complete similarity in all traits. If properly chosen, determinants can serve to link different kinds of assemblages. Thus, burial and hunting occupations might share various styles that could be used as determinants to identify them as products of the same cultual system, even though the two kinds of assemblages were otherwise dissimilar.

Archaeologists employing the McKern system found, as McKern had, that the units were most useful when they were changed from groups into classes, though the degree of methodological fidelity and clarity varies considerably in practice. The McKern system lends itself to manipulation, so that groups can be created at will by extensively subdividing one category of similar artifacts into many traits while combining dissimilar artifacts so that they count as only one trait. The resulting groups are a product of the originator's familiarity with the material and area under examination. The groups are then often covertly used as classes without being formally redefined or justified; that is, determinants are not listed nor the reasons for their choice made clear. This has made it difficult to explicitly treat the units and for anyone other than the inventor to systematically evaluate the results of analyses using them. Lack of explicitness has also produced a tendency to ignore formal chronological analysis and postulate temporal and "genetic" relationships without demonstrating their validlity.

The shortcomings of the Midwestern Taxonomic System led to its gradual modification into something quite different. Criticisms of the system were widespread by the late 1940's on grounds varying from its taxonomic structure (Brew 1946) to its slighting of data on provenience and function (Taylor 1948) and inability to deal with change through time (Phillips 1942). Archaeologists interested in establishing chronologies of cultural units and linking them

from area to area, the culture historians, were the largest and most influential group among the critics. Thus the important changes made in the McKern system were in the direction of making the temporal dimension in the data explicit.

McKern and others who had used the taxonomic system were also interested in chronological relationships, but had few methods by which to get at them. By the early 1950's, however, radiocarbon dating had been developed and the potential usefulness of seriation for the eastern United States recognized (e.g., Phillips, Ford, and Griffin 1951), making chronological ordering of assemblages more nearly routine. Previously, stratigraphy and the presence of European contact materials had been the only methods commonly used to furnish information on chronology, and they have limited applicability.

The new methods for controlling time and the dissatisfaction with the McKern system resulted in the publication in 1953 of "Method and theory in American archaeology: an operational basis for culture-historical integration" by Philip Phillips and Gordon R. Willey, later revised and published as a book (Willey and Phillips 1958). A new system for ordering data is presented, with a basic unit, the phase, comparable to the McKern system's focus (Phillips and Willey 1953:620).

As in the focus, the phenomena being grouped are called components and are defined as the manifestations of a phase at a site. The component consequently suffers from the same circularity it possesses under the older system: in order to recognize a component, the phase has to exist; but before a phase can be defined, at least one component has to be recognized. One major difficulty with the McKern system, the lack of a phenomenological unit at the level of assemblage that can be recognized before units at that level are defined, is thus carried over into the new system.

Phases do differ from foci in one important respect, in conception if

not in use. They must be continuous in time and space. This necessitates that the temporal and spatial relationships of the components be known, in contrast to foci, which are based solely on formal similarity. Willey and Phillips define a phase as "an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time"(1958:22). This imprecise definition does not specify what phenomena phases are to group nor how they are to be bounded. It does imply that the phenomena must be spatially and temporally contiguous, if not continuous. The definitions given of "locality" and "region" do not clarify the bounds of the phase, since they are equally flexible.

Two special kinds of phase, the horizon and tradition, are discussed at some length (Willey and Phillips 1958:29-38). A horizon is "a primarily spatial continuity represented by cultural traits and assemblages whose nature and mode of occurrence permit the assumption of a broad and rapid spread" (p. 33). A tradition is defined as "a (primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms" (p. 37). Both are phases, serving to group assemblages, rather than being taxonomic units more inclusive than the phase (pp.42-43).

Willey and Phillips do not state how components are to be grouped into a phase. Since no formal measures of similarity are mentioned, it may be assumed that the groups are not based on trait counting as in the McKern system. Phases formed by archaeologists following Willey and Phillips are probably covert classes rather than groups. That is, all components in a phase share the defining criteria, which are implicit. The same seems to hold true of foci as actually used, in contrast to how they were visualized

by those who originated the Midwestern Taxonomic System. Many foci have been retained unchanged except that they are called phases, even though not yet demonstrated to be continuous in either time or space. Numerous examples are incorporated in Gordon Willey's An Introduction to American Archaeology, Vol. 1 (1966), including the conversion of the Hamilton, Hiwassee Island, and Dallas foci (Lewis and Kneberg 1946) into phases (Willey 1966:251). This wholesale tranformation of foci into phases meant that Willey and Phillips' new unit had little immediate effect on culture history in the eastern United States. Archaeologists continued much as they had before, but using the phase rather than the focus as their rationale for forming units at the level of assemblage. Higher units in the McKern hierarchy were gradually abandoned altogether, as advocated by Phillips and Willey (1953:631).

Neither the McKern nor the Willey and Phillips systems were used as they were formally designed, but rather served to justify continuing practice, which remained covert. Thus they share many deficiencies. Neither has been rigorously applied except in rare instances, William Ritchie's summary of New York archaeology (1944) using the McKern system being one example. Instead, archaeologists have tended to form groups of assemblages by covert methods, then justify them by couching them in the terms associated with one or the other system. This is a natural result of both systems being useful only for descriptive summary, while many archaeologists wanted to study problems such as change in settlement patterns (e.g., Lewis and Kneberg 1946) and subsistence systems (e.g., Caldwell 1958) over time. A covert approach to unit formation allows the real basis of the conclusions reached to remain obscure, while the overt descriptive units become established in the literature as meaningful and real.

A variety of meanings may be given to such units once they have been formulated. For example, Mason (1970) points out that the term Middle

Woodland has been used in a number of different ways: to denote an archaeological period, cultural stage, formal taxon, and cultural tradition. This confusion is not related to the derivation of Middle Woodland from a specific system of classification, but to the lack of clarity about the use to which the term is to be put (Mason 1970:804). The result is widespread use of the phrase in whatever way seems most convenient for a particular problem. The confusion is compounded by the archaeologists' failure to make their usages explicit or even to discriminate among the various possible usages, with the result that, "in the subculture of North American archaeology Middle Woodland ordinarily functions as a kind of primitive term, undefined or only incompletely defined and with the supposition that it has an object or referent accessible and intelligible to all who are properly initiated" (1970:807). Because they are not explicitly defined, phase-level units like Middle Woodland are often used in several ways by archaeologists, but such covert practice is promoted by methods of unit formation that permit only descriptive and not problem-oriented units to be formed.

The phase was designed to allow culture-historical integration, "the descriptive process concerned with cultural forms, with plotting these forms in space and time, and with defining their relationships and inferred functions" (Willey and Phillips 1958:61). Explanation, or processual interpretation, is placed on a higher level, not part of culture-historical integration but necessarily preceded by it (1958:4). Explanation must follow description since it involves "an attempt to discover regularities in the relationships given by the methods of culture-historical integration" (1958:6). This view of archaeological research implies a belief that the units on which explanation is based have some reality apart from their usefulness in solving a particular problem. Only thus could units be established without reference to explanation, to potential answers to a

problem.

The clearest evidence that the phase is believed to represent some real unit rather than being a construct comes in the earliest version of the paper, when phases are likened to biological species and ethnographic societies, both often treated as empirical units rather than as constructs. The main difference among these units in terms of their reality is that phases are "constantly subject to modification and redefinition, always with a view to closer approximation to the theoretically possible ethnographic 'reality,' but they must remain to the end the basic formulations of the data" (Phillips and Willey 1953:629). The more recent consideration of the social aspects of archaeological units (1958:48-56) continues to reflect the belief that archaeological units approximate social reality.

The view that phases must be precedent to explanation makes it inevitable that archaeologists be concerned primarily with establishing temporal-spatial frameworks for their data and using them to provide historical sequences of events, since this must be done before processes of culture change can be studied. The authors themselves give a pertinent example:

> Cultures A and B are classified as Archaic because they possess certain common denominators that we have chosen as criteria for that stage. Their common possession of these features may be the result of historical contact, environmental determination, homotaxis in a truly evolutionary sense, or any two or all three of these. In other words, the system, if it can be called a system, is not rigged to exclude any particular kind of explanation (1958:71).

The stages produced by this scheme have as little meaning as the units in the Midwestern Taxonomic System. They are purely descriptive, summarizing a large body of data but with no justification offered for the choice of certain traits as defining criteria from the infinite number of possible traits. The stages are apparently classes rather than groups, but this does not affect their lack of meaning; it just makes its basis clearer. Like

units in the McKern system, they have no necessary spatial or temporal coherence. Neither are they comparable, since some are defined mainly on observable technological criteria, while others use inferences about religious, political, and social organization (1958:73) for definition.

The stages proposed by Willey and Phillips are more meaningful than the units in the McKern system only in being designed to be developmental, in the sense that by implication they reflect a presumption of unilinear progression in technological and social complexity from the Lithic through the Postclassic stages. In contrast to phases, these stages are not meant to reflect the real world but are designed to present only one possible way of organizing archaeological information in a developmental framework (1958:77). The stages are not formed by incorporating phases together taxonomically, as foci are incorporated into an aspect. Rather, both phases and individual assemblages are examined and classified into a stage if they display its defining criteria (1958:77).

Much of the chronological detail of the regional and areal sequences from which the stages were originally derived is omitted; the resulting culture history consequently consists mainly of a distributional study of developmental stages in the New World. There are many other ways to organize culture histories, the most common being the recording of areal chronologies linked by absolute dates and divided into periods. Each period is then described by discussing its characteristic artifacts. Willey's An Introduction to American Archaeology, Vols. 1 and 2 (1966, 1971) provides one of the best examples of this approach to culture history. However they organize the data, all such works have in common the goals of describing archaeological units and summarizing their time-space distributions.

Developmental relationships are often postulated in culture histories, but not tested or explained. For example, Willey and Phillips (1958:63)

assume a common origin for maize farming in the New World and imply that it spread from Mesoamerica into the eastern United States (p. 163). They similarly presume a Eurasiatic origin for eastern Archaic and Woodland attributes like pottery (p. 118). No other explanations are considered, nor is any attempt made to ascertain if the data really support these hypotheses.

Two kinds of criticism have been leveled at those who use the component-phase system to produce culture histories. One deals with the systematics, attacking the use of components as the basic phenomenological units. The other questions the methods and aims of culture historians, for whom the phase was designed.

Reservations about the systematics concentrate first on the component. Although not entirely recognizing the circularity embodied in the concept of component, K. C. Chang sees that phases must antedate components, which are nonetheless called empirical entities (1967:41). A new empirical unit, the settlement, is proposed. It is defined as "a unit of prehistoric culture that is in a 'stationary state' and occupies a meaningful area and spans a meaningful micro-time" (Chang 1967:38).

The settlement is meant to be a unit recognizeable without the aid of classification, analogous to an artifact at the level of discrete object. A settlement is conceived as a artifact on a larger scale, that of assemblage: "a physical unit of deposition which is composed of cultural things abandoned in specific spatial relationships" (Chang 1967:15). To be recognized as settlements, these assemblages must meet the conditions of a stationary state; that is, they must show no change significant in terms of a particular problem. Temporal discontinuities do not necessarily serve as boundaries of settlements, since a stationary state can exist in two assemblages separated by a measurable time (1967:47). On the other hand, two or more settlements may be recognized in one depositional unit. Settlements are also required

to "complete an actual or presumable self-sufficient sphere of day-in-day-out activities" (1967:41-42).

Obviously, the settlement concept presents some problems in its application. If it is an empirical unit, it cannot include assemblages separated in space, even though they may be products of the same cultural group. Nevertheless, settlements are often treated as classes, as an example from Chang (1967:53-54) illustrates. The Lower Erh-li-kang period at the Cheng-chou site is embodied in several spatially separate archaeological features. These must have been classed together as Erh-li-kang on some implicit basis, rather than empirically recognized as a settlement, since they are not contiguous. Once the features are associated through classification the settlement can be bounded, but that does not alter the fact that it is constructed. Chang affirms elsewhere (1968:3) that a settlement need not be continuous in space, but must only be the product of the same group of people.

Settlements are conceived as empirically discrete when they correspond to depositional units, but as classes when they do not. In the second case, the phenomenological membership of the classes remains unclear; sometimes the members are assemblages separated in space and sometimes they are constructs representing "stationary states." How the assemblages are identified as members of a particular settlement is also unclear.

In any case, settlement is not synonymous with component. A component is treated as an empirical unit and a member of a class at the same time. A settlement is either an empirical unit or a class, but not both at once. A settlement may also be a member of a class, such as a period, at a higher level, but unlike a component it is not required to be so by definition. Thus the particular Erh-li-kang settlement at Cheng-chou discussed earlier is a member of the Erh-li-kang period, but can be recognized as a settlement

without being so classified.

Rouse (1968:23-24) has criticized the use of the settlement as a phenomenological unit by pointing out that it is often impossible to associate assemblages that are the product of one group of people but are empirically separated in space into settlements. G. R. Willey, on the other hand, takes settlement to be equivalent to component in the classificatory sense (1968:212). This means that a settlement, like a component, should be identifiable by reference to the class of which it is a member; then spatially separate assemblages can be classified together into one component or settlement as desired.

The settlement shares the shortcomings, dating back to the Midwestern Taxonomic System, of the component in that it is sometimes an empirical and sometimes a classificatory unit. In the first usage, it is similar to a component and in the second it is analogous to a focus or phase (Dunnell 1971:180). Because of the difficulties that arise in recognizing settlements, the concept has not been employed extensively by archaeologists. The component--focus/phase system of McKern and Willey and Phillips remains the most common one in use in the discipline.

Most authors who use the word settlement, as in settlement pattern studies, treat it as a phenomenological unit that can be recognized apart from its membership in a class. How these units are identified is not clear, but they are initially treated as separate settlements and only classified together if they display the defining criteria of a particular settlement pattern. For example, burial and living sites are regarded as two kinds of settlements that may or may not be part of the same settlement pattern. This is not the use of settlement advocated by either Chang (1967) or Willey (1968). Examples of such usage may be found in Trigger (1968), Vogt (1968), and Streuver (1968).

Not only the systematics of culture history, but also its goals have come under criticism (Binford 1968a; Fritz and Plog 1970; Dunnell 1971). One group of critics has censured culture history for producing historical rather than scientific explanations of archaeological data.

Culture history arranges events in temporal sequence and puts them in a cultural context that "explains" them, paralleling the procedure followed by conventional history in which events are "explained" by reference to prior events without formally connecting them with laws or rules. The historian relies on the common cultural background he shares with the reader to make the causality seem plausible (Spaulding 1968:35; Dunnell 1971:20). The use of assumed rather than tested relationships in culture history has been illustrated above with examples from Willey and Phillips (1958); Binford (1968c) makes explicit some of the "explanations" implicit in work on the change from Upper Paleolithic to Mesolithic in western Europe. Sometimes the relationships postulated by archaeologists cannot even be justified as historical, since the temporal sequence of events is not demonstrated. The assumption (Griffin 1943:207) that some elements of the Ft. Ancient aspect were derived from Tennessee is an example, since the elements are not shown to be earlier in Tennessee than in the Ft. Ancient area.

Archaeologists advocating scientific explanation hold that their goal is to study and explain cultural processes (Binford 1968a:14), the term process perhaps deriving from Rouse (1939). Willey and Phillips (1958:6) argue that unit formation and chronological arrangement must precede the study of process. However, process and data on context are later lumped together with space-time correlation as part of "culture-historical integration" (1958:11). Evidently, two meanings of the word process are in use, the first denoting explanation and the second context and function. Thus explanation must be preceded by both "the reconstruction of spatial-

temporal relationships, on the one hand, and what may be called contextual relationships, on the other" (1958:11).

Confusion of these two meanings of process has led some culture historians to believe that the study of context, historical explanation, is the same as the study of process, sometimes used to mean scientific explanation of culture change. Process also has a third meaning, referring to the laws "responsible for changes observed in the organization and/or content of the system" (Binford 1968a:14). These distinctions are important ones, for on them hinge the debate between culture historians and processual archaeologists about the proper goals of prehistory (e.g., Flannery 1967).

Processual or explanatory archaeology is interested in producing scientific explanations for archaeological data. Scientific explanation may be defined as prediction and/or control (Meehan 1968:19). An event is held to be explained if it can be either predicted or controlled or both. This kind of explanation is made possible by rules or laws that hold for all cases and thus can be used to predict or control a particular case. Among processual archaeologists, there are some who maintain that since laws must exist before explanation can occur, the primary aim must be to verify these laws or propositions (Binford 1968a:17-18; Fritz and Plog 1970:405; Watson, LeBlanc, and Redman 1972:3). Others (Dunnell 1971:18; Tuggle, Townsend, and Riley 1972:9), following Meehan (1968), believe that the laws are part of a logical system and thus not to be verified, since they are true by definition. Rather, the effort is to fit the laws to particular sets of data by means of hypothesis testing, thus explaining that data. The goal in either case is scientific explanation, with disagreement mainly over how explanation is achieved.

A clear example of the differences between historical and processual explanation as used in archaeology is provided by a recent debate. The

first part is presented in a paper by Jeremy Sabloff and Gordon Willey (1967) titled "The collapse of Maya civilization in the Southern lowlands: a consideration of history and process." The analysis is couched in terms of the scientific method; for example, the proposed explanation for the Maya collapse is called an hypothesis. But the explanation, a postulated invasion of the area from the Gulf Coast of Mexico, which occurred immediately prior to the fall of Maya civilization, is historical in character. The only reason given for viewing this invasion, for which some evidence is presented, as the cause of the decline is its position directly precedent in time to the decline.

There is some discussion of process, dismissed as meaningless until the culture-historical relationships of the Maya are established:

> What we are saying here, in essence, is that in the Maya area processual factors, such as the ecological suitability of a great civilization in a tropical forest area, the effects of populations increases in a 'type X environment,' or the long-term inviability of a 'theocratic state,' can only be understood after external historical factors are controlled (1967:312).

The answering paper (Binford 1968b) strongly criticizes the historical explanation offered. Explanation is properly done, according to Binford, by first presenting the events temporally prior to the one being explained, then demonstrating the causal relationship between the proposed explanation and the event being explained. This is done by formulating a set of general laws which allow one to predict the event being explained by reference to the known preceding events. Since invasion does not always lead to a decline in the invaded civilization and since decline is not always preceded by an invasion, Sabloff and Willey have failed to derive laws that would predict the Maya decline. They have therefore failed to explain that decline.

The belief that units at the level of phase must be established before cultural processes can be studied makes the use of historical explanation

inevitable in culture history. Scientific explanation deals with fields of unknown phenomena, while culture historians arrange fields of known phenomena by means of taxonomic classifications like the McKern and Willey-Phillips systems. The kind of explanation appropriate to bodies of known information, in which the explanatory generalizations are implicit, is historical explanation (Spaulding 1968:35).

In culture history, the data is ordered in one way arbitrarily, to allow description. Since this order is all that is known about the data, the assumptions behind its arrangement remain implicit and incapable of justification. Any arrangement is acceptable for description, but not for scientific investigation, where classifications must be justified by reference to their usefulness in solving a problem. Culture-historical classes are not useful for scientific study except by accident. Taxonomic units are well suited to culture history and historical explanation because they simplify the presentation of known classes justified in other, often unknown, ways (Dunnell 1971:83).

A scientific explanation can only be established by demonstrating that certain rules or laws that are logically true apply to a particular case and thus explain it (Meehan 1968). This is done by testing a number of proposed explanations, alternative hypotheses, against the data. The one that fits best is the best current explanation; the others are either disconfirmed for that case or shown to be less sufficient, elegant, or parsimonious than the chosen hypothesis. An hypothesis is shown to fit the data if it can account for all of it yet does not predict data not in evidence. The process of testing alternative hypotheses has been described a number of times (e.g., Binford 1968a; Fritz and Plog 1970; Dunnell 1971; Watson, LeBlanc, and Redman 1972).

The formulation of scientific goals for prehistory has ramifications for

systematics. The importance of explicit definition of the units used by archaeologists has become more obvious (Binford 1968a; Dunnell 1971). Dunnell (1971) reviews the various kinds of classification and grouping devices used in prehistory and demonstrates that explicit paradignatic classification is the method best suited to forming units for scientific study of artifacts. This implies that units on the level of assemblage as well as discrete object should be paradigmatic rather than taxonomic if they are to be used to discover new information rather than to describe what is already known. This makes apparent again the need, recognized for some time, for a phenomenological unit at the level of assemblage to serve as members of such classes. Previous attempts (McKern 1939; Rouse 1955; Willey and Phillips 1958; Chang 1967) all suffer from an inability to devise such a unit that can be recognized without recourse to a classification.

Despite their difficulties with formally explaining their procedure, archaeologists have long recognized empirical units at the level of assemblage intuitively. Thus the artifacts from a site are often divided into several assemblages each representing a separate use of the site. Dunnell (1971) attempts to make the conceptual basis of this unit, long used implicitly, explicit. The unit, called an occupation, is defined as "a spatial cluster of discrete objects which can reasonably be assumed to be the product of a single group of people at that particular locality deposited over a period of continuous residence comparable to other such units in the same study" (Dunnell 1971:151). The definition is tactical and so must be applied by each archaeologist as the situation warrants. Since occupations are collections of objects, they are harder to recognize phenomenologically than discrete artifacts. Even so, the concept makes explicit a unit that can be used to discuss archaeological procedure at this level. It makes it possible to consider phases to be classes of occupations rather than components,

removing the circular reasoning previously associated with component. The term component may then be reserved to its use as the manifestation of a phase at a site (Dunnell 1971:158). In turn, a phase can then refer to a paradigmatic class with occupations as its members.

## Application of Methods of Unit Formation to the Ft. Ancient Tradition

With the history of archaeological units at the level of phase established, it is necessary to turn to a discussion of the use of such units in the literature on Ft. Ancient preliminary to considering how they are employed in the current study. Units from the Midwestern Taxonomic System and the Willey-Phillips system have had the most application in Ft. Ancient studies. The units appear in adapted forms, not created exactly as advocated by either McKern (1939) or Willey and Phillips (1958) in their statements of method. However, these deviations are less important than the ultimate congruity in purpose and use of all such units: to create culture-historical sequences, rather than to aid processual explanation.

The major work on Ft. Ancient is James B. Griffin's The Fort Ancient Aspect (1943). The units formulated therein using the Midwestern Taxonomic System have been the framework into which most subsequent work on Ft. Ancient has been fitted. The identity of Ft. Ancient and the terms and units which structure it derive largely from this comprehensive study.

While published in 1943, the work on which The Fort Ancient Aspect is based began in 1933 (Griffin 1943:1). It was intended to provide an example of the application of the Midwestern Taxonomic System to a body of data (1943:1). Griffin's use of the system shows concretely the processes followed by one of its advocates in applying it to archaeological data: formation of the original groups, sometimes using the McKern measure of similarity and sometimes not; transformation of these groups into covert classes; and identification of new data with the classes. Contemporary studies such as those by Cole and Deuel (1937) and Lewis and Kneberg (1946) suffer with The Fort Ancient Aspect from the inexplicitness of the McKern system and the lack of a clearly stated objective other than description.

Initially, pottery collections from only five sites were examined. The sites, Baum, Gartner, Feurt, Fox Farm, and Madisonville, are located in Ohio and Kentucky. They had already been identified with a unit called Ft. Ancient, a Ft. Ancient culture having been recognized by W. C. Mills and others who had excavated several of the sites. The "culture" had never been analyzed or defined, and its meaning and place in time and space were unknown.

The procedure followed in studying this material was to first make a list of the total cultural traits using the literature as well as the pottery available from the five sites. This was compared with McKern's list of Upper Mississippi traits and a judgment made that the two are enough alike to be two aspects of the same phase (Griffin 1943:2). The five assemblages were then divided into three foci, ostensibly adhering to the McKern system in which the components of a focus share nearly all their traits. In the initial grouping, Baum and Gartner were put into the Baum focus, Fox Farm and Madisonville into the Madisonville focus, and Feurt into the Feurt focus.

A tabulation of shared traits by number and percentage for these five assemblages is given in Table 1, based on the lists of pottery and non-pottery traits given for each assemblage (1943, Appendix D). Pottery data for Feurt is not provided in these trait lists, so only non-ceramic traits are used in comparing it with other assemblages. Enumerating shared ceramic traits is somewhat dubious even in the presence of tables because it is not clear that a uniform process of trait discrimination has been used for all assemblages in each focus. Despite these qualifications, the figures shown in Table 1 are instructive.

On the basis of the four assemblages for which full trait lists are present, the most similar collections are grouped together into foci. Baum and Gartner share 80.5% of their traits; Madisonville and Fox Farm share

Table 1. Compilation of shared traits from five Ft. Ancient components.

| Collections | Non-pottery traits | | | Pottery traits | | | Total traits | | |
|---|---|---|---|---|---|---|---|---|---|
| | total | # shared | % shared | total | # shared | % shared | total | # shared | % shared |
| Madisonville-Fox Farm | 159 | 111 | 71.7 | 60 | 42 | 70.0 | 219 | 153 | 70.0 |
| Baum-Gartner | 123 | 98 | 79.7 | 72 | 59 | 82.0 | 195 | 157 | 80.5 |
| Feurt-Baum | 141 | 98 | 69.5 | data not available | | | | | |
| Feurt-Madisonville | 167 | 100 | 60.0 | data not available | | | | | |
| Feurt-Gartner | 141 | 85 | 60.3 | data not available | | | | | |
| Feurt-Fox Farm | 140 | 97 | 69.3 | data not available | | | | | |
| Baum-Madisonville | 165 | 97 | 58.8 | 84 | 41 | 48.8 | 249 | 138 | 55.4 |
| Baum-Fox Farm | 139 | 93 | 66.9 | 77 | 34 | 44.2 | 216 | 127 | 58.8 |
| Gartner-Madisonville | 166 | 83 | 50.0 | 82 | 39 | 47.6 | 248 | 122 | 49.0 |
| Gartner-Fox Farm | 138 | 81 | 58.6 | 74 | 33 | 44.6 | 212 | 114 | 53.8 |

Data on trait occurrence from Griffin 1943:366-376.

70%; and none of the four is as closely similar to any of the others as to the one with which it is linked. There is no way to judge, however, whether 70% or even 80% similarity is the "practical identity" (McKern 1939:311) required for formation of a focus.

Examining only non-pottery traits, so that the Feurt site may be considered, it is evident that it is almost equally similar to Baum and Fox Farm, although the three assemblages are placed in separate foci. Also, Feurt is nearly as similar to Fox Farm as Madisonville is. On the basis of non-pottery traits alone, it is not clear how the Feurt component was put in a separate focus if the McKern system were being consistently applied.

Although there is no table of pottery traits for Feurt, the pottery descriptions provide clues to the reasons for creating a Feurt focus. These reasons are not related to the rules for forming similarity groups under the Midwestern Taxonomic System. One of the two main kinds of pottery found at the site is Baum Cordmarked; the other is Feurt Incised, a plain shell-tempered ware apparently distinguished from similar types solely on the basis of its incised rectilinear design (1943:89-90). Since shell-tempered plain pottery is also present at Baum, the ceramic assemblages from the two sites seem to be very similar except for the absence of the Feurt rectilinear design at Baum. Feurt pottery is not so similar to that from Madisonville or Fox Farm; therefore, Feurt would probably be grouped with Baum and Gartner under the McKern system if both pottery and non-pottery traits were tabulated.

Instead, the Feurt assemblage is put in a different focus, mainly because of the occurrence of Feurt Incised pottery, "not found at any of the sites in any of the other foci" (1943:90). The Feurt focus was formed, not on the basis of quantitative dissimilarity between its components and those of other foci, but because of a qualitative difference, the presence

of a single distinctive kind of incised design on pottery. It can be demonstrated, then, that even for the original five assemblages, the McKern system was not consistently applied, even though the groups are called foci.

By 1937, the Anderson focus had been added to the three originally discriminated (Griffin 1937:273). The Anderson component is its largest assemblage. The focus was probably formed just as the earlier ones had been, by a measure of similarity intuitively approximating the McKern system. Ceramics again played the major role in discriminating the foci, as evidenced in the number of pottery traits and the amount of space allocated pottery description in The Fort Ancient Aspect. This is an example of the McKern system's tolerance for subdivision of certain artifact categories into many traits to create the desired degree of similarity between assemblages.

At this point, not only had four foci been created, but they had changed from groups into covertly defined classes. This is shown by identification of new collections not involved in the original grouping process with each of the four foci (Griffin 1937:273). That these new assemblages were not grouped with the others by similarity but identified as members of pre-existing classes can be demonstrated by looking again at the trait lists.

The major assemblages previously discussed, from whatever focus, share a majority or near majority of traits (Table 1). Anderson also holds to this pattern, sharing 60% of its total traits with Baum and 56.9% with Madisonville. In contrast, the other assemblages with fewer total traits in most cases share less than half of them with any other collection, whether from their own focus or not (Table 2). Since this is the case, according to the McKern system the small assemblages cannot be included in the same foci as the larger ones, but must either be placed in separate foci or omitted from consideration. That they are placed in existing foci despite their lesser

Table 2. Compilation of shared traits, selected large and small Ft. Ancient components.

| Collections | Non-pottery traits | | | Pottery traits | | | Total traits | | |
|---|---|---|---|---|---|---|---|---|---|
| | total | # shared | % shared | total | # shared | % shared | total | # shared | % shared |
| *Baldwin-Gartner | 104 | 33 | 31.7 | 63 | 39 | 61.9 | 167 | 72 | 43.1 |
| Baldwin-Anderson | 84 | 30 | 35.7 | 81 | 26 | 32.1 | 165 | 56 | 33.0 |
| *Steele Dam-Anderson | 81 | 25 | 30.9 | 69 | 53 | 76.9 | 150 | 78 | 52.0 |
| Steele Dam-Baum | 118 | 24 | 20.3 | 76 | 43 | 56.6 | 184 | 77 | 41.9 |
| *Larkin-Madisonville | 146 | 22 | 15.1 | 58 | 20 | 34.5 | 204 | 44 | 21.6 |
| Larkin-Baum | 121 | 19 | 15.7 | 72 | 15 | 20.8 | 193 | 34 | 17.6 |
| *Proctorville-Feurt | 148 | 26 | 17.6 | data not available | | | | | |
| Proctorville-Baum | 119 | 26 | 21.8 | data not available | | | | | |

*Both components from same focus, smaller assemblage first. Data on trait occurrence from Griffin 1943:366-376.

degree of similarity to the other components indicates that the foci have become classes whose definitions the new components fit or that the level of similarity required was arbitrarily altered from case to case. In either case, the McKern system, which requires components of a focus to be nearly identical, is not being followed.

To summarize, five major assemblages were first grouped into three foci mainly on a qualitative basis, with pottery emphasized over non-pottery traits in foci formation. Trait lists which included many other traits not used in forming the three groups were drawn up; these lists were used to make description of each assemblage easier, rather than to compare assemblages and create foci, as contended. The three groups were expanded with the addition of the Anderson focus. The first evidence that these groups had become covert classes comes with the identification of small assemblages like those from Larkin and Steele Dam with them (1937:273). This would not be possible unless the tenets of the McKern system for group formation were violated. The groups were frozen so that new information could be added to them without changing them, and reorganization of foci on the advent of new information was precluded. Unfortunately, the defining criteria of the foci are not made explicit, so other workers attempting to use this framework have had difficulty adding new assemblages.

Griffin realized he was not strictly following the taxonomic method proposed by McKern. He states:

> Theoretically, a site or group of sites should be placed in the classification framework after an objective comparison with similarly organized data which have been shown to cohere...Irrespective of theory, components are recognized at times as probable members of various cultural divisions, but it is only after the analysis and comparisons are made that any accurate idea of their relationships is forthcoming. For example, the four foci proposed in this report were conceived long before the final trait lists and comparative analyses were prepared, and the actual demonstration of the existence of these four divisions may well have been

> influenced by these impressions. The trait lists and comparative statements indicate, or, one might say, have been arranged to indicate, that such a fourfold division does have some degree of soundness (1943:334).

However, he doesn't say how the four foci were originally formed; this is apparently unnecessary, since they are more or less justified by the McKern system.

A modified form of the McKern system is used to summarize the findings and describe many of the traits recognized but not used as criteria for the foci. A list of foci traits is given in Table VII of the book (Griffin 1943: 368). A trait from the general list seems to have been included in the foci trait list if it occurred in two or more major components or in a majority of the total components of a focus. There are four sets of foci traits for each focus: those shared with no other focus, with one other, with two others, and with all three of the other foci. The traits shared with no other focus may be regarded as determinants in the McKern sense, although they are not so labeled by Griffin. Thus the Baum focus determinants are cremation, crescent-shaped shell gorgets, perforated epiphyseal disks, turkey head rattles, arrow points made from deer toes, perforated deer phalanges, and beveled edge points (1943:368). The traits shared between two or three foci have no meaning in the McKern system.

The Midwestern Taxonomic System comes into proper use only in the formation of the aspect. A majority of the 131 focus traits are common to all four foci and thus the foci can be grouped into an aspect, since they share "a preponderating majority of the traits and trait elements" (McKern 1939:308) as required. Otherwise, the McKern system appears in The Fort Ancient Aspect only as a subtle influence and in the names of the units and the presence of trait lists.

The imprecise systematics evident in the book stem partly from a desire to use the McKern system while retaining the intuitive classes which fa-

miliarity with the data suggested would be useful in studies of temporal and developmental relationships. For Griffin was interested in these problems, as the examination of the aspect's chronological position with respect to Adena, Hopewell and historic tribes and the extensive consideration of possible connections with cultural manifestations in surrounding areas demonstrates. Data unrelated to the classification, from stratigraphy and European artifacts, aided chronological ordering of the aspect with other units on a similar scale. The temporal order of the components or foci within the aspect was another question, one that there was no attempt made to answer with the inadequate, covert classes used in the study.

Given this formal basis, the comparison of Ft. Ancient traits with those from other cultural groups has no genetic meaning. Such comparisons are purely descriptive, an uncontrolled recording of similarity the degrees of which can be arbitrarily manipulated by the choice of traits. For example, after a discussion of the distribution of individual traits, it is stated:

> The Fort Ancient Aspect seems to have drawn some of its cultural elements from the southeast, in the upper Tennessee Valley, and also from the southwest, where the major highway of the area, the Ohio River, offered easy access. It has been pointed out that many of the traits of the southern foci of Fort Ancient almost certainly were derived from these southern areas, where they occur not only at prehistoric sites but also at sites within the historic period (1943:207).

The inference, without demonstration that these traits are earlier in non-Ft. Ancient areas, is that the traits originated outside Ft. Ancient rather than spreading from within it or being independently developed in several areas. Whether traits are homologous or analogous is seldom considered by culture historians; homology is usually assumed without discussion (Binford 1968a:10).

Clearly defined classes are necessary to deal meaningfully with temporal and developmental problems, yet attempts to adhere to the McKern system

prevented the archaeologists using it from adopting an overt problem orientation. Even though their classes did not derive from the system, as in Griffin's case, they were justified by it and so could not be recongized apart from it. Such classes were not designed to be useful for genetic or chronological studies because their model, the Midwestern Taxonomic System, did not allow for them. There are many other difficulties with Griffin's classes that do not derive from the attempt to use the McKern system, but that attempt added a good deal of unnecessary confusion to the work and limited its value.

Since publication of The Fort Ancient Aspect there has been no other attempt to summarize or integrate all the extant data on Ft. Ancient. A few papers have presented areal summaries (Mayer-Oakes 1955b; Dunnell 1961; Prufer and Shane 1970; Dunnell 1972), adding to or modifying the scheme offered by Griffin. Other Ft. Ancient studies have concentrated on one occupation, with only passing reference to phase-level units (Hanson 1966; McKenzie 1967; Dunnell, Hanson, and Hardesty 1971). These are peripheral to understanding how occupations have been grouped into larger units.

Griffin (1943:240-245) notes some Ft. Ancient components in West Virginia, but these were not placed in a focus until definition of the Clover complex (Mayer-Oakes 1955b:164-174), which in effect comprises a fifth focus of the Ft. Ancient aspect. A trait list serves to define the complex; no formal count of traits held in common with other Ft. Ancient foci is made, but rather the assemblages are recognized as Ft. Ancient largely on the basis of the pottery's similarity to Madisonville focus ceramics (Mayer-Oakes 1955b:171).

Three works dealing with Ft. Ancient at the phase level serve to illustrate the change in systematics from the Midwestern Taxonomic System to the phase and finally to problem-oriented research, which uses the phase in a

different way. Robert C. Dunnell's (1961) unpublished paper on Kentucky Ft. Ancient gives an analysis of material from Kentucky in McKern system terms. Taking The Fort Ancient Aspect as a starting point, the paper examines assemblages in the light of established foci. However, the Kentucky collections are not grouped into foci following the McKern system. Rather, a chronology is established through seriation and divided into three periods on the basis of presence and absence of certain traits. The three divisions are assumed to mark foci boundaries (1961:32). The distribution of the assemblages is plotted on a map, showing the divisions to represent spatially separate groups.

The occupations are then identified with existing foci where possible using those traits occurring in only one focus as diagnostic traits (Griffin 1943:368). Assemblages displaying the diagnostic traits of a focus are classified as members of that focus (Dunnell 1961:36-38). Each of the diagnostic traits is treated as a sufficient but not necessary condition for recognizing a member of the focus. This is clear from the procedure if not from its explanation, for assemblages displaying only one diagnostic trait are classed as members of the focus for which that trait is diagnostic. For example, Gp 1 is put in the Madisonville focus (p. 35) even though the only diagnostic trait it displays is a shell gorget (Appendix B), presumably of the mask gorget type that is a determinant of the Madisonville focus.

Two new foci, Yates and Mayo, are proposed to group assemblages that do not fit into any of the pre-existing foci. The new foci are apparently classes rather than groups based on similarity, since no trait lists are given and the only traits mentioned are diagnostic, which apparently serve as the defining criteria of the two classes (1961:41-46).

Although Midwestern Taxonomic System terminology is employed, this study has more in common with the phase-based systematics used in culture history

since Willey and Phillips introduced the concept of phase in 1953. The foci are continuous in time and space like phases, and the whole sequence is divided into three periods. The result is a culture history of Kentucky Ft. Ancient using unit names derived from Griffin (1943), but with units formed by classification rather than grouping.

The next major work on Ft. Ancient that attempts any consideration of phase-level units is the Blain Village site report (Prufer and Shane 1970). Blain Village is located in Ohio on the Scioto River. It is included in the Baum focus, called the Baum phase (Prufer and Shane 1970:38), but without formal justification. The assignment is apparently based on an impression of overall similarity, rather than on either a formal measure of correspondence or identification of the occupation with a defined class.

In this treatment, the Ft. Ancient aspect has become a tradition, and the four foci established by Griffin (1943) have become phases. A tradition is "a cultural pattern, traceable through time within determinable geographic boundaries, notwithstanding sub-regional and temporal variations due to internal change or external influences. In a Tradition the component units in space and time are always more closely related to each other than they are to other, neighboring Traditions or their component units" (Prufer and Shane 1970:239). Phases are sub-units of a tradition, "characterized by internal homogeneity through space and time, but the range of variation remains within the framework of the overall Tradition to which they belong" (1970:239).

Tradition and phase are thus analogous to aspect and focus in the McKern system except in requiring temporal-spatial continuity. They are taxonomic in structure, with phases grouped to form traditions. This differs from the Willey-Phillips tradition, which is a special kind of phase, not a higher unit in a hierarchy. In this revision of the concept, a tradition

is delineated by the degree of relatedness of its potential members, which implies developmental continuity. This is similar to the earlier usage (Willey and Phillips 1958:38). Due to the taxonomic nature of the tradition-phase relationship in the new formulation and the way they are defined, phases can only be recognized with reference to a tradition, much as components in the older scheme could only be recognized by reference to a phase.

The phase-level systematics offered by Prufer and Shane combines parts of the Midwestern Taxonomic System with the culture-historical scheme of Willey and Phillips. This is a result of attempting to summarize the time-space dimensions of pre-existing units, the Ft. Ancient aspect and its foci, which are taxonomic. The new units' only use is to present a culture history and thus they suffer from the arbitrariness all such units share.

The Prufer-Shane summary differs from that offered in The Fort Ancient Aspect mainly in the addition of time-space dimensions to the pre-existing foci. This is done with the aid of radiocarbon dates and a crude seriation (1970:245) that is not demonstrated to be a chronology. Several new phases are added to account for early Ft. Ancient assemblages, with the older phases reserved to later periods. The refined culture history offered is preferable to the description given in Griffin (1943) only because it attempts to define spatial-temporal relationships within the Ft. Ancient tradition as well as its external relationships.

The most recent work on Ft. Ancient that considers phase-level units in any detail is Robert C. Dunnell's The Prehistory of Fishtrap, Kentucky (1972). It contains examples of explicitly defined phases designed to summarize the findings of a problem-oriented study of an area in the eastern Kentucky mountains. Four phases are presented: Slone, Thacker, Sim's Creek, and Woodside. These phases are used to describe the culture history of the

area, but they have meaning apart from such a culture history since they summarize the results of an inquiry into changes in settlement pattern and subsistence base.

The nature of inter-phase relationships is established by reclassifying the phases and occupations into traditions defined by functional types. Two traditions, Archaic and Fort Ancient, are defined, with the Archaic tradition encompassing the first three phases and the Fort Ancient the last, the Woodside phase. The break between traditions corresponds with a functional change and is also correlated with a break in the occurrence of formal or stylistic types (Dunnell 1972:63).

The traditions are formed as advocated by Willey and Phillips (1958), being on the same level as the phases but defined differently. The discontinuity in styles and functions between the two traditions is mirrored in the discontinuity between the Woodside and the previous three phases. Thus, "the three Archaic phases remain arbitrary stylistic divisions of a continuum as shown by the distribution of both formal and functional types... The division between Sim's Creek and Woodside on the other hand is of a completely different character. It marks a gross rearrangement of functional types correlated with a nearly complete discontinuity of formal types" (1972: 63). In terms of the original problem of studying development, the only division into phase-level units that is meaningful is the one between Archaic and Ft. Ancient or between Woodside and the three prior units. Whether these two units are called phases or traditions is irrelevant.

Both the phases and traditions serve to summarize known information. But they are constructed for use in distinguishing certain kinds of developmental changes. In this they differ from most culture-historical units, which are arbitrarily and covertly defined so that their meaning is unknown. Although phases and traditions like those in Prufer and Shane (1970) and

Dunnell (1972) serve the same ultimate purpose of summarizing culture history, the differences in their derivation are important. A sounder and clearer culture history will result from the use of units whose meaning is known; but this is merely a side-effect of problem orientation, the main product of which is explanation of cultural change.

## Use of Units to Study the Development of Ft. Ancient

As the previous discussion shows, units at the scale of occupation such as phase and tradition have not been used in Ft. Ancient studies to analyze data, but only to summarize the results of analyses made using classes at lower levels. Since phases and traditions have not been used for any purpose other than description, they have had no particular meaning. However, there is no logical reason why units at this scale can not be employed in analysis.

The origin of Ft. Ancient or the nature of the transition from an earlier unit to Ft. Ancient is a case in point. These ways of phrasing an interest in the development of the archaeological manifestations grouped under the term "Ft. Ancient" imply the existence of units, for only units with recognizeable bounds can have points of origin or transition. The difficulty with using existing units like Ft. Ancient, Adena, Hopewell, and Late Woodland is that their meanings are problematic. This is partly because they have never been explicitly defined. Without such definitions, it is impossible to bound the units. But even if definitions were available, the units might very well fail to address the problem of development meaningfully. Since the boundaries of classes and groups are functions respectively of their definitions and their members, any boundary could be arbitrarily specified as the beginning of Ft. Ancient by using either appropriate defining criteria or appropriate assemblages. The meaning of a unit comes from the problem it is designed to solve; therefore, the origin of Ft. Ancient so phrased is not a legitimate problem. The units must derive from the problem, not the problem from the units.

All units, including Ft. Ancient, originate when they are created by a classifier. If one is interested in development, the proper problem to address is the nature of the changes in the phenomena that compose a unit,

not the origin of the unit itself. Later, these units can be used to summarize conclusions reached in such studies, in which case descriptive rather than problem-oriented divisions become appropriate.

Little attention has been paid to the development of the phenomena classified as Ft. Ancient, either within Ft. Ancient or across the boundaries that separate it from other units. In the absence of explicit problem-orientation, the emphasis has been on description rather than processual explanation. With the establishment of phases coherent in space and time, there has been some thought given to an internal developmental sequence for Ft. Ancient. One consideration is presented in the Blain Village report (Prufer and Shane 1970:240-245), where three early regional phases, Brush Creek, Baum, and Bladwin, are proposed for the period from about 950 to 1250 A.D. in Ohio. The next period, 1250 to 1400 A.D., contains two phases, Feurt and Anderson, while the third period, from 1450 A.D. to historic times, contains only the Madisonville phase. The proposed developmental sequence follows the time-space relationships of the units, and no doubt is derived chiefly from them. Thus the Feurt phase is held to have developed from Baum; both are centered in the Scioto River valley. Similarly, Anderson is derived from Brush Creek, since each is the westernmost phase in its period. No significance is attached to the fact that the lone Brush Creek component is 40 miles east of the nearest concentration of Anderson phase occupations and on a different river drainage system (1970:map, p. 243). The Madisonville phase is found throughout southern Ohio; its antecedents, in ceramics at least, are traced in Baum, Feurt, and Anderson (p. 244).

Besides their spatial-temporal contiguity, the only developmental evidence cited to connect the phases is ceramic. The interpretation of this evidence is subordinate to the phases' temporal-spatial configurations:

> Anderson pottery, with its typically angular incised designs, can be derived without difficulty from the conspicuous angular designs already present on Brush Creek ceramics. In view of the fact that Feurt Incised pottery is also characterized by angular patterns, it is well possible that during this middle period of the Fort Ancient Tradition certain ties existed between the two component phases (Prufer and Shane 1970:241).

The ceramic similarity of Anderson and Feurt to Brush Creek is interpreted differently in each case: Anderson is derived from Brush Creek, while Feurt is not. This interpretation is probably favored because the Feurt phase is immediately preceded in its own area by Baum, which thus becomes a better candidate for ancestry of Feurt than Brush Creek, which is located in a different area.

The principal difficulty with the developmental scheme offered in the Blain Village report is lack of problem orientation. Development is plainly a side-issue to culture history and so is couched in terms of previously-established culture-historical units rather than being treated separately with more appropriate units. The scheme offered is not demonstrated to be the best one and even if it were accepted on faith, the meaning of its developmental connections remains unclear. For example, Madisonville contains some Baum phase traits. Does this mean that Baum persisted until Madisonville times in some areas, or were these traits transmitted through Feurt? If Feurt is a direct descendant of Baum, what is the justification for separating the data into two phases? Do the phases embody only ceramic changes or are other artifact categories changing concomitantly?

If consideration of internal development in Ft. Ancient has been inadequate, the problem of the development of the earliest Ft. Ancient material has hardly been examined. The attention that has been given to the question suffers not only from a lack of explicit units and a problem-oriented method, but also from a reluctance to consider at all the possibility of local development of Ft. Ancient.

All three difficulties are illustrated in one treatment of the origins of Ft. Ancient (Prufer and Shane 1970). The descriptive units Ft. Ancient and Late Woodland are used to study development, with results like the following:

> At first glance, the differences between Fort Ancient as a whole (including the early phases), and the preceding Late Woodland phases of the Scioto Tradition appear to be radical indeed... In an impressionistic sense, it is as if Fort Ancient appears full-blown, without obvious antecedents, on the prehistoric scene of southern Ohio. From this, it follows that it would be difficult to explain Fort Ancient as a gradual modification of the Late Woodland cultural pattern. The appearance of Fort Ancient is too abrupt to permit this latter interpretation (Prufer and Shane 1970:258).

Plainly, this discussion is based on the belief that the culture-historical units "Ft. Ancient" and "Late Woodland" have some meaning in studying development. There is no reason why this should be true, since they were not created for that purpose but rather to summarize time-space relationships. The differences between them are built into their definitions, which are covert and may or may not have the implications for development attributed to them in the above statement.

The remainder of Prufer and Shane's discussion of Ft. Ancient development illustrates that Ft. Ancient and Late Woodland have much in common, to the point that one assemblage, Voss, has been independently identified as both Ft. Ancient and Late Woodland (pp. 259-260). The apparent importance of differences between Ft. Ancient and Late Woodland that lead Prufer and Shane to postulate a migration of Ft. Ancient peoples into the Scioto valley (1970:261) is a result of over-emphasizing the defining traits of these units, which naturally are different, and minimizing recognized similarities between them because they are not part of the definitions. Using the established units, there is no way to investigate the problem of Ft. Ancient development and reach a defensible conclusion.

As in the above case, culture historians often derive whatever unit is under study from some other area through either migration or acculturation. This disposes of the problem of development of the phenomena by shifting responsibility for explaining it to archaeologists in the supposed source area. They ignore it in turn, since they are concerned with local units, not with searching for antecedents to units in some other area. Thus development is often never really studied in culture history. Instead, the speculations advanced about development are assumed to be correct without either proper formulation of the problem or testing of alternative hypotheses. These ostensible explanations serve mainly to dissipate concern about problems of development that cannot be solved without reformulating the traditional culture-historical units.

In a problem-oriented approach, the development of Ft. Ancient is studied using units created especially to attend that problem, formulated at the scale of either occupation or discrete artifact. The procedures for constructing analytic units at either level are almost entirely analogous (Fig. 1), so the level chosen can only be justified by reference to practical considerations such as the amount and kind of data available.

Both methods begin by discarding pre-existing units and classifying the available data, occupations on one hand and discrete artifacts on the other, into types. The choice of particular types is oriented toward testing specified developmental hypotheses. For example, at the scale of discrete artifact, pottery might be classified into shell-tempered plain and shell-tempered cordmarked and projectile points into triangular, stemmed, and notched. Occupations could be divided into types such as: Type 1--projectile points, no pottery; Type 2--projectile points and pottery; Type 3--pottery, no projectile points.

Once all the data is so classified it must be associated. In the case

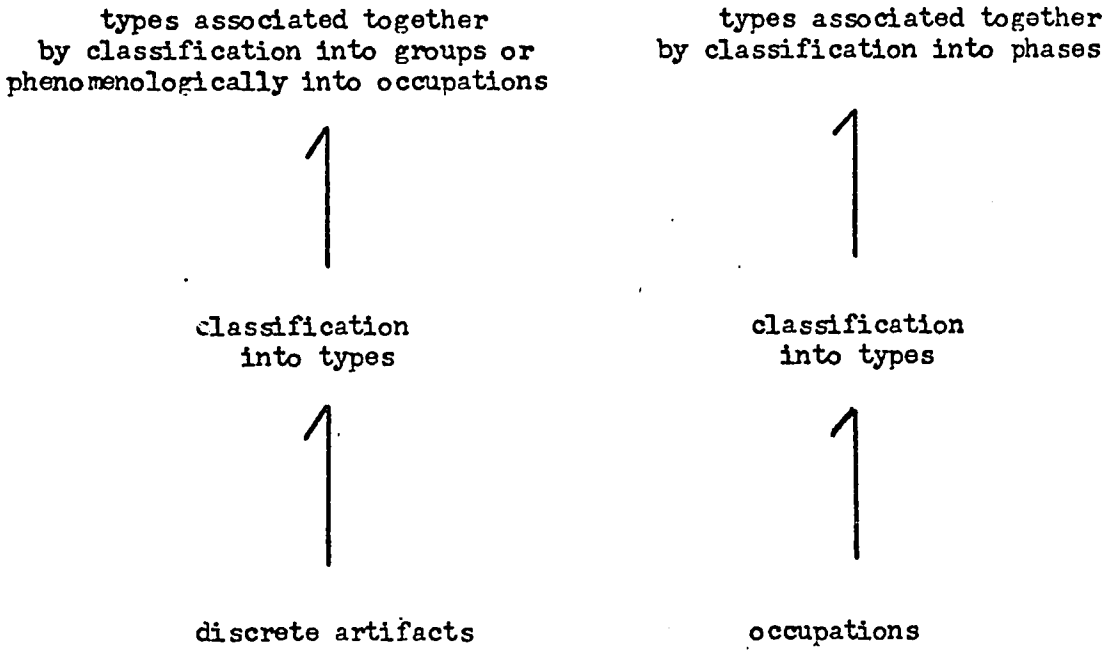


Fig. 1. Analogous Operations in Unit Formation at the Scale of Discrete Artifact and Occupation

of discrete artifacts, this can be done two ways (Fig. 1). Either the artifacts are associated phenomenologically because they belong to the same occupation or they are grouped together by means of a second act of classification. For example, once all the pottery in the data under study has been placed in types using the same classificatory scheme, the distribution of each type over occupations or other groups within that data can be studied. Shell-tempered plain pottery might occur in all occupations, while shell-tempered cordmarked is found in only a few. This could be interpreted in a variety of ways, depending on the problem being addressed and the precise distribution of type membership.

Treatment of occupation types is slightly different. There is only one way to associate them, by classification (Fig. 1). Thus certain of the Type 1, Type 2, and Type 3 occupations in the previous example might be grouped into phases using styles. Occupation types cannot be grouped phenomenologically because their members are spatially discrete; thus phases are always classes and never empirical units. At the scale of both discrete artifact and occupation, descriptive phases can be derived to summarize the results of the study. In the latter case, these may be the same as the problem-oriented phases or they may be devised purely for descriptive purposes.

Whether the procedure chosen is based on types of occupations or types of discrete artifacts, it is possible to compare the changes in the distribution of the types through time and space. Since they will have been designed for a specific purpose, such as studying the development of Ft. Ancient, the distributions of the types should have specifiable meaning in terms of that purpose. Once a conclusion is reached, it is possible to divide the data into descriptive units using either the boundaries suggested by the study's results or arbitrary criteria chosen solely to make description

easier.

It is possible to study Ft. Ancient development using occupation types, beginning by examining subsistence bases and settlement patterns, since their development is amenable to clarification using units at this scale. Formal types at the scale of occupation have never been employed in a study of Ft. Ancient. The one major settlement pattern study done in the Ft. Ancient area (Dunnell 1972) primarily uses types at the scale of discrete artifact rather than occupation to produce its conclusion that Ft. Ancient is intrusive, not developmental, in the Fishtrap Reservoir area. Since the prehistory of the region was previously virtually unknown, the aim is to provide a developmental culture history (1972:1), giving descriptive data that is useful to the formulation of pertinent hypotheses. The study uses functional and stylistic classes of discrete artifacts to create developmental phases. For example, the Thacker phase is defined by the presence of quartz-tempered pottery and significant amounts of both siderite and chert waste flakes (1972:34). So constituted, phases serve to summarize results rather than to embody them, in contrast to phases based on occupation types.

The present study will also employ types at the scale of discrete artifact rather than occupation. Analytical phases will not be created. The decision to use this method is dictated by the nature of much of the data, which consists of information on artifact assemblages drawn from the literature, with only one major assemblage actually examined. Very little is known about settlement patterns or subsistence systems in the study area, certainly not enough to form a basis for defining types at the scale of occupation. In fact, the nature of the data that is available precludes any kind of detailed comparative study of function, at whatever scale the analytic units are formulated. This is the case because published information deals largely with stylistic rather than functional artifact classes.

The remaining option is to examine development by concentrating on the distribution of styles over a number of individual occupations.

Pre-existing culture-historical units are of some use in such an undertaking. First, they provide terms in which the problem can be couched. In fact, the problem in a sense often derives from the use of such units which come to have a reality beyond their application in descriptions. Thus the development of Ft. Ancient is a problem created partly by the existence of the culture-historical unit "Ft. Ancient." The same problem could be examined without reference to these pre-conceived units, although it would be harder to decide on which part of a sequence to concentrate attention.

Second, culture-historical units often do embody major functional or stylistic changes, which is one reason they are a useful place to start a problem-oriented study. Developmental meaning has often been built into phases, more through their creators' familiarity with the material than through the demands of description, which is their ostensible purpose. There are other reasons for beginning with established units. Archaeologists often assume that the sources of the differences between such units are understood; these assumptions need to be confronted and tested along with other possible explanations in order to arrive at the best hypothesis. Simultaneously, a case can be made for problem orientation by showing how such an approach can produce more tenable, and often better, explanations of change than the ones previously taken for granted.

As has been indicated above, culture-historical explanations often involve untested assertions of migration or acculturation. Unless the relationships between phases are systematically tested, these explanations will stand for the data the phases incorporate. Processual explanations will be neglected except when studies are based on newly gathered data. There are a number of practical reasons why this should not happen.

Archaeological field work is expensive and time-consuming. Much of the data in the literature cannot easily be replicated, especially that for certain kinds of structures and features. For example, in the eastern United States large burial mounds have all but been destroyed or were excavated long ago. Thus, making use of existing data for new purposes is often practical and sometimes necessary. It is even more important in establishing contrasts between the products of descriptive culture history and explanatory prehistory.

Given preconceived phases in an area, one way to phrase a developmental problem is in terms of the nature of differences between the phases. In the case of two consecutive phases, these differences can be explained in several ways. They could be the result of non-comparable definitions of the phases. Such differences could also arise through development of one phase from the other, from migration of the later phase into the area, or from acculturation of the earlier phase by a cultural tradition located in another area.

To ascertain which of these hypotheses fits best, it is necessary to ignore the pre-existing phases and reexamine the data itself. The phases are useful only in identifying the pertinent data and providing some general information on temporal relationships within it. Once the range of data is established from the literature and any unpublished information that may be available, the first step is to make it comparable throughout the sequence. This allows one explanation of the perceived differences, that they result from non-comparability, to be either supported or discarded. The classes used for this purpose should be designed to be useful in testing the other hypotheses. Such testing cannot be done unless it is clear beforehand how each of the hypotheses would be manifest in the data, so that it is clear whether they are supported or disconfirmed by it. Once tested, the best explanation can be chosen.

After the best current explanation is chosen, the culture-historical units can be reapplied to the data. If they correspond to important developmental changes they can be retained with new definitions, or new phases that do not carry the connotations of the old ones may be constructed. A third option is not to use phase-level units at all in summarizing the findings, referring directly to the changes in the data instead.

## CULTURE HISTORY OF FT. ANCIENT AND PRECEDING UNITS

### Temporal-Spatial Relationships

Before treating the development of Ft. Ancient, it is useful to consider the history of the current understanding of the temporal-spatial relationships of Ft. Ancient, Adena, Hopewell, and Late Woodland in order to clarify the implicit definitions of these units and their implications for the research at hand. While previous sections have concentrated on the formal justification of units at the level of phase, the focus here will be on their content and relationships in time and space.

Three of the units, Adena, Hopewell, and Late Woodland, are generally regarded as belonging to the Woodland tradition (Willey 1966:251; Griffin 1967:177). Woodland was created as a taxonomic unit at the level of pattern or basic culture in the Midwestern Taxonomic System (Deuel 1935), but since has evolved into a unit on the level of phase, subsuming more phenomena than any included unit because it has a less restricted definition. In its guise as a phase, Woodland has been used in each of the four ways described by Mason (1970:807) in his discussion of the term Middle Woodland: as a formal taxon, a tradition, a period, and a stage. One occurrence of such mixed usage is found in Willey (1966:251), where Burial Mound I and II, which are developmental subdivisions of Woodland, also serve as periods dividing the interval from 1000 B.C. to A.D. 700 into two parts. Woodland is also referred to as a tradition, implying historical continuity; as such, it is defined by the presence of Woodland pottery, burial mounds, and the beginning of agriculture (1966:267). These three usages are duplicated in other papers (Caldwell 1958:19-21; Griffin 1967:177, 180). Woodland is used as a taxon by Sears (1948), being defined by the presence of Woodland pottery.

Despite formal definitions which allow it to be viewed as a phase-level unit similar to Hopewell and Late Woodland, Woodland is usually

employed as a higher-level taxonomic unit, no matter how it is used in a specific instance: as a tradition, formal taxon, period, or stage. For example, Woodland subsumes all occupations labeled Adena, without consideration given to whether the defining traits of the taxon, tradition, stage, or period are displayed by each occupation. Thus Woodland is usually used to group units, however their membership is defined, rather than to group phenomena.

The Woodland tradition extends beyond the Ohio River valley to include units in most of the eastern United States. A similar unit has been devised to apply only to the Ohio River drainage. Named the Scioto Tradition (Prufer 1965:130), it likewise encompasses Adena, Hopewell, and Late Woodland as they are manifest in this area and is an implicitly-defined phase used to denote a cultural tradition.

The Scioto Tradition is defined primarily in relation to a second, partly contemporary, tradition called Hopewell. It differs from the Ohio Hopewell phase in geographic extent, being present also in Illinois; in addition, it is more restricted in cultural content, since it includes only the artifacts associated with the elaborate burial ceremonialism of the mounds and earthworks. While defining traits are given for the Hopewell tradition--use of exotic raw materials, general mode of disposal of the dead, certain kinds of decorated pottery (Prufer 1965:131-132)--the Scioto Tradition is defined mainly by the absence or scarcity of these (pp. 130-131). Temporal contiguity also plays a role in the recognition of a Scioto Tradition occupation, and there are traits that link the occupations of the tradition together. These include grit-tempered plain and cordmarked pottery, as evidenced by their predominance in the ceramics classified as belonging to the Scioto series (1965:19-23). The similarity of this pottery from occupation to occupation, cross-cutting the three phases of the tradition, has been noted (Prufer

1965:36-38; Prufer and McKenzie 1966:250).

Whether the tradition is called Woodland or Scioto and whether it is treated as a phase or a higher taxonomic unit, it serves the same purpose: to summarize time-space relationships. The main interest of the Woodland or Scioto tradition stems from its place distinct from and contrasting with Ft. Ancient in culture histories. In summaries of the prehistory of the eastern United States, Ft. Ancient is placed in a non-Woodland tradition, usually Mississippian (Morgan 1952; Caldwell 1958:66; Griffin 1967:190) or some subdivision of it such as Temple Mound II (Willey 1966:251). In considerations of only the Ohio valley region, Ft. Ancient is usually treated as a tradition in its own right, separate from the preceding Woodland (Prufer and Shane 1970).

Similarities have been noted many times between Ft. Ancient and Woodland (Griffin 1943:207; Morgan 1952; McKenzie 1967:79; Prufer and Shane 1970:238), yet the two traditions remain separate even in summaries of the entire eastern United States. The division between Woodland and Ft. Ancient probably originated as an historical accident. Certain differences between the two kinds of assemblages were noticed more often than their similarities, reflecting the concerns of the day. Among these differences were the lack of burial mounds at certain prominent and early-excavated Ft. Ancient components such as Madisonville (Hooton 1920) and the small size of burial mounds when they were present (Mills 1904, 1922); large Ft. Ancient habitation sites (Moorehead 1892; Mills 1904, 1906; Hooton 1920), implying agricultural subsistence and contrasted with the lack of similar Woodland habitation sites; and the presence and sometimes predominance of shell-tempered pottery in many Ft. Ancient assemblages, as opposed to grit-tempered pottery in Woodland components.

A Ft. Ancient "culture" was recognized and differentiated from Hopewell

in the first decade of this century (Mills 1906), with Adena discriminated somewhat later (Mills 1917; Shetrone 1920). The separation of Ft. Ancient from Adena and Hopewell was further codified when the Midwestern Taxonomic System was applied to the data (Deuel 1935:430; Cole and Deuel 1937; Griffin 1943:2), with Adena and Hopewell placed in the Woodland pattern and Ft. Ancient in the Mississippian pattern. The basis for these assignments is not always clear; however, one pair of trait lists for the two patterns demonstrates that the differences mentioned above are still important in differentiating Woodland and Mississippian. Woodland traits include, among others, use of burial mounds and predominance of grit-tempered pottery, while the Mississippian basic culture (pattern) is partly recognized by the presence of agruciltural subsistence, shell-tempered pottery, and burial in cemeteries rather than burial mounds (Deuel 1935). Separation of Ft. Ancient and Woodland on much the same bases has persisted to the present.

Because the defining criteria of these units have not been explicit, there has been a tendency for them to change through time. An important instance of this is the lessening emphasis on lack of burial mounds as a criterion for Ft. Ancient as some were found at sites otherwise conforming to Ft. Ancient. The presence of shell-tempered pottery also was de-emphasized after large habitation sites that had little or no shell-tempered pottery were identified with Ft. Ancient (Griffin 1943:60). The most consistent contrast between Ft. Ancient and Woodland has been the differences in the kind of occupations represented: large habitation sites for Ft. Ancient and burial sites for Woodland. Even this distinction has blurred to some extent with the discovery of Woodland habitation sites like McGraw (Prufer 1965) and Lichliter (Allman 1957). Constant shifting of the defining criteria has allowed the two units to be maintained as discontinuous despite the accumulation of similarities between them. Woodland and Ft. Ancient are currently

distinguished largely on the basis of pottery designs, although the older criteria are used when they seem applicable. For instance, an occupation displaying shell-tempered pottery is classified as Ft. Ancient (Starr 1960), while one that has grit tempering is identified by some other criteria, such as the presence or absence of the curvilinear guilloche design on the pottery (Allman 1957; Prufer and Shane 1970).

The differentiation of three Woodland phases in the Ohio drainage is also fortuitous, as the history of each unit demonstrates. Adena is not a whole-cultural phase, but a burial complex, since the only recognized Adena assemblages are from burial sites without associated habitation areas (Fig. 2). The first formal attempt to define Adena (Greenman 1932) takes the form of a trait list drawn from the Adena Mound assemblage, the type occupation for the culture. The first 33 traits on the list are from this assemblage, with the remaining 26 taken from other collections after they are identified as Adena on the basis of possessing some of the first 33 traits (pp. 417-418).

The original Adena trait list has been revised and lengthered twice (Webb and Snow 1945; Webb and Baby 1957). New occupations are identified as Adena if they possess traits from the immediately preceding list; new traits are added to the list if they are present in a mound already identified as Adena by reference to the existing trait list. The presence of only one trait from the list allows a mound to be attributed to Adena (Webb and Baby 1957:8) and the occurrence of a trait in only one mound allows it to be added to the trait list (Webb and Baby 1957:22-23, traits 222 and 224).

The subjectivity of this procedure is admitted: "It is recognized that all traits are not of equal importance, and some may have little or no diagnostic value. It is obvious that all traits are more or less subjective, depending for their generality on the manner of their expression, as well as on the basic facts of observation which are sought to be recorded" (Webb and

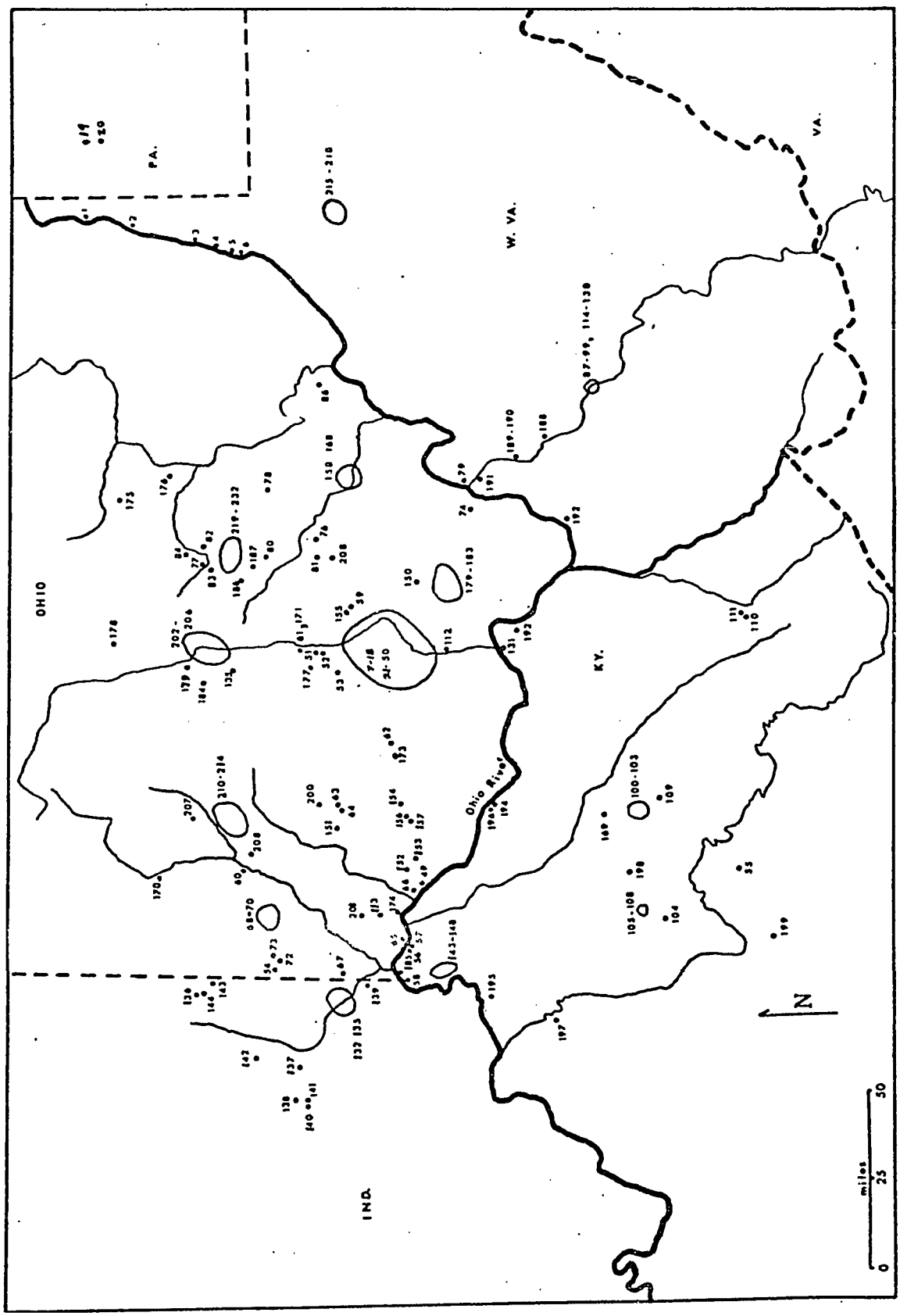


Fig. 2a. Identified Adena Occupations

1. Half Moon
2. Beech Bottom
3. Grave Creek
4. Cresap
5. Natrium
6. Welcome
7. Renick group
8. Greenman (1932), mound 1
9. Greenman 2
10. Greenman 3
11. Greenman 4
12. Greenman 5
13. Greenman 6
14. Greenman 7
15. Greenman 8
16. Greenman 9
17. Greenman 10
18. Greenman 11
19. McKees Rocks
20. Peter's Creek, Crall
21. Greenman 15
22. Greenman 16
23. Greenman 17
24. Greenman 18
25. Greenman 19
26. Webb and Snow (1945), mound 91
27. Webb and Snow 92
28. Webb and Snow 93
29. Webb and Snow 94
30. Webb and Snow 95
31. Webb and Snow 96
32. Webb and Snow 97
33. Webb and Snow 98
34. Webb and Snow 99
35. Webb and Snow 100
36. Webb and Snow 111
37. Webb and Snow 112
38. Webb and Snow 135
39. Webb and Snow 101
40. Webb and Snow 102
41. Webb and Snow 103
42. Webb and Snow 104
43. Webb and Snow 133
44. Webb and Snow 138
45. Webb and Snow 139
46. Webb and Snow 144
47. Webb and Snow 145
48. Webb and Baby (1957), mound 187
49. Webb and Baby 192 (Clough)
50. Webb and Baby 201
51. Westenhaver
52. Greenman 13
53. Greenman 14
54. Webb and Baby 200
55. Rowlette (1962), mound group
56. Crigler
57. Be 27
58. Hartman
59. Greenman 20
60. Webb and Snow 140
61. Webb and Snow 142
62. Greenman 23
63. Greenman 24
64. Greenman 25
65. Greenman 26
66. Greenman 27
67. Greenman 28
68. Greenman 29
69. Greenman 30
70. Greenman 31
71. Greenman 32
72. Greenman 33
73. Greenman 34
74. Webb and Baby 188
75. Webb and Baby 189
76. Webb and Baby 190
77. Greenman 38
78. Webb and Baby 214
79. Webb and Baby 217
80. Greenman 41
81. Greenman 42
82. Webb and Snow 124
83. Webb and Snow 125
84. Webb and Snow 126
85. Webb and Snow 127
86. Greenman 47
87. Greenman 57
88. Greenman 58
89. Greenman 59
90. Greenman 60
91. Greenman 61
92. Greenman 62
93. Greenman 63
94. Greenman 64
95. Greenman 65
96. Greenman 66
97. Greenman 67
98. Greenman 68
99. Greenman 69
100. Wright Mm 6
101. Wright Mm 7
102. Mt. Sterling
103. Gaitskill
104. Drake
105. Mt. Horeb
106. Tarlton
107. Grimes
108. Fisher
109. Ricketts
110. Jo 2

111. Jo 9
112. Webb and Snow 114
113. Webb and Snow 117
114. Webb and Snow 150
115. Webb and Snow 151
116. Webb and Snow 152
117. Webb and Snow 153
118. Webb and Snow 154
119. Webb and Snow 155
120. Webb and Snow 156
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124. Webb and Snow 160
125. Webb and Snow 161
126. Webb and Snow 162
127. Webb and Snow 163
128. Webb and Snow 164
129. Webb and Snow 165
130. Webb and Snow 166
131. Webb and Snow 173
132. Mound Camp
133. Glidewell
134. Whitehead
135. Stoops
136. Fudge
137. Greenman 50
138. Greenman 51
139. Nowlin
140. Kinsley
141. C. L. Lewis
142. White
143. Bertsch
144. Law
145. Robbins Be 3
146. Robbins Be 14
147. Riley
148. Landing
149. Webb and Snow 105
150. Webb and Snow 106
151. Webb and Snow 107
152. Webb and Snow 108
153. Webb and Snow 109
154. Webb and Snow 110
155. Webb and Snow 113
156. Webb and Snow 115
157. Webb and Snow 116
158. Daines
159. Webb and Snow 118
160. Webb and Snow 119
161. Webb and Snow 120
162. Webb and Snow 121
163. Webb and Snow 122
164. Webb and Snow 123
165. Coon
166. Greenman 44
167. Greenman 45
168. Greenman 46
169. Morgan Stone Bh 15
170. Webb and Snow 129
171. Florence
172. Webb and Snow 131
173. Webb and Snow 132
174. Sayler Park
175. Webb and Snow 134
176. Webb and Snow 136
177. Webb and Snow 137
178. James and Bagley
179. Webb and Baby 194
180. Greenman 21
181. Webb and Snow 141
182. Greenman 22
183. Webb and Snow 130
184. Hamilton
185. Gaines
186. Schwartz
187. Orr
188. Webb and Snow 167
189. Webb and Snow 168
190. Webb and Snow 169
191. Webb and Snow 170
192. Webb and Snow 171
193. Webb and Snow 172
194. Dover
195. Webb and Baby 175
196. Webb and Baby 176
197. Webb and Baby 177
198. Webb and Baby 178
199. Webb and Baby 179
200. Cowan Creek
201. Lester Schaffer
202. Toepfner
203. Dominion Land Co.
204. Davis
205. Greenman 35
206. Greenman 37
207. Webb and Baby 197
208. Webb and Baby 193
209. Webb and Baby 191
210. Webb and Baby 198
211. Webb and Baby 199
212. Webb and Baby 195
213. Webb and Baby 196
214. Webb and Baby 202
215. Webb and Baby 218
216. Webb and Baby 219
217. Webb and Baby 220
218. Webb and Baby 221
219. Webb and Baby 184
220. Webb and Baby 203

221. Webb and Baby 204
222. Webb and Baby 205
223. Webb and Baby 206
224. Webb and Baby 207
225. Webb and Baby 208
226. Webb and Baby 209
227. Webb and Baby 210
228. Webb and Baby 211
229. Webb and Baby 212
230. Webb and Baby 213
231. Greenman 39
232. Greenman 40

Fig. 2b. Key to Identified Adena Sites in the Ohio River Valley
Sources: Baby and Mays (1959), Berner (1971), Dragoo (1963), Greenman (1932), Kellar and Swartz (9171), Kercher (1949), McMichael (1971), Murphy (1971), Potter (1971), Rowlette (1962), Starr (1958), Webb and Baby (1957), Webb and Snow (1945), Webb and Snow (1959).

Snow 1945:12). Continually expanding trait-list definitions of Adena have been abandoned in favor of fixed criteria because the constant addition of traits made Adena less cohesive and hard to separate from other Early Woodland manifestations (Dragoo 1963).

Adena has been characterized a number of times by "typical" traits (Morgan 1952:86-88; Willey 1966:269-272), but the most important attempt to provide a fixed definition is that of Dragoo (1963). The Adena trait list (Webb and Baby 1957) is reduced in number, with many of the more general traits eliminated, and Adena is divided into two periods, Early-Middle and Late, each with its own characteristic set of traits. Thus Early-Middle Adena attributes include Cresap stemmed blades, Adena blades, unshaped grooved tablets, Fayette Thick pottery, blocked-end tube pipes, and simple pit graves, while Late Adena is partly characterized by Robbins blades, elaborate log tombs, shaped tablets, Adena Plain pottery, and copper bracelets (Dragoo 1963: 205-208).

This attempt to define Adena suffers from one of the faults of the earlier trait lists: all of the attributes are not found at every site that is classified as Adena. Which traits serve as necessary and/or sufficient conditions for the original identification of an Adena occupation is unclear. The trait lists do improve on the earlier ones in being limited to more specific and widely-occurring traits (Dragoo 1963:176), but the real need is for a list of defining criteria. Dragoo has instead provided a more precise description that does not include a way to identify the phenomena being described.

This need is recognized by participants in a symposium on Adena held at Ball State University (Swartz 1971). Several attempts are made to define Adena. One (McMichael 1971:89) lists the following "core traits:" sacred circles, double-post circular houses, conical mounds, mounds inside circles,

mounds over burnt houses, Robbins blades, expended-center and reel-shaped gorgets, tubular pipes, small granite or hematite celts, hematite hemispheres, galena, shaped tablets, carnivore jaw spatulas, and Adena Plain pottery. Each of these traits is apparently sufficient but not necessary for the identification of an Adena occupation, since the presence of one tubular pipe allows the Welcome Mound to be so classified (p. 90).

The discussion sections of the symposium show the participants' dissatisfaction with any attempt to define Adena (pp. 162-178) and their questioning of the need for a unit called Adena at all (p. 132). These reservations arise from the culture-historical nature of Adena and similar units, whose definitions cannot be justified because they are not designed to solve specific problems. Nonetheless, culture-historical units persist and are most useful for description if they are explicitly defined, so that new occupations can be identified with them. Such a generally agreed upon definition is not available for Adena.

A Hopewell culture (Fig. 3) has long been recognized (Mills 1906; Shetrone 1920), but a trait list or other device for identifying Hopewell assemblages has never been formalized. The following traits are listed as "characteristic of and as nearly as possible peculiar to, the Hopewell culture" (Shetrone 1920:156): geometric earthworks; irregularly-shaped mounds, often covering the remains of structures; cremation; highly developed sculptural art; use of copper and exotic materials like mica, obsidian, quartz crystal, and galena.

Like Adena, Hopewell is largely a burial complex; although a few habitation sites are now known (Prufer 1965; Shane 1970), the implicit definition of the phase continues to be based on traits found mainly in the mounds. This is illustrated by the fact that McGraw village, a habitation site, is identified as Hopewell by the presence of traits such as Hopewell

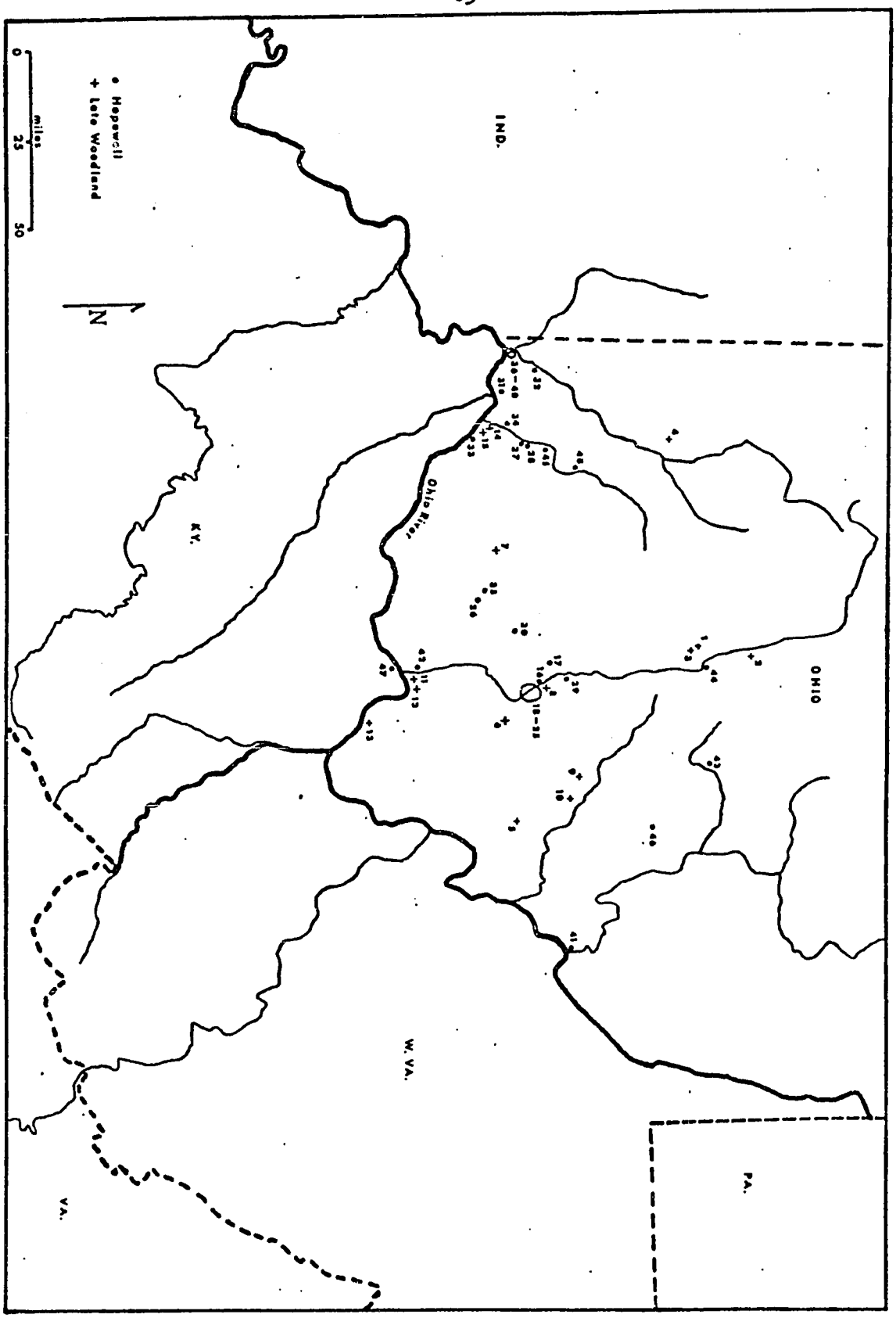
Late Woodland:

1. O. C. Voss
2. Cole
3. Zencor
4. Lichliter
5. Chesser Cave
6. Peters Cave
7. Enos Holmes
8. Voss-McKenzie
9. Written Rock Cave
10. Shaw Rock Shelter
11. Heinisch
12. Hilltop
13. Bonzo
14. Turpin
15. Ha 5

Hopewell:

16. McGraw
17. Hopewell
18. Rockhold
19. Harness
20. Ater
21. Ginther
22. Cedar Banks
23. Russell Brown 1, 2, and 3
24. Brown's Bottom 1
25. Esch
26. Fort Hill
27. Marriott 1
28. Turner
29. Mound City
30. Seip
31. Ha 778
32. Ha 237
33. Ha 104
34. Camden Works
35. West
36. Miami Fort
37. Ha 24
38. Ha 10
39. Ha 64
40. Headquarters
41. Marietta
42. Tremper
43. Newark
44. Wright
45. Foster's Crossing
46. Fort Glenford
47. Biggs
48. Fort Ancient

Fig. 3b. Identified Hopewell and Late Woodland Occupations
Sources: Allman (1957), Baby and Potter (1965), Baby, Potter, and Mays (1966), Griffin (1967), Hardesty (1965), Hastings (1969), Lee and Vickery (1972), Morgan (1952), Prufer (1964, 1965, 1967a, 1967b), Prufer and McKenzie (1966), Shane and Murphy (1967), Starr (1960).


0
25
50
miles
• Hopewell
+ Late Woodland
N
IND.
KY.
Ohio River
OHIO
W. VA.
VA.
PA.

blades and decorated ceramics that are known primarily from burial mounds and earthworks (Prufer 1965:130). Among decorations included in Prufer's (1965:26-32; 1968:5) Hopewellian series of ceramics are incising, brushing, rocker-stamping, and dentate rocker-stamping. Other traits often mentioned as characteristic of Hopewell include platform pipes (Morgan 1952), extensive use of exotic raw materials (Prufer 1965:131), and geometric earthworks and non-conical burial mounds (Willey 1966:274; Griffin 1967:183). Many of these duplicate those listed in Shetrone (1920) and demonstrate the persistence of the original implicit culture-historical units.

Late Woodland is a unit only recently applied in the Ohio valley region (Fig. 3). It has been used extensively, beginning in the 1940's, in other areas to denote the subdivision of the Woodland period that follows Hopewell or Middle Woodland (Maxwell 1952:186; Wray 1952:159). It is also used to refer to a cultural tradition, usually applied to non-Mississippian manifestations that persisted after A.D. 1000 (Bennett 1952:121; Griffin 1952a:Fig. 204; McNeish 1952:50), and as a formal unit recognized solely on the basis of certain traits, which are often believed but not demonstrated to have temporal significance (Quimby 1952:105). Summaries of Ohio valley culture history contemporary with those mentioned above for other areas do not employ Late Woodland at all, in any of its several meanings. For example, the term does not appear in papers by Morgan (1952) or Griffin (1952a) that discuss the area.

Instead, material that seemed to conform neither to Adena nor Hopewell nor Ft. Ancient is placed in the Intrusive Mound culture (Morgan 1952:93). Intrusive Mound artifacts, found with burials that were intruded into Hopewell mounds, include angular pentagonal points, large triangular and corner-notched points, antler points, ungrooved axes, harpoons, and shell beads (Morgan 1952:93). Intrusive Mound is mentioned in a few other culture

histories (Willey 1966:280) with the same list of traits. However, it is replaced in other recent accounts by Late Woodland (Prufer 1964:65; Griffin 1967:177), which is divided into several phases all defined mainly by pottery traits.

Late Woodland has been adopted in the Ohio drainage to accomodate assemblages that contain large percentages of cordmarked grit-tempered pottery, with none of the ceramics displaying either Hopewell or Ft. Ancient designs. The adoption of this usage can be demonstrated by examining several Late Woodland phases in different parts of the Ohio River area.

The Peters and Chesser phases are located in south-central Ohio (Fig. 3) and are based on two major assemblages from Peters Cave and Chesser Cave respectively. The pottery from Peters Cave shelter B is chert-tempered plain and cordmarked, with one grit-tempered net-impressed sherd. None of the pottery is decorated (Prufer and McKenzie 1966). The occupation could not be identified with either Hopewell or Ft. Ancient, since the ceramics of both show different and distinctive kinds of decoration that serve to identify them. Consequently a new phase, the Peters phase, is created and identified as part of Late Woodland (Prufer and McKenzie 1966). Similarly, the Chesser phase is defined on the basis of limestone- and grit-tempered plain and cordmarked pottery and Chesser Notched points (Prufer 1967:51); it is also assigned to Late Woodland (p. 51).

Another example is the Newtown phase of southwest Ohio. Ft. Ancient and Hopewell were already well-established concepts with many assemblages in the area identified with each when the Newtown phase was recognized (Oehler 1950). Ceramic assemblages that are not identifiable as either Hopewell or Ft. Ancient, since they lack the characteristic designs of these two wares, are assigned to Newtown (Oehler 1950; Starr 1960). Newtown has become a separate phase despite some continuity from Hopewell to Newtown in non-ceramic

artifacts like grooved axes, gorgets, and stemmed and notched projectile points (Griffin 1952b). Since Newtown material is known to precede Ft. Ancient stratigraphically at the Turpin site (Oehler 1950), Late Woodland is used explicitly to denote the period between Hopewell and Ft. Ancient in addition to serving as a formal unit (Griffin 1952b).

The third example of application of Late Woodland to material from the Ohio drainage is Lichliter village, in western Ohio near Dayton (Allman 1957). All the pottery from the occupation is grit-tempered and either plain or cordmarked, with no decoration (1957:61). The assemblage is identified as Late Woodland solely on the basis of the ceramics, with no knowledge of its chronological position (p. 61), although it has since been dated at A.D. 350±250 (Radiocarbon 1).

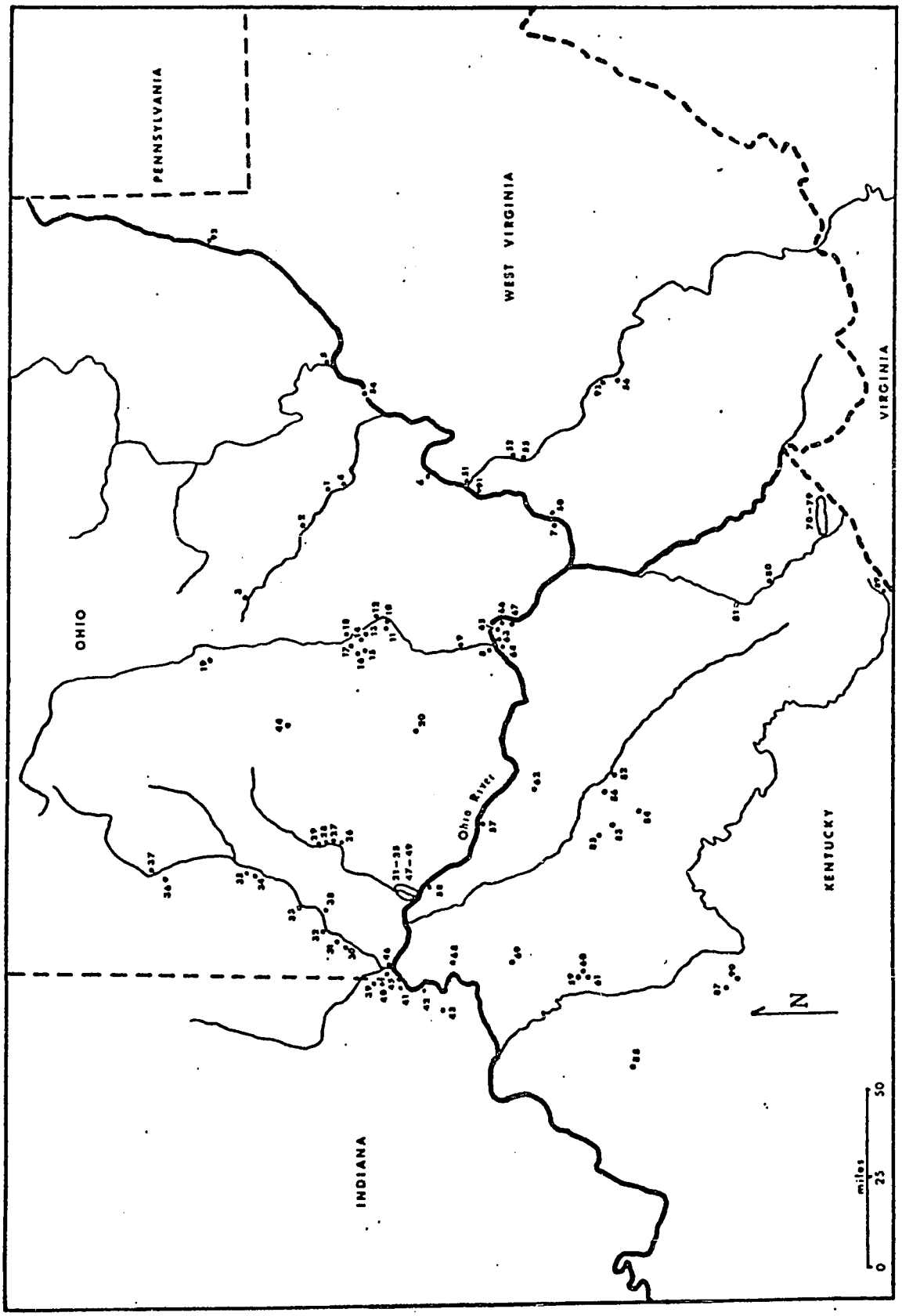
Finally, the Cole Complex of south-central Ohio has been formulated as a Late Woodland phase (Baby and Potter 1965). It includes Lichliter village and several other components and is defined by grit-tempered cordmarked and plain pottery, called Cole Cordmarked and Cole Plain. The cordmarked ceramics are "identical in form, surface, and lip treatment to Newtown Cordmarked" (Baby and Potter 1965:4). Although some sherds from one of the components, the O. C. Voss site, have the typical Ft. Ancient curvilinear guilloche design, this is considered unimportant because such sherds are uncommon and grit-tempered (p. 4). There are also some shell-tempered sherds in the Voss assemblage. These two deviations from the Late Woodland definition lead Prufer and Shane (1970:234-235) to reclassify the Voss site as early Ft. Ancient, thus reinforcing the contention that in the Ohio valley Late Woodland is equivalent to grit-tempered plain and cordmarked pottery that displays neither Hopewell nor Ft. Ancient designs. These assemblages are probably not identified with Adena because some or all of the pottery is cordmarked and thus not classifiable as Adena Plain, but is not thick enough to fit into

the cordmarked Adena type, Fayette Thick. Also, since Adena is a burial complex while these occupations represent habitation areas, they do not contain other traits that form the basis for identifying Adena.

The first important attempt to define Ft. Ancient (Fig. 4) employs the Midwestern Taxonomic System (Griffin 1943). The Ft. Ancient aspect is characterized by its pottery, which "forms such a very important part of this study and appears to be of such particular value in indicating the various cultural divisions herein established" (Griffin 1943:3). The important pottery traits shared by all four foci of the aspect are curvilinear and rectilinear guilloche and line-filled triangle designs, strap handles, and grit and shell tempering (p. 206). Non-ceramic artifacts play a less important part in defining the aspect, as is indicated by division of the pottery into many separate traits while other kinds of artifacts represent only one trait each (Appendix D).

Later descriptions of Ft. Ancient follow Griffin (1943) and Shetrone (1920) in placing emphasis on villages, shell and grit-tempered pottery and the curvilinear guilloche design, triangular projectile points, and agricultural subsistence (Morgan 1952; Mayer-Oakes 1955b:164-174; Dunnell 1961:3; Willey 1966:310). There has been no attempt to either re-define Ft. Ancient or make the current definition explicit. The most recent studies (McKenzie 1967; Prufer and Shane 1970) continue to recognize Ft. Ancient either by using some version of the above covert definition or by following prior identifications of occupations.

The lack of Hopewell and Late Woodland occupations south of the Ohio River (Fig. 3) is of interest. This may be the result either of real differences in the data south of the river or of differences in the systems of classification used in the two areas. The latter explanation seems strengthened by the occurrence of supposedly earlier Adena (Fig. 2) and


PENNSYLVANIA
WEST VIRGINIA
VIRGINIA
OHIO
KENTUCKY
INDIANA
Ohio River
N
miles
0
25
50

1. Gabriel
2. Graham
3. Baldwin (B)
4. McCune
5. Marietta (M)
6. Middleport (F)
7. Procterville (F)
8. Feurt (F)
9. Shisler (F)
10. Higby (B)
11. Morrison (M)
12. Caldwell's Bluff (F)
13. McGraw's Garden (B)
14. Blain (B)
15. Baum (B)
16. Seip (M)
17. Cramer (B and F)
18. Gartner (B)
19. Voss
20. Serpent Mound-Brush Creek (B)
21. Sand Ridge (M)
22. Hahn's Field (M)
23. Turpin (M)
24. Haffner-Kuntz (M)
25. Madisonville (M)
26. Mill Grove (A)
27. Fort Ancient (A)
28. Anderson (A)
29. Taylor (A)
30. Hine (M)
31. Steel Plant (M)
32. Campbell Island (M)
33. Kemp (A)
34. Incinerator (A)
35. Steele Dam (A)
36. Pleasant Hill (M)
37. Erp (A)
38. Monteville
39. site 18, Dearborn Co. (M)
40. site 19, Dearborn Co. (M)
41. site 20, Dearborn Co. (M)
42. site 18, Ohio Co. (M)
43. site 14, Ohio Co. (M)
44. Stokes (M)
45. State Line
46. Ha 60
47. Ha 16
48. Ha 34
49. Ha 8
50. Clover (C)
51. Orchard (C)
52. Buffalo (C)
53. Ms 71 (C)
54. Blennerhassett Island (C)
55. Clifton (C)
56. Brownstown (C)
57. Bk 2
58. Bintz (M)
59. Sc 6 (Y)
60. Sc 2 (Y)
61. Sc 7 (Y)
62. Fox Farm (M)
63. Fullerton Field (F)
64. Gp 1 (M)
65. Gp 20
66. Hardin (C)
67. Gp 30
68. Cleek-McCabe (Y)
69. Eagle Creek, On 28
70. Pi 10 (W)
71. Slone (W)
72. Pi 38 (W)
73. Pi 30 (W)
74. Pi 15 (W)
75. Pi 26 (W)
76. Pi 23 (W)
77. Pi 7 (W)
78. Pi 13 (W)
79. Pi 8 (W)
80. Pi 00 (W)
81. Jo 14 (W)
82. Bh 17
83. Larkin (M or Y)
84. Buckner (M)
85. Bb 1 (M)
86. Clay (M)
87. Mer 1 (Y)
88. Sh 5
89. Lr 2
90. Mer 15
91. Rolf Lee
92. Round Bottom
93. Mount Carbon

Fig. 4b. Key to Identified Ft. Ancient Occupations, with Phase Designation as Cited in Source
(B) Baum phase; (F) Feurt phase; (A) Anderson phase; (M) Madisonville phase; (C) Clover phase; (W) Woodside phase; (Y) Yates phase.
Sources: Britt (1966), Dunnell (1961, 1972), Goodell (1971), Griffin (1943), MacCord (1953), Mayer-Oakes (1955b), McMichael (1962), Prufer and Shane (1970), Purrington (1967), Purrington and Smith (1966), Solecki (1949, 1950), Starr (1960), Youse (1965).

later Ft. Ancient (Fig. 4) occupations in Ohio, Kentucky, and West Virginia. When the data are examined more closely, however, it appears that at least the absence of Hopewell sites south of the Ohio does not result completely from classificatory differences. Some traits found in Kentucky Adena mounds, such as increased use of Flint Ridge flint, copper, and mica, and zoomorphic and geometric designs on tablets (Dragoo 1963:269-278) are held in common with Hopewell. Despite this, these mounds are not placed in Ohio Hopewell but in Adena. This decision is justified by emphasizing differences rather than similarities in the data from Hopewell and these Kentucky sites: the lack of Hopewell pottery decorations, effigy platform pipes, geometric earthworks, and non-conical mounds in Kentucky and the presence of Adena traits like conical mounds, tubular pipes, and Adena Plain pottery. Since this Late Adena (Dragoo 1963:207) complex appears not only in Kentucky but north of the Ohio River as well and does have some basis in the data, it seems useful to retain the distinction between it and Hopewell, thus excluding Hopewell from the area south of the southern margin of the Ohio River. That this absence is due to lack of research in Kentucky can be ruled out on the grounds that Hopewell traits were familiar to Kentucky archaeologists and that much of central and eastern Kentucky has been surveyed (Webb and Funkhauser 1932; Hanson 1964; Purrington and Smith 1966; Fryman 1967; Dunnell 1972) without any Hopewell sites being located.

Late Woodland presents a different problem. Its absence in central and eastern Kentucky is due to a great extent to the use of different systems of classification there. Collections from certain rock shelters and open sites without mounds in the mountainous parts of eastern Kentucky are comparable to assemblages from Chesser and Peters Caves, Ohio. However, they are identified as Archaic rather than Late Woodland (Purrington 1967; Dunnell 1972) due to the lack of burial mounds and evidence that the Archaic

seasonal round hunting and gathering settlement-subsistence pattern is present. Some of the rock shelter occupations have been classified as Adena because they exhibit limestone-tempered plain and thick cordmarked pottery, as well as some other Adena traits (Webb and Snow 1945). It has since been argued (Purrington 1967:80-85) that these occupations are the product of a seasonal round people on the Archaic level. The formal similarities with Adena are held to be the result of diffusion (1967:84).

The burial mound and small habitation sites with houses and grit-tempered pottery that in Ohio are placed in Late Woodland (Allman 1957; Baby, Potter, and Mays 1966) do not have known counterparts in central or eastern Kentucky. No burial mounds have been associated with units other than Adena and Ft. Ancient nor have any hamlets or small villages similar to Lichliter in Ohio been excavated. Some occupations represented by surface collections may be small villages that are placed in Kentucky Ft. Ancient because they display shell-tempered pottery. These assemblages have little or no decorated pottery and thus no rectilinear or curvilinear guilloches (Dunnell 1961; Purrington 1967:90). While in Ohio the guilloche design precedes the use of significant amounts of shell tempering, as at O. C. Voss (Baby and Potter 1965) and Blain Village (Prufer and Shane 1970), in Kentucky shell tempering seems to be well-established before the guilloche design is used, for example at sites such as those of the Yates phase (Dunnell 1961) and Lr 2 (Purrington 1967:89). Thus data differences, specifically the earlier appearance of shell tempering in relation to the guilloche, may have affected the identification of Late Woodland in Kentucky.

The lack of Hopewell and Late Woodland in Kentucky can be attributed partly to the different archaeological personnel involved, especially the strong influence of William S. Webb in Kentucky from 1927 to 1957 (Schwartz 1967). His reluctance to formulate any non-Adena Woodland unit probably

contributed to the subsequent tendency to classify assemblages comparable to Late Woodland occupations in Ohio into Adena, Ft. Ancient, or Archaic rather than Late Woodland. However, differences do exist in the data from the two states that account for some of the discrepancy in units employed in each.

The lack of Hopewell and Late Woodland occupations in West Virginia (Fig. 3) stems from much the same circumstances as in Kentucky. Two Middle Woodland phases replace Hopewell in the West Virginia sequence, with the difference traceable to significant differences in the data. In the panhandle the Watson phase has been established, while along the Kanawha River the Armstrong phase is categorized as Middle Woodland.

Watson (Mayer-Oakes 1955b; Dragoo 1956) is characterized by limestone-tempered cordmarked and plain ceramics and does not participate in the elaborate mortuary pottery tradition of Hopewell. Stone mounds were built (Carpenter 1956; Dragoo 1956), but there are no geometric earthworks. Artifacts of exotic material are much rarer than in Hopewell, consisting mainly of objects made from Flint Ridge flint. Large midden areas are often directly associated with the mounds (Dragoo 1956), in contrast to Hopewell, where small living areas are found in the general vicinity of earthworks but not directly associated (Prufer 1965).

The Armstrong phase, in central West Virginia along the Kanawha River, has been described as a mixture of Adena and Hopewell traits (McMichael and Mairs 1965) and elsewhere McMichael (1961:34) speculates that Adena may have persisted in the Kanawha valley while the Hopewell phase became dominant farther west in Ohio. More recently (McMichael 1971:94) it has been suggested that the mounds along the Kanawha (Fig. 2) that were once placed in Adena (Greenman 1932; Webb and Snow 1945) be put instead in a local tradition that presumably includes the Armstrong phase. This causes the

range of Adena to contract to conform more closely to that of Hopewell. The difficulty some have found fitting Jo 2 at least, and perhaps both C & O Mounds, into an Adena sequence (e.g., Purrington 1972) is solved if they are placed in a local tradition along with the mounds along the Kanawha.

A Late Woodland grit-tempered pottery series is mentioned for central West Virginia under the name Buck Garden (McMichael 1962) but a phase has not yet been developed. In the West Virginia panhandle Late Woodland is synonymous with the Monongahela tradition (Mayer-Oakes 1955b), which is generally contemporary with Ft. Ancient. Late Woodland is used in this case to signify a late prehistoric group not classed as part of the Mississippian tradition, rather than as a purely formal unit or to designate the period between Middle Woodland and a later phase.

When Ft. Ancient and Hopewell were the only cultures recognized in the central Ohio valley, Ft. Ancient was believed to precede Hopewell, since it appeared to be less highly developed (Mills 1906). The only other evidence offered for this order is the intrusion of a Hopewell burial into the supposedly Ft. Ancient Robert Harness Mound (Mills 1907). This has been demonstrated to be incorrect, since the mound was probably either Hopewell or Adena, rather than Ft. Ancient, in affiliation (Griffin 1943:212-213).

After Adena and Ft. Ancient were differentiated, the first chronological relationship to be postulated among the three units was that between Adena and Hopewell. The arguments that Adena preceded Hopewell were at first based on developmental rather than stratigraphic evidence (Mills 1917; Shetrone 1920; Greenman 1932:487-490). The most thorough example of this approach is that of Webb and Snow (1945). However, although it was thus shown that Adena and Hopewell are linked developmentally, the assumed order of precedence, from Adena to Hopewell, could not be demonstrated until

stratigraphic evidence or absolute dates established it. By 1957, it was shown with the aid of radiocarbon dates that Adena began earlier than Hopewell, although there appeared to be considerable overlap (Webb and Baby 1957:111-112). This overlap (Fig. 5) has since been confirmed by an internal arrangement of Adena into periods (Dragoo 1963). The temporal overlap helps explain the absence of Hopewell sites south of the Ohio River, since outside the Scioto and Miami River valleys where Hopewell flourished Adena persisted in a Hopewell-influenced form (Fig. 5).

The temporal placement of Ft. Ancient in relation to Adena and Hopewell was uncertain until confirmed by radiocarbon dating, although some stratigraphic evidence existed to show that Ft. Ancient followed Hopewell (Griffin 1943:214-215). The presence of European contact material in some Ft. Ancient sites, while none was found in Hopewell assemblages, provided evidence confirming this interpretation (Griffin 1943:128-129). Radiocarbon dating (Figs. 5-6) has verified this sequence.

Once established for the Ohio valley region, Late Woodland was at first placed between Hopewell and Ft. Ancient in time, mainly on typological (Allman 1957) and stratigraphic grounds. The stratigraphic evidence consisted of the presence of a Late Woodland Newtown phase component underlying the Ft. Ancient Turpin component (Oehler 1950) and the intrusion of Intrusive Mound burials into Hopewell mounds (Morgan 1952). The validity of this placement has been questioned (Prufer 1964:65) with the argument that much of Late Woodland could belong to any pre-Ft. Ancient period, not just that following Hopewell. Radiocarbon dates only partially confirm the Hopewell-Late Woodland-Ft. Ancient sequence. For example, Lichliter is dated at A.D. 350±250 (Radiocarbon 1), while Chesser Cave is placed at A.D. 1070±140 (Prufer 1967a:48). Thus Late Woodland appears to be contemporary with parts of Hopewell, Ft. Ancient, and possibly Adena (Figs. 5-6).

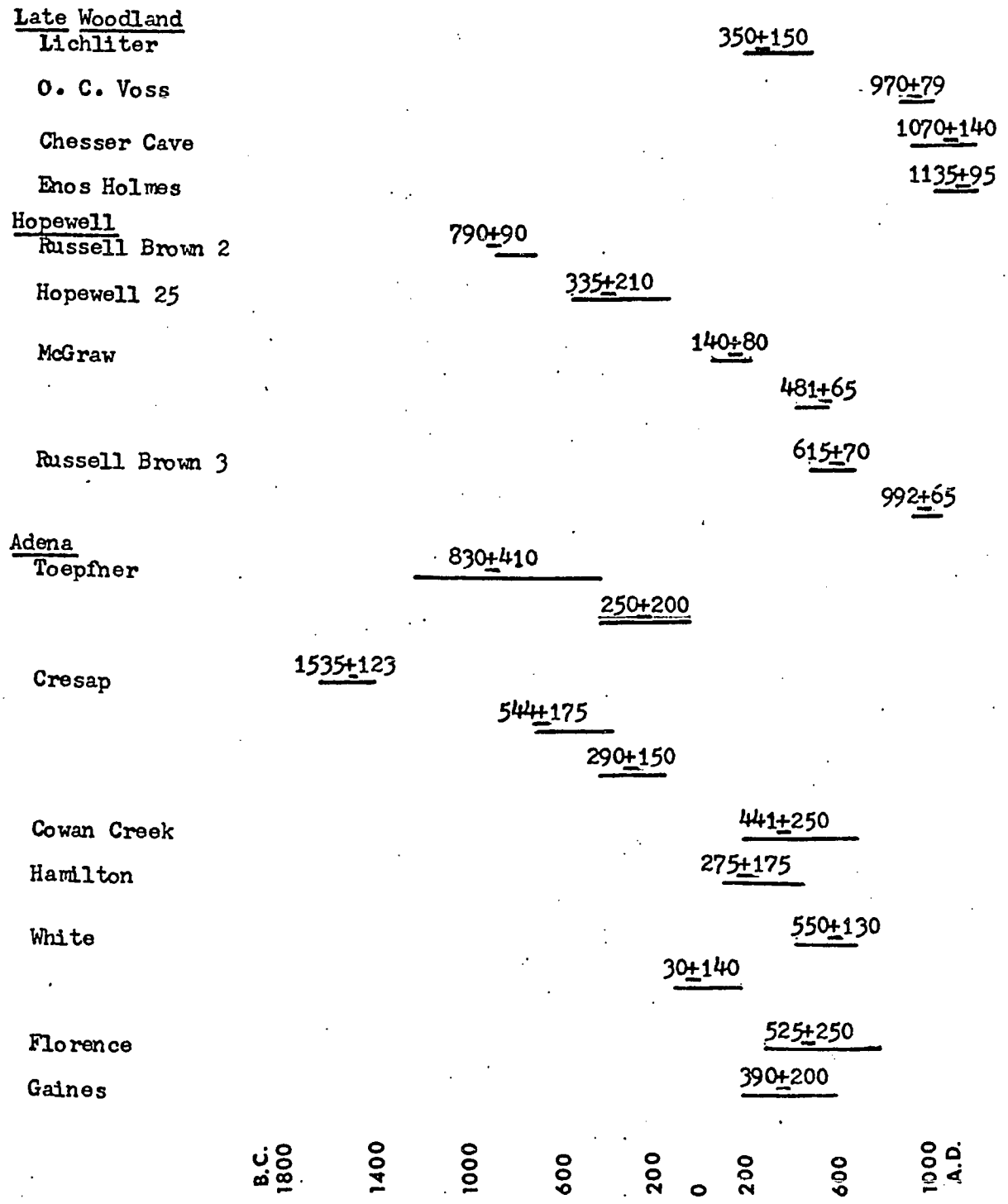



Fig. 5. Adena, Hopewell, and Late Woodland Radiocarbon Dates
Extreme dates only for Adena and Hopewell.

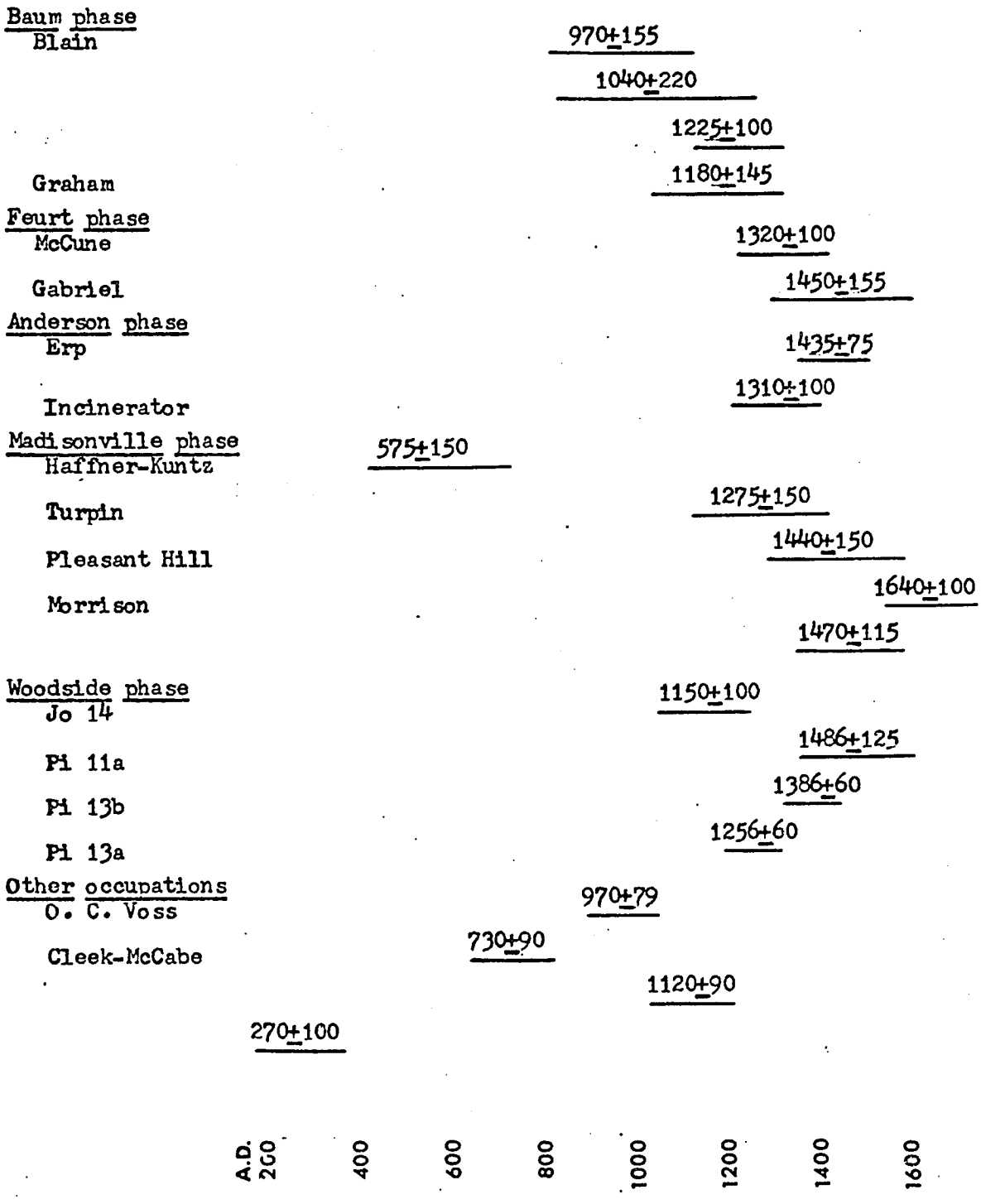



Fig. 6. Radiocarbon Dates for Ft. Ancient Occupations

# GENETIC CONNECTIONS

## A History of the Use of Genetic Concepts in Anthropology and Archaeology

Archaeological data from northern Kentucky is examined here with a view to determining which of several hypotheses best explain developmental relationships within it. The hypotheses are framed in terms of three important concepts: development, migration, and acculturation. The meaning of these concepts in the context of this study must be made explicit and the specific usage justified. Allied terms such as innovation, independent invention, diffusion, stimulus diffusion, and cultural evolution also need to be considered, since they are often used interchangeably with development, migration, and acculturation in some of their meanings, either in anthropology, archaeology, or this study.

Anthropology has been divided into a number of general schools by historians of the discipline (Lowie 1937; Hays 1960; Riley and Taylor 1967) according to differences in the way data is conceptualized. Since terms such as migration, diffusion, and cultural evolution are concerned with different kinds of genetic relationships within bodies of cultural data, they are used differently by each anthropological school, and their various meanings must be examined in that context.

One group of anthropologists has been characterized as "historical" because their main concern is the outlining of historical relationships between cultural groups (Lowie 1937; Riley and Taylor 1967). They attempt to explain similarities between groups chiefly in terms of two historical processes, diffusion and the survival of archaisms (Swadesh 1951; Service 1971:140). Diffusion is "the spread of culture traits or complexes from one group to another" (Swadesh 1951:3) and archaic residue are traits persisting from the common ancestry of two cultures (p. 1). The possibility is recognized that some similarities may not be the result of historic relatedness;

if genetic connections can't be demonstrated or seem improbable, the similarity is attributed to independent invention (Lowie 1937:158; Steward 1955:181; Service 1971:140).

The emphasis historical anthropologists place on genetic relationships leads to the tracing of the distribution of traits and trait complexes over cultural groups. Once similarities in traits are noticed, they must be assigned to historical connection or independent invention. A number of generalizations concerning the probability that similarity indicates relatedness have been formulated. For example, it has been noted that the likelihood of relatedness decreases with the distance between the groups in question and the difficulty of traversing it and increases with the number and complexity of shared traits (Lowie 1937:148-149, 158). Continuity of distribution of the trait is also viewed as important in supporting genetic connection (Lowie 1937:148-149).

Acculturation is not recognized as a special kind of trait movement by historical anthropologists. Rather, diffusion is made to encompass all movement of traits resulting from culture contact, including migration and acculturation. They are viewed as mere vehicles for that movement and therefore not crucial to understanding the resulting configurations. However, diffusion is sometimes divided into different types according to the kind of traits transmitted. Kroeber distinguishes stimulus diffusion from other kinds as the movement of the idea of a function without its attached stylistic interpretation, with the result that, "while systems or complexes in two or more cultures may correspond in functional effect, the specific items of cultural content, upon which historians ordinarily rely in proving connection, are likely to be few or even wholly absent" (1952:344).

Since determination of historical connection involves assessing the probability that a number of similar traits arose from such connection rather

than independently, the final assessment cannot be made in absolute terms. There is great variation among members of the historical school as to whether certain kinds of similarity are attributable to diffusion. For example, while Boas believes that diffusion is demonstrated only when the similarities involved are complex and continuously distributed in space (Lowie 1937:148-149), other diffusionists feel that nearly every similarity of traits can be attributed to diffusion (Lowie 1937:158). Because the criteria for recognizing diffusion vary so greatly, so do those for its obverse, independent invention: "There are only criteria of connection, none of independent development; hence, at best, parallelism might be inferred at the very close of investigation, from the failure to prove transmission" (Lowie 1937:158). There are no good criteria for separating similarities due to archaic survivals from those due to diffusion or independent invention, so the survival of archaisms is usually not distinguished from the other processes unless it is a convenient explanation for particular similarities, often linguistic (e.g., Swadesh 1951).

Historical anthropologists have plainly been interested more in explaining similarities in culture than in examining processes of culture change. They have largely ignored changes occurring in one area through time, concentrating instead on trait similarities that recur synchronously or nearly so in two or more cultures. For example, the diffusion of myths (Boas 1916) and traits of material culture like dogs, tobacco, and the bow and arrow (Kroeber 1939) have been reconstructed from the spatial distribution of these elements in ethnographic times. The historical interest has not been in how these traits developed, but rather in how observed cultural similarities can be explained.

Since similarities and differences are a function of the classificatory system used, they are not proper subjects for explanation (Meehan 1968:41;

Dunnell 1971:91). Historical anthropologists use implicit established units like tribe, culture, tobacco, and the Sun Dance to describe the phenomena they wish to study. The attempt is then made to explain the distribution of these descriptive units using historical processes. Since there is no problem beyond the "explanation" of arbitrary units, the meaning of the result is not knowable. Diffusion and independent invention become names for patterns of trait distribution rather than explanatory processes.

The tendency of historical anthropologists to concentrate on traits and their distributions has been criticized by the functionalist school. They prefer to view cultures as analogous to organisms or systems, with parts or subsystems whose function in maintaining the larger society is the major focus of interest. The emphasis on the internal workings of a society has led functionalists to depend on synchronic studies of culture, since historical reconstructions rarely provide as much detail as field work undertaken specifically with functional studies in mind. In addition, historical perspective is not required because interest usually does not center on directional change, but on maintenance of the status quo.

Since functionalists view cultures as systems, they do not see utility in tracing the history of individual traits or even trait complexes. For instance, Malinowski (1961) believes that the units of transformation in culture change are organized systems rather than traits, with the product not a mechanical mixture of pre-existing traits, but a new system. Similar views are expressed by Herskovits (1938) and other functionalists (Lowie 1937). However, some functionalists have retained an interest in culture change. Instead of employing historical processes like diffusion or migration to explain change that is not internally generated in a society, they concentrate on acculturation.

Acculturation is used by functionalists as the counterpart in the

ethnographic present of diffusion in the past (Hays 1960:332; Herskovits 1967). Whereas diffusion must be inferred by tracing similarities in traits and complexes from culture to culture, acculturation is studied by observing changes that result from known culture-contact situations (Herskovits 1938: 15; Malinowski 1961:28). Acculturation is usually defined by functionalists as the process that occurs during culture contact, subsuming all the changes that can be attributed to that contact. This broad definition is restricted by individual anthropologists in various ways (e.g., Redfield, Linton, and Herskovits 1936; Ezell 1961).

One important definition of acculturation restricts it to cases of continuous first-hand contact of cultures (Redfield, Linton, and Herskovits 1936:149; Herskovits 1938:10), while others have alluded to the degree of force employed in instigating change as crucial to defining the concept (Ezell 1961:4-5). These definitions imply that acculturation is recognizeable only through direct observation or historic records of culture contact, since continuity of contact and the use of force are not recoverable from study of traits alone.

Other functionalists allow for the identification of acculturation from traits, but believe it cannot be studied when trait distributions are the only evidence. For example, both Ralph Linton (1940:482) and Bronislaw Malinowski (1961:19), using "culture change" as a synonym for acculturation, treat it as change in organized systems, not merely the adoption of new traits. One formulation of this approach (Social Science Research Council 1953) lists some variables clearly derived from an organic or systemic view of culture that affect the course of acculturation: 1. boundary-maintaining mechanisms 2. relative rigidity or flexibility of the internal structure of a cultural system and 3. self-correcting mechanisms.

Such systemic change cannot be studied using data that purports to

reconstruct the past because reconstructions are not comparable to the ethnographic present in that they don't allow examination of the interactions of all relevant elements of the changing cultural systems (Malinowski 1961: 28). The functionalists' stress on changes in meaning as well as form (Linton 1940:482) disallows study of acculturation in past situations where meaning was not recorded and cannot be observed.

Functionalists do not deny the necessity of historical perspective in studying acculturation. Such perspective can only be provided, however, when some past period in a group's history is either well-known ethnographically, as is the case with many Indian cultures of the Southwest United States (e.g., Ezell 1961), or can be studied through "the reality of what still survives as a vital residue of past history" (Malinowski 1961:28). In either case, time depth against which change can be measured is provided by isolating periods that are well-enough known to be directly comparable to the ethnographic present.

The interest of functionalists in culture change is mainly descriptive, with changes that occur during observed or recorded culture contact situations described under the heading "acculturation." Attempts are sometimes made to isolate varying rates of change for different cultural items. For instance, tangible objects are said to be more readily transferred from group to group than patterns of behavior, while elements are easier to transfer than trait complexes (Linton 1940:485). Such descriptive characterizations of patterns of change are arrived at either by comparing several instances of acculturation (Linton 1940) or by comparing a group with itself in several different periods and recording the observed differences (Ezell 1961).

The units used in acculturation studies, like those employed by historical anthropologists, are implicit and unexamined. There is no attempt to formalize them or to clarify how acculturation is recognized or its effects

separated from those deriving from other processes of change that may be working concomitantly with acculturation. Instead, emphasis is placed on listing observed changes in the descriptive units; all such changes are then attributed to "acculturation."

A third group of anthropologists is interested in studying cultural change from yet a different perspective, that of progressive development or evolution. These neo-evolutionists view diffusion, acculturation, migration and similar processes as secondary in importance to evolution, mainly of interest as they affect the course it takes in particular instances.

Evolution is sometimes defined to encompass only linear or progressive change (Service 1971:12) and sometimes to include all kinds of adaptive change (Sahlins and Service 1960:23). Both cultural similarities and culture change are thus of interest to evolutionists. Julian Steward (1955) best represents the first group in a statement of the two important assumptions made by cultural evolutionists: first, that genuine parallels of form and function develop in historically independent sequences or cultural traditions, and secondly that these parallels are explainable by the independent operation of identical causality. The aim is to explain observed similarities in culture, an aim shared by historical anthropologists.

There are differences between the historical anthropologists and the Steward school of evolutionists, lying partly in the kinds of similarities each focuses on and partly in the kinds of explanations offered for them. Steward (1955) is concerned with parallels in "core" as opposed to "secondary" cultural traits. Core traits are those that directly mediate between a culture and its environment, while secondary traits encompass those that may vary without affecting the culture's environmental relationships. Thus, core traits are generally functional while secondary traits are dominantly stylistic. Historical anthropologists are most interested in the stylistic

aspects of culture, for it is by these that diffusion is recognized and traced (Kroeber 1952:90-91, 344).

Not only are historical anthropologists and certain evolutionists interested in different kinds of parallels in culture, they also use different kinds of concepts to explain them. Diffusion is a historical process which accounts for specified data only in the sense that it gives a name to observed patterns of trait distribution. It is not derived from an explicit theory or set of general principles and has no explanatory power in the formal sense of prediction and/or control (Meehan 1968). Evolution purports to be a theory or set of general principles that does have explanatory power. Thus Steward (1955:90) says that once regularities are established by cross-cultural comparison, the result should be "causal formulae which state that certain synchronic or diachronic conditions or factors presuppose certain other conditions or factors," and therefore presumably are explained by them.

The main difficulty with this approach to cultural evolution is the same problem faced by historical anthropologists: cultural similarities and differences are treated as inherent rather than problem-derived and explanations of them are attempted on that basis. Many cultural evolutionists are concerned with examining questions of change, rather than studying regularities. In such cases, cultural evolution is analagous to biological evolution in that it involves adaptation, specialization, and progressive change (Sahlins and Service 1960; Service 1971).

These anthropologists propose rules to govern cultural evolution, such as the Law of Cultural Dominance: "that cultural system which more effectively exploits the energy resources of a given environment will tend to spread in that environment at the expense of less effective systems" (Sahlins and Service 1960:75). With an approach that includes the formulation of

such laws and a general theoretical framework based on evolution, this group has the most potential of the schools of anthropology mentioned here for transcending description to produce explanations.

Regardless of their stated aims, the neo-evolutionists as a group regard diffusion, migration, and acculturation as of secondary importance to the evolutionary process. One of the important differences between biological and cultural evolution is the ability of cultures to contact and influence one another even though they have not previously been related. Diffusion and similar processes describe the various kinds of borrowing that can occur and on which evolution may work (Sahlins and Service 1960:24). They are not explanations themselves, but rather are events to be explained by evolutionary theory (Steward 1955:82).

A final view relevant to these issues but not attributable to a particular anthropological school is that developed by H. G. Barnett (1953). It incorporates a general theory of innovation that attempts to account for the appearance of new cultural traits in a given milieu by reference to psychological factors in the recipient population. While historical anthropologists are primarily interested in style and evolutionists in function, this general theory of innovation does not differentiate traits on that basis: all innovations of whatever kind are treated as manifestations of the same process. Since functional and stylistic categories are arbitrary, just as are all other kinds of classes, and determined by the problem being addressed rather than being existent in the data, this dichotomy does not have to be included in an explanation of innovation. Likewise, adoption, diffusion, and acculturation are merely varied forms of innovation (Barnett 1953:291). The focus is on how innovations are adopted, whatever their source.

An innovation is defined as "any thought, behavior, or thing that is new

because it is qualitatively different from existing forms" (p. 7). The process occurs by the linkage of two or more existing ideas to form a new configuration (p. 181). Since the cultural elements that embody these ideas are antecedent to the innovation, their history is traceable by plotting their time-space distributions. The various patterns that conjoining elements can take in forming new configurations may be named acculturation, diffusion, migration, development, or evolution. A trait or element can never be adopted into a new context without change: all diffusion involves some modification of the original and can only be viewed as direct transfer of traits if such modifications are treated as insignificant (Barnett 1953: 330-331). All varieties of trait acceptance can be subsumed by innovation theory because it conceives of change as the formation of new configurations of existing elements whose sources, whether inside or outside the culture in question, can be traced.

There has been little discussion in the anthropological literature of what different kinds of change mean, how they are recognized and their sources identified. Barnett's theory of innovation is an exception, since it provides a framework for explaining the acceptance of new elements that can be used to solve various kinds of problems. The ideas that combine and recombine to form innovations, and the elements that embody them, are units constructed by the anthropologists to suit a particular problem (Barnett 1953:183-187). Although the theory focuses on presenting psychological processes to explain the acceptance or rejection of new configurations, this is of less interest than the mechanics of configuration formation that allow their history to be traced.

Anthropologists have concentrated on processes like diffusion and evolution that involve interchange of ideas and must be inferred from their manifestations. Change occurring through migration or trade has largely

been ignored, probably because transfers of people and objects are directly observable in ethnographic studies and their mechanisms therefore do not need definition or analysis.

Anthropology has been a strong influence in the archaeological treatment of genetic relationships. Concepts derived from historical anthropology, especially diffusion and independent invention, have been widely employed in archaeology to account for cultural similarities (e.g., Ekholm 1964; Meggers 1964; Ford 1969). These terms have similar meanings in anthropology and archaeology and are used for a similar purpose: to provide historical explanations for traits that recur in several archaeological or ethnographic cultures.

In archaeology as in anthropology diffusion is traced by studying trait distributions, the main difference being that the traits are all artifactual and therefore involve material culture only. As in anthropology, similarity in cultural elements is assumed to result from contact in most cases. Assertions of genetic relatedness involve greatly varying distances and numbers and complexity of traits. Contact becomes a less plausible explanation for such similarities with increasing distance and geographical barriers between the cultures that contain them and must be supported by increasing the complexity and number of similarities (Ekholm 1964; Meggers 1964; Binford 1968a). These rules for separating diffusion from independent invention are drawn for the most part directly from anthropology (Ekholm 1964:507; Binford 1968a:10).

Diffusion and its adjunct, independent invention, are recognized in much the same way in archaeology as in anthropology. Both disciplines employ classifications that are not problem-oriented and are often implicit. Trait similarties generated by these classificatory schemes are assumed to be inherent in the data, not constructed. Therefore, they have to be

explained; diffusion and independent invention serve as historical, that is, implicit (Spaulding 1968), explanations. The debate over how to differentiate them cannot be resolved while the two processes are defined in terms of one another rather than as entities with different kinds of manifestations.

Some attempts have been made to define diffusion so that it can be separated from independent invention in archaeology. One suggestion is that to be diffused a trait must lack local antecedents or appear suddenly in an area (Meggers 1964:512; Fagan 1972:241). Archaeology also employs temporal relationships to distinguish the two processes. Thus, the trait or group of traits in question must exist at an earlier but contiguous time in some area outside the one under examination (Rouse 1955:719; Ekholm 1964:498). This requirement is generated by the time depth of archaeological data and is not present in anthropological studies of diffusion. In ethnography the traits are usually assumed or known by observation or record to be temporally contiguous and their direction of movement is not often subject to debate.

Despite advocacy of this rule for recognizing diffusion in archaeology, is has often been ignored or circumvented. For instance, Ekholm gives an example in which the archaeological trait can be matched in the supposed donor area only by modern cases and says, "Even though we could not find a good comparable example of the motif that was of the right date, we felt justified in thinking that the motif was probably in use at that time" (1964: 498).

Migration has been a very popular way for archaeologists to account for perceived cultural change. Although not derived from anthropology so much as from history or common knowledge, the concept is used in much the same way as diffusion. However, the stress is on providing an historical explanation for cultural differences rather than similarities. Often a sequence of cultures is involved: when differences between sequential units appear to

be large, the most common explanation for the change is migration. For example, in Webb and Snow (1945) and Spaulding (1952), the Adena culture of the central Ohio valley is derived by migration from the south and ultimately from Mexico because it contrasts in certain respects with the preceding Archaic. The perceived differences have caused investigators to disregard the possibility of a developmental relationship and look for another explanation for the change, in this case an Adena migration.

Migration and diffusion are not clearly differentiated in the archaeological literature. Although migration is often used to explain changes in a sequence, while diffusion is employed mainly to explain similarities that are assumed or demonstrated to be contemporaneous, a given group of similarities may be attributed by one archaeologist to diffusion and by another to migration. For instance, Caldwell (1958:60-64) notes traits shared between Mesoamerica and the southeastern United States and attributes the sharing to diffusion, while others (Krieger 1949; Newell and Krieger 1949) believe it stems from migration.

Some attempts have been made to provide rules for the archaeological recognition of migration similar to those cited above for diffusion. Migration has been labeled "site-unit intrusion" to contrast with diffusion, which is "trait-unit intrusion" (Willey et al. 1956; Rouse 1958:63). A migration or site-unit intrusion is demonstrated, according to Rouse (1958:64), if five criteria are met. First, an intrusive unit must be identified; it must be traceable to a homeland; all occurrences of this unit must be contemporaneous; favorable conditions for migration must be established; and finally, other hypotheses must be examined and migration determined to be the best current explanation of the data. How a unit is identified as intrusive is not clear from this discussion, but Rouse has more recently indicated that migrations are evidenced by "a total break in either a cultural or morphological

system" (1972:235). The same point is made by others: migration involves the sudden appearance of a group of traits without local prototypes (Haury 1958:1; Meggers and Evans 1958:9).

Although these investigators seek sources for the migrations they postulate, it is more often the case in archaeology that migration is identified without either a clear cultural break or a source area being demonstrated. However, the indiscriminant use of migration to explain archaeological differences and similarities has been moderated somewhat. Migrations recognized from the archaeological record alone are often equated with ethnographically known migrations. That is, the patterning of elements described above as denoting an archaeological migration is assumed to represent an actual population movement. There has been a tendency for archaeologists to invoke migration to explain a great variety of cultural changes, including many that do not display these criteria. However, partly because archaeological and ethnographic migrations are equated, this has come to seem less plausible as it becomes more frequent. Archaeologists have become uneasy over imputing so many changes to population movements, since they know that such movements are relatively rare historically.

The effect has been the revision of cases of culture change previously ascribed to migration. Since the similarities and differences that form the basis of the migration hypothesis still exist in the data, some other form of culture contact is felt to be required to explain them. Most commonly, the new explanation replaces migration with acculturation. The change is seldom clearly stated, nor is the term acculturation itself often used in archaeological monographs. Nonetheless, strong influence of a dominant culture on a weaker one, with one-way diffusion of traits, is the process described in such monographs (Rouse 1972:232). This more or less corresponds to the meaning frequently given to acculturation in ethnographic studies

(Herskovits 1938:9; Ezell 1961), whether it is so named by archaeologists or not.

One example of a body of data that was first attributed commonly to migration and later to acculturation is the Mississippian tradition. It has often been derived by migration from Mesoamerica because of resemblances to Mexican cultures, especially the sharing of platform mounds, plazas, corn agriculture, and some ceramic traits (Vaillant 1932; Barnett 1933; Wicke 1965; Ford 1969). This hypothesis, although persisting to the present, has more recently been replaced by acculturation, with the similarities attributed to strong, largely one-way influence of the Southeast from Middle America (Griffin 1949; Krieger 1949; Willey and Phillips 1958; Sears 1964; Willey 1966).

A second example involves the Adena culture. As indicated above, until the early 1950's many archaeologists derived Adena by migration from Mesoamerica, based on different resemblances than those employed when making the same argument for the Mississippian tradition. Head deformation and the burial mound are two important purported similarities between the two cultures, although a number of other have been cited (Spaulding 1952). By the latter half of the decade, Adena was generally treated as a "mixed culture" based on the Archaic but influenced from the Southeast and ultimately Mesoamerica (Webb and Baby 1957:56-60; Willey 1966:272-273; Griffin 1967: 180-183). Because it is held that this influence involved important traits like squash, corn, head deformation, and perhaps burial mounds, it may be characterized as acculturation.

One instance that indicates the meaning of acculturation when the term is used in archaeology appears in Fairbanks (1949). Sites that show a mixture of Late Middle Mississippi and local Woodland traits are called acculturated (p. 70). This pattern of traits results from the interruption of the

Woodland sequences by "the arrival of a technologically superior culture which rapidly cut away the economic base of the primitive cultures and radically changed their styles" (p. 72). Thus, acculturation involves important functional and stylistic changes. Elsewhere, acculturation is defined as "the acceptance of new ideas from outside sources, especially in large blocks" (Jennings and Reed 1956:119).

These two examples indicate that in archaeology acculturation is equivalent to large-scale, one-way diffusion. However, as in the examples given above concerning Mesoamerican ties with Mississippian and Adena, it is always clear that the contact being discussed reflects an especially far-reaching kind of diffusion that includes functional as well as stylistic traits.

Acculturation began to be used in archaeology soon after it became an inportant issue in anthropology. Its first applications were to data that either had both archaeological and ethnographic components (Keur 1941) or that were linked inferentially to specific ethnographic cultures like the Navajo (Hall 1944). The term has naturally been most used in studies where the ethnographic analog of the data is, or seems to be, obvious, since acculturation is employed in anthropology not to describe trait distributions but to label observed culture contact situations. The tacit limitation of use of the term is illustrated by the fact that acculturation is not mentioned in a major work that attempts to classify archaeologically recognizeable kinds of culture contacts (Willey et al. 1956). It aims to make a classification that need involve no ethnographic reconstruction (p. 7) and this criterion apparently precludes considering acculturation as an admissable kind of contact.

Despite the reluctance of archaeologists to use acculturation in situations where the data has no ethnographic analog, a similar concept is

embodied in certain uses of diffusion. Plainly, after functionalism became an important part of anthropology and after Taylor's (1948) criticism of archaeology for making history rather than anthropology its final goal, archaeologists have begun to feel that explanations using the historical concepts migration and diffusion are inadequate. One result has been that culture historians have adopted acculturation and tried to make diffusion more meaningful by emphasizing the study of functional-stylistic trait complexes or systems rather than isolated styles or functions (Troike 1955: 114; Flannery 1967:121).

Evolution, development, and innovation are recognized by archaeologists, but have a less clear derivation from anthropology than migration, diffusion, and acculturation. Archaeology has always had a strong developmental emphasis, perhaps beginning with Thompsen's three-age system. This part of the discipline has usually manifested itself in a tendency to divide time into periods, each characterized by a cultural stage (Rouse 1964:463). Progress or development of each stage from the one preceding is often, though not always, implied. For example, the Stone, Bronze, and Iron Ages reflect progressive technological change, while the change from Hopewell to Late Woodland in Ohio is often regarded as developmental but not an advance (Willey 1966:280).

Although evolution can refer to either progressive or non-progressive change (Sahlins and Service 1960), archaeologists have been reluctant to employ the concept at all. This is in part due to past carelessness in use of evolution in anthropology at the end of the 19th century and in archaeology more recently. Especially in the Southwest, classifications of artifacts have been done taxonomically in direct analogy to biological taxonomy (Brew 1946:47). This has been criticized on the basis that artifacts do not

reproduce genetically and should not be classified as if they do (Brew 1946: 47). Others have echoed this criticism, modifying it somewhat as cultural evolutionism has been revived and justified in anthropology. Evolution is allowed in ethnology but not in archaeology because it works only on living systems, not on artifacts (Binford 1972:106). This is phrased slightly differently by Rouse (1964:456), who observes that ethnologists can best study the process of evolution, while archaeologists study the product.

Although archaeology does not examine living systems directly, it does study the cultural remains of living systems. Thus it has a valid interest in cultural evolution analagous to the interest of paleontology and physical anthropology in biological evolution. Archaeologists are interested in changes in artifacts on the premise that they reflect changes in culture. Artifacts and archaeological stages embody evolution (Rouse 1964:463) in that all changes in material culture are developmental. Even though archaeologists do not often refer to Barnett's (1953) theory of innovation when they address change, they use many of the same assumptions, usually covertly. For example, archaeologists treat cultural attributes of artifacts as reflections of shared ideas (Rouse 1939; Flannery 1967; Dunnell 1971). Just as Barnett views innovations as involving the conjunction of existing ideas in new configurations, archaeologists assume that change occurs through the conjunction of existing cultural attributes in new patterns. This indeed is the only way migration, acculturation, or diffusion can be studied archaeologically, through the history of the elements whose distributions serve to identify the processes. Archaeologists often regard these changes as aspects of development or evolution (Rouse 1964:459), as Barnett regards them as aspects of innovation (1953:291).

Some archaeologists are more directly and explicitly linked to cultural evolutionism than others, avowedly deriving their orientation to data from

neo-evolutionists, in particular Leslie White (e.g., Binford 1965; Flannery 1967; Schuyler 1973). They regard cultures as evolving systems (Leone 1972:18), but generally place more emphasis on studying the system relationships than on cultural change. Not all development, but only progressive change is allowed by such archaeologists to be evolutionary (Binford 1972:105).

A number of others, following Steward (1955), are interested in explaining cultural parallels in evolutionary terms (e.g., Adams 1956). However, most archaeologists evince an interest in development as a concomitant of the discipline's traditional goal of understanding culture change (e.g., Caldwell 1958; Dunnell 1972), without reference to any specific anthropological model. With the time perspective they can develop, archaeologists are well-equipped to study cultural evolution; therefore, acculturation and migration might best be viewed as mechanisms of development or evolution, rather than as separate processes.

If migration, acculturation, and evolutionary change have been adopted into archaeology largely from anthropology, the question remains if they can maintain the same meanings in the two disciplines. Archaeologists generally assume that they do--that is, that migration represents population movement, while acculturation has a variety of ethnographic analogs depending on the specific case, but prominently including one-way diffusion from a dominant to a less-advanced culture. Evolution likewise is presumed to mean the same in anthropology and archaeology, referring to progressive or adaptive change.

One way to examine this question is to determine if examples of these concepts drawn from ethnography and archaeology show features that match consistently. That is, if it can be demonstrated that observed acculturation affects material culture in recognizeable ways, then it can be identified

solely using artifacts and confidently alleged to be equivalent to ethnographic examples in that respect. In effect, acculturation would have two parallel definitions, one in terms of material culture and one in terms of observed behavior. Each would contain criteria sufficient but not necessary for its recognition. Such a procedure does not allow one to assert that ethnographic and archaeological acculturation are equivalent. However, it may aid in finding a definition for archaeological acculturation that has something explicit in common with observed cases.

Anthropologists have treated migration and acculturation similarly when attempting to define their counterparts in material culture. In one treatment of this problem, the effects of an observed or historically known case of migration or acculturation on material culture are noted. An alternate treatment uses a migration or acculturation that is inferred from non-archaeological evidence to identify its archaeological complement. In either case, the concern is seldom with making general statements about the effects of migration or acculturation on artifacts, but rather with describing the particular instance under consideration.

There have been a number of studies done in the Southwest on the effects of the two processes, probably because a variety of sources of information are available for periods of known culture contact: archaeological, historic, ethnographic. Also, it is assumed to be an easy matter to identify ethnographic cultures with their archaeological past in that area. Since native groups have been well-recorded and some still exist, continuities traced in material culture from the prehistoric to the historic period are taken to indicate ethnic identity (Harrington 1940; Keur 1941; Gunnerson 1960; Hester 1962).

In the Southwest, migrations or acculturations that are indicated by linguistic, historic, or other evidence but which lack an identified material

culture component are presumed to be traceable archaeologically. The biggest obstacle to such endeavors is identification of ethnographic cultures with changes in the archaeological record (Hester 1962:99). Differences of opinion often occur. For example, Athabaskan speakers, which historically include the Navajo, were apparently migrants into the Southwest, since the main body of Athabaskans is tc the north in Canada (Harrington 1940; Hymes 1957). There is disagreement over whether the ancestral Navajo are properly identified archaeologically by the presence of the hogan or pointed-bottom pottery (Harrington 1940; Keur 1941; Hall 1944; Hester 1962), both associated ethnographically with the Navajo. By the criterion of pottery, the Navajo were present in the Southwest by A.D. 1000, while the first hogans do not appear until nearly A.D. 1500 (Hester 1962:100). The first appearance of these presumable objects of Navajo culture is taken to be synonymous with the initial appearance of Athabaskans in the area.

The appropriateness of characterizing as Navajo a group whose tribal affiliation must remain unknown because there is no ethnographic evidence on the point is questionable. It seems wisest to call the people Athabaskans rather than Navajo, even though some of the ancestors of the Navajo were presumably among them. It is not valid to identify the Navajo or even the Athabaskans with artifacts from an archaeological context. In each case, the problem lies in equating units that are defined differently. The Navajo tribe is defined by the people's feeling of group identity, the Athabaskans by linguistic affiliation, and archaeological units like Dinetah and Gobernador (Hester 1962), which are often associated with the Navajo or Athabaskans, by artifacts. Because the Navajo are known historically to have spoken Athabaskan and made hogans and pointed-bottom pottery does not indicate that they have always or exclusively done so. By this argument, any attempt to identify changes in material culture known archaeologically with migrations or

acculturations inferred on some other basis is invalid.

Studies which try to delineate the effects of migration and acculturation on material culture by observing them directly or through appropriate records are based on sound logic. One study (Quimby and Spoehr 1951) classifies objects from a museum collection according to how four dimensions, form, use, material of manufacture, and technological principles, are affected by known culture contacts. From the seven types that are represented in the collection, it is concluded that form is more resistant to change than material of manufacture, since four types involve changes in material and only two include changes in form.

A study of Hispanic acculturation of the Gila River Pimas has produced a second generalization. The Indians accepted items and traits, but few complexes of Hispanic culture, leading to the conclusion that noncoercive acculturation produces no great or sudden change in any aspect of the recipient culture, including artifacts (Ezell 1961:4-5). Linton (1940) also produces some generalizations about the effects of acculturation, concluding that tangible objects are more easily transferred than patterns of behavior and that elements are easier to transfer than trait complexes (p. 485). Also, form is adopted more readily than meaning or function (p. 486).

These descriptive characterizations of the kinds of changes in material culture that are often associated with acculturation do not provide a means to identify acculturation archaeologically with any assurance that it is equivalent to ethnographic acculturation in any way. The studies do not separate acculturation from other kinds of diffusion except by implying that the traits move in only one direction, so the only thing all the instances have in common is a mixture of local and foreign traits. Whether this mixture is always represented in the artifacts is not clear, nor is it known whether such changes in material culture can be the result of non-

acculturative processes.

Likewise, there is no one-to-one relationship between trade or migration and changes in artifacts. Heider (1967) has shown that archaeologists would probably infer direct trade between two groups in New Guinea that are known by observation to exchange goods through middlemen, with perishable products an important part of the network. It has also been observed that migration of people and trait movement are often independent of one another. For example, immigrants often adopt much of the material culture of their new homelands immediately upon arrival (Trigger 1968a:39).

Even though neither migration nor acculturation always has the same effects on material culture, it may still be true that certain patterns of artifacts can result only from one of the two processes. For instance, an abrupt and complete change in material culture may be caused only by a movement of people. If such relationships between artifacts and ethnographically observed processes exist, they have not yet been demonstrated. Consequently, it is not possible to give archaeological definitions to migration and acculturation that make the archaeological instances more than roughly equivalent to ethnographic examples.

Archaeologists have nearly always assumed the equivalence of ethnographic concepts like migration, invasion, and trade with their archaeological counterparts (e.g., Sabloff and Willey 1967; Clarke 1968:411; Ford 1969). Since they are defined differently, these processes cannot automatically be the same, but must be subsumed under laws or rules that relate them in ways that cause them to be identical in known respects. Such laws have not yet been formulated. In the meantime, it cannot be assumed that archaeological instances of migration and acculturation would, if known ethnographically, have counterparts that could be characterized as migration and acculturation.

The lack of demonstrated identities between archaeological and ethnographic

processes should not concern archaeologists. The usefulness of these concepts does not derive from their presumed equivalence to ethnographic processes, but from their ability to describe patterning in archaeological data.

## A History of the Use of Genetic Concepts in Ft. Ancient Studies

With a background in how anthropology and archaeology handle genetic relatedness, it is possible to examine the use of such concepts in Ft. Ancient studies. Three, migration, acculturation, and development, are of particular interest since they relate to the hypotheses that are the main focus of this paper. All three terms have been used in the literature on Ft. Ancient. The history of each is examined with a view to clarifying its current status as an explanation of Ft. Ancient origins. A general statement of each process phrased as an hypothesis is adequate for examining the literature, where such explanations are usually presented without elaboration on their meaning in terms of patterning in the data.

The first hypothesis is that Ft. Ancient developed locally from the Woodland tradition. Which Woodland phase or phases served as the progenitor cannot be stated in the hypothesis, since it is unclear which ones were immediately precedent to Ft. Ancient in many areas and this may well have varied in different parts of the region. The second hypothesis attributes Ft. Ancient to migration of people from another region into the Ohio valley, carrying the Ft. Ancient tradition with them. The third alternative is that Ft. Ancient originated through acculturation of the local Woodland by some outside tradition.

It is not surprising that development has never been espoused as an explanation for the origin of Ft. Ancient as a whole, since the problem of origins has been tangential to culture-historical concerns. As argued earlier, culture historians seldom consider the possibility of developmental relationships between their units. It is somewhat unexpected to find, however, that development has not been advanced to explain the origin of Ft. Ancient in any region or to account for any single occupation, no matter how similar to Woodland it may be. For example, the O. C. Voss site (Fig. 5) has been

identified as both Late Woodland (Baby and Potter 1965) and Ft. Ancient (Prufer and Shane 1970). Yet in the latter discussion, the Woodland characteristics of the assemblage are attributed to its marginal location (Prufer and Shane 1970:235) or to acculturation (p. 262), not to development from Woodland. This is despite the radiocarbon date of A.D. 970±79 A.D., one of the earliest dates for a Ft. Ancient site (Fig. 6).

Others have noted similarities between Woodland and Ft. Ancient (Griffin 1943:207; Morgan 1952; Dunnell 1961) but have not considered the possibility that Ft. Ancient originated locally. Instead, the continuities with Woodland are interpreted to be the result of acculturation of the local people by some group outside the Ohio valley. In such accounts, the mixture of Woodland with new traits marks the beginning of acculturation and thus of Ft. Ancient in that area. This is the most common current explanation of those differences between Woodland and Ft. Ancient that originally caused them to be recognized as separate traditions.

Most statements that attribute Ft. Ancient to acculturation are very general, implying that the influence of a non-local tradition was crucial to the formation of Ft. Ancient, but without specifying how this influence is manifest or measured. Often Ft. Ancient is said to be derived from some combination of acculturation and migration. In any case, no real effort is made to test these hypotheses. They are made plausible by imprecise references to traits supposedly shared by Ft. Ancient and its presumed progenitor, but the nature of the relationship is actually assumed rather than demonstrated.

Ft. Ancient is usually derived from the Mississippian tradition when its origins are considered. It was first classified as belonging to the Mississippian pattern soon after the inception of the Midwestern Taxonomic System (Cole and Deuel 1937; Griffin 1943:2). Although such classification was intended to reflect only formal similarity and not imply any develop-

mental link (McKern 1939:312), Ft. Ancient has since been consistently generated from Mississippian. The earliest example of this is provided in The Fort Ancient Aspect (Griffin 1943:308):

> It would appear that certain sites in the Madisonville Focus represent an early Mississippian migration into the area, and the merging of populations resulted in the Anderson Focus culture mixture. The Feurt Focus, as represented primarily by the Feurt site, contained either a fusion of people closely allied culturally to those of the Baum and Gartner sites and having a strong Mississippian tradition or the inhabitants of the Gartner and Baum sites who had moved to Feurt and there acquired more of the southern culture.... The Fort Ancient Aspect then represents a Middle Mississippi offshoot which merged culturally with a basic Woodland group already tinged with Mississippian traits.

In this interpretation, the northern Ft. Ancient occupations are products of acculturation, while at least some of the southern ones derive directly from migration.

In the discussion of specific traits shared between Ft. Ancient and Middle Mississippian (Griffin 1943:195-209, 257-260), the following attributes are listed to support connections between the two traditions: small thin triangular points; single- and double-pointed drills; discoidals; shallow, flat mortars; "biscuit"-shaped mullers; shell hoes; shell beads, pendants, and gorgets; large clay and stone equal-armed pipes; stone box graves; effigy bowls; and saltpans. In addition, large stone effigy pipes and various copper ornaments found only in the Madisonville focus, primarily at the Madisonville site, are listed. There is no attempt to show that any of these traits occur earlier in Middle Mississippian than in Ft. Ancient; instead, this is taken for granted.

More definite statement that Ft. Ancient has a Woodlad background occurs in two later papers, although the differences between Ft. Ancient and Woodland continue to be interpreted as the consequence of Mississippian acculturation and migration (Griffin 1946:92, 1952b:190). For instance,

Late Woodland (1952b:190) and Hopewell (1946:92) antecedents are suggested for parts of Ft. Ancient north of the Ohio River. Morgan (1952:96) follows Griffin in ascribing a mixed Woodland-Mississippi background to Ft. Ancient and attributing it to migration of Mississippians into the area, with consequent acculturation of the local people. The same explanation is adopted by Caldwell (1958:66, 1962:299), Dunnell (1961:23-24), and Willey (1966:309), generally with less emphasis on the role of migration and more on acculturation.

The only report of a single Ft. Ancient occupation that considers the acculturation hypothesis is that on Graham village in the Hocking River valley (McKenzie 1967). Acculturation of the local Woodland is suggested as one possible explanation for the site's small size, the early date of A.D. 1180, and the presence of such attributes as grit-tempered pottery and concave-based triangular points that are usually considered characteristic of Woodland. Several other hypotheses are also proposed to explain this data, among them the marginal location of the site, the possibility that it may be typical of Ft. Ancient habitation sites and better-known large sites exceptional, and that it may represent an early migration of Ft. Ancient people into the area (McKenzie 1967:78-79). However, none of these hypotheses is tested and acculturation remains only one of several possibilities.

Migration has been a common explanation for differences between units in culture history. However, it is currently used in Ft. Ancient studies mostly to explain particular occupations or sets of occupations and not as an explanation of the tradition as a whole. In two instances, migration is the favored hypothesis to explain a break in a demonstrated developmental sequence. Mayer-Oakes (1955a) discusses the established cultural continuity in the upper Ohio valley from Early Woodland to the historic period and

attributes a break in that continuity in Early Monongahela times in part of the valley to the migration upriver of Ft. Ancient people. Similarly, an abrupt break in the Archaic developmental sequence in the Fishtrap Reservoir area in Kentucky is linked to migration of Ft. Ancient peoples into the region via Levisa Fork of the Big Sandy River (Dunnell 1972:71-72). The break is both stylistic and functional (pp. 62-63) and is reinforced by the lack of "transitional" components that would link the Archaic seasonal round settlement pattern developmentally with the Ft. Ancient agricultural villages (p. 70). Although neither of these migration hypotheses is formally tested on new data, they are weighed against other possible explanations of existing data and found to be the best way to account for it. Both are aimed at explaining the appearance of Ft. Ancient in a particular area, not its ultimate origin.

Other Ft. Ancient site reports invoke migration to explain data without either testing it as a hypothesis or seriously considering alternatives that might serve as equally good explanations. An example is the Blain village report (Prufer and Shane 1970), in which the Baum phase and Blain village as a component of the phase are derived by "a direct incursion of outsiders largely displacing the local Woodland cultures" (p. 260). These outsiders were Mississippians. Development and acculturation are ruled out as possible explanations without any formal examination of existing data, much less testing on other information. Rather the conclusion is an "impressionistic" one (p. 258). There is an implication that this explanation holds not just for the Baum phase but for the whole of Ft. Ancient (p. 258).

The usual pattern in the literature on Ft. Ancient has been to propose an hypothesis without considering alternatives and without testing. The result is that the first hypothesis proposed to explain the appearance of Ft. Ancient, that it originated through Mississippian migration into the

Ohio valley followed by acculturation of the local Woodland people (Griffin 1943) has persisted as the explanation of choice in culture histories. The main variation has been to place more or less emphasis on migration and acculturation depending on the area in question. There has also been a tendency to account only for the appearance of the tradition in the area under study, rather than implying that the explanation offered applies to the origins of Ft. Ancient as a whole.

## Three Hypotheses on the Origin of the Ft. Ancient Tradition

Migration, acculturation, and local development are to be tested as alternative hypotheses to explain the origins of the phenomena placed in the Ft. Ancient tradition in northern Kentucky-southwest Ohio-southeast Indiana. Each hypothesis is defined by explicit criteria that govern how it is recognized phenomenologically; only thus can it be identified as an explanation for a particular set of data. The three hypotheses outlined here can be tested on information from any area; they are not specific to Ft. Ancient or to the area under study.

Since definition of the hypotheses is a matter of choice, it is possible to design them to be mutually exclusive. This is advantageous because, if the hypotheses have been properly and fully tested, only one of the original alternatives remains as a viable explanation. All but one of the hypotheses may be eliminated after partial testing as well, but this is not assured.

To make the hypotheses mutually exclusive, the dimensions of style and function are employed. A two-dimensional paradigm can be used to illustrate the procedure (Fig. 7). Function and style are each divided into several attributes characterizing kinds of change that can occur in them. A style is a class of attributes that varies independently of its non-cultural environment. In the paradigm, the stylistic attributes denote the initial appearance of foreign styles in the sequence under examination. They may appear as modes, classes of attributes of artifacts, or as types, which are combinations of two or more modes (Rouse 1939, 1960; Dunnell 1971). A foreign style is one that exists in another region before it appears in the study area.

Three patterns are recognized in the appearance of a set of foreign styles in a sequence: they may appear mixed with existing styles or alone,

| | Style | | | |
|---|---|---|---|---|
| | | new foreign set | mixed present styles and new foreign set | no new foreign set |
| Function | abrupt appearance of foreign function | expansionary migration 1 | acculturation 2 | development 3 |
| | no abrupt appearance of foreign function | fragmentary migration 4 | development with diffusion 5 | development 6 |

Fig. 7. Two-dimensional Paradigm of Types of Stylistic and Functional Change

unmixed with preceding styles. The third alternative is that no new set of foreign styles appears. Styles form a set when they appear together and have a common point of origin. Isolated foreign styles, those that enter a sequence from a number of different places, usually not appearing simultaneously, are not treated separately by the paradigm but are subsumed under category three, "no new foreign set." The paradigm has been so arranged because diffusion of isolated styles is not relevant to the problem of distinguishing migration and acculturation from development. Foreign styles, either modes or types, may mix with existing ones either by combining with them to form new types or by combining among themselves to form types that exist side-by-side with old styles.

Function in prehistory is the artificial relationship that exists between an object and its environment (Binford 1962; Dunnell 1971a). Functional change (Fig. 7) occurs either by the abrupt appearance of a foreign function or by the lack of such an abrupt change, either because functional change is gradual or because there is no change. Since the history of a functional change is only traceable by tracing the styles associated with it, it is not possible to speak of foreign as opposed to existing functions when they are divorced from style. If a change in function is to be imputed to influence from another area, the function must be tied to styles from that area and be present there before it appears in the study area.

Intersecting the attributes of the two dimensions forms classes which correspond to the hypotheses to be tested (Fig. 7). The intersecting attributes are the defining criteria of that class or hypothesis. The three hypotheses are mutually exclusive, since each of the classes that is generated corresponds to only one hypothesis. It will be noted, however, that while acculturation is represented by only one class, migration and development encompass more than one.

The classes in the paradigm have been devised and labeled following fairly closely the meanings given migration, acculturation, and local development in the archaeological literature. Archaeologists are in general agreement that migration is signified by the abrupt and complete replacement of a preceding unit with an intrusive one that has an earlier existence elsewhere (Haury 1958; Rouse 1958; Trigger 1968). This has become the necessary and sufficient condition for the recognition of migration as given by the classification (Fig. 7), with the intrusive units signified by sets of styles. As indicated earlier, the source of functional change cannot be identified except by locating the source of accompanying styles. In any case, functional change is irrelevant to the identification of migration in culture history, since it is assumed that migrants may be similar to or different from the local people with respect to the functions of their artifacts.

Therefore, two classes are labeled "migration" in the paradigm (Fig. 7), one representing introduction of a foreign function and one showing no abrupt appearance of a foreign function. The two types are likened to expansionary and fragmentary migration respectively. According to the Law of Cultural Dominance (Sahlins and Service 1960:75), a culture can't expand at the expense of another group unless it exploits the environment more efficiently than its rival. This implies technological superiority and thus functional change must occur if expansion occurs (Fig. 7). In contrast, fragmentary migration does not introduce foreign functions into the intruded culture since the migrants are present on sufferance of the host group.

In the classification used here, acculturation is identified by the continuation of some preceding styles accompanied by the addition of a set of new styles that is present earlier in some other area (Fig. 7). This stylistic configuration is necessary but not sufficient for recognizing

acculturation. There must also be an accompanying change in function. This requirement is an attempt to reflect in a way that is detectable archaeologically the anthropological notion that the acculturating group must be dominant to the acculturated one. Thus, without evidence for functional as well as stylistic change, acculturation cannot be identified (Fig. 7). Lack of the prescribed alteration in either style or function precludes acculturation as an explanation of the data.

Development subsumes the other three classes of the paradigm (Fig. 7). If both migration and acculturation are eliminated as explanations within this framework, then the changes under examination must be basically developmental. Diffusion may occur in a developmental context and is included in Class 5 if a set of styles is involved and in Classes 3 and 6 if only isolated styles are diffused. If there is a continuation of existing styles, development is the preferred explanation for either functional change or the introduction of a new stylistic complex from outside unless both kinds of change occur at the same time. In that case, the proper explanation involves acculturation rather than development.

As the classification shows (Fig. 7), the only time it is necessary to consider the possibility of functional change is when one kind of development, represented by Class 5, must be differentiated from acculturation. In every other case, the nature of the stylistic changes that occur in the data allows the identification of migration, acculturation, or local development.

If, after testing, either migration or local development stands as the best explanation of the information examined, it may be possible to indicate which of the two kinds of migration or the three kinds of development is represented, enhancing the explanatory power of the hypothesis by making it more precise. Class 5 development involves diffusion in one sense, the

appearance of a set of foreign styles, while Class 6 development may sometimes involve the diffusion of individual styles from a number of sources. The third kind of development, represented by Class 3, includes stimulus diffusion, the diffusion of a function without its accompanying stylistic attributes (Kroeber 1952:357). Of course, some foreign styles must be present in order that the source of the new function can be identified. The two kinds of migration, Class 1 and Class 4, involve an important distinction between expansionary and fragmentary migration that can only be made on the basis of whether functional change accompanies the displacement of existing styles.

These hypotheses are defined so as to be identifiable in archaeological contexts and bear no necessary formal relation to the use of the same terms in description and explanation of ethnographic data. This is true despite the rough correspondences that exist, a result of the classes being designed to incorporate distinctions made by archaeologists between these concepts that were derived originally from anthropology. Thus, for example, whether an archaeological case of acculturation would resemble an ethnographic one in any given respect is unknown. This is so because the two are defined to be identified in different kinds of data and therefore are not comparable, although they may seem similar. The usefulness of such hypotheses in prehistory is not affected by this as long as the noncomparability of the concepts is kept in mind. The main advantage to using these terms rather than new ones is their derivation from culture history, providing conceptual continuity within archaeology.

## THE CLEEK-MCCABE SITE

### Choice of Data for Testing Hypotheses on Ft. Ancient Origins

The general period of interest to this study is the boundary between Woodland--Adena, Hopewell, or Late Woodland as the case may be--and Ft. Ancient. Since the cultural content of this time span is not well established, the best course is to focus on the latest occupations belonging to any of the three Woodland phases and on early Ft. Ancient components. It is not always possible to determine a priori that a particular occupation falls in this period, but radiocarbon dates and internal chronologies for Adena (Dragoo 1963), Hopewell (Prufer 1964, 1965), and Ft. Ancient (Dunnell 1961) based on stylistic change provide some guide. It is clear that of Ft. Ancient occupations, only early ones are useful, since later components are not directly relevant to the origins of the tradition.

Appropriate data may come from both published sources and newly analyzed material. Some detailed new analysis is useful since extensive information on early Ft. Ancient components is not available in the literature with the exception of the Blain Village report (Prufer and Shane 1970). New analyses also have the advantage of allowing the artifacts to be classified in terms of the problem at hand, with the result that the classes are more useful than many that appear in published sources. This procedure provides more detailed and reliable results as well, and thus more confidence in the conclusion.

The literature can be useful in providing data directly relevant to testing the hypotheses, serving to supplement information gained by analyzing new data. It can also yield insight into developmental sequences in other regions that may be compared with the proposed Ft. Ancient sequence. For example, both analogies with and contrasts between Ft. Ancient and Oneota

and Monongahela traditions are instructive.

The whole Ft. Ancient region is not covered here. Choice of the area of interest is governed by the choice of available and appropriate unpublished material for analysis. This also determines which sources from the literature are useful. The decision made in this case to focus on the Cleek-McCabe assemblage from northern Kentucky is crucial, then, to understanding the other decisions.

The Cleek-McCabe site is located in Boone County in northern Kentucky (Fig. 8), on the bottomland bordering Mud Lick Creek, a tributary of Big Bone Creek and ultimately the Ohio River (Fig. 9). The site lies approximately ten miles from the Ohio along the stream, or seven miles overland in a straight line. The bottoms along Mud Lick Creek vary from a quarter of a mile to a few feet in width in the vicinity; the site is on an area about five hundred feet wide. The stream itself is approximately thirty feet wide from bank to bank.

The site extends from the stream bank back into the bottom about 100 yards. Its precise extent is not known, but field notes indicate that it covers most of an area at least 200 yards in length along Mud Lick Creek, centering on the burial mound labeled Be 23 (Fig. 10). There were once tı small burial mounds on the site, with Be 23 located close to the creek and Be 8 directly opposite it about 70 yards away in a direction perpendicular to the stream (Fig. 10). A village or midden area lying between the mounds, surrounding Be 8 and extending some distance along Mud Lick Creek in either direction, has been designated Be 22.

The original description of the site (Webb and Funkhauser 1932:32) lists two mounds and a surrounding artifact scatter on the Joseph Cleek farm, with the whole site labeled Be 8. Between this survey and excavation of a portion of the area in 1939, each of the three parts of the site was given a separate

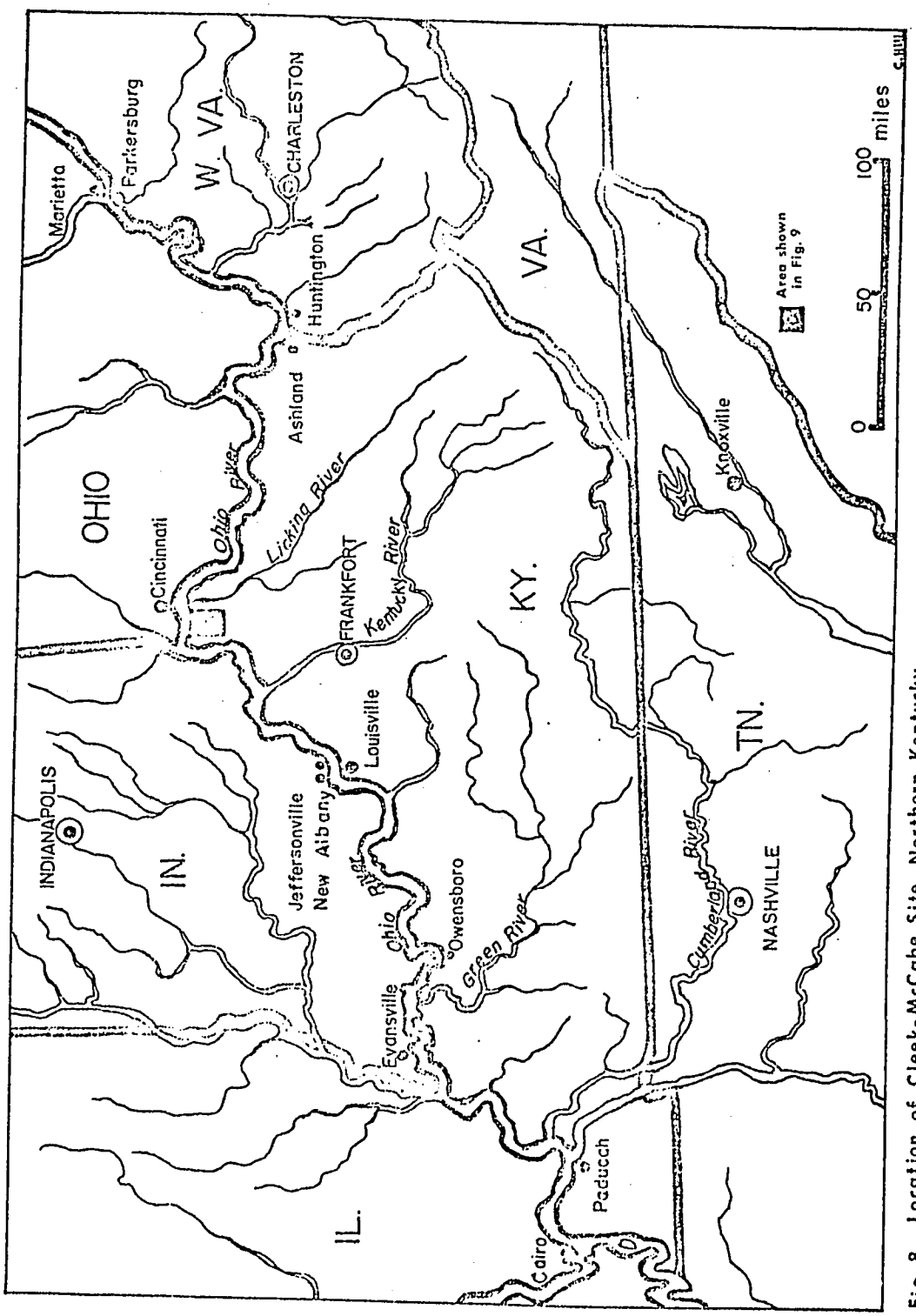



Fig. 8. Location of Cleek-McCabe Site, Northern Kentucky

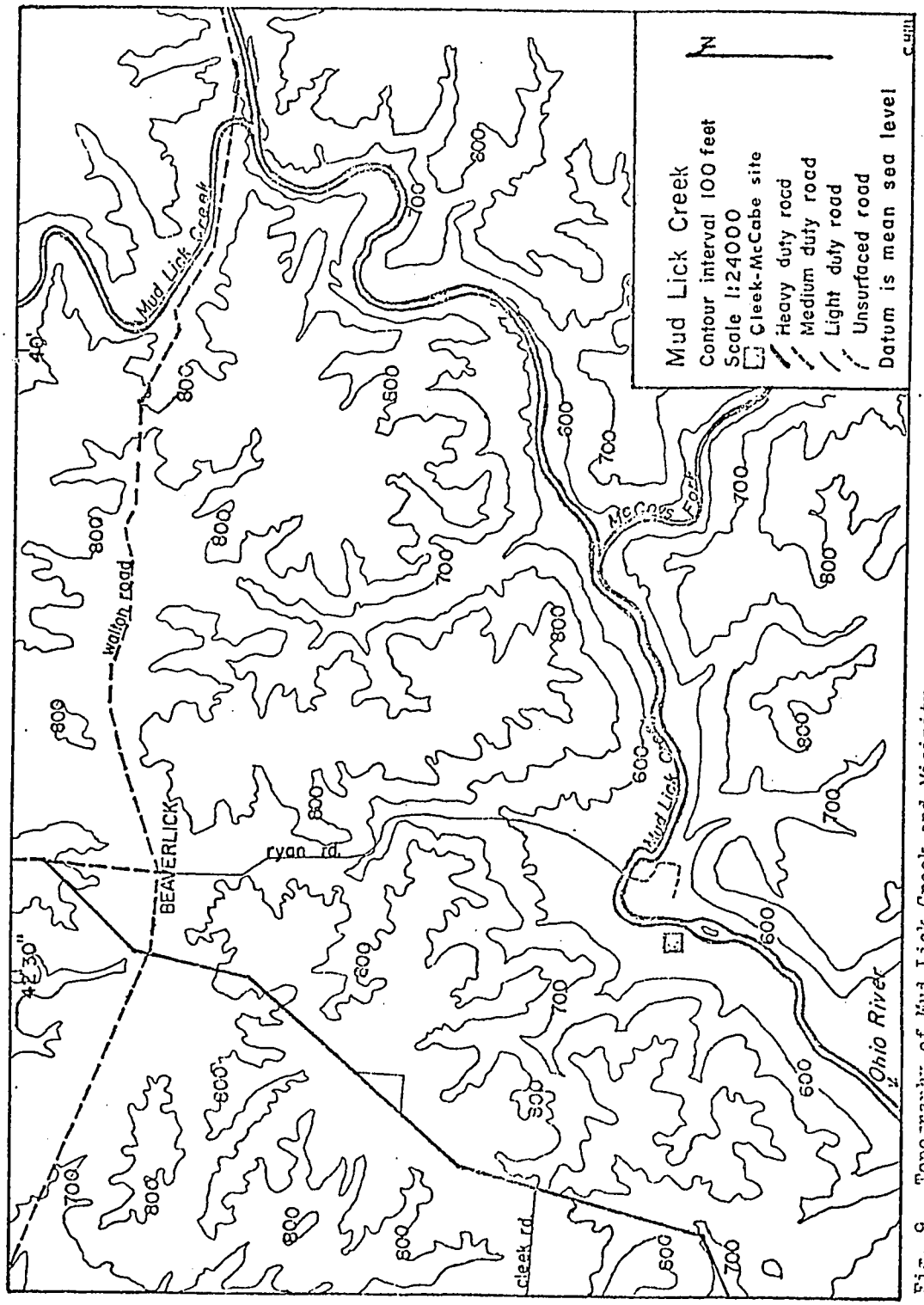



Fig. 9. Topography of Mud Lick Creek and Vicinity

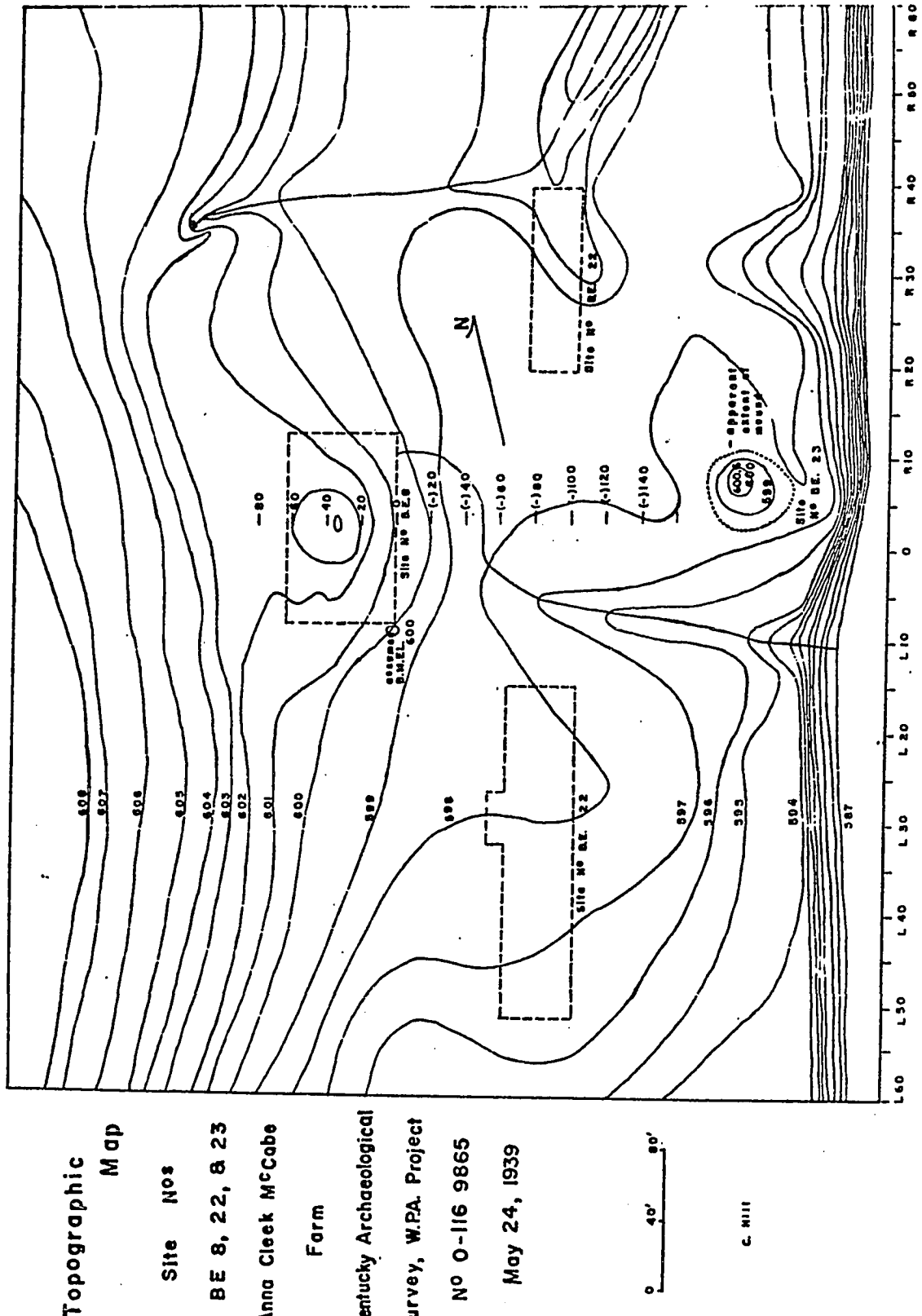



Fig. 10. Topographic Map of the Cleek-McCabe Site, Showing Areas Excavated

number (Fig. 10). Be 22 is also known as the Cleek village, while Be 8 is called the McCabe mound. Since the site will be considered here as an entity, it has been renamed Cleek-McCabe. The numbers Be 8, Be 23, and Be 22 are used to refer to the two mounds and the midden respectively when they are considered separately.

Part of the site was excavated in 1939 using Works Progress Administration-financed labor under the general supervision of W. S. Webb of the University of Kentucky, who was director of W.P.A. archaeology in the state. One of the burial mounds, Be 8, was completely excavated and two portions of the midden between the two mounds also were examined (Fig. 10).

The assemblage from this site was chosen for analysis chiefly because it seemed to represent an early Ft. Ancient occupation. The collection, consisting of about 25,000 artifacts, is large enough to support detailed consideration without the necessity of further excavation. The site's location in an area where a good deal of archaeological work has been done, yet with little known about early Ft. Ancient, also influenced the choice.

One indication that Cleek-McCabe is an early Ft. Ancient site is the presence of burial mounds, which are frequently found at occupations that have been labeled or dated as early in the Ft. Ancient sequence. These include O. C. Voss (Baby, Potter, and Mays 1966), Blain (Prufer and Shane 1970), Baum (Mills 1906), and Gartner (Mills 1904). In addition a ceramic seriation of collections from Kentucky Ft. Ancient components (Dunnell 1961) placed the sites with mounds, including Be 8, Sc 2, Sc 6, and Larkin (Fig. 4) at the older end of the sequence.

The seriation itself, although not formally verified as a chronology by reordering the assemblages using independent artifact styles, provides more evidence that Cleek-McCabe is at least the earliest of known Ft. Ancient sites in central Kentucky (Dunnell 1961:ff 31). The seriation is bolstered

by the observation that the occurrence of non-pottery attributes like serrated triangular points, trenched houses, crude stone disks, shell gorgets, and burial mounds (p. 30) is continuous when the assemblages are arranged in the order produced by the seriation.

The circular structure found under Be 8 (Fig. 11) also suggests an early placement, since such structures are commonly found under Adena mounds and thus might indicate that Cleek-McCabe is close in time to them. They are apparently absent in late Ft. Ancient. The occurrence of limestone-tempered pottery, which seemed to decrease from bottom to top of Be 8 (Dunnell 1961: ff 31), also supported the notion that the site might be related to Woodland units, in which grit- and limestone-tempered pottery predominates.

Though the site arguably falls in the correct temporal range, to be relevant to the study of Ft. Ancient origins there must be some basis for presuming it to be Ft. Ancient in affiliation. The assemblage does conform to the implicit definition of the tradition used by culture historians and accordingly has been identified as Ft. Ancient previously (Dunnell 1961; Goodell 1971). Curvilinear and rectilinear guilloche designs are present on the pottery; shell-tempered pottery is found in all excavated areas of the site; triangular projectile points preponderate; stone and pottery discoidals are present in the collection; corn was found in the McCabe mound and the size of the site indicates that it represents an intensive occupation of the type called a village by archaeologists working in the region (e.g., Allman 1957; Prufer 1965; McKenzie 1967; Prufer and Shane 1970). The Cleek-McCabe site may thus justifiably be labeled Ft. Ancient.

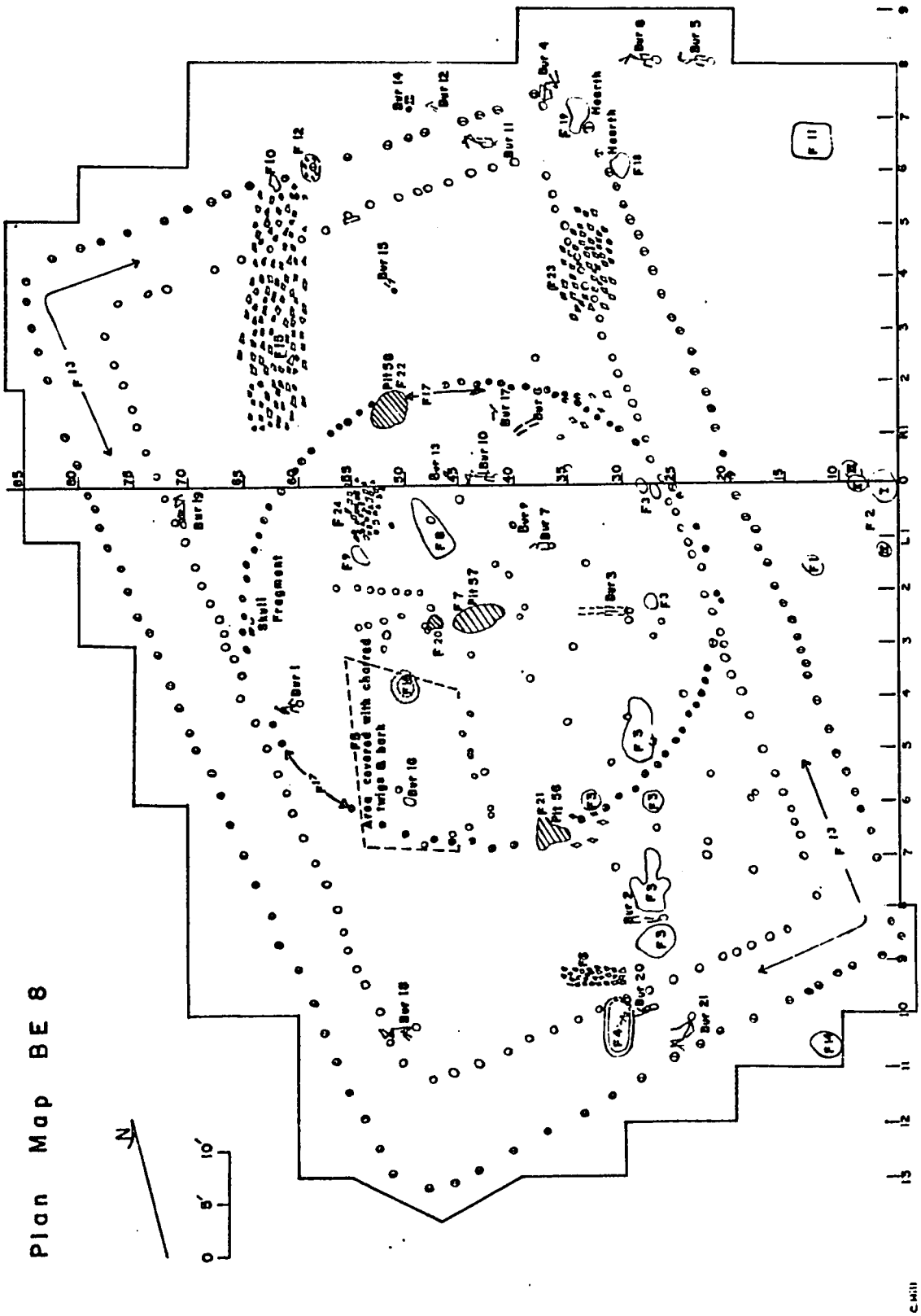



Fig 11. Plan Map, Be 8

## Description of the Excavation

The Cleek-McCabe site was first noted officially during the course of the Kentucky Archaeological Survey (Webb and Funkhauser 1932:32), with the remark that it was well known to amateur collectors in the area. The excavation that followed in 1939 concentrated on one of the mounds, Be 8. Work lasted from March 6 to the middle of July, with all but about two weeks, which were spent excavating the village midden, devoted to the mound. The field notes do not indicate why the site was chosen for exploration, although the emphasis given to excavation of mounds, particularly Adena mounds, during the W.P.A. program in Kentucky (Webb 1940, 1941a, 1941b, 1943a, 1943b; Webb and Elliott 1942) indicates that the presence of mounds at Cleek-McCabe may have influenced the decision.

The major part of the work at the site was supervised by Claude Johnston, with John Cotter replacing him for a short time at the end of the project. The number of W.P.A. laborers used is not recorded, but judging from photographs they numbered at least 14. Excavation began with Be 8. The mound was about 90 feet in diameter and 2½ feet high, having been cultivated for about fifty years. It was staked in 5 by 5 foot grids running roughly parallel to the cardinal directions (Fig. 11). The grids were numbered consecutively beginning at the center of the eastern edge of the mound, with the northern axis labeled right (R), the southern left (L), the eastern negative (-), and the western positive. Thus, square 40L1 is the seventh grid west and the first grid south of the midline (Fig. 11).

An assumed bench mark elevation of 600 feet, located near the edge of the mound (Fig. 10), ostensibly served as the base for measuring vertical distances. In practice, judging from comparison of profiles of the excavated portions with records of the top or one-half foot level of the excavation, the 604

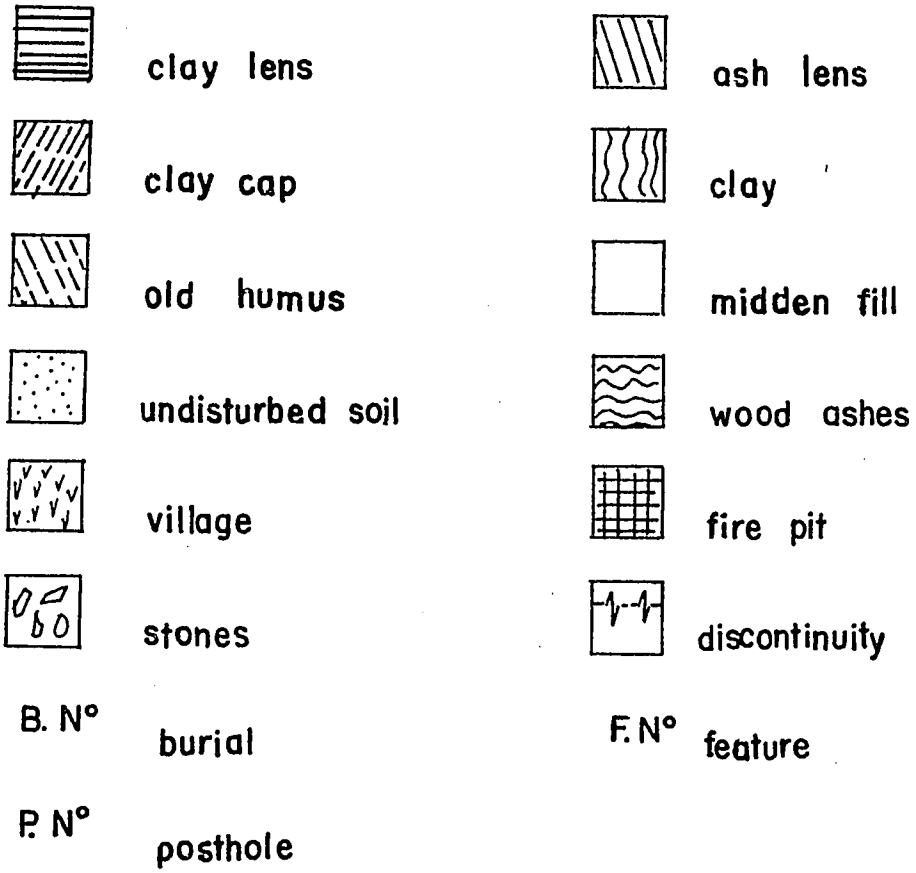
foot mark served as the datum for Be 8 (Fig. 12). The mound was excavated in arbitrary levels six inches in depth. The greatest depth reached was 8 feet, with most of the mound dug only to the $4\frac{1}{2}$ or 5 foot level (Fig. 12). Each 5 foot cut was excavated to the level of the Old Humus zone, a soil horizon that predated the mound. The postmolds found under the mound at this level were not sectioned until the patterns they formed had been completely uncovered.

Because of the use of arbitrary levels, the only information on stratigraphy comes from the wall profiles drawn every 5 feet from the 30 foot to the 55 foot cut (Fig. 12). Although the excavation extended from the 5 to the 85 foot cut, profiles were drawn only for the middle portion of the mound. Information on artifacts and features from the eastern and western parts of the mound is thus available only in relation to the arbitrary levels and the correspondence of these to visible strata is unknown.

The use of arbitrary levels was common practice at the time of this excavation and so is not discussed in the field notes. It is obvious from the profiles (Fig. 12) that distinct natural units were present in the mound. The arbitrary level technique mixed these strata. This had most serious consequences in the body of the mound, since the strata were sloping while the excavation units were horizontal, with the result that one arbitrary level may contain as many as six different natural units.

The mound apparently had no distinct boundary separating it from the surrounding midden. Two trenches, mentioned in the notes but not recorded on the maps, were dug out from the mound to the south and north in an attempt to delineate a boundary, but without success. Instead, the edge of the mound seemed to grade into the surrounding midden. The artifacts from these trenches are not recorded, so the contents of the midden directly adjacent to the mound are unknown.

Key




Scale

vertical 1"=2'6" horizontal 1"=20'

Fig. 12a. Stratigraphic Profiles, Be 8

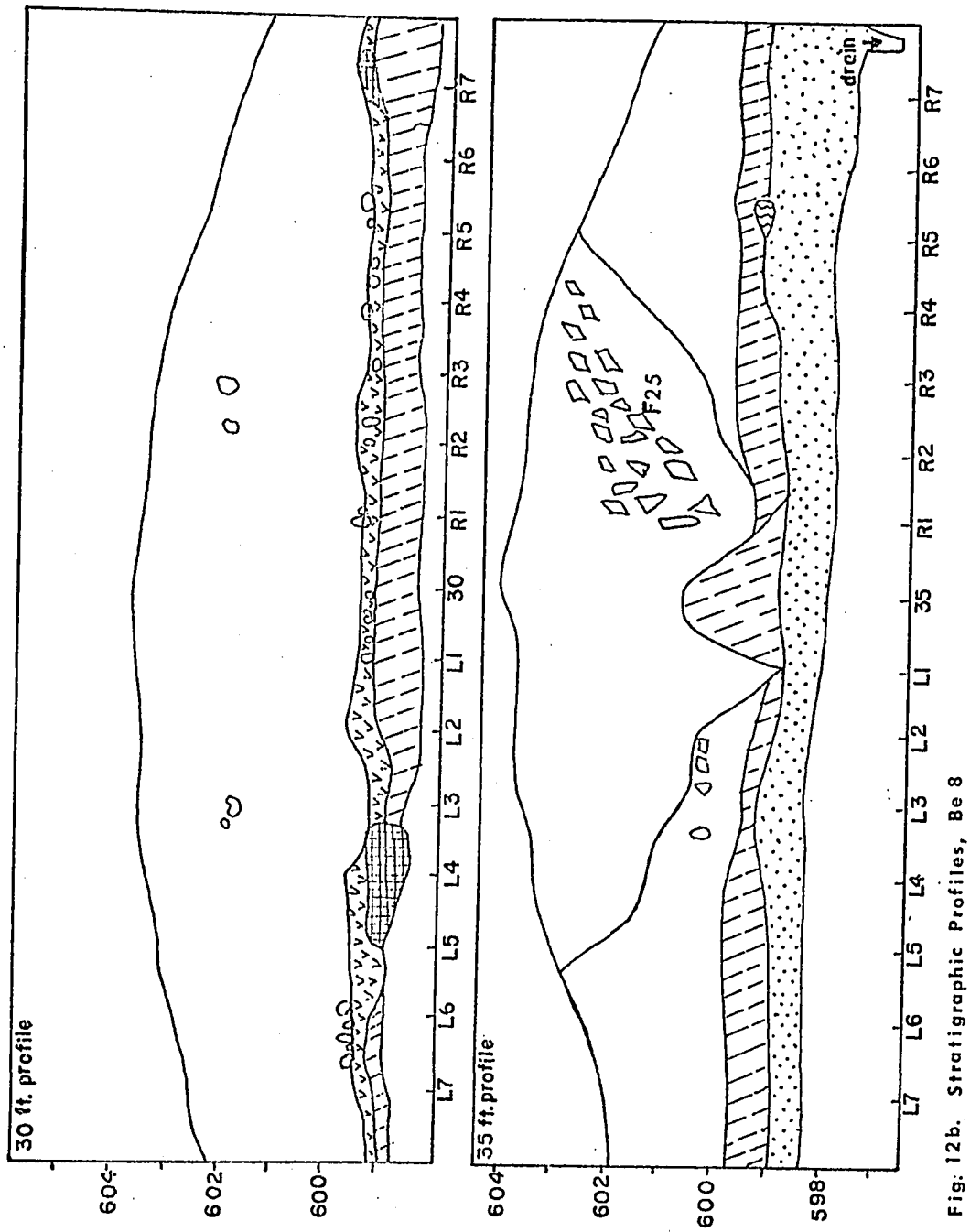



Fig: 12b. Stratigraphic Profiles, Be 8

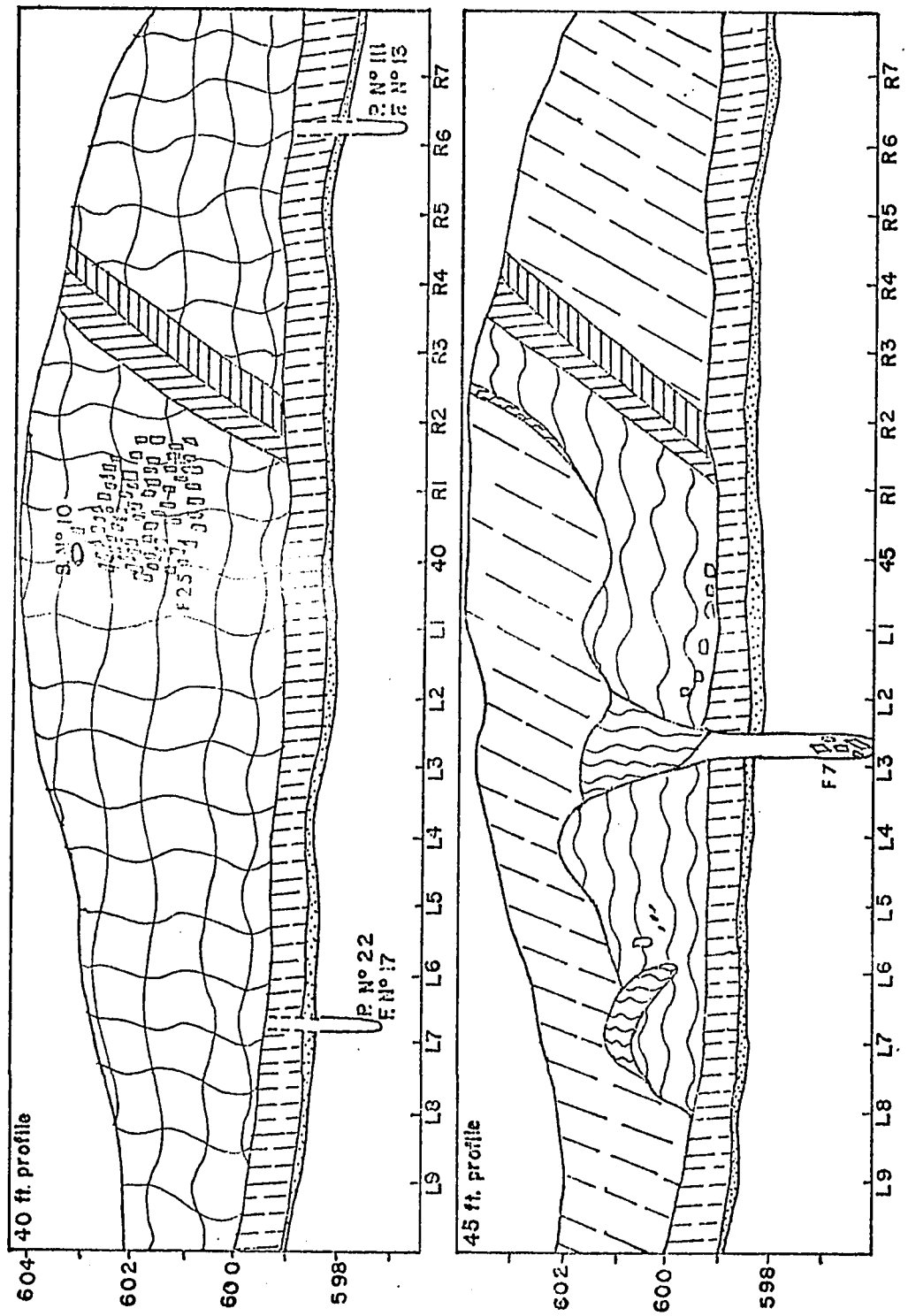



Fig. 12c. Stratigraphic Profiles, Be 8

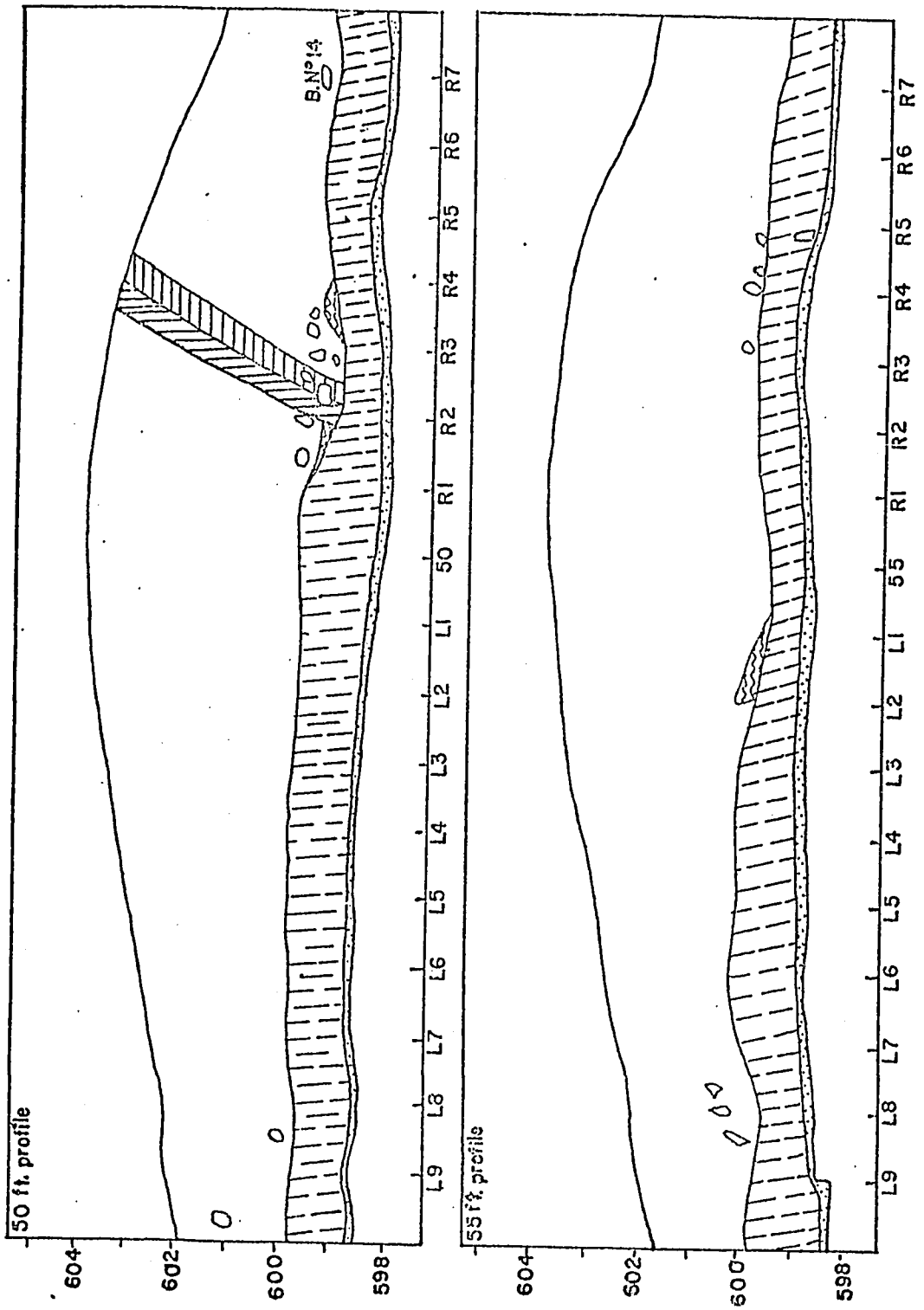



Fig. 12d. Stratigraphic Profiles, Be 8

One circular structure, Feature 13, and one double-walled rectangular structure, Feature 17, were found under the mound. Feature 13 contained 68 postmolds and Feature 17 had 111 postholes in the inner and 113 in the outer rectangle (Fig. 11). All three structures were directly superimposed, with the straight walls of Feature 17 running in the cardinal directions. The structures were centered slightly to the south of the center of the mound, extending beyond it about 20 feet to the south (Fig. 11). Fifteen other features, including rock pavements, fireplaces, and pits, as well as 21 burials were designated for the mound. Over 10,000 potsherds and about 225 other portable discrete artifacts were also recorded for Be 8.

It is apparent that the maps and profiles of the mound do not show all the parts excavated and may record some areas as excavated for which artifacts either were not found, were not saved, or were saved without data on provenience. Therefore, an alternate way to delineate the limits of excavation is necessary. For this purpose maps showing in which grids artifacts were found and recorded have been constructed from provenience data given in the artifact catalog. The deepest level reached in each square is taken as the limit of excavation in that grid; all levels above that are assumed to have been excavated and any artifacts from them recorded (Fig. 13). Thus, since no artifacts are recorded for square 15L1, $\frac{1}{2}$ foot level, it is assumed that none were found. By combining information from the plan map and the profiles (Figs. 11-12) with that from the artifact-occurrence map (Fig. 13), it is possible to obtain the most accurate idea of the parts of the mound that were excavated, the parts for which artifact proveniences were and were not recorded, and areas that according to the field notes were excavated but which do not appear on either kind of map.

In comparing the plan (Fig. 11) and the artifact-occurrence (Fig. 13) maps, it becomes apparent that a number of squares were dug outside the

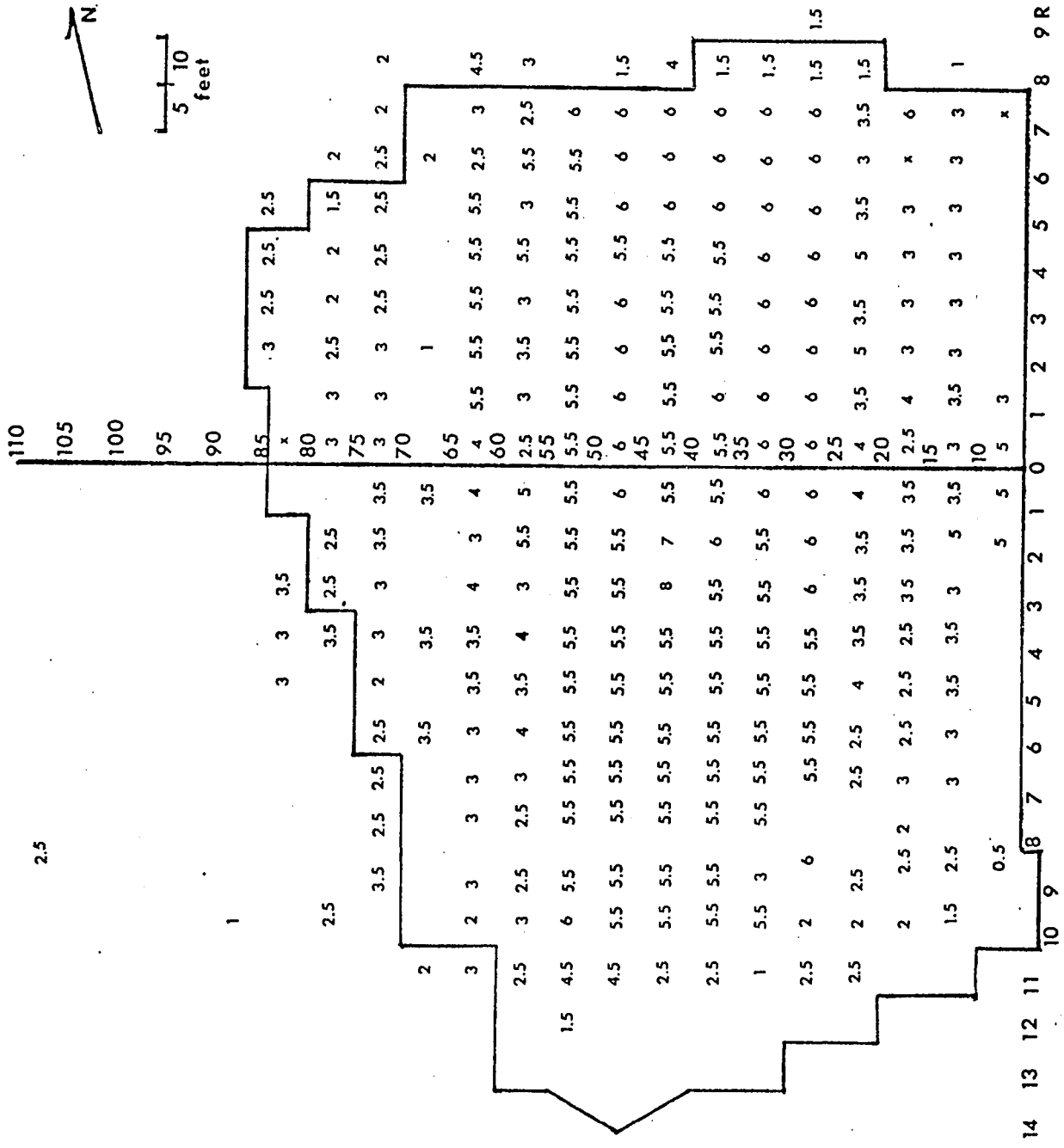



Fig. 13. Artifact Occurrence Map Noting Maximum Depth of Recorded Artifacts, Be 8

limits of excavation shown on the plan map. It also seems likely that artifacts found when the edges of the excavation were extended to uncover the three postmold patterns, Features 13 and 17, were not recorded. Thus the artifact-occurrence map shows no artifacts found in squares 20L12 through 45L12 and 30L13 through 55L13, despite the observation made in another connection in the field notes that the mound was surrounded by midden.

Two parts of Be 22, the midden between the two mounds (Fig. 10), were excavated using the same techniques used for Be 8, arbitrary six-inch levels dug by grids, which in this case were 5 by 10 foot rectangles rather than 5 by 5 foot squares. The same datum point was used, with the north-south lines given negative numbers since they lay on the eastern or negative side of the zero north-south coordinate (Fig. 10). The northern midden excavation was labeled Be 22R and the southern Be 22L. The excavated area in the right segment was 115 by 40 feet and in the left 190 by 60 feet. The maximum depth reached was 2½ feet, with much of the midden being only 1 to 1½ feet deep (Fig. 14). The datum used for constructing the profiles was 598.5 feet (Fig. 15).

An artifact-occurrence map has been constructed for Be 22 using the same procedure used for Be 8. It shows (Fig. 14) that artifacts were recorded for some parts of the midden not shown as excavated on the field map (Fig. 10). The three profiles that were made of the left portion of the midden excavation show that no natural strata were distinguished except for the midden itself and undisturbed soil (Fig. 15). Two features, one of which consisted of twelve separate burned areas, and one burial were found. The excavators made no plan map to show the entire midden excavation, but a partial plan was drawn of the left side, showing a "typical" area of Be 22 (Fig. 16). Almost 10,000 potsherds, as well as approximately 350 other artifacts, were recovered from the midden.

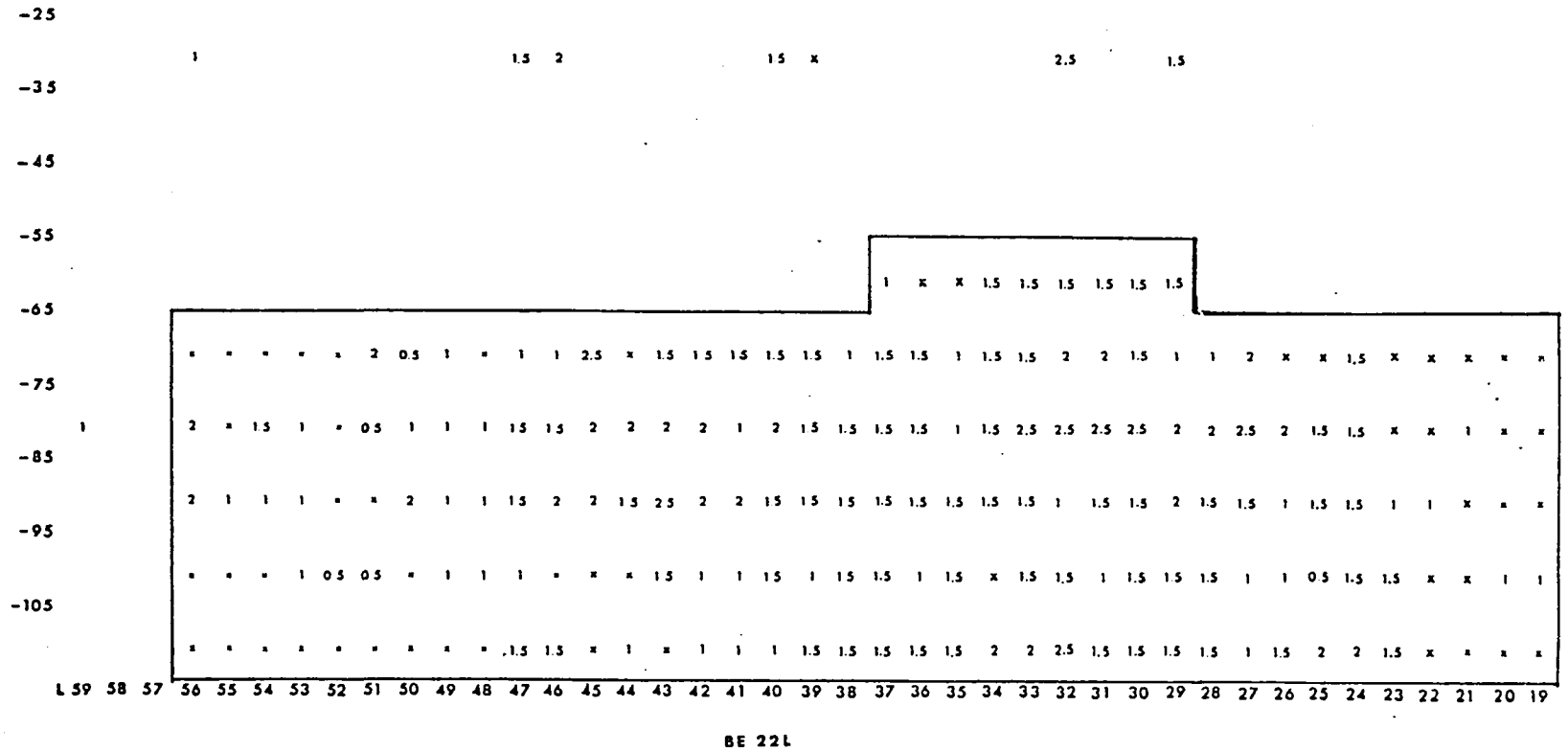



Fig. 14a. Artifact Occurrence Map Noting Maximum Depth of Recorded Artifacts, Be 22

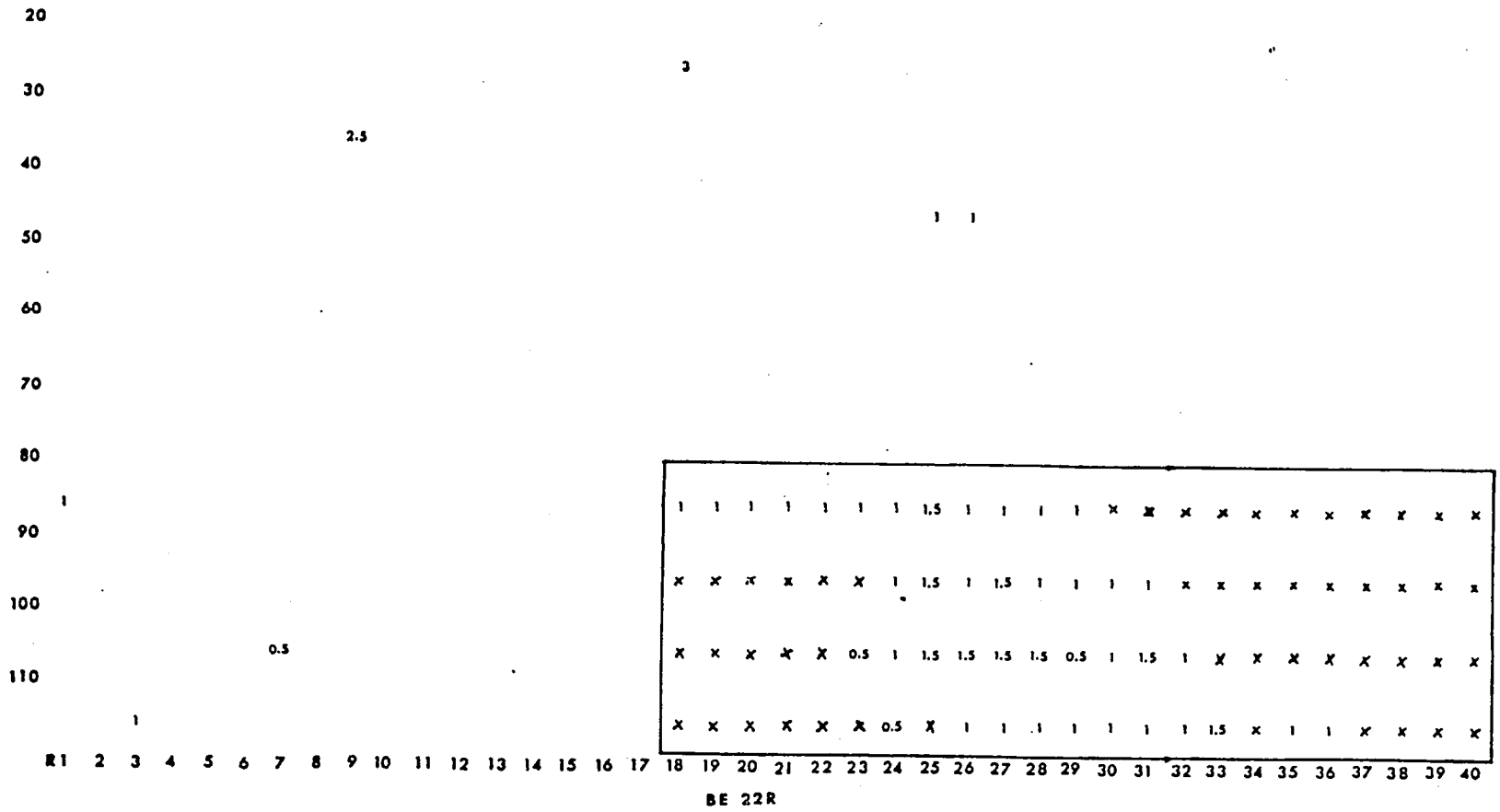



Fig. 14b. Artifact Occurrence Map Noting Maximum Depth of Recorded Artifacts, Be 22

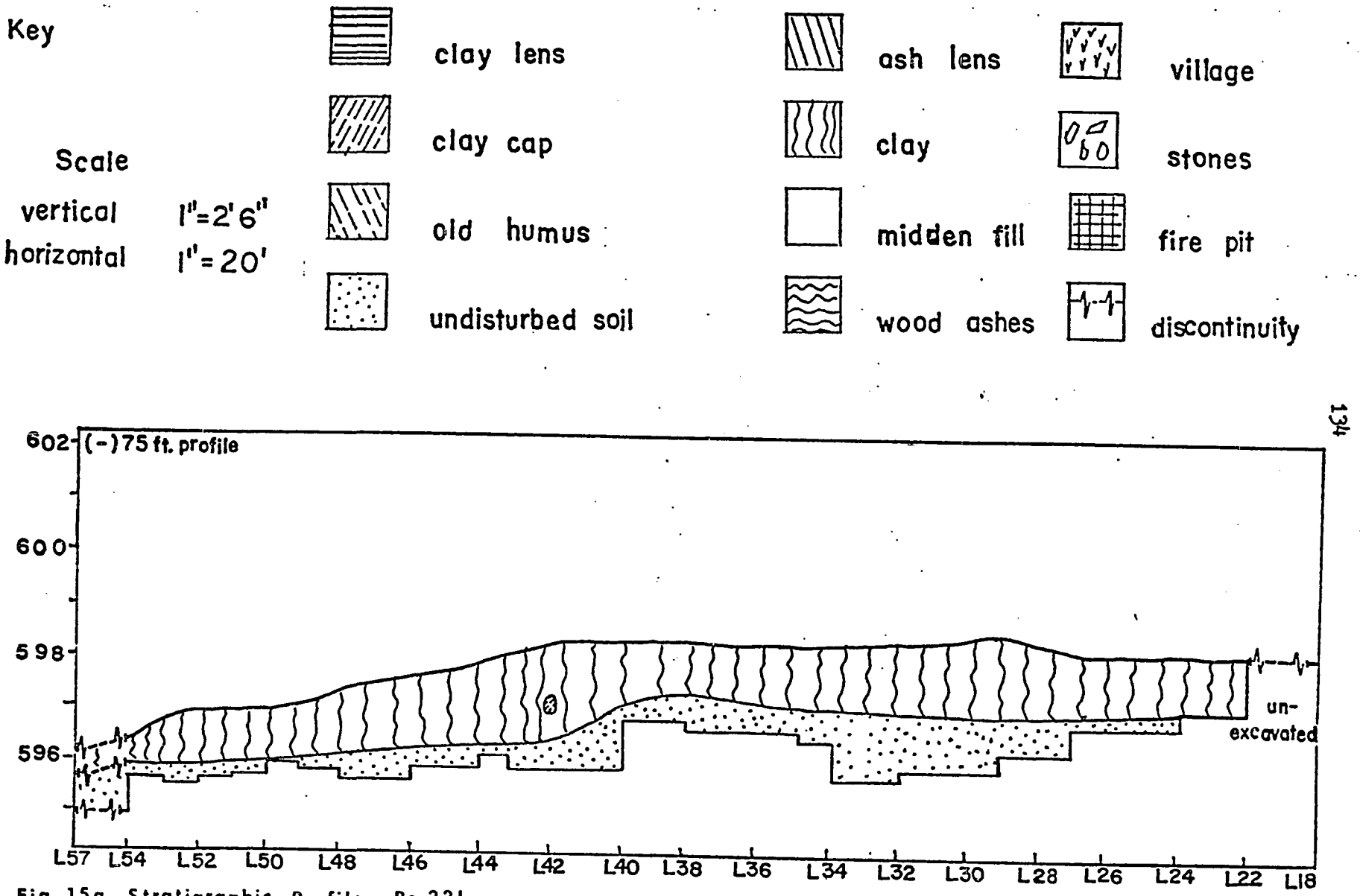



Fig. 15a. Stratigraphic Profiles, Be 22L

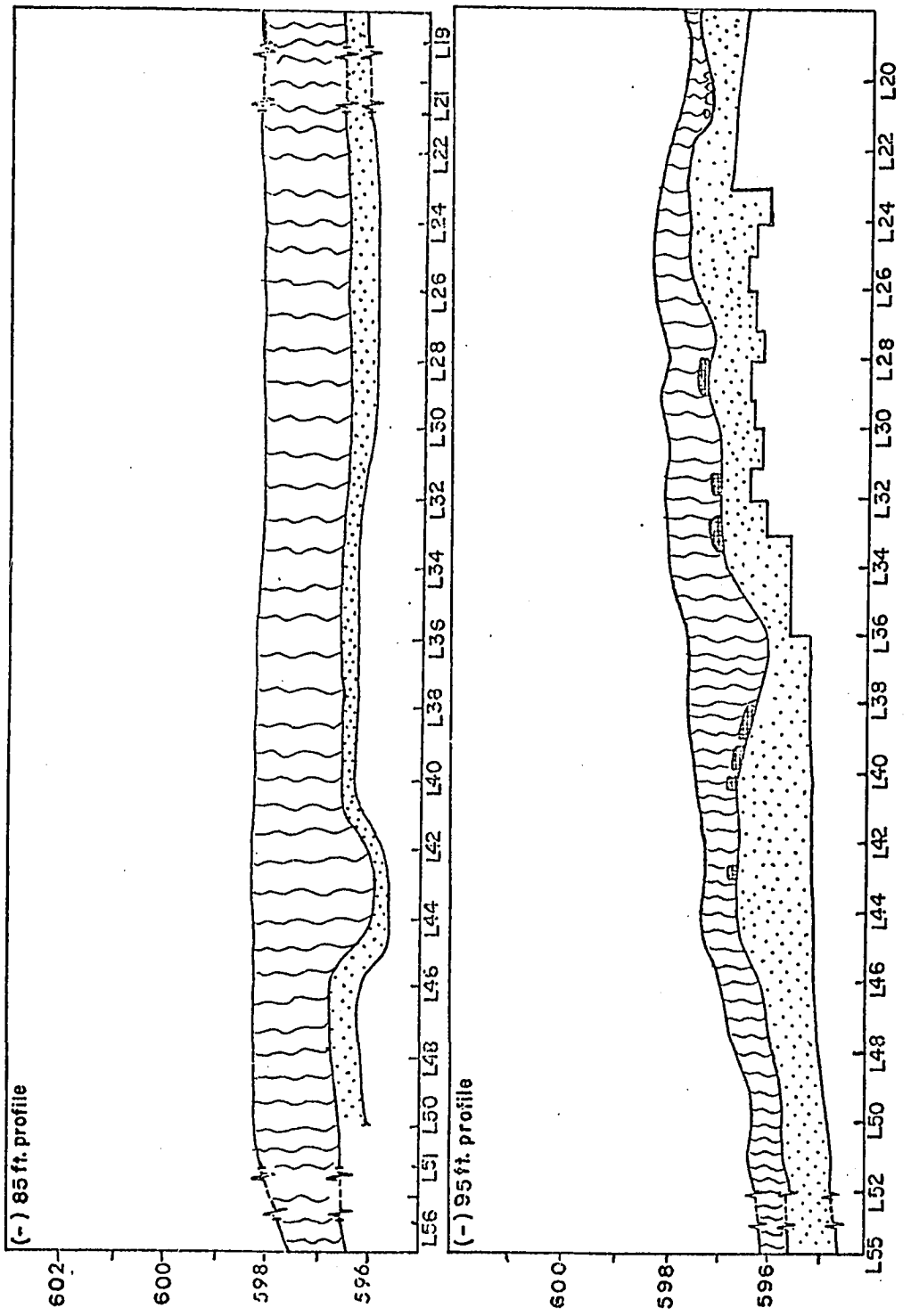



Fig. 15b. Stratigraphic Profiles, Be 22L

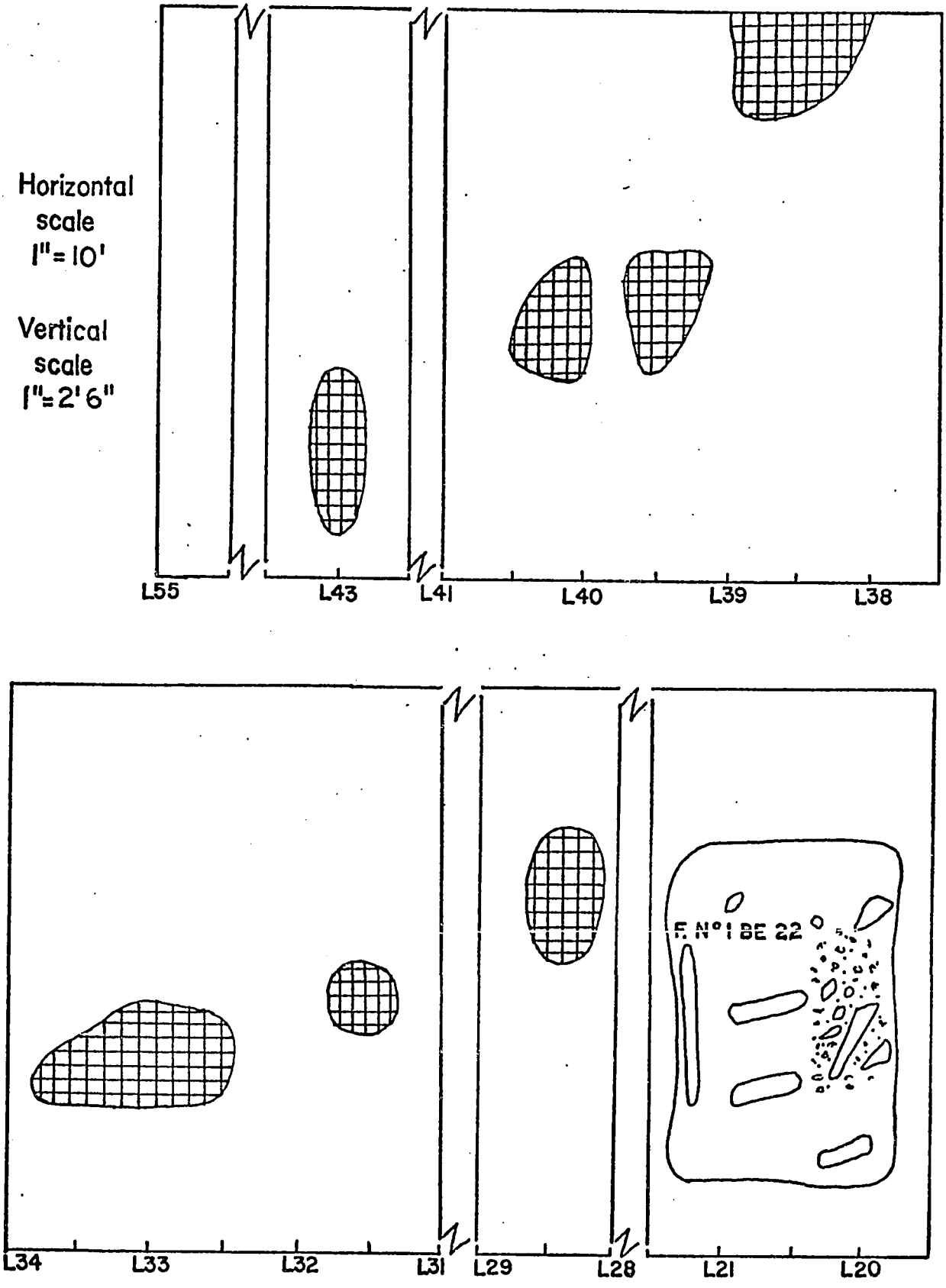



Fig. 16. Sample Plan, Be 22

## Recording the Collection

Analysis of the artifacts from the Cleek-McCabe site began with recording the excavated collection. Some of the artifacts were discarded in the field or before they could be catalogued: two major categories, waste flakes and animal bones, are missing from the collection. Apparently, only pottery and shaped artifacts made of other materials were consistently saved. The description of the site is affected by this, and some potentially useful information on its internal structure is lost. Functional analyses especially suffer because the few hundred shaped artifacts do not provide a very large sample. In the face of a dearth of functional studies in the literature, as well as the frequent omission of descriptive information on waste flakes and animal bones found at other sites, the biased assemblage from Cleek-McCabe is not as important in examining the hypotheses of Ft. Ancient origins as it is in the description of the collection.

The general plan of analysis employs dimensions that are cultural modes or types (Rouse 1939; Dunnell 1971), chosen for their usefulness in solving specified problems. Modes can be used singly, without being combined into types, for the same purposes. Pottery types formed by intersecting the attributes of three dimensions, temper, surface finish, and decoration, were applied during initial recording of the collection, which was done at the University of Kentucky. The procedure produces types such as shell tempered plain incised and limestone-shell tempered cordmarked undecorated (Appendix I). Temper, surface finish, and decoration were chosen as the best ceramic dimensions to record because their worth as historical styles has been demonstrated by their successful use in seriations of Ohio and Kentucky ceramics (e.g., Dunnell 1961; Prufer 1965; Hanson 1966; Dunnell 1972).

Since establishing a temporal sequence is an important part of solving the problem of Ft. Ancient origins in the region under study, styles that have a proven value in seriation are most likely to be useful. Also, these types correlate in a general way with established Ft. Ancient pottery types, which are often based on temper and surface treatment modes.

Other aspects of the pottery and other artifacts were recorded initially without being incorporated into formal types since no other attributes had been previously established as pertinent to the kinds of problems addressed here. However, the variety of data recorded was sufficient to allow a number of attributes to be discriminated if they showed promise of being useful.

Not all of the information recorded about the Cleek-McCabe collection is used, but only the part that proved to have utility in the stylistic and functional analyses pertinent to the problem. Dimensions useful for these purposes had to be discovered by attempting to employ a variety of modes and types until appropriate ones were found. The previous experience of other workers was helpful, as it had been in formulating the pottery classification. For example, Dragoo (1963) lists a number of attributes, including log tombs, circular structures under mounds, and certain kinds of projectile points or blades that appear to have temporal significance within Adena; a number of these proved useful in establishing a chronology in the present study.

## Internal Structure of the Site

Because the artifacts represent a "transition" between two known sets of material, broadly Woodland and Ft. Ancient, it is desirable to establish how much of the data from the Cleek-McCabe site is pertinent to the problem of Ft. Ancient origins. If important continuities run through all parts of the site, all of the data is relevant, while discontinuities may dictate that some of the information be discarded as not germane. The number of components present is not of immediate concern since that is determined by phase-level classification, which is not used in the analytic part of this study.

It must be shown that the assemblage is coherent, not the result of a mechanical mixture of two or more unrelated groups of artifacts. Such a mixture could well be created aboriginally during deposition or by the use of arbitrary excavation levels in a multi-occupation site. In the absence of distinct occupations noted during the field work, it is necessary to examine the artifacts of known provenience and reconstruct their relationships prior to excavation. The smallest unit which can be used to accomplish this is 5 by 5 feet by 6 inches in the mound and 5 by 10 feet by 6 inches in the two midden areas.

### The mound: description of constructional features

The visible structure of Be 8 (Fig. 12) suggests that it was built in stages. However, the strata are difficult to interpret because the profiles cover only the middle section of the excavation and are accompanied by only sketchy descriptions. For example, two lenses, one clay and one ash, appear on the right side of the profiles of the 40, 45, and 50 foot cuts. On the 35 foot profile there is an unexplained line in the same area and a similar line on the left side (Fig. 12). On the 30 and 55 foot cuts, no trace of

the lenses appears. The field notes indicate that these strata were first noticed in the 40 foot profile and could not be explained except as possibly being part of a primary structure for which there was no other evidence. A clay cap similarly appears in only the 45 foot profile (Fig. 12), although according to the field notes it was also noticed in the 35 and 55 foot profiles. Whether this cap appeared in the intervening cuts is not known. In the field notes Johnston interprets it as a cap covering the top of the mound. Most of Be 8 is described as filled with "midden material," consisting of large quantities of bone, shell, pottery, and flint.

Within the mound, two kinds of constructions, features and burials, are distinguished. Burials are those that contain human skeletal remains, and features comprise all the remaining non-portable artifact associations. These are traditional archaeological classes and have also been used by the excavators of Cleek-McCabe, although not very consistently.

The features are separated into functional classes on the basis of three dimensions, their constituent material, whether they show signs of burning, and the presence or absence of a constructed border (Fig. 17). Seventeen features were given field numbers; however, several of these contain more than one element that in other cases were treated by the excavators as separate features. For example, Feature 2 has four elements while Feature 1, which is otherwise similar, has only one (Fig. 11). The several cases in which similar features have been grouped together under one number are listed in Fig. 17 by their original number, followed by a parenthetical notation of the number of elements in each. The grouping of the component parts of Features 13-inner, 13-outer, and 17 into features is less fortuitous than in the other cases since the spatially separate elements form artificial patterns that show them to be related. Features

| Construction material | Evidence of burning | Border | |
|---|---|---|---|
| | | constructed border | no constructed border |
| rock | unburned | | 6, 15, 23, 24, 25<br>IV |
| | burned | | |
| earth | unburned | unnumbered (54)<br>7, 13-inner (111)<br>I 13-outer (113)<br>17 (68), 20, 21, 22 | |
| | burned | 4, 16<br>II | 1, 2 (4), 3 (8), 8<br>V 9, 10, 11, 14, 18<br>19, Be 22-2 (12) |
| wood | unburned | | |
| | burned | 12<br>III | 5, Be 22-1<br>VI |

Fig. 17. Classification of Features, Be 8 and Be 22

18 through 24 (Fig. 11) and 25 (Fig. 12) were not assigned field numbers. Feature Types I through VI are illustrated in Figs. 18-23 by members of each.

To clarify the relationships of the numerous members of Feature Type I, they are reclassified using the dimensions length and diameter, which were recorded upon excavation (Table 3). The Type I features, referred to as holes, that delineate Features 13 and 17 are tabulated separately (Table 3). The distribution of holes by length and diameter is very similar for the two rectangular structures that make up Feature 13, while Feature 17 contains smaller, shallower holes on the average (Table 3). The holes labeled "other" include all those that fall outside or inside the patterns defined by Features 13 and 17. There are 58 such holes (Fig. 11), among them Features 7, 20, 21, and 22. With the exception of these four features, their length-diameter distribution is similar to that of the holes forming Feature 17, suggesting that most of them are contemporary with it. Since none of these small holes were numbered on the original plan map, it isn't possible to match the measurements with specific holes. All of the miscellaneous holes are inside the inner line of Feature 13 (Fig. 11).

The notes and photos show that the small holes, all those except Features 7, 20, 21, and 22, are blunt-bottomed, with parallel or slightly converging sides. One, Feature 12, held a charred post, probably preserved because it was burned, as the only wood preserved at the site was charred (Fig. 17). It can be inferred that the other small holes also once held posts that were removed or have since decayed. One of the holes on the north side of Feature 13-inner had a rock in the edge of it, perhaps acting to help support the post that occupied it.

The other four holes, Features 7, 20, 21, and 22, do not fall in the size range of those from Features 13 and 17 (Table 3), being much larger and deeper. There is a suggestion in the field notes that these features

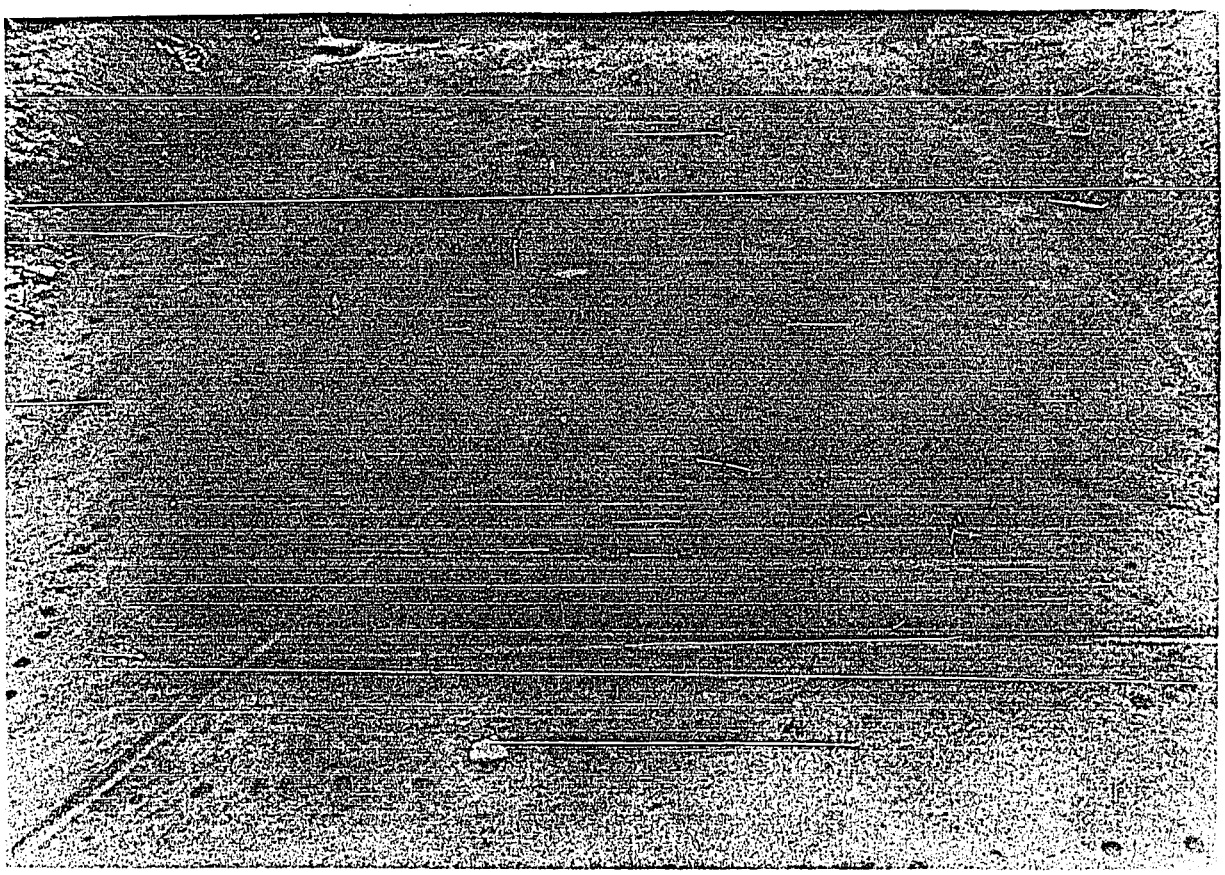


Fig. 18. Feature Type I, Showing Features 13, 17, 7, 21, and 22

Fig. 19. Feature Type II, Feature 4

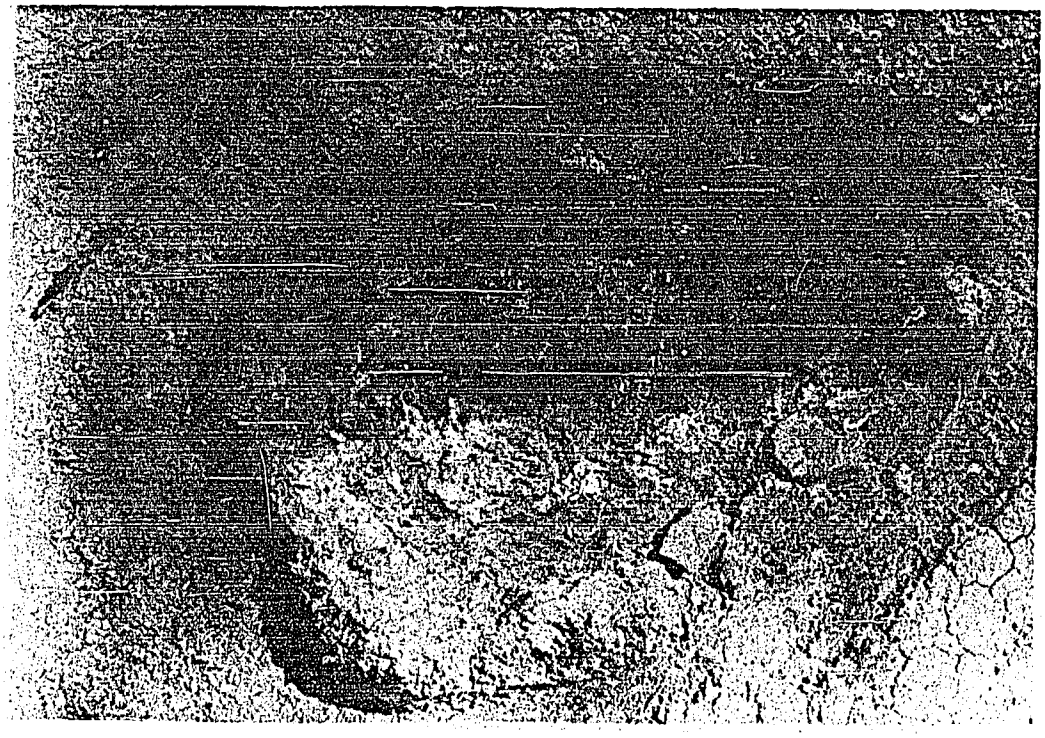


Fig. 20. Feature Type III, Feature 12

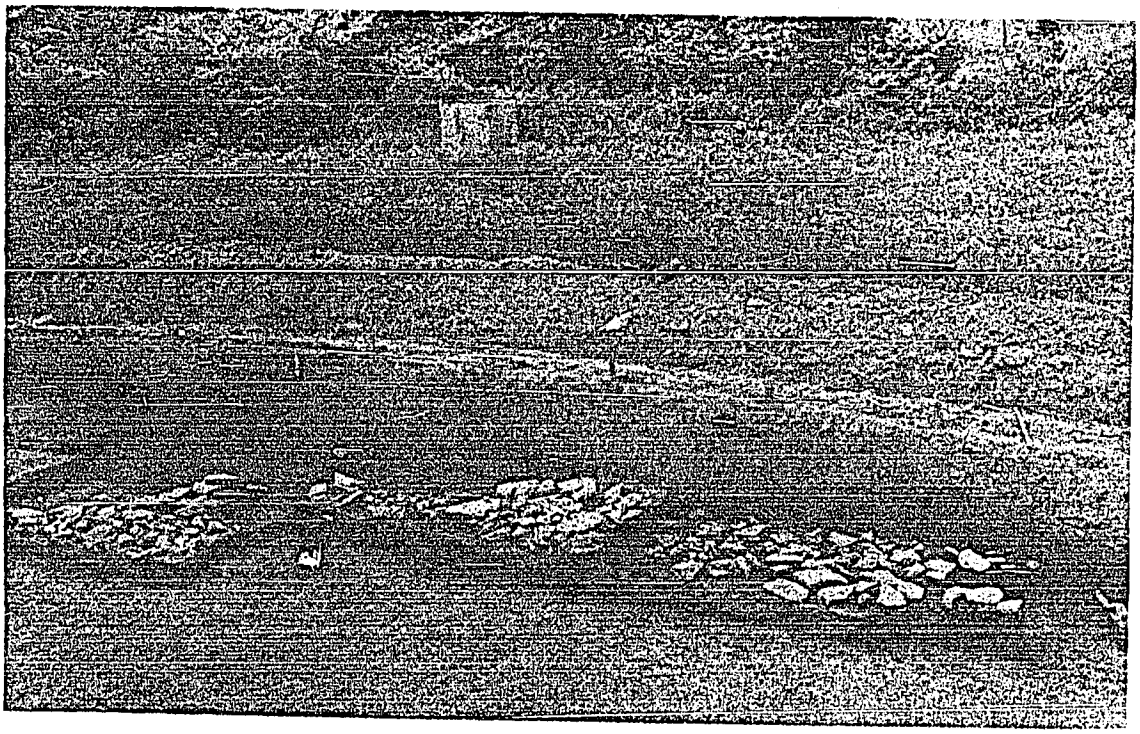


Fig. 21. Feature Type IV, Feature 15

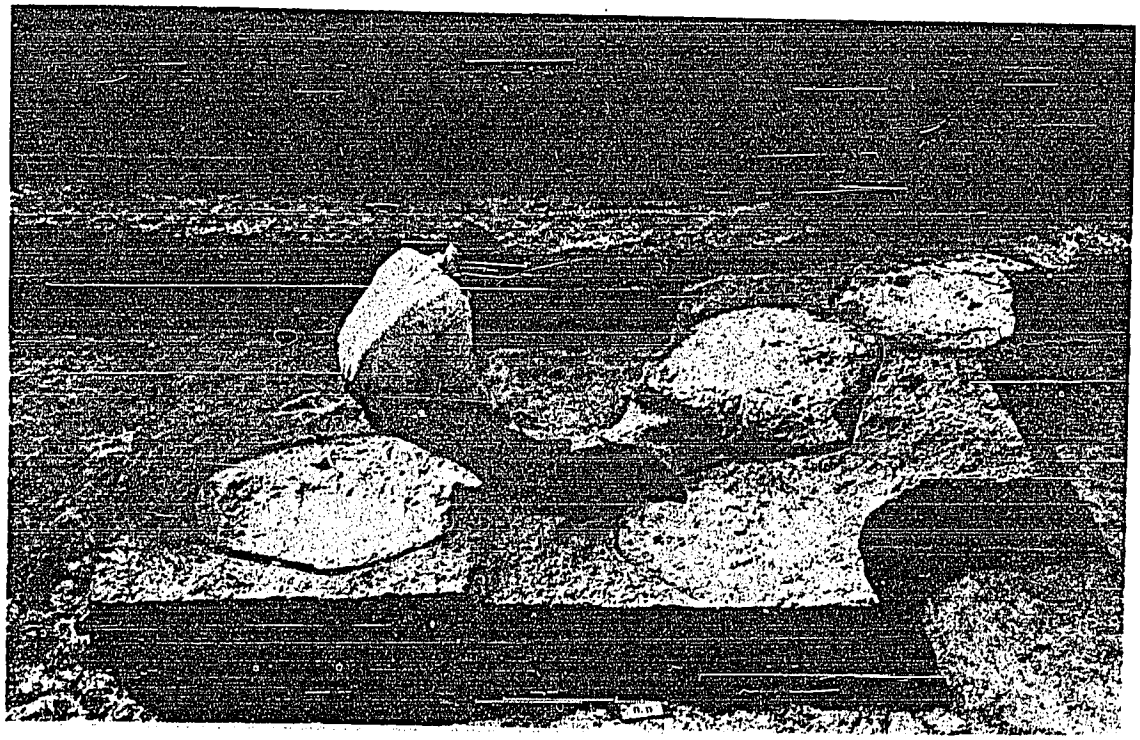


Fig. 22. Feature Type V, Feature 2

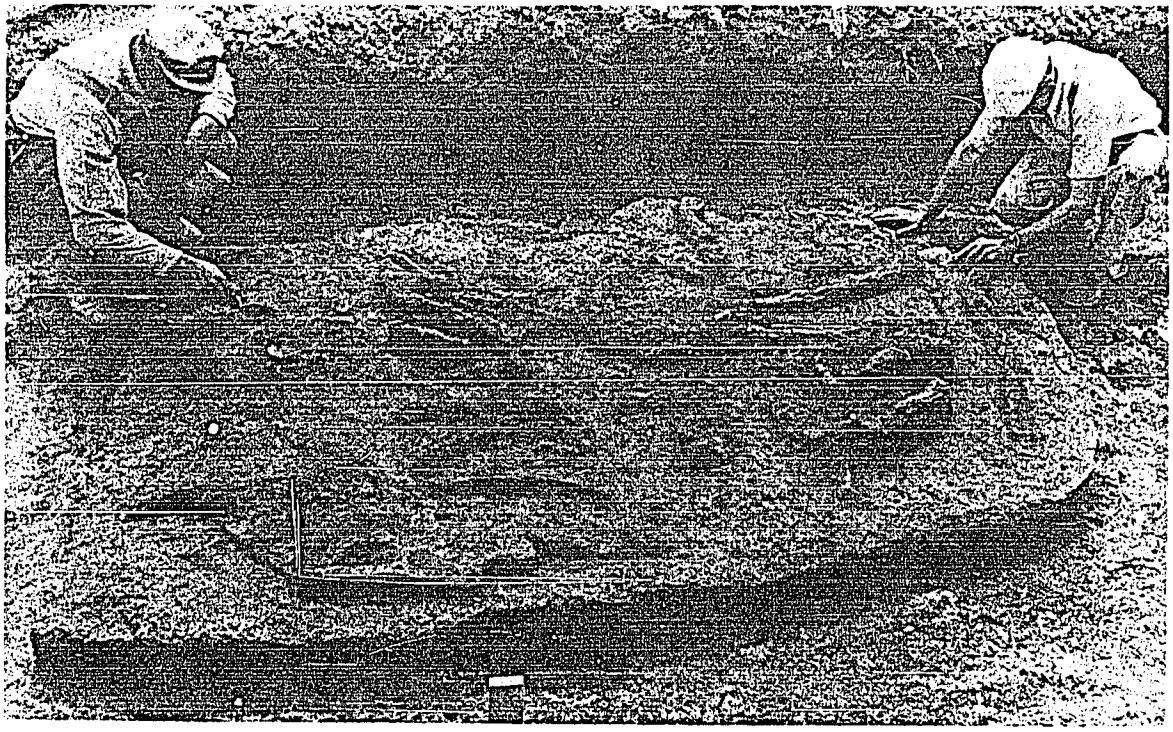


Fig. 23. Feature Type VI, Feature Be 22-1

Table 3. Classification of holes, Feature Type I, Be 8.

| | | Diameter (feet) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.00-0.49 | | 0.50-0.99 | | 1.00-1.49 | | 1.50-1.99 | | 2.00-2.49 | | 2.50-2.99 | |
| Length (feet) | | # | % | # | % | # | % | # | % | # | % | # | % |
| 0.00-0.49 | | | | | | | | | | | | | |
| | F13-inner | 2 | 1.80 | 1 | 0.90 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 2 | 1.77 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 44 | 64.71 | 3 | 4.41 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 24 | 41.38 | 13 | 22.41 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 0.50-0.99 | | | | | | | | | | | | | |
| | F13-inner | 13 | 11.71 | 12 | 10.81 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 10 | 8.85 | 11 | 9.73 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 19 | 27.94 | 2 | 2.94 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 9 | 15.52 | 6 | 10.34 | 0 | 0.00 | 1 (F20) | 1.72 | 0 | 0.00 | 0 | 0.00 |
| 1.00-1.49 | | | | | | | | | | | | | |
| | F13-inner | 4 | 3.60 | 64 | 57.66 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 17 | 15.04 | 58 | 51.33 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 1 | 1.72 | 1 | 1.72 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 (F21) | 1.72 |
| 1.50-1.99 | | | | | | | | | | | | | |
| | F13-inner | 1 | 0.90 | 14 | 12.61 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 1 | 0.88 | 14 | 12.39 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 (F22) | 1.72 | 0 | 0.00 |
| 2.00-2.49 | | | | | | | | | | | | | |
| | F13-inner | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| 2.50-2.99 | | | | | | | | | | | | | |
| | F13-inner | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F13-outer | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | F17 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| | other | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 1 (F7) | 1.72 | 0 | 0.00 |
| total | | | | | | | | | | | | | |
| | F13-inner | 111 | | | | | | | | | | | |
| | F13-outer | 113 | | | | | | | | | | | |
| | F17 | 68 | | | | | | | | | | | |
| | other | 58 | | | | | | | | | | | |

originally held large posts that supported a ridgepole. Of the large holes, Feature 21 exhibits a pronounced point at the bottom (Fig. 24) and Feature 22 was either blunt or slightly pointed. The shape of Feature 20 is not noted and Feature 7 was dug out before it could be sectioned. Feature 21 had limestone slabs stacked in it (Fig. 24). Features 7, 21, and 22 form a line centered in the middle of Features 13 and 17, with Feature 20 slightly off-center to the west of Feature 7 (Fig. 11). Features 21 and 22 are on the line of small holes forming Feature 17, but there is no indication in the notes whether they appeared to be contemporary with Feature 17. From the shape, depth, position, point of origin, and presence of rocks in the holes, it can be argued that Features 7, 20, 21, and 22 are postholes, larger versions of the small holes.

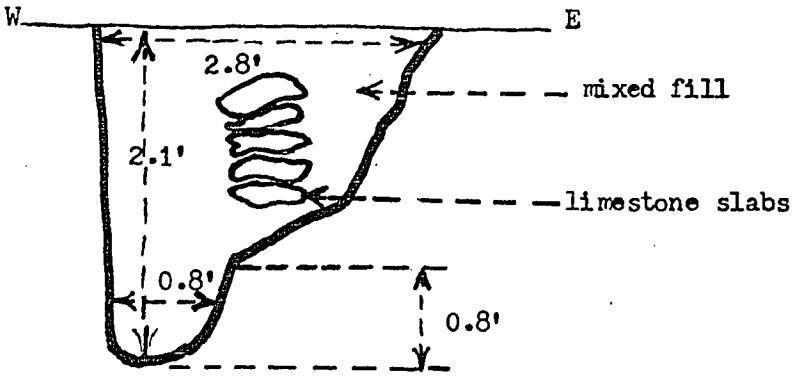



Fig. 24. Cross-section of Feature 21, Be 8

The three large structures that are delineated by postmolds, Features 13-inner, 13-outer, and 17, may have originated at different levels within the Old Humus zone that underlies the mound. The two lines of posts in the rectangular structure, Feature 13, appear to have been contemporaneous because most of the molds in both lines originated in the Old Humus (O.H.) zone, according to the field notes. Feature 17, the circular postmold pattern, was not discerned by the excavators until undisturbed soil was reached. This might indicate that these postholes were dug before those

in Feature 13. However, they are very shallow, having been mostly cut away before they were visible. They vary from .1 to .9 feet deep, with a mean of .4 feet, while the outer series of holes in Feature 13 are from .5 to 1.8 feet deep and the inner series from .2 to 1.7 feet, with means of 1.14 and 1.13 feet respectively. The differences in depths between the holes forming Features 17 and 13 can be accounted for partly by the fact that many of the circular structure's postholes were identified at lower levels than those from Feature 13. The excavation photographs also show that the molds of Feature 17 end at a higher level than those from either rectangular line (Fig. 25). This could mean that they originated from a higher level and thus are not as old as those in Feature 13 or that they were never as deep. The three structures are placed symmetrically within one another (Fig. 11), which suggests that they are all contemporaneous, or at least nearly enough so that the location of one influenced the location of the others.

The 21 burials found in the mound are tabulated according to burial position and stratum where discovered (Table 4). Bundle burials (Fig. 26) have most or all bones present but disarticulated and placed in a pile. Extended burials are those with the legs and body in line and the legs straight (Fig. 27) and flexed burials have the legs bent (Fig. 28). The position of the legs cannot be ascertained for five burials (Fig. 29); they are not assigned to any category, but are listed as unidentified.

The mound: continuity of construction

If the construction stages indicated by the apparent stratification were separated by appreciable periods of time, there is a possibility that Be 8 contians several disparate groups of artifacts. Patterning in the mound artifacts that is a result of differences in time of deposition is

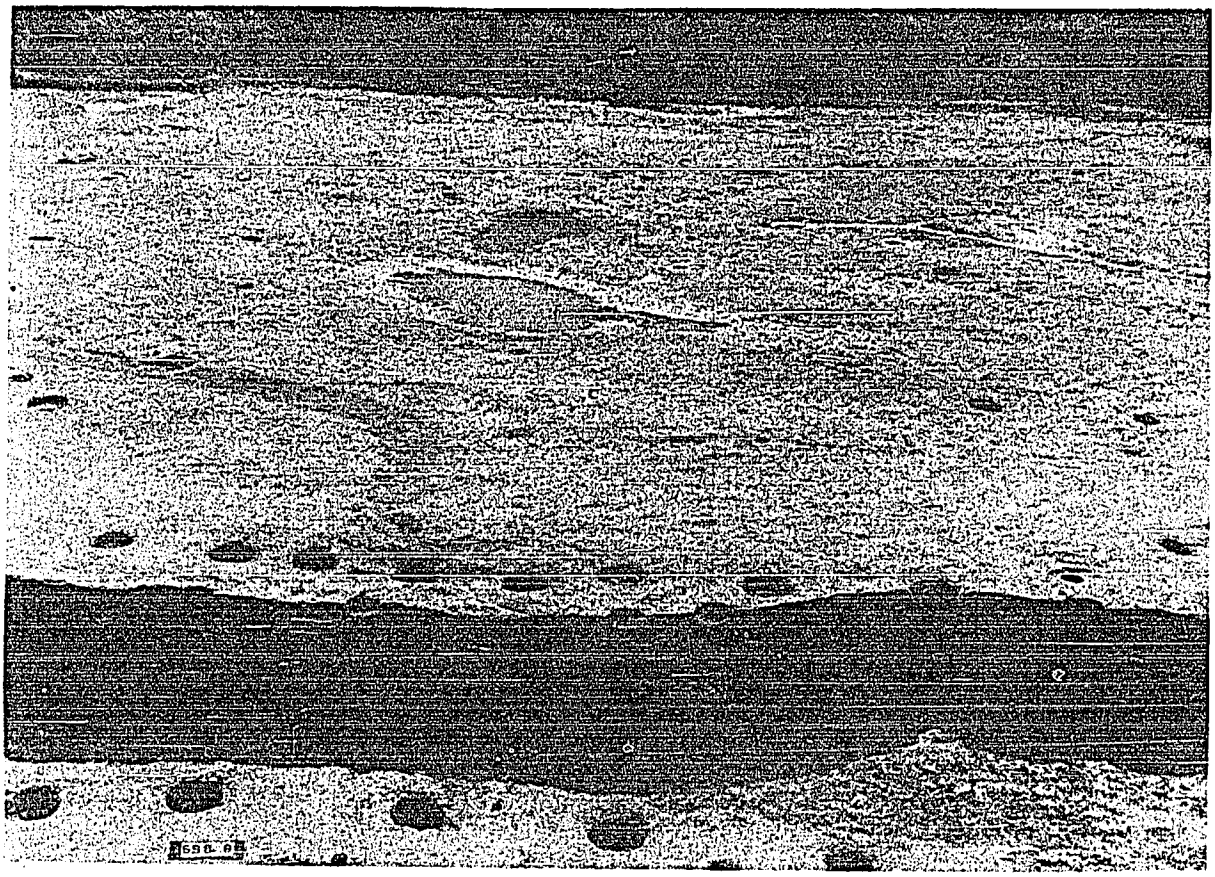


Fig. 25. Differential Depths of Postmolds
Shallow holes belong to Feature 17 and deeper holes to Feature 13 Inner.

Table 4. Tabulation of burials by burial position and stratum.

| Burial | Nearest stake | Pit | Stratum and position | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | plow zone | | | | directly under plow zone | | | | on or below O.H. zone | | | | unlocated | | | |
| | | | E | F | B | U | E | F | B | U | E | F | B | U | E | F | B | U |
| 1 | 65L4 | ? | | X | | | | | | | | | | | | | | |
| 2 | 30L8 | | X | | | | | | | | | | | | | | | |
| 3 | 35L2 | | X | | | | | | | | | | | | | | | |
| 4 | 40R8 | | | | | | | | | | X | | | | | | | |
| 5 | 25R9 | | | | | | X | | | | | | | | | | | |
| 6 | 40-0 | | X | | | | | | | | | | | | | | | |
| 7 | 40L1 | | | X | | | | | | | | | | | | | | |
| 8 | 30R9 | ? | | | | | | | | | | | | | | X | | |
| 9 | 45L1 | | | | X | | | | | | | | | | | | | |
| 10 | 40R1 | | | X | | | | | | | | | | | | | | |
| 11 | 45R7 | ? | | X | | | | | | | | | | | | | | |
| 12 | 50R8 | | | X | | | | | | | | | | | | | | |
| 13 | 50R1 | | | | | | | X | | | | | | | | | | |
| 14 | 50R8 | ? | | | | | | | | | | X | | | | | | |
| 15 | 55R4 | | | | | | X | | | | | | | | | | | |
| 16 | 55L5 | | | | | | | X | | | | | | | | | | |
| 17 | 45R2 | | | | | | | X | | | | | | | | | | |
| 18 | 55L10 | | | | | | | | | | X | | | | | | | |
| 19 | 75-0 | | | | | | | | | | | | | | | X | | |
| 20 | 30L9 | | | | | | | | | | X | | | | | | | |
| 21 | 25L10 | | | | | | | | | | X | | | | | | | |

E-extended, F-flexed, B-bundle, U-unidentified

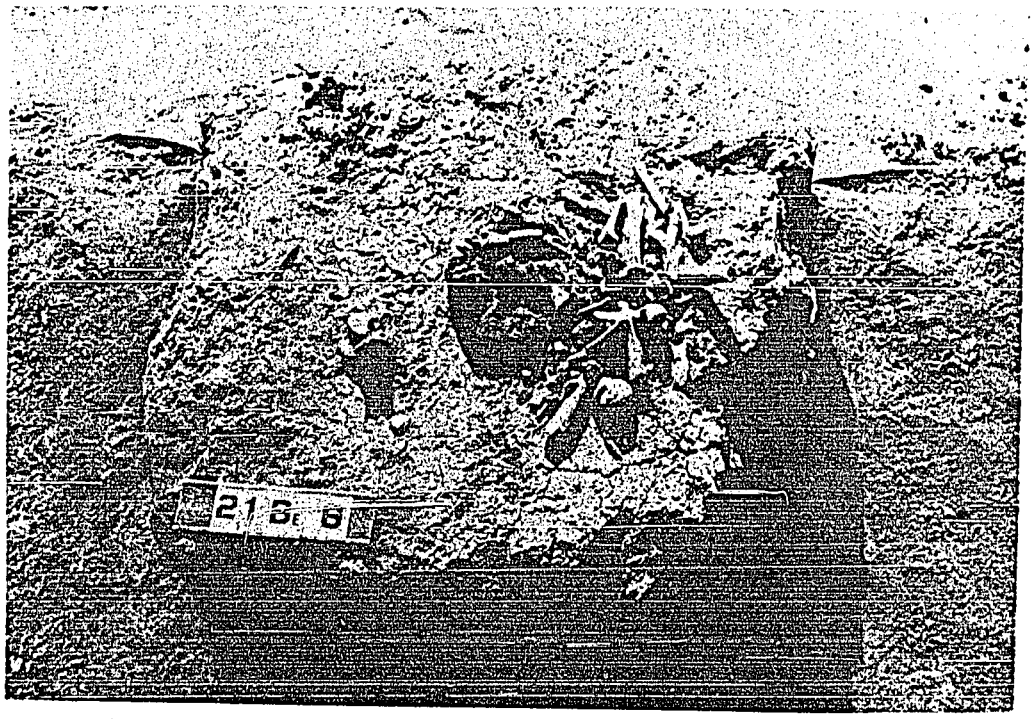


Fig. 26. Bundle Burial, Burial 16

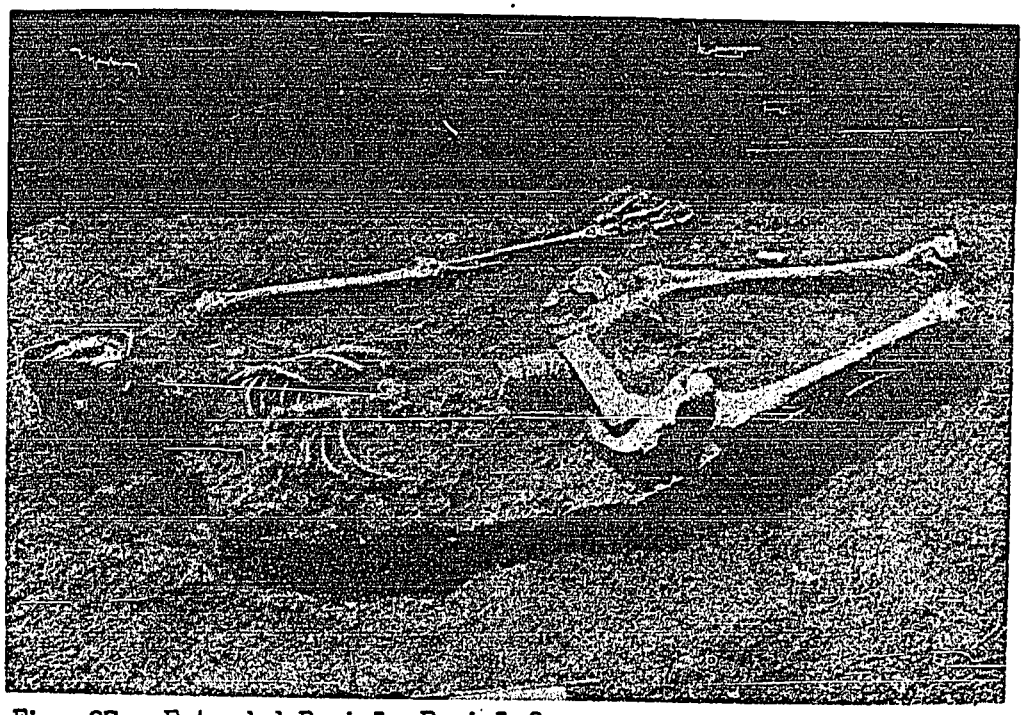


Fig. 27. Extended Burial, Burial 2

Fig. 28. Flexed Burial, Burial 18

Fig. 29. Unidentified Burial, Burial 17

tested for by drawing samples of pottery from the arbitrary levels. They must be taken from the middle of the mound where profiles are available (Fig. 12) so that frequency patterns can be understood in context of the visible strata.

Three areas were chosen to sample, one in the center and one each on the left and right edges of the mound (Table 5). Within each sample, the division of excavation units into arbitrary levels is preserved so that the same squares can be compared across levels to show any regular change in frequency of the pottery types with depth in any of the three parts of the mound. The samples are also comparable horizontally within each arbitrary level, allowing temporal changes that result from the slanting deposition of the strata (Fig. 12) to be reflected. A regular monotonic change in the type frequencies is expected if the strata were deposited at significantly different times.

None of the three samples shows regular change in the percentages of types vertically through the arbitrary levels (Table 5). Neither are the relationships between types constant; instead, they vary without pattern, indicating a lack of temporal significance. The same holds true for the horizontal relationships of the samples, compared either level by level or as a whole (Table 5). The order given the samples for horizontal comparison is determined by the direction in which the visible strata slant, indicating that, at least for the 40, 45, and 50 foot profiles, Sample 1 must have been deposited first (Fig. 12). The mound obviously had both vertical and horizontal structure, although it was inadequately recorded by the W.P.A. excavators. However, the visible layers apparently do not represent appreciably different periods of construction.

None of the samples contain enough sherds from the levels making up the Old Humus zone, mainly lying at a depth of 4 to 5.5 feet, to be sure that

Table 5. Percentages of pottery types in three samples drawn from Be 8.

| Pottery type | Level (feet) 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | tot. | % of grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sh cm | | | | | | | | | | | | |
| S1 % | 15.7 | 7.1 | 11.1 | 14.8 | 11.3 | 22.8 | 6.2 | 22.2 | 47.0 | 0.0 | 140 | 15.5 |
| S2 % | 0.0 | 9.5 | 18.3 | 5.1 | 15.3 | 14.4 | 14.5 | 11.6 | 16.6 | 13.9 | 133 | 13.4 |
| S3 % | 0.0 | 14.6 | 16.4 | 16.0 | 19.1 | 12.0 | 33.3 | 28.5 | 0.0 | 0.0 | 207 | 16.8 |
| sh pl | | | | | | | | | | | | |
| S1 % | 10.5 | 10.7 | 50.5 | 43.9 | 37.8 | 41.5 | 43.7 | 40.0 | 35.2 | 0.0 | 378 | 41.8 |
| S2 % | 0.0 | 33.3 | 21.5 | 32.4 | 44.3 | 26.1 | 36.8 | 35.4 | 22.9 | 32.5 | 320 | 32.3 |
| S3 % | 0.0 | 36.5 | 32.8 | 30.4 | 27.8 | 20.6 | 16.6 | 28.5 | 0.0 | 0.0 | 376 | 30.5 |
| ls cm | | | | | | | | | | | | |
| S1 % | 5.2 | 7.1 | 4.2 | 3.2 | 2.2 | 2.3 | 1.2 | 0.0 | 0.0 | 0.0 | 26 | 2.9 |
| S2 % | 33.3 | 3.1 | 5.2 | 5.1 | 5.6 | 6.3 | 1.9 | 1.1 | 0.0 | 2.3 | 35 | 3.5 |
| S3 % | 0.0 | 4.2 | 1.0 | 0.4 | 5.9 | 3.4 | 6.6 | 0.0 | 0.0 | 0.0 | 29 | 2.3 |
| ls pl | | | | | | | | | | | | |
| S1 % | 10.5 | 7.1 | 7.9 | 4.9 | 3.7 | 3.7 | 2.5 | 0.0 | 0.0 | 0.0 | 43 | 4.8 |
| S2 % | 0.0 | 6.3 | 10.4 | 2.5 | 6.4 | 1.8 | 3.8 | 9.8 | 6.2 | 4.6 | 67 | 6.8 |
| S3 % | 33.3 | 2.4 | 5.4 | 2.1 | 1.8 | 3.4 | 0.0 | 14.2 | 0.0 | 0.0 | 38 | 3.1 |
| ls-sh cm | | | | | | | | | | | | |
| S1 % | 36.8 | 28.5 | 7.9 | 11.5 | 8.3 | 9.3 | 15.0 | 15.5 | 0.0 | 0.0 | 101 | 11.1 |
| S2 % | 33.3 | 15.8 | 16.9 | 16.8 | 9.6 | 16.2 | 15.5 | 4.1 | 16.6 | 6.9 | 118 | 11.9 |
| S3 % | 33.3 | 14.6 | 9.5 | 10.8 | 15.9 | 17.2 | 30.0 | 0.0 | 0.0 | 0.0 | 157 | 12.7 |
| ls-sh pl | | | | | | | | | | | | |
| S1 % | 21.0 | 39.2 | 18.0 | 21.4 | 36.3 | 20.0 | 31.2 | 22.2 | 17.6 | 0.0 | 217 | 24.0 |
| S2 % | 33.3 | 31.7 | 27.4 | 37.6 | 18.5 | 35.1 | 27.1 | 37.7 | 37.5 | 39.5 | 317 | 32.0 |
| S3 % | 33.3 | 27.4 | 34.5 | 40.0 | 29.2 | 43.1 | 13.3 | 28.5 | 0.0 | 0.0 | 426 | 34.5 |
| total | | | | | | | | | | | grand total | |
| S1 | 19 | 28 | 188 | 182 | 132 | 214 | 80 | 45 | 17 | 0 | 905 | |
| S2 | 3 | 63 | 153 | 77 | 124 | 111 | 103 | 265 | 48 | 43 | 990 | |
| S3 | 3 | 164 | 292 | 460 | 219 | 58 | 30 | 7 | 0 | 0 | 1233 | |

composition of samples:
S1 35R4-35R8, 40R4-40R8
S2 40L1-40L4, 40-0; 45L1-45L4, 45-0; 50L1-50L4, 50-0
S3 45L7-45L11; 50L7-50L11; 55L7-55L11

sh-shell, ls-limestone, cm-cordmarked, pl-plain.

it is not consistently older than the higher strata. That it does not differ consistently is shown by comparing the contents of the excavation units wholly within the Old Humus zone with the rest of Be 8 taken as a unit (Table 6) and with the samples (Table 5). The O. H. zone contains nearly the same percentages of each type as the rest of the mound, indicating that the mound and O. H. zone can be treated as one depositional unit for purposes of comparison with the midden.

The location of features and burials also has some bearing on investigation of the temporal homogeneity of the mound. Apparently only two of the features, Features 7 and 25, originate in the mound fill (Table 7). Feature 7 begins under the clay cap and extends well down into otherwise undisturbed soil (Fig. 12c), while Feature 25 is a group of rocks that is visible in profiles of the 35 and 40 foot cuts (Fig. 12b-c). All the other features either were dug from the surface, as is the case with Feature 4 according to the field notes, or originate on, in, or under the Old Humus zone (Table 7). This is consistent with the contention that the mound was built rapidly, since it suggests that all but two of the features either existed before the mound was built or were dug into it after it was complete.

Feature 25 is contemporary with the original mound construction, as indicated by the fact that Burial 10 partly overlays it (Fig. 12c). In the field notes it is described as follows: "There appeared at stake 40 to 40R2 a large lens or pile of limestone rocks. This pile of rocks was almost all rocks as there was very little soil between them." Since it is associated with the slanting clay and ash lenses that extend through the middle of the mound (Fig. 12c-d), this rock pile is probably structural and not in itself indicative of a hiatus in mound construction.

Feature 7 presents a different problem because it might plausibly be interpreted to indicate a suspension of mound construction. To explore

Table 6. Percentages of pottery types in Old Humus zone and remainder of Be 8.

| | Excavation units | | | |
|---|---|---|---|---|
| Pottery types | Old Humus zone | | remainder Be 8 | |
| | # | % | # | % |
| sh cm | 107 | 18.26 | 1442 | 15.22 |
| sh pl | 232 | 39.59 | 3628 | 38.29 |
| ls cm | 16 | 2.73 | 253 | 2.67 |
| ls pl | 16 | 2.73 | 507 | 5.35 |
| ls-sh cm | 59 | 10.07 | 928 | 9.80 |
| ls-sh pl | 156 | 26.62 | 2708 | 28.58 |
| other | 0 | 0.00 | 8 | 0.08 |
| total | 586 | | 9474 | |

Table 7. Strata of origin of features, Be 8.

| Type | Feature # | Nearest stake | Stratum of origin |
|---|---|---|---|
| I | 7 | 45L2 | below clay cap in mound fill, 2.5 ft. level |
| | 13-inner | | in or below O.H. zone |
| | 13-outer | | in or below O.H. zone |
| | 17 | | below O.H. zone |
| | 20 | 45L2 | in or below O.H. zone |
| | 21 | 35L7 | in O.H. zone |
| | 22 | 50R1 | in or below O.H. zone |
| | unnumbered | | in or below O.H. zone |
| II | 4 | 35L10 | mound surface |
| | 16 | 50L4 | on O.H. zone |
| III | 12 | 60R6 | below O.H. zone |
| IV | 6 | 35L9 | on O.H. zone |
| | 15 | 60R5 | on O.H. zone |
| | 23 | 35R3 | on O.H. zone |
| | 24 | 55-0 | on O.H. zone |
| | 25 | 35R1 | mound fill |
| V | 1 | 15L1 | on O.H. zone |
| | 2 | 10-0 | on O.H. zone |
| | 3 | 30 ft. cut | on O.H. zone |
| | 8 | 50-0 | on O.H. zone |
| | 9 | 55L1 | on O.H. zone |
| | 10 | 60R6 | on O.H. zone |
| | 11 | 15R7 | on O.H. zone |
| | 14 | 15L10 | on O.H. zone |
| | 18 | 30R6 | on O.H. zone |
| | 19 | 30R7 | on O.H. zone |
| VI | 5 | 50L3 | on O.H. zone |

this possibility it is necessary to return to the earlier conclusion that Feature 7 is a postmold. The apparent origin of Feature 7 in the mound fill can be accounted for by postulating that it contained a post that rotted away after the mound was built, leaving a hole. Feature 7's profile is parallel-sided from the top of the O.H. zone down but the sides diverge above the O.H. zone (Fig. 12c). The upper portion of the hole is filled with clay, while the surrounding soil contains wood ashes. The mound fill above the top of the hole is also clay and the mound surface shows a corresponding indentation (Fig. 12c), which would result if the clay below had settled into a hole sometime after completion of the mound. All of this lends support to the contention that Feature 7 is the product of a post that rotted away sometime after the mound was built over it. The feature's apparent origin in the mound fill thus is not evidence for a pause in mound construction.

Further evidence in support of the assertion that temporal differences within the mound are inconsequential comes from differences in location of burials. All three burials that can be identified as extended, Burials 2, 3, and 6, come from near the surface of the mound, all being plow-disturbed (Table 4). The one bundle burial, Burial 16, was found just under the plow zone. The deep burials, those found at the O.H. zone or below, are Burials 4, 18, 20, and 21. They are all flexed; Burial 14, which is also deep but may have been in a pit, cannot be identified as to position (Table 4), since only the head and rib cage were present. Although the number of examples is small, the difference in position suggests that the shallow and deep burials form two groups, one buried before the mound was constructed and one after its completion. None of the burials whose stratum of discovery is identifiable was found in the middle part of the mound fill: all are located either in or under the plow zone or in or under the O.H.

zone (Table 4).

None of the burials were positively associated with pits, although the field notes indicate that four, Burials 1, 8, 11, and 14, may have been placed in pits. The stratum of origin of these questionable pits is not noted, but can be inferred in some cases. Burials 1, 8, and 11 are close to the surface of the mound, since they lie in the plow zone (Table 4). If these three burials were in pits, they almost certainly originated at the mound surface. Burial 14, the one burial that comes from on or below the O.H. zone (Table 4), has a problematic pit the origin of which cannot be reconstructed. Due to their scarcity, variability in grave goods is insufficient to add more information on the differential ages of the burials.

The distribution of ceramics, features, and burials confirms that Be 8 was built with no significant pause. Despite the visible stratification, the mound can be treated as temporally homogeneous and the artifacts it contains combined for comparison with other parts of the site when time differences are at issue.

The midden

Structural relationships in the two excavated midden areas are less complicated. Only one burial was found, in a flexed position on undisturbed soil near stake -95L34. Two features were recorded, both also in Be 22L. One is a group of charred logs, a member of Feature Type VI (Fig. 17), which the field notes suggest was probably part of a structure, since the earth around it was not burned. The other, Feature Be 22-2, encompasses 12 areas of burnt earth, each of which is a Type V feature. Seven are illustrated in the sample plan map (Fig. 16). The similarity of the midden burial and features to those from the mound suggests that the two parts of the site are functionally related. While Be 8 was completely excavated, the midden was not, so the greater number of burials and features in the mound does not necessarily imply functional differences.

The nature and extent of the relationship between the mound and midden can best be explored by determining if the two midden areas display time-related differences in the distribution of artifact types, either internally or when compared with one another or with the mound. Such differences may well exist even though the midden has no visible layering. The arbitrary 6-inch excavation levels, dug in 5 by 10 foot units, serve as the basis for the analysis.

The same pottery types used for the initial recording of ceramic data from the site are most suitable for studying temporal relationships within Be 22, as they were for Be 8. The number of sherds of each type has been computed for each arbitrary level and the percentage this represents of the total sherds in that level calculated. The results when arranged in stratigraphic order (Table 8) show considerable variation from the unimodal curves expected from historical types, at least on the left side of Be 22. All types from Be 22R conform to the model, suggesting that in Be 22L the

Table 8. Percentages of pottery types in arbitrary levels, Be 22L and Be 22R.

| Pottery type | Level (feet) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Be 22L | | | | | Be 22R | | |
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 0.5 | 1.0 | 1.5 |
| sh cm # | 30 | 1402 | 1134 | 294 | 72 | 82 | 284 | 21 |
| % | 24.79 | 36.62 | 37.29 | 29.73 | 32.00 | 52.23 | 33.37 | 14.79 |
| sh pl # | 46 | 1497 | 1330 | 459 | 131 | 42 | 316 | 45 |
| % | 38.02 | 39.11 | 43.74 | 46.41 | 58.22 | 26.75 | 37.13 | 31.69 |
| ls cm # | 9 | 63 | 36 | 5 | 0 | 8 | 16 | 0 |
| % | 7.44 | 1.65 | 1.18 | 0.51 | 0.00 | 5.10 | 1.88 | 0.00 |
| ls pl # | 3 | 142 | 78 | 37 | 2 | 1 | 45 | 1 |
| % | 2.48 | 3.71 | 2.56 | 3.74 | 0.89 | 0.64 | 5.29 | 0.70 |
| ls-sh cm # | 9 | 198 | 98 | 25 | 0 | 5 | 30 | 2 |
| % | 7.44 | 5.17 | 3.22 | 0.89 | 0.00 | 3.18 | 3.53 | 1.41 |
| ls-sh pl # | 23 | 520 | 357 | 169 | 20 | 19 | 159 | 73 |
| % | 19.01 | 13.58 | 11.74 | 17.09 | 8.89 | 12.10 | 18.68 | 51.41 |
| other # | 1 | 6 | 8 | 0 | 0 | 0 | 1 | 0 |
| % | 0.83 | 0.16 | 0.26 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 |
| total | 121 | 3828 | 3041 | 989 | 225 | 157 | 851 | 142 |

arbitrary levels might have cut across and mixed natural levels that were temporally different.

This possibility has led to the use of two computer programs to re-analyze the data. The first, SYMAP (Laboratory for Computer Graphics), is designed to map frequency distributions of specified data, while the GRPING program is a modified version of a technique for forming a similarity matrix based on the Mahalanobis generalized distance statistic (Mahalanobis 1936; King 1969:195-198) that was developed in the Geography Department of the University of Washington. These programs do not "discover" groups, but serve to present the data, initially structured by the classification, in a format advantageous to grouping. Both programs as used here employ the total percentage, including both rim and body sherds, of each pottery type in each excavation unit.

SYMAP generates maps by combining the frequency information for a designated type with coordinates for each excavation unit and for the outline of the area excavated in a given level (Figs. 30-37). The outlines are irregular and different for each level because the excavated units with data vary from one level to the next. The products are contour maps for each selected ceramic type or mode in the major levels. Every map shows six contour intervals, with the shading within each becoming darker as the frequency of the type increases.

Maps of both the absolute numbers of sherds and the percentage of a mode or type in a unit were made, but the emphasis is placed on the maps of percentage distributions because the frequency of types or modes in relation to one another is the crucial factor in detecting temporal change and is masked if differential densities occur. The maps of absolute sherd densities have been used to determine if the frequency maps unduly emphasize excavation units which have small sherd counts. A preponderance of

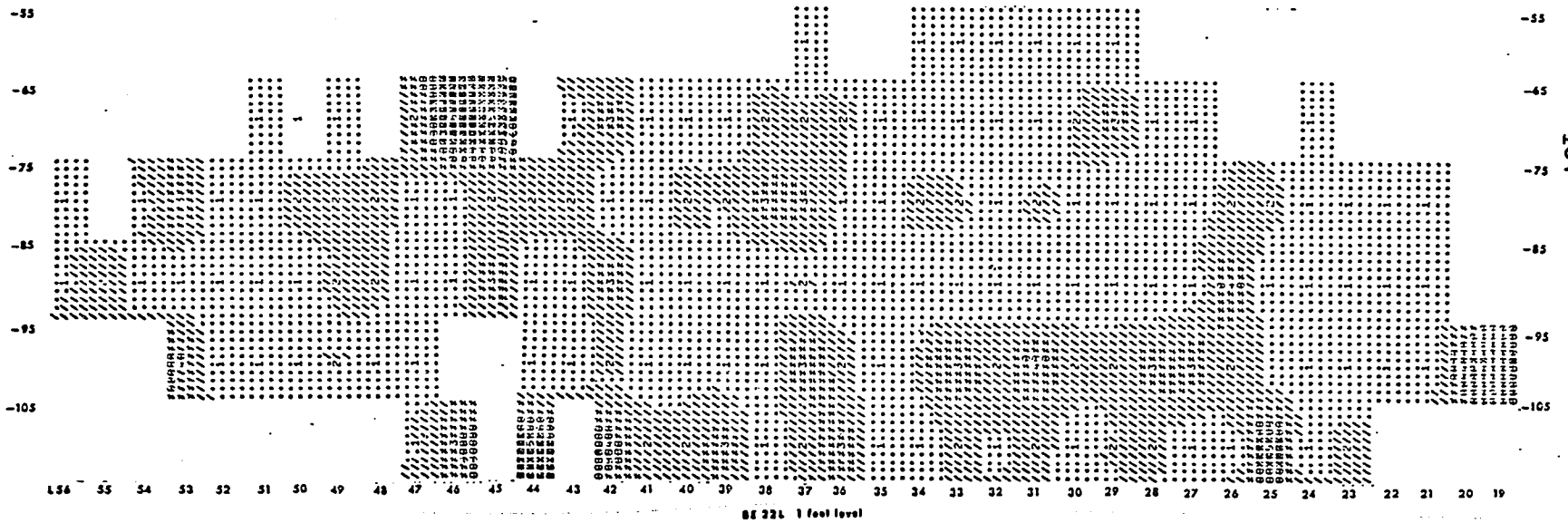



Fig. 30. SYMAP Showing Density of Limestone-Shell Tempered Sherds, Be 22L, 1 Foot Level Intervals in percentage points: 16, 16, 16, 16, 20, 16.

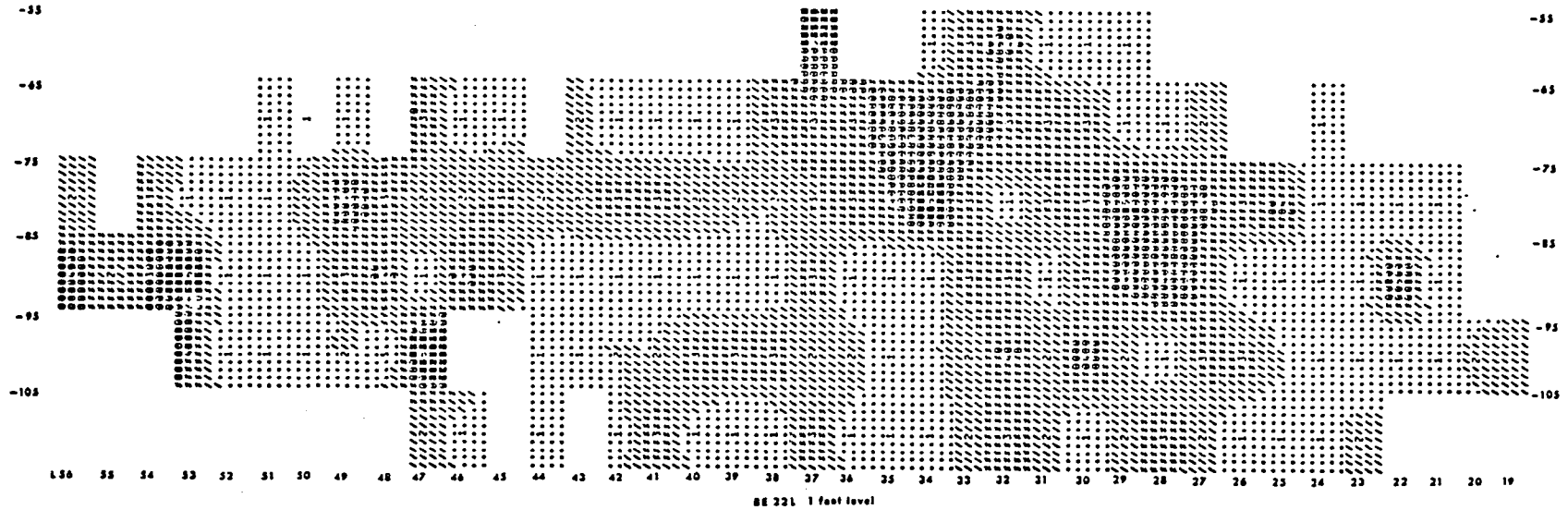



Fig. 31. SYMAP Showing Density of Shell Tempered Cordmarked Sherds, Be 22L, 1 Foot Level
Intervals in percentage points: 16,16,16,16,20,16.

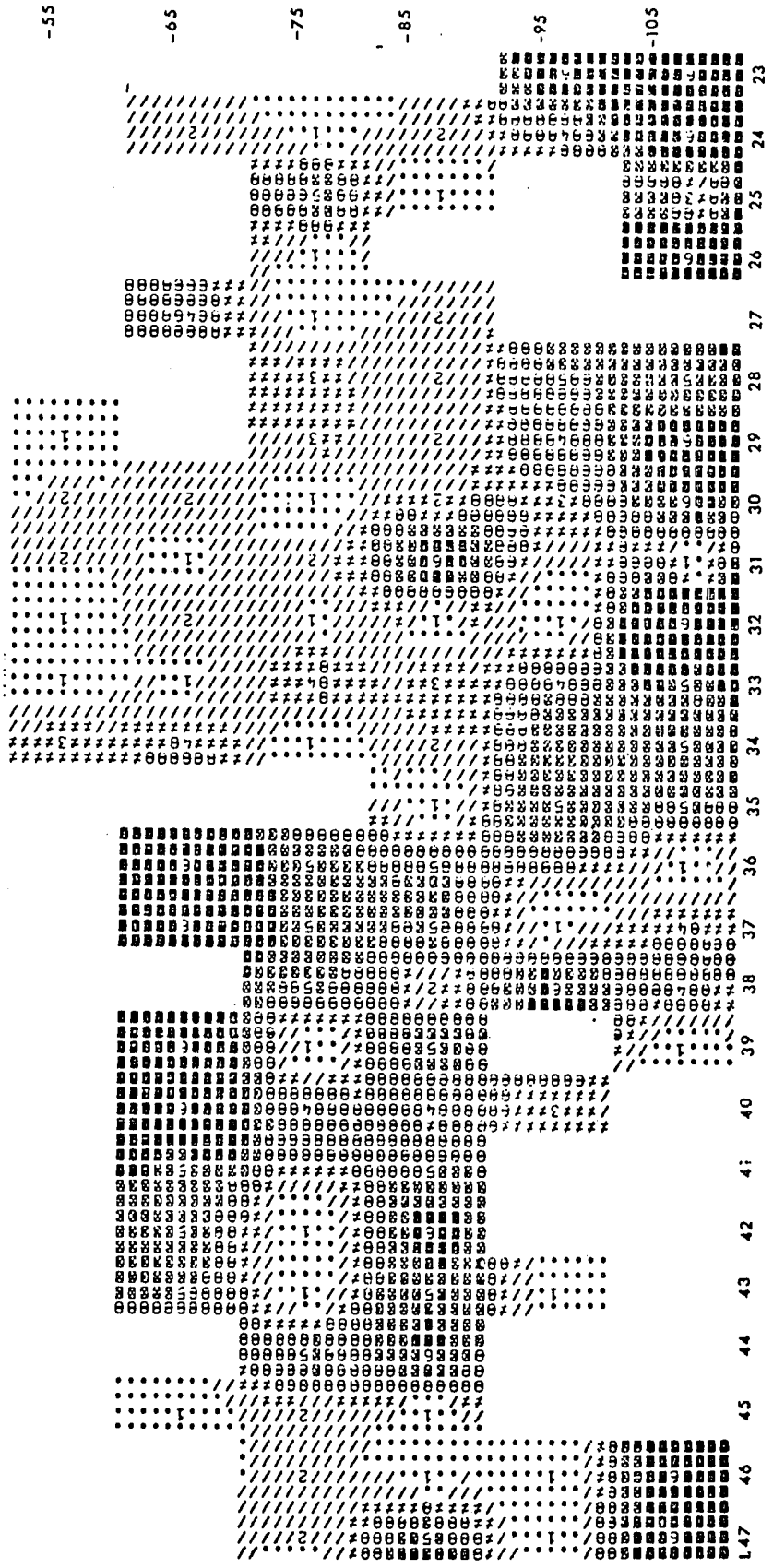



Fig. 32. SYMAP Showing Density of Limestone-Shell Tempered Sherds, Be 22L, 1.5 Foot Level
Intervals in percentage points: 5, 5, 5, 10, 10, 65.

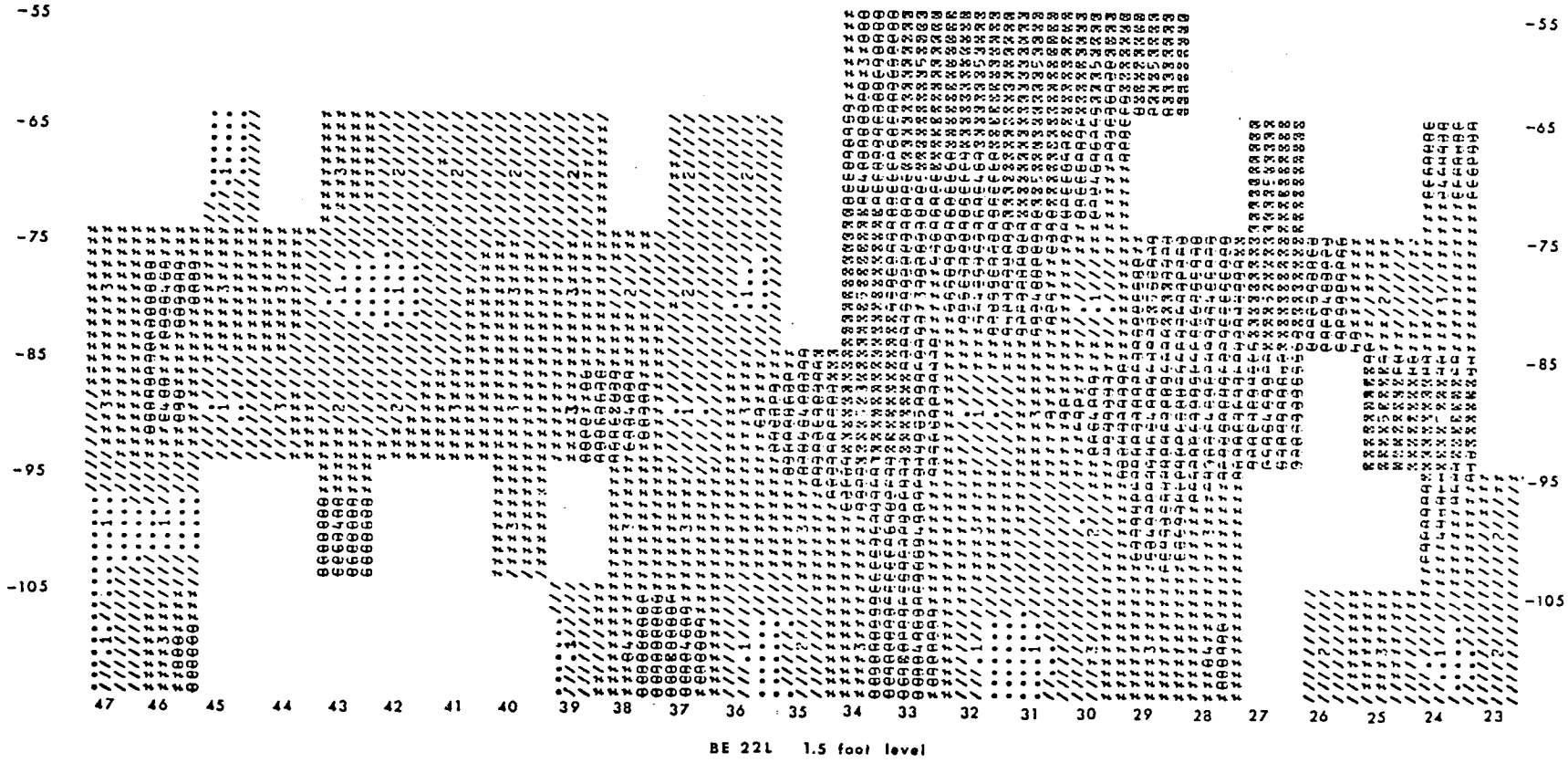



Fig. 33. SYMAP Showing Density of Shell Tempered Cordmarked Sherds, Be 22L, 1.5 Foot Level Intervals in percentage points: 1, 5, 5, 5, 24, 60.

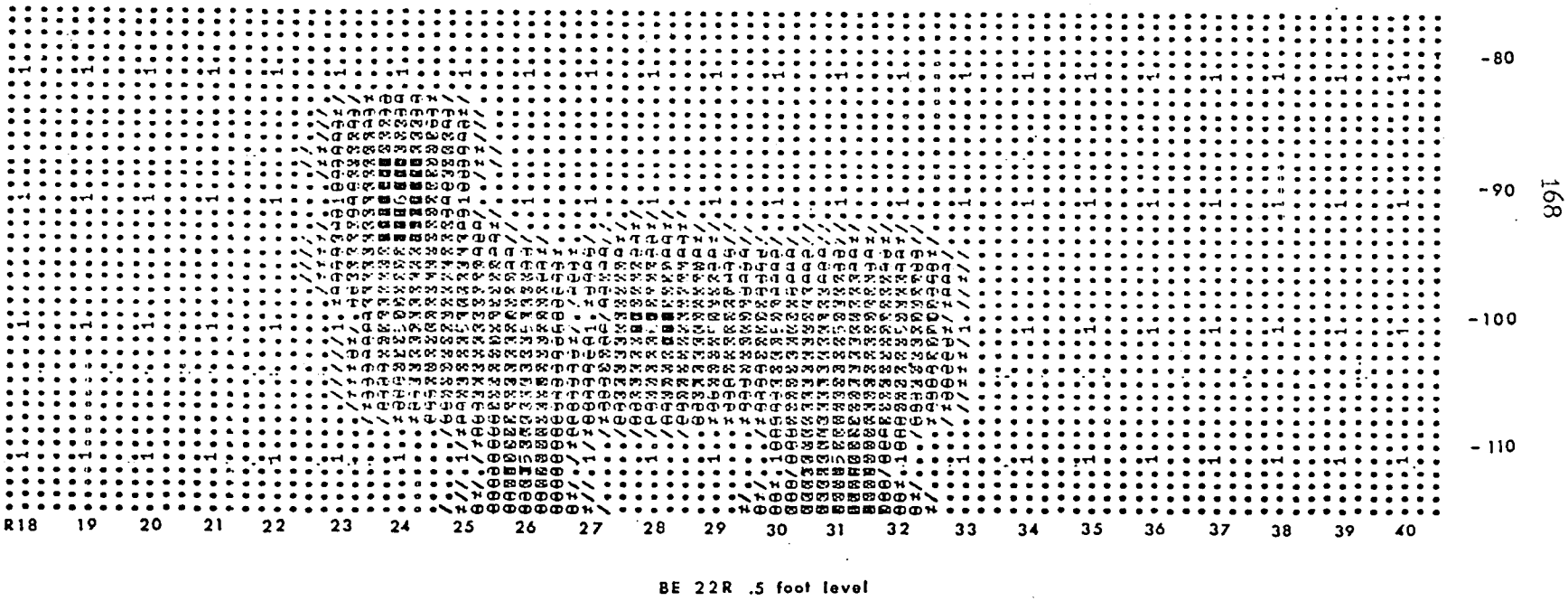



Fig. 34. SYMAP Showing Density of Limestone-Shell Tempered Sherds, Be 22R, .5 Foot Level Intervals in percentage points: 1, 1, 1, 5, 20, 72.

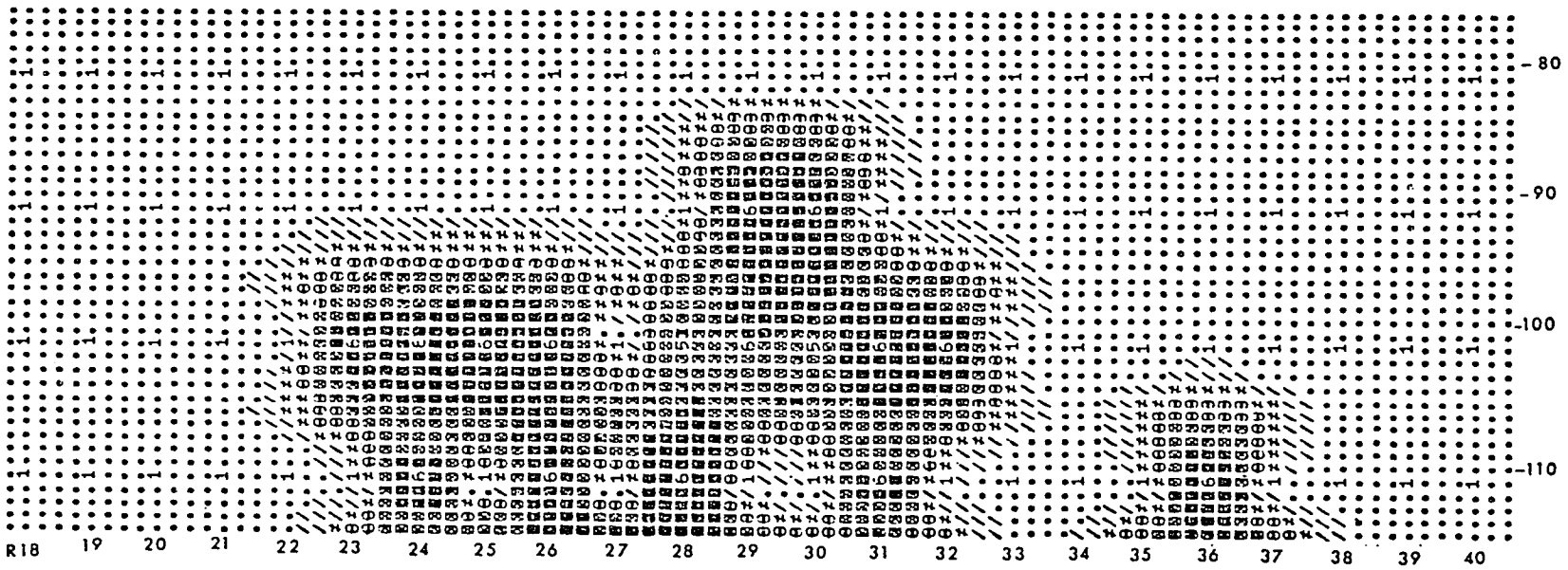



Fig. 35. SYMAP Showing Density of Shell Tempered Cordmarked Sherds, Be 22R. .5 Foot Level Intervals in percentage points: 1, 4, 5, 10, 20, 60.

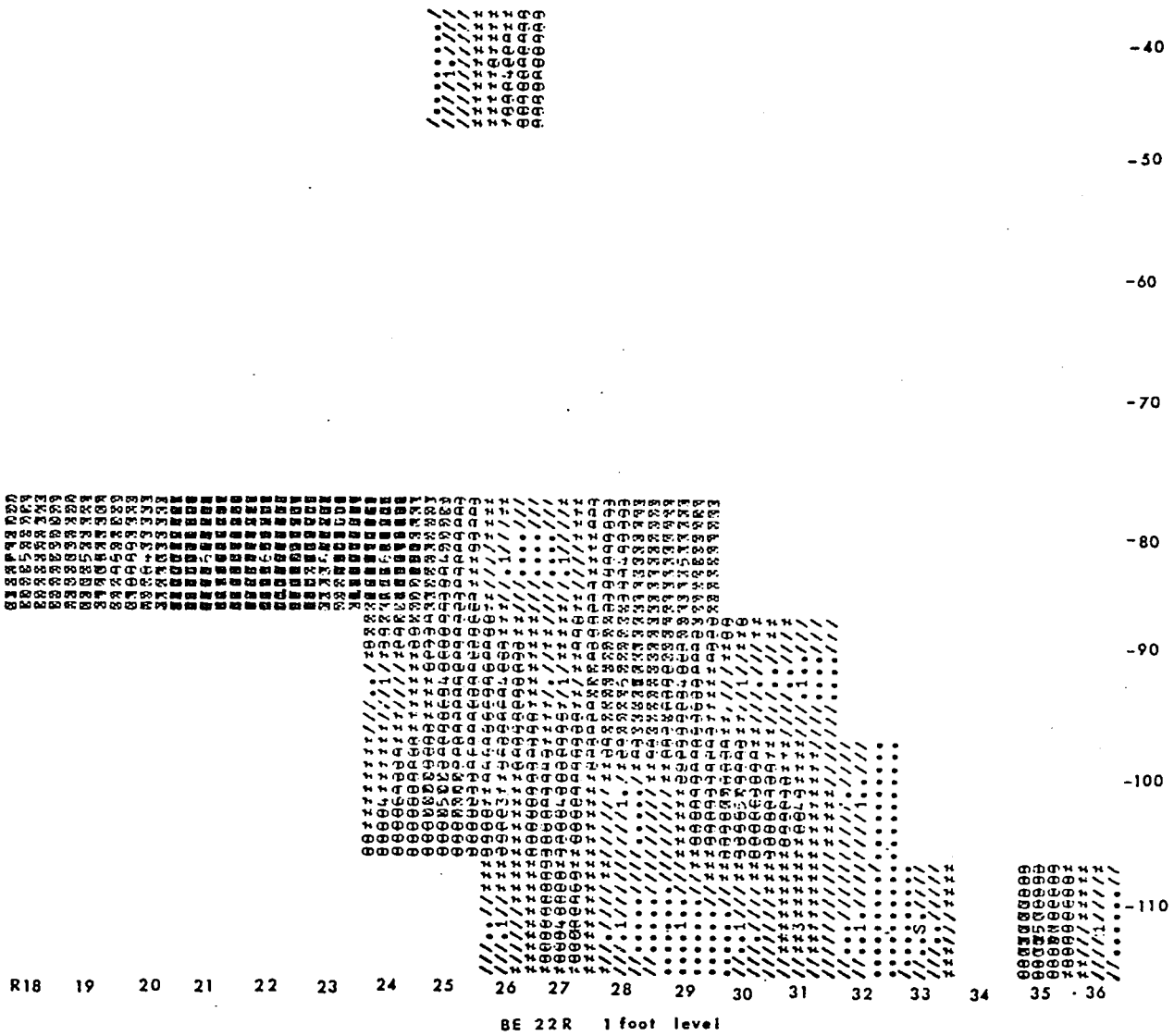



Fig. 36. SYMAP Showing Density of Limestone-Shell Tempered Sherds, Be 22R,

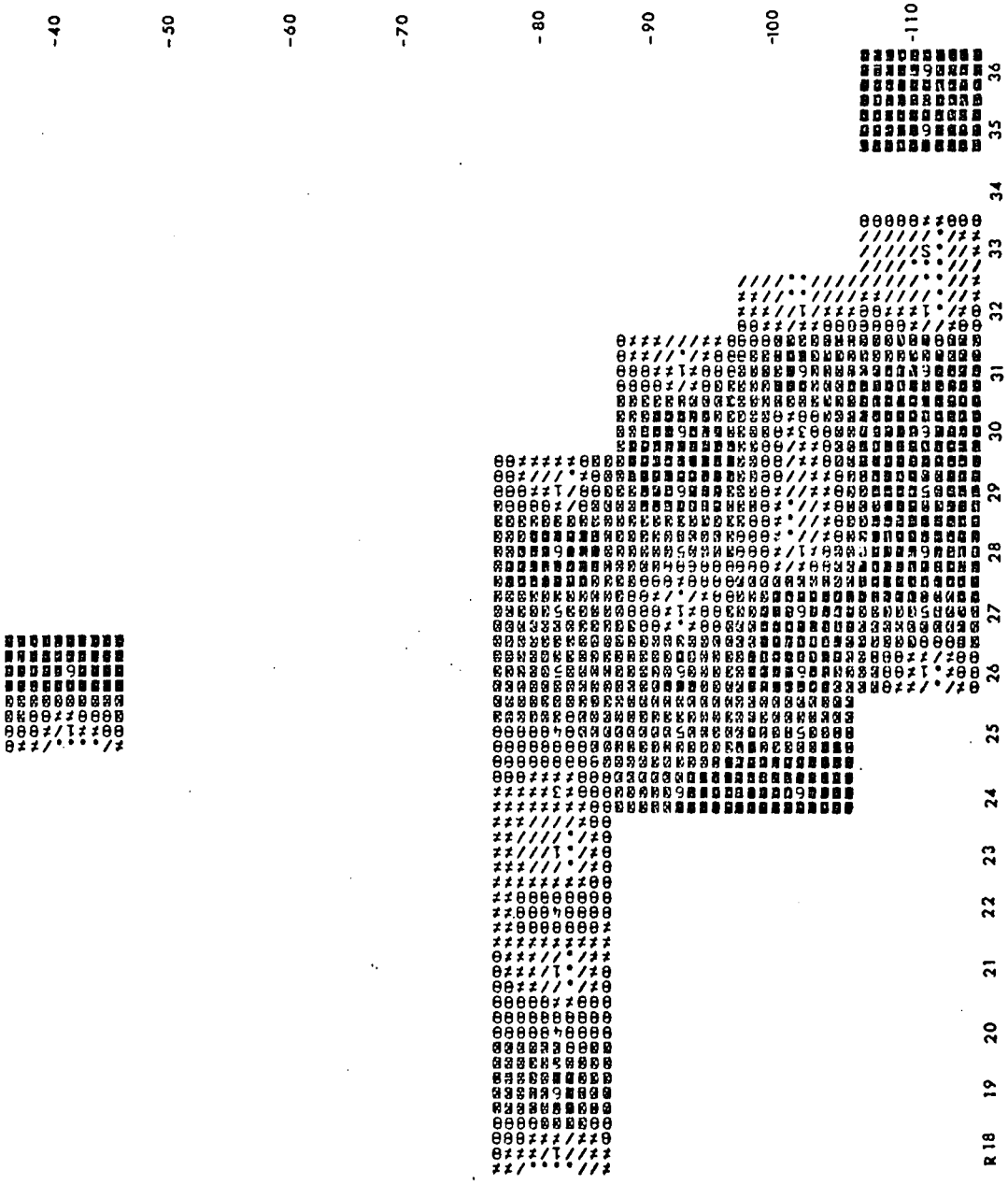



Fig. 37. SYMAP Showing Density of Shell Tempered Cordmarked Sherds, Be 22R, 1 Foot Level Intervals in percentage points: 1, 4, 5, 10, 20, 60.

one type over another is obviously more meaningful in a unit with a large population than in one with one or two sherds. Since all the observed pottery was collected by the excavators, the sherds from each unit are regarded as the total population, not a sample, and thus sample size is not of direct concern.

For the north part of the midden, Be 22L, any patterning of types is most likely to be visible in the 1.0 and 1.5 foot levels, which contain 3926 and 3096 sherds respectively, almost 85% of the pottery found in that portion. A number of frequency maps were made for both of these levels to illustrate the distributions of several pottery modes and types. It was noted that shell cordmarked and limestone-shell plain pottery have different distributions in both levels (Figs. 30-33), the areas of greatest frequency of the two types being largely complimentary rather than coincident. This is most clearly defined in the 1.5 foot level (Figs. 32-33). In both cases, the two types correspond much better in the areas of moderate frequency. Each type occurs in about the same frequencies in the same areas of both levels.

The variant distributions suggest that Be 22L displays a significant temporal range. If time differences were inconsequential, the type distributions in a given level and across levels would either be similar or vary from unit to unit without pattern. The variant distributions of the two types also reflect shifts in ceramic-centered activity areas, since temporal change would otherwise be directly reflected in the stratigraphic order of the levels (Table 8). The bext explanation for the patterns is that the arbitrary levels have cut through groups of artifacts that are temporally distinct. The areas of moderate frequency, where the types overlap, might reflect either mechanical mixing of two separate groups or a continuous distribution of frequencies through space.

The south midden excavation, Be 22R, is tested for temporal groups using the same method. Only in the 0.5 and 1.0 foot levels was a sufficient area excavated to be used in this test. Maps comparing the same types, shell cordmarked and limestone-shell plain, show that the highest frequencies of both occur in the same areas within each level (Figs. 34-37). The distributions also correspond well from level to level, indicating that the center of activity involving ceramics remained the same throughout the use of this part of the site. The fact that the three arbitrary levels seriate when ordered stratigraphically (Table 8) suggests that there is some temporal change represented in Be 22R. The frequency maps produced by SYMAP demonstrate that the arbitrary excavation techniques have not mixed once-distinct spatial groups in this area as they have in Be 22L.

To test for temporal groups of units in Be 22R that might be obscured by the SYMAP method and to compare any such groups, as well as those suggested for Be 22L, quantitatively, the GRPING program has been applied to the data. Since it orders units without regard to space, it allows boundaries to be estalished for the groups suggested by the SYMAPs. The resulting groups are less easy to interpret than those produced by SYMAP, so it is most advantageous to use the two programs in conjunction.

The GRPING program begins with the two most similar units and links other units to them in order of similarity, which is measured by comparing the amount of intra-cluster variance so produced with that produced by the addition of any other unit to the group. Groups other than the original arise because the units they contain are more similar to one another than they are to the members of the initial group. Eventually, all units and subgroups are linked to form one group. In cases where two or more units add the same amount of variance to a cluster, they are linked to it one by one in the order they were submitted to the program by the data bank.

To obtain the relevant subgroups from graphs showing all the ordered linkages, the final cluster is divided each time the variance reaches 3.5 (Figs. 38-39). The standard deviation thus being only 1.87 percentage points, the groups are coherent yet the major ones contain enough units to be plotted meaningfully in space. The units from the 1.0, 1.5, and 2.0 foot levels of Be 22L form one cluster and those from the 0.5, 1.0, and 1.5 foot levels of Be 22R form a second. These clusters separate into 11 subgroups in the case of Be 22L (Fig. 38) and 5 in the case of Be 22R (Fig. 39).

When the groups are mapped, it is apparent that not all are of equal interest. Group 3 from Be 22L coincides fairly closely with the shell cordmarked group shown by SYMAP for that part of the midden (Fig. 40), but the limestone-shell plain concentration is split among several groups that show little cohesion. Several of the groups consist mainly of units with small populations which have been grouped as a function of their size. Mapping the groups from Be 22R provides no additional information, as might be expected since SYMAP revealed no spatially separate clusters of types in that area.

Tabulating the percentages of the 7 pottery types for each of the 16 groups from the midden provides more information on time-related differences in the data. The groups have been ordered by arranging them so that the percentage of shell cordmarked pottery decreases from top to bottom (Table 9). This is justified by the fact that this type seems on stratigraphic evidence from Be 22R (Table 8) to be the most recent in the midden and to be on the increase. When the groups are so arranged, the other types do not form unimodal curves, which means that not all the groups are the result of temporal differences. The lack of correspondence between the SYMAP limestone-shell plain group and these clusters supports this and suggests that it and most of the rest of the midden data are the product of mixing,

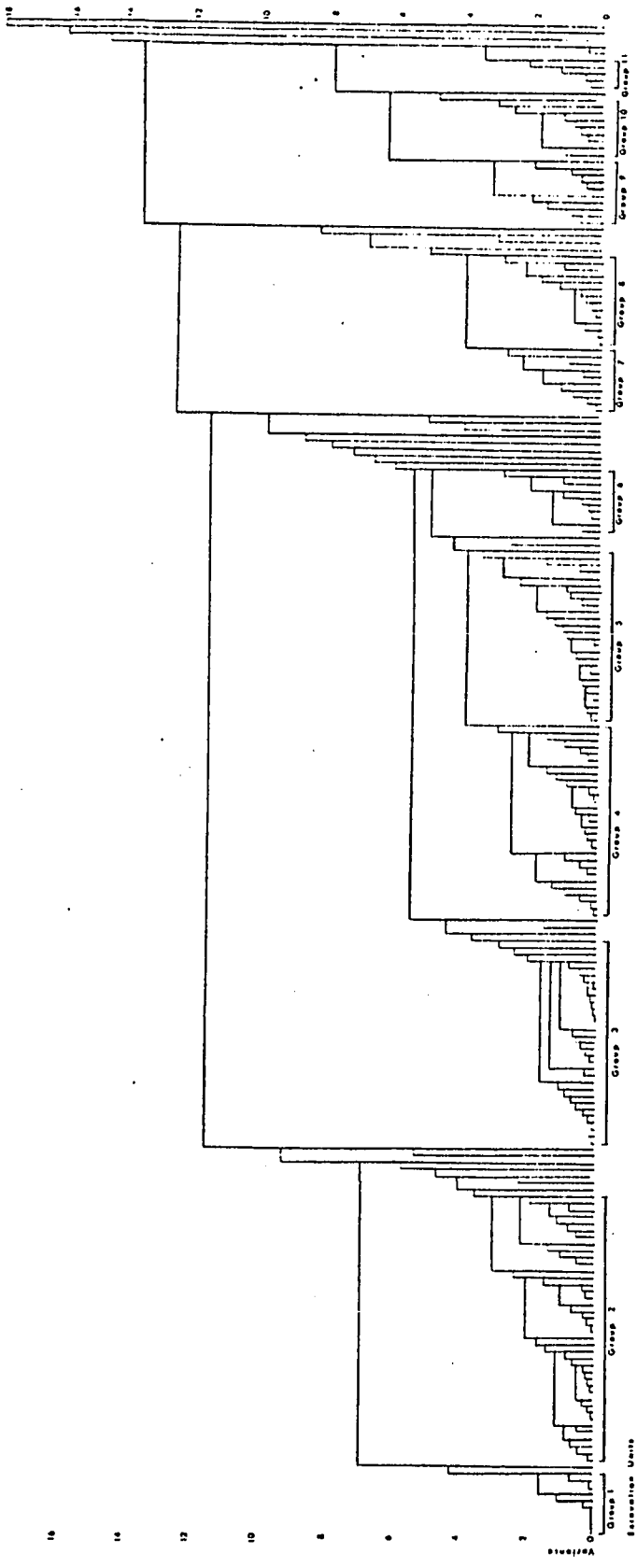


Fig. 38. Groups Formed at Variance 3.5, Be 22L

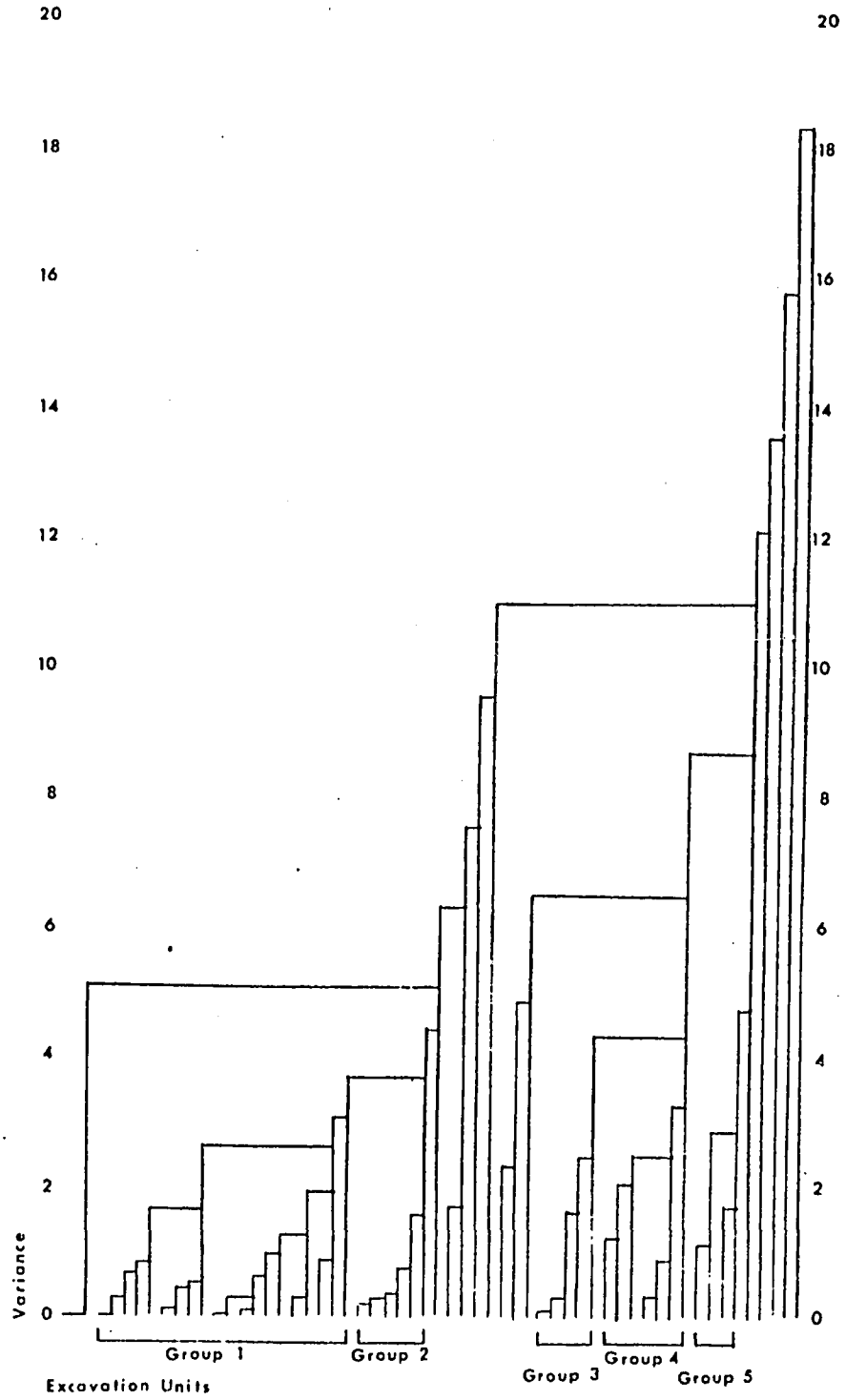



Fig. 39. Groups Formed at Vaiance 3.5, Be 22R

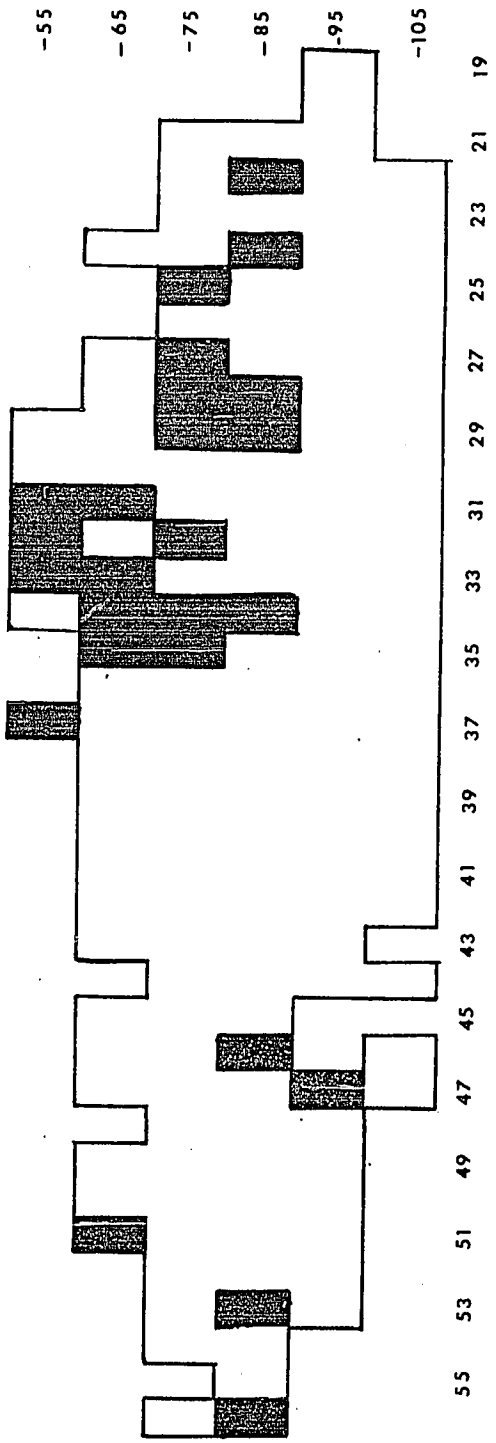



Fig. 40. Map of Spatial Distribution of Excavation Units in Group 3, Be 22L, from GRPING Program

Table 9. Percentages of pottery types in groups formed by GRPING program.

| Groups | Pottery types | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | sh cm % | sh pl % | ls cm % | ls pl % | ls-sh cm % | ls-sh pl % | other % | total # |
| Be 22L (3) | 56.13 | 35.51 | 1.28 | 1.35 | 2.56 | 3.17 | 0.00 | 1484 |
| Be 22R (2) | 54.67 | 28.05 | 0.00 | 1.43 | 6.47 | 9.35 | 0.00 | 139 |
| Be 22R (1) | 51.95 | 32.81 | 1.95 | 1.56 | 0.39 | 11.33 | 0.00 | 256 |
| Be 22L (5) | 43.59 | 40.61 | 0.57 | 1.78 | 3.49 | 9.96 | 0.00 | 1576 |
| Be 22L (4) | 38.15 | 36.03 | 1.17 | 3.19 | 4.04 | 17.43 | 0.00 | 941 |
| Be 22L (6) | 35.71 | 51.36 | 1.36 | 1.02 | 3.74 | 6.80 | 0.34 | 294 |
| Be 22R (3) | 33.33 | 63.10 | 0.00 | 1.19 | 0.00 | 4.76 | 0.00 | 84 |
| Be 22R (4) | 28.46 | 47.57 | 3.00 | 4.87 | 4.87 | 11.24 | 0.00 | 267 |
| Be 22L (2) | 27.80 | 54.87 | 1.03 | 5.11 | 1.52 | 9.61 | 0.06 | 1644 |
| Be 22L (7) | 27.18 | 46.60 | 0.00 | 0.00 | 19.42 | 6.80 | 0.00 | 103 |
| Be 22L (10) | 19.79 | 26.56 | 0.00 | 10.42 | 3.65 | 39.58 | 0.00 | 192 |
| Be 22L (8) | 19.47 | 39.32 | 0.57 | 2.27 | 10.96 | 27.22 | 0.19 | 529 |
| Be 22R (5) | 14.97 | 34.73 | 0.60 | 5.39 | 1.80 | 41.92 | 0.60 | 167 |
| Be 22L (9) | 9.62 | 40.55 | 1.03 | 1.72 | 3.09 | 43.64 | 0.34 | 291 |
| Be 22L (1) | 9.47 | 82.11 | 1.05 | 1.05 | 1.05 | 5.26 | 0.00 | 95 |
| Be 22L (11) | 6.12 | 12.24 | 0.00 | 0.00 | 2.04 | 79.59 | 0.00 | 49 |

Sh-shell, ls-limestone, pl-plain, cm-cordmarked.

or at least must be so regarded with the present methods. The exceptions are Groups 3 and 8, Be 22L. Group 3's correspondence with the shell cord-marked pottery distribution indicates that it is separated in time from the rest of the midden, while Group 8 has percentages similar to those from Be 8 (Table 6).

The differences between Be 8 and Be 22L Group 8 are not significant by the $X^2$ test at the .05 level of confidence (Table 10). This similarity indicates probable contemporaneity in a general sense; Be 8 is a single temporal unit and it is unlikely that a part of the midden would correspond closely to its pottery frequencies unless the two are contemporary and temporally distinct from the other excavated areas. Consequently, the other 14 midden groups have been combined with the ungrouped excavation units from these levels. The type percentages have been recalculated to form a new group, labeled Be 22 (0), which falls between Groups 3 and 8 on the revised seriation (Table 10).

Stylistic continuity and change among structural units

The four structural units established on the basis of the foregoing analysis seem to have temporal significance on other grounds and do seriate, with two discrepancies in minor types (Table 10). However, the order of the four units cannot be assumed to be chronological without being verified by seriations of independent types and/or modes (Dunnell 1970). Because no category of non-ceramic artifacts contains enough examples to allow adequate samples for seriation, the order given in Table 10 cannot be rigorously confirmed to be chronological. Instead, other artifact types and modes can be used to arrange the groups in the order generated by the pottery seriation. Since in these arrangements the modes and types show regular monotonic change, they tend to confirm the original order as chronological.

Table 10. Seriation of pottery types by groups, Be 8 and Be 22.

| Pottery type | Group | | | |
|---|---|---|---|---|
| | Be 22L (3) | Be 22 (0) | Be 22L (8) | Be 8 |
| sh cm | | | | |
| # | 833 | 2281 | 103 | 1549 |
| % | 56.13 | 35.51 | 19.47 | 15.40 |
| sh pl | | | | |
| # | 527 | 2954 | 208 | 3860 |
| % | 35.51 | 42.25 | 39.32 | 38.39 |
| ls cm | | | | |
| # | 19 | 108 | 3 | 269 |
| % | 1.28 | 1.54 | 0.57 | 2.67 |
| ls pl | | | | |
| # | 20 | 266 | 12 | 523 |
| % | 1.35 | 3.80 | 2.27 | 5.20 |
| ls-sh cm | | | | |
| # | 38 | 262 | 58 | 987 |
| % | 2.56 | 3.75 | 10.96 | 9.81 |
| ls-sh pl | | | | |
| # | 47 | 1106 | 144 | 2864 |
| % | 3.17 | 15.82 | 27.22 | 28.49 |
| other | | | | |
| # | 0 | 15 | 1 | 8 |
| % | 0.00 | 0.21 | 0.19 | 0.80 |
| total | 1484 | 6992 | 529 | 10060 |
| $X^2$ | | | | |

Sh-shell, ls-limestone, cm-cordmarked, pl-plain.

Ordering projectile point types and drill and flaker modes, which are the most populous artifact categories in the Cleek-McCabe collection after ceramics, confirms the sequence of the three major groups, Be 22L (3), Be 22 (0), and Be 8. Projectile points are classified according to two dimensions, hafting device and length (Table 11, Fig. 41). The order contains a discontinuity in the notched, 1.0-1.5 inch type, but is the best because any other order would cause anomalies in one or more of the major types.

The same order is obtained by arranging drills, pointed artifacts made of siliceous rock with polish wear on the point. They are separated into three modes on the basis of their shape: triangular, expanded-base, and corner-notched (Table 12, Fig. 42). The bone and antler artifacts called "flakers" in the Cleek-McCabe catalogue are divided into two modes. Flakers are defined here as bone or antler tools that are chipped or worn on one or both ends. The two modes distinguished are "pointed" and "not pointed" (Table 13, Fig. 42). The three major groups can be arranged in the same order using bone flakers as they are when projectile points and drills are employed (Table 13). In none of the three arrangements does Be 22L (8) display enough specimens to be confidently ordered; it has only three projectile points, two drills, and one flaker.

These three arrangements, while of little value alone because of the small number of modes and types used in each, which is in turn a result of the small number of non-ceramic artifacts, in each case support the order obtained through the ceramic seriation. This order would therefore seem best attributed to temporal variation. Since the position of Group 8, Be 22L cannot be confirmed, it has been removed from further use as a chronological unit.

The stylistic continuities between mound and midden that form the basis

Table 11. Arrangement of projectile point types, Be 8 and Be 22.

| Projectile point types | | | Groups | | |
|---|---|---|---|---|---|
| hafting device | length (inches) | | Be 22L (3) | Be 22 (0) | Be 8 |
| notched | <1 | # | | | |
| | | % | | | |
| | 1-1.5 | # | 1 | | 1 |
| | | % | 9.09 | | 2.00 |
| | >1.5 | # | | 4 | 1 |
| | | % | | 12.90 | 2.00 |
| unhafted | <1 | # | | 1 | 2 |
| | | % | | 3.23 | 4.00 |
| | 1-1.5 | # | 10 | 10 | 23 |
| | | % | 90.91 | 32.26 | 46.00 |
| | >1.5 | # | | 16 | 23 |
| | | % | | 51.61 | 46.00 |
| total | | | 11 | 31 | 50 |

notched, 1-1.5 in.

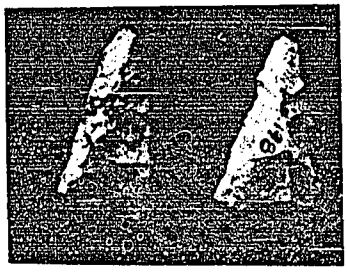
A

notched, 1.5 in.

B

triangular, 1 in.

C



triangular, 1-1.5 in.

D E

triangular, 1.5 in.

F G

Fig. 41. Projectile Point Types
A, Be 22L (3); B-G, Be 22 (0).

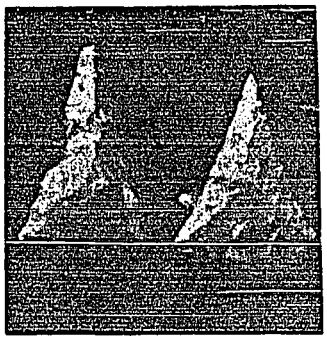
Table 12. Arrangement of drill modes, Be 8 and Be 22.

| Drill modes | | Groups Be 22L (3) | Be 22 (0) | Be 8 |
|---|---|---|---|---|
| triangular | # | 4 | 10 | 13 |
| | % | 66.67 | 71.43 | 92.85 |
| expanded-base | # | 2 | 3 | 2 |
| | % | 33.33 | 21.43 | 14.29 |
| corner-notched | # | 0 | 1 | 0 |
| | % | 0.00 | 7.14 | 0.00 |
| total | | 6 | 14 | 15 |

Table 13. Arrangement of flaker modes, Be 8 and Be 22.

| Flaker modes | | Groups Be 22L (3) | Be 22 (0) | Be 8 |
|---|---|---|---|---|
| pointed | # | 8 | 23 | 10 |
| | % | 88.89 | 88.46 | 55.56 |
| not pointed | # | 1 | 3 | 8 |
| | % | 11.11 | 11.54 | 44.44 |
| total | | 9 | 26 | 18 |

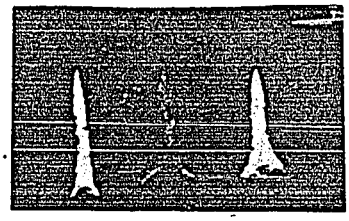
corner-notched
A



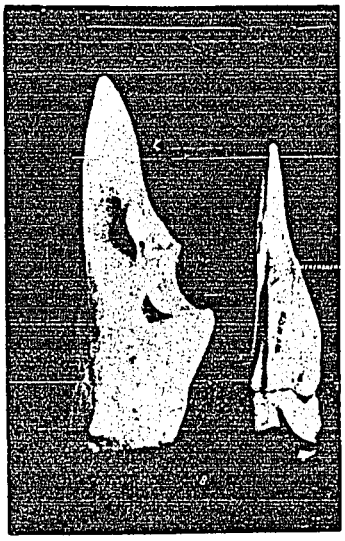
triangular

B

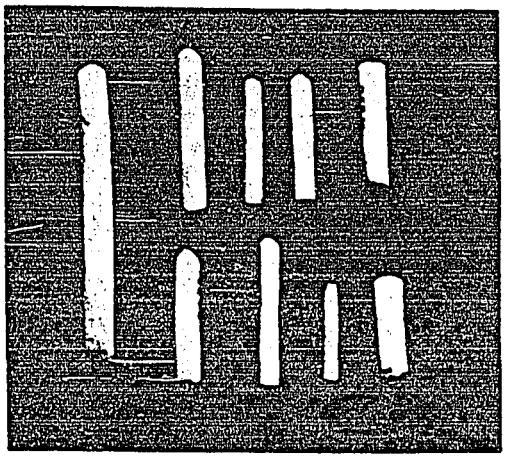
expanded-base
C



expanded-base
D



pointed
E



not pointed
F

Fig. 42. Drill and Flaker Modes
A-D, drills (A-C from Be 22 (O), D from Be 8).
E-F, flakers (all from Be 8).

for the seriation demonstrate that the two parts of the site are closely related. They are tied together by the occurrence in both of a multitude of styles, such as the guilloche design on pottery, stone and ceramic disks, and pottery rim shapes and strap handles, which are not used in the seriation or other arrangements of artifacts. Since the three groups have been separated by arbitrary means, they cannot be considered occupations. They are not components either, since they do not represent manifestations of defined phase-level units at Cleek-McCabe. Because they serve as the basis for comparing the data from Cleek-McCabe with that from other sites in the area and are temporally separate groups of artifacts, the groups in this sense are analogous to occupations.

There remains the question of how the groups are related to one another structurally. Be 8 and Be 22L (3) can be regarded as separate entities resulting from temporally separate activity loci, since they are both physically and temporally discrete. The remaining part of the midden may be interpreted either as a third intermediate locus resulting from gradual change in the frequencies of ceramic and other types of artifacts, or as a mixture of the other two groups, not necessarily in equal proportions. If gradual change is represented, each of the groups in the seriation should display some styles not present in either of the other groups. On the other hand, if the middle group, Be 22 (0), results from mixing it should contain all the styles present both early and late. The best test of these two possible explanations is afforded by ceramic data. Because it is the most numerous kind of artifact, pottery is most likely to present enough examples of each style examined so that scarcity alone will not decrease the likelihood of the style appearing in Be 22 (0).

Two lug styles provide support for the view that change was gradual in the site. Bifurcated and U-shaped lugs appear only in the mound (Table

14, Fig. 43). The presence of other lug styles in all three units suggests that this difference is not related to functional differences between the mound and the midden. Similarly, ceramic and limestone pipes are found only in Be 8, although sandstone pipes occur in all three groups (Table 15, Fig. 44). The fact that Be 22 (0) has more shell-tempered plain pottery than either of the other groups also militates against its being a mixed unit. The best explanation of the three groups' relationship is that they represent three relatively unmixed stages in a gradually changing sequence at this site.

Radiocarbon dates on three burials from Cleek-McCabe have some bearing on the relationship between midden and mound. The dating was done on bone because no charcoal, wood, or other datable organic material was saved when the collection was catalogued. The three burials chosen to produce the samples are Burials 20 and 21 from the mound (Figs. 45-46) and Burial 1 from Be 22 (Fig. 47). Burials 20 and 21 should provide maximum dates from Be 8, since both came from under it, on the O.H. zone and on undisturbed soil respectively. They were <u>in situ</u>, although Burial 21 had part of the skull missing. Both are from the edge of the mound, near stake 30L10 (Fig. 11). Burial 20 lies 0.7 feet under Feature 4 and is in a level several inches above the point of origin of nearby postmolds from Feature 13 (Fig. 45). Two field specimens, a bone object and a projectile point, are listed in association with Burial 20 but they were not catalogued and are missing from the collection. Burial 21 had no associated artifacts.

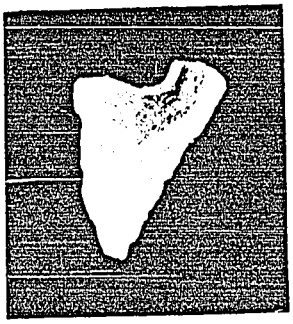
Burial Be 22-1 (Fig. 47) was found on undisturbed soil just below the habitation zone and one foot below stake -95L34. Two artifacts, a bone projectile point and a broken grooved ax, were associated but are missing from the collection. The ceramics from square -95L35, in which most of the burial is located, are placed in group Be 22 (0).

Table 14. Lug modes occurring on pottery from Be 8 and Be 22.

| Lug modes | | Groups Be 22L (3) | Be 22 (0) | Be 8 |
|---|---|---|---|---|
| bifurcated | # | 0 | 0 | 8 |
| | % | 0.00 | 0.00 | 26.67 |
| spouts | # | 1 | 6 | 6 |
| | % | 25.00 | 37.50 | 20.00 |
| U-shaped | # | 0 | 0 | 2 |
| | % | 0.00 | 0.00 | 6.67 |
| horizontal prongs | # | 0 | 1 | 2 |
| | % | 0.00 | 6.25 | 6.67 |
| vertical prongs | # | 2 | 7 | 9 |
| | % | 50.00 | 43.75 | 30.00 |
| other | # | 1 | 2 | 3 |
| | % | 25.00 | 12.50 | 10.00 |
| total | | 4 | 16 | 30 |

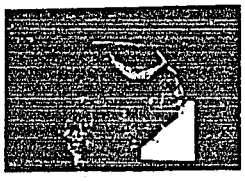
bifurcated

A



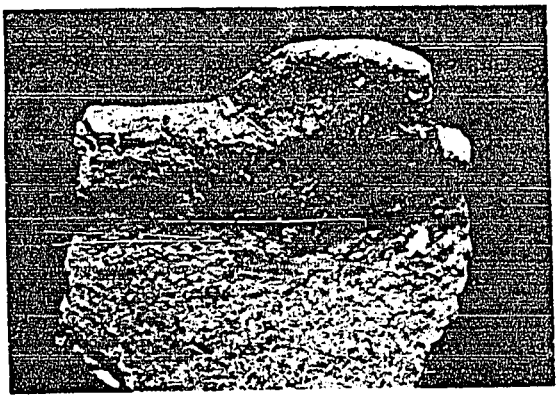
spout

B



semi-circular

C



horizontal prong

D

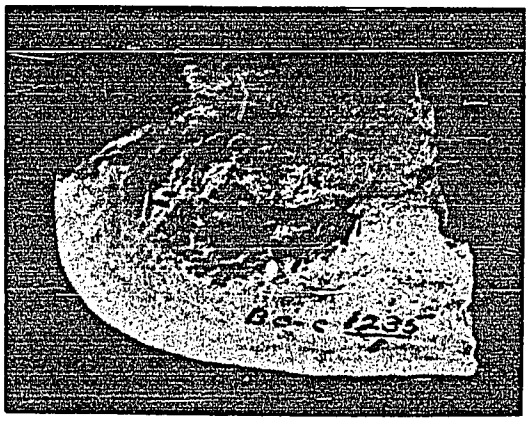
vertical prong

E

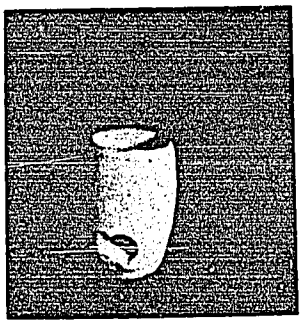
Fig. 43. Lug Modes
A-E from Be 8.

Table 15. Pipe modes occurring in Be 8 and Be 22.

| Pipe modes | | Groups Be 22L (3) | Be 22 (0) | Be 8 |
|---|---|---|---|---|
| ceramic | # | | | 4 |
| | % | | | 66.67 |
| limestone | # | | | 1 |
| | % | | | 16.67 |
| sandstone | # | 1 | 2 | 1 |
| | % | 100.00 | 100.00 | 16.67 |
| total | | 1 | 2 | 6 |

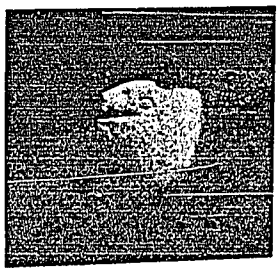


ceramic, shell-tempered
A



limestone
B

sandstone
C



sandstone
D

Fig. 44. Pipe Modes
A, Burial 2, Be 8; B, Be 8; C, Be 22 (0); D, Be 22L (3).

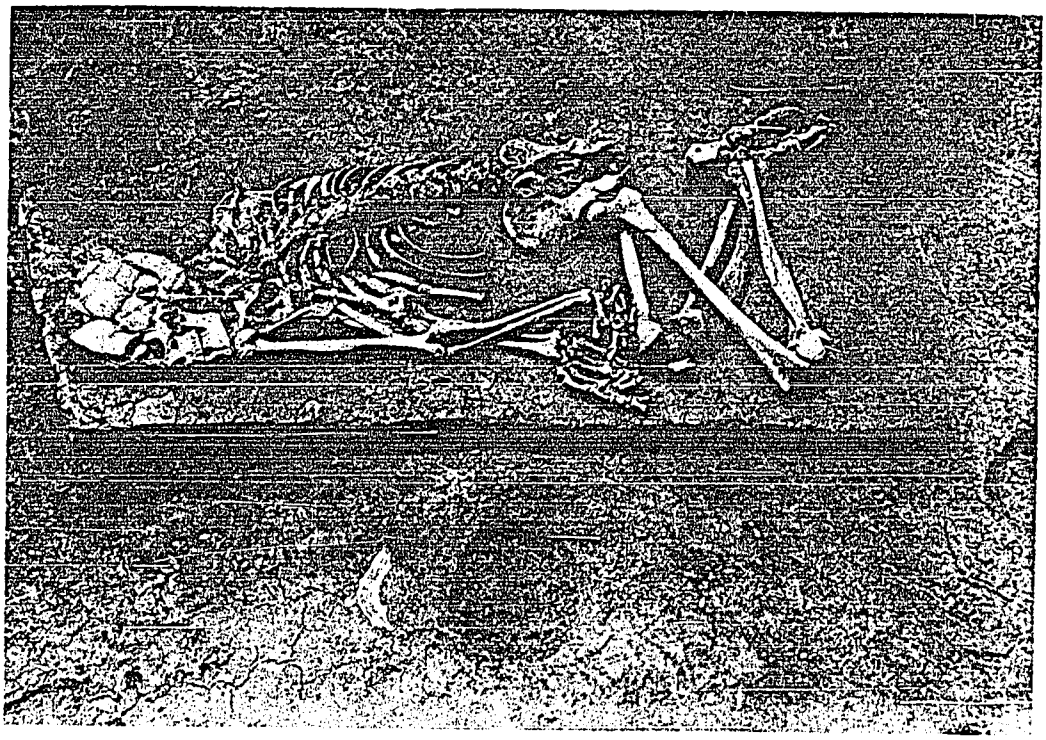


Fig. 45. Burial 20, Be 8

Fig. 46. Burial 21, Be 8

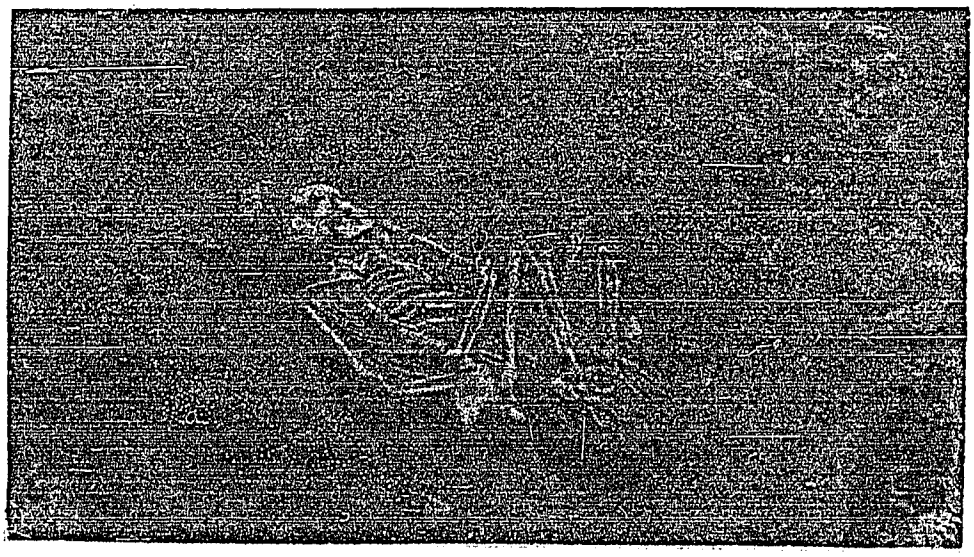


Fig. 47. Burial 1, Be 22

The bone used for the dates was cleaned of preservative and dated at Radiocarbon, Ltd. The process used was collagen extraction, with the dates based on the benzene count produced by the collagen. The three dates (Table 16) are disparate, with a maximum spread of 940 years at one standard deviation. The dates throw little light on the relationship of Be 8 to Be 22 except to suggest that part of the midden is younger than the mound. When this information is combined with the seriation (Table 10), it confirms that the oldest unit in the order is Be 8, with part of the midden represented by Be 22 (8) being equally old, and the youngest unit is Be 22L (3).

Table 16. Radiocarbon dates on bone collagen from burials, Be 8 and Be 22.

| Burial | Reference number of date | Date B. P. | Date B.C./A.D. |
|---|---|---|---|
| Be 8-20 | RL 216 | 1680±100 | A.D. 270 |
| Be 8-21 | RL 217 | 1220±90 | A.D. 730 |
| Be 22-1 | RL 218 | 830±90 | A.D. 1120 |

## TESTING THE HYPOTHESES

### Testing for Stylistic Continuity or Change

In order to test the three hypotheses about Ft. Ancient origins, the first task is to examine the data for stylistic continuities from Woodland to early Ft. Ancient. If such continuities are demonstrated, it disconfirms the migration hypothesis and simplifies the problem. If no continuities are found, the development and acculturation hypotheses are disconfirmed and migration remains a potential explanation of the data. The discussion focuses on but is not limited to the Cleek-McCabe site as the primary representative of early Ft. Ancient in northern Kentucky.

Seriation is one of the best methods for demonstrating stylistic continuity since a successful seriation requires that the occupations involved belong to the same cultural tradition. Pottery is one of the most common kinds of artifacts recovered from both Woodland and Ft. Ancient sites; with demonstrable historical styles already established, ceramic types serve as the basis for the primary seriation. Temper and surface finish are again the two dimensions used to define the ceramic types.

Ten types have been tabulated for each site having pottery in the southwest Ohio-southeast Indiana-northern Kentucky region (Figs. 2-4). The totals and percentages of each type for each collection are presented in Appendix II. Several collections have only approximate percentages reported and others only occurrence patterns of the pottery types. Given the small amount of variability in individual assemblages, collections with 30 or more sherds can be seriated with fairly good results: 16 of 35 collections can be ordered with variations from the model only at the ends of type distributions (Fig. 48).

Upon inspection of the seriation it becomes apparent that the order is

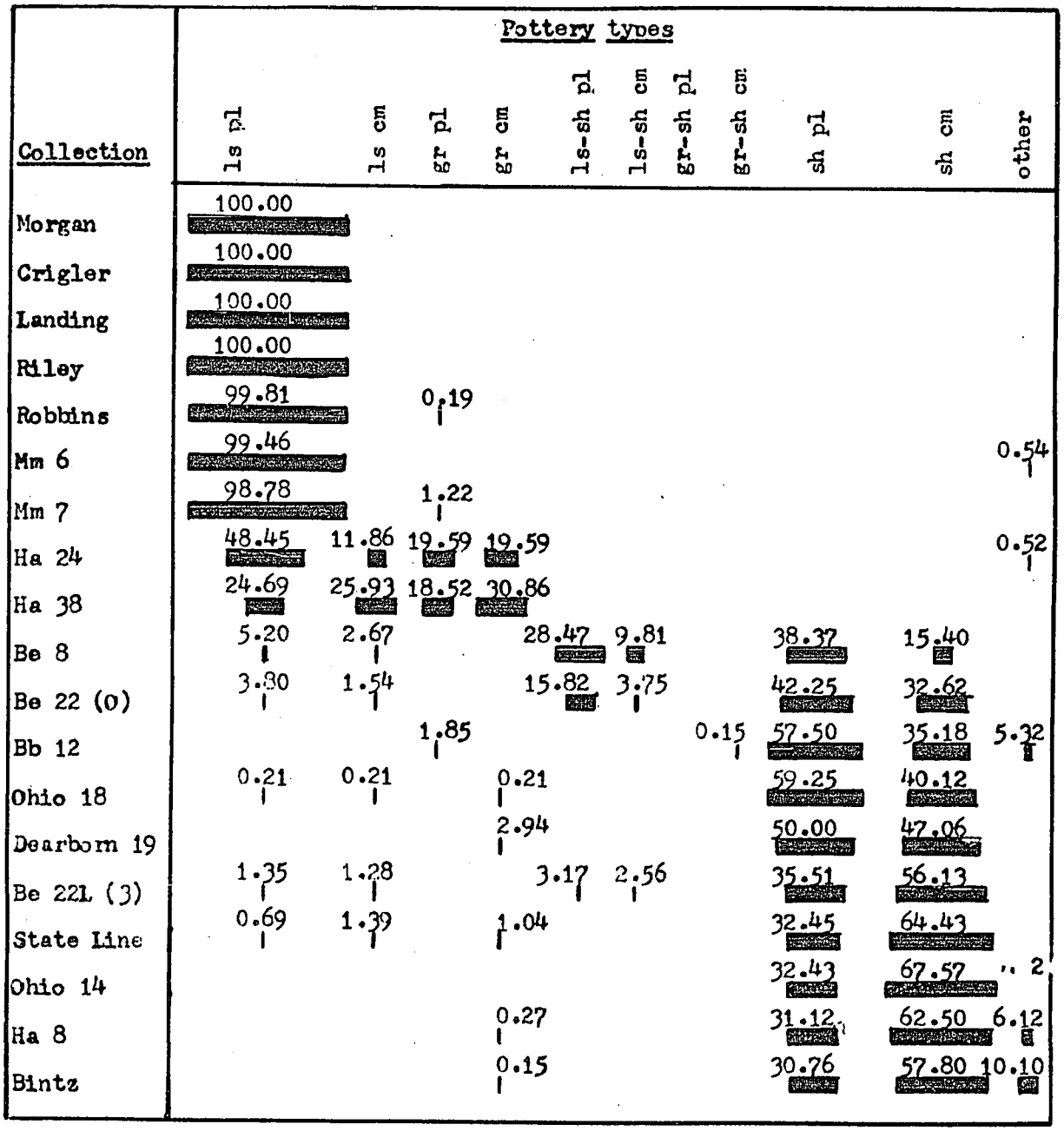



Fig. 48. Seriation of Pottery Types in Assemblages from Southwest Ohio-Southeast Indiana-Northern Kentucky Region

unchanged if grit and limestone tempered and grit-shell and limestone-shell tempered types are combined. This allows more assemblages to be seriated and is justified partly by a belief that limestone and limestone-shell tempering have not been consistently differentiated from grit and grit-shell modes in the sources. For example, Goodell (1971) and Dunnell (1961) differ on the amounts of these types present in Sc 2 and the present study differs from Dunnell's (1961) samples of Be 8 and Be 22, which record grit and grit-shell tempering as prominent components in place of limestone and limestone-shell tempered types. Therefore, a second seriation has been compiled (Fig. 49). It contains 27 collections and orders 21 of them. The first 4 assemblages in Fig. 47 and the first 7 in Fig. 48 are not ordered among themselves since they show identical percentages.

It is noted that there is an important gap in the sequence (Fig. 49) between Edwards and Mer 15. This is indicated by the sudden increase in shell-tempering, from none in Edwards to more than 35% of the sherds from Mer 15. The complimentary drop in the frequency of limestone/grit tempering is concentrated in cordmarked pottery. Shell temper is included in another 10% of the sherds in combination with limestone or grit particles. The explanation for this may lie in the unsystematic manner in which sites have been chosen for excavation, especially in Kentucky. It may be that sites which display small percentages of shell-tempered pottery lack imposing burial mounds and large midden areas, the two traits that attracted attention to a site in the past. Also, if the change to shell tempering occurred rapidly, the fewer sites in this period would be less likely to be represented.

A number of the assemblages with more than 30 sherds (Appendix III) that do not seriate (Figs. 48-49) are Hopewell earthworks (Fig. 3) that

| Pottery types / Collection | ls-gr/ pl | ls-gr/ cm | ls-sh/ gr-sh pl | ls-sh/ gr-sh cm | sh pl | sh cm | other | total |
|---|---|---|---|---|---|---|---|---|
| Morgan | 100.00 | | | | | | | 204 |
| Crigler | 100.00 | | | | | | | 114 |
| Landing | 100.00 | | | | | | | 267 |
| Riley | 100.00 | | | | | | | 159 |
| Robbins | 100.00 | | | | | | | 531 |
| Law | 100.00 | | | | | | | 217 |
| White | 100.00 | | | | | | | 164 |
| Mm 6 | 99.46 | | | | | | 0.54 | 3498 |
| Whitehead | 98.05 | 1.95 | | | | | | 256 |
| Mm 7 | 89.21 | 10.79 | | | | | | 241 |
| Ha 24 | 68.04 | 31.44 | | | | | 0.52 | 194 |
| Ha 64 | 57.00 | 43.00 | | | | | | 7 |
| Ha 38 | 43.21 | 56.79 | | | | | | 81 |
| Ha 65 | 17.83 | 82.17 | | | | | | 544 |
| Edwards | 16.82 | 82.25 | | | | | 0.93 | 107 |
| Mer 15 | 10.71 | 41.42 | 3.57 | 6.42 | 23.57 | 12.14 | 2.14 | 140 |
| Sc 2 | 6.47 | 12.35 | 14.12 | 25.88 | 28.82 | 12.35 | | 170 |
| Be 8 | 5.20 | 2.67 | 28.47 | 9.81 | 38.37 | 15.40 | | 10230 |
| Be 22 (0) | 3.80 | 1.54 | 15.82 | 3.75 | 42.25 | 32.62 | | 6992 |
| Bb 12 | 1.85 | | | 0.15 | 57.50 | 35.18 | 5.32 | 1353 |
| Ohio 18 | 0.21 | 0.42 | | | 59.25 | 40.12 | | 481 |
| Dearborn 19 | | 2.94 | | | 50.00 | 47.06 | | 34 |
| Be 22L (3) | 1.35 | 1.28 | 3.17 | 2.56 | 35.51 | 56.13 | | 1484 |
| State Line | 0.69 | 2.43 | | | 32.45 | 64.43 | | 866 |
| Ohio 14 | | | | | 32.43 | 67.57 | | 37 |
| Ha 8 | | 0.27 | | | 31.12 | 62.50 | 6.12 | 376 |
| Bintz (rims only) | | 0.15 | | | 30.76 | 57.80 | 10.10 | 673 |

Fig. 49. Seriation of Revised Pottery Types

apparently participate in a partially different pottery tradition (Prufer 1965, 1968). They show appreciable quantities of stamped sherds--simple stamped, check-stamped, rocker-stamped, and so on (Prufer 1968)--which have been combined here. Although many of the pottery collections from Hopewell mounds and earthworks are biased, those from Turner, Fort Ancient, and Marriott-1 are held to be fairly well collected and documented (Prufer 1968:1-2). Some of these assemblages will seriate among themselves (Fig. 50), confirming that they are participating in a separate ceramic tradition.

The order produced by the main seriation (Fig. 49) can be partially duplicated by occurrence seriations of burial types and projectile point modes (Tables 17-18). Frequency seriations of each of these are also possible, but allow considerably fewer collections to be ordered (Tables 19-20). This is partly caused by small sample sizes and inadequacies in reporting the assemblages in the literature. An ordering of structure modes is also possible for the few sites that have structures (Table 21). The only information available is for structures under burial mounds.

Together with the ceramic sequence, these five arrangements produce the chronology shown in Table 22. Collections with fewer than 30 sherds or that have only type occurrences, rather than frequencies, known have been included in the confirming seriations when their position remains constant; they are Hartman, C. L. Lewis, and the Turpin stone mound. Several of the assemblages are either too poorly known or have too few examples of the pertinent artifacts to be included in the final chronology. These include Law, Mm 7, Ha 65, Sc 2, Ohio 14, and Dearborn 19. The earthworks collections (Fig. 50) likewise have too little non-ceramic information to allow them to be compared with other kinds of assemblages.

The other assemblages ordered by the ceramic seriation (Fig. 49) are

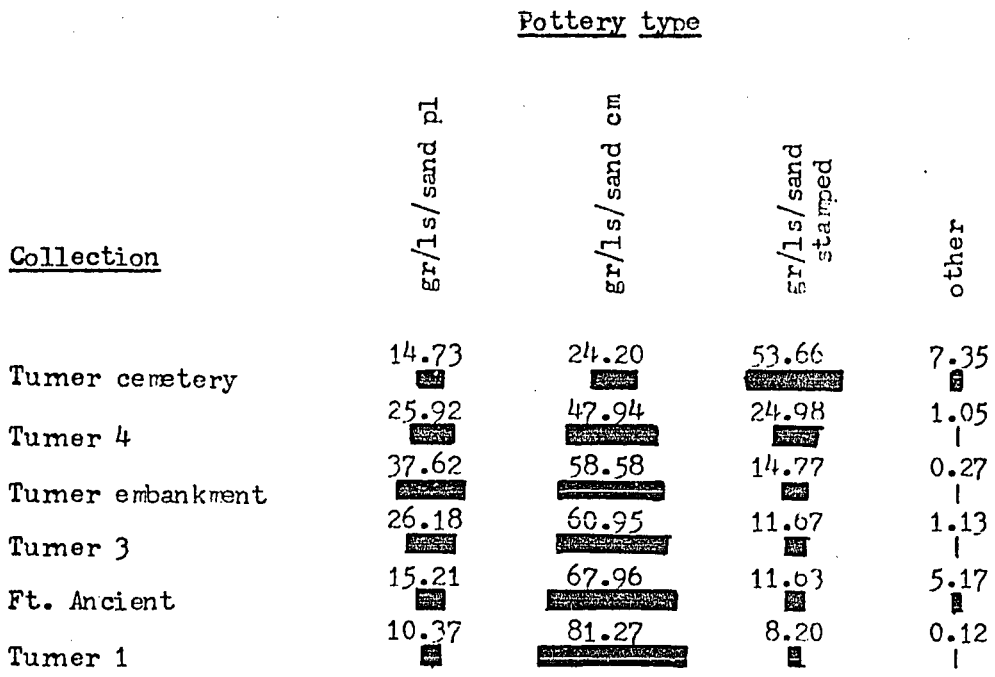



Fig. 50. Seriation of Pottery Types from Hopewell Earthworks in Southwest Ohio

Table 17. Occurrence seriation of burial types.

| | Burial position | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | E | | F | | B | | C | | SS | |
| Collection | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb |
| Morgan | x | x | | | | | | x | | |
| Crigler | x | x | | | | | x | x | | |
| Robbins | x | x | | | | | x | x | x | x |
| Riley | | x | | | | | | x | | x |
| Hartman | | x | | | | x | | x | | x |
| C. L. Lewis | | x | | x | | x | | x | | x |
| Edwards | | x | | x | | x | | | | x |
| Cleek-McCabe | | x | | x | | x | | | | x |
| Turpin stone mound | | ? | | x | | x | | | | ? |

E-extended, F-flexed, B-bundle, C-cremation, SS-single skull

Table 18. Occurrence seriation of projectile point shape modes.

| Collection | Projectile point modes | | | | |
|---|---|---|---|---|---|
| | triangular | notched | stemmed | ovate | total |
| Morgan | | x | x | | 16 |
| Crigler | | x | x | x | 14 |
| Robbins | | x | x | x | 35 |
| Riley | | x | x | x | 6 |
| Hartman | | x | x | | 10 |
| Ha 24 | x | x | x | | 20 |
| Ha 38 | x | x | x | | 31 |
| Mer 15 | x | x | | | 5 |
| Be 8-Be 22 (0) | x | x | | | 81 |
| Be 22L (3) | x | x | | | 11 |
| Turpin village | x | x | | | ? |
| Ha 8 | x | x | | | 56 |

Table 19. Frequency seriation of burial types.

| | | Burial position | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | | F | | B | | C | | SS | |
| Collection | | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb | log tomb | no log tomb |
| Robbins | # | 52 | 19 | | | | | 1 | 11 | 3 | 3 |
| | % | 58.43 | 21.35 | | | | | 1.72 | 12.36 | 3.37 | 3.37 |
| Riley | # | | 4 | | | | | | 1 | | 2 |
| | % | | 57.14 | | | | | | 14.29 | | 28.57 |
| Hartman | # | | 3 | | | | 2 | | 1 | | 1 |
| | % | | 42.86 | | | | 28.57 | | 14.29 | | 14.29 |
| Be 8-22 | # | | 3 | | 13 | | 1 | | | | 2 |
| | % | | 15.79 | | 68.42 | | 5.26 | | | | 10.53 |

E-extended, F-flexed, B-bundle, C-cremation, SS-single skull.

Table 20. Frequency seriation of projectile point shape modes.

| | Projectile point mode | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Collection | triangular | | notched | | stemmed | | ovate | | total |
| | # | % | # | % | # | % | # | % | |
| Robbins | | | 6 | 17.14 | 18 | 51.43 | 11 | 31.43 | 35 |
| Hartman | | | 6 | 60.00 | 4 | 40.00 | | | 10 |
| Ha 38 | 1 | 3.22 | 20 | 64.52 | 10 | 32.26 | | | 31 |
| Mer 15 | 3 | 60.00 | 2 | 40.00 | | | | | 5 |
| Be 22 (0) | 27 | 87.10 | 4 | 12.91 | | | | | 31 |
| Be 22L (3) | 10 | 90.91 | 1 | 9.09 | | | | | 11 |
| Ha 8 | 54 | 96.43 | 2 | 3.57 | | | | | 56 |

Table 21. Ordering of structure outline modes, structures underlying burial mounds.

| Collection | Structure outline modes | | |
|---|---|---|---|
| | circular | rectangular | total |
| Morgan | x | | 1 |
| Crigler | x | | 1 |
| Robbins | x | | 1 |
| Riley | x | x | 3 |
| Be 8 | x | x | 3 |
| Turpin (Ft. Ancient mound) | | x | 1 |

Table 22. Final chronology, collections from southwest Ohio-southeast Indiana-northern Kentucky region.

| Collection | $C^{14}$ dates | Phase affiliation |
|---|---|---|
| Morgan | | Adena |
| Crigler | | Adena |
| Robbins | | Adena |
| Riley | | Adena |
| Hartman | | Adena |
| C. L. Lewis | | Adena |
| Ha 24 | | Hopewell |
| Ha 38 | | Late Woodland |
| Edwards | | none given |
| Mer 15 | | Ft. Ancient |
| Be 8-Be 22 (0) | A.D. 270, A.D. 730, A.D. 1120 | Ft. Ancient |
| Be 22L (3) | | Ft. Ancient |
| Turpin | A.D. 1275 | Ft. Ancient |
| Ha 8 | | Ft. Ancient |

not included in the chronology because their order is changed in the burial or projectile point seriations. As a consequence, their chronological position is unclear. Because Be 8 and Be 22 (0) are next to each other in the ceramic seriation and their order with respect to one another and Be 22I (3) is known from a previous seriation (Table 10), they are combined. Eleven chronological positions, occupied by 14 assemblages, are established by correlating the several seriations.

The earlier end of the chronology is on the top, as established by the order given the parts of the Cleek-McCabe site and the radiocarbon dates (Table 22). The phase affiliation of each assemblage as indicated in the literature is listed also and shows that there is continuity from Adena through Hopewell and Ft. Ancient. The sequence can be used to demonstrate further stylistic continuities, especially in pottery. Ceramic continuities cannot be used to confirm the original seriation based on ceramics, but they can be used to examine further the relationships between the assemblages once a chronology is established.

The sites too poorly known to provide further comparative material have been excluded from further searches for stylistic continuity. These include the collections from Ha 24 and Ha 38, which are from the surface and not very large, and the assemblage from Mer 15, which is derived from only three test pits. None of these collections has been described in detail or well illustrated in the literature, making further use even more difficult. Ceramic and other continuously distributed modes are listed in Table 23.

The percentage of decorated sherds has a unimodal distribution over these collections, increasing dramatically in the time represented by the three portions of Cleek-McCabe. The earlier assemblages seldom have any decorated pottery, and Be 8 has only a small amount (Table 24). The incised vessel from the Morgan mound differs from the decorated pottery from

Table 23. Modes showing continuous distributions over chronologically-ordered collections.

| Collection | Ceramic modes: lug handle | strap handle | curvilinear guilloche | rectilinear guilloche | Other modes: non-ceramic grave goods | tooth pendant | chipped disk | puddled clay | elbow pipe | copper | mica |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Morgan | | | | | x | | | | | x | |
| Crigler | | | | | x | | | x | | x | x |
| Robbins | | | | | x | | | x | | x | x |
| Riley | x | | | | x | | | | | x | |
| Hartman | x | | | | x | | | | | x | |
| C. L. Lewis | ? | | | | x | | | | | x | |
| Edwards | ? | | | | x | x | | | | x | |
| Be 8 | x | x | x | | x | x | x | | x | | |
| Be 22 | x | x | x | x | x | x | x | | x | | |
| Turpin stone mound | ? | ? | ? | ? | x | | x | | x | | |
| Ha 8 | | x | x | x | | | | | | | |

Table 24. Distribution of decorated sherds through time.

| Collection | Decorated sherds # | % | total |
|---|---|---|---|
| Morgan | 1 (whole vessel) | 0.49 | 204 |
| Crigler | 0 | 0.00 | 114 |
| Robbins | 0 | 0.00 | 531 |
| Riley | 0 | 0.00 | 159 |
| Hartman | 0 | 0.00 | 17 |
| C. L. Lewis | 0 | 0.00 | 6 |
| Edwards | 0 | 0.00 | 107 |
| Be 8 | 94 | 0.92 | 10230 |
| Be 22 (0) | 420 | 6.01 | 6992 |
| Be 22L (3) | 180 | 12.13 | 1484 |

Cleek-McCabe, where no whole pots were found. It may represent mortuary pottery, while the sherds from Cleek-McCabe do not, since they were scattered throughout the mound and midden rather than being in burial association.

Although the demonstrated stylistic continuities that run through parts of the chronology are in some cases quite general, they tend to disconfirm the migration hypothesis for the origin of Ft. Ancient. Sharing of specific styles is difficult to demonstrate with information available in the literature. In particular, the non-Adena sites other than Cleek-McCabe have in many cases not been fully excavated or described, making continuities hard to trace. The problem is compounded by the time gap separating Cleek-McCabe from the earlier occupations, as represented by the lack of collections displaying small amounts of shell tempering (Fig. 49).

The migration hypothesis, along with acculturation and local development, is further tested by attempting to identify the sources of styles that first appear in the sequence upon the advent of Ft. Ancient. These include shell tempering, the curvilinear and rectilinear guilloche design, strap handles, triangular projectile points, ground stone disks, and elbow pipes. All of these are present at Cleek-McCabe, and all except the guilloche design are elements associated with the Middle Mississippian tradition, centered in the Mississippi valley south of St. Louis. The usual conclusion has been that Ft. Ancient derives from Middle Mississippian, either by migration (Griffin 1943; Morgan 1952; Prufer and Shane 1970) or acculturation (Griffin 1943, 1952b; Caldwell 1958, 1962). To test these explanations, the earliest appearances of each of the styles mentioned above is investigated.

Shell tempering is present at Cahokia, a major Mississippian site near St. Louis, at about A.D. 900 (Fowler and Hall 1972), and at two sites in western Missouri usually labeled Mississippian, Steed-Kisker and Gresham, at A.D. 860±110 and A.D. 875±150 respectively (Shippee 1972). The two radiocarbon dates from Be 8, which shows 58.77% shell-tempered pottery, are considerably older than this. The Haffner-Kuntz site in western Ohio (Fig. 4) has 100% shell-tempered ceramics and a $C^{14}$ date of A.D. 575±150 (Starr 1960). Both of these instances show unexpectedly early dates for Ft. Ancient and so may be suspect. However, shell tempering is also early in a number of other areas. Small percentages are present farther east at the O. C. Voss mound, dated A.D. 966±79 (Baby, Potter, and Mays 1966) and at Blain village, where the earliest date is A.D. 970±155 (Prufer and Shane 1970:232). A site in West Virginia, Hughes Farm, has a radiocarbon date of A.D. 710±90 from a structure with 12% shell-tempered pottery (Dunnell, personal communication); the Loyola Retreat site in Maryland yielded a date of A.D. 815±95 on shell-tempered ware (Rackerby 1972:572). Similar pottery is placed in Middle Woodland in Pennsylvania, New York, and New Jersey (Stephenson 1971:256-259; Cross 1971:321). Shell tempering is also early in Wisconsin, where there is a change through time from shell to grit tempering (Gibbon 1972:171). The shell-tempered pottery has been placed in Middle Woodland (Wittry 1959). At Carcajou Point, dated at A.D. 998±250 and A.D. 1028±250, 99% of the pottery is shell-tempered (Hall 1962).

Curvilinear and rectilinear guilloches do not appear outside the Ft. Ancient area except very late in the Mississippian tradition, when they are found on Matthews Incised at Kincaid and in southeast Missouri, and on Winterville Incised in the southern Yazoo Basin (Phillips 1970). They are present earliest at Haffner-Kuntz and the O. C. Voss mound,

besides occurring at Cleek-McCabe. Strap handles have a wide distribution in the eastern United States, from West Virginia and Virginia on shell- and limestone-tempered wares (Solecki 1949) to the Mississippi valley (Griffin 1949a). They are dated earliest at Cleek-McCabe and Blain Village in the Ohio valley and are later in the Mississippian tradition, loop handles being the exclusive form in the early period (Fowler and Hall 1972).

Triangular projectile points are the most common Ft. Ancient and Mississippian form. However, they occur in other traditions also and in assemblages that predate both Ft. Ancient and Mississippian. Small triangular points have been found at a number of Hopewell sites, including McGraw Village (Prufer 1965) and Brown's Bottom (Blank 1965), and at one of the C & O mounds, Jo 2 (Webb 1942), which is identified either as Adena or Woodland (Webb 1942; McMichael and Mairs 1963). The Driskill site in western Kentucky (Schwartz 1962) produced 73 small triangular points, which constituted 96% of the points found, in association with the pre-Mississippian pottery types Mulberry Creek Cordmarked and Baytown Plain. Similar points are found in Wisconsin in association with the Middle Woodland shell-tempered pottery mentioned above (Wittry 1959).

Ground stone discoidals are present in the Mississippian tradition as early as A.D. 900 (Fowler and Hall 1972), as well as in Ft. Ancient. They are also found in Monongahela sites (Mayer-Oakes 1955), at Yankeetown in Indiana (Kellar 1968), which is dated at A.D. 900±150 (Radiocarbon 1970), and at Leimbach in northern Ohio, which is related to Adena and has a date of 520±310 B.C. (Shane 1967). Elbow pipes are found in Mississippian assemblages from Illinois, including Crable and Kincaid, and also in the Powell Mound at Cahokia (Jensen 1963:111). The Powell Mound has been placed in the pre-Mississippian Late Woodland period,

dated from about A.D. 600 to 800 (Fowler and Hall 1972:2). Within Ft. Ancient they are found earliest at Blain (Prufer and Shane 1970), O. C. Voss (Baby, Potter, and Mays 1966) and Cleek-McCabe.

The points of origin of these styles remain unclear; shell tempering and triangular projectile points, which are early in widely separated areas, probably have more than one independent origin. It is clear, however, that the styles do not make up a coherent set originating in one area. Thus, they do not support the acculturation or migration hypotheses, and in particular they fail to conform to the belief that Ft. Ancient is a result of Mississippian migration or acculturation. Most of them are earlier outside the Mississippian tradition than they are in it, and they do not occur together in Mississippian until after they appear in Ft. Ancient. There is no reason to suppose that they came to northern Kentucky Ft. Ancient from the Mississippian tradition rather than from the various regions--western Kentucky, West Virginia, Wisconsin--where they appear earlier.

## Evidence for Functional Continuity or Change

Although the migration and acculturation hypotheses are weakened by the evidence of stylistic continuity previously presented, it is important to examine the data for information on functional changes that may occur between Woodland and Ft. Ancient. Because the evidence is incomplete, the discussion cannot be confined to the northern Kentucky region and can deal only with large-scale changes, specifically in settlement patterns and subsistence bases.

The best evidence on Woodland settlement patterns is from the Hopewell phase. A number of habitation sites are known and show that the people lived in small sedentary hamlets rather than in nucleated villages. Examples are McGraw (Prufer 1965), Brown's Bottom (Blank 1965), and Ha 24, Ha 64 (Starr 1960:104-106), and Ha 65 (Lee and Vickery 1972) in southwest Ohio. Each of these occupations is small. Ha 64 covers one acre and surrounding pottery concentrations indicate the presence of a number of other Hopewell sites on a series of one-to-two acre terraces (Starr 1960:105). The McGraw site measures 140 by 95 feet (Prufer 1965:10), and a number of comparably-sized occupation areas appear as dark circles in the surrounding area at several hundred yards distance (1965:14). Similar circular refuse areas associated with Hopewell blades and McGraw Cordmarked and Plain pottery are visible elsewhere in the Scioto River bottoms (Shane 1971:145). Evidence of sedentariness comes mainly from the character of the McGraw midden, which averaged seven inches deep and was very dense and black (Prufer 1965:12). The Twin Mounds village, Ha 24, has at least one house (Lee and Vickery 1972).

The Adena settlement pattern is virtually unknown. No villages have been identified with burial units. Structures under burial mounds were once believed to be remains of prior villages (Webb 1943:596; Morgan 1952) but

are now regarded as ceremonial structures (Dragoo 1963). A possible exception is the area surrounding one of the C & O mounds, Jo 2, in eastern Kentucky (Fig. 2). Beyond the extent of the mound were 60 post-molds and eight fireplaces, as well as at least six circular structures which were found under the mound (Webb 1942). The other postholes may once have been covered by since-removed mounds. Also, there is some question about the Adena affiliation of Jo 2 in view of its unusual mixture of artifact styles (McMichael and Mairs 1963; Purrington 1972).

Three possible Adena hamlets have been mentioned in the literature. They are associated with grit- or limestone-tempered plain pottery and include apparent circular postmold patterns near but not under burial mounds. One such area is near the Caldwell or McBeth mound in the Scioto River valley (Shane 1971:144), and another is near the Bagley and James mounds twenty miles from Columbus, Ohio (Potter 1971:11). The James mound has a $C^{14}$ date of 678±113 B.C. (1971:10). The third instance is an unnamed site in Madison County, Kentucky, where midden material is found about 60 feet from two small burial mounds (Rowlette 1962:94). The Leimbach site in northern Ohio (Shane 1967) shows similarities to Adena; a portion of one circular structure was excavated there.

Late Woodland settlement patterns are also poorly known, partly because of the inconsistent use of the term. The Lichliter site, near Dayton, Ohio (Fig. 3), is a hamlet or small village. One complete circular structure and parts of three others were uncovered in an area of about 250 by 50 feet (Allman 1957). The site's dimensions are 600 by 300 feet, so several more houses could be present. The only Newtown phase site with structures is Turpin, where a rectangular postmold pattern identified as Late Woodland was found under a Ft. Ancient burial mound (Oehler 1950). Starr (1960:61) states that such structures "dotted the Turpin site during the 'Newtown'

period," but the only illustration is of the same structure described by Oehler (1950) as being from under the mound. Two occupations, one Newtown and one Ft. Ancient, are apparently represented at Turpin, since there is a humus line separating them (Starr 1960:62), but the descriptions are too imprecise to illuminate the Newtown settlement type. The Peters and Chesser phases of south-central Ohio are known only from caves (Prufer and McKenzie 1966; Prufer 1967). No structures are present; the Chesser Cave component at least appears to represent a seasonal hunting camp reoccupied several times (Prufer 1967).

Some cultigens were grown by the Woodland people. Corn has been found in several Hopewell sites, both mounds and hamlets. It is reported for the McGraw site, with dates running from A.D. 140±80 to A.D. 481±65 (Prufer 1965:104) and from Ha 65 and Ha 24 in Hamilton County, Ohio (Lee and Vickery 1972). Hopewell mounds with maize are Turner Mound 1 in southeast Ohio and Harness in the Scioto valley (Griffin 1960) and the Biggs earthworks on the Kentucky side of the Ohio River opposite the mouth of the Scioto (Hardesty 1965). Corn has also been found at one Adena occupation, the Daines mound near Athens, Ohio (Murphy 1971), which is dated at 280±140 B.C. Chenopod seeds, another possible cultigen, have been found in Ohio Adena sites (Goslin 1957), as have squash and gourd (Yarnell 1964:121). Rock shelters in Kentucky which have produced maize, sunflower, gourd, and squash from what were once thought to be Adena occupations (Webb and Snow 1945) are now attributed to Archaic hunters and gatherers (Purrington 1967).

Both Adena and Hopewell have been alleged to be agricultural on the basis that the large mounds and earthworks associated with these phases could have been constructed only if an agricultural subsistence base was present (Webb and Snow 1945; Spaulding 1955; Willey 1966:268). In this argument, such an economic base is the only kind that would allow the

freeing of excess laborers and the organization necessary for such major public works. Others feel that Woodland cultures could sustain these works, which were often built in stages, with a hunting and gathering economy (Caldwell 1958:30).

The presence of cultivated plants in Woodland sites does not necessarily imply an agricultural subsistence base, since they may be used to supplement hunting and gathering rather than to supply a crucial portion of the total food supply. Examples are provided by the Archaic people of Kentucky. Sunflower was found associated with the Sim's Creek phase in the Fishtrap region of eastern Kentucky (Dunnell 1972:68); a number of rockshelters farther to the west have produced the cultigens mentioned earlier that were once ascribed to Adena but now are associated with a hunting and gathering economy (Purrington 1967). In Hopewell, the gathering of wild plants and shellfish and hunting are attested to by evidence from McGraw (Prufer 1965:113-124). In view of the lack of nucleation, agriculture would not be necessary to support Woodland populations.

A possible exception is Lichliter, which may represent a small nucleated village and perhaps be indicative of an agricultural economy. It has been speculated (Dunnell 1972:77) that nucleation is not possible in a hunting and gathering based economy in the eastern Woodlands. No comparable sites have been excavated in the region, so it is not possible to do more than point out that the site indicates a change in settlement type from the hamlet. No corn or other cultigens were found at Lichliter (Allman 1957).

In contrast to the Woodland settlements mentioned, Ft. Ancient habitation sites are usually at least several acres in area. Cleek-McCabe covers approximately five acres and another early Ft. Ancient site, Blain Village, extends over eight acres (Prufer and Shane 1970). The midden deposits in both sites are two feet or more thick. Later sites like Anderson and

Madisonville extend over many acres (Griffin 1943). Structural evidence is also more abundant in Ft. Ancient occupations. Turpin has at least one Ft. Ancient house (Oehler 1950), Buckner in Kentucky has two (Dunnell 1961), and the Slone site in eastern Kentucky displays a number of houses enclosed by a stockade (Dunnell, Hanson, and Hardesty 1971). The Baum and Gartner sites apparently had circular houses in the village areas (Mills 1904, 1906). Forty-nine of these were found at Baum, with the largest measuring 21 by 12 feet, although most of the others were about half that size (Mills 1906: 55-59). The presence of structures in many Ft. Ancient sites suggests permanent occupation, as does the size and depth of the midden areas. The same traits attest to nucleation.

Corn has been found at most excavated Ft. Ancient sites, including Blain (Prufer and Shane 1970), Graham (McKenzie 1967), Baum, Gartner, Feurt, Baldwin, Anderson, Madisonville, Campbell Island, Cramer, and Turpin (Goslin 1952). Charred corn and corn cobs were found at Cleek-McCabe in the mound, at the four foot level of square 40L4. Wild plant remains, beans, and sunflower seeds have been found at a number of Ft. Ancient sites (Table 25). The prevalence of maize and beans and the size of the habitation areas is consistent with subsistence based on agriculture.

From the available information, there seem to be functional differences between Woodland and Ft. Ancient both in settlement pattern and subsistence. The evidence is not adequate to allow the changes to be traced in detail or placed in time, although it is certain that the new settlement-subsistence system is present in early Ft. Ancient sites like Blain and Cleek-McCabe. Whether the changes in settlement pattern and subsistence base occurred at the same time is not known. Some investigators are convinced that at least late Hopewell is agricultural while

retaining its dispersed settlement pattern (Prufer 1965).

There is a tendency for occupations to shift from hills and ridges to terraces and bottoms along rivers in the period from Hopewell to Ft. Ancient. All of the Ft. Ancient sites listed in Table 26 are located on bottoms or broad terraces, while Adena and Hopewell sites are frequently found on hills or ridges as well as on lower land (Starr 1960:21-22; Prufer 1964:67-68). Hopewell habitation sites are found in both kinds of terrain (Starr 1960:104; Prufer 1965). The change seems to correlate with the process of nucleation, perhaps because a nucleated village requires more space than a hamlet; it may also be related to greater dependence on cultivated crops, although this cannot be demonstrated with available information. Corn has been found at Hopewell hamlets both on high land, such as Ha 24 (Starr 1960:104; Lee and Vickery 1972), and on bottomland, such as McGraw (Prufer 1965).

Such a change in location of sites can be documented for the chronological sequence established for the northern Kentucky region (Fig. 49 ). The shift from hilly to flat terrain occurs in the time between the occupations of Ha 24 and Ha 38; Ha 38 is considerably larger, covering an area of four acres (Starr 1960:55). The distribution of the sites by type of terrain is shown in Table 26.

Both acculturation and some kinds of local development require that functional change occur. However, the evidence that changes in settlement pattern and subsistence base happened sometime previous to or coeval with the stylistic changes that signal the beginning of Ft. Ancient is not exact enough to be of direct use in supporting or disconfirming any of the hypotheses. It is established that corn was present in the area before the advent of Ft. Ancient, as was a sedentary settlement pattern.

Table 25. Cultivated and wild plant remains from Ft. Ancient sites.

| Site | Cultigens | corn | beans | sunflower | squash, gourd | Wild plants | buttemut | walnut | hazelnut | acorn | chestnut | hickory nut | blackberry | wild cherry | wild grape | wild plum | papaw | buckeye | morning glory | sumach |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Plant remains | | | | | | | | | | | | | | | | | | |
| Anderson | | x | | | | | | | | | | | | | | | | | | |
| Baldwin | | x | | | | | | | | | | x | | | | x | | | | |
| Baum | | x | x | | | | x | x | x | | x | | | | x | x | x | | | |
| Bintz | | x | | | | | | | | | | x | | | | | | | | |
| Blain | | x | x | | x | | | x | | x | | x | | x | x | | x | | x | x |
| Campbell Is. | | x | x | x | | | | | | | | | | | | | | | | |
| Cleek-McCabe | | x | | | | | | | | | | | | | | | | | | |
| Cramer | | x | x | x | x | | | | | | | x | | | | x | x | | | |
| Feurt | | x | x | | | | x | x | | x | | x | x | x | | x | x | | | |
| Gartner | | x | x | | | | x | x | x | | x | x | | | | x | x | | | |
| Graham | | x | | | | | x | x | | | | x | | | | | | | | |
| Hardin | | x | | | | | | | | | | | | | | | | | | |
| Madisonville | | x | | | | | | | | | | | | | | | | | | |
| Morrison | | x | | | | | | | | | | | | | | | | | | |
| Schisler | | | | | | | | | | | | x | | | | | | | | |
| Turpin | | x | | | | | | | | | | | | | | | | x | | |

Table 26. Location of sites in chronological sequence by terrain.

| Site | Location |
|---|---|
| Morgan | ridge |
| Crigler | hill |
| Robbins | ridge |
| Riley | ridge |
| Hartman | hill |
| C. L. Lewis | terrace |
| Ha 24 | ridge |
| Ha 38 | terrace |
| Edwards | bottoms |
| Mer 15 | bottoms |
| Be 8-Be 22 | bottoms |
| Turpin | terrace |
| Ha 8 | terrace |

# CONCLUSIONS

## The Hypotheses

### Rules governing local development

Given the evidence presented, local development of Ft. Ancient from the preceding Woodland is the best of the three hypotheses proposed to explain the origins of the phenomena placed in Ft. Ancient in the northern Kentucky-southwest Ohio-southeast Indiana region. The first point supporting local development as opposed to migration is stylistic continuity from Woodland to Ft. Ancient, particularly evidenced by the fact that occupations from both traditions can be seriated together using a number of different, unrelated artifact types and modes (Figs. 48-49, Tables 17-20). Such continuities would not exist except by chance if Ft. Ancient originated in the area through migration.

Another line of evidence that contravenes both migration and acculturation as better explanations of the data than local development is that there is no group of styles appearing in early Ft. Ancient that has a coherent origin elsewhere. A number of Ft. Ancient styles that have no precursors in local Woodland phases have been shown either to have a number of different possible points of origin outside Ft. Ancient or to have no earlier distribution, indicating that they originate within the tradition. Local development allows for the diffusion of isolated styles and is the best way to account for the stylistic change that does occur between Woodland and Ft. Ancient.

Somewhere in the Woodland-Ft. Ancient continuum there occur two important functional changes, from dispersed to nucleated sedentary settlement pattern and from hunting and gathering to agricultural subsistence base. These changes are not necessarily concurrent; since nucleation may not be

supportable without agriculture in this environment, agriculture may have appeared first. Neither functional change can be demonstrated with the inadequate available evidence to be concomitant with the beginning of Ft. Ancient as defined stylistically. It is fairly certain that Ft. Ancient has both agriculture and nucleated settlements, but since the history of these changes is uncertain, they cannot play an important part in choosing the best of the three hypotheses.

However, once local development is chosen as the most adequate hypothesis, it can be demonstrated that the stipulated changes in settlement and subsistence type are not incompatible with that conclusion. Two rules have been advanced to account for the development of agriculture in the eastern United States (Dunnell 1970a). The first is that "subsistence systems through time tend to maximize economic potential of a given macroenvironment" (p. dated 10/13/70), while the second states that "sedentariness is a necessary condition of agricultural subsistence; agriculture will develop when the potential of the cultigens alone is greater than the total non-cultivated potential resources" (p. dated 10/27/70).

These rules are not new to archaeology, but their explicit expression as laws that can help to explain developmental changes subsumed under them is novel. It is usually assumed that cultures maximize resource potential until the carrying capacity of the environment is reached (Binford 1968b: 331-332; Zubrow 1971:130; Glassow 1972; Plog and Garrett 1972). At that point, three choices are open. Either emigration occurs or there is selection for increased efficiency of production or for increased regulation of the birth rate (Binford 1968b:332; Zubrow 1971:130). The conditions under which each of the alternatives occurs are not defined. The agricultural potential of the environment has been proposed as one limit to increased efficiency of production (Meggers 1954) which might lead to

adoption of either emigration or birth rate regulation. The rule in question states, "the level to which a culture can develop is dependent upon the agricultural potentiality of the environment it occupies" (Meggers 1954:815).

Of the alternatives, only increased efficiency of production transcends the existing maximum economic potential with new technology. The other options allow a culture to remain at carrying capacity. In all three cases, economic potential is maximized or is tending toward a new, higher maximum. It has been asserted that cultures do not necessarily maximize the exploitative potential of their environment (Streuver 1968:309), but the basis of this statement is not explained.

Sedentariness has often been postulated as necessary for agriculture, for a number of disparate reasons. Two arguments consider it necessary for the initial domestication of plants and thus for the intense exploitation of cultigens that may follow and that constitutes agriculture (Dunnell 1972:80). Streuver (1964:97) believes residential stability is prerequisite to the development of a "dump heap" situation where potential cultigens can flourish and become domesticated, while others have asserted that sedentariness is required to allow a population increase that forces emigration into an adjacent environmental zone, causing pressure there that leads to the development of food production (Binford 1968b:332; Glassow 1972). More directly relevant to the rule is the implication or statement that the techniques of agricultural production itself require sedentariness (Caldwell 1958:xi; Flannery 1968:82; Dunnell 1972:78).

The law that agriculture will develop when the potential of the cultigens exceeds the potential of the non-cultivated resources has received the least consideration in the literature. It is a partial corollary of the first rule in that the development of agriculture is not a maximizing

strategy unless intensive cultivation can produce more than the resources it replaces. One of the premises of primary forest efficiency (Caldwell 1958:xi) is that hunting and gathering subsistence systems can be productive enough in certain environments to resist the adoption of agriculture even when it is based on already-developed cultigens such as maize. Examples from the Near East (Flannery 1965) illustrate vividly how the potentials of wild wheat and barley could be gradually increased by genetic selection and more efficient exploitation until dependence on their domesticated offspring was feasible.

One important precondition for the development of agriculture, sedentariness, was present in the central Ohio valley in the form of the dispersed sedentary settlement pattern of Hopewell (Prufer 1965) and perhaps Adena (Potter 1971) before the advent of Ft. Ancient. Also, a cultigen with a proven high potential was present in the guise of corn, although it had not yet developed the productivity it later achieved in prehistoric North America. Given the rules discussed above and the presence of these two preconditions, the development of agriculture in the area is a plausible outcome. Sedentariness may have preceded the appearance of corn in the eastern United States if Adena possesses a dispersed sedentary settlement pattern, but agriculture based on cultigens developed in the eastern United States, such as sunflower, marsh elder, and ragweed (Black 1963; Yarnell 1964), did not result. This is presumably because these domesticates did not and perhaps could never exceed the potential of other resources (Caldwell 1958:73).

The second important functional change that occurred by early Ft. Ancient times, the nucleation of settlements, has been alluded to previously in connection with the development of agriculture. A rule can

be formulated to subsume it as follows: nucleation will occur when the resource potential can support it and is increased by it. For example, the productivity of swidden farming would probably be increased by nucleation because clearing forest openings is made easier.

Rules governing migration and acculturation

In order for any hypothesis to have explanatory power its application to a particular instance must be subsumed under laws of culture change (Meehan 1968; Spaulding 1968). Otherwise it has only the status of an historical explanation, falling under implicit rather than explicitly formulated rules (Spaulding 1968). In order to make migration and acculturation viable alternatives to local development as explanations of the origin of Ft. Ancient in northern Kentucky and the surrounding area, the rules that govern them must be stated.

Not just local development, but all three hypotheses, can be viewed as involving development. The advent of a migratory tradition in a new area or the acculturation of one tradition by another are not accidental, but are the result of specifiable developmental trends in both donor and recipient traditions. The Law of Cultural Dominance (Sahlins and Service 1960) presents one set of conditions under which either migration or acculturation will occur. It states that more efficiently exploitative cultures will expand at the expense of less efficient ones.

Several corollaries can be derived from the law. The first is that more efficient environmental exploitation implies technological superiority, which in turn implies functional difference. Thus the law encompasses acculturation and expansionary but not fragmentary migration as defined here (Fig. 7), since the latter does not involve functional change. A second corollary is that less efficient cultures cannot

expand at the expense of more efficient ones. Finally, adjacent traditions will not encroach on one another if neither can exploit the other's environment more efficiently.

Following the pattern set by the Law of Cultural Dominance, two new laws are tentatively proposed to account for expansion by migration as opposed to acculturation. The Law of Migratory Expansion states that a more efficiently exploitative tradition will expand by migration at the expense of a less efficient tradition that does not possess the potential to reach an equivalent level of efficiency. By the Law of Acculturative Expansion, a more efficiently exploitative tradition will expand by acculturating a less efficient tradition that does possess the potential to reach an equivalent level of efficiency.

Inference from the rules

These laws and corollaries taken together with those governing the development of agriculture indicate that the failure of the adjacent Mississippian tradition to expand into the western Ft. Ancient region either by migration or acculturation is due to the existence in the area of an equally efficient tradition for that environment at the time expansion would have occurred. The beginnings of expansion from the Cahokia area have been placed at about A.D. 1000 (Griffin 1967:189); Aztalan in Wisconsin, which is usually attributed to Mississippian migration, has dates ranging from A.D. 1100 to 1300 and other Mississippian-influenced sites in the area are of about the same age (Gibbon 1972:174).

The pre-existant traditions in the central Ohio valley are Woodland and Ft. Ancient. The implication, then, is that agriculture must have been well enough established to match in efficiency potential Mississippian migrants with an economy also based on agriculture. It must be concluded that

agriculture developed in the Woodland-Ft. Ancient continuum parallel to or slightly later than its development in the Mississippi valley. This allowed the Ft. Ancient and Mississippian traditions to exist side-by-side in the Ohio valley without either encroaching on the other.

Further support for the belief that western Ft. Ancient and Mississippian are in some respects similar manifestations of independent processes of agricultural development is offered by the nature of the geographical boundary between them along the Ohio River and in Kentucky and Indiana. The guilloche design is a useful Ft. Ancient marker; it occurs in Shelby, Marion, and Hamilton Counties in central Indiana, but not slightly to the southwest in Morgan County (Householder 1940; Dragoo 1951). Along the Ohio River, there is Ft. Ancient pottery as far west as Louisville and the Falls of the Ohio (Guernsey 1939; Setzler 1940; Swartz 1973a).

Mississippian pottery is recognized by shell tempering and the lack of the guilloche design; it is sometimes accompanied by clay-tempered pottery that is regarded as Late Woodland or early Mississippian (Hoffman 1966). In the southwest corner of Indiana along the Ohio there are a number of Mississippian sites, including the Angel Mounds, that show a predominance of shell tempering in the ceramics (Hoffman 1966; Black 1967). Slightly farther east, however, an archaeological survey of the Newburgh Lock area near Owensboro, Kentucky, found that clay tempering was five times as common as shell tempering, implying that the most intensive occupations were in Late Woodland-early Mississippian times (Hoffman 1966:84). Other surface surveys in the area have produced similar findings (e.g., Curry 1954). Shell-tempered pottery is in an even smaller minority in Perry County in central Indiana near the river (Kellar 1957).

The evidence indicates that there are no permanent Mississippian sites that show a predominance of shell tempering beyond southwest Indiana; the

lack of platform mounds beyond that point further supports this (Kellar in Black 1967). Apparently there was some Mississippian utilization of rock shelters up the Ohio River from the Wabash lowlands as far as central Indiana, probably as hunting camps (Kellar in Black 1967). Others have identified Mississippian as far east as the Falls of the Ohio, where it meets the farthest western extension of Ft. Ancient (Guernsey 1939; Swartz 1973a:28), but the kinds of occupations represented are not stated.

The apparent lack of permanent Mississippian or Ft. Ancient settlements along this 80-mile stretch of the Ohio River lends further support to the argument that the two traditions represent parallel developments rather than being genetically linked. If they were so linked, a gradual transition from one to the other through space would be expected, while the meeting of two traditions in the same developmental stage might well result in an area between them that acted as a buffer zone, with no permanent occupations but exploited transiently for hunting or other purposes by both.

## Reconsideration of Phase-level Units

Of the three hypotheses originally proposed to account for changes that occur between the Woodland and Ft. Ancient traditions, development from the local Woodland remains as the best explanation for the origin of Ft. Ancient in the northern Kentucky region. The local Woodland has been divided into Adena, Hopewell or Middle Woodland, and Late Woodland. The developmental sequence demonstrated in this study (Table 22) contains assemblages from all these entities in the order they are usually assumed to follow, from Adena to Hopewell to Late Woodland to Ft. Ancient.

Because the four units are part of a developmental continuum in this region, there is a legitimate question whether the traditional divisions should be retained. Pottery styles and degree of elaboration of burial ceremonialism are currently the main criteria for separating the cultural units. The first question is whether phase-level units are necessary at all. They are used chiefly as a convenient way to refer to supposed spatial and temporal cultural differences as they are retailed in culture histories. Non-analytic phases have little other use, but possess serious drawbacks. They are usually arbitrary, not justified in terms of a problem; their defining criteria are usually implicit, making application to new data difficult; they become rigidified and universally repeated to the detriment of problem-oriented research; their covert definitions may gradually shift, damaging any integrity they may have had originally. Once phases are established and accepted, they often come to have a larger reality that overwhelms non-definitive changes in that data that cross-cut the phases.

Named phases might best be replaced by special-purpose units tied to a specific problem and given descriptive rather than proper names. For example, certain studies may group agricultural villages together in order

to contrast them with other contemporary kinds of occupations. Other studies might link all these occupations using common styles in order to contrast the settlement pattern with earlier or later groups of occupations. Culture histories could then be abandoned in favor of treatments of the cultural laws formulated by prehistorians and examples of their application to problems of cultural development.

However, synthetic phases are likely to continue in use in prehistory. In such a case, they are best constructed as whole-cultural phases and defined on the basis of the settlement-subsistence system represented. Such phases are comparable and easier to organize into culture histories than is presently the case. The developmental relationships between phases are more easily traced on such a background than using the current mixture of part-and-whole-cultural, stylistic and functional, implicit and explicit phases.

In this context, the traditional phases used in northern Kentucky-southwest Ohio-southeast Indiana should be abandoned or redefined. Redefinition on the basis of settlement-subsistence system types seems feasible for Ft. Ancient and Woodland. Ft. Ancient is already fairly well established to include only nucleated sedentary agricultural groups in the central Ohio valley. Woodland currently includes a variety of phases that probably range from seasonal round hunting and gathering groups to nucleated sedentary agriculturalists. Hopewell and possibly Adena, which comprise most of the Woodland occupations in the central and upper Ohio valley, have a dispersed sedentary settlement pattern and were dependent on hunting and gathering for most of their span (Caldwell 1958; Prufer 1965). Ohio valley Woodland is best defined on this basis, with all units displaying other settlement patterns or subsistence bases, even though traditionally labeled Adena, Hopewell, or Late Woodland, excluded from the Woodland tradition.

Adena and Hopewell are best retained to refer to stylistically different mortuary complexes. This has already been proposed in the formulation of the Scioto tradition (Prufer 1965). Adena, Hopewell, and central Ohio Late Woodland are treated as phases of the Scioto tradition based on the similarity of their non-ceremonial pottery. Ceremonial ceramics are found mainly in Hopewell and are concentrated in the earthworks. The non-ceremonial Hopewell pottery found in the hamlets is grit tempered plain and cordmarked, with little decoration (Prufer 1965), as is Adena and Late Woodland pottery (Prufer and McKenzie 1966). The three wares are believed to be linked developmentally (Prufer 1965:130), forming the basis for the Scioto tradition in which all three phases share. The differences among them center in the amount and elaboration of the ceremonial pottery and the associated burial practices.

The continuity from Adena through Hopewell to Late Woodland within the Scioto tradition is established impressionistically rather than demonstrated (Prufer 1964, 1965). It does fit the evidence and is supported by the demonstrated relationship existing in northern Kentucky-southwest Ohio-southeast Indiana. The failure of the Hopewell earthworks ceramic collections to seriate with the other assemblages from the area and the fact that they can be ordered internally (Fig. 50) supports the contention that the Hopewell sites represent participation in two different pottery traditions, one involving ceremonial ware and one the utilitarian pottery.

Late Woodland presents a problem different from Adena and Hopewell, which differ from one another mainly in mortuary styles and degree of elaboration of the mortuary complex. Despite the belief that central Ohio Late Woodland is agricultural and a continuation of the Scioto tradition from Hopewell (Prufer and McKenzie 1966; Prufer 1967a), which is also held to depend on agriculture (Prufer 1965), there is an alternative interpretation

that accounts for certain anomalies in the data. Some Late Woodland may actually represent Archaic occupations that co-exist with both Hopewell and Ft. Ancient.

Occupations from the Late Woodland Chesser and Peters phases are found mainly in rockshelters (Prufer and McKenzie 1966; Prufer 1967a). Chesser cave represents a winter hunting camp that shows evidence of several occupations (Prufer 1967a:49). The type and location of these occupations suggest that they represent seasonal round hunting and gathering groups that share certain styles with Hopewell and Ft. Ancient. These include the pottery temper and surface finish modes; ceramics from both phases are grit, chert, and limestone tempered plain and cordmarked. The similarity to Adena and Hopewell utilitarian pottery is the factor that has led to inclusion of the Chesser and Peters phases in the Scioto tradition. Projectile point styles found at the cave sites also indicate continuities with Hopewell (Prufer and Shane 1970:88), as do flint blades found at Chesser. Chesser also produced some shell-tempered pottery.

This style sharing is explainable as the adoption by Archaic groups of styles diffused to them from Hopewell and Ft. Ancient. A parallel instance occurs in eastern Kentucky (Purrington 1967:148-150), where shell-tempered pottery, triangular projectile points, gorgets, and mica are found in seasonal round hunting and gathering contexts. The lack of villages or burial mounds away from the major rivers in eastern Kentucky (Purrington 1967) further supports this hypothesis. A similar situation may well exist in central Ohio, explaining the variance in location of Hopewell and Late Woodland occupations and their different character.

In southwest Ohio, Late Woodland presents a somewhat different problem. The position of Late Woodland in time between Hopewell and Ft.

Ancient has been assumed rather than demonstrated (Prufer 1964). The assemblages are similar enough to Hopewell or even Adena to be classed with them with equal validity (1965:65). This is certainly true of Lichliter, especially in view of its $C^{14}$ age of A.D. 350±150 (Radiocarbon 1959). Likewise, the similarity between material from Hopewell habitation areas and Newtown has been noted (Griffin 1952b; Starr 1960:107). It is probably best to revise Late Woodland in southwest Ohio, classifying its components with other cultural units, including Adena, Hopewell, and Ft. Ancient when appropriate.

There is no longer reason to expect Adena, Hopewell, Late Woodland, and Ft. Ancient occupations to be present in every area or to follow one another in that order invariably. Since they are defined on the basis of culture content rather than time of occurrence, they may overlap one another in some areas and fail to appear in others. For example, traditionally identified Adena and Ft. Ancient collections have been linked developmentally for the broad area under study here (Table 22), but the nature of the link in northern Kentucky proper is still uncertain. There are no known Hopewell occupations there (Griffin 1946:57) and no defined Late Woodland. Thus, although Adena and Ft. Ancient collections occupy opposite ends of the chronology (Table 22), there may be no great time gap between them in northern Kentucky. Several observers have postulated that Adena may have been more persistent there than in areas where it developed into Hopewell (Griffin 1946:57; Prufer 1964:56). Dragoo (1963) has demonstrated that many of the northern Kentucky Adena mounds, including the Robbins mound, are late Adena, partly on the basis that certain artifacts from them display Hopewell styles.

Although Adena is often given an uppermost time limit of 0 A.D. (Dragoo 1963), many sites assigned to it have much later $C^{14}$ dates (Fig. 5). The Gaines mound is the only dated Adena site in northern Kentucky, with an age

of 25±200 B.C. given for the log tomb under the mound (Radiocarbon 1960) and 120± 200 B.C. (Radiocarbon 1961) and A.D. 390±200 (Radiocarbon 1962) from elsewhere in the mound. The White site in nearby Indiana has a number of $C^{14}$ dates, ranging from A.D. 30±140 to A.D. 550±130 (Swartz 1973b). It is usually classified as Adena (Kellar and Swartz 1971) and has log tombs, copper bracelets, expanded-center gorgets, and Adena Plain sherds (Swartz 1973b), all of which are found in the Robbins mound. The range of available dates suggests that an Adena mortuary complex did survive well into the first millenium A.D. in the area.

The radiocarbon dates from Cleek-McCabe lend support to extension of Ft. Ancient back several hundred years before A.D. 1000. The earliest date, A.D. 270±100, is too early for a Ft. Ancient component, despite the date on Haffner-Kuntz in Ohio of A.D. 575±150. There are no technical grounds for questioning the date, but there is also nothing to suggest that the burial was present before the mound was built. The date is unacceptably early because the seriations (Fig. 49, Tables 19-20) show that there is a gap between the last Woodland and first Ft. Ancient occupations that such an early date does not allow for. The other mound date must also be viewed with skepticism, although there is no reason for supposing it to be incorrect. More dates from early Ft. Ancient components in the area will clarify the tradition's absolute chronology. The third date from the midden is in line with that of A.D. 1275±150 from the Ft. Ancient component at Turpin (Starr 1960) and with dates from other early Ft. Ancient components elsewhere (McKenzie 1967; Prufer and Shane 1970).

## Implications for Other Parts of the Ft. Ancient Area

The developmental nature of Ft. Ancient in the northern Kentucky region does not warrant the assumption that it is the result of local development in other parts of its distribution (Fig. 4). The evidence for local development needs careful examination in each area. In central Ohio, the possibility that Late Woodland is actually a persistent Archaic explains why it has proven difficult to derive Ft. Ancient from Late Woodland in that area.

Prufer and Shane (1970:258) remark on the differences in material culture between the two units and conclude that "it would be difficult to explain Fort Ancient as a gradual modification of the Late Woodland cultural pattern." The confusion stems from the similarity of Late Woodland ceramics to Hopewell utilitarian pottery, specifically that from McGraw village, which has led to placing the Chesser and Peters phases in the Scioto tradition (Prufer 1965:130). As a consequence, these phases are treated as probably agricultural (Prufer 1967a:46). If Late Woodland is agricultural, yet dissimilar to Ft. Ancient, Ft. Ancient cannot be derived from Late Woodland. As a result, Ft. Ancient is imputed to a migration into the Scioto valley (Prufer and Shane 1970:258). This argument is made despite the fact that both Hopewell and Ft. Ancient are held to have agricultural economies (Prufer 1965; Prufer and Shane 1970).

Deserving of consideration is the hypothesis that Ft. Ancient developed in the Scioto valley, as in the northern Kentucky region, from the preceding Woodland, which in this case is Hopewell. Late Woodland is at least partially contemporary with Ft. Ancient, as radiocarbon dates from Chesser Cave and Blain Village indicate (Prufer 1967a; Prufer and Shane 1970). This apparent coexistence is more evidence that Ft. Ancient is not derived from Late

Woodland, but that the two represent different means of exploiting somewhat different environments.

There are a number of stylistic continuities between early Ft. Ancient, as represented by Blain Village, and Hopewell. Two kinds of Hopewell projectile points are found at Blain and apparently have been recovered from other early Ft. Ancient sites also (Prufer and Shane 1970:87-88). The possibility that these types may be long-lived is admitted by the authors, although it is unclear how this can be equated with the belief that Ft. Ancient is migratory into the area. Another connection with Hopewell is the presence of parallel-sided blades at Blain, Baum, and Graham (Prufer and Shane 1970:96). The Ft. Ancient blades are made by a somewhat different technique and usually from different kinds of flint than Hopewell specimens (1970:97), but the presence of true blades is nonetheless a continuity between the two traditions. Burial mounds are also found in both units in the Scioto valley area, being present at the Ft. Ancient sites of Blain, Baum, and Gartner. Similarly, the flat-topped mound at Baum that has been attributed to Mississippian influence (Griffin 1952:190) is at least equally plausibly derived from Hopewell, in which large rectangular mounds are often found associated with earthworks.

If there is a developmental relationship between Hopewell and Ft. Ancient, it should be reflected in the pottery as it is in northern Kentucky. Temper-surface finish types (Appendix IV) can be arranged as unimodal curves (Fig. 51 ). The order is not thereby confirmed as chronological, although radiocarbon dates provide partial support ( Fig. 51 ). That a seriation is possible does demonstrate that the assemblages are participating in the same pottery tradition. At least one major break is reflected in the shell plain and shell cordmarked percentages, between Blain and Gp 1.

Again, the Hopewell earthworks do not seriate with the other assemblages

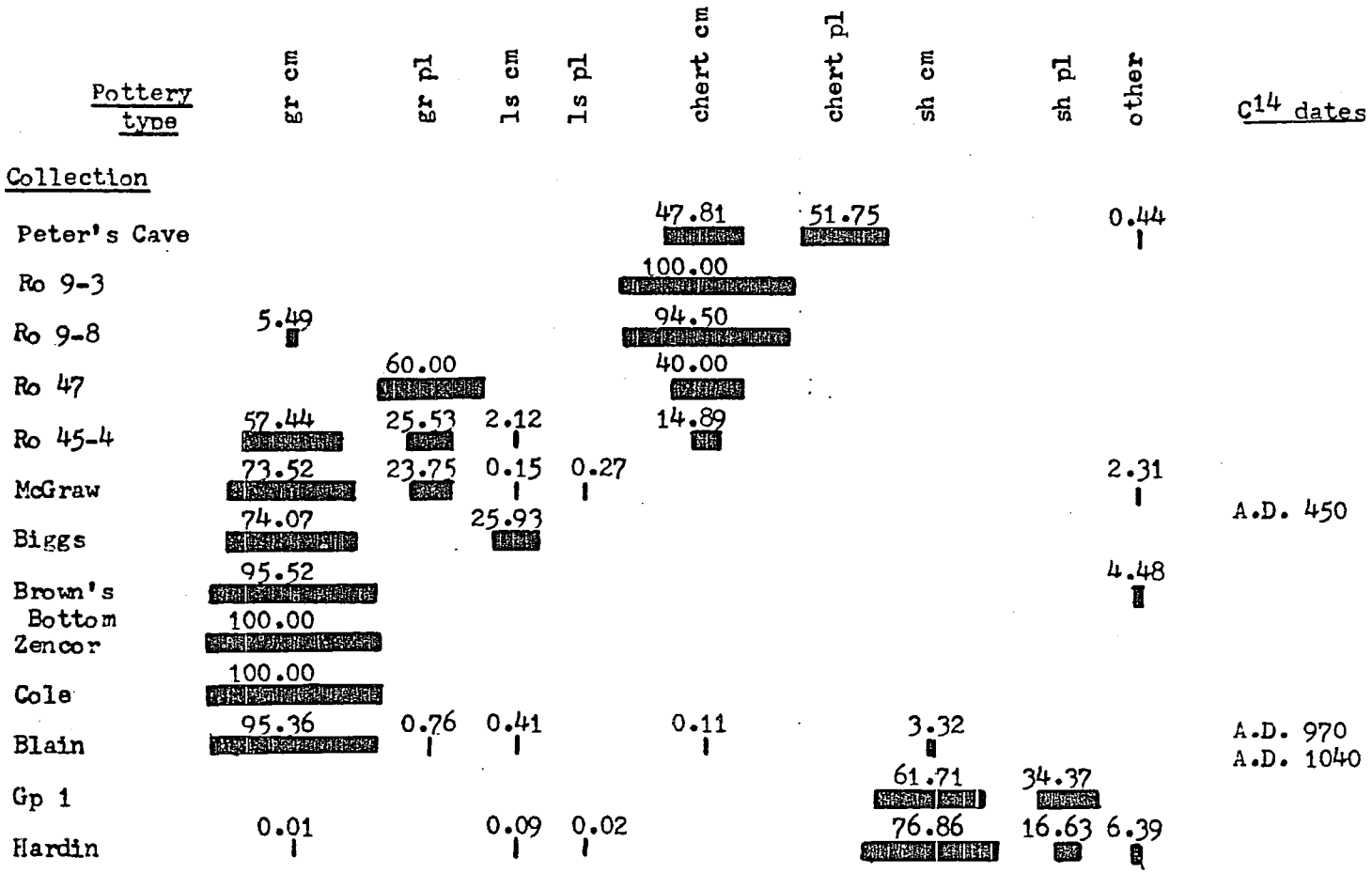



Fig. 51. Seriation of Pottery Types, Central Ohio and Kentucky

but can be ordered among themselves (Fig. 52 ), implying that they belong to a separate ceramic tradition. Not all of the assemblages in the seriation are reliable. All the collections listed (Fig. 52 ) are comparable, except possibly Hopewell-general, Ginther, and Seip-general, which have poor provenience information and may be biased by removal of selected sherds for type collections or the discarding of the less spectacular sherds (Prufer 1968:1-2, 32, 41-42, 62). Since the order cannot be confirmed bacause lack of information prevents the seriation of other kinds of artifacts, it may be that some non-comparable assemblages fit into it by chance.

There is much less information for the area of Ohio farther east along the Hocking River. No Hopewell sites are identified in that area, but there are some Late Woodland occupations in rockshelters and caves (Fig. 3). It is possible to seriate the few collections that are available using pottery types (Appendix V, Fig. 53 ). Radiocarbon dates again tend to support the order, although it cannot be assumed to be chronological. The fact that Late Woodland occupations seriate with Hopewell and Ft. Ancient assemblages confirms that they share the same pottery tradition, but does not affect the contention that they represent seasonal round rather than sedentary settlements.

In eastern Kentucky, the Woodside phase has been demonstrated to represent a Ft. Ancient migration into the Fishtrap region on upper Levisa Fork (Dunnell 1972). The movement evidently originated downriver, since earlier Ft. Ancient occupations exist in the vicinity of Paint Creek. One of these, Jo 14 (Fig. 4), has a $C^{14}$ date of A.D. 1150±100 (Dunnell, personal communication). There is some evidence from Jo 14 that Ft. Ancient developed in the middle Levisa Fork area rather than in turn originating from the Ohio River by migration (Dunnell, personal communication). Adena and possibly another local Woodland are represented in the immediate area at

| Collection | gr cm | gr pl | sand cm | sand pl | gr stamped | sand stamped | other | $C^{14}$ date |
|---|---|---|---|---|---|---|---|---|
| Russell Brown 2 | 10.60 | 19.43 | | 14.13 | 52.82 | | | A.D. 90 |
| Russell Brown 1 | 24.69 | 23.49 | | | 48.18 | | 3.61 | 140 B.C. |
| Harness 4 | 34.80 | 25.11 | | | 37.44 | | 2.64 | A.D. 200 |
| Russell Brown 3 | 38.89 | 38.89 | | | 16.67 | 5.56 | | A.D. 430 |
| Hopewell-general | 63.50 | 26.81 | | 0.40 | 8.86 | | 0.40 | A.D. 615 |
| Seip-general | 80.98 | 9.96 | | 0.20 | 7.44 | 0.56 | 0.84 | A.D. 590 |
| Ginther | 88.19 | 8.11 | | | | 2.21 | 1.48 | |
| Ater | 100.00 | | | | | | | |

Fig. 52. Seriation of Pottery Types from Hopewell Mounds and Earthworks, Central Ohio
Gr-grit, cm-cordmarked, pl-plain.

| Collection | gr cm | gr pl | ls cm | ls pl | chert cm | chert pl | sh cm | sh pl | other | $C^{14}$ date |
|---|---|---|---|---|---|---|---|---|---|---|
| Chesser | 1.89 | 4.37 | 84.11 | 6.06 | | | | 3.57 | | A.D. 1070 |
| Ho 7 | 27.18 | | 64.97 | 5.99 | 1.84 | | | | | |
| Fa 2 | 60.00 | 40.00 | | | | | | | | |
| Graham | 92.76 | 5.26 | | | | | | 1.96 | | A.D. 1180 |
| Gabriel | 17.94 | 6.22 | 4.02 | | | | | 71.79 | | A.D. 1425 |

Fig. 53. Seriation of Pottery Types in Collections from the Hocking River Area
Gr-grit, ls-limestone, sh-shell, cm-cordmarked, pl-plain.

the C & O mounds (Webb 1942; McMichael and Mairs 1963; Purrington 1972).

The stylistic continuities that exist between the units in the Scioto River area are suggestive of a Hopewell ancestry for Ft. Ancient in regions other than northern Kentucky. These continuities disconfirm the belief that Ft. Ancient appeared in the Scioto valley through migration (Prufer and Shane 1970). There is not enough time depth represented in the Hocking valley to draw the same conclusions there. It may well be the case that Ft. Ancient appeared in the upper Hocking River by migration from downriver or even from the Ohio River in a manner analogous to its appearance in the Fishtrap region in the mountains of eastern Kentucky. That Ft. Ancient is not the result of Mississippian acculturation in any of these instances is demonstrated by the same arguments that hold for northern Kentucky Ft. Ancient, since the same stylistic similarities between the two traditions are in question in each area. The possibility that Ft. Ancient in a given area may have come into existence by acculturation of local Woodland people from elsewhere within Ft. Ancient or from outside is not thereby ruled out, but such an origin has yet to be demonstrated for any part of the tradition.

It appears that the development of a dependency on agriculture, coupled with nucleation of settlements, was proceeding over a broad area of the central Ohio River valley and its tributaries. As this process was working to bring about functional similarity throughout the region, the diffusion of styles increased. Strap handles, shell tempering, triangular projectile points, and curvilinear and rectilinear guilloche designs came to be widely shared among locally developing groups. These shared styles have come to be the basis for distinguishing Ft. Ancient from the preceding units defined on other bases. A law, the Law of Diffusion of Styles, can be formulated to explain this trend. It states that diffusion of styles between traditions in contact with one another will increase as their technological development

converges and they become functionally more similar. A somewhat similar statement, although not in the form of a rule, has been made by Binford (1962:220): "The distribution of style types and traditions is believed to be largely correlated with areas of commonality in level of cultural complexity and in mode of adaptation."

Conforming to this rule, with the passage of time the various Ft. Ancient groups, with their diverse origins, become stylistically more similar. Early Ft. Ancient occupations show the greatest diversity, with those like Blain and Graham in eastern and central Ohio displaying very little shell tempering, while Cleek-McCabe pottery is more than 50% shell-tempered. Similar differences are noted in percentages of decorated sherds and percentages of rim with appendages (Table 27). The tendency for similarity to increase with time has been commented on several times. Prufer and Shane (1970:242-244) record that by late prehistoric times, most Ft. Ancient occupations display a predominance of shell tempering, triangular strap handles, greater variety of vessel shapes, and effigies on pottery, and conclude that they can all be grouped into one phase, Madisonville. In contrast, early Ft. Ancient is divided into three phases, with the possibility that more may be defined in central Ohio (Prufer and Shane 1970:240-241).

Table 27. Comparison of frequency of selected modes in early Ft. Ancient components.

| Collection | Pottery mode | | |
|---|---|---|---|
| | % shell temper | % decorated sherds | % rims with appendages |
| Graham | 2.0 | 2.8 | 3.8 |
| Blain | 3.3 | 9.8 | 15.9 |
| Be 8 | 53.8 | 0.9 | 10.6 |

## Non-Mississippian Agriculture in the Eastern United States

Treating Ft. Ancient as an indigenous development in the central Ohio River valley has a number of implications. It has been tacitly assumed that the introduction of corn agriculture was part of the supposed Mississippian migration or acculturation that produced Ft. Ancient. This explanation seemed obviously correct because Ft. Ancient is the first demonstrably agricultural group in the traditional succession of units and because it shares certain styles with Mississippian (Caldwell 1958). Even those who believed Hopewell to be based on agriculture felt that it was followed by a period of cultural decline, represented by Intrusive Mound and Late Woodland, in which agriculture was presumably no longer practiced (Griffin 1960). According to this formulation, agriculture was then reintroduced by the Mississippian tradition.

Other areas of the eastern United States that were once thought to derive agriculture from the Mississippian tradition provide possibly illuminating comparative information. East of the main part of the Ft. Ancient area, in West Virginia and western Pennsylvania, is the Monongahela phase. It has a strongly agricultural base (Mayer-Oakes 1955b), with circular stockaded villages and circular houses. Monongahela shares a number of styles with Ft. Ancient, including shell-tempered pottery with lug handles, triangular projectile points, and stone discoidals.

There is a clear developmental sequence from grit to limestone to shell tempered pottery in the Monongahela area (Mayer-Oakes 1955a:224). One example of a Woodland, pre-Monongahela occupation is the Watson site in Hancock County, West Virginia. The artifact assemblage contains 25% grit-tempered and 75% limestone-tempered ceramics (Dragoo 1954) and is dated at A.D. 500±100 (Mayer-Oakes 1958). A number of excavations have produced

evidence that shows a coexistence of grit or limestone and shell tempering (Augustine 1938a, 1938b; Butler 1939; Cresson 1942) and a gradual increase in shell tempering (Solecki 1949; Mayer-Oakes 1955a:180-183; Dunnell 1962). The presence on limestone-tempered pottery of incising, lugs, and handles which are usually associated with shell tempering also indicates that the two wares are developmentally related (Mayer-Oakes 1954, 1955a:224). Pipe forms and decoration also show a developmental sequence (Mayer-Oakes 1955a:223-224). Other attributes like bird bone beads, perforated deer toe bones, and perforated teeth are also found in both Monongahela and earlier phases (Mayer-Oakes 1955a:158-161).

Predating the advent of shell-tempered pottery is an apparent shift in settlement pattern. While earlier mounds are located on hilltops and are not associated with extensive middens, the otherwise similar Middle Woodland period mounds in the upper Ohio valley are found on river terraces, along with fairly extensive middens (Dragoo 1956:84). The Watson site, for instance, covers several acres (1956:60). This change in settlement size presages the nucleated villages of the Monongahela phase. It suggests that agriculture may have been present in the area as early as A.D. 500, lessening the possibility that the Monongahela farming-based economy was introduced from another region. All indications are that the subsistence-settlement system of Monongahela was a local development rather than the direct result of outside influences.

The Oneota tradition in Wisconsin and similar units on the Plains like Mill Creek, Nebraska, and Steed-Kisker have long been derived by migration from the Mississippian heartland (Bennett 1952; Griffin 1960), much for the same reasons that Ft. Ancient was similarly derived. They also share certain artifact styles, especially ceramic, with the Missis-

sippian tradition, as well as the practice of corn agriculture. As demonstrated in several summaries of the data (Hall 1962, 1967; Henning 1967, 1970; Gibbon 1972), this explanation is no longer adequate. Some of the styles traditionally attributed to Mississippian influence now appear to be earlier to the north. As mentioned previously, at the Oneota site of Carcajou Point shell tempering is present in 99% of the sherds at about A.D. 1000 (Hall 1962). It can be derived most parsimoniously from earlier occurrences of shell tempering in Wisconsin (Wittry 1959) which appear in vessels that are Woodland in shape (Hall 1962:111), rather than from the Mississippian tradition. There are numerous continuities with the preceding Woodland phases, including continued use of burial mounds, cordmarking, wedges, flat netsinkers, and oval houses (Gibbon 1972:171-173).

The change from hunting and gathering to agricultural subsistence seems to have occurred about A.D. 800 to 900 in all these areas, as attested by changes in settlement patterns and increased instances of preserved corn (Hall 1967:180-181; Gibbon 1972). There is some support for the view that agriculture is present as early as A.D. 200, mostly from the location of Middle Woodland sites in the Carolinian zone and the faunal remains from them (Cleland 1966:30).

Acculturation may have occurred in some areas, since some specifically Mississippian styles like seed jars and effigy-handled spoons do appear (Henning 1972:174). However, most of the elements traditionally accepted as of Mississippian origin appear differentially in the Oneota area (Gibbon 1972:174) and have not been demonstrated to originate in the Mississippian tradition. Even if a set of Mississippian styles occurs in some areas, it has not been satisfactorily linked to any functional change, especially the beginning of dependence on agriculture.

The course of development in each of the regions under discussion, from western Pennsylvania to the Plains, is apparently similar. Several hundred years after the introduction of maize, nucleated villages, and a demonstrably agricultural subsistence base appear. A developmental rather than an historical process is the best explanation. The early parts of traditions such as Ft. Ancient, Monongahela, and Oneota are "Mississippian" mainly in the sense that they share with the Middle Mississippian tradition a way of life based on agriculture (Hall 1967:180). The heterogeneity noted for the early Ft. Ancient phases is also evident in Oneota (Gibbon 1972:173). The same holds true for Monongahela, which has recently been derived from three different Woodland pottery traditions (Johnson, George, and Dragoo 1972). One kind of Monongahela pottery originates in the limestone-tempered Watson ware, with a clear transition to shell tempering; another kind of Monongahela ceramics is derived from Mahoning ware, which is grit tempered; and the third kind comes from the limestone-tempered pottery of the Pennsylvania-Virginia-Maryland border area.

## Interaction Spheres

In an manner analogous to the increased interaction among parts of the central Ohio valley that led to the widespread sharing of styles known as "Ft. Ancient," demonstrable contacts between Ft. Ancient and the Mississippian tradition also increase with time. Traits mentioned specifically as showing Ft. Ancient connections with Mississippian by Griffin (1943), the main source of descriptive information on Ft. Ancient, are found most prominently at the Madisonville component. These include copper beads, pendants, and copper-covered ornaments, certain Southern Cult motifs, an increase in pottery vessel shapes, and effigies on pottery. Madisonville borders on the historic period, since it contains European contact materials (Griffin 1943:128-129). The Taylor component also displays a number of traits shared with Mississippian, which probably indicate that it is also near the historic period (1943:128).

The artifacts from other late Ft. Ancient sites reflect increased Mississippian contact in places more distant from the Mississippi valley. Hardin Village, which produced European contact materials, also yielded rolled copper beads, a copper pendant, effigy pottery appendages, and a small percentage of red or black painted pottery (Hanson 1966). The Buffalo site in Putnam County, West Virginia (Fig. 4) has produced copper beads (Mairs 1960); its age is placed between A.D. 1560 and A.D. 1800 by radiocarbon dates (Hanson 1972).

The motifs of the Southern Cult (Waring and Holder 1945) appear prominently in the Southeast, at Moundville and Etowah, and at Spiro in Oklahoma (Willey 1966:305). However, scattered instances do occur in Ft. Ancient occupations (Table 28). Only three motifs are found and accompanying paraphenalia like "chubs" and axes and engraved copper sheets are absent.

Large flint swords are present at Madisonville and Taylor (Griffin 1943: 254). Table 28 seems to be roughly chronological, with the exception of the Taylor collection, which is probably closer to the historic period than indicated (Griffin 1943:128). None of the motifs appear in early Ft. Ancient occupations like Blain, Cleek-McCabe, Baum, or Graham. The nearest Mississippian sites from which they were available to Ft. Ancient are Angel, where the equal-arm cross and rattlesnake appear and which dates from c. A.D. 1200 to 1300 (Kellar in Black 1967), and Jewell, with the equal-arm cross design and a date of A.D. 1293±100 (Hanson 1970). These dates equate well with the one from the Turpin component of A.D. 1275.

Not only Ft. Ancient and Mississippian, but also Oneota and Monongahela come to share a number of styles, including strap handles and shell tempering on pottery, triangular projectile points, and rectangular houses. As has been demonstrated, these styles do not necessarily originate in a single area; however, the fact that they, along with other traits such as elbow pipes, discoidals, wall-trench structures, and Southern Cult motifs, are widely shared among agricultural groups of the eastern United States is significant. Such sharing can be explained by invoking the Law of Diffusion of Styles, previously used to understand the occurrence of the styles that mark the beginning of Ft. Ancient throughout the central Ohio valley. That is, such sharing is related to increasing contact between groups that occurs as they converge functionally. The similarities in Orr, Grand River, Lake Koshkonong, and other areal phases that have caused them to be grouped together in Oneota can be accounted for in the same way.

If the classificatory units are disregarded, it can be seen that after the development of agriculture in the various parts of the eastern woodlands, a continually greater amount of style-sharing is the rule. Certain styles came to be shared over whole river drainages, while others like shell

Table 28. Occurrence of Southern Cult design motifs in Ft. Ancient components.

| Collection | Southern Cult motif | | | |
|---|---|---|---|---|
| | weeping eye | rattlesnake | equal-arm cross | source |
| Anderson | | | x | Griffin 1943 |
| Taylor | | | x | Griffin 1943 |
| Feurt | | x | | Griffin 1943 |
| Turpin | | x | x | Oehler 1950 |
| Fox Farm | x | x | x | Griffin 1943 |
| Hardin | x | x | x | Hanson 1966 |
| Madisonville | x | x | | Griffin 1943 |
| Ms 71 | x | x | | Mayer-Oakes 1955b |

tempering spread to be found over much of the eastern United States by the end of the prehistoric period.

Similar patterns of trait sharing have been characterized as interaction spheres (Caldwell 1964). In an interaction sphere, several regional developmental sequences are linked by certain widespread styles. The regional traditions exist before the interaction among them develops, and the styles they come to share do not have a single source (Caldwell 1964:138).

The example that inspired the concept is Hopewell (Caldwell 1964; Streuver 1964). At least two regional traditions, the Scioto tradition in Ohio-Indiana (Prufer 1965) and the Havana tradition in Illinois (Streuver 1968), compose the Hopewell interaction sphere as most narrowly conceived. More broadly, Hopewell ceremonial traits are found in other, often far-removed, traditions, including Copena in Alabama (Faulkner 1971), the Robbins phase of late Adena (Dragoo 1963), Marksville in Louisiana, and Santa Rosa-Swift Creek in Florida (Willey 1949; Griffin 1958). The concept might be easily applied to earlier Adena contacts with widely separated areas. These contacts are exemplified by the Adena artifacts found as far east as Delaware and Maryland (Thomas 1971).

The differences in intensity of interaction signified by the differential sharing of "Hopewell" attributes are not yet explained (Streuver 1964:88), although the shared complex is usually characterized as ceremonial or mortuary goods (Caldwell 1964:138) or status-specific objects (Streuver 1964:88). The patterning of traits called an interaction sphere is not an explanation itself, although it may serve to facilitate explanation by rules such as the Law of Diffusion of Styles. The concept provides a convenient way to recognize complexes of styles diffused in a short period of time among a number of developmentally separate phases, yet retain that separation.

The decline of the Hopewell interaction sphere has been attributed to climatic change (Griffin 1958) and warfare (Prufer 1964:70). Another possible explanation more in keeping with the developmental sequence proposed here is that the decline was linked to the beginnings of effective agricultural subsistence (Cleland 1966:95). The change involved abandonment of a system of goods exchange for agriculture, a system with greater economic potential but one not initially capable of sustaining the interaction sphere. The later style sharing can be seen as the evolution of another exchange system, probably on a different basis, when agriculture became more efficient.

Not only is the interaction between traditions partially the result of parallel cultural evolution, it probably also supports the momentum of change. As stated by Caldwell (1964:142), the principle is, "the greater the interaction, the greater the innovation." The argument follows Barnett (1953) in holding that innovations are recombinations of existing forms. "The explanation then for a positive correlation between interaction and innovation is that when different cultural traditions are brought together there becomes available to each a new supply of diverse forms upon which new arrangements of forms--innovations and inventions--can be built" (Caldwell 1964:143). The Hopewell interaction sphere may well have contributed to its own decline by helping to disseminate knowledge that played a part in the widespread development of agriculture.

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APPENDIX I

Temper-Surface Finish-Decoration Modes
Used to Classify Ceramics from Cleek-McCabe

| Temper | Surface finish | Decoration: incised rim | incised body | other rim | other body | no decoration rim | no decoration body |
|---|---|---|---|---|---|---|---|
| shell | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| limestone | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| limestone-shell | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| grit | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| grit-shell | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| untempered | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |
| other | plain<br>cordmarked<br>fabric-impressed<br>other<br>unidentifiable | | | | | | |

# APPENDIX II

## Distribution of Pottery in Temper-Surface Finish Types Southwest Ohio-Southeast Indiana-Northern Kentucky

Collection: Ohio

| site # | site name | source of assemblage | source of sherd count | total sherds |
|---|---|---|---|---|
| | Clough Creek | surface | Starr (1960) | 784 |
| | Hahn's Field | surface | Starr (1960) | 33 |
| Ha 8 | Waterworks | surface | McMichael (1960) | 376 |
| Ha 16 | Sand Ridge | surface | Starr (1960) | 117 |
| Ha 24 | Twin Mounds village | surface | Starr (1960) | 794 |
| Ha 38 | Perin | surface | Starr (1960) | 81 |
| Ha 42 | Edwards | excavation | Kellar (1960), Starr (1960) | 107 |
| Ha 47 | Lawyer | surface | Starr (1960) | 6 |
| Ha 60 | Stoneking | surface | Starr (1960) | 39 |
| Ha 64 | | surface | Starr (1960) | ? |
| Ha 65 | Headquarters | excavation | Lee and Vickery (1972) | 544 |
| Ha 68 | 8½ Mile | surface | Starr (1960) | 7 |
| | Lichliter | excavation | Baby and Potter (1965) (rims only) | 23 |
| | Monteville | excavation | Britt (1966) | 27 |
| | Steel Plant | ? | Griffin (1943) | 3 |
| | Stokes | excavation | Griffin (1943) | 85 |

Pottery type

| Collection: Ohio | | ls pl | ls cm | gr pl | gr cm | ls-sh pl | ls-sh cm |
|---|---|---|---|---|---|---|---|
| Clough Creek | # | 109 | 109 | 23 | 6 | 0 | 0 |
| | % | 13.90 | 13.90 | 2.93 | 0.77 | 0.00 | 0.00 |
| Hahn's Field | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ha 8 | # | 0 | 0 | 0 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.00 |
| Sand Ridge | # | 0 | 9 | 5 | 26 | 0 | 0 |
| | % | 0.00 | 7.69 | 4.27 | 22.22 | 0.00 | 0.00 |
| Ha 24 | # | 94 | 23 | 38 | 38 | 0 | 0 |
| | % | 48.45 | 11.86 | 19.59 | 19.59 | 0.00 | 0.00 |
| Ha 38 | # | 20 | 21 | 15 | 25 | 0 | 0 |
| | % | 24.69 | 25.93 | 18.52 | 30.86 | 0.00 | 0.00 |
| Edwards | # | 3 | 6 | 15 | 82 | 0 | 0 |
| | % | 2.80 | 5.61 | 14.02 | 76.64 | 0.00 | 0.00 |
| Lawyer | # | 3 | 1 | 0 | 2 | 0 | 0 |
| | % | 50.00 | 16.67 | 0.00 | 33.33 | 0.00 | 0.00 |
| Stoneking | # | 0 | 0 | 10 | 8 | 0 | 0 |
| | % | 0.00 | 0.00 | 25.64 | 20.51 | 0.00 | 0.00 |
| Ha 64 | # | ? | ? | ? | ? | 0 | 0 |
| | % | 24.50 | 10.50 | 32.50 | 32.50 | 0.00 | 0.00 |
| Ha 65 | # | 73 | 358 | 0 | 19 | ? | ? |
| | % | 13.42 | 65.81 | 0.00 | 3.49 | ? | ? |
| 8½ Mile | # | 0 | 4 | 1 | 1 | 0 | 0 |
| | % | 0.00 | 66.67 | 14.29 | 14.29 | 0.00 | 0.00 |
| Lichliter | # | 0 | 0 | 3 | 20 | 0 | 0 |
| | % | 0.00 | 0.00 | 13.04 | 86.96 | 0.00 | 0.00 |
| Monteville | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Steel Plant | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stokes | # | 0 | 0 | 6 | 66 | 0 | 0 |
| | % | 0.00 | 0.00 | 7.06 | 77.65 | 0.00 | 0.00 |

| | | Pottery type | | | | |
|---|---|---|---|---|---|---|
| Collection: Ohio | | gr-sh pl | gr-sh cm | sh pl | sh cm | other |
| Clough Creek | # | 0 | 0 | 457 | 53 | 27 |
| | % | 0.00 | 0.00 | 58.29 | 6.76 | 3.44 |
| Hahn's Field | # | 0 | 0 | 22 | 10 | 1 |
| | % | 0.00 | 0.00 | 66.67 | 30.30 | 3.03 |
| Ha 8 | # | 0 | 0 | 117 | 235 | 23 |
| | % | 0.00 | 0.00 | 31.12 | 62.50 | 6.12 |
| Sand Ridge | # | 0 | 0 | 13 | 59 | 5 |
| | % | 0.00 | 0.00 | 11.11 | 50.43 | 4.27 |
| Ha 24 | # | 0 | 0 | 0 | 0 | 1 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.52 |
| Ha 38 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Edwards | # | 0 | 0 | 0 | 0 | 1 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 |
| Lawyer | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stoneking | # | 0 | 0 | 18 | 2 | 1 |
| | % | 0.00 | 0.00 | 46.15 | 5.13 | 2.56 |
| Ha 64 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ha 65 | # | ? | ? | 0 | 0 | 94 (mixed ls- or gr-sh) |
| | % | ? | ? | 0.00 | 0.00 | 17.28 |
| 8½ Mile | # | 0 | 0 | 0 | 0 | 1 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 14.29 |
| Lichliter | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Monteville | # | 0 | 0 | 23 | 4 | 0 |
| | % | 0.00 | 0.00 | 85.16 | 14.81 | 0.00 |
| Steel Plant | # | 0 | 0 | 0 | 3 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 |
| Stokes | # | 0 | 0 | 0 | 0 | 13 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 15.29 |

Collections: Kentucky

| site # | site name | source of assemblage | source of sherd count | total sherds |
|---|---|---|---|---|
| Bb 1 | | ? | Dunnell (1961) | 20 |
| Bb 12 | Buckner | excavation | Dunnell (1961) | 1353 |
| Bb 13 | Larkin | excavation | Dunnell (1961) | 399 |
| Be 3 | Robbins | excavation | Webb and Elliott (1942) | 531 |
| Be 15 | Riley | excavation | Webb (1943b) | 159 |
| Be 17 | Landing | excavation | Webb (1943b) | 267 |
| Be 20 | Crigler | excavation | Webb (1943a) | 121 |
| Be 32 | Hartman | excavation | Webb (1943a) | 17 |
| Bh 15 | Morgan | excavation | Webb (1941a) | 204 |
| Bk 2 | | ? | Dunnell (1961) | 25 |
| Cp 1 | Bintz | excavation | MacCord (1953) rims only | 673 |
| Ga 8 | | ? | Dunnell (1961) | 15 |
| Mer 15 | Mercer | excavation | Goodell (1971) | 140 |
| Mm 6 | Wright | excavation | Webb (1940) | 3498 |
| Mm 7 | Wright | excavation | Webb (1940) | 241 |
| Ms 1 | Fox Farm | excavation | Dunnell (1961) | 654 |
| On 28 | Eagle Creek | excavation | Purrington and Smith (1966) | 56 |
| Sc 2 | Yates | excavation | Dunnell (1961) | 170 |
| Sc 6 | Jameson | ? | Dunnell (1961) | 69 |
| Sc 7 | Grazier | ? | Dunnell (1961) | 25 |
| Sh 5 | Casey | excavation | Goodell (1971) | 353 |
| | none given | surface | Rowlette (1962) | 4 |

Pottery type

| Collections: | | ls pl | ls cm | gr pl | gr cm | ls-sh pl | ls-sh cm |
|---|---|---|---|---|---|---|---|
| Kentucky | | | | | | | |
| Bb 1 | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bb 12 | # | 0 | 0 | 25 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 1.85 | 0.00 | 0.00 | 0.00 |
| Bb 13 | # | 0 | 0 | 3 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.75 | 0.25 | 0.00 | 0.00 |
| Be 3 | # | 530 | 0 | 1 | 0 | 0 | 0 |
| | % | 99.81 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 |
| Be 15 | # | 159 | 0 | 0 | 0 | 0 | 0 |
| | % | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 17 | # | 267 | 0 | 0 | 0 | 0 | 0 |
| | % | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 20 | # | 121 | 0 | 0 | 0 | 0 | 0 |
| | % | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 32 | # | 0 | 0 | 16 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 94.12 | 5.88 | 0.00 | 0.00 |
| Bh 15 | # | 204 | 0 | 0 | 0 | 0 | 0 |
| | % | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bk 2 | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cp 1 | # | 0 | 0 | 0 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.00 |
| Ga 8 | # | 0 | 0 | 0 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 6.67 | 0.00 | 0.00 |
| Mer 15 | # | 0 | 0 | 15 | 58 | 0 | 0 |
| | % | 0.00 | 0.00 | 10.71 | 41.42 | 0.00 | 0.00 |
| Mm 6 | # | 3479 | 0 | 0 | 0 | 0 | 0 |
| | % | 99.46 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mm 7 | # | 215 | 26 | 0 | 0 | 0 | 0 |
| | % | 89.21 | 10.79 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ms 1 | # | 0 | 0 | 18 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 2.75 | 0.15 | 0.00 | 0.00 |
| On 28 | # | 2 | 0 | 5 | 3 | 12 | 10 |
| | % | 3.57 | 0.00 | 8.93 | 5.36 | 21.43 | 17.86 |
| Sc 2 | # | 0 | 0 | 11 | 21 | 0 | 0 |
| | % | 0.00 | 0.00 | 6.47 | 12.35 | 0.00 | 0.00 |
| Sc 6 | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sc 7 | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sh 5 | # | 0 | 0 | 2 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.57 | 0.00 | 0.00 | 0.00 |
| ? | # | 4 | 0 | 0 | 0 | 0 | 0 |
| | % | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Pottery type

| Collections: Kentucky | | gr-sh pl | gr-sh cm | sh pl | sh cm | other |
|---|---|---|---|---|---|---|
| Bb 1 | # | 0 | 0 | 14 | 4 | 2 |
| | % | 0.00 | 0.00 | 70.00 | 20.00 | 10.00 |
| Bb 12 | # | 0 | 2 | 778 | 476 | 72 |
| | % | 0.00 | 0.15 | 57.50 | 35.18 | 5.32 |
| Bb 13 | # | 1 | 0 | 349 | 43 | 2 |
| | % | 0.25 | 0.00 | 87.47 | 10.78 | 0.50 |
| Be 3 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 15 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 17 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 20 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Be 32 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bh 15 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bk 2 | # | 0 | 0 | 10 | 15 | 0 |
| | % | 0.00 | 0.00 | 40.00 | 60.00 | 0.00 |
| Cp 1 | # | 0 | 0 | 207 | 389 | 68 |
| | % | 0.00 | 0.00 | 30.76 | 57.80 | 10.10 |
| Ga 8 | # | 0 | 0 | 13 | 1 | 0 |
| | % | 0.00 | 0.00 | 86.67 | 6.67 | 0.00 |
| Mer 15 | # | 5 | 9 | 33 | 17 | 3 |
| | % | 3.57 | 6.42 | 23.57 | 12.14 | 2.14 |
| Mm 6 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mm 7 | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ms 1 | # | 0 | 3 | 211 | 371 | 50 |
| | % | 0.00 | 0.46 | 32.26 | 56.73 | 7.65 |
| On 28 | # | 0 | 0 | 9 | 6 | 9 |
| | % | 0.00 | 0.00 | 16.07 | 10.71 | 16.07 |
| Sc 2 | # | 24 | 44 | 49 | 21 | 0 |
| | % | 14.12 | 25.88 | 28.82 | 12.35 | 0.00 |
| Sc 6 | # | 11 | 6 | 44 | 8 | 0 |
| | % | 15.94 | 8.70 | 63.77 | 11.59 | 0.00 |
| Sc 7 | # | 4 | 9 | 8 | 4 | 0 |
| | % | 16.00 | 36.00 | 32.00 | 16.00 | 0.00 |
| Sh 5 | # | 3 | 0 | 305 | 39 | 4 |
| | % | 0.85 | 0.00 | 86.40 | 11.05 | 1.13 |
| ? | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Collections:
Indiana

| site # | site name | source of assemblage | source of sherd count | total sherds |
|---|---|---|---|---|
| | C. L. Lewis | excavation | Kellar (1960) | 6 |
| | Dearborn 19 | ? | Griffin (1943) | 34 |
| | Law | excavation | Kellar and Swartz (1971) | 217 |
| | Nowlin | excavation | Black (1936) | 17 |
| | Ohio 14 | ? | Griffin (1943) | 37 |
| | Ohio 18 | ? | Griffin (1943) | 481 |
| | State Line | surface | Starr (1960) | 866 |
| Hn 10 | White | excavation | Swartz (1973b) | 164 |
| | Whitehead | excavation | Griffin (1942) | 256 |

Pottery tyne

| Collections: Indiana | | ls pl | ls cm | gr pl | gr cm | ls-sh pl | ls-sh cm |
|---|---|---|---|---|---|---|---|
| C. L. Lewis | # | 0 | 0 | 4 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 66.67 | 16.67 | 0.00 | 0.00 |
| Dearborn 19 | # | 0 | 0 | 0 | 1 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 2.94 | 0.00 | 0.00 |
| Law | # | 0 | 0 | 217 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 |
| Nowlin | # | 16 | 1 | 0 | 0 | 0 | 0 |
| | % | 94.11 | 5.89 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ohio 14 | # | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ohio 18 | # | 1 | 1 | 0 | 1 | 0 | 0 |
| | % | 0.21 | 0.21 | 0.00 | 0.21 | 0.00 | 0.00 |
| State Line | # | 6 | 12 | 0 | 9 | 0 | 0 |
| | % | 0.69 | 1.39 | 0.00 | 1.04 | 0.00 | 0.00 |
| White | # | 162 | 0 | 2 | 0 | 0 | 0 |
| | % | 98.78 | 0.00 | 1.22 | 0.00 | 0.00 | 0.00 |
| Whitehead | # | 1 | 0 | 250 | 5 | 0 | 0 |
| | % | 0.39 | 0.00 | 97.66 | 1.95 | 0.00 | 0.00 |

| | | gr-sh pl | gr-sh cm | sh pl | sh cm | other |
|---|---|---|---|---|---|---|
| C.L. Lewis | # | 0 | 0 | 0 | 0 | 1 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 16.67 |
| Dearborn 19 | # | 0 | 0 | 17 | 16 | 0 |
| | % | 0.00 | 0.00 | 50.00 | 47.06 | 0.00 |
| Law | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Nowlin | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ohio 14 | # | 0 | 0 | 25 | 12 | 0 |
| | % | 0.00 | 0.00 | 67.57 | 32.43 | 0.00 |
| Ohio 18 | # | 0 | 0 | 285 | 193 | 0 |
| | % | 0.00 | 0.00 | 59.25 | 40.12 | 0.00 |
| State Line | # | 0 | 0 | 558 | 281 | 0 |
| | % | 0.00 | 0.00 | 64.43 | 32.45 | 0.00 |
| White | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Whitehead | # | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# APPENDIX III

## Distribution of Pottery in Temper-Surface Finish Types Hopewell Mounds and Earthworks, Southwest Ohio

| Collection | | Pottery type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ls pl | ls cm | gr pl | gr cm | ls stamped | gr stamped | other | tot |
| Ft. Ancient | # | 0 | 0 | 47 | 210 | 0 | 31 | 21 | 309 |
| | % | 0.00 | 0.00 | 15.21 | 67.96 | 0.00 | 10.02 | 5.17 | |
| Marriott 1 | # | 84 | 71 | 55 | 172 | 16 | 33 | 2 | 433 |
| | % | 19.39 | 16.39 | 12.70 | 39.72 | 3.69 | 7.62 | 0.46 | |
| Turner cemetery | # | 9 | 17 | 5 | 6 | 7 | 42 | 9 | 95 |
| | % | 9.47 | 17.89 | 5.26 | 6.31 | 7.36 | 46.30 | 7.35 | |
| Turner embankment | # | 105 | 217 | 174 | 404 | 71 | 71 | 18 | 1060 |
| | % | 9.90 | 20.47 | 16.41 | 38.11 | 6.68 | 6.68 | 1.68 | |
| Turner 1 | # | 50 | 599 | 36 | 74 | 35 | 31 | 3 | 828 |
| | % | 6.03 | 72.34 | 4.34 | 8.93 | 4.22 | 3.98 | 0.12 | |
| Turner 3 | # | 105 | 186 | 54 | 184 | 26 | 28 | 24 | 607 |
| | % | 17.29 | 30.64 | 8.89 | 30.31 | 4.27 | 7.40 | 1.13 | |
| Turner 4 | # | 87 | 80 | 59 | 190 | 36 | 58 | 53 | 563 |
| | % | 15.45 | 14.20 | 10.47 | 33.74 | 6.37 | 18.61 | 1.05 | |
| Turner 6 | # | 7 | 20 | 3 | 8 | 3 | 6 | 1 | 48 |
| | % | 14.58 | 41.66 | 12.50 | 6.25 | 0.00 | 6.25 | 2.08 | |
| Turner 7 | # | 9 | 1 | 5 | 17 | 0 | 6 | 0 | 38 |
| | % | 23.68 | 2.63 | 13.15 | 44.73 | 0.00 | 15.78 | 0.00 | |
| Turner 9 | # | 1 | 0 | 4 | 25 | 14 | 0 | 1 | 45 |
| | % | 2.22 | 0.00 | 8.88 | 55.55 | 31.10 | 0.00 | 2.22 | |

Source: Prufer (1968)

# APPENDIX IV

## Distribution of Pottery in Temper-Surface Finish Types Central Ohio and Kentucky

Collection: Ohio

| site # | site name | source of assemblage | source of sherd count | total sherds |
|---|---|---|---|---|
| | Blain Village | excavation | Prufer and Shane (1970) | 13294 |
| | Brown's Bottom | excavation | Blank (1965) | 469 |
| | Caldwell Little Bottom | excavation | Lovejoy (1967) | 48 |
| | Cole | excavation | Baby and Potter (1965) (rims only) | 23 |
| | McGraw | excavation | Prufer (1965) | 9598 |
| Ro 2 | Morrison | excavation | Prufer and Andors (1967) | 743 |
| | Peter's Cave | excavation | Prufer and McKenzie (1966) | 218 |
| Pk 4 | Newton Farm | surface | Prufer (1967b) | 9 |
| Ro 7 | Caldwell's Bluff | surface | Prufer (1967b) | 705 |
| Ro 8 | Caldwell's Bottom | surface | Prufer (1967b) | 381 |
| Ro 9-2 | Harness | surface | Prufer (1967b) | 21 |
| Ro 9-3 | Harness | surface | Prufer (1967b) | 82 |
| Ro 9-8 | Harness | surface | Prufer (1967b) | 91 |
| Ro 9-13 | Harness | surface | Prufer (1967b) | 34 |
| Ro 20 | McGraw 2 | surface | Prufer (1967b) | 17 |
| Ro 35 | Higby | surface | Prufer (1967b) | 7 |
| Ro 36-1 | Russell Brown Middle Terrace | surface | Prufer (1967b) | 4 |
| Ro 36-2 | Russell Brown Middle Terrace | surface | Prufer (1967b) | 72 |
| Ro 36-3 | Russell Brown Middle Terrace | surface | Prufer (1967b) | 18 |
| Ro 40 | Brown's Bottom 2 | surface | Prufer (1967b) | 314 |
| Ro 45-3 | Lynch | surface | Prufer (1967b) | 12 |
| Ro 45-4 | Lynch | surface | Prufer (1967b) | 47 |

Collection:
Ohio

Pottery type

| | | ls pl | ls cm | gr pl | gr cm | chert pl | chert cm | sh pl | sh cm |
|---|---|---|---|---|---|---|---|---|---|
| Blain Village | # | 1 | 55 | 102 | 12678 | 1 | 15 | 0 | 442 |
| | % | 0.01 | 0.41 | 0.76 | 95.36 | 0.01 | 0.11 | 0.00 | 3.32 |
| Brown's Bottom | # | 0 | 0 | 0 | 448 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 95.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| Caldwell Little Bottom | # | 0 | 0 | 0 | 4 | 11 | 20 | 13 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 8.33 | 22.91 | 41.68 | 27.08 | 0.00 |
| Cole | # | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| McGraw | # | 26 | 14 | 2279 | 7056 | 0 | 0 | 0 | 0 |
| | % | 0.27 | 0.15 | 23.75 | 73.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| Morrison | # | 427 | 71 | 41 | 193 | 0 | 0 | 3 | 3 |
| | % | 56.12 | 9.55 | 5.52 | 25.98 | 0.00 | 0.00 | 0.40 | 0.40 |
| Peter's Cave | # | 0 | 0 | 0 | 0 | 113 | 109 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 51.75 | 47.81 | 0.00 | 0.00 |
| Pk 4 | # | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 7 | # | 0 | 0 | 0 | 98 | 115 | 2 | 436 | 54 |
| | % | 0.00 | 0.00 | 0.00 | 13.90 | 16.31 | 0.28 | 61.84 | 7.65 |
| Ro 8 | # | 1 | 0 | 3 | 0 | 0 | 323 | 54 | 0 |
| | % | 0.26 | 0.00 | 0.79 | 0.00 | 0.00 | 84.77 | 14.17 | 0.00 |
| Ro 9-2 | # | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Ro 9-3 | # | 0 | 0 | 0 | 0 | 0 | 82 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 |
| Ro 9-8 | # | 0 | 0 | 0 | 5 | 0 | 86 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 5.49 | 0.00 | 94.50 | 0.00 | 0.00 |
| Ro 9-13 | # | 0 | 0 | 3 | 21 | 0 | 10 | 0 | 0 |
| | % | 0.00 | 0.00 | 8.82 | 61.47 | 0.00 | 29.71 | 0.00 | 0.00 |
| Ro 20 | # | 0 | 0 | 0 | 6 | 11 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 35.29 | 64.70 | 0.00 | 0.00 | 0.00 |
| Ro 35 | # | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 36-1 | # | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | % | 25.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 36-2 | # | 1 | 6 | 0 | 58 | 0 | 5 | 0 | 0 |
| | % | 1.42 | 8.57 | 0.00 | 82.85 | 0.00 | 7.14 | 0.00 | 0.00 |
| Ro 36-3 | # | 0 | 0 | 1 | 15 | 0 | 2 | 0 | 0 |
| | % | 0.00 | 0.00 | 5.55 | 83.33 | 0.00 | 11.11 | 0.00 | 0.00 |
| Ro 40 | # | 0 | 5 | 0 | 280 | 0 | 29 | 0 | 0 |
| | % | 0.00 | 1.59 | 0.00 | 89.18 | 0.00 | 9.23 | 0.00 | 0.00 |
| Ro 45-3 | # | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 45-4 | # | 0 | 1 | 12 | 27 | 0 | 7 | 0 | 0 |
| | % | 0.00 | 2.12 | 25.53 | 57.44 | 0.00 | 14.89 | 0.00 | 0.00 |

ls-limestone, gr-grit, sh-shell, pl-plain, cm-cordmarked

Collection:
Ohio

Pottery type

| | | sand pl | sand cm | clay pl | clay cm | gr st | gr br | ls st | ls br | sand st | other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blain Village | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Brown's Bottom | # | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 4.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Caldwell Little Bottom | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cole | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| McGraw | # | 0 | 0 | 0 | 0 | 183 | 39 | 0 | 0 | 0 | 20 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 1.91 | 0.41 | 0.00 | 0.00 | 0.00 | 0.21 |
| Morrison | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 |
| Peter's Cave | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 |
| Pk 4 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 7 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 8 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 9-2 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 9-3 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 9-8 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 9-13 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 20 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 35 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 36-1 | # | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 36-2 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.84 |
| Ro 36-3 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 40 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 45-3 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ro 45-4 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

gr-grit, ls-limestone, pl-plain, cm-cordmarked, st-stamped, br-brushed

Collection: Ohio

| site # | site name | source of assemblage | source of sherd count | total sherds |
|---|---|---|---|---|
| Ro 47 | Voss-McKenzie | surface | Prufer (1967b) | 25 |
| | Zencor | excavation | Baby and Potter (1965) (rims only) | 196 |
| Collection: Hopewell mounds and earthworks | | | | |
| | Ater | excavation | Prufer (1968) | 505 |
| | Edwin Harness | excavation | Prufer (1968) | 171 |
| | Ft. Hill | excavation | Prufer (1968) | 154 |
| | Ginther | excavation | Prufer (1968) | 271 |
| | Harness-3 | excavation | Prufer (1968) | 48 |
| | Harness-4 | excavation | Prufer (1968) | 227 |
| | Hopewell-general | excavation | Prufer (1968) | 496 |
| | Hopewell-17 | excavation | Prufer (1968) | 6 |
| | Mound City | excavation | Prufer (1968) | 300 |
| | Rockhold-2 | excavation | Prufer (1968) | 100 |
| | Russell Brown-1 | excavation | Prufer (1968) | 166 |
| | Russell Brown-2 | excavation | Prufer (1968) | 283 |
| | Russell Brwon-3 | excavation | Prufer (1968) | 54 |
| | Seip-general | excavation | Prufer (1968) | 2508 |
| | Seip-1 | excavation | Prufer (1968) | 392 |
| | Seip-2 | excavation | Prufer (1968) | 43 |
| | Tremper | excavation | Prufer (1968) | 431 |
| Collection: Kentucky | | | | |
| | Biggs | excavation | Hardesty (1965) | 81 |
| Gp 1 | | excavation | Dunnell (1961) | 128 |
| | Hardin | excavation | Hanson (1966) | 16328 |

| Collection: Ohio | | Pottery type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ls pl | ls cm | gr pl | gr cm | chert pl | chert cm | sh pl | sh cm |
| Ro 47 | # | 0 | 0 | 15 | 0 | 0 | 10 | 0 | 0 |
| | % | 0.00 | 0.00 | 60.00 | 0.00 | 0.00 | 40.00 | 0.00 | 0.00 |
| Zencor | # | 0 | 0 | 0 | 196 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hopewell mounds and earthworks: | | | | | | | | | |
| Ater | # | 0 | 0 | 0 | 505 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Edwin Harness | # | 5 | 1 | 24 | 67 | 0 | 0 | 1 | 1 |
| | % | 2.92 | 0.58 | 14.03 | 39.18 | 0.00 | 0.00 | 0.58 | 0.58 |
| Ft. Hill | # | 0 | 0 | 124 | 17 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 80.51 | 11.03 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ginther | # | 2 | 2 | 22 | 239 | 0 | 0 | 0 | 0 |
| | % | 0.73 | 0.73 | 8.11 | 88.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| Harness-3 | # | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 97.91 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Harness-4 | # | 0 | 0 | 57 | 79 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 25.11 | 34.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hopewell-general | # | 0 | 1 | 133 | 315 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.20 | 26.81 | 63.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hopewell-17 | # | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 16.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mound City | # | 31 | 131 | 101 | 21 | 0 | 0 | 0 | 0 |
| | % | 10.33 | 43.67 | 33.67 | 7.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Rockhold-2 | # | 0 | 0 | 44 | 51 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 44.00 | 51.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-1 | # | 0 | 0 | 39 | 41 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 23.49 | 24.69 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-2 | # | 0 | 0 | 55 | 30 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 19.43 | 10.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-3 | # | 0 | 0 | 21 | 21 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 38.88 | 38.88 | 0.00 | 0.00 | 0.00 | 0.00 |
| Seip-general | # | 17 | 2 | 250 | 2031 | 0 | 0 | 0 | 0 |
| | % | 0.67 | 0.07 | 9.96 | 80.98 | 0.00 | 0.00 | 0.00 | 0.00 |
| Seip-1 | # | 6 | 0 | 84 | 193 | 0 | 0 | 0 | 0 |
| | % | 1.53 | 0.00 | 21.42 | 49.23 | 0.00 | 0.00 | 0.00 | 0.00 |
| Seip-2 | # | 1 | 0 | 3 | 10 | 0 | 0 | 0 | 0 |
| | % | 2.32 | 0.00 | 6.97 | 23.25 | 0.00 | 0.00 | 0.00 | 0.00 |
| Tremper | # | 189 | 0 | 227 | 4 | 0 | 0 | 0 | 0 |
| | % | 43.85 | 0.00 | 52.66 | 0.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| Collection: Kentucky | | | | | | | | | |
| Biggs | # | 0 | 21 | 0 | 60 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 25.93 | 0.00 | 74.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gp 1 | # | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 79 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 34.37 | 61.71 |
| Hardin | # | 4 | 14 | 0 | 2 | 0 | 0 | 2715 | 12549 |
| | % | 0.02 | 0.09 | 0.00 | 0.01 | 0.00 | 0.00 | 16.63 | 76.86 |

| Collection: Ohio | | Pottery type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sand pl | sand cm | clay pl | clay cm | gr st | gr br | ls st | ls br | sand st | other |
| Ro 47 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zencor | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hopewell mounds and earthworks | | | | | | | | | | | |
| Ater | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Edwin Harness | # | 0 | 0 | 0 | 0 | 63 | 0 | 8 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 36.82 | 0.00 | 4.67 | 0.00 | 0.00 | 0.00 |
| Ft. Hill | # | 1 | 0 | 0 | 0 | 1 | 10 | 0 | 1 | 0 | 0 |
| | % | 0.64 | 0.00 | 0.00 | 0.00 | 0.64 | 6.49 | 0.00 | 0.64 | 0.00 | 0.00 |
| Ginther | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.21 | 0.00 |
| Harness-3 | # | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 2.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Harness-4 | # | 0 | 0 | 0 | 6 | 85 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 2.64 | 37.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hopewell-general | # | 2 | 0 | 0 | 0 | 44 | 0 | 1 | 0 | 0 | 0 |
| | % | 0.40 | 0.00 | 0.00 | 0.00 | 8.86 | 0.00 | 0.20 | 0.00 | 0.00 | 0.00 |
| Hopewell-17 | # | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 83.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mound City | # | 0 | 0 | 0 | 0 | 1 | 0 | 13 | 1 | 1 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 4.33 | 0.33 | 0.33 | 0.00 |
| Rockhold-2 | # | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| | % | 3.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-1 | # | 0 | 0 | 0 | 0 | 81 | 5 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 48.78 | 3.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-2 | # | 40 | 0 | 0 | 0 | 156 | 0 | 0 | 0 | 0 | 0 |
| | % | 14.13 | 0.00 | 0.00 | 0.00 | 55.82 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Russell Brown-3 | # | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 3 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 16.65 | 0.00 | 0.00 | 0.00 | 5.55 | 0.00 |
| Seip-general | # | 5 | 0 | 0 | 0 | 187 | 0 | 2 | 0 | 14 | 0 |
| | % | 0.19 | 0.00 | 0.00 | 0.00 | 7.44 | 0.00 | 0.06 | 0.00 | 0.54 | 0.00 |
| Seip-1 | # | 0 | 0 | 0 | 0 | 102 | 0 | 0 | 0 | 7 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 26.01 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| Seip-2 | # | 1 | 0 | 0 | 0 | 7 | 0 | 1 | 0 | 20 | 0 |
| | % | 2.32 | 0.00 | 0.00 | 0.00 | 16.27 | 0.00 | 2.32 | 0.00 | 46.50 | 0.00 |
| Tremper | # | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| | % | 0.00 | 0.00 | 1.16 | 0.00 | 0.69 | 0.00 | 0.00 | 0.00 | 0.69 | 0.00 |
| Collection: Kentucky | | | | | | | | | | | |
| Biggs | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gp 1 | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.92 |
| Hardin | # | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1045 |
| | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.39 |

## APPENDIX V

### Distribution of Pottery in Temper-Surface Finish Types
### Hocking River Area

| Collection | | | | | Pottery type | | | |
|---|---|---|---|---|---|---|---|---|
| site # | site name | source of assemblage | source of sherd count | total sherds | | ls pl | ls cm | gr pl |
| | Chesser Cave | excavation | Prufer (1967a) | 997 | # | 61 | 847 | 44 |
| | | | | | % | 6.06 | 84.11 | 4.37 |
| An 6 | Gabriel | surface | Shane and Murphy (1967) | 273 | # | 0 | 11 | 17 |
| | | | | | % | 0.00 | 4.02 | 6.22 |
| | Graham | excavation | McKenzie (1967) | 4782 | # | 0 | 0 | 252 |
| | | | | | % | 0.00 | 0.00 | 5.26 |
| | Deboer | excavation | Mortine (1971) | 6 | # | 0 | 0 | 3 |
| | | | | | % | 0.00 | 0.00 | 50.00 |
| Ho 7 | Shaw Rock Shelter | surface | Shane and Murphy (1967) | 217 | # | 13 | 141 | 0 |
| | | | | | % | 5.99 | 64.97 | 0.00 |
| Fa 2 | Written Rock Cave | surface | Shane and Murphy (1967) | 20 | # | 0 | 0 | 8 |
| | | | | | % | 0.00 | 0.00 | 40.00 |

| Collection | | Pottery type | | | | | |
|---|---|---|---|---|---|---|---|
| | | gr cm | chert pl | chert cm | sh pl | sh cm | other |
| Chesser Cave | # | 19 | 0 | 0 | 36 | 0 | 0 |
| | % | 1.89 | 0.00 | 0.00 | 3.57 | 0.00 | 0.00 |
| Gabriel | # | 49 | 0 | 0 | 195 | 0 | 0 |
| | % | 17.94 | 0.00 | 0.00 | 71.79 | 0.00 | 0.00 |
| Graham | # | 4436 | 0 | 0 | 94 | 0 | 0 |
| | % | 92.76 | 0.00 | 0.00 | 1.96 | 0.00 | 0.00 |
| Ho 7 | # | 59 | 0 | 4 | 0 | 0 | 0 |
| | % | 27.18 | 0.00 | 1.84 | 0.00 | 0.00 | 0.00 |
| Fa 2 | # | 12 | 0 | 0 | 0 | 0 | 0 |
| | % | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

gr-grit, sh-shell, cm-cordmarked, pl-plain, ls-limestone