7

STRATIGRAPHY

Accumulations from and variations in human living patterns leave sequential layered deposits known as *strata* (singular: *stratum*). Each stratum may differ from those above or below it in texture (the size of the soil particles), composition (types of organic or inorganic matter), or texture *and* composition, as well as color, thickness, and cultural archaeological features. Different strata in a site are proof of changing conditions and man's unpredictable activity during the time required for their accumulation. Strata rarely have uniform characteristics, because there are always changes and variations in man's living patterns, in the rate of accumulation, and even in the collection of sterile deposits. Stratigraphy, therefore, is the study of strata or the different layers and levels of occupation on an archaeological site and their relation to each other, and the determination of the archaeological sequence or order in which they were laid down.

Archaeologists distinguish between *stratification*, which is the existence of superimposed layers, and *stratigraphy*, which is the study and interpretation of stratified deposits.

There are well-stratified mounds in the Middle East that, with successive rebuildings, are as high as 30 meters. Once an ancient mud-brick structure fell into disuse, the ancient builder leveled out the area and rebuilt on top of the earlier debris. In the New World, vestiges of American Mississippian mounds that surround a plaza are well-known and in Cahokia, Illinois, a mound 30.5 meters in height covers 16 acres of land. Generally, such mounds average between 5 and 15 meters in height. Sometimes certain elements of the earlier structure were reused, and this, of course, presents a confusing picture to the archaeologist. A Middle Eastern tell that has a long history of occupation and has been built up over a period of time may have a great many strata, the earliest represented by the lowest levels of occupation and the latest represented by the topmost levels. The general rule is that a stratum must have been deposited earlier than the one above it and later than the one below it. In other words, it is presumed that a stratum that is above another is later in time, that it has been superimposed on an earlier deposit. The upper stratum will, therefore, contain artifacts of later manufacture than the lower or earlier level. The archaeologist, however, must not be too hasty in equating sequential deposits with the sequential age of the materials found in the superimposed layers. The context of the artifacts and their comparisons must be carefully evaluated before any judgmental conclusions can be drawn.

A stratum is dated by the *latest* artifacts found in its soil. Thus, the dating of a stratum is dependent on artifacts or architectural features. A coin hoard would therefore date a level easily,

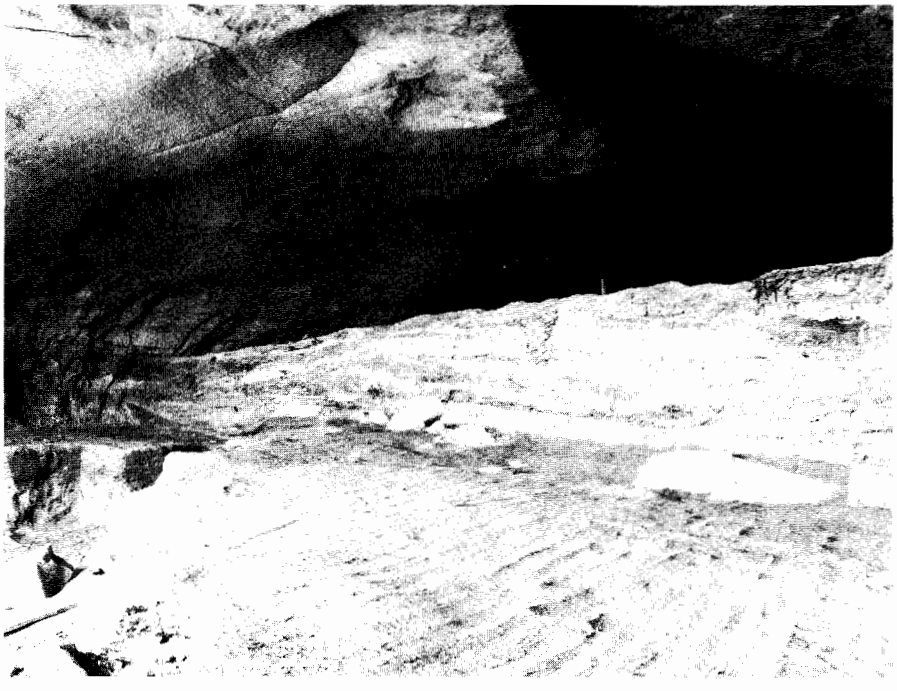


FIGURE 7-1. Detailed natural stratigraphy, Cowboy Cave, Utah. The maximum height of the cross-section is ca. 1.5 meters. (Courtesy of Jesse D. Jennings and the Archaeological Center, University of Utah)

assuming that it was the latest object found in the level, by indicating that the level was destroyed or fell into disuse some time after the manufacture of the coins. Objects of material culture (and, by implication, the level in which they are found) usually cannot be absolutely dated—that is, to a specific year. Instead, they are assigned a time span during which they must have been in use. For example, a level might be dated to the third or fourth centuries B.C. The first of these dates, 300 B.C., is considered the earliest possible date—the date before which this level could not have been in use. The second date of the span, 200 B.C., is the latest possible date—the date after which this level could not have been in use. The Latin phrases *terminus ante quem* (limit before which) and *terminus post quem* (limit after which) are used to refer to these dates. The difference between the *terminus post quem* and the *terminus ante quem* would therefore indicate the life span of the level (see Figure 7-2).

These terms are frequently used in relation to a *sealed deposit*—that is, a layer overlaid by another layer and completely separated from it, with no disturbances from intrusions. It therefore follows that the date of the layer above is later than every object in the sealed level. The closest relative date of these layers and artifacts is determined by the *terminus post quem* when an artifact of a known date is found; the *terminus ante quem* would be indicated by the date the earliest artifact was manufactured. For example, if a 1978 coin is found in the construction of a floor level (not *on* the floor), the floor must have been laid in 1978 or after, but it doesn't mean that floor levels below were necessarily laid earlier than 1978. However, the indications are that they were laid at some point around that time, unless another coin, let's say of 1948, turns up imbedded in one of those levels. Should that be the case, all the floor levels above the 1948 coin could have their *terminus post quem* ascribed to that date.

If, however, a stratum has been disturbed by later intrusions, such as postholes (pits formed by timber used for roof support), ditches, pits (storage pits, silos, rubbish pits, clay pits,

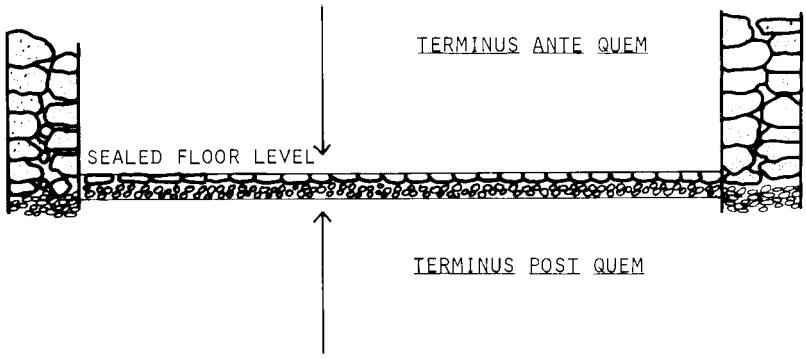


FIGURE 7-2. Stratigraphic principles: *terminus post quem* and *terminus ante quem.* The *terminus ante quem* refers to the date the building was actually constructed. The *terminus post quem* would actually date the floor. The earliest date of the building (the date before which it cannot have been constructed), its *terminus ante quem*, would be the date of the earliest artifacts found lying on the floor. The most recent artifacts lying on the floor date the last use of the building—the *terminus post quem* of the period when the building was in use. Thus, this material cannot be earlier than the floor (except for possible "heirloom" pieces of jewelry, etc.). It is also presumed that the material under this floor will date its construction. This material cannot be later than the floor. The *terminus post quem* of the floor, the date after which the floor cannot have been constructed, will be the date of the latest object found under the floor. The difference between the two dates would establish the closest absolute date.

and others), or robber trenches (areas from which the stones or bricks of an earlier structure have been removed or "robbed" to be re-used in a new construction) made at some later time, or even natural agencies such as the movement of earthworms or by weathering, it has to be meticulously excavated and recorded along with other stratum features. In this way the extent of the disturbed soil can be distinguished from earlier soil lying adjacent to it at the same level. Thus a pit dug down into a deeper stratum must be more recent or later than the stratum into which it intrudes. Often the artifacts found at the bottom of such a pit are contemporary with the time it was dug. In other words, the bottom of a posthole may provide an indication as to the date the post was put in place; the material near the top of the hole as it filled up is much less useful for dating.

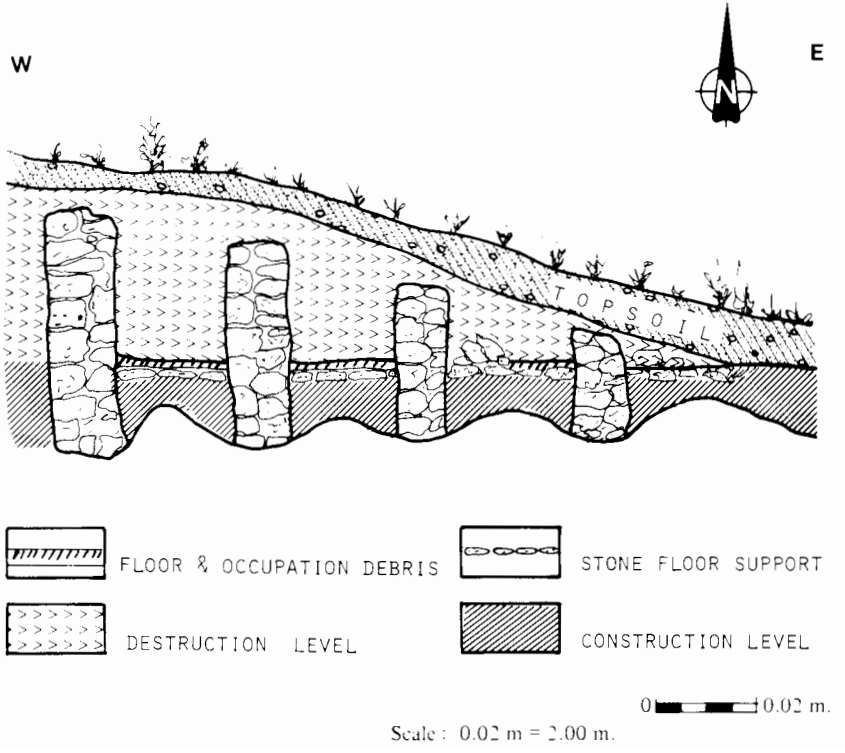
Therefore, one of the first questions the archaeologist asks is whether or not the stratum is a result of undisturbed *primary activity*—i.e., is its preserved accumulation free from intrusions? Or is it a result of disturbed and intrusive elements, indicating that its deposit has accumulated from *secondary activity?* Often in multilevel sites there is a mixed deposit of primary activity that is disrupted by secondary activites; these may be human reuse of the area or may be natural processes, i.e., alluvium. Thus secondary activity may include human or natural phenomena, or both. For example, often in the complex stratigraphy of prehistoric sites, occupation surfaces are disturbed by pits or graves. Reading and evaluating the stratigraphy of such complex sites is difficult, for the archaeologist has to know how to link the activity layers so that each respective stratum and its activities can be identified and correlated. This may involve distinguishing cultural data from other cultural data, or natural deposits from those that are cultural in context and content. The archaeologist must make both a temporal and functional assessment of the physical remains. Only then can an understandable sequence evolve for the horizontal and vertical three-dimensional reconstruction of the stratigraphy.

Very often there are visible differences between the composition of strata, but sometimes the archaeologist is stymied, because the distinc-

tions are unclear and strata fade into one another without any coherent reference. Thus physical stratigraphic relationships are difficult to discriminate. This is the reason why such deposits have to be segregated until their positions can be analyzed and tied in with other layers or levels.

Stratigraphy is founded upon prolonged observation and inference. Its interpretation can only be learned by the study of exposed sections and *section drawings,* which are scale drawings of the stratification of a site. Only features that remain entirely within one level can be observed in relation to other levels; all else must be inferred. In fieldwork, the novice may study a stratum—the texture of its soil, its color, its archaeological objects, and so on, and may describe the features of each level. But in attempting to explain what happened there, when it happened, or how it happened, he or she is forming inferences by interpreting visual data. The ability

FIGURE 7-3. Section of a one-level site. This is a vertical section of a one-level site constructed on sandy earth. The construction level is represented by diagonal lines. The floor is supported by large flat stones. On top of the floor lies a destruction level, covered over by humus or topsoil. Note that the erosion of the topsoil is, to a great degree, related to the height of the standing wall structures. The height of the remaining portions of the wall determines the contour of the topsoil. The dating of this one-level site would be dependent upon the type of masonry and the objects and materials found in the destruction level, as well as those which are found in association with (i.e., underneath) the sealed floor (see Figure 7-2). All these objects might be ascribed to one and the same period, which would indicate a short life of the building, or, if the building was occupied for a long time, they could be of two distinctly different periods spanning some years. Note that the wall foundations have been constructed by the wide-trench method (the ancient builders dug a wide trench from the level above so that they could physically enter the foundation trench as they constructed the wall). Compare these wall foundations to those represented in Figure 7-5, which were probably laid from the level above.



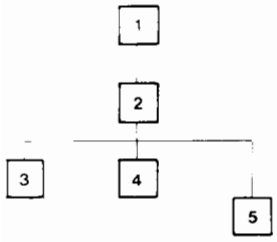
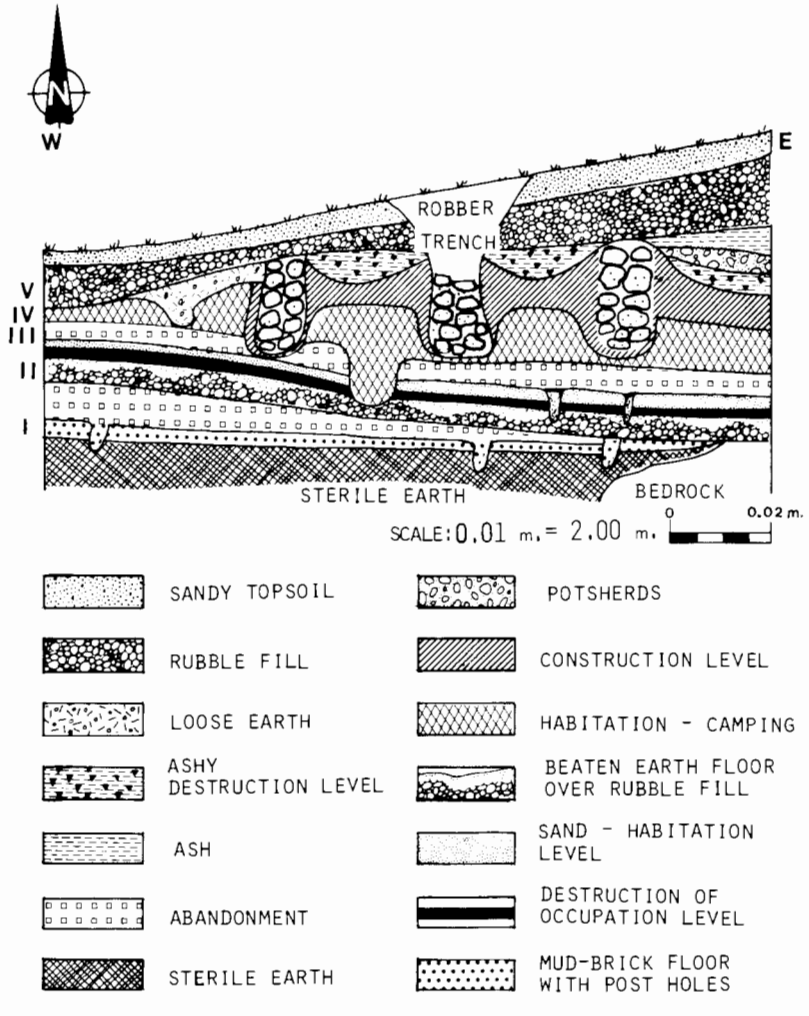


FIGURE 7-4. The type of stratigraphy represented in Figure 7-3 might be charted as shown.

FIGURE 7-5. Stratigraphic vertical section of a multilevel site. From the bottom of the deposit, bedrock and sterile earth are followed by level I, consisting of a mud-brick floor with postholes. This is followed by a period of abandonment; level II, a beaten-earth floor, was laid over a rubble fill that was left nearly intact by the destruction that followed. Level III is a sandy earth floor with two irregular postholes, followed by another period of abandonment. Level IV is a habitation or camping level, and is associated with a large pit. Level V, which disturbs the earlier level, represents the first phase of monumental building. It is a construction level, which in turn is followed by a destruction level filled with ash. Associated with level V is a period of camping with a pit (to the left) which uses the wall for support. Rebuilding levels are shown to the right of the section and are represented by ash, followed by potsherds, indicating an irregular pattern of use of the area before it is covered over by a rubble fill, is abandoned, and is finally covered again by a sandy topsoil.



to observe and to infer correctly is one of the goals of field archaeology. The archaeologist is measured by his or her skill in drawing reasonable conclusions from the stratigraphic picture he or she observes.

Every archaeological stratum deserves an explanation. It may be both cultural and geologic, as most are, but strata can also belong to purely geologic material which may have collected when the site was abandoned. The archaeologist has to be sure that the freshly exposed section will settle the question. Stratification is by no means easy to interpret. It can be found to be inverted (a sequence of overturned levels with the oldest being on the top). This is not an uncommon phenomenon, particularly in Hong Kong, where treasure-seekers have dug pits in their search for antiquities and have left a reverse sequence. Erosion and earthquakes can also redeposit geologic and cultural materials, which then present a confusing picture. In wet climates with a sandy soil, strata are poorly preserved and their interpretation is extremely difficult. In loose soils a heavy object, such as a coin, can move and travel downward until it rests on a hard subsoil surface. Archaeological training and experience are absolutely necessary in identifying successive strata accurately as they are uncovered, and in interpreting their time and significance.

No site exists as an isolated phenomenon. Every site is dependent upon its surroundings, and the study of stratification depends on the correlations the archaeologist draws from his or her observation of each stratum in relation to other strata and to the surroundings of the site as a whole. It is necessary to establish a hypothesis. Suppose, for instance, that an ash level is unearthed. In order to explain the origin of this stratum, the archaeologist should call to mind all possible ways in which this ash level might have been produced. To determine which is the right working hypothesis, it will be necessary to examine the surrounding objects or architectural features for other indications of a conflagration, for each working hypothesis is interrelated to a group of features and objects present in the level.

Two hypothetical sites are shown in Figures 7-3 and 7-5 along with interpretation of their stratification. A one-level site such as that illustrated in Figure 7-3 does not generally require as detailed a stratigraphic analysis as does a multilevel site (Figure 7-5).

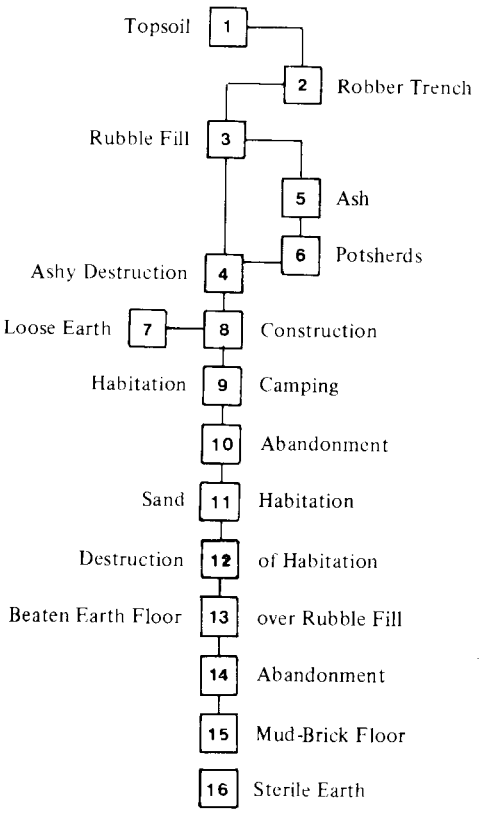


FIGURE 7-6. Charting the stratigraphy of Figure 7-5. As the trench is excavated, the novice should know how to chart the stratigraphy. (This is also a helpful tool when one is reading excavation reports.) Charting is essential to understanding the various activity layers that affected the trench or the site. Some sixteen layers were excavated from the top of the deposit to the bottom; they might be charted as shown.

Stratigraphy, together with the study of human cultural remains, is an index to the history of the site. It is stratigraphical evidence that provides the archaeologist with a perspective of the chronology; the geologic, faunal, and floral history of the site; and (through the study of the cultural changes that took place within each level) the nature of the phases of settlement.

The archaeologist also uses stratigraphy as the source of primary data for the interpretation of artifact sequences. It may be assumed that all objects found in one stratum are contemporary and that when these associated data are corre-

lated with material from other sites, a key will be provided to the understanding of contemporary industries, artifact use, and architectural features, and that (combined with nonartifactual material) will reflect shared activities of a culture. But the archaeologist cannot adequately explain the chronological patterning of objects or architectural features without having thoroughly studied and carefully interpreted what is gleaned from the site's stratification.

In summary, stratigraphy is the study and interpretation of the sequential deposits of a site. It is perhaps the single most important principle on which proper excavation techniques are based; careful observation and recording of stratigraphical evidence is absolutely essential for any interpretation of a site. The greater the care with which the stratigraphy is recorded, the greater the information the site will yield. If maximum information and interpretation are to be obtained from the stratigraphy, the excavator's records and excavation techniques will be so accurate as to enable him or her to hypothetically place back in the excavated area all the walls, objects, soil types (such as burnt layers), and any other archaeological features in their exact original position in the excavation.

Stratification provides the archaeologist with all the directly observable evidence for working out a hypothesis of the history of each deposit and the site as a whole. From the study of each stratum and its deposits, an empirical basis for a stratum-by-stratum culture evolves. The assessment of the cultural phenomena (pottery, stone tools, metalwork, etc.) typical of each stratum should provide a sequence of regional phenomena, which can be woven into a representative culture system. This culture system forms the basis for comparison with like cultures from other sites.

FIGURE 7-7. Stratigraphic studies for the novice should begin with the analysis of features that are above the ground. For example, the differences in masonry and repairs to this Turkish house can be observed by the novice, who should learn to record the wall stone by stone. Pre-excavation study of construction projects and structures that have been reused helps the novice learn to selectively observe the features that an archaeologist looks for in his or her analysis of stratigraphy. (Photograph by Nina Joukowsky)

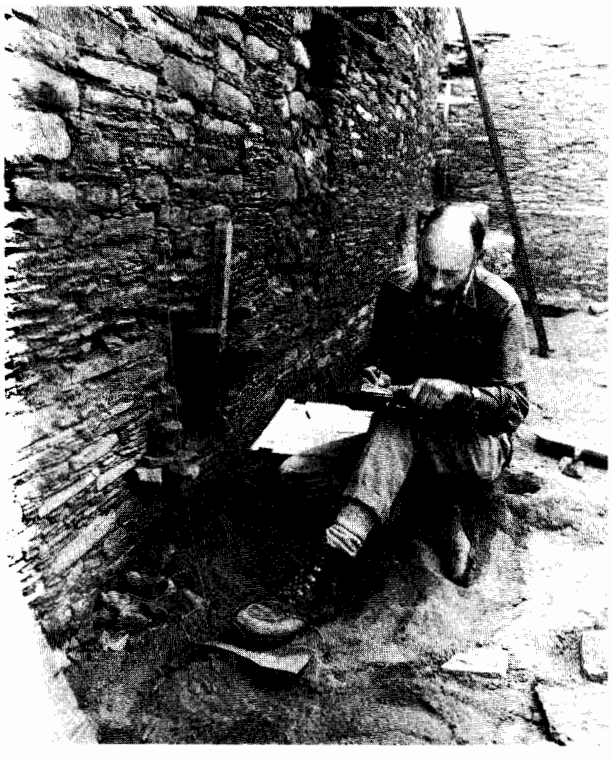


FIGURE 7-8. The study of masonry at the excavations of Pueblo Alto, Chaco Canyon, New Mexico. Detailed recording of masonry and wall features is an integral part of the excavation of these pueblo rooms. In studying each element of its construction and reconstruction, the archaeologist has to bear in mind that the stones were laid in reverse order. Only with the study of its foundations will the archaeologist have a clue as to its original construction date and its stratigraphy. (Courtesy of the National Park Service, Division of Chaco Research, and the University of New Mexico Photo Services, Dick Meleski, photographer)

FIGURE 7-9. Stratigraphic section of Marco Island, Florida (8 Cr 108), representing Archaic and Formative deposits. Zone A is a sterile deposit; Zone B is ascribed to the Archaic Stage (ca. 1500 B.C.) which the excavators reason was a seasonally-occupied component; Zone C is the Formative Stage (ca. 300 B.C.) —it also includes a burial mound adjacent to the 80-acre village midden; and Zone D consists of the overburden of Zone B debris that was removed at the time of the preparation of the burial mound. Zone E is a recent humus stratum. (Photo by W.A.. Cockrell, BHSP, Tallahassee, Florida)