Articles

American Historical Archeology: Methods and Results

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For historical archeology to be effective, research methods must be employed that ensure that both archeological and historical data be synthesized in a constructive manner. An example from Flowerdew Hundred, a Virginia plantation, illustrates such an approach. Collections from eighteen sites (1619 to 1720) were studied and dated by the inside bore diameters of pipestem fragments from clay smoking pipes. The sites grouped into three distinct categories, each with a different date. The latest group of sites (1680 to 1720) contained Colono ware, a slave produced pottery; none of the earlier sites did, although there were blacks at Flowerdew Hundred as early as 1619. On the basis of studies of probate data and other primary historical sources, it is suggested that this pattern of Colono ware occurrence is due to a change in the social and residential status of blacks during the century and that only when they lived separately from the masters did they make this type of pottery.

IT MAY BE SAID THAT AMERICAN HISTORICAL ARCHEOLOGY has come of age in the two decades since its emergence as a separate and distinct subdiscipline. The Society for Historical Archeology was founded in 1967, and there has since been a vigorous development of archeological approaches to the accounting of the American experience since 1492. Now any archeology that deals with the material remains of literate peoples is "historical." Thus the archeology of ancient Greece and Rome, of ancient Sumer, or of dynastic China is historical since these civilizations were fully literate and left ample documents. But in practice, historical archeology as it is conducted in the United States is usually restricted to the study of European Americans or other people whose presence resulted from European settlement—African-Americans and Asian-Americans—and of the native Americans in the years following initial European contact as they interacted with the new arrivals from the Old World.

One common definition of historical archeology is "the archeology of the spread of European culture throughout the world since the 15th century, and its impact on indigenous peoples" (*1*, p. 5). This is a post hoc definition, describing the work of most who consider themselves historical archeologists. The study of southern plantation life, slave and free black communities, Chinese labor camps, New England Puritan farmsteads, frontier forts, French fur trading posts, Spanish missions, and historic Indian pueblos all fall within this definition, to cite but a few examples. In every case, historical archeology attempts to ask sophisticated questions of its data, couched in terms of modern historiographic and archeological methods. It has not always been so. The field has a long history; as early as 1856, James Hall, a descendent of Miles Standish, excavated the site of his illustrious ancestor's house using remarkably careful techniques for the time (*1*, pp. 29–30). Occasional other excavations were conducted on historical sites during the latter 19th century, and the pace quickened in the first half of the 20th. But with relatively few exceptions, this work was motivated by a combination of antiquarian interest and a site's connection with some great American name, such as that of Thomas Jefferson or John Alden. Some projects were primarily exercises in the recovery of architectural data to aid in the restoration for historic sites, such as the program carried out in the 1930s and 1940s at Colonial Williamsburg.

History and Archeology

It is only recently that historical archeology has transcended this narrow perspective and become a useful contributor to the work of both historians and anthropologists. The fact that it serves two different disciplines—history and anthropology—has led to a dilemma of sorts: are historians and anthropologists equally qualified to conduct historical archeological research? Genuine concern and a number of heated debates have sprung from this duality. Anthropologists often feel that historians have an overly particularistic approach to their data (*2*) whereas historians sometimes see a tendency toward overgeneralization and a disregard for the complexity of the past in the work of anthropological archeologists (*3*). The fact remains, however, that historical archeology has in large part been taught and carried out by anthropologists. Although there is nothing inherently wrong with this situation, historical archeology needs both anthropological and historical perspectives to be fully effective. Anthropological archeologists and historians often ask different questions. Neither are necessarily more "right" than the others; ideally they should be complementary and not opposed. From the outset, historians and archeologists work with different data bases: the historian with documents and the archeologists with "material culture"—"that sector of our physical environment that we modify through culturally determined behavior" (*1*, p. 24). While the historian creates contexts of the past based on probate data, court records, censuses, diaries, and related written materials, the archeologist's contexts are created from the study of excavated foundations, pottery fragments, faunal remains, smoking-pipe stems, and other such material realia. Since people in the past produced both documents and material objects, it is obvious that archeology and history must be complementary. The real question is

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how best are we to combine the methods of historiography and archeology to reach a better understanding of the past, not which of the two is more appropriate.

History's prime value to archeology is a function of the richness of the documentary record. No amount of excavation can ever provide the kind of data used by historians to create a coherent, highly detailed construction of the past, and it should be against this construction that archeologists project their findings. This does not mean that archeology is simply a "handmaiden to history," as has been suggested by one eminent archeologist (*4*). Rather, while using the material record as a point of departure, archeologists should seek explanations for their data in terms of the known history of the region and time represented by their material. Such explanations can then be used to frame further questions to be asked of the archeological data, and the answers to these questions again formulated with the historical record in mind.

Archeology's prime value to history lies in its promise to take into account large numbers of people in the past who were either not included in the written record, or if they were, were included in either a biased or minimal way. Slaves, indentured servants, poor tenant farmers, and modest freeholders formed the majority of the population in preindustrial America, but they were given less than full representation in the primary written sources. Even when they do appear, it is usually not their writing that we find, but that of others, and one must take into account the biases of the recorder who was writing about them.

A second value of archeology to history is a function of the commonplace quality of most material culture. As fundamental components of everyday life, things like houses, dishes, barrels, clothing, and food were so universal and taken for granted that there was little need to make written note of their existence, much less appearance. True, there are occasional building contracts, large numbers of detailed lists of household contents known as probate inventories, and other random mention of objects, but all fall short of the kind of detailed description required to make material culture useful in the construction of historical context. Archeology has produced a rich corpus of closely dated evidence that, if used correctly, can provide insights not obtainable from the documentary sources.

Were we to rely only on documents and surviving structures for our knowledge of the early architecture of the Chesapeake region (tidewater Maryland and Virginia), for example, we would come away with a highly distorted picture. However, archeological research in the region has revealed a widespread building tradition in the 17th and 18th centuries that has all but vanished from the landscape and has related that tradition to the area's economic history (*5*). Known as earth-fast construction, this type of architecture was widely practiced by planters involved in tobacco monoculture. Houses were constructed by setting the main framing posts directly into the ground, rather than on a sill. This kind of construction is more easily accomplished and reflects a different attitude toward structural permanence than does a fully framed house. In the case of tobacco farming, which is labor intensive, earth-fast building is a statement of attitudes about what is or is not important in the establishment of a farmstead. These impermanent houses tell us that the farmers were not building for future generations, but to meet their immediate needs. In the best of circumstances, rarely realized, the hope was to amass sufficient wealth to enable a planter to return to England, so investment in items of long-term value at the expense of immediate monetary return made little sense. It is significant that the artifacts found in sites with earth-fast buildings often reflect a high degree of affluence, not surprising if they are seen as satisfying certain material needs more immediate than that of an elaborate house. Throughout the Chesapeake, when farming shifted from tobacco to mixed crops, more permanent houses were constructed. Although this change occurred at different times in the area, the correlation between house form and type of farming is very consistent.

Studies such as this clearly show the complementary nature of history and archeology. The structural details and widespread use of earth-fast structures could not have been known without archeology, but the relation between these structures and farming practices could not have been established without written records. Most important, the connection between impermanent construction and attitudes toward investment and its changes at different times in the region could not have been determined without combining both data sets to provide a more coherent and detailed picture of an aspect of early colonial life.

A considerable amount of historical archeology does not follow the procedure suggested above. In many cases, researchers will use the documentary base as a starting point and attempt to find reflections of aspects of the written record in the archeological data. Such an approach is not productive because it guarantees that nothing significant will be contributed by the archeology and, furthermore, what is demonstrated by the archeology can be more clearly perceived in the documents. Conversely, it is also common practice to attempt to determine the reflection of some artifactual pattern in the historical record, such as a relation between a class of expensive ceramics and the value of the estate of the owner. Since the value in question is already a known quantity, again, nothing new is provided by the archeology beyond a rather self-evident and expectable relation between affluence and quality of possessions. Both approaches are unidirectional and fall short of the critical step in which each body of data is used to inform the other in such a way as to arrive at conclusions that neither data set could provide alone. It is only through such an approach that one can prevent archeology from being a handmaiden to history or history to archeology.

Archeology at Flowerdew Hundred, Virginia

A more detailed and extended example of such an approach comes from archeological research at Flowerdew Hundred, Virginia, on the south side of the James River, midway between Richmond and Williamsburg. Established in 1619 by Sir George Yardley, Virginia's first governor, Flowerdew Hundred was one of a number of "particular plantations" established in the James River drainage. These plantations were private operations, in contrast to those that were established by a company of shareholders, and their granting was done as a way to encourage success through the free enterprise of the owners. Flowerdew Hundred has been continuously occupied since its founding and is today a working farm.

The settlement history of the plantation is complex, involving a large number of individual owners, either of the original 1000-acre grant, or smaller portions of it. In its broadest outlines, Flowerdew Hundred began as a single large land holding, gradually divided into smaller and smaller sections with different owners, and late in the 18th century underwent a process of consolidation, with three owners dividing the property by 1810. By the 1820s a single family owned the full 1000-acre property, and it has remained intact since that time. Intensive site survey has located over 60 archeological sites on the property, with the earliest occupation attributed to paleo-Indians in the tenth millennium B.C. The prehistoric sequence is a full one, with archaic and woodland materials in abundance. Some 30 of the sites recorded are from the period of European settlement and provide an unbroken sequence from 1619 to the present. Extensive archeological investigations have been carried out at nine of the historic period sites by archeologists from

the College of William and Mary and the University of California at Berkeley. These sites have been selected to provide a set of sites with overlapping dates representing the occupation from 1619 through the early 20th century.

In addition to those sites that have been fully excavated, collections have been made from the surface of all other sites on the plantation. It is highly unlikely that any sites have been overlooked in the bottomlands along the river, although survey in the more wooded area on the western edge of the property has not been as thorough. As far as is known, all sites that date to the first hundred years of occupation are located in the bottomlands. This pattern is partly due to the river's importance as the primary route of transport and communication before the development of efficient overland roads and partly to the fertility of the bottomland soil, which would make siting a house near the fields a logical choice. The first settlement away from the river, along a low ridge, a mile from the shore, seems not to have taken place until the latter part of the 18th century. All three plantation houses representing the early 19th century three-part division of the land are located on this ridge (Fig. 1).

Eighteen sites along the flood plain date to before 1730. Of these, 6 have been excavated, and the remaining 12 are represented by large surface collections, made during spring plowing when the newly turned earth and rain make artifact location efficient. In working with these collections a number of obvious questions are asked, including the determination of the artifact types present, the nature of architectural evidence, density of artifactual material as indicative of the location of features beneath the surface, and, of course, the dating of the site as accurately as possible. Data such as these make site selection for excavation more informed and permit the formulation of tentative research questions.

Pipestem Chronology and Flowerdew Settlement

One of the most frequently used dating techniques in 17th and 18th century historical archeology is based on the diameter of the bores of English white clay smoking pipestems. Harrington has shown that, over time, the average diameter of stem bores underwent a rather linear reduction between 1590 and 1800, from 9/64 inch to 4/64 inch, a rate of approximately 1/64 inch every 30 years (*6*). Although there is some disagreement as to the precision of the method, most workers would agree that given an adequate sample of stem fragments, reasonable dates can be produced, particularly from after the mid-17th century until the latter 18th. However, if discrepancies exist, these would not seriously interfere with the use of the method for dating sites relative to each other, even if the actual chronometric date might be inaccurate, since the factors causing the possible error would be present in all samples.

Deriving a date by this method is quite simple. A graduated set of drill bits is used to measure all stem fragments in the sample, and a histogram is prepared showing the percentage of each diameter in the total sample. Thus a site that dates between 1620 and 1650, the time when diameters of 8/64 inch were typical, will show a high percentage of 8/64-inch bores, and a small number of bores of both 9/64 and 7/64 inches. Theoretically, sites from later in this 30-year period would show more 7/64-inch bores than those of 9/64 inch, and to some extent this effect can be observed. Furthermore, the sharper the peak exhibited by the histogram, the briefer the occupation. Sites of occupation duration exceeding 60 years would produce stems with bores varying in diameter as much as 4/64 inch, and thus each increment of diameter would be represented by a smaller percentage of the total sample of stem fragments. Thus the technique not only provides a reasonable piece of dating evidence for the site from which the sample was taken, but some indication of the duration and nature of the occupation.

Binford (*7*) has developed a refinement of the Harrington technique using a regression formula. His technique produces a mean date for the occupation, but the duration is not indicated. Both techniques have their uses, but the Harrington histograms provide more information.

Histograms were prepared for the 18 sites on the Virginia flood plain site that predate 1730 (Fig. 2). When compared with each other, these graphs provided a pattern that strongly suggested that the sites could be grouped into three discrete sets exhibiting a high degree of similarity within each group and distinct difference from those shared by the other groups. Sites of group one all produced histograms that peak sharply in the period 1620 to 1650 and fall off quite sharply following the middle of the century. Group two sites exhibit histograms with a much flatter profile, indicating a more prolonged occupation than that of group one sites. Sites of group three are distinguished by histograms with peaks as sharp as those of group one; in this case the peak corresponds to the period between 1710 and 1750. The reason for the rapid drop at the end of this period is the result of the withdrawal of almost all settlement on the floodplain, removal to the ridge to the west, and the use of the fertile bottomlands almost exclusively for farming. The only site on the floodplain that postdates the mid-18th century is the remains of a structure that probably housed a person charged with running a nearby ferry service.

Having established a clear-cut pattern in the artifactual evidence, the next step was to look to the historical record to see if there were events that took place in the region that might in some way explain

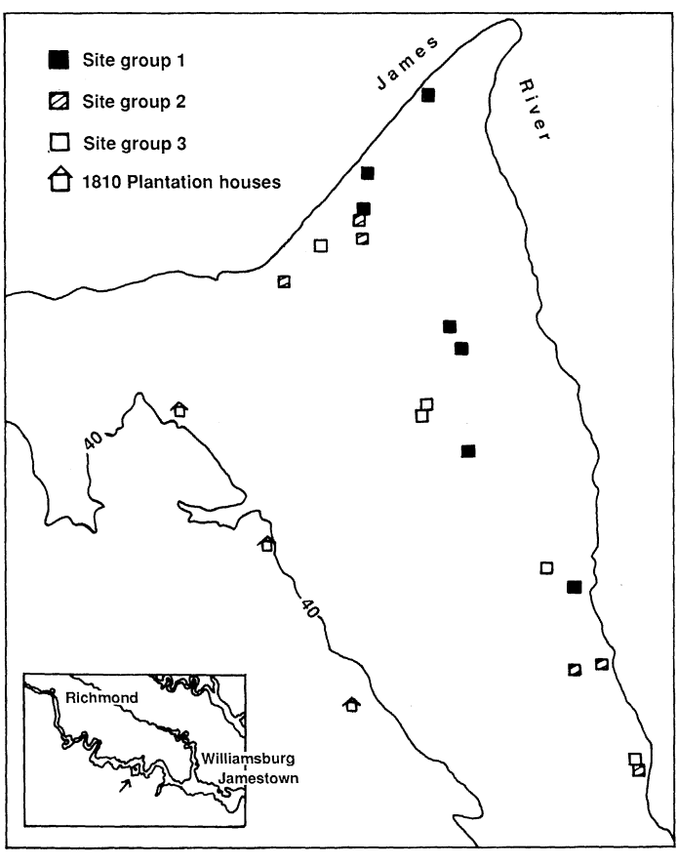

Fig. 1. Location of plantation houses and other settlements at Flowerdew Hundred, Virginia. Inset map shows location of the site (arrow) in Virginia. [Adapted from (*15*)]

the observed pattern. Two major events suggest themselves as accounting for the site groups. The first was the severe depression to tobacco prices that occurred during the third quarter of the 17th century. All seven sites in group one appear to have been abandoned by 1675, with pipe stem bores of 8/64 inch being in the majority. Associated artifacts, particularly dateable ceramics, support this date. Four sites in group one have been excavated, and all show earth-fast construction. These sites are obviously the remains of farmsteads established by the early 17th-century tobacco entrepreneurs; and with the depression in tobacco prices, settlement slowed, and the farms were abandoned. Since the documentary record for Flowerdew Hundred is scanty, it is not possible to determine where the occupants went after leaving their homes.

The second major event in the history of the Chesapeake region that has bearing on the groupings of sites was the full institutionalization of racially based slavery during the last 20 years of the century (*8*). At this time, the numbers of slaves arriving in the region increased dramatically, and the pattern that was to mark the economy of the region until the Civil War was set. Occupants of farmsteads represented by site group three were probably among the emerging class that would form the elite of 18th-century Virginia, although their material culture does not suggest any marked affluence at the time of their life at Flowerdew Hundred (Fig. 1). If they were slave holders, the number of slaves at each farm was probably quite small, perhaps as few as the two or three typical of small freeholds of the period (*8*). In contrast to sites of groups one and three, sites of group two were occupied for a longer period of time, beginning late in the period of site group one occupation and overlapping the settlement of group three sites in its earlier years. It can be suggested that the former occupants of these sites represent a group with a stronger commitment to staying in the area than that of their predecessors. Although there is no documentation for the fact, it could well be that these farmsteads were based on somewhat more diversified crop production, following the arguments advanced by Carson *et al.* (*9*).

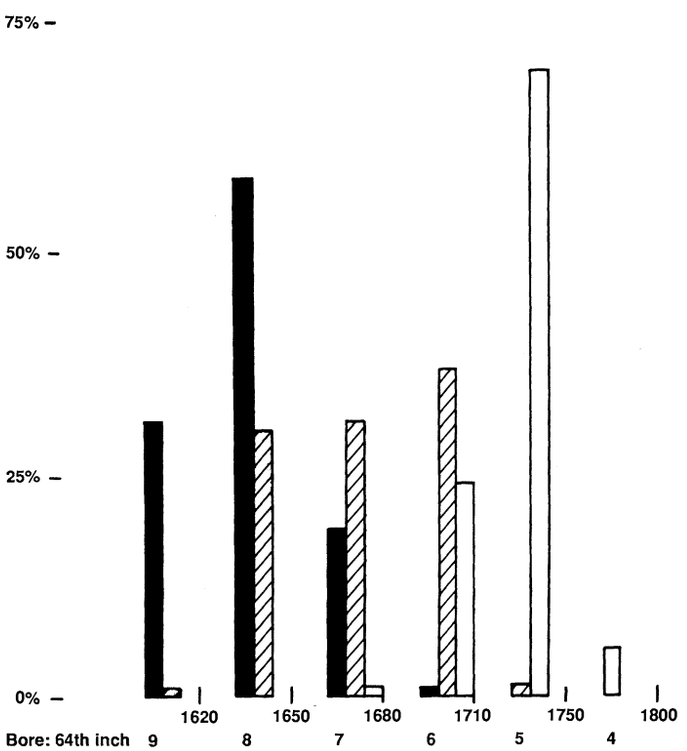

Fig. 2. Histograms showing percentages of clay pipestem fragments of varying bore diameters at 18 sites at Flowerdew Hundred, Virginia. [Adapted from (*15*)]

The delineation of three distinct sets of sites, each tentatively related to different aspects of 17th-century Chesapeake history, forms the basis of a research design for the archeology of 17th- and 18th-century Flowerdew Hundred. This research is still in its initial phases, but significant patterns have already begun to emerge. Once the site groups were defined, the locations of the sites in each group were investigated, and a clear pattern was apparent (Fig. 1). Sites of both groups one and three are evenly distributed along the bottomlands. But during the period of group two sites, settlement can be seen to be restricted to either the northernmost or southernmost sections of the plantation. Just what this difference signifies is unclear, but the fact of its existence further strengthens the significance of the groupings. Since the shoreline along most of the eastern boundary of the plantation is cyprus swamp, with a depth of a quarter of a mile, settlement on this shoreline would have been impossible. The group two sites are located in those areas where easiest access to the river would have been possible, and the five sites of groups one and three which are centrally located are further from river access than their location would suggest.

Colono Ware at Flowerdew Hundred

When the artifact assemblages from sites in each of the groups were compared, another important difference was observed. All five sites in group three produced significant quantities of Colono ware, a locally produced, handmade, unglazed pottery in a variety of European shapes (*9*). No sites in either of the other two groups produced this type of ceramic. Formerly termed Colono-Indian ware, this pottery was long thought to have been made by local Indian groups and traded to the colonists. Gray-brown in color, fired at a low temperature, and tempered with either grit or shell, it shares certain characteristics with coastal Algonquian pottery. However, its distribution in time and space raises certain problems with such an attribution. It does not become common until the last quarter of the 17th century, and it increases in quantity through the later part of the 18th century. During this same time, the native population was undergoing a severe decline. The Beverley census of 1703 lists 612 Indians for all of Virginia, and the decline continued unabated during the 18th century (*10*). Furthermore, Colono ware is found only from the Chesapeake southward into South Carolina and Georgia, those areas where slave populations were large and often settled at a distance from the houses of the planters.

Most scholars working with Colono ware now agree that it was made and used by slaves, with its roots in a generalized West African ceramic tradition (*11*). Whether found in Virginia or South Carolina, it is remarkably similar in its technological attributes, although there are significant differences in the shapes of Colono ware from the upper and lower south. Colono ware from the Chesapeake was made in a wide variety of shapes, closely copying English prototypes, including punch bowls, porringers, pipkins, and handled drinking cups. Colono ware from South Carolina exhibits a much more restricted set of shapes, primarily large and small globular pots and shallow bowls. It will be seen that these differences in form are probably the result of different patterns of planter-slave interaction in each region.

The presence of Colono ware in all group three sites at Flowerdew Hundred strengthens the identification of these sites as those occupied by small-scale holders. However, it raises a new problem in turn. If Colono ware was made by slaves, why do we not encounter it on sites that predate the 1680s? Flowerdew Hundred had a small black population at its very beginning. Fifteen of the first 25 blacks

to come to English North America were owned by the first two occupants of Flowerdew Hundred, George Yardley and Abraham Piercy. The muster of 1625 lists seven "negroes" residing at Flowerdew Hundred. While there is no further reference to blacks at Flowerdew Hundred until the 18th century, it is very likely that there was a continuous African-American presence there throughout. But whether the presence of blacks in the Chesapeake was continuous or not, the fact remains that they were there from 1619 on, and yet Colono ware seems not to have been produced until quite late in the 17th century.

It was the association between Colono ware and a specific group of sites at Flowerdew Hundred, and its absence from sites of the other two groups, that prompted the formulation of the question above. An answer to this question, as well as an explanation of the difference in shape between Virginian and South Carolina Colono ware, is suggested by Upton's study of the relation between servant-master social interaction and house size in 17th-century Virginia (*12*). Upton's research is based on an analysis of room-by-room probate inventories from 17th-century Virginia. Taken for tax purposes, probate inventories are detailed listings of the contents of houses and their conditions and values. Not all probate inventories were taken on a room-by-room basis, but a significant number of them were and provide important data on house size based on room number. Although most houses throughout the 17th century were quite modest structures of two or three rooms, houses of 8 to 11 rooms were not uncommon. These larger houses, built by more affluent members of the society, were initially occupied by both the planter and his indentured servants.

Figure 3 shows a graph of house size in Virginia from room-by-room inventories. Between 1640 and 1720, houses in the 8- to 11-room category exhibit an interesting trend. They steadily increase in number until the 1680s and then decrease, reaching their 1640 level by 1710 (Fig. 3). The reason for the gradual increase in number of larger houses comes as no surprise. Indentured servants and masters lived under the same roof, and the increase reflects the growing number of individuals who could afford servants, and their rooms were included in the inventories. However, after the 1660s, there

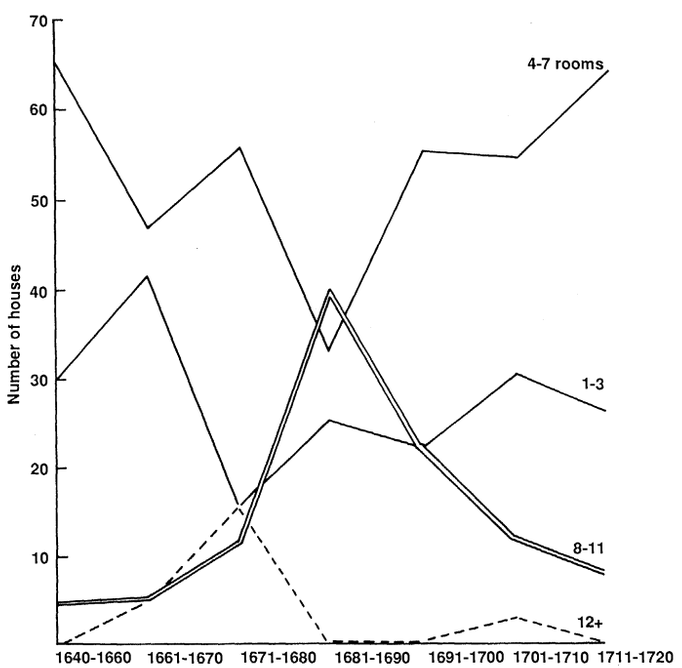

Fig. 3. Virginia house sizes from room-by-room inventories, 1646 to 1720. [Adapted from (*16*)]

was growing strain between masters and servants, reflected in a sharp increase in litigation over servant's rights or unrealized expectations on the part of the masters. This time was also a period which saw a number of attempted servant uprisings. The result of this alienation was to restructure the arrangement of living space; separate quarters were constructed for the servants apart from the main house, and the main house became smaller. It is particularly noteworthy that this change predated the major influx of slaves at the end of the 17th century, so that the model for slave settlement had already been established. What were to become slave quarters already existed in the form of separate servants' quarters. Contemporary descriptions of plantations of this time clearly describe the situation (*13*):

> Some people in this country are comfortably housed. . . . Whatever their rank, and I know not why, they build only two rooms with some closets on the ground floor and two rooms in the attic above; but they build several like this, according to their means. They build also a separate kitchen, a separate house for the Christian slaves, one for the negro slaves, and several to dry the tobacco, so that when you come to the home of a person of some means, you think you are entering a fairly large village.

Results and Conclusions

The significance of the relation of the shift in architectural arrangements to the pattern of Colono ware occurrence in time is potentially great. If blacks as well as whites lived in the same household as did the planter before the establishment of separate quarters, then they would have access to the material goods of the household as well. Not only would it not be necessary for them to manufacture their own pottery, but they would have been familiar with both the shapes of English pottery and its function in the preparation and consumption of food. The historical record shows that black servants or slaves and white indentured servants regularly shared living space before the last quarter of the 17th century. Many blacks paid taxes and also appear in numbers of court actions on a par with their white contemporaries. As Edmund Morgan has noted, "there is more than a little evidence that Virginians during these years [before 1660] were ready to think of negroes as members of or potential members of the community on the same terms as other men and to demand of them the same standards of behavior" (*14*). During this time, some blacks were fully enslaved, some served as indentured servants, and not a few were free. It was not until the end of the century that race became the predominant criterion for slave status, and slavery as a full-blown institution emerged. When Morgan wrote, Upton's study had not been done, and the implications of their conclusions could not be perceived in their relation to Colono ware. A closer degree of social interaction between black and white in the years before 1660 made the production of Colono ware unnecessary. Once blacks were settled separately and made to produce their own utensils, pottery would be among the most basic of necessities, and it was produced in the range of English forms with which its makers were familiar. When the situation in South Carolina is compared with the patterns seen at Flowerdew Hundred, this explanation also sheds light on the differences in pottery shapes found between the two areas. Blacks arrived later in South Carolina, and when they did, they came in great numbers and from the first were settled apart from the planter's house, often at a great distance. There was little or no opportunity to become familiar with either English pottery forms or English food ways. The limited inventory of shapes found in South Carolina Colono ware reflects comparable African forms, and these fit into African food preparation and consumption practices (*11*). The large jars are for cooking of the starchy foundation for a meal, manioc, or cornmeal. The small jars are for preparing the meat, fish, or vegetable relish that is served

over the carbohydrate, and the shallow bowls are used in food consumption. This stronger retention of prior African cultural elements among South Carolina blacks is also to be seen in basketry, language (the Gullah dialect), woodcarving, and other crafts. There are no counterparts for these in the Chesapeake, almost certainly because of a longer period of black-white interaction and on closer and different terms.

In the nonexperimental sciences (if archeology is indeed a science), precise certainty is rarely achieved. Rather, research takes the form of a gradual refinement of explanation, as more and more factors are incorporated into the construction of the past that one is attempting to create. In historical archeology, this refinement is best accomplished by maintaining a balance between the documentary and material evidence, being always mindful that, to be a productive exercise, the results should provide a more satisfactory explanation than would be forthcoming from either set of data alone. To be sure, the conclusions arrived at here could have been arrived at by a different route than that taken, but regardless of the precise set of steps involved, it would be necessary to incorporate both material culture, in this case a discrete type of pottery, and documentary evidence to obtain the explanation provided. The pattern of distribution of Colono ware in time and space cannot be understood in the absence of documentary support. However, once this explanation has been provided, a dimension of black-white relations in 17th-century Virginia has been made more clear than it would have been if the archeological data were not taken into account. This is particularly true in the context of pre-1660 Virginia, since the documentary record for this period is thin and there are numerous ambiguities regarding the status of blacks and the way in which they and the white community related to each other.

It is easy to project the better known 18th-century pattern of relationships into the past in an uncritical fashion, but studies such as ours tell us that to do so would run a high risk of error and that every bit of evidence, from both history and archeology, will be necessary if we are ever to reach a better understanding of what truly was taking place. It may well be that historical archeology's greatest utility is in contexts such as that of Virginia in the first half of the 17th century. In these contexts, there is sufficient documentary evidence to inform the archeology, but not in such a quantity as to make archeological analysis a weaker component in the total research design.

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Superconductivity—The State That Came in from the Cold

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The exploration of high transition temperature copper-oxide–based superconductors has proceeded vigorously and internationally during the first year following the initial publication of the work of Bednorz and Müller. Progress in understanding the physics that underlies the phenomena has been slowed by difficulties resulting from the delicate and complex crystal chemistry of the material. Reports of superconducting behavior well above 100 kelvin have not been confirmed to date, although there is some suggestive evidence. A survey of the present state of the science and the possibilities for electronic and electrical power technologies is given.

THE RESPONSE TO THE HIGH TEMPERATURE SUPERCONDUCTIVITY discovered by Bednorz and Müller (*1*) is almost unprecedented. The impact has been compared to that which followed the discovery of x-rays by Röntgen at the end of the last century (*2*). As a result, it is likely that insights will be generated throughout condensed matter science and it seems possible that entirely new technologies will emerge. The dynamic nature of this one-year-old field, in which more information is disseminated by word of mouth, preprints, and conference reports than by archival journals, means that our task is both easier because we cannot

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