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Forager-farmer transitions in coastal prehistory

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FORAGER-FARMER TRANSITIONS IN COASTAL PREHISTORY

by

Paul R. Green

A Dissertation submitted to the faculty of
The University of North Carolina at Chapel Hill
in partial fulfillment of the requirements for the degree
of Doctor of Philosophy in the Department of Anthropology

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PAUL RANDOLPH GREEN. Forager-Farmer Transitions in Coastal Prehistory (Under the direction of Carole L. Crumley).

A comparison of the process by which sedentary communities and full scale agriculture appear in two independent cultural settings, one in the Mediterranean basin and the other in Mid-Atlantic North America, shows it to be gradual and influenced by both local and exogenous factors. The nonagricultural Mesolithic cultures of the French Languedoc, their nominally agricultural successors: the Cardial Neolithic groups, and the nonagricultural Mockley culture of North America for a long time all resisted complete acculturation to a true farming lifestyle.

Local social processes working within a bountiful estuarine ecosystem did eventually produce sedentary life, ceramics, and some social ranking. In both cases, however, full scale agriculture and the appearance of large village populations with clear class differentiation did not appear until much later in their respective historical sequences: the late Neolithic and Chalcolithic in France and the ultimate late Woodland in coastal Virginia. When this change finally came, it had much to do with external factors such as trade and population movements.

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ACKNOWLEDGMENTS

Most of the people who contributed to this work are, for me, a close group of friends and relatives. Their help is so deeply woven into the fabric of my personal and professional growth, a brief passage here would never do them justice. Hopefully, they know already the affection and appreciation I bear for all of them. Carole Crumley is a mentor, colleague, and close friend of almost fourteen years. She is a true "life partner" in terms of interests and perspectives. I am eternally grateful for her lasting concern and not so gentle urgings to finish the dissertation. The forebearance of my other committee members, Robert Daniels, Joffre Coe, John Gulick, and Richard Yarnell is gratefully acknowledged.

Nearly all of my kin group (both affines and consanguines) have been drafted into my field work at some time or another, and I love them all for it. My wife Jo Anne and brother David worked mightily at the Swing Site, Cedar Point Site, and Great Neck Site for the true minimum wage. Much prehistory was saved that might otherwise have been lost but for them.

Much of what I am as an archaeologist springs from years of interaction with faculty and fellow students at the University of Missouri and the University of North Carolina at Chapel Hill. From the "old days" at Mizzou I

acknowledge the lasting influences of Bill Marquardt, Ann Tippitt, Walter Berry, Eric van Hartesveldt, Alan Downer, and Alan May. At Carolina I had the privilege (especially for an Old World archaeologist!) of occupying an office in the lower floor of the Alumni Building, within the Research Laboratories of Anthropology. There lived an affable "mafia" which nurtured my development as an archaeologist and a human being. To Dave Moore, Billy Oliver, Paul Gardner, Steve Potter, Greg Waselkov, Dan Simpkins, Trawick Ward, Jack Wilson, and Kit Wesler: thanks for the memories, guys.

This work I dedicate to my father, Donald Frank Green. Dad is in a very real sense responsible for it, since he personally saw to it that I applied to college and worked hard to succeed. He and my mother, Mary Ann Green, were always there when needed. Whatever is good or lasting in this work or in me is mostly due to them, and I thank them for it.

INTRODUCTION

This work began ten years ago in the lower Chesapeake Bay, an area which has held a special fascination for me from childhood. Coastal fieldwork paralleled a growing interest for me in Mediterranean France during the Neolithic period. The Languedoc is the south coastal region of France west of the Rhone delta, where dense concentrations of Neolithic sites are found. Coastal Languedoc and Virginia had a number of strikingly parallel cultural developments: both hosted precocious sedentary societies with pottery and a diverse economy based on the estuarine ecosystem. In each case full-scale agriculture took a long time to appear, and only then did major changes in material and social systems occur.

Given current interests in forager-farmer transitions and coastal adaptations, the time seemed right for an examination of these issues in the regions stated. To state the problem: prehistoric cultures in certain coastal settings developed fully sedentary lifestyles capable of supporting moderately large or dense populations, without food production as a primary subsistence base. Especially in estuaries a diverse, resilient food collection strategy endured climatic change and demographic stress, and for a long time resisted dependence on food production.

This work first discusses natural processes which shape coastal environments. It then examines certain regions in the Mediterranean basin and Mid-Atlantic North America to study factors contributing to the appearance of settled life and a food producing economy. Mindful of the imperfect nature of prehistoric evidence, we rely upon site plans, artifact sets, and subsistence assemblages to shed light on these processes. By exposing the sequence of development to comparative study, we hope to gain a better understanding of general maritime adaptations, the nature of contact between inland and coastal societies, and the role of environmental factors in structuring coastal settlement and subsistence, particularly the rise of sedentary life and agriculture.

The Comparative Archaeology of Coastal Societies

Numerous works over the past thirty years have contributed to a new environmental paradigm in anthropology, one quite different from that advocated by early twentieth century determinists. It traces its origins to the work of Grahame Clark, Carl Sauer, Julian Steward, and others. It characterizes components of the biophysical environment: plant and animal distributions and characteristics, hydrologic, geologic, and atmospheric elements and processes, etc. Understanding the interaction of these factors gives insight into the nature of physical limitations on culture process.

Archaeologists organize research topics in relatively homogeneous regions. Discrete adaptation types are discerned for the Great Lakes, the Ozark Mountains, the Gulf Coast, etc. Comparing adaptations to one particular kind of environment, the coastal ecosystem, has great potential for cross-cultural research. Sometimes referred to as "maritime anthropology" (cf. Smith 1977), it is the subject of several volumes of the Ninth International Congress of Anthropological and Ethnological Sciences. Casteel and Quimby (1975:1-4) state:

> . . . those cultures, societies, and subcultures that are of the sea or pertaining to the sea are the subject matter of maritime anthropology and consequently, maritime anthropology subsumes a broad spectrum of cultural and physical phenomena. . . . It is the rapidly increasing interest and concern on the part of many different nations and scholarly specialties in the resources and potential uses of the world's oceans and seas that have fostered the emergence and growth of maritime anthropology. . . The abundance of data concerning the various aspects of maritime anthropology offers excellent opportunities for different kinds of comparative and analytical studies . . .

For designing fieldwork, research must be carried out at a "far more restricted scale and in reference to regional and environmental factors tightly specified in time and space" [Clarke (1976:462); also see Rindos 1984:16)]. Little and Morren (1976:83-84) further narrow the area of concentration:

> By studying smaller, less complex human systems, we can not only expand our knowledge of the operation of more traditional societies, but we

> can begin to sort out the basic elements of human systems to predict the consequences of ecological interpretations currently problematic in technologically sophisticated societies. Clearly as the complexity of the human life-support system and the dependence on outside resources increase, so too does the instability of the ecosystem. Attempts to manage imbalanced ecosystems by the imposition of new life-support systems or the input of higher levels of energy carries with it considerable risk. For these reasons studies must be made of relatively small and technologically simple human populations more closely integrated within their ecosystems.

Clarke (1976), Little and Morren (1976) and others also stress the importance of recovering the entire life support system, as far as technically feasible, rather than a "single species studied in isolation from subsistence assemblages" (Clarke 1976:461). Be mindful of these guidelines when considering evidence from areas discussed below. According to Clarke (1976:461):

> Real economies are integrated: only a fraction of their structure is represented by the list of resources exploited . . . The vital missing half of the systemic structure is contained in the specification of the <u>relationships</u> of the elements in the structure: their relative seasonal fluctuations, their relative energy-input/output, their relative contributions to the whole economy. Man/resource relationships are not simply the sum of the resource attributes but depend upon the competitive yields and demands--in time and labor --of other activities, both economic and non-economic, of different cultural priorities; the relationships depend not only on the 'mix' and the 'weighting' but also are relative to particular environmental and cultural states.

Maritime adaptations in prehistory have concerned archaeologists working in the Circumpolar Zone, especially as related to the diffusion of artifacts and social traits. Despite intervening factors, such as the interaction of coastal cultures with those of the interior:

> the widespread distribution and similarities in northern maritime adaptations suggest that it is methodologically sound to investigate their origins and function as a separate adaptation type, and to determine their evolutionary roles, as a self-sufficient economic strategy, as a subsystem within both mixed Neolithic and maritime economies, and as a seasonal partner to coastal-interior adaptations of the northern seacoasts and forest (Fitzhugh 1975:12).

In the past, studies of coastal or maritime archaeology derived from many sources. The increased use of shellfish by peoples throughout the world after the last glacial retreat led to the development of a class of prominent and durable archaeological sites: shell heaps, shell middens, or kitchen middens as they are variously known. Similar methodological problems associated with the excavation of these coastal sites led to increased communication between archaeologists and prehistorians around the world (Waselkov 1982).

Clark (1952, 1975) provided a basis for comparative study in his studies of north European coastal cultures. Works by Butzer (1971), Bintliff (1981), Davidson (1972), and Kraft (1976) have clarified the genetic and spatial relationships between environmental settings and coastal archaeological sites. While useful to focus on geographic units such as the Pacific, the Circumpolar Zone, and the North Atlantic, we also emphasize the study of adaptations to specific parts of maritime ecosystems, such as deltas, estuaries, and lagoons (see comments above by Clarke _et al_.) (cf. Fig. 5).

Within the coastal milieu, we are especially concerned with the cultural processes leading to the development of sedentary life and agriculture. The latter problems have, of course, been central to the course of archaeological research in the latter half of the twentieth century. This paper is concerned with relatively small populations in a specific ecotonal situation, the temperate zone estuary.

In order to compare maritime adaptations cross culturally, we sought environmental settings as similar as possible. This was not thought to be a difficult matter, as there exists at continental and regional scales of landforms sufficient information to identify such environments with precision. For reasons largely apart from the concerns of pure research, however, e.g., available time and funding, the areas finally selected are less than ideal. We compare cultures of similar complexity on opposite sides of the Atlantic, in similar climatic zones and estuarine settings.

The areas originally selected were the Chesapeake Bay in North America and the Tagus River in Portugal. Both are large estuaries in a transitional location between northern and southern ecological zones. The Tagus River estuary is at the center of

> the one European area that has the unique combination of a Mediterranean latitude and an Atlantic coastline . . . , where . . . the coastal interests of the local Mesolithic are widely evident; although . . . one must also remember the abundant vegetal resources of the same highly productive alluvial littoral in this southern latitude (Clarke 1976:466).

The Mid-Atlantic coast of the United States has areas comparable to those listed by Clarke (Figure 32). The Chesapeake Bay has long been recognized as a rich natural laboratory for ecological study. In the past decade several archaeological projects have refined our understanding of local culture history and change in the lower Chesapeake (cf. Turner 1976; Potter 1982; Waselkov 1982; Geier 1983). The Chesapeake Bay is the northern terminus of many floral and faunal distributions in the southeastern United States, while two of its principal rivers, the Susquehanna and the Potomac, drain basins in cooler, more inland regions.

For the European example, it was unfortunately not possible to schedule fieldwork in the Tagus River region, and the course of the author's personal career led to a shift southward in the area of interest in the eastern United States.

The areas ultimately selected were the Languedocian estuaries of southern France and Mid-Atlantic North America, the latter specifically from the James River to the Pamlico River. In this work the archaeological and environmental evidence from Languedoc and the lower Chesapeake Bay are examined to describe the spread of sedentary life and the transition from food collection to food production in the coastal zone.

Along the shores of the western Mediterranean and south Atlantic Europe, the widespread occurrence of a particular kind of pottery, "Cardial" or "Impressed" ware, heralds the onset of the "Neolithic" stage of cultural development in the sixth and fifth millenia B.C. (Figure 26) (Bailloud 1974; Escalon de Fonton 1974; Geddes 1986; Geddes et al. 1983; Guilaine 1976; Lewthwaite 1981; Phillips 1975; Waterbolk 1971). In conventional models of European prehistory, this is one of two major trajectories of "neolithization" in Europe, whereby Mesolithic cultures were "replaced" by Neolithic cultures; the other being that of the Bandkeramik (also known as the Linear Pottery Culture) in the fifth millenium B.C.

Along the east coast of the United States (roughly between modern Delaware and North Carolina), from about 3000 to 2000 B.C. a distinctive maritime Archaic tradition appeared, with large, seasonal camps and substantial use of coastal resources (Figure 41). This pattern, augmented by a diverse harvest of wild and domesticated plant foods, persisted into the latter part of the Middle Woodland and early part of the Late Woodland periods in the Mid-Atlantic (ca. A.D. 800-1000) (Stoltman 1978;

Stoltman and Barreis 1983) (Figure 42). During this same period, apparently sedentary cultures appeared, supported by a largely nonagricultural subsistence base and producing distinctive ceramic wares. Full fledged dependence on agriculture for subsistence does not appear until well into the Late Woodland period along the coast (ca. 1300 to 1500) (Figures 43 and 155).

At first the parallel evolution of Mesolithic to Neolithic economic stages in Europe with Archaic to Woodland in North America seemed a reasonable one (cf. Hadleigh-West 1962; Clark 1980:10). But closer inspection produced difficulties. For example, the process of "neolithization" is today interpreted quite differently from a generation ago. This process once described the acculturation of hunter-gatherers to the "neolithic" lifestyle, marked by the appearance, usually quite suddenly, of polished stone tools, grinding stones, pottery, storage pits, and houses (cf. Case 1975).

Outright or modified diffusionism today has largely been abandoned in favor of local cultural intensification processes (Barker and Gamble 1985). The paths by which hunter-gatherers and farmers interacted were numerous and varied (Dennell 1985), and the pace of agricultural innovation quite deliberate (Rindos 1984). Our areas of temporal and formal concern therefore contain somewhat blurred boundaries.

We shall focus on the earlier transition (e.g., late Mesolithic to early Neolithic in southern France) because it is there that sedentary life makes its appearance; cultigens, while present, do not seem to have much changed basic lifeways. The latter transition (e.g., late Middle Woodland to early Late Woodland, or later, in the Mid-Atlantic) marks the shift to food production in a major way, and is likewise of interest.

Each of these areas has historical characteristics unique to the course of its evolutionary development, to be sure. Yet there are common elements of broad import as well. As discussed above, the potential contribution of the cross-cultural study of maritime adaptations is considerable. Some, as we have seen, make a case for the "abundance" of estuaries. For cultures adapted to these 'Edens', what was the spatial and temporal pattern of their settlement and subsistence systems? What are the similarities and differences relative to coastal societies in similar latitudes, but different historical traditions? How do such patterns compare with inland types?

Maritime Adaptations, Sedentary Life, and Agricultural Origins

In this work the estuarine system is selected for the kind of comparative study discussed above, largely to examine the nature of its high biological productivity, the exploitative potential of this productivity for cultures, and the relationship of the latter to the evolution of sedentary life and agriculture. As we are concerned with the transition from hunter-gathering to agricultural lifestyles, we consider the case of the maritime forager, for he is a special breed indeed. In comparing hunter-gatherers world wide, Perlman (1980:257) finds that coastal groups often exhibit greater sedentism, higher population densities, larger populations, and more complex social organization than do inland groups.

To examine these differences more closely, Perlman defined coastal zones in terms of their productivity and studied hunter-gatherer adaptations in some of them, particularly estuaries. He rejected arguments (cf. Osborn 1977) which put marine subsistence late in human evolution and placed a low value on coastal resources, as ostensibly shown by coastal site distributions, caloric contributions to diet, labor-intensive collecting requirements, etc. He cited evidence to show that some of the highest productivity areas along coasts (e.g., low terrain wide shelf plains) are also those most likely to have been inundated or otherwise affected by Holocene sea level rise (Perlman 1980:286). Partially exposed narrow shelves (such as the Mediterranean basin) have a recent and shorter history of estuarine development and coastal productivity (Perlman 1980:286).

As for the effect of sea level change on population distributions along coasts, Perlman (1980:296) noted that the loss of productive coast and estuaries and consequent population relocations could produce evidence otherwise interpreted as autochthonous population "growth". Harris (1978:408) suggests, however, that such "packing" is a naive assumption, with emigration being a more likely short-term response to such events. "The exact impact of submerging or even emerging coasts on the archaeological record for a particular area would vary with the changes in other environmental parameters (e.g., increasing warmth and possible associated productivity increases, changes in the distributions of selected resources, etc.)."

Perlman (1980:292f) cites numerous ethnographic and archaeological examples of coastal societies which achieved full or partial sedentism before neighboring interior agriculturalists did; a feature which he views as "opportunistic response to high localized productivity." Likewise, Harris (1978:410) notes that sites in ecotones between major ecosystems, for example coasts, "offer optimum access to assured and variable supplies of wild plants and animals and are likely to have been associated with the development of sedentism." Harris focuses on the changes in sociocultural complexity accompanying the shift to a sedentary lifestyle, proposing that consequent reductions in the size of the subsistence territory, logistic mobility, and the average birth spacing interval lead to increased population and attendant elaboration of social organization (Harris 1978:Figure 2).

> In Latin America the idea of early forager sedentarism and semisedentarism historically has been associated with coastal archaeology . . . River mouths with estuaries closely juxtapose plentiful brackish-water fauna with terrestrial plants and animals and have provoked the greatest amount of discussion of non-agricultural sedentarism, although other coastal aquatic environments may offer a similar subsistence richness (Stark 1981:357).

Stark (1981:358) reports that conclusive evidence of nonagricultural sedentism is difficult to come by in Archaic Mesoamerican coastal prehistory, although this problem may have a great deal to do with the effects of sea level change and land subsidence (cf. Perlman 1980 above).

The two cases examined here, from Mediterranean Europe and Atlantic North America, illustrate some of the aspects of maritime subsistence and sedentary life discussed by Binford (1964; 1968), who twenty years ago advanced a hypothesis connecting the origins of agriculture to population growth in resource abundant coastal regions. In that same decade, new finds in Mexico (concerning the Olmec in Veracurz and Tabasco) and Israel (the Natufian at Nahal Oren) showed archaeologists the presence of substantial sedentary communities in coastal settings, one agriculturally based (the former) and the other nonagricultural.

Cauvin's recent study of the transition to early farming villages in Palestine concluded, for example, that there was, among other things, a shift from round to rectangular structures and from small to large villages in the late eighth millenium B.C. (Marfoe 1981:55). Binford's (1968) hypothesis includes regions similar to the Mid-Atlantic coast of North American in many respects, and is summarized, after Rindos (1984), below.

Various archaeologists have attempted to test Binford's hypothesis or to shed new light on the nature of nonagricultural sedentary coastal adaptations in prehistory. Meyers (1971:115) set out conditions for testing Binford's hypothesis; some of them are lacking in the western Mediterranean and the Mid-Atlantic region discussed here. Others have incorporated elements of Binford's hypothesis into their research design and met with variable success (cf. Stark 1974; Voorhies 1976). Clarke (1976) examined many of the issues implicit in Binford's (1968) argument; independent treatments of artifactual and ecological evidence were put forth and compared in a general model of the transition from gatherer-hunter economy to agricultural economy in Mesolithic-Neolithic Europe (see below).

Binford (1983:200) later modified his position on coastal societies:

> people did not adopt agriculture if they lived in highly productive environments:

> little 'Gardens of Eden' where food was plentiful. In addition, it has been generally assumed that in such environments people will become sedentary; they will stop moving.

For an example Binford (1983:200) cites Beardsley *et al.* (1956:34):

> . . . in general, sedentary life has more survival value than wandering life to the human race, and that, other things being equal, whenever there is an opportunity to make the transition, it will be made.

This is what Binford (1983:200f) calls the "Slug Principle":

> a man doesn't do anything to get a meal unless he has to. If he doesn't have to walk, he will sit. If there is a lot of food in one place, as for example on a shell bank, then he will sit right there. Clearly, in a Garden of Eden Man will not move about.

Binford pokes fun at what he considers several examples of the Garden of Eden approach in the literature, in the High Andes, the Great Basin, in coastal environments (Perlman 1980), in the Near East, and in Mexico. Continuing, he states that:

> In the gradualist argument, Man develops agriculture because he becomes more knowledgeable. According to the Garden of Eden view, he does so faster in rich environments which encourage sedentism; sedentism, in turn, is seen as encouraging productive intensification, or experimentation with ways of producing sufficient food in the limited space around a permanent settlement (hence agriculture). An alternative to this view (and one which totally begs the question) is that the adoption of agriculture requires increases sedentism; presumably, therefore, with agriculture people settle down, because it offers that increased reliability which ensures that the decision against mobility will be made according to the Slug Principle (Binford 1983:202-203).

This makes for lively reading, but contains several twists of argument and oversimplifications. First, all the examples cited earlier but two are located in or adjacent to known "hearth" areas of plant and/or animal domestication, thus their possible relationship to the development of agriculture in those zones should not be dismissed lightly. Binford abandoned his model of coastal "Edens"

> . . . since it seemed . . . to lead one inevitably to the view that some peoples were 'more perceptive' or 'smarter' than others; why else would they have grasped so early the Great Truth of the Least Effort Principle, while others ignored its self-evident advantages . . . (Binford 1983:201f).

This is an oversimplification. The spatial and temporal structure of the coastal resource net and the preference ranking of resources and scheduling of their exploitation by cultures is complex, varying according to the type of coastal ecosystem and the particular configuration of that one setting; see the discussion below on Clarke 1976.

To the question "why didn't the California Indians and the Indians of the Northwest Coast develop agriculture?" (both being highly successful foraging/fishing societies with sizable populations), Binford (1983:202) replies that such arguments overlook a very important bit of empirical evidence:

> while it appears that agriculture followed sedentism in the Near East, Mesopotamia, even in Peru, the data available from Mesoamerica and North

> America are clear in indicating that the adoption of domesticated plants preceded the appearance of sedentary ways of life in those areas.

Unless there is confusion in what Binford means by "sedentary" (a typical situation for many of us, in fact, according to Rafferty 1985:113-116), this statement is incorrect, as demonstrated later in this work. Moreover, Binford (1983:212) contradicts his own statement at a later point:

> In Mesoamerica and North America, as well as in some regions of temperate Europe, increased sedentism facilitated by aquatic exploitation seems to have anticipated the adoption of agriculture. On the other hand, where aquatic alternatives were not present and where domestication of animals did not occur, agriculture continued to be a calorie-seeking strategy and mobility remained the only means of ensuring the acquisition of animal foods largely from terrestrial sources. In these circumstances, sedentism is only forced into being long after the adoption of agriculture as a 'back-up' strategy and at a much greater packing threshold.

Must we accept Binford's version of "Eden"? I think not. Far from being simple "slugs", coastal foragers combined temporal flexibility and spatial mobility with more complex social organization to meet the challenges of increased population. Archaeologists in recent years have become more aware of the complex patterns underlying coastal settlement and subsistence and site formation (cf. Waselkov 1982; Gagliano 1983) (Figure 6). Shell middens, because of their durability and visibility, long dominated such reconstructions. Now they form but a portion of the overall pattern. Other components include base camps or settlements, clay and lithic quarries, burial and other "sacred" sites, hunting preserves, plant collecting areas, etc. According to Harpending and Davis (1977), at least two competing hypotheses on estuarine adaptations and settlement patterns could be formulated:

H1: in the estuarine environment resources are distributed evenly and are of many different species, therefore hunter-gatherer groups minimize energy expenditure by being sedentary and possibly territorial.

H2: in the estuarine environment resources are widely scattered and only locally abundant, therefore group mobility is necessary in order to exploit the full range of available resources.

Regarding the comments of Binford and others on the "survival value" of sedentary life, we note the following. Mobility was the rule for hominid settlement for millions of years, sedentism for only a few thousand. The success of mobility in adapting to the total spectrum of environmental situations in the world compared to sedentism seems obvious. But where are mobile societies now? Once the alternative of sedentism was introduced as a factor in the game of survival, whenever and wherever that occurred, the rules were irreversibly changed. Now the "survival" of mobile hunter-gatherers meant more than adapting to the pitfalls and potentials of the biophysical environment--it meant competition and/or coexistence with sedentary foragers and farmers. In the long run (if one can call six or seven millenia by that phrase), the latter clearly proved the dominant adaptation.

It is not the intent here to examine general models on the origin of agriculture; for an admirable summation of past and current research, the reader is commended to Rindos (1984). Rindos (1984:1-36) outlines V. Gordon Childe's hypothesis of environmental determinism, Robert Braidwood's hypothesis of orthogenetic cultural evolution, George Carter's "single origin" hypothesis, the equilibrium and ecological models of Lewis Binford and Kent Flannery, and Mark Cohen's model of demographic determinism. Binford's model of agricultural origins followed his earlier interest in the rise of sedentary, farming societies in the Virginia coastal plain (Binford 1964), and paralleled his concerns with the Mesolithic-Neolithic transition from food collecting to production (Binford 1968). According to Rindos (1984:20), one of the attractive features in Binford's model is that "people are seen as interacting with, rather than merely reacting to," environmental changes, such as sea level rise and fall, changing precipitation and temperature, etc. Both of these topics, one specific in area, the other in theme, are relevant to the present research and will be examined in some detail.

For a restatement of Binford's (1968) hypothesis, we refer to Rindos (1984:19):

> . . . population density, even for hunting and gathering peoples, will not be uniform: areas favorable to human habitation (for example, the coastal areas of Mesolithic Europe-Author) will be separated by zones that are less favorable. When population builds up within the "optimal" habitats, excess population will be released to the less favorable ones because the equilibrium between population and resources must be maintained. However, the very act of releasing these "daughter" groups places stress upon those areas least likely to be able to absorb it--the suboptimal zones. It is therefore in the suboptimal zones that we expect to find the greatest pressures for the adoption of new modes of subsistence, for it is only through the utilization of a new type of relationship with the environment that the system can create an equilibrium in the face of long-standing and frequent disturbances brought on by the influx of immigrant groups.

Not everyone could and would settle in the new coastal environments of the early Holocene, probably for the kind of historical reasons Binford found unappealing:

-proximity, or lack of it, to the coastal regions

-persistent preference for familiar resources, despite their reduced abundance, thus requiring local readjustment but not necessarily outmigration

-competition from existing inhabitants, although we really have little knowledge of the rate of filling or just what constitutes a normal packing of various coastal biomes by humans with different technological kits.

Rindos (1984:253) stesses:

> the necessity of separating domestication (human interaction with plants) from agricultural origins (the origin and evolution of the agroecology) . . . Domestication has a long, gradualistic history whereas the origin of agricultural systems was a relatively sudden phenomenon that was to have radical effects upon human social and cultural systems.

This distinction may help explain an apparent anomaly in the timing of the introduction of cultigens, particularly maize and squash, into the American Southwest from Mexico.

Since the 1940s most specialists in that area have accepted the notion that such crops were first used several millenia B.C. Berry's (1985) reexamination of the evidence suggested a more recent date, i.e., about 100-200 B.C. Recent evidence from the Southwest (Simmons 1986) may alter this model, but another body of data, from the Mississippi River area of Missouri and Arkansas, tends to support Rindos' notion of a slow period of domestication, followed by a rapid expansion of maize agricultural systems after A.D. 1000-1200 (Lynott et al. 1986).

Rindos (1984:279) describes the spread of agriculture using hypothetical societies relevant to the present research. One society is agricultural, the other nonagricultural, both with comparable effective carrying capacities. In the nonagricultural instance this is possible due to a diversified maritime subsistence base, much like that proposed here for the large Early-Middle Woodland settlements in coastal Virginia and North Carolina.

> In a situation in which both societies have achieved relatively high population levels, the maritime society, like the agricultural one, would experience periodic fluctuations in carrying capacity. However, its subsistence resources would be wild, and the effect of climatic variation on total carrying capacity would be rather unimportant. Sufficient variability in resource choice would exist that temporary shortage of one food might be compensated for by alternative sources. Thus an equilibrium would be established between carrying capacity and population. Excess population of humans, if it existed, would be both stable and a direct function of the total population. Under agricultural conditions the situation would be radically different; agricultural production would intensify the effects of environmental variation. Environmental crises would be both more frequent and more severe, and the relative intensity of the environmental crises would increase with increases in the carrying capacity. As population increased the incidence of environmental crises would increase. Excess population, in part a function of K[dom], would increase over time (Rindos 1984:279).

K[dom] is the increase in the carrying capacity of the environment K contributed by domesticated plants (Rindos 1984:272). Further:

> By introducing environmental instability, agriculture creates the conditions favorable for its own spread; the environmental control inherent in agriculture not only spawns new populations and sends them off into new environments, but also allows these populations to continue in the same subsistence pattern (Rindos 1984:280).

Finally, "we must remember that it was the less stable, not the best-adapted agricultural systems, that flourished" (Rindos 1984:285). Regarding the role played by environmental change:

> climatic influence may play a role in almost any consideration of the origin of agriculture in a specific region, for no reasonable person could deny at least a limiting role to

> environmental conditions. Because it is only in studies relating to a specific region that climate can be held to play the decisive role in the origin of agriculture, it is not surprising that, on the whole, climatic determinists are frequently also diffusionists.

Yesner's (1980) masterful comparative synthesis of maritime hunter-gatherer adaptations reasserts their importance, stability, and diversity in the face of earlier criticism from Osborn (1977) and others. While focusing on environmental change and demography as prime causal factors in the coastal regime, Yesner fully agrees with Clark (1981) and others that all relevant variables need examination, including changes in social organization, exchange patterns, and technology. Clark (1981:444) adds that:

> for coastal hunter-gatherers, the overall availability, distribution, and "mix" of critical terrestrial staples (e.g., red deer, cervids in general, economic plant species [esp. nuts]) are likely to have a more direct impact upon the structure of a settlement/subsistence system than the diversity of coastal resources per se.

While Yesner (1981, response to Clark) does not deny this, he disagrees with Clark as to whether the primary adjustment of the group is to the terrestrial or maritime resources. Hayden (1981) treats the transition from Paleolithic/Paleoindian to Mesolithic/Archaic hunter-gatherer economies, emphasizing resource reliability and the types of food resources being exploited.

Clarke (1976:460-461) proposed that traditional studies of the forager-farmer (Mesolithic-Neolithic) transition in Europe overemphasized the importance of meat in the Mesolithic diet at the expense of wild plant and aquatic foods (e.g., shellfish, fish, etc.). This resulted in an under-estimated productivity for Mesolithic gatherer-hunter-fisher groups, especially those in richly productive estuarine settings. He suggested a number of locations in Europe that could serve as empirical testing grounds for hypotheses related to these issues, including extinct Mediterranean lake marshes and the deltas, estuaries, and lagoons of major rivers such as the Rhone, Guadalquivir, and Tagus (Clarke 1976:462,464).

Archaeologists have studied coastal shellfishing sites in Europe for over a century, but to date have not sought evidence for exploitation of edible water-related plants, e.g., *Brassica*, *Beta*, *Crambe*, *Echinophora*, *Zostera*, *Atriplex*, etc. (Clarke 1976:465; Varagnac 1959). The discovery of the use of wild legumes by Mesolithic groups in Languedoc (also discussed in Chapter II) would appear to confirm some of the ideas of Clarke and Rindos as outlined above.

In the New World, while maize, beans, and even squash appear to arrive late in Mid-Atlantic coastal subsistence patterns (see Chapter III), hickory, walnut, and acorn nuts are ubiquitous and plentiful through all periods and localities (cf. Larson 1980 and Johannessen 1984). In terms of percentage of assemblage by weight, hickory is by far the dominant of the three, but acorn is seemingly under-represented (cf. Yarnell and Black 1985:97-98).

Archaeologists and ethnobotanists have long been aware that acorns can be an important food source (as in the case of the California Indians), but in the Mid-Atlantic region they have still resisted embracing this notion as regards aboriginal subsistence. Nut meat is still considered a minor supplement to the diet or as "famine food" to be used only as a last resort. The omnipresence of hickory in abundance is often taken as *prima facie* evidence of its primary use as a fuel, not a food.

A few authors, however, suggest that the importance of acorns is underestimated. Yarnell and Black (1985:97), for example, counsel that "acorn was the most important plant food in the Southeast until Mississippian times when it was replaced in this position by corn." Bainbridge (1985) goes even farther in suggesting that acorns had a similar eminence throughout the Old World before the advent of cereal agriculture and extensive pastoralism; foraging cultures, deriving important components of their diet from acorns, he terms "balanocultures" (from the Greek balanos- acorn).

What we have attempted to show in this brief survey is that coastal environments are not localized special cases, but range world wide through all latitudes, and are quite resilient to the stresses of environmental change. Some archaeologists studying maritime cultures are attempting to show causal links between foraging-fishing economies, sedentism, and agriculture. In the present study, quite the contrary, we expect that, all other things being equal, such peoples would not readily adopt agriculture, and in fact would resist strenuously such a change. Binford's original models (1964, 1968) of agricultural origins in marginal zones near estuaries remains an intriguing, still fully untested possibility, especially for places that meet his test conditons. For most cases, however, prehistoric coastal cultures will afford better opportunities to study the persistence of stable collecting lifeways in the face of competition from fully agricultural systems.

CHAPTER I

HOLOCENE COASTAL ECOLOGY

Coastal Environments and Ecosystems

Temporally speaking, our interest is in the Holocene epoch, from about 8000 B.C. to the present. [Note on chronology: phenomena discussed here are noted in conventional B.C./A.D. ("Before Christ"/"Anno Domini") terminology. B.C./A.D. in upper case indicates historical dates, arbitrarily assigned temporal period divisions, or recalibrated radiocarbon dates. Lower case "b.c./a.d." indicates uncalibrated radiocarbon dates, the form used here for the most part.] The Holocene period was chosen for several reasons: the development of sedentary life and the transition to fully food producing economies occurred then and not earlier in the regions discussed, based on current evidence. Although modern and extinct hominids have lived by the oceans for thousands of years and reaped its harvest, the environments seen today along sandy coasts owe their existence mainly to the postglacial effects of sea level change.

Coastal zones and ecological systems are classified according to geomorphology, hydrology, energy, biotic production, etc. (cf. Odum and Copeland 1972). For example, in a recent overview Gagliano (1983) defined and portrayed the broad evolution of coastal ecosystems against their interaction with human groups at four scales: sites, landforms, subsystems (e.g. barrier-bays), and systems (e.g. the Mississippi River deltaic plain). Pethick (1984:2-3) reviewed coastal classifications based on sea level change, structural controls and tectonics, and coastal processes.

The classification used here (Kearns 1974) concerns sandy, coastal-plain coasts and is based on relative vertical changes of sea level, rates of erosion and deposition, and the horizontal shoreline movement resulting from their balance (or imbalance). Kearns' theoretical block models (Figures 1 and 2)

> are not intended to represent any specific coast . . . However, the conditions and results postulated by those models are possible. In fact, they may have existed in the past, or may be transient, short-lived, evolutionary situations that are not present in the sedimentary record (Kearns 1974:60-63).

The distinction between barrier and non-barrier coasts made by Kearns reflects the controlling influence of coastal barriers on the existence of lagoon and marsh environments. Sea level is viewed here as critical since it is the "one element of the coastal environment which is independent at all landform scales and consequently can be considered as the ultimate control" (Pethick 1984:211).

In his study of the Netherlands coast, Louwe Kooijmans (1980) defined six general zones, from marine to freshwater environments: sandy coastal barriers, tidal flats, salt marshes, estuarine creek systems, and areas of fluvial sedimentation. The distribution of these zones is traced in a manner similar to that used by Kraft (1976) in Delaware.

Sections of the Mid-Atlantic coast from Delaware northward to New Jersey are examples of sandy coastal plains without barriers. Figure 3 illustrates the process of Holocene marine transgression as preserved in the sedimentary record of the Delaware coast (Kraft 1976). Local cases also exist from the Cape Henry, Virginia area south to Oregon Inlet in North Carolina. Figure 4 illustrates in schematic form the outer coastal landforms in the Cape Henry area. To the south is a classic barrier island development: the Outer Banks of North Carolina.

We need to classify more precisely the specific sedimentary regimes of the lower Chesapeake-Cape Henry area and the Languedocienne. The Chesapeake Bay system is a drowned river valley, a partially mixed or moderately stratified estuary with a complex pattern of layers and water masses (Odum 1971:352-362). The standard definition of an estuary is "a semi-enclosed coastal body of water which has a free connection with the open sea and within which sea water is measurably diluted with fresh water derived from land drainage" (Pritchard 1967:3).

Estuaries are found at river mouths, in coastal bays and tidal marshes, and in water bodies behind barrier beaches (Odum 1971). Their water regimes and chemistry are affected by oceanic tides, precipitation, fresh water runoff from land areas, evaporation, and wind (Cowardin et al. 1979:8f) (see Figure 5). The salinity of estuaries may be variable, as in hyperhaline lagoons (Laguna Madre, Texas) and brackish estuaries (Chesapeake Bay), or relatively stable, as in sheltered euhaline embayments or brackish embayments with partly obstructed access or small tidal range (Pamlico Sound, North Carolina) (Cowardin et al. 1979:9). Estuaries in this context form one of several wetland and deepwater contexts, the others being marine, riverine, lacustrine, and palustrine (nontidal wetlands and such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below five parts per thousand (Cowardin et al. 1979:12).

Schubel and Hirschberg (1978:285) present a view of estuaries that is at once more conservative, but better balanced, than that expressed by Odum and others. They note that during highstands of sea level estuaries are abundant and relatively large, during lowstands, rare and small. Estuaries are ephemeral on a geological time scale; their lifetimes are limited to a few thousand years and at most to a few tens of thousands. Weather events (floods, hurricanes) can accelerate their evolution and shorten their lifespan appreciably. Estuaries are abundant only in ten to twenty per cent of the last million years and the biological importance of estuaries to the survival of organisms and to the maintenance of total marine ecosystems appears to have been exaggerated. However, Schubel and Hirschberg note that the estuary is of paramount importance to one particular species at least, *Homo sapiens*.

Thus, one of the chief tenets of the present work, that estuaries provide a unique resource biome, one that preadapts human societies for a sedentary, socially complex lifestyle, is not invalidated by their work. Although estuarine conditions are stressful and often result in low species diversity, the unparalleled richness of food results in a bounty of life, more fruitful than either marine or freshwater ecological systems (Odum 1971:352). Estuaries reached their peak development, in number, size, and complexity, approximately 3000 to 5000 years ago when the rise of sea level slowed perceptibly and sea level nearly reached its present height (Schubel and Hirschberg 1978:287). The role of climatic and sea level change in reshaping coasts and influencing cultural evolution is discussed below.

Changes in Climate, Sea Level, and Coastal Environments

Climatic change is seen here not as *the* prime mover of culture change, but only as a trigger for change when other necessary and sufficient conditions are present. Further, we attempt to specify situations where climate change did *not* initiate culture change, as well as those where it did. The effects of sea level and climatic change have typically been discussed at global or continental macroscales or at specific localities (microscale). This work studies effects at the regional or subregional scale of culture (mesoscale). The two areas chosen here are located in southern France and Mid-Atlantic North America, the former during the climatic period generally known as the Atlantic Optimum or Hypsithermal, ca. 6000-3000 B.C, the latter case from about 1000 B.C. to the present.

Many climatologists and archaeologists have an optimistic view about the causal relationship between climate and culture. For example, to Wendland and Bryson:

> climatic change and similar geophysical events tend to be nearly synchronous globally. The sign of the change may be different in different places, one place getting dryer when another gets wetter. The magnitude of the change may also be vastly different. . . Eustatic sea-level changes must also be globally synchronous. If climatic changes are rapid and interspersed with relatively stable times, then there should be globally preferred dates of climatic change. It is possible, statistically, to sort out these preferred dates from those generated by progressive or random changes. . . It is also possible to sort out globally preferred times of culture change, presumably related to times of environmental change, from internally generated (random) or diffusive changes (progressive). . . Times of maxima of cultural change rates can also be inferred from radiocarbon dates (Bryson 1978:316-7).

Using this method, Wendland and Bryson devised the following chart of correlated climate and culture change (from Bryson 1978:318,Table 7.3.1):

CLIMATE CHANGES		CULTURE CHANGES	
biologic	geologic	clear, most significant	less clear or significant
	ad 1350	ad 1350	ad 1280
ad 1100		ad 1100-1120	
		ad 690-700	ad 850
ad 270	ad 350	ad 150	ad 130
810 bc	550 bc	560 bc	300 bc
		1150-1160 bc	
	1650 bc		1650 bc
	2200 bc	2280-2350 bc	
3110 bc	2950 bc		
	4000 bc	3950 bc	3550-3560 bc
	5000 bc		5250 bc
	5700 bc	5850 bc	5860 bc
6540 bc	6550 bc		
7350 bc	7350 bc	7580 bc	7610 bc

Based on this work, the authors concluded that

> there appears to be a rather good correspondence between dates of cultural and climatic change. This correspondence is surprisingly good in light of the probable error in the dating of both sets of changes. This in no way contradicts the existence of other origins of culture change. It is likely that those cultures which changed at times of climatic change were those in marginal areas or under other pressures as well. Many cultures persisted through dates at which many others changed (Bryson 1978:319).

Bryson (1978:326-327) concedes, furthermore, that

> Most but not all palaeoclimatic investigations have reached the conclusion that Holocene climatic fluctuations are of relatively small magnitude. Robust cultures in good locations could probably weather any of those which have occurred. However, it appears that in marginal situations, culturally or climatically, the larger fluctuations of the Holocene have been sufficient to trigger culture change. This has probably been a result of change in the economic base, agriculture, hunting-gathering, or herding, either by removing it entirely or reducing its carrying capacity. The response whether *in situ* modification of lifestyle, migration, or literal disappearance of the people must be determined case by case.

The example which Bryson examines is the Mill Creek case from Iowa. During the period a.d. 1120-1350 summer patterns moved southward and mid-summer rains were reduced up to fifty per cent in central North America. Marginal maize farmers largely disappeared, but the Mill Creek culture, favored with better water supplies, survived into the 1300s. In a few decades, the vegetation in the area changed from prairie and forest to steppe and scrub forest. The meat component in the Indian diet largely shifted from browsers (deer) to grazers (bison). Changes in pottery styles and population distributions are observed for that time as well, correlated with major changes in Middle Mississippian cultures to the east.

Carbone (1976) adapted the work of Bryson and Wendland for describing Holocene environmental change in the Mid-Atlantic region of North America. Major discontinuities in the climatic and/or biotic data as evidenced by radiocarbon assays were noted at about a.d. 1120 (beginning of the Pacific episode), a.d. 690 (Neo-Atlantic), a.d. 250 (Scandic), 560 b.c. (Sub-Atlantic), 3110 b.c. (Sub-Boreal), 6540 b.c. (Atlantic), and 7580 b.c. (Boreal) (Carbone 1976:Table 22). With each cycle of rise and fall of temperature and/or precipitation, Carbone attempted to show relative changes in vegetation and cultural evolution (Carbone 1976:Figure 48). Following Wendland and Bryson, however, he noted that direct causality may not be inferred for all of the environmental/cultural transitions (Carbone 1976:182).

By no means is there unanimity on the matter of climatic change as a prime mover in culture change. For example, as McGhee (1981:162) notes,

> . . . during the last 5000 years, when climatic variations have been relatively minor and when most human populations were relatively sophisticated both socially and technologically, most . . . events are as likely to have been the result of social, political or cultural factors (as climatic change) . . . useful archaeological evidence for climatic change is most likely to come from areas climatically marginal to human occupation, and areas occupied by peoples with relatively simple technologies and economies.

McGhee (1981:163) argues for suspicion of simple climatic models of culture change, based on the degree of precision, or lack of it, of both the archaeological and palaeoenvironmental records, and in the complexity of human cultural response, especially with sophisticated societies. Similarly negative views are expressed by Anderson (1978; 1981:339).

Referring to the effects of the Little Ice Age (hereafter abbreviated LIA, and defined below on pp.38ff) in Switzerland, Pfister (1981:237-238) notes that

> Subsistence crises only occurred whenever crops failed repeatedly and when several staple foods were affected at the same time. This was always the result of the cumulative impact of a number of unfavourable weather conditions (wet autumns, long winters, cold springs, cool wet summers), stretching over several years and involving large areas. A good example is the cluster of bad years from 1812 to 1817, which caused the last great subsistence crisis of the western world (cites Post 1977).

This relates to the effects of volcanic dust veiling, discussed elsewhere. Pfister concludes that "This leads one to the conclusion that subsistence crises were not primarily the result of climatic stress. In fact, it is astonishing how efficiently past societies managed to overcome the impact of a limited climatic stress."

Qualms about the role of climate are likewise expressed in biogeography, where

> It is likely that climate was not the only cause of many of the major pollen-stratigraphic changes during the Holocene in either northwest Europe (Iversen, 1960) or eastern North America between

> 65 (degrees) W and 90 (degrees) W longitude (Davis 1976, 1978). The well-documented changes in pollen stratigraphy over the last 10,000 years probably reflect primarily the migration of species into new areas from glacial refugia stimulated by large-scale regional climatic change at the onset of the Holocene (Birks 1981:126-7).

A nicely balanced model of the relationship between climate and culture change is cited by McGovern (1981), who studied the Norse settlements on Greenland dating to the periods under discussion.

> Combined with existing paleoenvironmental data, (the present) paleoeconomic model indicates that the Norse would have been particularly vulnerable to fluctuations in important marine and terrestrial resources during the fourteenth and fifteenth centuries. However, archaeological and ecological data also indicate that the Norse never made use of alternative resources and ignored efficient Inuit technology. The Norse extinction thus may be seen as a failure of human managers to select effective responses to climatic stresses. A speculative organizational model is presented to account for this failure of decison-making (McGovern 1981:404).

A careful approach, but one which also incorporates climate, is put forth by Parry (1981:329-330):

> Our basic premise is that <u>permanent</u> land abandonment in northern Europe is somehow connected with long-term climatic change. The assumptions underlying this contention are as follows. First, a distinction is assumed between the very different effects of long- and short-term changes of climate. Short-term climatic changes might be expected to have a short-term (but not a long-term) agricultural effect, unless they trigger a response that has been pre-conditioned by other long-term factors. (The latter concept is necessary to explain such phenomena as the failure to re-settle an area initially deserted in response to a run of harsh years, once more benign climatic conditions had returned). Conversely, it is reasonable to assume that long-term climatic changes could have long-term agricultural effects. Secondly, a distinction is assumed between ephemeral (or temporary)

> agricultural response and permanent agricultural response; and between single events which are the products of individual decisions (e.g. the desertion of single farms) and aggregate events which constitute the actions of many men (the desertion of entire farming regions). Finally, we assume a distinction between hypotheses of climatic change as proximate or precipitating causes of agricultural change and those which are underlying or indirect causes of agricultural change.

It should go without saying that the cultures with which we deal here did not preserve information of use in resolving some of these issues. Nevertheless, the points are well taken.

The climatic history of the world contains considerable information on two major atmospheric phenomena which occurred in the latter portion of the second area of interest noted earlier (the Woodland period in eastern North America, particularly the Atlantic coastal region). These are the so-called Medieval Optimum and the Little Ice Age (LIA). We shall discuss these "events" and their possible causes in some detail, for it is our contention that they had an important role in shaping the course and timing of major cultural trends in eastern North America. This arguments stems directly from earlier ideas put forth by James Griffin.

Griffin (1961) developed an hypothesis relating climate and culture change in the American Midwest, whereby the Hopewellian phenomenon declined after about A.D. 200 with the onset of a cooler, moister climate (and deleterious effects on incipient maize agriculture) and the development and later expansion of Mississippian culture correlated to first a warm, dry episode between about 700 and 1200, followed by a cold period from about 1200 to 1700. More recent data reported by Baerreis et al. (1976) suggest cool,dry conditions at the end of Hopewell but otherwise support Griffin's basic model for the Mississippian.

Griffin recognized that regional responses to major climatic episodes would vary in expression, so "a relatively mild climate in the Upper Mississippi Valley-Great Lakes area coincides with effective rainfall for vegetation and agriculture in the Southwest and western plains and that a colder climatic regime in the north and northeast coincides with evidence for drought and erosion in the Southwest and Plains" (Baerreis et al. 1976:43). Griffin (1961:711) attributed the cultural florescence of the Iroquois in lower Ontario and New York between 1400 and 1600 to the modifying effect of the Great Lakes; Baerreis et al. prefer an explanation based on contacting air masses.

Regarding the relationship of climate change and Hopewell economy, we still lack a firm understanding of the basis of the latter, although the bulk of the evidence suggests that maize was not of sufficient importance at that time so that a climate change would have had harmful effects on the overall subsistence base. Relating climatic shifts to changes in the distribution of maize-supported Mississippian cultures seems to put us on firmer ground, although even here we are reminded that such short climatic episodes will contain heterogeneity, at interannual and interdecadal scales for example (Baerreis _et al_. 1976:51ff).

Much of Griffin's originial hypothesis found its origin in the studies of historically documented climatic episodes in Europe. According to Lamb (1981:301f), the High Middle Ages evidently saw a persistently warm climatic epoch which lasted until about A.D. 1300-1310 in Europe and affected about two-thirds of the northern hemisphere in the previous 100-200 years. A peak of warmth seems to have been attained a fews centuries earlier in Greenland and much more of the Arctic. During this period, oats and barley were regularly grown in Iceland, wheat in Norway, and hay in Greenland, The Viking colonists were able to settle in the most marginal and now inhospitable of their conquests, Greenland, Canadian forests were tens of kilometers north of their present limits, and Scottish agricultural settlements flourished in the highlands (Lamb 1965; Schneider and Londer 1984:111). In the High Arctic region, McGhee (1981:174-176) has recovered archaeological and geological evidence that summer sea ice in the region was relatively less extensive (indicating a warmer climate) prior to 2100 BC, perhaps during the periods 1200-700 BC and AD 500-1000, and certainly from AD 1000 to AD 1600.

The climatic amelioration in Europe had quite different effects in the Southwestern region of North America. As recounted by McGhee (1981:170):

> on the southern periphery of the Great Basin, the region occupied by Pueblo agriculturalists, a series of archaeological events which may be related to climatic change which occurred in the centuries following A.D. 1000. Between A.D. 1000 and 1300, irrigation agriculture gradually replaced dry farming methods, and the twelfth and thirteenth centuries A.D. saw the abandonment of many of the larger settlements. A study of maize grown during this period shows a significant decrease in the size of cobs during the thirteenth century, and these events have been related to a decrease in winter rainfall in the area . . . , although factors such as warfare and invasion have also been suggested to account for the abandonment of sites.

Schneider and Londer (1984:110) note that tree ring analyses suggested that a great drought between 1276 and 1289 caused abandonment of the Mesa Verde site. But the severity of this drought compared to others in the region has been questioned, thus climate might have been only one of the factors that led to abandonment of Mesa Verde. Population greatly in excess of carrying capacity could have been another factor (Schneider and Londer 1984:110). Another variable is introduced by Betancourt and van Devender (1982), who state that "middle and late Holocene vegetation in the (Chaco) canyon was pinyon-juniper woodland up until Anasazi occupation between 1000 and 800 years ago. Instead of climate, Anasazi fuel needs may explain the drastic reduction of pinyon and juniper after 1230 years ago."

Following the Medieval Optimum period, i.e., after about 1300 or so, Europe and other parts of the Northern Hemisphere experienced a time of declining temperatures. According to Lamb (1981:301f) these centuries brought a series of changes, some of them abrupt, leading to the so-called Little Ice Age between about 1550 and 1700 or as late as 1850 (cf. the Swiss Alps evidence cited by Porter 1981:99), when the extent of ice on the Arctic seas and of ice and snow on land seems to have been greater than at any time since the last major glaciation (Le Roy Ladurie 1971). The LIA period probably ranks with the warmest Postglacial times around 6000 years ago as the only time when the mean climatic conditions seem to have departed in just one direction everywhere from those of the present century.

> Even so, there was undoubtedly a strong geographical pattern of regions where the anomaly was particularly intense and others where it was much weaker. There was also a continual variation with time, and indeed the variability of the weather from year to year and from one 5-year period to the next (at least in Europe) seems to have been particularly great during the early onset phases of the LIA between AD 1300 and about 1450 and in the climax stages in the sixteeenth and seventeenth centuries (Lamb 1981:301f).

According to Barry (1978:158)

> . . . the LIA appears to have begun in the tenth century in east Asia and temperatures there reached a minimum in the twelfth century. The cooling apparently spread westward, reaching European Russia in the mid-fourteenth century and central

> Europe in the mid-fifteenth century. . . Such displacements and longitudinal relationships are suggestive of adjustments in the tropospheric wave structure.

An LIA climate is indicated in Greenland by Camp Century ice cores in the 15th century, and Crete core in Greenland indicates a late 12th century LIA. Sea ice began to move southward. The LIA may therefore have begun at least two to three centuries earlier in the North Atlantic than is generally inferred (Barry 1978).

The possible role of volcanism in initiating or exacerbating climatic change has been alluded to several times above and is now being carefully studied by geologists. According to Bray (1978:256-257) "Volcanic activity seems to have had a major influence on short-term temperature changes in the recent past. . . The tendency for famines and poor grain harvests which occur as a result of cold summers to follow volcanic eruptions was noted for several Japanese famines by Arakawa (1955) and for a summary of the more northerly European and Japanese data." Furthermore, "a temporal relationship between volcanic eruptions and increased periods of glacial advance has been noted for the recent 'Little Ice Age' (Bray 1971, 1974a), the period from AD 860 to present (Lamb 1970), the past 40,000 years (Bray 1974b), and the entire Quaternary (Kennett and Thunell 1975)" (Bray 1978:260).

There are significant tendencies for low

> temperatures and for poor grain harvests in the higher latitude regions of the Northern Hemisphere to follow volcanic eruptions. . . Many of the major glacial advance periods since AD 1500 may have been triggered by the shorter ablation periods caused by the cold resulting from large eruptions and especially from a series of large and closely spaced eruptions. This conclusion does not imply that volcanism caused the 'Little Ice Age', but rather that volcanism may be related to the timing of the Holocene ice advances and may have contributed to the lowered global temperatures which accompanied these phases (Bray 1978:262).

The latest volcanic activity reported in the Basin and Range province dates to around A.D. 1100, followed by a period of cooler climate and increased rainfall in the 1300s (Smiley 1961). In the 1500s the area experienced a severe drop in rainfall. The effects of the Sunset Crater eruption in Arizona around A.D. 1066 have been studied by archaeologists, who demonstrated that

> . . . at least in the Flagstaff area, . . . variation of density, settlement pattern, and movement of prehistoric populations appears coincident with a number of geological, paleontological, and paleobotanical indications of environmental changes. Such changes include episodic alluviation and erosion, volcanism, and altered floral and faunal distributions. Tree-ring and pollen studies when integrated with the above data strongly suggest that climatic change must be regarded as the ultimate cause of the given demographic trends (Hevly *et al*. 1979:516f).

A cautionary note regarding the correlation of volcanism, climate, and culture is provided by Renfrew (1979:582): "Disparate events simply should not be cross-correlated unless their simultaneity can independently be documented. Indeed there is the risk that the volcanic eruption may on occasion replace the migratory horde as an easy explanation to be assumed on convenient occasions by those who will not critically evaluate their evidence." Renfrew examined the effects of earthquake, tsunamis, and ashfall on Minoan agriculture, but did not consider the veil effects of the ash, a topic which has achieved great attention from climatologists recently.

After the peak of the last major glacial advance had passed, ca. 18,000 years ago, the subsequent climatic warming and steady melting of the ice elevated world sea level rapidly on a geological time scale. Using radiocarbon dates on submerged peat deposits, the presence of extinct megafauna on the continental shelves, and stratigraphic records of coastal sedimentary transgressions, geologists have reconstructed the fluctuating progress of this change in sea level (cf. Figure 7). Integrating information about this major environmental change is not a simple matter, however, for as Everard (1980:1) notes, "The literature on sea levels is enormous in quantity and grows exponentially: it is scattered among the works of astronomers, geophysicists, geologists, geomorphologists, hydrographers, oceanographers, climatologists, biologists, archaeologists, historians, land surveyors, civil engineers, etc. The list amply emphasizes the very complex interdependence of the dynamics of the solid earth, the world ocean, and the atmosphere."

Fairbridge (1978:201-202) notes that

> Detailed study of the changing level of the sea has shown some remarkable results. For example, in the past 20,000 years or so, not only has there been a large oscillation from glacial to interglacial of the order of 130 m, but also the record shows secondary oscillatons in the past 7,000 years (see Figures 7 to 11 here-Author). It is clear that these variations are real. In particular, at about 4300 radiocarbon years BP (during the documented historical period of Egypt) there was a sea-level drop that exceeded 5 m. Such a sea-level drop corresponds to an extraordinarily abrupt climatic change especially since the sea level returned to its previous height over 250 years. There was no 'ice-age', but there was a catastrophic change. . . There was also a fairly big oscillation in Roman times, of some 2 m, which had a profound effect on glacier advances in the Alps and on the weather in the Mediterranean region. It produced, as a matter of fact, a very pleasant cool equable climate which historians would recognise immediately as being favourable for fostering intellectual activities."(!)

The presence of now submerged terrestrial sites on the continental shelves was attested to by the discovery there of shallow water faunal assemblages, e.g. oyster beds, of Pleistocene megafauna such as mastodon, and peat deposits. That sea level was still rising in the Holocene, albeit quite slowly compared to its late Pleistocene rate, is seen in the numerous archaeological sites being eroded on the present shoreline (cf. Haag 1975; Powell 1965). Sea level curves for regions of interest to the topic in this paper are presented in Figures 8 to 11.

Our knowledge of sites on the east coast of the United States is distorted because of the rise in sea level there since the Late Archaic, erasing traces of older sites. As Nummedal (1983:80) reports, recent archaeological and geological data increasingly support the view that the latest rise of sea level, the Holocene transgression, was not a smooth, monotonous rise of the sea. The rise appears to have been characterized by a series of oscillations with an amplitude of a few meters on a typical time scale of hundreds of years, as seen in the sea level curve for the South Carolina coast (Figure 11). The most recent sea level minimum corresponds to the peak of the "little ice age" at the end of the medieval time (Figures 7 and 11).

Rising sea level also inundated Mesolithic and early Neolithic sites along the coast of Languedoc and Roussillon (cf. Geddes et al. 1983). However, most authors consider the presence of in situ early and middle Holocene sites on the continental shelf a doubtful possibility because of the destructive effects of coastal transgression during the early Holocene (cf. Haag 1975; Kraft 1976:67). There are some suggestions that later Woodland period sites may have been preserved in special cases, for example in areas of quiet alluviation in the upper reaches of river channels and their estuaries (cf. the Bilbo site on the Savannah River) (Haag 1975:77) and in the immediate intertidal flats of Delaware Bay (Kraft 1976). Brennan (1976:12) notes that sites on the lower

Hudson, because of local topography, were located far above water level and are so situated today.

The connection between rising sea level, alteration of the coastal environment, and the archaeological record (cf. Solecki 1961; Shepard 1964; Powell 1965; Emery and Edwards 1966), showing a rise of some 6 meters or more since 4000 B.C., began a spirited debate over the effects of such a process on the nature and timing of cultural adaptations in coastal settings (cf. Salwen 1967; Bullen 1969; Powell 1971). In New England, for example, Snow (1972) and Ritchie (1969) argued for internal cultural intensification or innovation as a primary mechanism behind the varying species and amounts of shellfish used over the millenia. Braun (1974) sees environmental change as the primary factor in an alternative model of explantion, while conceding the existence of internal change at some as yet undetermined level. The relevance of sites that now are probably submerged off the New England coast and of sites which show an Archaic origin for shellfish use are also cited (Newman 1974; Brennan 1976).

In Europe, Clarke (1976) pointed out that fluctuations in sea level and land alike have destroyed most of the Mesolithic coastline, its littoral, and associated archaeological sites.

> The only exceptions are the fragmentary Baltic areas of isostatic coastal recovery (Ertebolle

> phase), the uplifted patches of western Britain and Galicia and the coastal sites accidentally preserved where located high on the point or island remnant of a coastal hill range, well above the local inundation level. It is now apparent that throughout the Atlantic and Mediterranean, we have only the 'stubs' of once extensive Mesolithic littoral systems, fortuitously preserved for us only in these few fragments--the Ertebolle, Obanian, Portland Bill, Teviec and Hoedic, the Galician and Asturian, and the Tagus middens (Clarke 1976:466).

Colquhoun's (1981) preliminary Holocene sea level change curve for South Carolina (Figure 11) shows a rise in the period 1000-1500 years b.p. (a.d. 500-1000), based on indirect evidence (i.e., from Europe), but no direct evidence except for site clustering in interriverine areas. Brooks and Canouts (1981) examine evidence linking the evolution of subsistence-settlement systems on the interior coastal plain of South Carolina with Holocene sea level changes. As sea level rises, they propose, the surface land mass is reduced and resource zones and the cultures exploiting them are likewise packed together more tightly. Soil drainage decreases as well, lowering nut and and deer productivity and placing further stress on the existing resource base. The resulting labor-intensive economy that maximizes the remaining resources would, according to Brooks and Canouts, "increase the number of archeologically recognizable sites due to greater artifact accumulation.

By way of example, they suggest that "the Mississippian Period (ca. A.D. 1000-1600-Author) largely coincided with a relatively lower sea level. . . What appears to be a dramatic decline in the use of the interriverine zone during the Mississippian Period, may in fact represent the areally extensive exploitation of nuts and deer during low sea level, resulting in few archaeologically recognizable sites" (Brooks and Canouts 1981:59). This correlation of sea level change and settlement packing is interesting, but at the rather fine scale discussed here, i.e., several centuries, there is insufficient evidence to judge the actual gains or losses in surface area, and whether those area added or subtracted meaningfully alter existing resource zones. Further, emigration and alteration of the subsistence diet are possible ways to relieve the proposed stress on available resources aside from the archaeologically undocumented processes of labor-intensification or relaxation. The evidence of the sea level changes may be more relevant in pinpointing changes of temperature which could affect the length of growing seasons and consequent food supplies.

Archaeologists have frequent recourse to geologists and geomorphologists to understand the environmental situations of sites. But coastal sites have likewise proved valuable to geological studies. McIntire (1971) used shell middens and other cultural deposits in coastal Louisiana sites to obtain data of interest to geologists, including sedimentation, water salinity, subsidence, deterioration, and stages of coastal retreat or growth. Once site distributions were mapped by period and correlated with those of streams, beaches, and abandoned natural levees, the evolution of the overall physical system could be examined (McIntire 1971:203). DePratter and Howard (1977) traced the progradational changes of shoreline on the Georgia coast near the mouth of the Savannah River using the spatial distribution of dated archaeological sites components. However, Tooley (1985:229) cautions that "while in a general sense there is a close correlation between climate, sea level and coastal changes, it can only be demonstrated on a large scale, and invariably over a long time period. Where sea level and coastal changes synchronise with climatic changes at a different scale, they do so infrequently or equivocally."

Geomorphic situation and eustatic changes of sea level are important variables in unravelling the pattern of maritime adaptation in prehistoric New England (Brennan 1976; Braun 1974; Ritchie 1969; Snow 1972). Ritchie and Snow argued that Late Archaic, riverine peoples in this area underwent a wholly internal and gradual expansion of their subsistence base, thay they gradually learned the ways of the seashore. Brennan and Braun maintain that the aboriginal inhabitants had always exploited shellfish according to the favorability of local conditions, such as changes in major oceanic currents and in sea level. Brennan (1976) adds that shellfish exploitation on the lower Hudson stopped shortly after exploitation on the New England coast began. At least this is the picture resulting from the fact that the lower Hudson estuary became too fresh after a decline in sea level which in turn was a consequence of land emerging from the effects of glacial deformation. Already destroyed and inundated sites could be seen just offshore in certain locations.

The nature of settlement on barrier islands was examined by McMichael (1977) at Sapelo Island, Georgia. Performing judgmental and stratified random sampling surveys, McMichael found that sites were limited to the Pleistocene sand ridges, and appeared to concentrate in areas contiguous to tidal marshes, especially where tidal streams approached the shoreline. This location would enhance travel to and from the site while permitting access to a variety of estuarine resources. In a study of Neolithic settlement along the Dutch coast, Louwe Kooijmans (1980) found the observed site distribution patterns for all periods to be similar to that reported for Sapelo Island by McMichael (1977).

No sites were reported from sandy barriers at the time they formed the actual coastline. No sites were found in former tidal flats. Sites were found in estuaries and peat zones only where elevated areas existed, such as silty levees and outcropping former dune ridges. Major occupations occurred along rivers where protection from flooding was possible, at first by natural elevations and from the Medieval period by man-made devices.

> The major cause for the ending of a period of occupation was the general rise of sea level, which counteracted the temporary gain of the sedimentary process. In due course the favourable conditions that led people to settle down disappeared; drainage became worse, flooding became more frequent, arable land and natural pasture land marshy. A new transgression phase might have accelerated this process (,)

for example, those during the Neolithic (20 cm rise/century) and the Roman periods (5 cm rise/century) (Louwe Kooijmans 1980:112).

The factors of climate, sea level, and coastal environment discussed above play key roles in shaping the nature of coastal societies seen in our two examples. In the second study, which is set during a time of well-documented climatic shifts, we suggest that the pattern and timing for the adoption of a full-fledged agricultural economy along the Mid-Atlantic coast of North America is causally related to those events. The role of climate and sea level change is seen to play a more background role in the first case study, but one which nonetheless greatly influences our perception of the evidence, if only by virtue of the fact that a large portion of the relevant site data is now obscured or lost completely.

CHAPTER II

THE FORAGER-FARMER TRANSITION IN SOUTHERN FRANCE

The Environmental Setting

The Languedoc and Roussillon lowlands occupy the coastal region of France west from the Rhone River to the Spanish border, flanked on the south by the Mediterranean and to the north by the foothills of the Cevennes and Corbieres (Embleton 1984:196) (Figures 12 to 15). The Roussillon landscape consists of gravel plateaus, terraces, and entrenched valleys, largely the result of dissection of a sequence of Pliocene marine clays and silts overlain by thick fluvial sand and gravel deposits left by a regressing sea.

> Behind and to the north of the Roussillon lies the Corbieres, an area of tangled relief built of Cretaceous and Upper Jurassic limestone, with many karst features. Near Sigean and Cape Leucate, the Corbieres garrigue approaches close to the coast, although its margin is now a fossil cliff line protected by the more recent coastal lagoon and sand bar system (Embleton 1984:196).

The rest of Languedoc repeats the sedimentary and landscape features noted above, with the addition of occasional limestone and basalt hills, outcropping at Cap d'Agde and in the hills northwest of Beziers (Embleton 1984:196). Along the coast sand bars topped by dunes curve from one headland to another; behind them are brackish lagoons (etangs) surrounded by marshland, much of the latter now reclaimed for farmland (Embleton 1984:196-198) (Figures 16, 18 to 19). Most of the larger streams which drain the coastal plain have been stabilized and channelized since the World War II, with consequent disturbance of many archaeological sites on adjacent elevations (Figure 17). A survey in 1982 of the coastal lowlands between Aigues Mortes and the Lez river near Montpellier revealed that many previously recorded sites (Prades 1973) had been affected in this and similar manner by modern land disturbing activities.

The lowlands of Languedoc, with which we will be most concerned, have a Mediterranean type climatic regime with hot summers and mild winters. Rainfall clusters in the fall and spring, with extended dry spells common in the summer. Soils in the upland regions are poorly developed and calcareous, reflecting the slow rate of pedogenesis on the limestone substrate. Finer alluvial silts and colluvial deposits are found in the stream and river floodplains of the coastal plain proper.

Although research on late Mesolithic and Neolithic climate is in its infancy in Languedoc, a considerable amount of data has been forthcoming in the last decade from rock shelters and caves in the Montagne Noire and Corbieres. This confirms that the coastal area occupied a transitional zone between the Atlantic oceanic and mediterranean type climates and that the Mesolithic-early

Neolithic period was a time of temperate climate and substantial precipitation (Brochier 1978).

The concern of archaeologists for understanding processes of coastal change relative to sea level rise and fall was described in some detail in Chapter I. In the Mediterranean basin, sea level change has been linked to synchronous climatic events and consequent geomorphological phenomena (cf. Flemming 1969; Bintliff 1981) of importance to ancient cultures. Unfortunately for the present discussion, Bintliff's (1981) timely review of Claudio Vita-Finzi's "Older Fill" and "Younger Fill" falls beyond the period of the forager-farmer transition in Languedoc. However, important new information has been forthcoming from a site on the coast of Roussillon (Geddes _et al_. 1983); Guilaine _et al_. 1984) (discussed below). Sea level rose fairly rapidly during the time of the earlier Neolithic, covering perhaps most of the site record of that time; the rate of rise levelled off in the late fourth millenium b.c., about the same time noted world wide (Figures 7 and 9).

The Cultural Setting

The earliest Neolithic components in Europe outside the Aegean and the Balkans, in the form of the widespread occurrence of a particular kind of pottery, Cardial or Cardial Impressed Ware, are found along the northern and western rim of the Mediterranean Sea (Figures 20 and 26). This begins the "Neolithic" stage of development in the 6th and 5th millennia B.C. (Coudrot 1976). By the 1980s carbonized remains of domesticated wheat were found in the western Mediterranean dating to the 6th millenium B.C.; opinion is divided on whether ovicaprid domestication occurred in that area independently of events in the Middle East. Despite these advances, early Neolithic sites are still most frequently identified today by the presence of artifacts, e.g., particular types of ceramics and stone tools, and associated radiocarbon dates. Ironically, then, it remains more a <u>period</u> than a <u>stage</u> concept (cf. Stoltman 1978).

In conventional models of European prehistory, this is one of two major trajectories of "neolithization" in Europe, the other being that of the Bandkeramic (or LBK, Linear Pottery Culture) in the fifth millenium B.C. (cf. Gabel 1958). Recent research and thinking on the early Neolithic in southern France can be gleaned from Bender and Phillips (1972), Phillips (1975:45-57), Guilaine (1979), Mills (1983), and Whittle (1985:96-113) in English, and from Arnal (1976), Courtin (1972; 1974), Guilaine (1976), Roudil (1976; 1980), Escalon de Fonton (1974; 1976a; 1976b), and Sacchi (1976) in French. The sequence of impressed wares in Languedoc has been recently reported in detail by Arnal (1976). From these sources the following outline is abstracted.

By the middle of the sixth millenium b.c. there were maritime subsistence oriented peoples living along the southern coast of France from the present area of Nice west to Roussillon (Figures 22 to 25, 27). These people used a type of container new to the region: ceramic vessels, upon whose exterior surface the edge of a *Cardium edule* shell had made repeated impressions.

> The origin of the Impressed Ware complex remains obscure. . . Meanwhile an open mind at least should be kept on the question of some distant contribution from the central or eastern Saharan to the Mediterranean Neolithic (Case 1975:47).

The lithic assemblages of Cardial Neolithic sites resemble those of the late Mesolithic period in the region quite closely, with a heavy emphasis on blades and geometric microliths, most of the latter probably being used as projectile points (arrowheads in this case). Likewise bone tools continued the Epipaleolithic or Mesolithic tradition.

Habitation sites are found mostly in caves and rock shelters at some distance from the sea, but there is evidence that this pattern is biased by the rising of the sea in the middle Holocene to roughly its present level and the consequent drowning of many open air settlements (Figure 9). Apparently the development of estuaries and lagoons along the coast as the rate of sea level rise dropped off encouraged settlement around these sources of many different kinds of foods. "Such a food source provides a stable, if monotonous, diet, with a permanent sedentary base, leaving open the possibility of experimenting with other sea resources, land mammals, or even planted crops" (Phillips 1975:44).

> Although commonly occupying the same caves and rock-shelters as their mesolithic predecessors, as at Chateauneuf-les-Martigues, in an extensive territory like Apulia the makers of impressed ware have left behind them enclosures, round houses and storage-pits, the common traces of early European peasant communities (Clark 1980:89).

Such sites were found by aerial photography and confirmed by recent extensive excavations (e.g., Passo di Corvo: Whittle 1985:103-105).

Early sites with pottery are found on islands and in coastal caves near Marseille, such as Cap Ragnon (6020±150 b.c. and 5700±150 b.c.) (Courtin *et al*. 1970-1972) and the shell midden of Ile Riou (5650±150 b.c. and 5420±160 b.c.) (Courtin and Froget 1969). Faunal remains from Cap Ragnon included red deer, rabbit, sheep (presumably wild), fish (eight species), and six types of shellfish. Bone tools, thick flakes, and Cardial impressed pottery also were found. The huge rock shelter of Chateauneuf-les-Martigues is located some two kilometers from the Berre lagoon which is northwest of Marseille (Phillips 1975:52). There in the sixth millenium b.c. a late Mesolithic assemblage of geometric microliths is supplemented by true transverse arrowheads and a few sherds of Cardial impressed pottery.

Incipient cereal and ovicaprid domestication may exist in the 5th millennium b.c. levels. In Gard at the rock shelter of Baume de Montclus, some 604 depositional layers contain a cultural sequence from middle Mesolithic times (Sauveterrian phase) through the late Mesolithic (Castelnovien) and into the early (Cardial) and late (Chassean) Neolithic. In the interior, Cardial ware sites date largely to the fifth millennium b.c., as at St. Mitre, Courthezon, Salernes, Jean Cros, Grotte Gazel, and La Grotte de l'Aigle (Courtin 1976; Roudil and Soulier 1979; Guilaine 1979a; 1980c).

Courtin (1976) sees these inland sites as maintaining a "miserable" subsistence based on small game, fishing, shellfishing, and wild plant collecting, an interesting and definitely minority view in light of current scientific opinion on Mesolithic coastal foragers (see Introduction). For example, recent fine sieving of sediments at the cave site of Balma Abeurador in western Languedoc show a rather plentiful subsistence pattern based on just these resources: "hunting of large mammals, small game and birds; seasonal fishing for salmonids; collecting terrestrial and marine molluscs; and the gathering of wild legumes, fruits, and nuts" (Vaquer 1980a; Vaquer et al. 1986:1).

Early studies of the distribution of impressed ware suggested a straightforward diffusion from the eastern to western Mediterranean. This maritime expansion would have been part of a general demic movement of agriculturalists from the Balkans and Aegean through Europe proper, the "wave" model of Ammerman and Cavalli-Sforza (1984) (cf. studies of forager-farmer interaction in southern Italy by Whitehouse 1968; 1970). Today, however, the expansion and acculturation wave model is in decline among prehistorians, the vogue being local development and if anything a "wave" of assimilation by indigenous groups (cf. Renfrew 1967, 1975; Bender 1978; Lewthwaite 1981).

Studies since the 1960s have largely concluded that the impressed ware

> presents a marked regional variability in form and ornamentation, to a degree incompatible with models of a relatively rapid, unified spread of a Neolithic complex of traits . . . by coastal and maritime diffusion and migration (Geddes 1986:765).

Also, early Neolithic open air settlements with evidence of a fully agricultural economy are extrememly rare in southern France and Spain. One important, though redeposited, assemblage comes from Leucate in Roussillon. There Early Neclithic ceramics and a diverse faunal assemblage were recovered in sediments apparently dredged from a site of that period, now submerged under six to seven meters of the Mediterranean (Geddes et al. 1983; Guilaine et al. 1984).

The early Neolithic site of Leucate is located on the outer fringe of a coastal lagoon in Roussillon. Dredging of a channel in the 1970s resulted in the discovery that a large submerged site once existed there. Unfortunately, the activity that discovered the site also destroyed its context. Archaeologists did, however, recover a great deal of material from the spoil heaps. From this they have pieced together a conjectural picture of life on the Mediterranean coastal plain in the sixth and fifth millenia B.C.

The dominant ceramic by far is Cardial Impressed ware, apparently of the early phase. Although no ethnobotanical remains were found in context, the faunal evidence goes a long way in confirming the models of Clarke (1976), Varagnac (1959:366-369) and others who saw late Mesolithic and early Neolithic life on the French coast depending on a wide range of wild food sources. The site's situation on the now drowned continental shelf suggests that the present site distribution pattern of the Cardial phase may be grossly underrepresented, both in numbers and in types of environments inhabited.

Thus it is that sea level rise through the later Holocene, combined with alluviation and filling of coastal marshes in historic times, in all likelihood skews our perception of the Early Neolithic landscape and site distribution patterns. Well preserved sites of the period have indeed been found and excavated in Languedoc (Arnal 1976; Audibert and Hugues 1956; Courtin 1972, 1974;

Courtin *et al*. 1970-1972; Guilaine 1979a, 1980c; Vaquer 1980a; Vaquer *et al*. 1986), but they are typically caves and rock shelters, and afford only part of the overall picture.

In terms of lithics, the assemblages of the late Mesolithic/Epipaleolithic in southern France show some signs of gradual evolution into the Neolithic period (defined here as beginning with the appearance of the impressed wares in the late seventh and early sixth millenia B.C.). Clark (1980:85ff) correlates the discontinuous distributions of blade and trapeze industries and Cardial impressed ware with the exploitation of highly productive tunny fishing grounds by early Neolithic fishing groups. The blade and trapeze lithic component is frequently found not only in early Neolithic assemblages with impressed ware, but also in middle and some later Neolithic assemblages, suggesting "that it relates either to (an indigenous) population at a time when a Neolithic way of life first began to infiltrate . . . or that it formed part of the impressed ware culture itself" (Clark 1980:85).

The Evolution and Dispersal of Sedentary Life and Agriculture in Southern France

The Rindos model of domestication and agriculture described in the Introduction may, it seems, be applied with some accuracy to the western Mediterranean region. During the early Neolithic period in southern France (ca. 6000-5000 B.C.), all the elements of an agricultural economy were present, including domestic sheep, wheat, and barley, along with the earliest pottery in the area, Cardial impressed ware. In that area the transition from food collecting to food production (ostensibly the Mesolithic-Neolithic transition) took place from about 6000 to 4500 b.c.

Cohen's (1977:121ff) reconstruction of this period sees coastal Europe as increasing in population throughout the Mesolithic and early Neolithic. This was a consequence of both local growth in the estuarine zone and agglomeration of peoples abandoning the interior, where the economic effects of the dramatic shift from glacial tundra to postglacial forest had been most severely felt. The now familiar theme of "broad-sprectrum" food collecting led somehow to "increasingly sedentary behavior on the part of many populations" (Cohen 1977:122). According to Cohen (1977:131f), looking at Europe in general:

> In some regions, the evidence seems to indicate that indigenous Mesolithic populations borrowed stylistic elements from the intrusive populations while retaining their own traditional hunting and gathering economies. In other areas the indigenous poopulations seem to have adopted the new economy while retaining their separate ethnic identities. In still other instances, the intrusive populations seem to have abandoned farming in favor of the hunting and gathering economy practiced by their

new neighbors.

Case (1975) presents an updated version of the traditional diffusionist model of neolithization in western and Mediterranean Europe. Native Mesolithic traditions are seen to contribute to the lasting European Neolithic "heritage", in the manner of the bow, megalithic monuments, skin boats, land clearance by fire, etc.

In the Ertebolle "Neolithic" of Scandinavia, the Tagus River Mesolithic of Portugal, and the French south coastal Neolithic we have cases of sedentary forager-fishing societies persisting well past initial "Neolithic" contact. This is documented by the presence in the Morbihan section of Brittany of semisedentary or sedentary base camps at Teviec and Hoedic, where substantial burial grounds also occur (Monnier 1979:123-137, in Giot *et al*. 1979). This geometric microlithic-based, aceramic complex (see Figure 21) extends into the fourth millenium B.C. on the French Atlantic coast, long after the arrival in the interior of full scale agricultural communities and well after the appearance on the coast of megalithic monuments and tombs (Pequart *et al*. 1934, 1937; Case 1975:50-51). The existence of sites from this Mesolithic period on the French Atlantic coast is strongly suggested by the pattern of sea level rise there (Figure 8) and the existence of partially inundated Neolithic sites.

Similarly, in the Tagus estuary near Muge, huge shell middens with large cemetery areas are found at sites such as Cabeco d'Armoreira, Cabeco d'Arruda, and Moita do Sebastiao (cf. Roche 1951; 1960; Clark 1980:93). The Tagus culture was aceramic, used geometric microliths, was apparently semisedentary (circular or oval house patterns have been found at Sebastiao) and subsisted on a diverse food base. Like the Morbihan Mesolithic, it too persisted well past the time when ceramics (here Cardial impressed ware), megalithic structures, and full scale agriculture came on the scene (cf. Savory 1968; Whittle and Arnaud 1975). The idea that the Portuguese Mesolithic-Neolithic transition was a gradual one is also receiving some support from the initial results of a restudy of the Muge skeletal populations (Lubell et al. 1985).

Thus it appears that these coastal Mesolithic groups only slowly merged with the fully agricultural Neolithic groups. Grahame Clark (1977; 1980:85ff) has speculated that part of the dispersion of impressed ware and megaliths in western and mediterranean Europe, once thought the exclusive product of farmers in the Neolithic and Chalcolithic, may have been the work of coastal fishing groups following the harvest of hake and mackerel along the shoreline. The lithic assemblage of these coastal fishers would have been the blade and trapeze microliths seen in the middens of the Tagus and Morbihan. The abundant resources collected from the sea would have permitted, so the hypothesis goes, the support of a labor force capable of erecting megalithic buildings.

For an opposing view of the megalithic distribution and its posited relationship to coastal diffusion, one is referred to Renfrew (1967; 1975), where local forces, including population growth and density and social intensification are preferred as explanatory variables. Lewthwaite's (1981) aptly titled essay on the western Mediterranean early Neolithic advances research very little. In a rambling polemic he faults most previous research on the topic, from Bernabo Brea's first survey of Cardial ware to even Clarke's (1976) pioneering speculation. Of some validity and usefulness is his conclusion that the conceptual units with which archaeologists attack the problem of agricultural and village origins in Europe are not up to the job. Thus, "early neolithic" masks a variety of local adaptational and culture contact situations, some of which Dennell (1985) has recently discussed.

The detailed nature of coastal Mesolithic economies in southern France is dimly understood at present, but Clarke (1976:471) speculates that "Early Mediterranean ecology makes it likely that the vegetal basis of many of the Mesolithic subsistence systems on the European littoral will have been a pulses/bulbs/grass-seeds and nuts combination, balanced by coastal gathering, fishing and fowling, and inland hunting of ovicaprids, deer, aurochs and equids."

According to Dennell (1983:174), ethnographic evidence shows that the lifetime territories of early farmers and hunter-gatherers is fairly stable. In Dennell's opinion, "the 'spread' of farming after 6000 b.p. over most of temperate Europe is best explained by the way that mesolithic societies assimilated new resources and techniques, rather than by the expansion of farming pioneers" (1983:176). In southern France, the initial appearance of pottery, cereals, legumes, or sheep resulted in little change in the location of settlements or in diet (Dennell 1983:187).

> Here, sheep were used in the early Holocene, so their presence in early Neolithic contexts need not be attributed to outside influences (cites Courtin 1978). Artefactual analysis indicates that the early neolithic impressed ware assemblages are probably the outcome of local developments, as in coastal Yugoslavia, there was no major change in settlement location or subsistence pattern for long after the first usage of pottery; in this case, until the Chasseen culture of the fifth millenium b.c. (cites Guilaine 1979, Phillps 1975).

Settlements of varying size of the late Neolithic in southern France are described in some detail by Vaquer (1980b), Gasco (1980a,b); and Gutherz (1975). Although substantial Neolithic villages are known from the Garonne basin, open air settlements that have been competently excavated and reported are rare for the coastal plain of Languedoc (Figure 28).

In the latter stages of the Neolithic and in the Chalcolithic that follows, megaliths, dry stone walled houses and fortified settlements are known (Figures 29 to 31), but what must have been the more commonplace settlement type remains undetected (Arnal 1963; 1973). Mills (1985) conducted survey in this region (Figure 28) and was able to refine our knowledge of this period:

> agricultural settlements were concentrated over the coastal plain from the Middle Neolithic onwards, with a few sites over the southern margins of the Garrigues in the Middle Neolithic and Final Neolithic. There is evidence for the exploitation of the interior of the Garrigues at these periods, as shown by the use of caves and the construction of dolmen, but this was probably on a seasonal basis for hunting, grazing, and other activities, since there are no permanent settlements. There is a marked increase in settlement density on the plain during the Chalcolithic, with a parallel spread of settlement over the interior of the Garrigues (Mills 1985:191-192).

According to Barker (1985:71), "four alternative models can be put forward for the beginnings of farming in the Mediterranean basin." One is the traditional model of migrating maritime farmers; second is the model whereby small groups of colonists introduced agriculture, which was then adopted by indigenous foragers (most favored today); third, dispersion of domesticated plants and animals from east to west by exchange between foragers; fourth, agricultural production is indigenous to the basin and was not introduced from outside. Barker favors a combination of the third and fourth models. Whatever its ultimate derivation, full scale agriculture (in the sense of Rindos 1984) came to southern France not with the Cardial Neolithic, but with the appearance of the Chassean Neolithic and Fontbouisse Chalcolithic in the fourth and third millenia B.C. (cf. Delano Smith 1972; 1979; Mills 1983:134f).

CHAPTER III

THE FORAGER-FARMER TRANSITION IN MID-ATLANTIC NORTH AMERICA

The Environmental Setting

The configuration of southeastern Virginia in post-Miocene times has been reconstructed in considerable detail by geologists and biologists (cf. Oaks and Coch 1963, 1973; Oaks *et al*. 1974; Oaks and Whitehead 1979; Onuschak 1973). This area (Figure 32) contains numerous subtle scarps and intervening flats or terraces. Initial workers in this and similar regions incorrectly attributed these topographic features (mostly on non-stratigraphic evidence) to a few dramatic episodes of marine transgression and regression during the Pleistocene (Oaks and Coch 1973:11-14). Oaks and Coch analyzed hundreds of core profiles in terms of the sedimentary morphology of the facies they contained. Eight formations and various members were defined, along with several regressive episodes, all of which showed the Pleistocene sequence to be developmentally and spatially complex.

Following a marine regression and shoreline emergence episode between about 60,000 and 40,000 years ago, the Londonbridge Formation was deposited (Figure 34). It comprises a sand and gravel facies in ridges and clayey silts in intervening lagoonal deposits (Oaks and Coch 1974:80). A prominent north-south ridge of oysters

(Crassostrea virginica Gmelin) was also identified near the eastern section of the present Dismal Swamp. Sometime in the mid-Wisconsin stage (absolute dates are uncertain here) the Sandbridge Formation was deposited (Figure 35). According to Oaks and Coch (1973:89ff.), it consists of a homogeneous sandy lower member and a heterogeneous upper member, with facies of ridge sands and flatland or alluvial clayey-sands, silty-sands, and silty-clays.

The spatial interrelationships of these lithofacies suggest a combination of barrier island and backbarrier environments (Figure 4), such as Pungo Ridge, Dawley's Corner Ridge, and Knotts Island Ridge were all formed during this period. The late Wisconsin glacial maximum saw sea level in this area fall more than 180 feet below the current mean and the concurrent eastward migration of the shoreline (Oaks and Coch 1974:84f). The land exposed prior to the Holocene submergence was not studied by Oaks and Coch, but recent submarine geological studies have shed some light on this portion of the sedimentary sequence.

Ridge and swale topography on the seafloor in the vicinity of False Cape, for example, has been interpreted as relict strand plain and beach ridges. Less is known farther from the present shoreline, however, and this missing information is essential to resolving the long debate over the origin of barrier islands. Furthermore, it was during this period, roughly 18,000 to 8,000 B.C., that the first humans began to occupy this region of the continent. While the scattered recovery of megafaunal remains from the continental shelf testifies to the presence there of a probable common food source of Paleoindians, nothing is known of their coastal sites and associated local environments.

Sea level rose quite rapidly, in geological terms, in this area between about 8000 and 3000 B.C. (Oaks and Coch 1974:Fig.12) (Figure 10). Paleoindian occupation had been supplanted by Archaic cultural groups, whose sites are far more numerous and widespread than the former. Evidence from other areas in North America suggests that Archaic peoples intensively exploited both marine and riverine aquatic resources, and one might easily suppose that Archaic groups were so situated by Holocene shorelines of any given time. As the glaciers retreated in the north and sea level began to rise,, Archaic groups were necessarily "forced" westward. Previous Archaic occupations were either buried or, as Kraft (1976) suggests, more likely destroyed by the dynamic working edge of the transgressing sea. Thus, Archaic sites found today in the Virginia Beach area, for example, represent a palimpsest of later coastal occupuations and inner coastal plain remnants of former Archaic site distribution patterns.

Models of barrier island formation not only serve to explain the genesis of submarine topography on the continental shelf, but also the most recent landforms found in current shoreline regimes of the region. Oaks and Coch (1973:98) divided southeastern Virginia coastal sediments into those of barrier environments (foreshore, berm, dunes, backdune flat, and inlets) and backbarrier environments (marshes, swamps, small beaches, tidal flats, and open bays) (Figure 4). Each of these local environments has a characteristic biotic association, knowledge of which is useful to the archaeologist attempting to assess locally available and exploitable resources. In addition, to the west of these barrier/backbarrier environments fluvial sediments were and are being deposited.

Cape Henry possibly developed by aggradation of dune ridges northward from a barrier (island?) (Figure 38). Today portions of the cape on the Atlantic beach are eroding and exposing old formations (Figure 37), while aggradation is taking place on the bay shore. In the figure are seen the major geomorphic features existing today: (A) an abandoned shoreline fronting the Pleistocene headland (B) which forms the south shore of Broad Bay (C) and running from the west side of Lynnhaven Inlet toward the Atlantic Ocean. The Lynnhaven River (D) is a drowned stream valley or estuary, much like the Chesapeake into which it empties. Broad Bay (C) is a coastal lagoon that formed after the original barrier (not specified, but perhaps the high dune which forms the north shore of Broad Bay?) had separated it from the Atlantic, at a time still not determined. North of Broad Bay exist some forty or more relict or stabilized dune ridges (E), belonging to several groups which trace the development of the cape.

Fisher (1967) has traced this development by the use of pedogenic analysis and inspection of surface morphology through aerial photography. The numerous relict dune ridges on Cape Henry were divided by Fisher into nine temporal sequences (Figure 38). According to Fisher's model, sometime after 2000 BC erosion from the Pleistocene headland, combined with longshore drift currents, initiated and distally prograded a spit formation. Subsequent erosion and aggradational episodes eventuated in the present formation (Figure 36). The physical parameters and developmental sequence described for Cape Henry are broadly comparable to those found at Cape Henlopen, Delaware by Kraft (1976) (Figures 33 and 39).

Sedimentary analysis of samples from the Cape Henry beach ridge complex showed that distinctions between stablized, older dunes and more active systems could be systematically identified (Robbins and Whittecar 1983). Further, the genesis of the various ridge groups and their sediment source areas could be investigated by these same procedures, with the conclusion that the beach ridges formed over a long portion of the Holocene (Whittecar *et al*. 1984). Soil development on the low beach ridges in Seashore State Park on Cape Henry appears to be quite similar for groups of different ages (Whittecar *et al*. 1982).

The relatively recent formation of Cape Henry is borne out archaeologically by the absence there of *in situ* Paleoindian and Archaic components, although these both occur on the Pleistocene formations immediately south and west of Broad Bay. Although Oaks and Coch defined the local environments of the present coastal regime, their research was not directly aimed at detailing the Holocene evolutionary sequence, as was Kraft's in Delaware. Thus, while we are aware of the dynamic and recent nature of the littoral zone we are much less certain of the paleogeography of this period, which coincides with the appearance of Archaic and Woodland peoples in this area.

Some of this informational lacuna for the Holocene has been filled, at least for the western part of the coastal plain, by work in the Dismal Swamp in southeastern Virginia and near Rockyhock Swamp in northeastern North Carolina, although unfortunately for the cultural periods discussed here such work seldom focuses on the ultimate Holocene (Whitehead 1972; Whitehead and Oaks 1981; Whitehead 1981). The following description of the evolutionary biota is recounted from Green (1980).

An analysis of hundreds of pollen profiles provided, with careful qualifications, a biotic history for the late Pleistocene and Holocene and, when combined with the geological data of Oaks and Coch, permitted a tentative reconstruction of the development of the swamp itself. From about 10,000 to 8,000 B.C. the region was dominated by pine (jack or red) - spruce forest with some fir. This boreal forest of the very late glacial epoch occurred in interfluvial zones, while freshwater marsh vegetation developed on the inorganic clays being deposited in streams. Between 8000 and 6200 B.C. a hardwood beech-hemlock-birch forest developed, while marsh formation steadily increased along streams and in interfluvial areas (Figure 40). From about 6200 to 4000 B.C. a fibrous oak-hickory forest dominates, although other plant types common to the region today were also abundant in the swamp, including gun, sweet gum, ash, red maple, walnut, elm, and cypress (Whitehead 1972: 309) (Figure 40).

The percentage of oak-hickory decreased from 4000 to 1500 B.C., while cypress-gum vegetation increased and finer-grained peats began to be increasingly deposited in interfluves (Figure 40). From 1500 B.C. to the present, peat development occurred throughout the swamp. Cypress-gum forest dominated a complex mosaic of vegetational types, whose pattern Whitehead (1972:311) attributes to watertable fluctuations, storm blow-downs, and natural or human induced forest fires.

During this period the possibility of maize cultivation by Middle Woodland period Indians in the Dismal Swamp area is raised by Whitehead (1965). Five grains of maize pollen were found in a core sample of the swamp peat near Lake Drummond, at the 0.49 meter level. A radiocarbon date of 1630$\pm$100 bc (Y-1321) was obtained from the 0.80 meter level of the core producing the maize pollen. Assuming a relatively uniform rate of peat formation, Whitehead estimates the age of the level containing the maize at about 250 bc.

The possibility of contamination is ruled out and the find taken as evidence of small-scale land clearing and cultivation within the known confines of the swamp at that time. The question of contamination should not be ruled out, however, due to the unspecified retrieval and processing procedure (Yarnell, personal communication). Furthermore, the location of the find is probably the least likely spot for maize cultivation imaginable, given the proximity of relatively fertile soils immediately to the east and west. A summary of Holocene vegetational distributions in the northeastern United States showed that pollen changes in the period from about A.D. 1 to 1500 were relatively small and often localized (Bernabo and Webb 1977:80ff). This lends no direct support for the efficacy of arguments for the role of climatic change in the spread of maize agriculture in that region, although one might question the representativeness of the sample. More is said below on the matter of agricultural origins and dispersals in eastern North America.

Summarizing the Dismal Swamp's developmental history, Whitehead (1972:313) states:

> that the primary factor controlling the beginning of swamp development was ponding due to the rise of sea level. The latter phases of the swamp's development were probably also controlled by an interaction between topography of the Sandbridge surface and the rise of sea level. The postglacial climatic amelioration appears to have controlled the character of the vegetation growing on the interfluves within the swamp, but ultimately edaphic factors related to sea level seem to have superseded.

The picture presented emphasizes the complex and heterogeneous composition and mosaic distribution pattern of biophysical resources.

The Cultural Setting

For the present purpose our boundaries are as follows: on the east the Atlantic Ocean, on the west the Fall Line interface of piedmont and coastal plain. In north-south terms our focus is on the area from the Potomac to the Neuse rivers, although reference will be made to developments as far north as New England and south to Georgia. Graphic summaries of ceramic distributions are depicted in a very general way for Archaic through Late Woodland times in Figures 41 to 43, and these provide the essential artifactual framework for our discussion. Use of the direct historical approach in some aspects is possible here because of the fine accounts made by the English in the sixteenth and seventeenth centuries.

In the late sixteenth century, Algonkian (or Algonquian) cultures or "groups" occupied the coastal region from the ocean to the piedmont, from the Neuse River in North Carolina north to the Maritime Provinces in Canada (cf. Snow 1978). As Snow (1978:60) notes:

> . . . there was probably some general feeling of common culture between the peoples of contiguous drainages, reinforced by contrast with the Iroquoian and Siouan communities in the interior. Diffusion of both material and nonmaterial traits along the coast was probably facilitated by frequent trade and intermarriage between contiguous tribes.

West of the Algonkian areas in Virginia and North Carolina were found Iroquoian and Siouan speakers (Boyce 1978; Feest 1978a, 1978b; Phelps 1983). In North Carolina, the Tuscarora occupied the inner coastal plain; just to their north were Iroquoian speaking Nottoway and Meherrin. The piedmont of North Carolina and Virginia was occupied by Siouan speaking peoples. The thrust of Snow's (1978:69) synthesis of East Coast culture history is an affirmation of autochthonous origin from the time of the late Archaic and "steady development without notable discontinuities" since then. More recent large scale movements of ideas or peoples, suggested by many native origin "myths" and favored by an earlier generation of diffusion-minded prehistorians, are stated to be unsupported by archaeology, although "exceptions" to the pattern are noted (Snow 1978:60).

There is some archaeological evidence that the ancestral Iroquois moved south into North Carolina's inner coastal plain after 500 B.C. (Coe 1964; Snow 1978:60), eventually reaching the coast south of present New Bern and effectively cutting off further Algonkian penetration southward (cf. Phelps 1983). Snow's (1978:60) claim of 2,000 years of cultural stability in this Carolina Iroquoian area requires verification in the material culture. Work by Phelps (1983) and others in the inner coastal plain of northeastern North Carolina has identified numerous candidates for Tuscarora sites noted in the historic literature. While the timing of the original southward migration of the Iroquois is still uncertain, even more so is the possibility of repeated movements over this two millenia period.

As noted in Green (1986b), present evidence suggests that the development and dispersal of pottery types in the region under discussion occurred mainly along the corridor formed by the plain forming the Atlantic coast of much of what is now the United States. Movements of materials and ideas certainly must have also taken place along the rivers running west to east from the Appalachian mountains to the sea (cf. Phelps 1983, Egloff 1985, Turner 1982).

But the general development of ceramic complexes in the Atlantic coastal plain appears to be related to population movements north or south along that corridor or to technological and economic adjustments particular to the local environmental setting.

Whereas Snow (1978) derides migration and climate change as obsolete factors in models of culture change along the Atlantic seaboard, other archaeologists find them relevant indeed. Custer (1985), Clark (1980), and Griffith (1980) all conducted detailed comparisons of material assemblages from sites in Delaware, Maryland, and Virginia, focussing especially on ceramic taxa. Custer (1985) examined collections for the southern two-thirds of the Delmarva peninsula and compiled a distribution of wares in terms of their presence or absence at sites. His temporal focus was from about 1000 B.C. to around 1000 A.D., or the beginning of the Late Woodland period in that region.

The early first millenium B.C. was apparently a time of experimentation in ceramic fabric, temper, shape, etc. Marcey Creek, Dames Quarter, Bushnell, Croaker Landing, "Currituck Beaker", etc. occur in the coastal plain from Delaware to North Carolina. Tempering material ranges from crushed steatite to clay, shell, plant fiber, and grit. Despite local variations, this period is noted for its flat-bottomed vessels, usually with lug handles.

After about 300 B.C. mixed grit and clay tempered Nassawango ware replaces Dames Quarter, Marcey Creek, Vinette I, and other early wares in the central Delmarva peninsula, then grades into clay tempered Coulbourn ware, followed by crushed clay and shell tempered Wilgus ware (Custer 1985:146). This latter transitional period is associated with the Delmarva Adena phase, presumably a time of interaction with eponymous developments in the Ohio river valley.

The southern portions of the peninsula show strong connections with the Potomac river basin, evidenced by the presence of sand tempered Accokeek ware. This orientation would continue to the Historic period. From A.D. 300 to 700 widespread similarity is seen in the ceramic assemblages of the Delmarva, for this is when Mockley ware spread over a large region of the coast, from south of the Neuse River in North Carolina as far north as southern New England (Custer 1985:147; Green 1986a).

As Custer notes, there is increasing evidence that Mockley ware derives from an Early Woodland shell tempering tradition centered in southeastern Virginia and northeastern North Carolina. After about A.D. 700 Mockley ware is replaced throughout the northern and central Delmarva by sand and grit tempered Hell Island ware, with which it bears no evolutionary relationship in technological terms. "The appearance of (Hell Island ware) seems to indicate that the orientation of interaction networks shifts north for many of the late Woodland societies of the Delmarva peninsula" (Custer 1985:147).

The southern part of the peninsula maintained its connections with the Chesapeake area through the Woodland period and into the Historic period. Although north and south were divided in terms of tempering traditions by that time, they shared similarities in design which shows some common participation in an overall interaction sphere reaching from the Delaware river valley to the Virginia coastal plain (Custer 1985:147). Populations using incised Townsend ceramics moved southward in Delaware about A.D. 1300 (Custer 1984:162,171). These groups lived in settlements of considerable size, though without evidence of social ranking (e.g., elaborate burials or exchange materials) (Custer 1984:170).

Figures 156 and 157 show in simplified form the chronological succession of ceramic wares in the Atlantic coastal region. The radiocarbon evidence for this scheme is listed in Table 1. Even in the Late Archaic period two distinct kinds of container had developed, with steatite vessels in the Mid-Atlantic and ceramic vessels with fiber tempering along the coasts of Florida to North Carolina. This dichotomy continued into the Early Woodland period.

Along the northern coasts "grit" tempered flat-bottomed and conical vessels dominated (Vinette I, Marcey Creek, Bushnell, etc.). In the south the fiber tempered Stallings tradition gave way in the second millenium B.C. to the sand tempered Thoms Creek-Refuge-Deptford wares, which would form the essential tempering matrix for most of the wares to follow in that region. Although the evidence is somewhat equivocal, and the interpretations largely unconfirmed, it would appear that in the mid first millenium B.C. a shell tempering ceramic tradition developed in the estuaries of northeastern North Carolina and southeastern Virginia (cf. Painter 1977).

This latter ware fits into the first millenium B.C. model of ceramic experimentation with various tempering agents, vessel forms, and surface treatments, as suggested by Phelps (1983:31). At this time the radiocarbon dates from the Currituck Site (31CK34) still precede by several centuries the earliest charcoal based dates for Mockley ware to the north in the Delmarva peninsula and Virginia proper. This shell tempered cord marked and net impressed Mockley tradition dominated that area, while to the south the Deep Creek, Mount Pleasant, and Wilmington wares continued the evolution of the sand tempered complex.

As defined in Green (1986b), Liberty Hill is an intermediate ware between the Mount Pleasant and Cashie series. Liberty Hill cord marked and net impressed types are very similar to Cashie ware in every way but surface treatment. They might relate to Cashie ware in a way analogous to the technological and temporal relationships between Mockley and Colington, where the tempering agent persisted, but cord and net marked surfaces were replaced by fabric impression. It is further hypothesized that Liberty Hill fabric impressed ware is technologically and temporally intermediate between Mount Pleasant and Cashie fabric impressed, with a suggested dating of about A.D. 600 to 1200. Liberty Hill is a provisional ware, however, and its cultural and temporal characteristics, even its identity, may change as new data becomes available.

Liberty Hill may be partly equivalent to the previously described Albemarle ware in Virginia (Evans 1955:39-44). The original core area of distribution for Albemarle was in the upper reaches of the James river and its tributaries, particularly the Rivanna (Evans 1955; Holland 1966). Subsequent reports in local Virginia journals have extended this distribution eastward. Occasional finds are reported in along the Potomac and James rivers, but usually in contexts suggesting exchange rather than population movement (cf. Snow 1978:62). In the inner coastal plain of southeastern Virginia, however, there appears to be a larger concentration of Albemarle ware than previously noted.

Examination of unpublished collections held by the Virginia Research Center for Archaeology reveals this type of pottery in substantial numbers in Isle of Wight and Suffolk; an unusually large concentration also occurs at 44VB48, the "Chesopean" site reported by Painter (1959) (Figures 45 to 47). Albemarle cord marked and net impressed sherds, minor components in the ware along the upper James, but more numerous toward the coast, are essentially the same as Liberty Hill types with those surfaces. Albemarle fabric impressed is identical to Liberty Hill fabric impressed. Those sherds identified as Albemarle simple stamped type in Virginia are quite similar to the Cashie/Gaston simple stamped type in North Carolina.

Chronological affiliations of Albemarle components in its "original" core area are depicted in Table 2 and Figure 156. These fall into the later Middle Woodland and early Late Woodland periods. One possiblity for the observed distributions is that the Albemarle/Liberty Hill/Cashie pattern traces a general movement of Iroquoian speakers south and southeastward through the piedmont of Virginia and into the inner coastal plain of Virginia by the Late Woodland period proper. Findspots of these wares outside these areas would represent exchange points as noted above, superimposed on the pattern of the general cultural distribution.

Another suggestion is that Liberty Hill is antecedent to Cashie ware in northeastern North Carolina and southeastern Virginia; cord marked and net impressed types in the Middle Woodland would give rise in the Late Woodland to fabric and simple stamped types in terms of overall popularity (cf. Green 1986a). Obviously, Albemarle fabric impressed type in the latter case should not date to Middle Woodland context, as it does in the piedmont of Virginia. Discovery of these wares in good context and in association with radiometric dates is necessary to advance the problem.

At least in terms of ceramic development, it seems that the northern and central sections of the North Carolina coastal plain were more heavily influenced by trends to the south than the north during the Middle Woodland period. This was reversed during the Late Woodland period, when the Colington and Cashie series spread throughout the Albemarle-Pamlico region. Though unproven, it may be that these dispersals are related to the southward movements of Algonkian and Iroquoian speakers, respectively, from the northeastern United States. At the very least Phelps (1983) has demonstrated conclusively that the distribution of these wares coincides with the historically known range of the above mentioned ethnic and linguistic groups.

That the coastal Algonkians from Massachusetts to North Carolina were practicing a highly productive maize agriculture in the sixteenth century is well attested by the historic record. The archaeological evidence to confirm this picture, as well as extend it back in time to find a proper origin, is sadly incomplete. Current preoccupation in the archaeobotanical literature devolves around the origins of the Eastern Agricultural Complex, a suite of native cultigens found primarily in the eastern United States. Rather little attention has been paid to explicating the processes by which maize agriculture first reached and later dominated Atlantic coastal economies. What follows is a brief attempt to recount some current general theories and regional syntheses which bear on this matter for the eastern United States.

According to Yarnell (1964:104), with a few exceptions, corn appears earliest, about 350 b.c. to a.d. 550, in the eastern United States in about six Hopewell sites, in a pattern stretching east some 630 miles from the Kansas City area into central Ohio, but only about 90 miles north or south of the 40 degree line of latitude. One example of such corn associated with radiocarbon dates comes from the Renner site near Kansas City (about a.d. 185--average of three dates). The Knight (Ansell) site in Calhoun County, Illinois has maize and a date of a.d. 250±175, though the association of the two is uncertain. This type of corn is similar to Tropical Guatemalan flints, with 12 to 14-rowed ears. In post-Hopewell times, i.e., after A.D. 1000, a second type of maize dominated in archaeological assemblages: Eastern Complex or Northern Flint. This maize is mostly 8-rowed with strong row pairing; 10- and 12-rowed varieties occur in lesser amounts (Yarnell 1964:107).

> The earliest known occurrence of this race is perhaps about A.D. 1000 in Middle Mississippian sites where it is found usually as a minor element in corn which is otherwise much like the 'Basketmaker corn' of the Southwest. It appears as the exclusive type corn only slightly later in Owasco sites in New York (Yarnell 1964:107).

An Owasco component at the Sackett site in New York dated at a.d. 1140±75 was cited as the (then) earliest Eastern Complex corn east of the Mississippi. However, as Yarnell (1964:119) reports,

> the earliest corn in the East seems not have been Eastern Complex, but derived from an early Southwestern Basketmaker type. Eastern corn may have come from the Guatemalan highlands and may have been brought by Mayan speakers up the east coast of Mexico from which it diffused northward through Texas to the Mississippi Valley and up the Ohio Valley to New York and the Upper Great Lakes region. It seems more likely, however, to have arrived from the Southwest along with beans or perhaps earlier. The Middle Mississippi peoples grew both Eastern and Basketmaker corn to varying degrees. Later peoples and more northeasterly peoples apparently grew only Eastern Complex corn.

Galinat (1985:267-278) presents another reconstruction, summarized below. The eight rowed race (Maiz de Ocho) first appeared in the Southwest about A.D. 200 to 700 after having spread from either highland Guatemala or highland Colombia, a problem yet to be resolved. The route of spread may have been from Mexico to the eastern slopes of Rockies by way of the Rio Grande valley of New Mexico, ca. A.D. 100-500; from northeastern New Mexico and southeastern Colorado to the Arkansas River valley

> and eventually along all the major river valleys which have abundant sites with eight-rowed maize, especially those of the Mississippi, Missouri, Platte, and Ohio, also down to Texas, over to the Mississippi delta, and upward into the eastern Woodlands.

However, Galinat notes that the early remains of eight-rowed maize in the southeastern United States probably stem from the Nal Tel of Tamaulipas rather than the Maiz de Ocho of the Southwest. In any case, it was preadapted to high altitudes and northern altitudes. The classic type of Northern Flint had become sorted out in adaptability at the Blain site in Ohio by A.D. 1040 and at several sites in upstate New York at about the same time. It gradually spread along the riverine areas toward the Northeast, arriving in New England about A.D. 1400. Maiz de Ocho became almost the exclusive race to be cultivated in a broad zone from the Dakotas to New England and to the northernmost limits for the growth of maize in Canada up until the early 1900s.

This prominence was achieved only after introgressive hybridization allowed it to pick up certain traits from its more primitive predecessor that helped in its adaptation to the cooler spring conditions.

The southeastern dent corns were from several races that came chiefly from the coastal areas of eastern and western Mexico. The dents probably spread to the Southeast in historic times with Spanish trade from Mexico. The Southern Dents are dissimilar from the Northern Flints in almost every plant and ear character. They have a late flowering, tall, single stalked plant that carries a short thick ear with many rows (12-14) of thin, deep kernels. The Northern Flints have an early flowering, short, much tillered plant that carries several long, thin ears with few rows (eight) of thick, shallow kernels.

Continuing our survey of the archaeological evidence for maize agriculture in the eastern United States, we find archaeobotanical remains from the D'Olive Creek Site (1Ba196) in the Mobile Bay-Pensacola region of southern Alabama and Florida (Knight 1984). Charred remains included hickory nuts, persimmon seeds, acorns, and mulberry seeds which led Knight to assign a seasonal occupation of June/July to October. Also, quantities of maize cobs found in small "smudge-pit" like features represented the only direct evidence of cultigens so far identified in the region (Figure 44). Zooarchaeological remains included 10 species of fish, 11 species of reptiles, 6 species of mammals, 2 species of bird, and marsh clams.

Archaeological evidence of maize agriculture in

Florida is extremely scanty. Larson reports ethnohistoric accounts which ascribe maize surpluses to a few Timucuan villages and at least its presence in most of them. The archaeological evidence in south Florida is entirely negative, pointing

> to the fact the territory of the St. Johns Timucua was astride a portion of the boundary separating the maize agricultural area of north Florida from the south Florida area where maize and, quite likely, other forms of agriculture were absent . . . (As for the west coast of Florida - Author) there appears to be little, if any, important maize cultivation south of 29 degrees north latitude (roughly a line drawn between Cedar Key and Daytona Beach) (Larson 1980:212-213).

Larson found this situation quite different from that in the Gulf Coast region around Apalachee in northwestern Florida, where large and contiguous acreages of soil favorable for maize facilitated the establishment of large, permanment villages in the Mississippian period.

Based on ethnohistoric accounts and evidence from the Pine Harbor site on the Georgia coast (analyzed by Yarnell), Larson (1980:206-220) suggests those societies practiced a dispersed, shifting type of agriculture. Not all families would have planted crops, and there typically would not have been a surplus to carry the village over the winter. When all but the seed for the following spring was consumed, the people turned to nut and root collecting. Larson suggests that soil types favoring maize agriculture were restricted in extent and contiguity; hence the "scattered and small size of the agriculture production unit" (Larson 1980:209).

Brose (1984) describes the sequence leading to agriculturally based, stratified societies for Woodland and Mississippian period groups along the Gulf Coast of northwestern Florida, and the relationship to these events of climatic change. From A.D. 950 to 1150 regions in the area were represented by different cultural ecological adaptations along the Gulf Coast and at interior riparian zones. Both the coast and the interior are relatively diffuse in their economic adaptation and are crosscut by a number of locally based, but nonexclusive settlement-subsistence systems. During this period of ameliorated hemispheric climate, distinctive Mississippian <u>ceramics</u> (representing a tradition <u>later</u> associated (here?) with distinctive sociceremonial manifestations and a structured settlement-subsistence system) appear somewhat simultaneously at a number of loci throughout the region, introduced by as yet indeterminate processes (cites Caldwell 1958; Griffin 1961, and others).

From A.D. 1150 to 1350 the prehistoric cultures and the atmospheric climatic pattern develop a dichotomy between coastal zones and interior riparian or lacustrine zones or both. In the coastal zone, conservative complexes retain their diffuse economies, although several geographically differing settle-subsistence systems exist.

Those on the interior that were closer to Mississippian cultures show the effects of that proximity (Brose 1984:166). The events in the period from A.D. 1350 to 1500 are largely reconstructed on the basis of somewhat later historical accounts. There were apparently both relatively loosely structured <u>and</u> highly structured Mississippian societies in northwestern Florida (although their interrelationships are uncertain). This inference reflects the enduring distinction between coastal and interior zones during a period which began with mild climate but rapidly shifted after A.D. 1450 into a pattern of long cold winters and short drier summers (Brose 1984:167). From A.D. 1500 to 1700, massive cultural and climatic deterioration (in the latter case, referred to as the Little Ice Age) is indicated, with the early abandonment of many noncentral towns and some major centers, and a significant overall population decline (Brose 1984:168).

The extensive excavations conducted in the American Bottoms in Illinois prior to construction of FAI-270 give us a clear picture of the evolution of plant husbandry for that region in later prehistory (Bareis and Porter 1984). The summary of the paleoethnobotanical work on that project showed that maize agriculture appeared rather suddenly and extensively from about A.D. 800 to 1000 (Emergent Mississippian period), remaining "high" (in terms of percentage of features containing maize) in all subsequent periods (Johannessen 1984:207, Fig.74). Substantial utilization of squash or gourd occurs first in the early Late Woodland period (about A.D. 300 to 500 in that region). Starchy seeds such as sunflower and marsh elder rise to large numbers in Middle and Late Woodland assemblages (ca. 150 B.C. to A.D. 800) and continue so even in later periods when maize is preeminent.

The evidence for plant food use in Tennessee is reported by Watson (1985) and summarized here. In the Little Tennesse river drainage Woodland and Mississippian plant remains are dominated by nut remains, especially acorn and hickory but squash, gourd, sunflower, chenopod, and maygrass are found throughout as are various wild seeds and fruits. Maize is definitely present in the Middle Woodland component at Icehouse Bottom. Both eight- and twelve-rowed cobs were found in contexts dated to A.D. 439±75 (a weighted average of eight dates), this being one of the earliest well documented occurrences of maize in the Eastern Woodlands. Maize becomes much more abundant in Early Mississippian and later periods, but beans do not appear until Late Mississippian times. Only with increasing abundance of maize in the Early Mississippian do nuts decline in frequency (Watson 1985:136).

Watson (1985:140) reports that in the Duck River/ Normandy Reservoir area, Shea analyzed plant remains from the Banks V site. Again, nuts predominate, making up 93.7% of total plant foods (acorn, walnut, chestnut, hickory, with hickory comprising 89% of total plant food). Maize makes up 5.1% of total plant food remains. Radiocarbon dates on these features range from A.D. 735±145 to A.D. 1045±90. Twenty cobs are represented, with 35% 8-rowed, 30% 10- and 12-rowed, 5% 14 rowed. The 8-rowed samples are Eastern complex or Northern Flint; the 12-14-rowed is probably tropical flint or popcorn type.

In general, maize first appears in the Normandy area of Tennessee in very minor amounts in the McFarland Phase (early Middle Woodland, 100 b.c.-a.d. 200), but increases in the Owl Hollow phase (late Middle Woodland, ca. a.d. 200-600); the Mason phase (a.d. 600-1000) has some squash and sunflower; the Banks Phase (Mississippian; a.d. 800-1350) has the most diverse plant food spectrum; squash and especially maize were very important, but nuts, weed seeds, and fruits were still being used, although in lesser amounts (Watson 1985:142). In the lower Little Tennessee River valley, Cucurbita pepo appears first in the mid-third millenium b.c. followed by gourd before 1000 b.c. Sunflower and sumpweed are added in the first millenium b.c., then maize about a.d. 400 with beans finally evident approximately a.d. 1250 (Watson 1985:144). Maize does not seem to have been important until Mississippian/Fort Ancient times anywhere for which there is good evidence, and even nuts, other wild plant foods, and hunting were still highly significant subsistence activities (Watson 1985:146).

In west-central Illinois, sampling from cultural components predating a.d. 600 has revealed a scanty evidence of maize. Nor has Middle Woodland maize dependence been inferred from human skeletal studies, such dependence showing up only in post Middle Woodland times. The time of transition may be pointed out at the Koster East Site; only one sample from an early component (dated a.d. 620±70) has associated maize, whereas 24% of late component pits (a.d. 830±70) yielded maize. In the American Bottom the frequency of maize became much greater for sites postdating a.d. 800 than for earlier ones (Asch and Asch 1985:197).

Moving now to the northeastern United States,

> the Owasco is the earliest culture in New York state for which the cultivation of corn and beans can positively be asserted. While corn has been found on the village sites of every phase, beans are not known from the early or Carpenter Brook horizon of this culture (Ritchie 1965:275).

Typical sites include Maxon-Derby (Figure 150), with ten houses, an estimated population of 200-250, a subsistence base of corn, wild plants, fish, birds, and mammals, and a date of a.d. 1070, and Bates (Figure 151), again with corn.

On Martha's Vineyard in Massachusetts, Ritchie (1969:233) found corn in the latest horizon (16th century) at the Peterson site (a single charred kernel probably associated with a carbon date of a.d. 1565±90). One kernel was also found at the Hornblower II site in Feature 13; an ash bed covering this feature radiocarbon dated at a.d. 1160±80. According to the excavator, "the initial appearance of agriculture on the coast and its interaction with the marine ecology remains to be elucidated. It is, however, manifest even from our limited data that significant demographic changes were associated with the rise of farming here as on inland sites in the same area" (Ritchie 1969:233).

Population decline and increase in the southeastern area of New England is proposed for the first millenia before and after Christ (Snow 1978:66, citing Dincauze). Climatic change is ruled out by Snow (1978:66,68) as causing the initial decline or other cultural changes noted along the East Coast, with the precise causes still unknown. The later increase is traced by him to the introduction of agriculture, though no supportive evidence is cited. Snow (1978:68) also notes a shift in grit to shell tempering in coastal Algonkian ceramics in Maine around A.D. 1000, about the same time the shift occurred elsewhere in the general Algonkian distribution.

On the upper Delaware drainage many Late Woodland components were originally thought to be related to the Owasco tradition, in New York the ancestral Iroquois population. Snow (1978:62), however, believes "More careful analysis of future findings will probably show that the similarities are superficial." He cites recent studies showing, for example, that the similarities between Delaware and Iroquois longhouses are superficial.

The only maize reported to date from Delaware is from the Ritter site (7S-D-2,3), a microband base camp of the Slaughter Creek complex (ca. A.D. 1000-1600) (Custer 1984:165).

No corn was found in the substantial Late Woodland Moyaone component at the Accokeek Creek site on the Potomac River (Stephenson and Ferguson 1963) (Figure 145). Small but consistent amounts of carbonized corn were found at the Reedy Creek site (44HA22) in south-central Virginia (Coleman 1982). Feature 41, a round, bell-shaped pit, for example, carbon dated to a.d. 1150±65. Michael Trinkley's analysis of the ethnobotanical remains from that feature showed the presence of corn, beans, hickory nuts, walnuts, acorn, persimmon, cherry, grape, and maypops, associated with Clarksville pottery. At the Hand site (44SN22), Smith (1971) found carbonized corn remains in association with a Colington/ Cashie component dating roughly to the period A.D. 1500-1620.

Corn (*Zea mays*), beans (*Prosopis*), hickory nuts (*Carya glabra*), and black walnuts (*Juglans nigra*) were recovered in carbonized form at the Shannon site (44MY8), a large palisaded village in southwestern Virginia (Benthall 1969:143). The village consisted of circular houses, 8 to 23 feet in diameter, within an oval shaped palisade measuring some 322 feet by 210 feet (Figure 147). Houses are identifed only along the interior of the palisade, although this is where excavations concentrated (see Benthall 1969:Fig.3). According to Benthall (1969:145ff), the ceramic evidence (some 12,000 sherds, of which Radford ware makes up 73%, Clarksville about 23%, and New River about 5%), the house patterns, the hundred or so burials, etc. all indicate a single occupation of about 25 years duration, possibly by Siouan speakers.

Also in Montgomery County, at the Thomas site (44MY18), MacCord (1976) found charred beans, hickory nut, and black walnut (but no corn) in a pit feature (no. 35) carbon dated at a.d. 1045$\pm$60. In Bland County in southwestern Virginia, at the Brown Johnson site (44BD1), MacCord (1971) excavated a single component Late Woodland village. Circular in plan (Figure 146), the village consisted of some thirteen circular houses surrounded by a palisade. The similarity of the circular plan with circular houses in the piedmont and mountain zones of Virginia and North Carolina reminds us of Trinkley's (1985:118) statement concerning the plan of shell rings on the South Carolina coast: "Fundamentally, the circular shape of the shell rings may be related to the egalitarian nature of Early Woodland societies, where a circular clustering of habitations would promote communication and social interaction, . . . with a central area reserved for group activities." Hearths, storage pits, burials, limestone tempered Radford ceramics, and some carbonized corn kernels were found at the Brown Johnson site. Radiocarbon dates put the occupation of the site between about a.d. 1200-1500 (probably closer to the end of that range, according to MacCord).

At the White Oak Point site in Westmoreland County, Virginia, Waselkov (1982:311-312) found corn (*Zea mays*) in three Late Woodland contexts (context 5: A.D. 1100-1300, no radiocarbon dates; context 6, radiocarbon dated at a.d. 1310±50 and 1460± 45, and context 9, A.D. 1300-1450, no radiocarbon dates). The evidence consisted of one corn embryo, one definite kernel and two possible kernel fragments, and one corn cupule. The majority of the plant remains were hickory, acorn, and walnut. Potter's (1982) excavations in Northumberland County, Virginia produced only the familiar hickory nuts as a possible plant food source; no evidence of maize was found.

In North Carolina, corn has been found in the Pisgah phase, ca. A.D. 1100-1400, at the upland site of Warren Wilson (31BN29). In the south coastal plain of North Carolina, only miniscule amounts of carbonized maize have been found, despite strenuous searching. Less than one gram each of corn was found at the Uniflite site (31ON33) and the Flynt site (31ON305) (Glazier 1986:5), both in Late Woodland context. Loftfield (1976:139) also notes very small amounts of corn at 31ON195 (corn cupules and kernels in Feature 1, possibly early Late Woodland) and 31ON31 (Feature 2, Late Woodland).

It was Yarnell who first pointed out the relationship between maize agriculture and the length of the growing season. Citing him directly:

> We have found no early historic reports of corn growing north of 47.5 degrees nor of corn growing in an area with an average frostless season of less than 120 days. In addition to this we find that prehistoric archaeological sites producing the remains of crop plants are all located south of 47.6 degrees and within the 120-day limit. This strongly indicates that one of the effective limits of prehistoric Indian agriculture was the line marking the limits of the 120-day average frost-free period, even though the Indians had corn that could mature in 60 to 70 days (Yarnell 1964:128).

Yarnell suggests that growing such corn in a 120+ day frost free zone permitted a margin of safety in the spring and fall against the advent of occasional late and early frosts. Plotting the distribution of the frost free period in the Midwest (Yarnell 1964:Map 4), he could identify areas of interesting correlation between climate, agriculture, and culture area. For example, New York Iroquoian sites were "isolated from Monongahela sites in southwestern Pennsylvania by a substantial zone of short frostless season," and "except for a narrow corridor along the Mohawk River, the Iroquoian sites are similarly isolated from the New England Algonkians" (Yarnell 1964:136).

Finally, Yarnell noted an interesting chronological relationship between site location and the frostfree period. From Early Woodland times through the Mississippian and the historic periods, sites were apparently located in zones with successively shorter growing seasons (Yarnell 1964:137), possibly reflecting reliance on varieties of maize that were becoming better adapted to the rigours of the midcontinental climate.

Figure 155 is a graphic speculation on the expansion of maize agriculture into eastern North America. Background information is extracted from Yarnell (1964), Munson (1966), Griffin (1967), Stoltman (1978), Stoltman and Barreis (1983), and many others. Figure 155 also suggests the final stages of this expansion along the Atlantic seaboard. As noted above, corn first appears in the southeastern United States in the late Middle Woodland period (defined as 100 B.C.-A.D. 550), dated at A.D. 439$\pm$75 at the Icehouse Bottom site in Tennessee (Yarnell 1985:102-104). But overall corn remains rare to non-existent until late in the Late Woodland period, or about A.D. 900-1000, when it begins to appear widely and in ever increasing amounts through the Mississippian expansion (Yarnell 1985:102-104; Yarnell n.d.:10).

In Chapter IV we suggest that the arrival of full scale maize agriculture along the coast of southeastern Virginia and northeastern North Carolina relates to a southward movement of such an economy from Algonkian-Iroquoian areas in New York, Pennsylvania, and southern New England. This movement south may be related to the onset of cooler conditions in the thirteenth century, known in Europe as the Little Ice Age (see discussion in Chapter I).

Archaeology of the Lower Chesapeake Bay: Excavations on Cape Henry

Although Cape Henry was visited occasionally by avocational archaeologists in the 1960s and early 1970s (Painter, personal communication; Harrison 1962:90), the work reported here is the first systematic research to be done. As intimated below, the author's original interest in Seashore State Park and Natural Area, which occupies most of the Cape Henry formation, had less to do with comparative archaeology than it did following up the easily visible surface indications of Indian occupation. Ease of access, abundant cultural remains, and an intriguing ecological setting made it an attractive component of the research project which finally came to fruition in the present work.

Earlier in this chapter we described the geological history of Cape Henry as understood today. While Seashore State Park and Natural Area occupies the southern portion, Fort Story, an installation of the U.S. Army Training and Doctrine Command, occupies the modern cape itself. The highest, most active, and arguably the most dramatic dune formations also occur in Fort Story. Recent archaeological surveys performed as part of the Army's cultural resource management program have confirmed the opinion of this writer and others that little, if any, aboriginal materials are to be found on the modern cape.

The terrain is entirely unsuitable for agriculture and permanent freshwater sources are scarce, except for the unusual White Hill Lake (Figure 49). This finding matches that of McMichael (1977) and others working on the South Carolina and Georgia coasts in terms of site locations, or lack of them, on active coastal barrier formations.

-Swing Site (44VB16)

Harrison (1962:90) reports that "a relatively large number of artifacts were uncovered during grading of the land for a subdivision at Broad Bay Colony" (see Figure 47). This area, now an island because of modern channelization and dredging, lies just south of the Swing Site (Figure 48). Largely due to the easy access, cooperation of park officials, and high surface visibility, a program of archaeological investigation was begun by the writer in Seashore State Park and Natural Area in 1978.

Our aim was to identify camp sites with some intact features, and thereby pinpoint occupations of limited timespan. This would give us insight into the sequence of ceramic development in the area and some notion as to the spatial organization of the aboriginal settlements. Few substantial settlements had been systematically excavated at that time on the south side of Broad Bay, and although the sandy soil on the cape argued against such sites being present there, we hoped that sites representing other parts of coastal settlement systems could be found.

Surface collection of artifacts was carried out at a number of sites within the Natural Area. Considerable excavation was also undertaken at 44VB16, the Swing Site, and 44VB40, the Cedar Point Site, over the period from 1978 to 1981 (described below). All sites found within the park were located atop a relict dune ridge which forms the north shore of Broad Bay. Similar ridges are found throughout the park and trace the progradation of the Cape Henry foreland in its earlier stages of development (discussed earlier). As yet, no sites have been located on these interior dune ridges.

The survey procedure consisted of walking the dune ridges and visually checking for the presence of artifacts and/or shell. Prospection in the swales between the ridges was obviated by the dense undergrowth and standing water present there for parts of the year. Sites that were identified consisted only of the artifact/shell scatters noted above; no hearths, pits, or other features were visible at that time.

The first site noted was 44VB13, located on the white sandy beach adjacent to White Hill. On initial inspection, it appeared to be a promising shell midden of considerable extent. However, information from local boatmen and some cleaning of the beach scarp showed the site to be quite recent in formation and not an intact archaeological site. Channel dredging operations in Broad Bay used the beach as a dump area for materials, resulting in the jumbled mixture of oyster shell and artifacts visible today.

Still, the artifacts from the site (Tables 11 and 12; Figures 75 to 78) are useful in a comparative sense when considering the remains from true habitation sites. The 349 sherds of this redeposited assemblage consist of Middle and Late Woodland types. Colington fabric impressed and simple stamped types dominate the Late Woodland wares, while Mount Pleasant and Mockley make up the Middle Woodland, in that order of frequency. Lithics are mostly flakes of chert, quartzite, and jasper, along with a few small cores and fragments of cracked rock.

We next made surface collections on a tall dune just southeast of 44VB13. Decades ago, local treasure seekers had apparently (from local lore) blasted away parts of this formidable dune with high pressure hoses, seeking in vain the long lost treasure of the pirate Blackbeard. We found no pirate treasure, but did recover a gorget fragment and some 163 sherds, mostly from the Middle Woodland period (Table 11). Most of the specimens were collected on the eroding dune face and appeared to derive from a shallow (8-10 cm thick) zone immediately below ground surface at the top of the dune. No features were identified.

Next, moving northwest along Long Creek trail from 44VB13 we encountered several small surface scatters of ceramics and lithics. Consisting of 44VB14, 44VB15, and the 15 Cove Site, the artifact distributions of the site are recorded in Tables 11 and 12. They are in general dominated by the Middle Woodland Mount Pleasant and Mockley wares. Again, no features were detected. A few small pockets of oyster shell were observed on the surface, but these could easily be of recent origin, as oysters still grow along the banks.

The Natural Area of Seashore State Park contains several hiking trails which permit access to most of its biotic environments. Fox Run trail leads from the visitor center south to Long Creek, where it intersects the trail by that name. Long Creek trail winds along the shore next to a pine tree-stablized dune ridge some five to seven meters in elevation. Following the trail southeastward for several hundred meters, one comes upon a slight elevation which projects out in the creek, providing an excellent view to the southeast of White Hill and Broad Bay proper (Figure 48).

At a bend in the shoreline near a slight prominence, we began noticing sherds and flakes on the sandy surface (Figure 48). At that time a tall pine hugged the shore and from it hung one of the best tree swings in the area, hence the name Swing Site (44VB16). Site 44VB16 was selected for excavation for the following reasons: surface indications of abundant pottery and some shell; erosion of the dune face was rapidly removing any contextual information that may have originally existed; finally, the site was easily accessible and across from Bay Island where substantial finds had been noted earlier (Harrison 1962).

Excavations and surface collections were carried out intermittently over the period from June 1978 to January 1981. A contour map of 44VB16 was constructed and excavation units dug in a judgmental distribution over the site, based on surface artifact concentrations and a desire for generally representative coverage (Figure 50). We began a thorough surface collection and a program of test excavations at the site. Figure 50 shows the final toll of excavated 1 x 1 meter units. Figures 51 and 52 show the site before excavation. Natural stratigraphic levels were used as the excavation unit. Colington fabric impressed and simple stamped sherds began to appear almost immediately upon commencing excavation (Figures 53 and 54). Figure 63 is the reconstructed vessel section shown being excavated in Figure 54.

Layers of sand of different color and texture were identified during excavation, but no clear cultural features were identified at this time (Figures 55 and 56).

A second series of units dug nearer the bank did, however, expose the first true midden at the site (Figures 57 and 58). This was a dark gray to black organic sand with minor amounts of shell included. Along with ceramics, we recovered in the quarter inch mesh large numbers of animal bone (deer, bird, and fish) and an assortment of lithics, including a small celt (Figure 70). Other finds included projectile points, pipe fragments, and an assortment of small lithics (Tables 4, 5, and 12; Figures 59 to 74).

Over 1300 sherds were collected from 44VB16. The frequencies of the principal wares are summarized in Table 5, and show occupation from the Middle to Late Woodland periods. Contrary to 44VB11, Mockley dominates over Mount Pleasant in the assemblage, with net impressing the preferred surface treatment. The Late Woodland Colington assemblage is largely fabric impressed, with a sizable number of sherds exhibiting incision over the surface treatment.

The prevalence of this item and the relatively small number of simple stamped sherds lead me to suggest an approximate date of occupation for the Late Woodland component of about A.D. 1200 to 1300. The first criteria stems from analyses carried out in Delaware by Griffith (1980; 1982) on Townsend ware, which is the approximate cultural equivalent of Colington in that more northerly area of Algonkian occupation. Incision over fabric impression is more prevalent earlier in the Late Woodland, then fades to lower frequencies by the 1400s. Based on independent evidence from sites in North Carolina and Virginia (discussed below), domination by simple stamping on Colington or Townsend/"Roanoke" sherds (cf. Egloff and Potter 1982) is relatively late in the temporal sequence, say the 1400s to 1500s. Projectile points from 44VB16 are the typical triangular type, and give us little additional temporal information.

Today 44VB16 is largely destroyed, a consequence of persistent bank erosion due to tidal action and the increasing wave erosion caused by boat traffic in Long Creek. Its location gave it's inhabitants a clear view of Long Creek and Broad Bay, as well as a convenient jump off point for hunting trips into the interior of Cape Henry. In all likelihood, it served this purpose for the more permanent occupations on Bay Island and on the mainland to the south at what is now known as the Great Neck Site.

-Cedar Point Site (44VB40)

Several miles to the southeast of 44VB16 the foreland which is Cape Henry pinches to almost touch the Pleistocene mainland at the Narrows (Figure 47). The original discovery of the Cedar Point site can be traced to amateur collecting in the late 1950s and early 1960s. "Sherds, arrowheads, axe heads, and bones have been found by excavating on the east side of The Narrows . . . between Broad Bay and Linkhorn Bay" (Harrison 1962:90).

Since that report, what apparently was once an extensive site has been largely destroyed by construction of a boat ramp and parking facilities at the terminus of the 64th Street entrance to Seashore State Park. Artifacts and features may still be observed, however, eroding out of the dune ridge face fronting Linkhorn Bay. These surface finds are what drew the author to investigate the site by testing in the ridge itself. Figures 79 to 81 show the site vicinity prior to excavation.

A small excavation area was lined out on the ridge peak and digging according to natural levels began. A sequence similar to that at 44VB16 appeared, though not as deep or varied (Figures 82 to 84). The principal item of interest was a charcoal feature (as yet undated) in close association with a large number of Colington fabric impressed sherds (Figures 85 and 86). Artifacts from 44VB40 are listed in Tables 6, 7, and 12 and illustrated in Figures 87 to 93.

The nearly one thousand sherds again break into two distinct occupations, one Middle Woodland, the other Late Woodland. Colington fabric impressed sherds dominate the later occupation. Stratigraphically below the layer containing the Colington sherds and cut by Feature 2, we discovered a layer containing heavy amounts of Mount Pleasant and some Mockley ware. Net impression is far and away the dominant surface treatment for the Mount Pleasant ware. The dominance of the Mount Pleasant ceramic continues the pattern established elsewhere in the Park, where Mockley increases to the north and west, Mount Pleasant to the south and east.

The work at 44VB40 concluded our examination of temporary camp sites on the north shore of Broad Bay, and our attention now turned to the larger, more permanent settlements on the "mainland" to the south.

Excavations on Broad Bay -Great Neck Site (44VB7)

On the southern shore of Broad Bay in Virginia Beach lies one of the largest archaeological sites in southeastern Virginia, whether one considers areal size, quantities of artifacts, or any other measure (Figure 96). It is more accurately described as an array or complex of archaeological sites, overlapping in space and spanning temporal periods from Paleoindian to Protohistoric and Colonial. Today this great complex is generally known as the "Great Neck Site" (after the peninsula upon which it is found). By the spring of 1979 a great deal of pot hunting by artifact collectors and excavation by amateur archaeologists had occurred at Great Neck.

In May 1979 we literally stumbled over the amateur excavations while doing ground survey in the northern Great Neck area. The condition of the site at that time was in an unfortunate, though familiar, state. Open excavations could be seen in several places, and apparently closed out excavation areas remained unfilled or partially so; large numbers of potsherds and pieces of bone and shell littered the sides of excavation units and the surfaces of backdirt piles (Figures 97 and 102). The significance of the site was immediately apparent and plans were made to work there as soon as possible.

The northern section of what is now the city of Virginia Beach was among the earliest areas settled by Europeans in the early seventeenth century. Though towns in the European mold were slow to form in Tidewater Virginia, the English did develop an efficient settlement system of dispersed agricultural plantations located along navigable water bodies. The land upon which the Great Neck site is found once belonged to such estates, being sold off only in recent decades for use as a riding stable and, eventually, a residential subdivision. A thorough history of the property can be found in Geier (n.d., forthcoming). The lot numbers assigned by the Meadowridge Associates subdivision development have been retained in many of the reports of work done at Great Neck, as no comprehensive and systematic mapping of the site for archaeological purposes was attempted until 1982.

Local collectors have long known of the richness of the site and accordingly termed it the "Great (or Old) Indian Fields." A fluted Paleoindian projectile point was found to the west across Great Neck Road on the surface of plowed fields in the late 1970s. Occasional surface finds of Archaic points have been reported for the area as well. It is with the Woodland period, however, that the site takes on its real importance in the culture historical record. The first excavations at Great Neck were directed by Mr. Floyd Painter of Norfolk, an avocational archaeologist. Painter and his volunteers have worked, mostly on weekends, since the late 1970s to "rescue" important artifacts before they were destroyed. Indeed, half a dozen or more human burials were either destroyed by construction of the main access road for the subdivision or covered over during construction of the nearby tennis courts before salvage could be attempted by Painter's group.

It is certain that much more would have been lost without the efforts of Painter's team, and that they did in several cases labor under the imminent threat of construction. Nonetheless, much valuable contextual and artifactual information was lost through the field procedures they followed (Figure 103). Painter's efforts in 1979 focused on Lots 1 and 2. A rough grid of 5 x 5 ft units was employed during the excavation of the cultural deposits. This unit size was retained in the present work for consistency, although other workers at Great Neck have used the more conventional metric system; depths were also recorded in English units. The author never observed features or units being mapped into this system by Painter or his crews, nor did the latter ever allude to such data being recorded.

The plow zone in Lot 1 varied considerably in its thickness, apparently due to grading during the initial clearing and landscaping process. Some burial pits were found only just below modern ground surface. In Painter's work, sediments were removed by shovel and not screened. Only human remains, large sherds and bone and shell artifacts were retained, the remaining materials being discarded on site. Unfortunately, these collected materials were not kept separate by provenience except in special cases, such as a burial (although even in this instance it is uncertain whether the association is correct or represents an intrusion of one feature by/into another).

Painter came to believe early that Lot 1 represented what he termed "one culture", thus, in his mind, obviating the need for careful attention to contextual details. There is, consequently, no site map for Lot 1, a most unhappy circumstance given its rare finds. There he discovered a large burial area dating to the Early-Middle Woodland periods, based on associated ceramics. Large (three to five feet across, three to four feet in depth) trash-filled pits were also found, containing tremendous amounts of animal bone, carbonized plant remains, and pottery.

The burials, at least the ones observed by the author, included extended and semi-flexed types, some single inhumations, others with several persons in the same feature (Figure 104). In some cases one individual was laid over another in the same pit; skulls that had been removed from the postcranial section were used as head and foot rests in one case (Figure 104). One burial, an extended adult male, contained over twenty thousand shell beads. Unfortunately, despite stringent security by Painter this feature was vandalized and much of the material lost.

The author has no accurate figures on the physical anthropology of the burial population, but based on Painter's statements its population size can be estimated to include upwards of thirty to forty individuals. In 1979 and 1980 the skeletal material was to be sent to a physician for analysis, according to Mr. Painter. Human skeletal remains from features disturbed in antiquity or more recently could be seen on the surface of Lot 1, and the author collected most of a child's cranium which had been left on the surface and subsequently crushed.

Although Painter has not compiled a final report of his excavations at Great Neck and the nearby Long Creek Site, he and others have commented on them and associated artifacts or burials in various short articles in The Chesopeian (Painter 1967, 1968, 1979, 1980; Painter and Pearce 1966, 1968; Pearce 1967, 1968; Pritchard 1965). Curiously, the cultural component discovered by Painter in Lot 1 appears similar in many respects to that in another site excavated by him, the "Currituck Site" (31CK34) in Currituck County, North Carolina (Painter 1976, 1977, 1978). Chief among the similarities was the presence of shell-tempered, net-impressed and cord marked vessels with flat bottoms. More will be said on this topic later.

Painter also worked in Lots 6, 7, and 9 by 1979, discovering a component quite different from that of Lot 1. From small trash-filled pits Painter obtained shell-tempered pottery and an associated radiocarbon date of a.d. 1515±70 (UGa-3294) (Fleming 1981:3). The predominant surface treatment was what Painter termed "brushed", but which is more commonly known as simple stamped; lesser amounts of fabric impressed, plain, and unidentified sherds were also found.

Painter allowed the author research access to the site in May 1979, and work commenced in Lot 7. Figure 105 shows the location of lots 1 to 7 relative to the modern cultural topography. A 5 x 5 ft unit, termed GN-1, was opened near the end of one of Painter's exploratory trenches (Figure 97). Plow zone sediments were removed with trowels in three inch thick units and screened through quarter-inch mesh hardware cloth. After reaching a depth approximately seven inches below ground surface, trowels were exchanged for flat shovels and sediment removed to a depth of eleven inches below surface. At that depth undisturbed features could be clearly seen below the remaining plow scars (Figures 99 to 101). In this area of Lot 7 the plow zone had apparently truncated and disturbed most of the original midden, which was less than five inches thick in most areas.

When excavated, the features in GN-1 were seen to be small trash-filled pits and possible postmolds (Figure 100). Their contents included pottery (Figure 98), shell, small animal bone fragments, and carbonized plant remains. The dominant ceramic by far is Colington Simple Stamped ware (Tables 8 and 9), dating to the Late Woodland period (cf. Phelps 1983; Green 1986a); for earlier and/or different classifications of this pottery see Harrington 1948, Blaker 1952, Evans 1955, and Egloff and Potter 1982. This is Painter's "brushed" pottery, and his date of a.d. 1515 fits well with the statements of Haag, Evans, and others who proposed it as an ultimate horizon marker for coastal Algonkian cultures in southeastern Virginia and northeastern North Carolina.

From late May to the middle of June 1979, and again in September of that year, excavations were carried out along the boundary between Lots 1 and 2 (Figure 105). Four 5 x 5 foot units (GN2 through GN5) were excavated entirely by trowel. All sediment was screened through quarter inch mesh hardware cloth. In addition, liter sized samples of sediment from features were retained for flotation and recovery of microfloral and microfaunal remains. Figure 106 illustrates the distribution of features found in these four units. Figures 107 to 112 show various results of the excavations.

Units GN4 and GN5, excavated in September 1979, proved the least interesting of the group, containing only the small remnants of pit features or midden lenses and a rather sparse artifact inventory. In fact, it appeared that this may have begun to define the edge of the main concentration of Early-Middle Woodland features and burials found in Lot 1. West of these units features occur in large numbers and close proximity. Grading and filling had considerably affected the original stratigraphic profile in GN4 and GN5. Mixed aboriginal and Euroamerican artifacts and construction fill were found in lenses down to about sixteen inches below the surface. From that depth to some twenty inches skim shovelling proceeded and revealed that little intact midden was to be found in the area.

The more interesting features were found earlier in units GN2 and GN3, consisting of two large and deep trash filled pits and remnants of a third. Under a shallow layer of recently disturbed and filled sediments (Zone Ia) were found the remnants of the "original" (pre-construction) humus zone (Zone Ib), and below that a layer some 10 to 12 inches thick--the old plow zone of mixed Euroamerican and aboriginal artifacts (Zone Ic). Relatively little shell was found in this zone. Zone II is the undisturbed midden, consisting of a very dark brown sandy loam sediment with liberal amounts of shellfish, mostly oyster but with minor portions of hardshell clam, whelk, and periwinkle. Figures 105 to 112 show the distribution of features and important stratigraphic details in units GN2 and GN3.

Feature 1 in unit GN2 is a trash-filled pit that apparently was disturbed by later activity, perhaps a burial. Referring to the south wall profile of GN2 in Figures 107 and 111, a pit-like area of clayey fill intrudes pre-existing midden/pit deposits. Near the base of this fill area in late June and early July 1979 we recovered a nearly complete human mandible and identified some ephemeral remnants of additional bone, including ribs (Figure 122). Whether this was indeed a burial subsequent to the original midden/pit, or is connected in some way to the human remains from unit GN3, remains to be seen.

Feature 2 extends over units GN2 and GN3, and is a large trash-filled pit with an oval shape in plan view. Several internal layers of stratification were noticed during its excavation and in profile (Figure 112). Dense pockets of periwinkle occur near the top of the feature; below are dipping lenses of oyster and clam shell. Near the base of the feature was a dense concentration of animal bone, including femurs and antler from deer (Odocoileus virginianus), and a great variety of bird, fish, and mammalian bone (Figure 124). These remains are currently under study by Gregory Waselkov. Included among the latter concentration were several large Mockley net impressed potsherds (Figure 113).

Feature 2 continued into unit GN3, which yielded additional large amounts of pottery, bone, shell, and carbonized remains (Figures 113 to 119). Unfortunately, despite our best efforts we were unable to complete the excavation of Feature 2 before being forced to turn to other matters (mid-July). The excavation unit was thoroughly covered with plywood and other material to preserve it for our return. When that time came in early September 1979, however, we found that Painter's group had completed the "excavation" of the feature, leaving a large void where it once stood (Figure 103). Although no photographs or notes were available for the latter work, a bag of artifacts and bone material was retained. These included several human long bones (Figure 123) of an adult male(?); whether this was an intact or disturbed burial, and whether it was related to the remains found in Feature 1 of unit GN2 remains unknown.

The pottery found in both features is shell-tempered Mockley Ware, with net impressed and cord marked surface treatments defining the principal types (Tables 8 to 12; Figures 113-119). The distribution of Mockley Ware in time and space is treated elsewhere in this paper. However, an important variation from Mockley assemblages to the north occurs in this site, as both conical bases and flat bases or bottoms are found.

Feature 2 contained examples of both. The flat bottomed vessels have either net impressed or cord marked surfaces, like Mockley Ware, but otherwise are identical to the pottery found by Painter at the "Currituck Site" (31CK34), and termed by him "Beaker Ware." Radiocarbon dates from 31CK34 (810-660 b.c.) suggest an Early Woodland date for that ceramic ware, but recently obtained dates from Great Neck (a.d. 260) in association with the same type of pottery support a Middle Woodland temporal affiliation. It is possible, therefore, that the two sites represent opposite "ends" of the temporal span for the ware.

Painter's group continued excavation in Lots 1 and 2 during the remainder of 1979. Additional work was also done in lots south of Thomas Bishop Lane, although the author has no information on this activity. Three other periods of excavation have been carried out at Great Neck since the above described work. In 1980 and 1981 several test trenches and squares were excavated during in Lots 16 and 17 in Green Hill Farms section 3 of Meadowridge Subdivision (Figure 125) (Fleming 1981).

This work produced more evidence of a Late Woodland occupation, including

> a high proportion of simple stamped, shell tempered ceramics, small triangular projectile points of chert and quartz, circular shallow trash and burial pits (often with extended burials) and . . . undefined architectural features (Fleming 1981:3).

Approximately 1000 sherds were recovered from Lots 16 and 17. Only feature 6 was closely analyzed with regard to ceramics. The fill associated with this extended burial (Figure 127) contained 187 sherds, of which some 88% was Colington shell-tempered ware. Of the Colington Ware, the simple stamped type comprised some 52.4% (Fleming 1981).

Additional work in this same area was later conducted by personnel of the Virginia Research Center for Archaeology (VRCA). This work is described in Egloff and Turner (1984) and the results of the work depicted in Figure 126. While the ceramic analysis is not complete, the resulting longhouse and palisade wall combine with Fleming's finds of Colington simple stamped pottery to indicate a very late Algonkian village.

In all probability, this may indeed be the site of "Chesapeake", shown on English maps of the 16th and early 17th centuries (Figures 138 to 140). The longhouse pattern compares favorably with that shown by White for the Carolina Algonkian villages of Pomeiooc (Figure 141) and Secoton (Figure 143). Recent work by the author at 31HY43 in North Carolina has uncovered longhouse patterns and possibly part of a palisade wall which may identify that site with Pomeiooc (see field map reproduced in Figure 142). An additional longhouse pattern is also known from the very southern terminus of the Algonkian distribution at the Uniflite Site in Onslow County, North Carolina (Figure 144) (Loftfield 1979).

Following their work near the Fleming house, VRCA staff continued excavations to the west in the Middle Woodland part of the Great Neck Site. This material remains unpublished, but the staff has kindly consented to the reproduction of some working field maps from Lot 3 (Figures 128 and 129). The familiar pattern of Mockley ware was recovered, along with an abundance of archaeobotanical and zooarchaeological specimens. Several radiocarbon dates recovered from features in this work have helped clarify the later end of the temporal distribution of flat based shell tempered vessels.

Apparently these pots begin to fade out of use in third and fourth centuries A.D., to be replaced by the conical type bases. In 1986 additional work was undertaken in Lot 11 of the Great Neck Site, under the supervision of VRCA (Egghart 1986). At least two periods of occupation are identified, characterized by Mockley ware in the Middle Woodland and Colington simple stamped (there termed "Roanoke Island") in the Late Woodland.

A major excavation was conducted just west of the Great Neck Site proper in the early 1980s by James Madison University (Geier, forthcoming). The Addington Site (44VB9) was the focus of the work (Figures 94 and 95), and its analysis should provide an interesting counterpoint to that discussed here when it becomes available.

Assemblage Comparisons in Southeastern Virginia and Northeastern North Carolina

In this work we decided to focus on the distribution in time and space of the most senstitive cultural marker available, pottery. In particular we chose to examine the distributions of Mockley Ware and Colington Ware, since each was known to typify coastal sites in the local study area for the Middle and Late Woodland periods, respectively. The data for this analysis consisted of the field work described earlier, additional survey in southern Virginia Beach, in unpublished reports, and in the published literature. Tables 1 to 3, 13 to 38, and Figures 130 to 137, 148, 149, 152, 153, 156, and 157 display this information.

Shell tempered, simple stamped potsherds make their appearance in the archaeological literature as a result of observations by Caldwell and Harrington on material gathered from testing at Fort Raleigh on Roanoke Island in 1947 (Harrington 1948). Further work by Blaker (1952) resulted in the typing of the pottery as Roanoke Simple Stamped, with a tentative spatial distribution from Cape Hatteras, North Carolina to the York River in Virginia. Even then, it was suspected that the ware was late in the aboriginal sequence, and possibly contemporaneous with the first English attempts at settlement in the late 1500s and early 1600s.

Harrington (1948) found it as the clear majority ware in the ditch at Fort Raleigh; at Kecoughtan (also known as Kicotan) in Hampton, Virginia the same type of pottery was found in association with early Euroamerican remains, again in abundance to the near exclusion of other wares (Blaker 1952). Harrington's extensive excavations at Fort Raleigh confirmed that "Roanoke Simple Stamped" pottery was the dominant shell-tempered type at the site and found in features dating stratigraphically earlier and later than the fort occupation in the 1580s (Harrington

1962:40). This was the first conclusive evidence that the type at least reached the Historic temporal horizon.

A second ceramic type found in similar amounts at Fort Raleigh resembled the Roanoke ware in form and surface treatment, but contained angular quartz temper instead of shell. Occurring in somewhat different contexts from the Roanoke ware, it was presumed, lacking hard evidence otherwise, to be roughly contemporaneous with the latter. Today Roanoke Simple Stamped pottery is classified as Colington simple stamped type (Phelps 1983, 1984; Green 1986b). In Virginia some specialists (cf. Egloff and Potter 1982) still classify it separately as Roanoke Ware, but its intimate associate with the coastal Colington phase is well documented at numerous sites.

The unnamed "grit" tempered pottery otherwise resembling Colington simple stamped is now classified as Cashie simple stamped type, primarily associated with the Iroquoian speaking Tuscaroran groups in the inner coastal plain of North Carolina (cf. Phelps 1983). Its presence on Roanoke Island may represent in a small way riverine exchange between the coastal Algonkians and interior Iroquoians. Harrington's (1962) excavations did not shed any light on the origins and time span of the simple stamped wares.

According to Feest (1978:253), some late external influences in the area of the Rappahannock River are discernible, as in the occurrence of Roanoke simple stamped sherds in southern Virginia, particularly in Kecoughtan. "A fragment of traditional history, collected around 1610, relates that the Indians of tidewater Virginia had moved into this region only 300 years previously [Strachey 1953]. Archaeological evidence shows this situation may apply only to tribes north of Rappahannock River." This interpretation is not supported by the evidence. "In 1597 he (Powhatan) conquered Kecoughtan after the death of its powerful chief, and before 1607...added almost all other tribes on James and York rivers to his tribal empire...It is likely that European contacts encouraged this rise of large political entities (Feest 1966)".

Looking at Smith's (1971:378) ceramic seriation from the Hand site (44SN22) on the lower Nottoway River, we may make the following observations in light of current typology and cultural affiliation. The dominant ware is of course Colington, with fabric impression the typical surface finish. Cashie ware (Smith's "Sturgeon Head" and "Branchville" series) is present in minor amounts in nearly all contexts with Colington ware. Colington simple stamped type is rare and found as a minor component in a handful of features (Table 21).

A two stage occupation is suggested for the site. The first is a minor Middle Woodland settlement as indicated by small amounts of Mockley net-impressed and cord marked wares. The second, and most substantial, occupation is in the Late Woodland period. Primary Algonkian affiliation is shown by the dominance of Colington ware. Minority amounts of Cashie ware likely indicate contact with neighboring Iroquoian populations; the consistency of the Cashie ware in features suggests this contact to be consistent through time.

The small amount of Colington simple stamped suggests one of two possibilities: either a dating of the Colington occupation within the Late Woodland proper, say A.D. 1000-1500, or relative isolation from the core area of distribution for that type, on the outer coastal plain of southeastern Virginia and northeastern North Carolina. Incised and/or punctated surfaces on Colington vessels are depicted in Smith's figures and tables, but not in a manner which could give ready comparison with the work of Griffith (1980) in Delaware, so as to date more precisely the Colington occupation.

Our examination of the various site assemblages, displayed here in the tables, confirms the long held notions of the association of Townsend/Colington ceramics with the coastal Algonkians of Virginia and North Carolina, respectively. Within this distribution, however, we are more interested in the specific array of Colington simple stamped pottery. Haag (1958), Blaker, Harrington, and others felt that this type was a potential marker of the ultimate aboriginal occupation of the coast.

Figure 153 shows the distribution of Colington simple stamped pottery in sites with more than 100 sherds. The number shown is the percentage of the total Colington sherds with surface treatment. Thus, at 31HY43 in North Carolina all of the surface treated Colington sherds are of this type. Our interpretation of the overall pattern is that the high frequencies indicate likely sites of villages occupied immediately before and/or during the time of European contact in the late 16th and early 17th centuries A.D.

The villages so identified include Kicotan, Nansemond, Chesapeake, Roanoac, Pomeiooc, and Croatoan. Only the work at 44VB7 and 31HY43 has produced sufficient feature evidence to indicate that this hunch from the pottery is on the right track. Certainly much more confirmatory information is needed, especially suites of radiocarbon dates from material in good stratigraphic context. The remaining sites lend themselves to several interpretations, depending on one's affinity for a particular dimension. Most are from poorly understood contexts, so we are unsure of their temporal standing.

If we assume they are all more or less of one century, then we could interpret this pattern as one of down-the-line exchange. Succeedingly smaller amounts of

Colington simple stamped ware would be found away from the core area near the coast. At any rate, the distribution would tend to confirm that the outer coastal Algonkian sites were in ways both material and political distinct from the Powhatan chiefdom in the central Tidewater of Virginia. Simple stamping falls off rapidly in popularity after one leaves the areas indicated on Figure 153.

The earlier Mockley ware distribution has been discussed in some detail already. Figure 152 plots the distribution of sites with the relative proportion of net to cord marked Mockley ware indicated. Only sites of 100 or more sherds are included. We hoped to cast some light on the question of whether one of these surface treatments predated the other. Since the study of Stephenson and Ferguson (1963), most people have tacitly assumed that cord marking is somewhat earlier, to be superseded by net impression in the later Middle Woodland.

We can discern no clear message in this regard from the distribution in Figure 152. In general, cord marking dominates on the James River sites and net impression more toward the actual shore. This may be an artifact of the functional affinity of a site location (netting being more prevalent in fishing villages?) rather than any temporal separation. The available radiocarbon dates from the area also are unable to make a clear separation (Table 1).

Taking the distribution back in time to the earliest

Middle Woodland and into the Early Woodland, we plotted the location of sites producting sherds of flat based, shell tempered vessels (Figure 152). These are confined to a few sites in southeastern Virginia and northeastern Virginia. As Phelps (1983) has suggested, the form of these vessels fits quite nicely into that typical of other Early Woodland wares in the region, such as the clastic tempered wares in central and northern coastal Virginia. They also indicate an affinity with the flat based steatite vessels of the late Archaic period.

A possible transitional ware between the two has even been suggested by the work of amateur archaeologist Floyd Painter, who recovered vessels resembling steatite pots but made of clay tempered with shell from the Waterlily Site in Currituck County (Painter 1970) and elsewhere in this area.

The Evolution and Dispersal of Sedentary Life and Agriculture in Mid-Atlantic North America

Much of what we know about these two topics in the research area discussed here comes from the primary and derivative works concerning the first English settlements in Virginia and North Carolina. These concerned European penetration of the world of the Virginia and Carolina Algonkians. In Virginia the Powhatan chiefdom held great political authority and subsisted on a diverse agricultural economy with maize at its core.

Turner (1973) essentially follows the work of James Mooney in ascribing to the Powhatan polity at the time of English contact in 1607 a total population of slightly more than 10,000 persons, distributed throughout 26 to 32 territorial units in the Virginia coastal plain. In a paper published simultaneously with Turner's, Feest (1973) derives a total population for the Powhatan between about 14,000 and 22,000 persons. In either case, high population densities are observed in interior cultural units proximal to the Fall Line. Affirming the work of Mook, Swanton, and Binford, Turner (1973:59) proposes that occupation of this ecotone gave access to a resource base more diverse than that in the coastal zone, one where the annual run of anadromous fish provided a substantial and stable source of nutrition. Greater population growth and density were consequences of this favored location.

This large population base, located in the core area of what would later become the Powhatan chiefdom, provided an important element in the establishment and expansion of the latter (Turner 1973, 1976, 1978). The effect(s), if any, of the introduction of full-scale maize agriculture to this area are discussed only briefly and indirectly by Turner and his predecessors, largely due to the lack of archaeobotanical evidence.

Another gap, of some importance, relates to sites and contexts firmly dated to the period of Powhatan hegemony. The rich ethnohistoric evidence in this regard actually serves to blind us to the situation on the ground. Sites that may belong to this period and which are in the right vicinity are legion; confirmed sites number less than a dozen. One of the prime goals of the present work was to pinpoint such sites in one area, i.e., the coastal plain south of the James River. As discussed above, we now have some good evidence to suggest that some of the ultimate Algonkian settlement pattern can be identified.

Our survey of the lower Chesapeake Bay has shown that a few, widely separated, but sedentary nonagricultural villages dominated the cultural landscape of Early to Middle Woodland times. An indigenous ceramic tradition based on shell-tempering ("Currituck"/Mockley) developed in the seventh century b.c., or earlier, and by a.d. 300 had spread north the Hudson river drainage and south to that of the Neuse in North Carolina. Sedentary communities at Great Neck, Currituck, and Briarfield subsisted on a now classic broad spectrum diet, with deer and small game, fish, shellfish, birds, reptiles, and wild plant foods, mostly nuts, being exploited.

Barber's (1981) analysis of faunal remains from Maycock's Point (44PG40), for example, showed exploitation of freshwater mussels, white-tailed deer, turkey, turtles, sturgeon, and gar, a pattern which endured at the site through several centuries of occupation. Villages appear to have contained upwards of several hundred persons; burial areas, circular houses, and incipient social ranking (indicated by grave goods) are indicated. By about a.d. 800 this Mockley ceramic tradition was being supplanted by the Colington series. Net-impressed and cord marked types are replaced everywhere in the region by a fabric impressed type, often with incision and/or punctation. A simple stamped shell-tempered type occurs as well, though always in small amounts and in a range focusing on the lower Chesapeake and Outer Banks.

Townsend/Colington ceramics are widely distributed along the coast from New Jersey to North Carolina (Figure 43). We interpret this distribution as the gradual expansion of Algonkians down the coast from about 1000 to 1350. This period was one of considerable warmth in the higher latitudes, as noted earlier. The extension of the growing season in these areas may have favored the expansion of corn agriculture into what is now New York. The longhouse villages of the Iroquois share many architectural and economic features with their Algonkian neighbors (Figures 150 and 151).

How dominant maize was in the diet of these peoples from 1000 to 1350 we just do not know. We do know that it was critical to the economy by the time of European contact. Perhaps the onset of the Little Ice Age in the fourteenth century provided the external impetus which pushed maize from being an important to an indispensible part of the Algonkian diet. The increase in fortified settlements accompanies this latter part of the Late Woodland. However, these facts might alternatively be explained by a gradual rise in population as Algonkian groups settled in and filled up the best available land in the coastal plain (cf. Turner 1973, 1976, 1978). As always, more work is needed.

CHAPTER IV

CONCLUSIONS: THE ORIGINS AND EVOLUTION OF COASTAL SEDENTARY LIFE AND AGRICULTURE

New field work in Virginia and a reexamination of the existing evidence in both North America and Europe is presented here to address problems of cultural change, specifically that from forager to farmer in coastal environments. We have been able to identify at least two distinct cultural episodes in coastal Virginia, the Mockley and Colington, each of which possessed diverse coastal economies. The latter had, however, incorporated maize agriculture to a large degree, greatly increasing the number of people that could be fed in a given area.

A few distinct Mockley sites approach the size of most Colington villages, but for the most part Mockley settlement is composed of smaller campsites scattered about the central village. The larger Mockley sites are located in especially advantageous locations, ones which had been exploited in the Archaic and even Paleoindian periods. The large Colington sites often are located in similar locales, but particularly those with soil suitable for cultivation. In the distribution of Colington Simple Stamped pottery, some distinctive spatial patterning suggests the type can be used as a marker of 16th and 17th century Algonkian occupation of the outer coastal plain of southeastern Virginia and northeastern North Carolina.

The coastal areas of Neolithic Languedoc and Middle to Late Woodland Virginia had several similar cultural evolutionary developments, including pottery using sedentary societies with a diversified, estuarine based economy. The appearance of full-scale agriculture was retarded in these cultures at least partly because of their successful coastal adaptation. When it finally came, only then did major changes in material and social systems take place. Our research concludes that sedentary life and full scale agriculture appeared in societies occupying coastal environments through a combination of local and exogenous mechanisms. To emphasize one at the exclusion of the other, which most hypotheses and models have done, is too narrow an approach.

It is facile to suppose that simple cultural diffusion or migration is wholly responsible for the introduction of a "Neolithic" lifestyle to forager cultures. A similar case obtains for those who expect that local factors, whether social intensification, demographic stress, etc., everywhere produced in coastal settings this result. Local social processes acting on the bounty of the estuarine ecosystem did eventually produce sedentary life, ceramics, and some social ranking. In both cases, however, full scale agriculture and the appearance of large village populations with clear class differentiation did not appear until much later in their respective historical sequences; until the late Neolithic and Chalcolithic in France and the ultimate late Woodland in coastal Virginia. When this change finally came, it did indeed have much to do with outside forces.

It is proposed here that full scale agriculture, with the features noted above, arrived in coastal Virginia and northeastern North Carolina sometime after a.d. 1300-1400. This economic system moved southward with Algonkian and Iroquoian groups retreating before an increasingly cooler climate, the Little Ice Age. Climatic change is seen here as a possible trigger for change, given the right conditions of economy, population, and social organization. Though likely not the first such movement, it was the first to encounter the already bounteous harvest of estuaries with an existing highly productive food system. Thus the English found when they arrived on the scene in the late sixteenth and early seventeenth centuries an Algonkian economy which had already successfully merged elements of the Mockley phase subsistence strategy with its own.

Tables 1 to 38 follow in numerical order
and occupy pages 145 to 199.

Table 1. Legend for ceramic tables.

AB	-	Albemarle Ware
AC	-	Accokeek Ware
BK	-	Beaker Ware
BN	-	Bushnell Ware
CB	-	Coulbourn Ware
CL	-	Clements Ware
CO	-	Colington Ware
CS	-	Cashie Ware
CU	-	Currioman Ware
DC	-	Deep Creek Ware
HI	-	Hell Island Ware
HN	-	Hanover Ware
KF	-	Keyser Farm Ware
LH	-	Liberty Hill Ware
MC	-	Marcey Creek Ware
MK	-	Mockley Ware
MP	-	Mount Pleasant Ware
MT	-	Middletown Ware
MY	-	Moyaone Ware
NM	-	Nomini Ware
PC	-	Popes Creek Ware
PG	-	Prince George Ware
PMC	-	Potomac Creek Ware
SC	-	Stony Creek Ware
ST	-	Stallings Ware
SV	-	Sullivan Ware
TC	-	Thoms Creek Ware
TW	-	Townsend Ware
VC	-	Vincent Ware
VN	-	Vinette I Ware
WN	-	Wolfe Neck Ware
YO	-	Yeocomico Ware

cd	-	cord marked
fb	-	fabric impressed
fbi	-	fabric impressed with incision and/or punctation
nt	-	net impressed
pl	-	plain
ss	-	simple stamped
rs	-	residual
ot	-	other
ud	-	unidentified
shl	-	shell

Table 2. Radiocarbon dates from sites in coastal areas of Atlantic North America.

Note: all dates are expressed in uncalibrated years b.c./a.d.; refer to original source for details on context and excavator's assessment on date's validity; * indicates aberrant date according to excavator.
Mat. = material dated; ch: charcoal or charred nut, sh: shell, bn: bone
Cer. = associated ceramics; for explanation of abbreviations see Table 1.
pc = personal communication.

Date	Lab No.	Context	Source	Mat.	Cer.
ad 1690±55	DIC-1762	44WM119	Waselkov 1982	ch	YO
ad 1645±70	SI-4372	44NB147	Potter 1982	ch	YO
ad 1630±55	DIC-1767	44WM119	Waselkov 1982	ch	YO
ad 1605±70	SI-4231	44NB147	Potter 1982	ch	YO;MK;TW
ad 1510±75	DIC-1765	44WM119	Waselkov 1982	ch	YO
ad 1540±55	DIC-1770	44WM119	Waselkov 1982	ch	YO
ad 1445±60	SI-4370	44NB147	Potter 1982	sh	YO
ad 1255±60	SI-4369	44NB147	Potter 1982	sh	YO
ad 1790±50	Beta-17508	31HY43,Fea2	Green 1986	sh	CO-ss
ad 1640±50	Beta-8134	31HF30B,Fea.3	Phelps,pc	ch	CO-fb
ad 1630±60	?	31BF25	Claasen 1980	?	CO
ad 1515±70	UGa-3294	44VB7,lot 6	Fleming n.d.	ch	CO ss
ad 1500±100	Beta-17507	31HY43,Fea8	Green 1986	ch	CO-ss
ad 1400±65	UGa-2550	31ON33,Fea.3	Loftfield 1979	ch	CO-fb
ad 1380±60	?	31BF58	Claasen 1980	?	CO
ad 1330±80	Beta-12117	44VB7,Bur29A1	Egloff,pc	bn	CO(ss?)
ad 1320±60	Beta-4394	31BR1,Fea 1?	Phelps 1982	?	CO
ad 1320±80	UGa-3847	31DR14,A,Z3,L1	Phelps 1981:50	sh	CO-fb
ad 1315±70	UGa-1089	31CK9, Sq.B	Phelps 1977:20	ch?	CO
ad 1290±60	Beta-4395	31BR1,Fea 6?	Phelps 1982	?	CO
ad 1260±50	UGa-1461	44JC118-119	Outlaw 1980	ch	CO-fb,fbi
ad 1245±125	UGa-1547	44JC118-119	Outlaw 1980	bn	CO-fb,fbi
ad 1230±65	UGa-1087	31DR33,E,Fea.3	Phelps 1981	sh	CO-fb
ad 1095±50	UGa-2552	31ON33,Fea.19	Loftfield 1979	sh	CO-fb;HN-fb
ad 1045±65	UGa-1090	31DR14,B,Z3	Phelps 1981	sh	CO-fb;MP-cd
ad 945±65	UGa-1460	44JC118-119	Outlaw 1980	ch	CO-fb
ad 860±85	UGa-3434	31DR35,Fea.6	Phelps 1984:30	ch?	CO-fb;MP
ad 825±95	UGa-4011	31HF20B,Fea.1	Phelps,pc	ch	CO-fb
ad 685±60	UGa-2549	31ON33,Fea.19	Loftfield 1979	ch	CO-fb;HN-fb
ad 455±60	UGa-2547	31ON33,Fea.2	Loftfield 1979	ch	CO-fb
ad 400±65	UGa-2548	31ON33,Fea.55B	Loftfield 1979	ch	CO-fb?
455±60 bc	UGa-2551	31ON33,Fea.55	Loftfield 1979	sh	CO-fb
ad 1590±120	SI-137	DeShazo,VA	MacCord	?	TW
ad 1460±45	DIC-1766	44WM119	Waselkov 1982	ch	TW
ad 1370±60	UGa-924	Poplar Thic.,DL	Artusy 1976	?	TW
ad 1345±60	SI-4943	SlghtrCrk,Fea1	Custer 1984	?	TW
ad 1340±55	DIC-1768	44WM119	Waselkov 1982	ch	TW;CU

Table 2. Radiocarbon dates from sites in coastal areas of Atlantic North America (continued).

	Date	Lab No.	Context	Source	Mat.	Cer.
ad	1310±50	DIC-1764	44WM119	Waselkov 1982	ch	TW;MY
ad	1285±75	UGa-925	Warrington,DL	Artusy 1976	?	TW
ad	1270±50	SI-4944	SlghtrCrk,Fea2	Custer 1984	?	TW
ad	1260±50	UGa-1461	?site;VA	Outlaw 1977	?	TW
ad	1245±125	UGa-1547	?site;VA	Outlaw 1977	?	TW
ad	1235±60	SI-2188	Lankford 2	Custer 1984	?	TW
ad	1225±75	SI-4232	44NB147;24L4	Potter 1982	ch	TW
ad	1125±65	SI-4230	44NB147;20L2	Potter 1982	ch	TW
ad	1100±55	UGa-1440	Bay Vista,DL	Artusy 1976	?	TW
ad	1085±75	UGa-923	Mispillion,DL	Artusy 1976	?	TW
ad	1045±60	SI-2684	Lankford 1	Custer 1984	?	TW
ad	1015±55	UGa-1760	7S-H-18,Fea 3	Custer 1984	?	TW
ad	1005±70	SI-4374	44WM119	Waselkov 1982	?	TW
ad	1000±60	SI-2686	Lankford 2	Custer 1984	?	TW
ad	975±60	SI-4946	SlghtrCrk,Fea2	Custer 1984	?	TW
ad	1741+200	M-527	Gaston;Fea.148	Coe 1964:118	ch	CS
ad	1425±70	UGa-1086	31BR7,Fea.21	Phelps 1977:20	ch	CS
ad	1150±65	UGa-3143	31NS3b,Fea135A	Phelps 1980:71	ch	CS;CL
ad	1385+55	SI-3665	18AN17	Peck 1978	ch	"SV"
ad	1040±60	SI-3666	18AN17	Peck 1978	sh	"SV"
ad	1200±55	UGa-1761	Rbbns Fm,Fea 1	Custer 1984	?	PMC;KF
ad	1586+200	M-525	Gaston;var.fea	Coe 1964:118	ch	CL
ad	970±110	?	McLean Mound	MacCord 1966	?	?;MW mound
ad	950±70	UGa-3142	31NS3b,Fea137	Phelps 1980:72	ch	CL?
ad	950±80	Beta-1285	31NH28	Ward etal 1980	bn	—
ad	890±80	UGa-3849	31DR15,A,Z3,L2	Phelps 1981:50	sh	MP
ad	685±75	UGa-3144	31NS3b,Fea135B	Phelps 1980:71	ch	CL
ad	460±85	UGa-3435	31DR35,Pit 1	Phelps 1984:29	sh	MP
ad	360±65	UGa-1085	31CK9,MW bur.	Phelps 1977:20	bn?	--
ad	265±65	UGa-1088	31DR15,A,Z3	Phelps 1981	sh	MP
ad	1320+100	SI-216	Briarfield,VA	McCary 1967	ch	MK;SC;PG
ad	880±60	DIC-1769	44WM119	Waselkov 1982	?	MK;NM
ad	875±90	GX-2263	44PG40,Z.2	Opperman 1980	sh?	MK;SC
ad	860±60	DIC-1763	44WM119	Waselkov 1982	?	MK;NM
ad	815±95	I-5246	?site;MD	Gardner etal 1971		MK
ad	775±75	SI-4942	SlghtrCrk,Fea6	Custer 1984	?	MK;CB
ad	580±120	M-1608	?site;MD	Wright 1973	?	MK
ad	460±120	GX-2266	44PG40;Maycock	Barka etal 1977	?	MK
ad	460±90	Beta-12120	44VB7,Fea106AB	Egloff,pc	ch	MK
ad	445±90	?	44PG40;Maycock	Opperman 1980	ch	MK
ad	410±60	Beta-12121	44VB7,Fea106AE	Egloff,pc	ch	MK
ad	330±65	UGa-1273a	Wolfe Neck,DL	Artusy 1976	?	MK
ad	325±160	UGa-1273b	Wolfe Neck,DL	Artusy 1976	?	MK
ad	300±110	I-6060	HughesWillis,DL	Artusy 1976	?	MK
ad	260±60	Beta-12119	44VB7,Fea106C	Egloff,pc	ch	MK(fltbtm)

Table 2. Radiocarbon dates from sites in coastal areas of Atlantic North America (continued).

Date	Lab No.	Context	Source	Mat.	Cer.
ad 245±90	GX-2264	44PG40,Z.4	Oppermann 1980	?	MK;SC
ad 240±70	UGa-1762	Wilgus	Custer 1984	?	MK
ad 200±90	I-5817	Carey Farm,DL	Artusy 1976	?	MK
125±65 bc	UGa-4744	44NN7,Fea.3	Geier 1983:192	sh	MK;PC
140±65 bc	UGa-4743	44NN7,Fea.1	Geier 1983:192	sh	MK;PC
425±65 bc	UGa-4745	44NN7,Fea.3	Geier 1983:192	sh	MK;PC
660±60 bc	UGa-1424	31CK34;Beaker	Painter 1978	ch	"BK"
660±85 bc	UGa-1785	31CK34;Beaker	Painter 1978	ch	"BK"
810±260 bc	UGa-2189	31CK34;Beaker	Painter 1978	bn	"BK"
3985±75 bc*	UGa-4742	44NN7,Fea.1	Geier 1983:192	sh	MK;PC
ad 916±200	M-526	Gaston;var.fea	Coe 1964:118	ch	VC
ad 210±110	QC-1357	38GE219	Trinkley 1984	?	DC
120±130 bc	QC-1358	38GE237	Trinkley 1984	?	DC
90±? bc	?	Ft Johnson,SC	South etal 1976	?	HN
150±60 bc	?	38CH275	Trinkley 1984	?	HN
180±100 bc	?	38BK134	Trinkley 1984	?	HN
280±? bc	?	Ft Johnson,SC	South etal 1976	?	HN
ad 755±85	SI-2793	18KE3	Custer 1984	?	AC
ad 80±125	M-1605	?site;MD	Wright 1973	?	PC;AC
490±95 bc	I-5247	?site;MD	Gardner etal 1971	?	PC;AC
545±95 bc	I-5090	?site;MD	Gardner etal 1971	?	PC;AC
650±150 bc	?	Kingsmill,VA	Reinhart 1974	sh	PG;SC
1120±75 bc*	SI-2794	18KE3	Custer 1984	?	AC
ad 1565±90	I-3100	Peterson,Fea45	Ritchie 1969	ch	shell,grit
ad 1380±80	Y-1528	Hornblower2,MA	Ritchie 1969	ch	shell-cd
ad 1230±100	Y-1852	VincentFea28MA	Ritchie 1969	ch	shell,grit
ad 1160±80	Y-1653	Hornblower2,MA	Ritchie 1969	ch	shell-cd
ad 1150±80	Y-1652	Cunningham, MA	Ritchie 1969	ch	shell,grit
ad 400±80	Y-1533	CunninghamFea1	Ritchie 1969	ch	shell,grit
100±80 bc	Y-1812	VincentFea22MA	Ritchie 1969	ch	shell,grit
360±100 bc	I-3102	Peterson,Fea23	Ritchie 1969	ch	shell,grit
290±60 bc	UGa-1763	Wilgus	Custer 1984	?	CB;WN
375±65 bc	UGa-1224	Wolfe Neck,DL	Griffith 1982	?	CB
380±85 bc	I-6886	Dill Farm,DL	Griffith 1982	?	WN
500±85 bc	I-6891	Dill Farm,DL	Griffith 1982	?	WN
505±60 bc	UGa-1223	Wolfe Neck,DL	Griffith 1982	?	WN
ad 740±90	I-6338	Island Field,DL	Griffith 1982	?	HI
ad 645±55	UGa-1441	Cedar Crk,DL	Griffith 1982	?	HI
ad 640±155	UGa-3439	Del.Park	Custer 1984	?	HI
ad 625±85	I-6868	Red Lion	Custer 1984	?	HI?
ad 605±400	UGa-3437	Del.Park	Custer 1984	?	HI
ad 455±160	UGa-3438	Del.Park	Custer 1984	?	HI?
ad 360±75	UGa-3498	Del.Park	Custer 1984	?	HI?

Table 2. Radiocarbon dates from sites in coastal areas of Atlantic North America (continued).

Date	Lab No.	Context	Source	Mat.	Cer.
ad 275+100	UGa-3501	Del.Park	Custer 1984	?	HI?
ad 190+175	UGa-3464	Del.Park	Custer 1984	?	HI?
ad 185+95	UGa-3499	Del.Park	Custer 1984	?	HI?
ad 175+85	UGa-3502	Del.Park	Custer 1984	?	HI?
ad 100+80	UGa-3467	Del.Park	Custer 1984	?	HI?
ad 95+65	UGa-3558	Del.Park	Custer 1984	?	HI?
ad 85+75	UGa-3503	Del.Park	Custer 1984	?	HI?
ad 80+85	UGa-3465	Del.Park	Custer 1984	?	HI?
ad 65+170	UGa-3504	Del.Park	Custer 1984	?	HI?
10+80 bc	UGa-3500	Del.Park	Custer 1984	?	HI?
150+80 bc	UGa-3557	Del.Park	Custer 1984	?	HI?
150+80 bc	UGa-3557	Del.Park	Custer 1984	?	HI?
240+70 bc	SI-2189	18WO23	Custer 1984	?	Adena
240+100 bc	SI-2190	18WO23	Custer 1984	?	Adena
380+80 bc	Y-933	St Jones	Custer 1984	?	Adena
495+100 bc	SI-2188	18WO23	Custer 1984	?	Adena
785+75 bc	SI-2191	18WO23	Custer 1984	?	Adena
430+80 bc	Y-1532	Pratt,Fea13,MA	Ritchie 1969	ch	VN
520+120 bc	Y-1531	Pratt,Fea10,MA	Ritchie 1969	ch	VN
590+105 bc	I-3101	Peterson,Str2B	Ritchie 1969	ch	VN
841+68 bc	?	Hunter, NY	Ritchie 1969	?	VN
998+170 bc	?	Oberlander 2,NY	Ritchie 1969	?	VN
1250+100 bc	?	O'Neil 2,NY	Ritchie 1969	?	VN
1400+? bc	?	Ellsworth Falls,ME	Byers 1959	?	VN
1070+70 bc	SI-4376	44WM119	Waselkov 1982	ch	BN
1110+75 bc	SI-4375	44WM119	Waselkov 1982	sh	BN
1160+70 bc	SI-4377	44WM119	Waselkov 1982	sh	BN
950+95 bc	I-5091	Monocacy;MD	Gardner etal1971	?	MC
1220+120 bc	Y-1289	Miller Field,NJ	Kraft 1970	?	MC
2500+80 bc*	SI-2802	18KE17	Custer 1984	?	MC;MK
3065+70 bc*	SI-1907	18KE17	Custer 1984	?	MC;MK
935+175 bc	UGa-2904	Lighthouse Pt	Trinkley 1984	?	TC
2220+350 bc	UGa-584	Spanish Mt,SC	Trinkley 1984	?	TC
2515+95 bc	GXO-345	Rabbit Mt,SC	Trinkley 1984	?	ST
3050+180 bc	UM-432	Camden Co.,GA	Trinkley 1984	?	ST

Table 3. Archaeological sites in the Mid-Atlantic and adjacent regions of North America discussed in the text or listed in tables.

Delaware
Bay Vista   Carey Farm   Cedar Creek   Delaware Park   Dill Farm
Hughes Willis   Island Field   Lankford 1 and 2   Mispillion
Poplar Thicket   Red Lion   Robbins Farm   Slaughter Creek
Warrington   Wilgus   Wolfe Neck   7S-H-18

Maine
Ellsworth Falls

Maryland
Accokeek Creek   Monocacy   Saint Jones   18AN17   18KE3
18KE17   18WO23

Massachusetts
Cunningham   Hornblower 2   Peterson   Pratt   Vincent

New Jersey
Miller Field

New York
Hunter   Oberlander 2   O'Neil 2

North Carolina
[Beaufort Co.]
31BF25 (Archbell Point A)   31BF58

[Bertie Co.]
31BR1 (Shipyard Landing)   31BR7 (Jordan's Landing)

[Carteret Co.]
31CR2   31CR6   31CR16   31CR81   31CR97B   31CR107   31CR110
31CR116   31CR127   31CR140   31CR142

[Chowan Co.]
31CO1 (Bandon)   31CO5 (Hollowell)

[Cumberland Co.]
McLean mound

[Currituck Co.]
31CK8   31CK9 (Baum)   31CK10-31CK19   31CK21   31CK23-31CK28
31CK34 (Currituck Beaker)

[Dare Co.]
31DR1 (Cape Creek)   31DR12-31DR16   31DR33-31DR35 (Tillet)

[Edgecombe Co.]
31ED29 (Parker)   31ED31   31ED32

Table 3. Archaeological sites in the Mid-Atlantic and adjacent regions of North America discussed in the text or listed in tables (continued).

[Gates Co.]
31GA1 (Roberts Wharf)

[Hertford Co.]
31HF20 (Mount Pleasant)   31HF30 (Liberty Hill)

[Hyde Co.]
31HY43

[Nash Co.]
31NS3B (Thorpe)

[New Hanover Co.]
31NH28 (Cold Morning)

[Northampton Co.]
Gaston

[Onslow Co.]
31ON31   31ON33 Uniflite   31ON49   31ON111   31ON115   31ON117
31ON135   31ON138   31ON139   31ON143   31ON154   31ON155
31ON159   31ON162   31ON168   31ON187   31ON194

South Carolina
38BK134   38CH275   38GE219   38GE237   Fort Johnson
Lighthouse Point   Rabbit Mount   Spanish Mount

Virginia
[Charles City Co.]
44CC4 (Camp Weyanoke)

[Chesterfield Co.]
44CF1 (Comstock)   44CF67 (White Bank Park)

[Chesapeake City]
44CS4   44CS8   44CS42   44CS48

[Fairfax Co.]
Accotink

[Gloucester Co.]
Carter Creek

[Hampton City]
44HT3 (Briarfield)   44HT59   44HT62   Kicotan

[James City Co.]
44JC26 (Powhatan Creek)   44JC27 (College Creek)
44JC70 (Croaker Landing)   44JC118   44JC119   Kingsmill

Table 3. Archaeological sites in the Mid-Atlantic and adjacent regions of North America discussed in the text or listed in tables (continued).

[King George Co.]
De Shazo

[King William Co.]
Richmond (Moysonec) 44KW4 (T.Gray Haddon)

[Lancaster Co.]
Indiantown Farm 1 -4

[New Kent Co.]
44NK10 (Potts)

[Newport News City]
44NN7 (Skiffes Creek)

[Northumberland Co.]
44NB3 44NB8 44NB9 44NB10 44NB16 44NB19 44NB23 44NB25
44NB29 44NB41 44NB44 44NB49 44NB56 (Long Point) 44NB57
44NB63 44NB75 44NB86 44NB94 44NB97 44NB100 44NB102
44NB105 44NB107 44NB109 44NB110 44NB111 (Boathouse Pond)
44NB112 44NB123 44NB126 44NB127 44NB128 (Plum Nelly)
44NB131 44NB132 44NB139 44NB145 44NB147 (Bluefish Beach)
44NB158 44NB181 44NB185

[Powhatan Co.]
44PO3 (Hertzler)

[Prince George Co.]
44PG1 (Hopewell Airport) 44PG40 (Maycock's Point)
44PG51 (Powell's Creek)

[Portsmouth City]
44PM11 44PM12 44PM13 (Portsmouth Refinery) 44PM24 44PM29-
44PM32 44PM34 44PM36 44PM38-44PM40 44PM42-44PM45

[Richmond Co.]
Woodbury Farm

[Southampton Co.]
Hand

[Suffolk City]
44SK1 44SK2 44SK5 44SK14 44SK17 44SK21 44SK24 44SK27
44SK38 44SK40 44SK43 44SK46 44SK49 44SK50 44SK51
44SK52 44SK53 44SK58 44SK80 (Upton) 44SK81 (Butler)
44SK91 44SK142 44SK143 44SK144 44SK145

Table 3. Archaeological sites in the Mid-Atlantic and adjacent regions of North America discussed in the text or listed in tables (continued).

[Virginia Beach City]
44VB2 44VB4 44VB5 44VB7 (Great Neck) 44VB9 (Addington)
44VB11 (White Hill) 44VB12 44VB13 44VB14 44VB15
44VB16 (Swing) 44VB24 44VB25 44VB28 44VB39
44VB40 (Cedar Point) 44VB43 44VB48 (Chesopean) 44VB64
44VB67 44VB68 44VB70 44VB71 44VB72 44VB75 44VB76
44VB77 44VB80 44VB81 Fox Run 15 Cove Lynnhaven Marina
Long Creek Aragona Pungo #1 Pungo #2 Pungo #3

[Westmoreland Co.]
44WM4 (Mount Airy) 44WM6 (Hallowes) 44WM119 (White Oak Point)

[York Co.]
44YO2 (Kiskiak)

Table 4. Ceramic distributions at the Swing Site, 44VB16.

Horizontal Units: Surface, A-H, J-L, P-S, W, Beta, Gamma, Other
Vertical Units: 0-5

	Excavation Units													
Wares/types	A-0	A-3	A-5	B-3	C-1	C-3	C-4	C-5	D-1	D-3	D-5	E-3	E-4	
Colington														
ss	0	0	0	1	0	0	0	0	0	0	0	0	0	1
fb	0	4	0	0	4	2	15	0	2	12	0	1	21	61
fbi	0	0	0	0	1	0	2	0	3	0	1	2	6	15
pl	1	0	0	0	0	1	0	0	0	4	0	0	2	8
rs	4	2	0	0	5	4	9	0	2	12	0	6	16	60
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mockley														
nt	0	0	0	0	0	0	1	1	0	0	0	0	1	3
cd	1	0	0	0	1	1	0	0	0	0	0	0	5	8
rs	0	0	0	0	0	0	0	0	0	1	0	0	0	1
ot	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Mount Pleasant														
cd	3	0	3	0	0	0	1	2	0	0	0	0	4	13
nt	0	0	0	0	0	0	0	0	0	0	0	0	0	0
fb	1	0	0	0	0	0	0	0	0	0	0	0	0	1
rs	0	0	0	0	0	0	0	0	1	1	0	1	0	3
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deep Creek														
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	10	6	3	1	12	8	30	3	8	30	1	10	55	177

Table 4. Ceramic distributions at the Swing Site, 44VB16, continued.

Horizontal Units: Surface, A-H, J-L, P-S, W, Beta, Gamma, Other
Vertical Units: 0-5

	Excavation Units													
Wares/types	F-1	F-4	F-5	G-0	G-1	G-3	G-4	G-5	H-0	H-1	H-2	H-3	H-5	
Colington														
ss	0	4	0	0	0	0	0	0	1	0	0	0	0	5
fb	2	17	0	0	0	7	6	5	8	1	0	1	17	64
fbi	0	4	0	1	0	2	0	0	0	0	0	0	4	11
pl	0	6	0	0	0	1	0	0	0	0	0	0	0	7
rs	2	18	0	0	1	6	8	7	15	3	2	10	1	73
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mockley														
nt	1	1	3	0	0	0	0	2	0	0	0	0	0	7
cd	0	0	0	0	0	0	0	0	0	0	0	0	1	1
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Pleasant														
cd	0	11	1	0	0	0	0	0	0	0	0	0	0	12
nt	0	0	0	0	0	0	0	0	0	0	0	0	1	1
fb	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rs	1	0	0	0	0	0	0	1	1	0	0	0	0	3
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deep Creek														
rs	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Clay-tempered	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Unidentified	0	0	0	1	0	0	0	0	0	0	0	0	0	1
	6	61	4	2	1	16	14	16	26	4	2	11	24	187

Table 4. Ceramic distributions at the Swing Site, 44VB16, continued.

Horizontal Units: Surface, A-H, J-L, P-S, W, Beta, Gamma, Other
Vertical Units: 0-5

	Excavation Units													
Wares/types	J-1	J-2	K-2	L-2	P-1	P-2	Q-3	Q-11	R-1	R-2	S-1 &2	S-3	W-1 &2	
Colington														
ss	2	2	1	0	0	4	4	5	0	0	1	6	0	25
fb	1	1	30	11	1	9	11	2	2	4	1	3	0	76
fbi	0	0	1	0	0	1	3	0	0	14	0	0	0	19
pl	0	0	0	0	0	1	4	2	0	5	0	8	0	20
rs	2	3	0	0	0	5	8	4	3	14	0	9	2	50
ot	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Mockley														
nt	0	0	0	0	0	0	0	0	0	0	0	3	0	3
cd	0	0	0	0	0	0	1	0	0	0	0	1	0	2
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Pleasant														
cd	0	0	0	0	0	0	0	0	0	0	0	1	0	1
nt	0	0	0	0	0	0	1	0	0	0	0	1	0	2
fb	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	1	0	0	0	1	0	2
	5	6	32	11	1	20	33	14	5	37	2	33	2	201

Table 4. Ceramic distributions at the Swing Site, 44VB16, continued.

Horizontal Units: Surface, A-H, J-L, P-S, W, Beta, Gamma, Other
Vertical Units: 0-5

Wares/types	W-11	Gamma midden	Beta midden	Other	General Surface	SITE TOTALS(n)	%
Colington						1008	74.1
ss	0	7	3	1	31	73	
fb	0	30	6	28	135	400	
fbi	0	4	3	10	37	99	
pl	1	4	3	1	40	84	
rs	0	14	7	4	138	346	
ot	0	0	0	0	5	6	
Mockley						231	17.0
nt	0	4	3	2	122	144	
cd	0	24	6	1	31	73	
rs	0	1	0	2	8	12	
ot	0	0	0	0	0	2	
Mount Pleasant						96	7.1
cd	0	0	0	1	4	31	
nt	0	4	1	0	24	32	
fb	0	0	1	0	5	7	
rs	0	0	0	0	18	24	
ot	0	0	0	0	0	2	
Deep Creek	0	0	0	0	0	1	0.1
Clay-tempered	0	0	0	0	4	5	0.4
Mica-tempered	0	0	0	0	2	2	0.1
Unidentified	0	0	0	0	15	17	1.2
	1	92	33	50	619	1360	100.0%

Table 5. Summary of principal ceramic surface treatments at the Swing Site, 44VB16.

Colington	572	100.0%
ss	73	12.8
fb	400	69.9
fbi	99	17.3
Mockley	217	100.0%
nt	144	66.4
cd	73	33.6
Mt Pleasant	70	100.0%
cd	31	44.3
nt	32	45.7
fb	7	10.0

Table 6. Ceramic distributions at the Cedar Point Site, 44VB40.

Horizontal Units: Surface, 1 to 6, Fea.1 (F1), Fea.2 (F2)
Vertical Units: Gray Sand (g); Yellow Sand (y)

Wares/types	1g	1y	2g	2y	3g	3y	4g	4y	5g	5y	6g	6y	F1	F2	Surf.	Misc.	TOTAL
Colington																	477
ss	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
fb	0	0	1	1	3	11	16	45	47	31	41	7	41	10	23	15	292
fbi	1	0	0	0	0	0	0	0	7	0	0	0	0	1	1	0	10
pl	0	0	0	0	0	1	0	0	6	7	3	0	4	0	2	2	25
rs	1	1	0	3	1	5	2	15	24	39	9	7	7	4	24	6	148
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mockley																	71
nt	0	0	0	0	0	0	0	0	0	0	1	2	0	0	51	0	54
cd	0	0	0	0	0	0	0	0	0	0	0	2	1	0	9	0	12
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
ot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Pleasant																	391
cd	1	0	0	1	0	0	0	0	0	1	0	1	0	0	11	0	15
nt	5	18	0	22	2	29	1	22	7	19	7	15	2	10	74	5	238
fb	0	0	0	0	0	2	0	3	0	0	0	1	0	1	1	0	8
rs	0	2	0	17	5	12	1	16	0	8	1	17	2	6	0	5	92
ot	1	0	0	1	0	5	0	0	1	3	0	0	0	0	27	0	38
Deep Creek																	1
rs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
																	18
Unidentified	0	0	0	0	0	1	0	0	0	0	0	0	0	0	17	0	18
	9	21	1	45	11	66	20	101	93	108	63	52	57	32	246	33	958

Table 7. Summary distribution of principal ceramic types at the Cedar Point Site, 44VB40.

			Ratios excluding plain, residual, other
Colington	477	total=304	100.0%
ss	2		0.7%
fb	292		96.0%
fbi	10		3.3%
pl	25		
rs	148		
ot	0		
Mockley	71	total=66	100.0%
nt	54		81.8%
cd	12		18.2%
rs	5		
ot	0		
Mount Pleasant	391	total=261	100.0%
cd	15		5.7%
nt	238		91.2%
fb	8		3.1%
rs	92		
ot	38		
Deep Creek	1		
Unidentified	18		
TOTAL	958		

Table 8. Ceramic distributions at the Great Neck Site, 44VB7.

Horizontal Units: Surface, Units GN1-5, Features 1/2-4, 2/1-3, 3/1
Vertical Units: Zones I-II

	Total Surface	GN1-I	GN1-II	GN1-F2	GN1-F3	GN1-F4	GN2-I	GN2-II
Colington								
ss	58	48	17	34	1	2	0	3
fb	18	4	1	3	1	3	0	1
fbi	3	4	4	1	0	3	0	0
pl	2	0	1	0	0	0	0	0
rs	108	258	12	7	1	4	0	0
ot	3	0	0	0	0	0	0	0
Mockley								
nt	29	0	0	0	0	0	2	91
cd	9	2	0	0	0	0	0	24
rs	23	1	0	0	0	0	15	220
ot	0	0	0	0	0	0	0	3
Mount Pleasant								
cd	4	1	0	0	0	0	0	1
nt	9	1	3	0	0	0	0	2
fb	1	0	0	0	0	0	0	0
rs	11	29	3	1	1	0	0	1
ot	1	0	3	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0
	279	348	44	46	4	12	17	346

Table 8. Ceramic distributions at the Great Neck Site, 44VB7, continued.

Horizontal Units: Surface, Units GN1-5, Features 1/2-4, 2/1-3, 3/1
Vertical Units: Zones I-II

	GN2-F1	GN2-F2	GN2-F3	GN3-I	GN3-F1	GN4-I	GN4-II	GN5-I	GN5-II
Colington									
ss	0	0	0	0	6	0	0	0	2
fb	0	0	0	0	4	0	0	0	3
fbi	0	0	0	0	1	0	0	0	0
pl	0	0	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0	0
Mockley									
nt	11	28	3	4	404	39	53	12	64
cd	3	3	0	0	79	3	4	2	17
rs	32	37	3	5	319	27	99	56	231
ot	0	0	0	1	1	0	0	1	0
Mount Pleasant									
cd	0	0	0	0	3	0	0	0	0
nt	0	0	0	0	16	1	0	0	1
fb	0	0	0	0	0	0	0	0	0
rs	0	0	0	0	6	0	1	0	0
ot	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	2	0	0	0	0
	46	68	6	10	841	70	157	71	318

Table 9. Summary of principal ceramic types with surface treatments at the Great Neck Site, 44VB7.

	Unit 1		Units 2-5		Total Site*	
	n	%	n	%	n	%
Colington						
simple stamped	102	81.0	11	55.0	171	76.0
fabric impressed	12	9.5	8	40.0	38	16.9
fabric w/incision	12	9.5	1	5.0	16	7.1
	126	100.0	20	100.0	225	100.0
Mockley						
net impressed	0	0.0	711	84.0	740	83.5
cord marked	2	100.0	135	16.0	146	16.5
	2	100.0	846	100.0	886	100.0
Mount Pleasant						
cord marked	1	20.0	4	16.7	9	20.9
net impressed	4	80.0	20	83.3	33	76.7
fabric impressed	0	0.0	0	0.0	1	2.3
	5	100.0	24	100.0	43	99.9

	Colington	Mockley	Mount Pleasant
Unit 1	94.7%	1.5%	3.8%
Units 2-5	2.2%	95.1%	2.7%

*includes surface collections

Table 10. Ceramics in features of Lot 3, Great Neck Site (44VB7), excavated by the Virginia Research Center for Archaeology.

	Features						
Wares/types	106-C	106-C1	106-C2	106-C3	106-C4	106AE	106AE1
Colington	[not analyzed]						
Mockley	156	25	12	155	10	70	111
nt	114	16	11	87	9	25	25
cd	42	9	1	68	1	45	86
rs	[not analyzed]						
[Flat-bases]	7	1	0	0	0	0	0
nt	4	1	0	0	0	0	0
cd	0	0	0	0	0	0	0
rs	3	0	0	0	0	0	0
Mount Pleasant	0	1	0	0	0	0	1
nt	0	0	0	0	0	0	1
rs	0	1	0	0	0	0	0
Liberty Hill							
ss	0	0	0	1	0	0	0

Table 11. Ceramic distributions at various sites in Virginia Beach, Virginia.

	Sites								
	44VB11	44VB13	44VB14	44VB15	Fox Run	15 Cove	Lynn. Marina	Long Creek	Aragona
Colington	77	227	4	12	0	0	8	5	1
ss	9	27	0	0	0	0	0	0	0
fb	17	16	3	3	0	0	4	1	1
fbi	2	4	0	0	0	0	0	1	0
pl	0	1	0	0	0	0	0	0	0
rs	49	179	1	9	0	0	4	3	0
ot	0	0	0	0	0	0	0	0	0
Mockley	27	26	1	13	4	5	7	0	0
nt	11	16	1	9	4	2	5	0	0
cd	16	10	0	4	0	3	2	0	0
rs	0	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0	0
Mount Pleasant	58	96	7	8	3	4	4	12	2
cd	12	2	2	2	0	0	0	1	0
nt	22	16	5	1	0	4	3	5	2
fb	2	1	0	0	0	0	0	1	0
rs	20	77	0	3	3	0	0	5	0
ot	2	0	0	2	0	0	1	0	0
Deep Creek									
cd	0	0	0	0	0	0	0	0	0
nt	0	0	0	0	0	0	0	0	0
Clay tempered	0	0	0	0	0	0	0	1	0
Unidentified	1	0	0	3	0	0	1	0	0
	163	349	12	36	7	9	20	18	3

Table 11. Ceramic distributions at various sites in Virginia Beach, Virginia, continued.

	Sites						
	Pungo,	Pungo,		44VB7(with lot #)			
	site 1	Site 2	44VB16	[1,2]*	[3]	[7]	[16,17]***
Colington	0	0	1008	621	**	409	164
ss	0	0	73	69	-	102	86
fb	0	0	400	26	-	12	24
fbi	0	0	99	4	-	12	0
pl	0	0	84	2	-	1	23
rs	0	0	346	108	-	282	31
ot	0	0	6	3	-	0	0
Mockley	280	11	231	1960	547	3	0
nt	116	5	144	740	292	2	0
cd	33	1	73	146	252	1	0
rs	127	3	12	1068	3	0	0
ot	4	2	2	6	0	0	0
Mount Pleasant	15	1	96	58	2	42	4
cd	0	0	31	8	0	1	0
nt	15	0	32	29	1	4	0
fb	0	0	7	1	0	0	1
rs	0	1	24	19	1	34	3
ot	0	0	2	1	0	3	0
Middletown	14	0	0	0	0	0	19
cd	0	0	0	0	0	0	0
nt	4	0	0	0	0	0	5
pl	10	0	0	0	0	0	14
rs	0	0	0	0	0	0	0
Clay tempered	0	0	5	0	0	0	0
Other	0	0	3	0	0	0	0
Unidentified	0	0	17	2	1	0	0
	309	12	1360	2641	550+	454	187

*total surface collections are included with Lots 1-2
**Colington ceramics were not analyzed due to time limitation
***Feature 6 only

Table 12. Lithic assemblages from sites in Virginia Beach, Virginia.

Lithic Category	44VB7	44VB11	44VB13	44VB15	44VB16	44VB40
projectile points	2	1	0	0	3	0
preforms	1	0	0	0	0	2
microtools	0	0	2	0	4	0
gorgets	0	1	0	0	0	0
cores	1	0	0	0	4	0
microcores	18	5	6	0	41	4
flakes	101	8	20	13	271	26
grinding stones	2	0	3	0	0	0
cracked rock	309	0	18	0	45	59
geological specimens	8	0	1	0	17	8

	Pungo #1	Pungo #2	Pungo #3
projectile points	1	1	0
preforms, biface frags.	7	0	3
microtools	0	1	0
gorgets	0	0	0
cores	4	1	2
microcores	0	0	0
flakes	17	8	20
grinding stones	1	2	0
hammerstones	2	0	0
cracked rock	39	7	18

Table 13. Ceramics at four sites in the coastal plain and piedmont of Virginia (after Buchanan 1966, 1976; MacCord and Livesay 1982.)

Wares/types	Mount Airy 44WW4	Camp Weyanoke 44CC4, surface and tests	Hallowes Site,44WM6	Hertzler Site,44PO3
Townsend	26	1357	99	5
fb	1	1078	26	3
fbi	0	93	5	0
ss("Roanoke")	0	39	0	1
pl	10	120	52	1
rs	15	27	16	0
Mockley	9	236	1	1
cd	5	157	1	1
nt	4	79	0	0
Popes Creek	7	0	0	0
nt	3	0	0	0
rs	4	0	0	0
Prince George	0	101	0	0
fb	0	4	0	0
ss	0	55	0	0
nt	0	5	0	0
cd	0	32	0	0
pl	0	5	0	0
Stony Creek	0	1509	1	996
fb	0	434	0	624
ss	0	519	0	22
nt	0	48	0	6
cd	0	362	0	80
pl	0	82	0	53
rs	0	11	1	211
ot	0	53	0	0
Albemarle	0	112	4	2479
fb	0	35	0	1734
ss	0	14	0	75
cd	0	22	4	132
nt	0	10	0	18
pl	0	15	0	201
rs	0	2	0	319
ot	0	14	0	0
Potomac Creek	1	0	16	0
cd	1	0	8	0
pl	0	0	8	0
Camden, pl	1	0	3+bowl	0
Marcey Creek	0	0	0	1
Unidentified	0	0	0	2
	44	3315	124	3485

Table 14. Ceramics at four sites in the Virginia coastal plain. (See MacCord 1967; Gregory and Jerrell n.d.; McCary 1958; Buchanan 1983; MacCord 1982.)

Wares/types	Hopewell Airport (44PG1)	Powell's Creek (44PG51)*	Kiskiak (Chiskiak) (44YO2)	Butler (44SK81)	Upton (44SK80)
Townsend	37	689	20	18	290
fb	29	603	20	10	4
fbi	0	0	0	0	0
ss("Roanoke")	1	0	0	6	42
pl	5	0	0	0	0
rs	2	86	15**	2	244
ot	0	0	20***	0	0
Mockley	2	0	212	0	14
cd	2	0	158	0	14
nt	0	0	54	0	0
Prince George	4	7****	0	0	14****
fb	2	-	0	0	-
ss	1	-	0	0	-
nt	0	-	0	0	-
cd	1	-	0	0	-
pl	0	-	0	0	-
rs	0	-	0	0	-
Stony Creek	275	150****	19	7	32****
fb	112	-	0	0	-
ss	29	-	0	1	-
nt	5	-	17	0	-
cd	34	-	2	0	-
pl	11	-	0	0	-
rs	84	-	0	6	-
ot	0	-	0	0	-
Albemarle	22	0	112	0	0****
fb	3	0	35	0	0
ss	8	0	14	0	0
cd	2	0	22	0	0
nt	0	0	10	0	0
pl	1	0	15	0	0
rs	2	0	2	0	0
ot	0	0	14	0	0
Other	0	66	0	0	0
	340	912	3315	25	350

*Feature 18 only
**Actually shell-tempered residual is specified, technically this could be Townsend or Mockley, or some of each.
***"Potts cord-wrapped dowel"
****Not analyzed to type

Table 15. Ceramics at three sites in Virginia and Maryland. (After Stephenson 1963, Winfree 1967, Evans 1955, and McCary 1967.)

Wares/types	Accokeek Creek Site, Md.	T.Gray Haddon Site (44KW4)	Briarfield Site (44HT3)
Townsend	305	8659	99
fb	228	4057	60
fbi	77	0	0
pl	0	2116	0
rs	0	2486	0
ot	0	0	39
Mockley	7971	140	5709
cd	2635	123	3442
nt	5119	17	1705
pl	217	0	462
rs	0	0	100
Popes Creek nt	2344	0	0
Popes Creek cd	9714	0	0
Prince George	0	381	12
fb	0	39	0
nt	0	3	11
cd	0	188	1
pl	0	38	0
rs	0	113	0
Stony Creek	0	5410	83
fb	0	1025	37
ss	0	5	0
nt	0	2545	33
cd	0	211	9
pl	0	353	0
rs	0	1271	4
Albemarle	738	1465	0
fb	53	1206	0
cd	516	27	0
nt	169	38	0
pl	0	61	0
rs	0	133	0
Potomac Creek	34737	0	0
cd	34573	0	0
pl	164	0	0
Moyaone	1099	0	0
cd	977	0	0
incised	74	0	0
pl	48	0	0
Marcey Creek	274	5	0
Unident.,Other	1008	0	5
	58190	16060	5908

Table 16. Ceramic distributions in Portsmouth, Virginia sites collected by Gardner et al. (1981a, 1981b, 1982).

Sites	Colington	Mockley		other shell	Popes Creek			Prince George			Other	total
	fb	nt	cd	rs	nt	cd	rs	nt	cd	rs		
44PM11	-	-	-	-	1	-	1	-	-	-	-	2
44PM12	-	13	19	96	1	-	25	1	2	7	18	182
44PM24	-	-	-	-	-	-	-	7	-	46	-	53
44PM29	-	-	-	1	-	-	-	-	-	-	-	1
44PM30	-	-	-	1	-	-	1	-	-	1	-	3
44PM31	-	1	1	-	-	-	-	-	-	-	-	2
44PM32	-	-	-	-	-	-	-	-	-	1	-	1
44PM34	-	-	-	1	-	-	-	-	-	1	-	2
44PM36	-	-	-	-	3	-	7	14	-	54	1	79
44PM38	2	-	-	-	-	-	3	7	-	-	-	12
44PM39	-	4	(1*)	-	-	1	1	(1*)	1	1	-	10
44PM40	-	-	-	3	-	-	-	-	-	4	-	7
44PM42	-	-	1	5	-	-	6	1	-	1	-	14
44PM43	-	-	-	-	-	-	3	-	-	-	-	3
44PM44	-	-	1	2	-	-	-	-	-	-	-	3
44PM45	-	-	-	-	-	-	2	-	-	-	-	2
Area M	-	-	-	1	-	1	3	-	-	-	-	5
	2	18	23	110	5	2	52	31	3	116	19	381

Table 17. Ceramic distributions at selected sites in the Virginia coastal plain. (Evans 1955; note-some of Evans' types have been renamed or recombined since his publication; these changes are discussed in the text and are reflected below.)

Wares/types	Accotink	Kicotan	Potts 44NK10
Colington	42	473	1574
ss	1	186	67
fb	41	35	643
fbi	0	0	0
pl	0	248	671
rs	0	4	119
ot	0	0	74
Mockley	8	45	1804
cd	7	11	563
nt	1	6	1241
rs	0	0	0
ot	0	28	0
Stony Creek	0	11	1369
cd	0	6	558
nt	0	0	440
fb	0	1	146
ss	0	1	7
rs	0	0	17
ot	0	3	37
Clarksville	81	0	0
cd	42	0	0
nt	25	0	0
ot	14	0	0
Prince George	0	0	1341
cd	0	0	244
nt	0	0	748
fb	0	0	158
ss	0	0	18
rs	0	0	28
ot	0	0	36
Albemarle	0	0	0
fb	0	0	0
cd	0	0	0
nt	0	0	0
Clay tempered	0	0	36
Other	0	0	9
	131	529	6133

Table 18. Ceramic distributions at sites in the Virginia coastal plain (after Geier 1983, Opperman 1980, Reinhart 1978, Malpass 1976, and McCary 1976).

Wares/types	Skiffes Creek 44NN7	Maycocks Point 44PG40	College Creek 44JC27	Powhatan Creek 44JC26	Richmond Site Moysonec
Colington	0	57	2859	788	155
ss	-	-	0	17	0
fb	-	-	1015	23	70
fbi	-	-	102	0	2
pl	-	-	194	152	70
rs	-	-	1527	575	0
ot	-	-	21	21	13
Mockley	895	6875	745	619	203
cd	378	3765	292	456	113
nt	468	1822	57	141	89
rs	27	1277(pl)	348	[see CO]	[see CO]
ot	22	11	48(pl)	22	1
Popes Creek	183	0	0	0	0
cd	51	-	-	-	-
nt	125	-	-	-	-
rs	7	-	-	-	-
Stony Creek	0	144	136	274	555
cd	-	-	41	69	218
nt	-	-	13	18	188
fb	-	-	10	18	63
rs	-	-	72	131	0
ss	-	-	0	6	0
ot	-	-	0	32	86
Albemarle	0	13	180	0	15
cd	-	-	3	-	3
nt	-	-	0	-	5
fb	-	-	153	-	0
ss	-	-	1	-	0
rs	-	-	1	-	5
ot	-	-	22(pl)	-	2(pl)
Prince George	0	0	0	575	182
cd	-	-	-	80	60
nt	-	-	-	429	83
fb	-	-	-	8	28
ss	-	-	-	2	0
rs	-	-	-	247	0
ot	-	-	-	64	11(pl)
Clay Tempered	0	0	0	0	65
Other;Unident.	18	0	0	2648	0
	1096	7089	3920	4904	1175

Table 19. Ceramic distributions at sites in the Northern Neck of Virginia (after Potter 1982 and Waselkov 1982).

Wares/types	Long Point 44NB56	Plum Nelly 44NB128	Bluefish Beach 44NB147	Boathouse Pond 44NB111	White Oak Point 44WM119
Townsend	101	111	12	53	1025
ss	0	0	0	0	0
fb	17	14	11	23	1025
fbi	1	0	1	4	0
pl	4	14	0	26	0
rs	78	82	0	0	0
ot	1	0	0	0	0
corded	0	1	0	0	0
Mockley	0	59	58	78	285
nt	0	28	55	50	182
cd	0	31	3	28	103
Nomini	0	4	0	11	150
cd	0	3	0	11	62
fb	0	1	0	0	88
Popes Creek	0	2	0	2	574
cd (AC)	0	2	0	2	105
nt	0	0	0	0	469
Prince George nt	2	0	0	1	0
Currioman fb	0	1	0	4	582
Yeocomico	0	2	219	57	1118
Sullivan cd	0	2	0	23	0
Bushnell	0	0	0	0	360
Moyaone cd	0	0	0	0	12
Camden pl	0	0	0	0	17
Other; Unident.	0	7	74	370	1084
	103	188	363	599	5207

Table 20. Ceramic distributions from sites in Northumberland, Lancaster, and Richmond counties, Virginia (Potter 1982).

	Sites (all 44NB—)														
Wares/types	3	8	9	10	16	19	23	25	29	41	44	49	57	63	75
Townsend fb	2	-	-	-	33	16	13	3	5	4	x	1	1	-	-
fbi	-	-	-	-	2	2	-	-	-	-	1	-	-	-	-
pl	-	-	-	-	-	-	2	6	4	1	-	-	-	-	-
corded	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
shell, resid	-	-	-	-	70	145	53	16	-	4	5	-	-	-	-
Poto.Crk. cd	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Yeocomico	2	-	-	-	2	-	1	-	-	-	-	-	-	1	-
Mockley nt	1	-	-	-	2	148	-	32	2	-	-	-	-	-	-
cd	-	-	40	-	11	114	-	27	-	-	-	-	-	-	-
pl?	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
Accokeek cd	-	-	-	-	2	x	-	-	-	-	-	-	-	-	-
Popes Crk nt	-	-	-	-	2	x	-	-	-	-	-	-	-	-	-
Camden?	4	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Sullivan cd	-	6	-	1	4	-	6	-	-	-	-	-	-	-	1
Currioman fb	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-
Total	9	6	41	1	131	442+	75	84	11	9	8+	1	1	1	1
Wares/types	86	94	97	100	102	105	107	109	110	112	123	126	127	131	132
Townsend fb	-	-	5	-	1	-	-	-	-	2	-	8	1	3	1
fbi	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
pl	-	-	4	1	-	-	-	-	3	-	-	2	-	-	-
shell, resid	4	-	-	1	-	1	-	1	1	-	2	19	-	-	2
Poto.Crk. cd	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Yeocomico	1	-	-	-	-	1	-	-	-	-	-	-	-	1	-
Mockley nt	-	1	-	-	-	-	-	-	1	-	1	-	-	-	-
cd	-	-	2	-	-	-	1	1	-	-	-	1	-	2	-
Sullivan cd	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Currioman fb	-	-	-	-	-	-	-	-	-	-	-	5	1	-	-
Total	5	1	13	2	1	2	1	2	5	3	3	36	2	6	3

						Lancaster Co. Indian Town Farm				Richmond Co. Woodbury Farm		
Wares/types	139	145	158	181	185	1	2	3	4	1	2	TOTAL
Townsend fb	1	-	-	1	7	13	-	-	4	59	20	204
fbi	-	-	-	-	-	-	-	1	-	-	4	12
pl	-	-	-	-	-	9	-	8	-	-	-	40
corded	-	-	-	-	-	-	-	-	-	1	1?	3
shell, resid	-	3	9	-	8	22	-	29	5	259	1	660
Poto.Crk. cd	-	-	-	-	-	-	-	-	-	-	-	2
Yeocomico	-	-	-	-	2	-	-	-	-	-	-	11
Mockley nt	-	1	7	-	3	-	-	-	-	463	27	689
cd	-	2	6	-	14	3	6	14	1	77	4	326
pl?	-	-	-	-	3	-	2	-	-	43?	6?	66
Accokeek cd	-	-	-	-	-	-	-	-	-	-	-	2?
Popes Crk nt	-	-	-	-	-	-	-	-	-	-	-	2?
Camden?	-	-	-	-	-	-	-	-	-	-	-	8
Sullivan cd	-	-	-	-	-	-	-	-	-	-	-	19
Currioman fb	-	-	-	-	-	3	-	-	-	13	4	31
Other	-	-	2	-	1	2	-	-	-	-	-	5
Total	1	6	24	1	38	52	8	52	10	915	67	2080

Table 21. Features from the Hand Site (44SN22), Southampton County, Virginia (Smith 1971) containing Colington simple stamped or Mockley net impressed pottery.

Feature No.	Ware/type	Total sherds (all wares) in feature
31*	Colington ss Mockley net	91
47	Mockley net	?
170	Colington ss Mockley net	68
171	Colington ss	72
344	Colington ss	73
564	Colington ss	?

*Feature 31 contained 50 Colington fabric impressed sherds, 6 Colington plain, 2 Colington simple stamped, 1 Colington with exterior surface scraped, 2 Mockley net impressed, and 30 other sherds.

Table 22. Ceramics at four sites in the piedmont and coastal plain of Virginia (after Egloff 1981, Sasser 1972, Anderson 1974, Holland 1985, Bott 1979, and Outlaw 1980).

Wares/types	White Bank Park Site 44CF67	Comstock 44CF1	Carter Creek* Glo.Co.	44JC118 44JC119
Townsend	132	855	329	315
fb	121	847	143	132
fbi	0	0	14	1
ss("Roanoke")	0	8	0	1
pl	0	0	32	7
rs	11	0	140?	174
Mockley	189	97	54	30
cd	29	–	24	22
nt	108	–	30	8
pl	7	–	0	0
rs	45	–	0	[see Twn]
Prince George	94	–	–	–
fb	8	–	–	–
nt	26	–	–	–
cd	37	–	–	–
rs	23	–	–	–
Stony Creek	179	–	14	3
fb	13	–	1	–
nt	68	–	1	–
cd	44	–	8	–
rs	54	–	4	–
Albemarle	–	–	5	1?
fb	–	–	2	–
cd	–	–	2	–
nt	–	–	1	–
Unident., Other	304	–	–	333
	898	952	402	682

*There is uncertainty on my part concerning the validity of these figures, since the original (Anderson 1974) and secondary sources (Holland 1985) disagree on counts for some of the same types.

Table 23. Ceramic distributions at five sites in the Virginia coastal plain (after Clark 1977, Wittkofski 1980, Bott 1980, and Gardner *et al.* 1982).

Wares/types	44PM13	44HT59	44HT62	44CS42	44CS48
Colington	0	3	0	0	4
ss	-	0	-	-	1
fb	-	1	-	-	0
fbi	-	0	-	-	0
pl	-	1	-	-	0
rs	-	1	-	-	3?
ot	-	0	-	-	0
"Currituck"	28	0	0	0	0
Mockley	72	0	21	2	1
cd	7	-	5	0	0
nt	9	-	2	2	1
rs	26	-	1	0	0
ot	30	-	13	0	0
Stony Creek	41	1	14	9	3
cd	1	0	2	0	0
nt	9	0	8	9	0
fb	0	0	0	0	0
rs	29	1	4	0	3
ss	0	0	0	0	0
ot	2	0	0	0	0
Prince George	8	0	0	0	3
cd	0	-	-	-	0
nt	6	-	-	-	2
fb	0	-	-	-	0
ss	0	-	-	-	0
rs	0	-	-	-	1
ot	2	-	-	-	0
Other;Unident.	13	1	21	9	3
	162	5	56	20	14

Table 24. Ceramic distributions at sites in southeastern Virginia, based on collections in the Virginia Research Center for Archaeology; some sites are also represented by other work, summarized in separate tables (note: Liberty Hill and Middletown are provisional wares, described in Green 1986a and 1986b).

		Virginia Beach sites (44VB__)															
		2	4	5	7	9	12	24	25	28	39	43	48*	64	67	68	70
CO	ss	-	-	6	60	1	-	-	-	-	-	10	20	2	-	-	-
	fb	-	-	34	8	-	-	3	-	-	3	-	141	1	-	-	-
	fbi	-	-	3	-	-	-	-	-	-	-	-	20	-	-	-	-
	rs	-	-	-	15	-	-	3	-	-	-	3	166	1	1	-	-
MK	nt	-	2	7	-	10	-	-	3	-	-	3	10	-	-	-	-
	cd	-	3	1	1?	4	-	-	-	-	-	-	4	-	-	-	-
	ot	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	rs	-	2	-	-	-	-	1?	-	-	10	-	-	-	-	-	-
shl	rs	-	-	16	-	31	-	-	-	-	-	-	-	-	-	-	-
CS	fb	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	ss	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	rs	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
MP	nt	-	-	1	-	4	-	-	4	-	-	1	-	-	-	-	-
	cd	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	fb	-	-	-	-	-	2	-	-	-	-	-	27	-	-	-	-
	rs	-	-	2	-	3	2	1	-	-	-	1	3	-	2	-	-
MT	nt	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	cd	-	-	-	-	-	-	-	-	1	-	7	1	-	-	1	1
	fb	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
	ot	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
	rs	-	-	-	1	5	-	-	-	3	-	2	-	-	-	-	-
LH	nt	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-	-
	cd	-	-	-	1	-	-	-	-	-	-	-	53	-	-	-	-
	fb	-	-	-	-	-	-	-	-	-	-	-	138	-	-	-	-
	rs	-	-	-	-	-	-	-	-	-	-	-	44	-	-	-	-
DC	cd	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
TOTAL		1	7	70	87	58	6	9	7	5	13	29	652	4	3	1	3

*these figures represent only the portion examined in the time available; approximately 800-1000 sherds remain unanalyzed, most apparently Liberty Hill fabric, with minor amounts of cord and net; all the shell-tempered ware was analyzed.

Table 24. Ceramic distributions at sites in southeastern Virginia, based on collections in the Virginia Research Center for Archaeology (continued).

	Virginia Beach sites (44VB__)							Suffolk sites (44SK__)							
	71	72	75	76	77	80	81	1	2	5	14	17	21	24	27
CO ss	-	-	-	-	-	5	-	-	-	-	-	-	-	-	2
fb	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
fbi	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
rs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MK nt	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
cd	1	-	-	1	2	-	-	5	-	-	2	-	-	-	-
ot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
rs	2	-	-	1	6	-	-	-	-	-	-	-	-	-	-
shl rs	-	-	1	2	-	66	4	13	-	1	-	-	2·	2	-
CS fb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ss	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
rs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MP nt	1	-	-	-	-	-	-	2	-	-	-	-	2	-	1
cd	-	-	-	-	-	-	-	1	2	5	2	4	-	-	-
fb	1	-	-	-	-	-	-	-	-	-	-	11?	-	-	-
rs	-	-	-	-	-	1	-	2	-	2	2	2	3	-	-
MT nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cd	-	-	-	-	-	-	-	-	-	-	-	48	-	-	-
fb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
rs	2	1	-	-	-	-	-	1	-	-	-	1	-	-	-
LH nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
fb	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
rs	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
DC cd	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
HN cd	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
rs	-	-	-	-	-	-	-	-	-	-	2	2	-	1	-
TOTAL	7	1	1	4	8	78	4	34	2	9	8	74	7	3	3

Table 24. Ceramic distributions at sites in southeastern Virginia, based on collections in the Virginia Research Center for Archaeology (continued).

		Suffolk sites (44SK__)														
		38	40	43	46	48	49	50	51	52	53	58	80	91	142	143
CO	ss	-	-	-	-	-	1	-	1	2	-	7	51	-	-	-
	fb	2	-	1	-	-	-	-	-	-	-	1	1	-	2	2
	fbi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	rs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MK	nt	2	-	-	-	-	-	-	-	-	-	-	1	-	2	-
	cd	9	3	-	-	-	-	-	-	-	-	1	-	2	10	-
	ot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	rs	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-
shl	rs	5	3	1	4	2	2	1	-	8	2	6	273	-	-	-
CS	fb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ss	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
	rs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MP	nt	-	-	-	-	-	-	-	-	-	-	-	5	-	-	1
	cd	60	-	-	-	-	-	-	-	-	-	-	7	2	11	3
	-fb	26	-	-	-	-	-	-	-	-	-	-	-	-	4	4
	-rs	5	-	-	-	-	-	-	-	-	-	-	7	3	5	3
MT	nt	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
	cd	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	fb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	rs	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
LH	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cd	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	fb	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	rs	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
DC	cd	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	fb	-	-	-	-	-	-	-	-	-	-	-	-	-	7	2
HN	cd	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	rs	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MC		3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL		147	6	2	5	2	3	1	1	10	2	16	351	8	43	16

Table 24. Ceramic distributions at sites in southeastern Virginia, based on collections in the Virginia Research Center for Archaeology (continued).

		44SK__		Chesapeake (44CS__)				
		144	145	4	8	42	TOTAL, ALL SITES	
CO	ss	–	–	–	–	–	168	
	fb	–	–	–	–	–	204	Colington = 585
	fbi	–	–	–	–	–	24	
	rs	–	–	–	–	–	189	
MK	nt	–	–	–	–	1	51	
	cd	–	2	–	–	–	51	Mockley = 129
	ot	–	1	–	–	–	2	
	rs	–	–	–	–	–	25	
shl	rs	–	–	–	–	3	448	shell res.= 448
CS	fb	–	–	–	–	–	1	
	ss	–	–	–	–	–	5	Cashie = 7
	rs	–	–	–	–	–	1	
MP	nt	–	–	1	–	1	24	
	cd	–	–	–	–	–	98	Mount
	-fb	–	–	–	3	–	78	Pleasant = 258
	-rs	–	–	–	8	1	58	
MT	nt	–	–	–	–	9	12	
	cd	–	–	–	–	–	63	Middletown= 106
	fb	–	–	–	–	–	3	
	ot	–	–	–	–	–	1	
	rs	–	–	–	–	9	27	
LH	nt	–	–	–	–	–	22	
	cd	3	–	–	–	–	64	Liberty
	fb	–	–	–	–	–	156	Hill = 290
	rs	–	–	–	–	–	48	
DC	cd	–	–	–	–	–	6	Deep Creek= 15
	fb	–	–	–	–	–	9	
HN	cd	–	–	–	–	–	5	Hanover = 12
	rs	–	–	–	–	–	7	
MC		–	–	–	–	–	3	Marcey Creek= 3
TOTAL		3	3	1	11	24	1853	

Table 25. Ceramic distributions at sites on Colington Island, Dare County, North Carolina. (After Phelps 1981).

	Sites						
Wares/types	31DR15	31DR33	31DR34	31DR14	31DR12*	31DR13*	31DR16*
Colington	13	68	7	206	5	46	0
ss	0	3	0	5	0	0	0
fb	2	42	5	140	5	29	0
fbi	0	1	0	0	0	0	0
pl	0	6	2	8	0	7	0
rs	11	16	0	53	0	10	0
ot	0	0	0	0	0	0	0
Cashie	0	4	0	8	0	0	0
ss	0	0	0	1	0	0	0
fb	0	4	0	7	0	0	0
pl	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0
Mockley	0	0	0	0	0	0	0
nt	0	0	0	0	0	0	0
cd	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0
Mount Pleasant	364	63	0	19	30	62	132
cd	25	9	0	12	5	11	12
nt	53	11	0	0	2	0	27
fb	122	18	0	5	20	38	36
rs	147	25	0	2	2	0	44
ot	17	0	0	0	1	13	13
Clay tempered	0	0	0	4	0	0	0
	377	135	7	237	35	108	132

Table 26. Ceramic distributions at various sites in the northern and central coastal plain of North Carolina. (After Phelps 1975, 1980, 1981, 1982.)

Wares/types	Sites: 31ED29	31ED31	31ED32	31NS3B	31CO5	31GA1
Colington	0	0	0	0	190	537
ss	0	0	0	0	26	37
fb	0	0	0	0	154*c	474
fbi	0	0	0	0	0*c	4
pl	0	0	0	0	10	22
rs	0	0	0	0	0	*d
Cashie	0	0	0	2945*b	5	102
ss	0	0	0	(b)	5	84
fb	0	0	0	(a)	0	18
pl	0	0	0	(c)	0	0
rs	0	0	0	-	0	0
ot	0	0	0	(d)	0	0
Mockley, cd	0	0	0	0	5	2
Mt.Pleasant	0	0	0	2814*b	22	112
cd	0	0	0	(b)	3	23
nt	0	0	0	(c)	0	10
fb	0	0	0	(a)	17	76
rs	0	0	0	-	0	0
ot	0	0	0	-	2	3
Deep Creek	292	68	97	785*b	40	5
ss	5	2	0	-	0	0
nt	7	3	1	(c)	8	0
cd	133	35	39	(b)	4	1
fb	6*a	5*a	5*a	(a)	28	4
rs	140	21	52	-	0	0
ot	1	2	0	-	0	0
Marcey Creek	1	1	0	0	0	0
ss?	1	0	0	0	0	0
pl	0	1	0	0	0	0
Adams Creek,fb	0	0	0	0	7	9
Hanover	0	0	0	0	0	6
Fiber tempered,pl	5	0	1	0	2	2
	298	135	98	6544	271	775

*a-actually "cord dowel" impressions, according to Phelps (1981;1975). *b-based on Phelps' percentages; type breakdowns were not published, and the letters here indicate only (by their alphabetical order) their relative ranking according to his statements. *c-incision and punctation over fabric impression are present, but not distinguished in the sherd counts (Phelps 1982:27). *d-residual sherds not separated by ware/type (Phelps 1982:51).

Table 27. Ceramic distributions from surface collection of prehistoric sites in Currituck County, North Carolina.

Wares/types	31CK08	31CK09	31CK10	31CK11	31CK12	31CK13	31CK14	31CK15
Colington	3	1010	1	23	9	83	2	0
ss	0	8	0	0	0	2	0	0
fb	3	747	0	9	4	31	0	0
fbi	0	68	0	3	0	7	0	0
pl	0	37	0	0	0	2	0	0
rs	0	149	1	11	5	41	2	0
ot	0	1	0	0	0	0	0	0
Mockley	0	19	0	15	0	3	0	0
nt	0	18	0	8	0	2	0	0
cd	0	1	0	0	0	1	0	0
rs	0	0	0	7	0	0	0	0
ot	0	0	0	0	0	0	0	0
Mount Pleasant	1	335	3	0	23	27	7	32
cd	0	12	0	0	1	4	0	0
nt	1	134	3	0	6	5	1	7
fb	0	59	0	0	4	6	2	5
rs	0	101	0	0	10	10	2	16
ot	0	29	0	0	2	2	2	4
Deep Creek	0	41	0	0	0	0	0	0
nt	0	12	0	0	0	0	0	0
cd	0	4	0	0	0	0	0	0
fb	0	15	0	0	0	0	0	0
rs	0	10	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0
Hanover	0	2	0	0	0	0	0	0
fb	0	1	0	0	0	0	0	0
rs	0	1	0	0	0	0	0	0
Unident.	0	1	0	2	0	0	0	0
Total	4	1408	4	40	32	113	9	32

Table 27. Ceramic distributions from surface collection of prehistoric sites in Currituck County, North Carolina (continued).

Wares/types	31CK16	31CK17	31CK18	31CK19	31CK21	31CK23	31CK24	31CK25
Colington	56	28	3	26	55	0	4	0
ss	0	0	0	0	0	0	0	0
fb	32	8	0	13	22	0	0	0
fbi	2	0	0	4	5	0	0	0
pl	0	0	0	0	0	0	0	0
rs	22	20	3	9	28	0	4	0
ot	0	0	0	0	0	0	0	0
Mockley	0	0	0	1	2	0	0	0
nt	0	0	0	0	1	0	0	0
cd	0	0	0	1	1	0	0	0
rs	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0
Mount Pleasant	0	7	0	0	7	2	0	1
cd	0	0	0	0	0	0	0	0
nt	0	3	0	0	3	0	0	0
fb	0	0	0	0	2	0	0	0
rs	0	4	0	0	2	0	0	1
ot	0	0	0	0	0	2	0	0
Deep Creek	0	0	0	0	0	0	0	0
nt	0	0	0	0	0	0	0	0
cd	0	0	0	0	0	0	0	0
fb	0	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0	0
ot	0	0	0	0	0	0	0	0
Hanover	0	0	0	0	0	0	0	0
fb	0	0	0	0	0	0	0	0
rs	0	0	0	0	0	0	0	0
Unident.	0	0	0	0	0	0	0	1
	56	35	3	27	64	2	4	2

Table 27. Ceramic distributions from surface collection of prehistoric sites in Currituck County, North Carolina (continued).

Wares/types	31CK26	31CK27	31CK28	Overall Totals
Colington	3	14	20	1340
ss	0	1	0	11
fb	2	1	3	875
fbi	0	1	1	91
pl	0	0	0	39
rs	1	11	16	323
ot	0	0	0	1
Mockley	0	0	0	40
nt	0	0	0	29
cd	0	0	0	4
rs	0	0	0	7
ot	0	0	0	0
Mount Pleasant	17	71	21	554
cd	1	4	1	23
nt	11	36	6	216
fb	0	6	0	84
rs	5	23	14	188
ot	0	2	0	43
Deep Creek	0	0	0	41
nt	0	0	0	12
cd	0	0	0	4
fb	0	0	0	15
rs	0	0	0	10
ot	0	0	0	0
Hanover	0	0	0	2
fb	0	0	0	1
rs	0	0	0	1
Unident.	1	0	1	6
	21	85	42	1983

Table 28. Preliminary analysis of ceramics from 31CO1, Chowan County, North Carolina (also known as "Waratan" in the excavations by Painter and MacCord (see MacCord 1963).

	1986 coll.	1963 rept.	1956 rept. surface**	1956 rept. test exc.
Colington	75*	29	0	0
ss	-	2	0	0
fb	-	19	0	0
pl	-	2	0	0
rs	-	0	0	0
ot	-	6	0	0
Mockley	101	0	0	0
cd	-	0	0	0
nt	-	0	0	0
rs	-	0	0	0
ot	-	0	0	0
"Sand & Pebble tempered"	825	-	-	***
"Sand-temp."	-	945	0	0
ss		7	0	0
fb		204	0	0
nt		460	0	0
cd		81	0	0
rs		137	0	0
ot		56	0	0
"Gravel-temp."	-	15	357***	939
fb		3	149	692
nt		8	114	123
cd		0	66	87
ot		4	28	37****
"Clay-tempered"	25	-	***	-
Other	-	14	-	-
	1026	1003	357	939

Table 29. Ceramic ware distributions at the Chowanoke Site, by area (figures are sherd counts) (after Green 1986b)

	30-A	30-B*	30-E	30-F	20-A	20-B		Total
COLINGTON	47	264	83	3795	57	11076	=	15322
CASHIE	10	23	18	105	12	1682	=	1850
LIBERTY HILL	60	649	56	222	240	1560	=	2787
(Fabric)	(31)	(591)	(26)	(166)	(30)	(764)	=	(1608)
(Cord/Net)	(6)	(17)	(21)	(42)	(154)	(435)	=	(675)
MOUNT PLEASANT	520	2398	1021	1936	340	2277	=	8492
MOCKLEY	14	44	14	221	13	371	=	677
MIDDLETOWN	6	2	4	7	3	277	=	299
DEEP CREEK	119	1455	30	183	36	821	=	2644
HT-1	0	3	0	6	2	72	=	83
OTHER	0	3	1	18	3	54	=	79
Total =	776	4841	1227	6493	706	18190	=	32233

*Features only

Table 30. Ceramic ware distributions at the Chowanoke Site, by area (figures are percentages) (after Green 1986b).

	30-A	30-B*	30-E	30-F	20-A	20-B		Mean
COLINGTON	6.1	5.4	6.8	58.5	8.1	60.9	=	47.6%
CASHIE	1.3	0.5	1.5	1.6	1.7	9.3	=	5.7%
LIBERTY HILL	7.7	13.4	4.6	3.4	34.0	8.6	=	8.6%
(Fabric)	(4.0)	(12.2)	(2.1)	(2.6)	(4.2)	(4.2)	=	(5.0%)
(Cord/Net)	(0.8)	(0.4)	(1.7)	(0.6)	(21.8)	(2.4)	=	(2.1%)
MOUNT PLEASANT	67.0	49.5	83.2	29.8	48.2	12.5	=	26.3%
MOCKLEY	1.8	0.9	1.1	3.4	1.8	2.0	=	2.1%
MIDDLETOWN	0.8	0.1**	0.3	0.1	0.4	1.5	=	0.9%
DEEP CREEK	15.3	30.1	2.4	2.8	5.1	4.5	=	8.2%
HT-1	0.0	0.1**	0.0	0.1	0.3	0.4	=	0.3%
OTHER	0.0	0.1**	0.1	0.3	0.4	0.3	=	0.3%
Total =	100.0	100.0	100.0	100.0	100.0	100.0	=	100.0%

*Features only
**Actual figure is less than 0.1%

Table 31. Ceramic distributions at the Chowanoke Site, by area (figures are percentages for each ware) (after Green 1986b).

	30-A	30-B*	30-E	30-F	20-A	20-B	Total
COLINGTON	0.3	1.7	0.5	24.8	0.4	72.3	= 100.0%
CASHIE	0.5	1.2	1.0	5.7	0.6	91.0	= 100.0%
LIBERTY HILL	2.2	23.3	2.0	8.0	8.6	55.9	= 100.0%
(Fabric)	(1.9)	(36.8)	(1.6)	(10.3)	(1.9)	(47.5)	=(100.0%)
(Cord/Net)	(0.9)	(2.5)	(3.1)	(6.2)	(22.8)	(64.5)	=(100.0%)
MOUNT PLEASANT	6.1	28.3	12.0	22.8	4.0	26.8	= 100.0%
MOCKLEY	2.1	6.5	2.1	32.6	1.9	54.8	= 100.0%
MIDDLETOWN	2.0	0.7	1.3	2.3	1.0	92.7	= 100.0%
DEEP CREEK	4.5	55.0	1.1	6.9	1.4	31.1	= 100.0%
HT-1	0.0	3.6	0.0	7.2	2.4	86.8	= 100.0%
OTHER	0.0	3.8	1.3	22.8	3.8	68.3	= 100.0%
Area % =	2.4	15.0	3.8	20.1	2.2	56.5	= 100.0%

*Features only
**Actual figure is less than 0.1%

Table 32. Distribution of principal ceramic types at Chowanoke (figures are sherd counts). Rare types and residuals excluded (after Green 1986b).

	AREAS 30-A	30-B*	30-E	30-F	20-A	20-B		TOTAL
COLINGTON								
Fabric-impressed	2	202	31	2539	24	5593	=	8391
Fab.impr.& incised	2	3	0	18	1	204	=	228
Simple stamped	1	3	4	37	2	317	=	364
Plain	0	0	0	60	2	230	=	292
	5	208	35	2654	29	6344	=	9275
CASHIE								
Fabric-impressed	4	20	8	81	9	801	=	923
Fab.impr.& incised	0	0	0	0	0	4	=	4
Simple stamped	4	1	6	14	1	448	=	474
Plain	0	0	0	6	0	47	=	53
	8	21	14	101	10	1300	=	1454
MOCKLEY								
Net-impressed	7	32	9	135	11	183	=	377
Cord-marked	0	2	4	46	2	178	=	232
	7	34	13	181	13	361	=	609
LIBERTY HILL								
Fabric-impressed	31	591	26	166	30	764	=	1608
Net-impressed	4	7	16	20	98	195	=	340
Cord-marked	2	10	5	22	56	240	=	335
	37	608	47	208	184	1199	=	2283
MOUNT PLEASANT								
Fabric-impressed	91	1381	209	868	23	454	=	3026
Net-impressed	33	137	193	110	107	308	=	888
Cord-marked	31	291	142	355	56	459	=	1334
	155	1809	544	1333	186	1221	=	5248
DEEP CREEK								
Fabric-impressed	17	268	4	15	3	103	=	410
Net-impressed	28	218	8	49	12	112	=	427
Cord-marked	32	354	10	66	5	319	=	786
	77	840	22	130	20	534	=	1623

*features only

Table 33. Distribution of principal ceramic types at Chowanoke (figures are percentages). Rare types and residuals excluded (after Green 1986b).

	AREAS						
	30-A	30-B*	30-E	30-F	20-A	20-B	SITE
COLINGTON							
Fabric-impressed	40.0	97.2	88.6	95.6	82.8	88.2 =	90.5
Fab.impr.& incised	40.0	1.4	0.0	6.7	3.4	3.2 =	2.5
Simple stamped	20.0	1.4	11.4	1.4	6.9	5.0 =	3.9
Plain	0.0	0.0	0.0	2.3	6.9	3.6 =	3.1
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0
CASHIE							
Fabric-impressed	50.0	95.2	57.1	80.2	90.0	61.6 =	63.5
Fab.impr.& incised	0.0	0.0	0.0	0.0	0.0	0.3 =	0.3
Simple stamped	50.0	4.8	42.9	13.9	10.0	34.5 =	32.6
Plain	0.0	0.0	0.0	5.9	0.0	3.6 =	3.6
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0
MOCKLEY							
Net-impressed	100.0	94.1	69.2	74.6	84.6	50.7 =	61.9
Cord-marked	0.0	5.9	30.8	25.4	15.4	49.3 =	38.1
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0
LIBERTY HILL							
Fabric-impressed	83.8	97.2	55.3	79.8	16.3	63.7 =	70.4
Net-impressed	10.8	1.2	34.1	9.6	53.3	16.3 =	14.9
Cord-marked	5.4	1.6	10.6	10.6	30.4	20.0 =	14.7
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0
MOUNT PLEASANT							
Fabric-impressed	58.7	76.3	38.4	65.1	12.4	37.2 =	57.7
Net-impressed	21.3	7.6	35.5	8.3	57.5	25.2 =	16.9
Cord-marked	20.0	16.1	26.1	26.6	30.1	37.6 =	25.4
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0
DEEP CREEK							
Fabric-impressed	22.1	31.9	18.2	11.5	15.0	19.3 =	25.3
Net-impressed	36.4	26.0	36.4	37.7	60.0	21.0 =	26.3
Cord-marked	41.5	42.1	45.4	50.8	25.0	59.7 =	48.4
	100.0	100.0	100.0	100.0	100.0	100.0 =	100.0

*features only

Table 34. Ceramic distribution at 31HY43, possible site of Pomeiooc, Hyde County, North Carolina.

Ware/type	n	%	% of types within major wares
Colington	1244	83.3%	
simple stamped	360		94%
plain	23		6%
residual	861		
Mockley	2	0.2%	
net impressed	2		
Middletown	231	15.5%	
net impressed	70		64%
cord marked	35		32%
fabric impressed	5		4%
residual	121		
Hanover	8	0.5%	
cord marked	4		
fabric impressed	3		
residual	1		
clay-tempered, net impressed	7	0.5%	
	1492	100.0%	

Table 35. Colington Ware distribution in Haag's (1956) survey of the North Carolina coastal plain (figures are sherd counts).

Site	Fabric impressed	Fabric-impressed; incised/punctated	Simple stamped	"Plain" (Residual?)	Total
A-1	152	5	8	89	254
A-2	-	-	-	-	-
A-3	-	-	-	-	-
A-4	-	-	-	1	1
A-5	6	1	-	2	9
A-6	-	-	-	1	1
A-7	23	-	-	10	33
A-8	3	-	-	-	3
A-9	15	1	-	22	38
A-10	-	-	-	-	-
A-12	-	-	-	-	-
B-3	36	-	-	47	83
B-4	17	-	1	21	39
B-5	25	-	-	-	25
C-1	5	-	-	-	5
C-2	8	-	-	6	14
C-3	44	-	-	23	67
C-4	56	-	-	84	140
C-5	-	-	-	-	-
H-1	25	3	74	24	126
H-2	-	-	-	-	-
H-3	-	-	-	-	-
H-4	138	2	-	325	465
H-5	31	-	-	35	66
H-6	10	-	1	11	22
H-7	10	-	-	10	20
H-8	-	-	-	4	4
H-9	29	-	5	-	34
H-11	-	-	-	-	-
H-12	-	-	-	-	-
N-1	-	-	-	-	-
N-2	-	-	-	-	-
N-3	5	-	1	9	15
N-4	-	-	-	-	-
O-1	-	-	-	-	-
P-1	16	-	4	8	28
P-2	-	-	-	-	-
P-3	-	-	-	-	-
P-4	4	-	-	-	4
P-5	40	-	-	21	61
P-6	8	-	1	15	24
P-7	-	-	-	-	-
P-8	-	-	-	-	-
P-9	-	-	-	-	-
P-11	-	-	-	-	-
P-12	-	-	-	-	-

Table 35. Colington Ware distribution in Haag's (1956) survey of the North Carolina coastal plain (continued) (figures are sherd counts).

Site	Fabric impressed	Fabric-impressed; incised/punctated	Simple stamped	"Plain" (Residual?)	Total
P-13	56	-	4	37	97
P-14	34	-	11	1	46
P-15	7	-	-	2	9
P-16	-	-	-	-	-
P-17	26	-	2	16	44
P-18	25	-	7	9	41
P-19	61	-	10	7	78
P-20	-	-	-	-	-
P-21	27	-	-	7	34
P-22	-	-	-	-	-
P-23	16	-	1	6	23
P-24	-	-	-	-	-
P-25	42	-	-	36	78
P-26	-	-	-	-	-
P-27	-	-	-	-	-
P-28	-	-	-	1	1
P-29	-	-	-	-	-
P-30	-	-	-	-	-
P-31	-	-	-	-	-
P-32	-	-	-	-	-
P-33	-	-	-	-	-
P-34	-	-	-	-	-
P-35	-	-	-	-	-
P-36	-	-	-	-	-
P-37	-	-	-	-	-
P-38	-	-	-	-	-
P-39	-	-	-	3	3
R-1	14	-	-	24	38
R-2	14	-	2	13	29
R-3	3	-	-	7	10
76 sites	1031	12	132	937	2112

Table 36. Sites from Haag's (1956) survey with relative concentrations of Colington Simple Stamped ware.

Site	Simple Stamped / Total Colington	%	Simple Stamped / Total-plain/residual	%
H-1	74/126	58.7	74/102	72.5
P-14	11/46	23.9	11/45	24.4
P-18	7/41	17.1	7/32	21.9
H-9	5/34	14.7	5/34	14.7
P-1	4/28	14.3	4/20	20.0
P-19	10/78	12.8	10/71	14.1
R-2	2/29	6.9	2/16	12.5
N-3	1/15	6.7	1/6	16.7
P-17	2/44	4.5	2/28	7.1
H-6	1/22	4.5	1/11	9.1
P-23	1/23	4.3	1/17	5.9
P-6	1/24	4.2	1/9	11.1
P-13	4/97	4.1	4/60	6.7
A-1	8/254	3.1	8/165	4.8
B-4	1/39	2.6	1/18	5.6

Table 37. Ceramic distributions at 31ON33 (Uniflite Site) and other sites in the southern North Carolina coastal plain (After Loftfield 1976,1979.)

Wares/types	31ON33		Total from 1976 Survey*	
White Oak [Colington]***	6520	92.1	6320	27.1
ss	0	0.0	30	0.1
fb	4754	67.1	5228	22.4
pl	615	8.7	1062	4.6
rs	1151	16.3	**	**
White Oak [Mockley]	325	4.6	139	0.6
cd	325	4.6	128	0.5
nt	0	0.0	11	0.1
Carteret [Hanover]	150	2.1	1957	8.3
cd	78	1.1	429	1.8
fb	56	0.8	1482	6.3
pl	8	0.1	46	0.2
rs	8	0.1	**	**
New River [Deep Creek?]	33	0.5	891	3.8
ss	0	0.0	30	0.1
cd	9	0.1	626	2.7
nt	0	0.0	19	0.1
fb	4	0.1	184	0.8
pl	0	0.0	32	0.1
rs	20	0.3	**	**
Onslow [Liberty Hill?]	41	0.6	17	0.1
cd	18	0.3	17	0.1
pl	10	0.1	0	0.0
rs	13	0.2	**	**
Adams Creek	0	0.0	1337	5.7
cd	0	0.0	31	0.1
fb	0	0.0	1306	5.6
Fiber-tempered	8	0.1	0	0.0
Unidentified	3	0.1	12700	54.4
	7080	100.1	23361	100.0

*Surface collection of 155 sites plus test excavations at 3 sites, in the area between the Pamlico and New rivers (see Loftfield 1976).
**Counted below in one group as "Unidentified".
***Ware names in brackets reflect more commonly used terms.

Table 38. Proportions of selected Middle and Late Woodland ceramic types from Loftfield's (1976) survey of sites in Onslow and Carteret counties, North Carolina.

Note: 175 sites and more than 21,000 sherds were identified by the survey; ceramic analyses were presented for 147 sites which had at least 50 identifiable sherds.
[LATE WOODLAND] 12 of 147 sites contained Colington simple stamped pottery (Loftfield's White Oak thong marked).

site	Col ss	Total Col	% Tot	Total sherds
31ON31	1	54	1.9	212
31ON49	8	36	22.2	229
31ON138	1	10	10.0	25
31ON139	4	12	33.3	28
31ON155	3	13	23.1	243
31ON162	4	46	8.7	127
31ON168	1	3	33.3	31
31CR6	1	268	0.4	492
31CR97B	1	70	1.4	104
31CR107	2	25	8.0	135
31CR110	1	28	3.6	163
31CR140	3	461	0.7	1900
	30	1026	2.9	3689

[MIDDLE WOODLAND] 23 of 147 sites contained Mockley net impressed and cord marked pottery (Loftfield's White Oak net impressed and cord marked types).

site	Mk nt	Mk cd	Total Sherds
31ON49	3	3	229
31ON111	0	2	86
31ON115	2	0	80
31ON117	1	0	6
31ON135	0	1	39
31ON139	0	5	28
31ON143	0	1	19
31ON154	0	6	205
31ON155	2	8	243
31ON159	0	2	209
31ON162	0	2	127
31ON168	0	2	31
31ON187	0	1	41
31ON194	0	2	478
31CR2	0	1	90
31CR6	6	5	492
31CR16	0	2	527
31CR81	0	34	1680
31CR110	0	2	163
31CR116	0	4	4
31CR127	1	0	50
31CR140	0	12	1900
31CR142	0	2	43
	15	97	6770

Proportions range from < 1 to about 4-5%

Figures 1 to 157 follow in numerical order
and occupy pages 201 to 327.

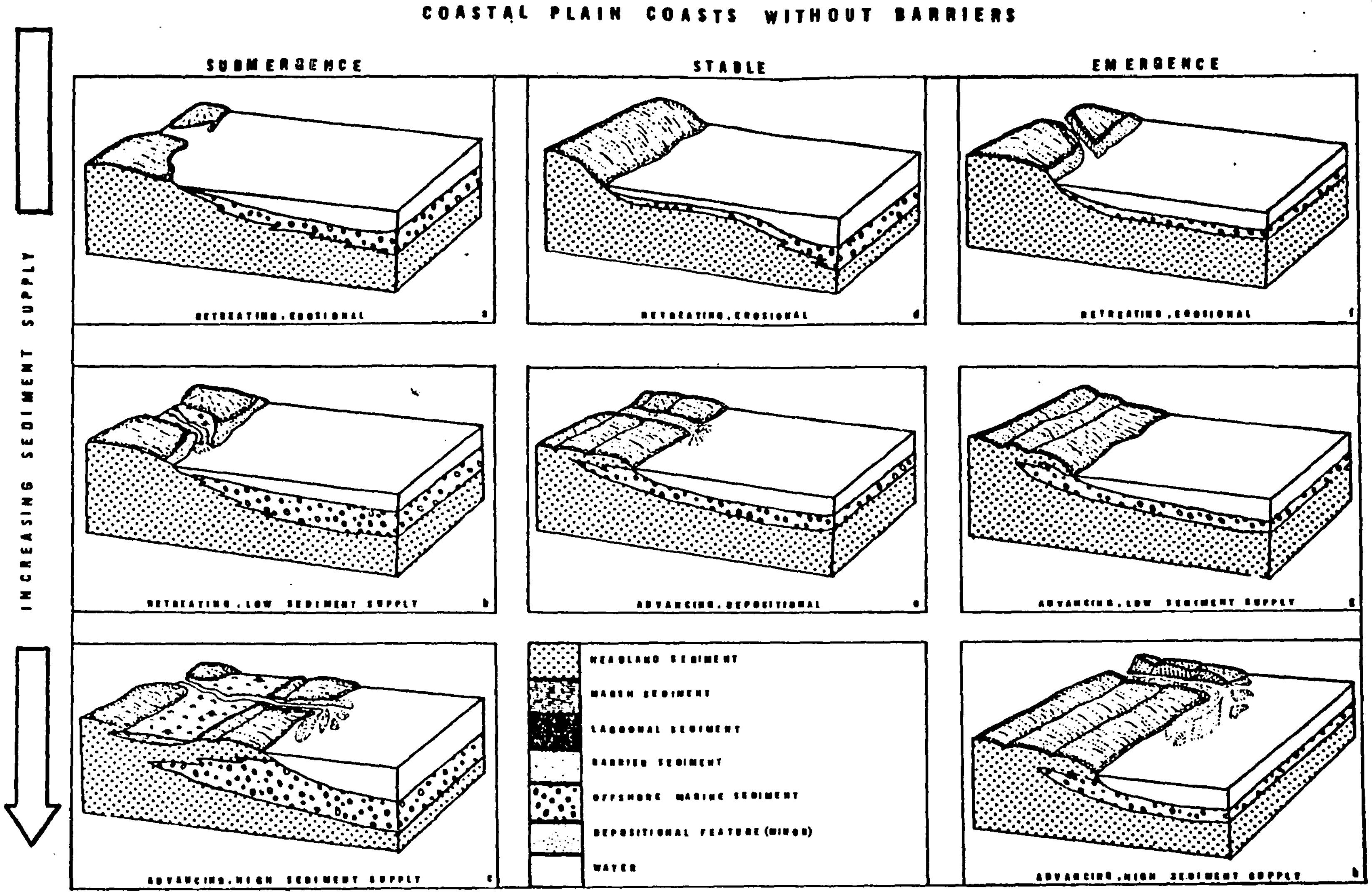


Figure 1. Coastal plain coasts without barriers (Kearns 1974: Fig. 8).

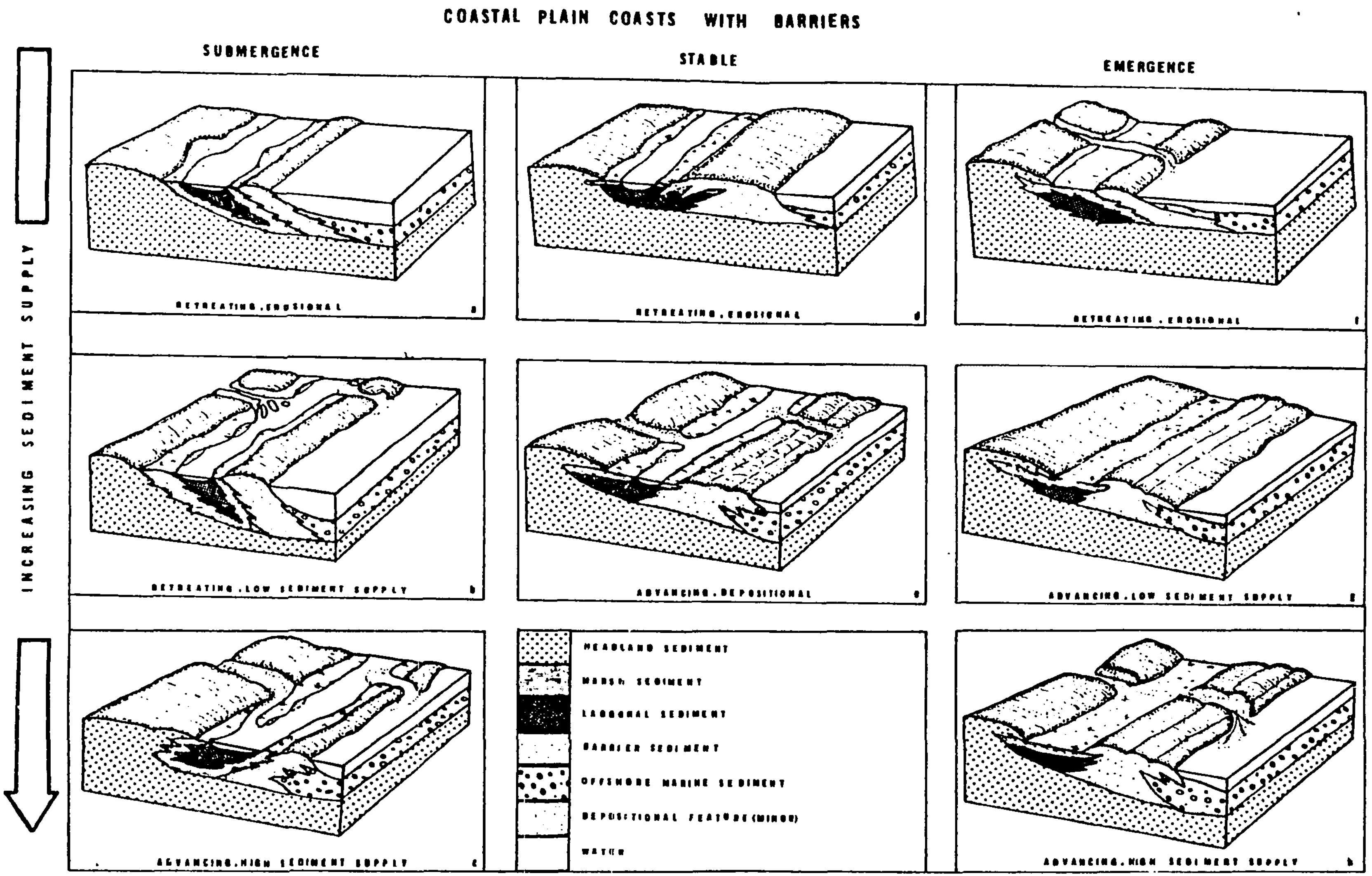


Figure 2. Coastal plain coasts with barriers (Kearns 1974: Fig. 9).

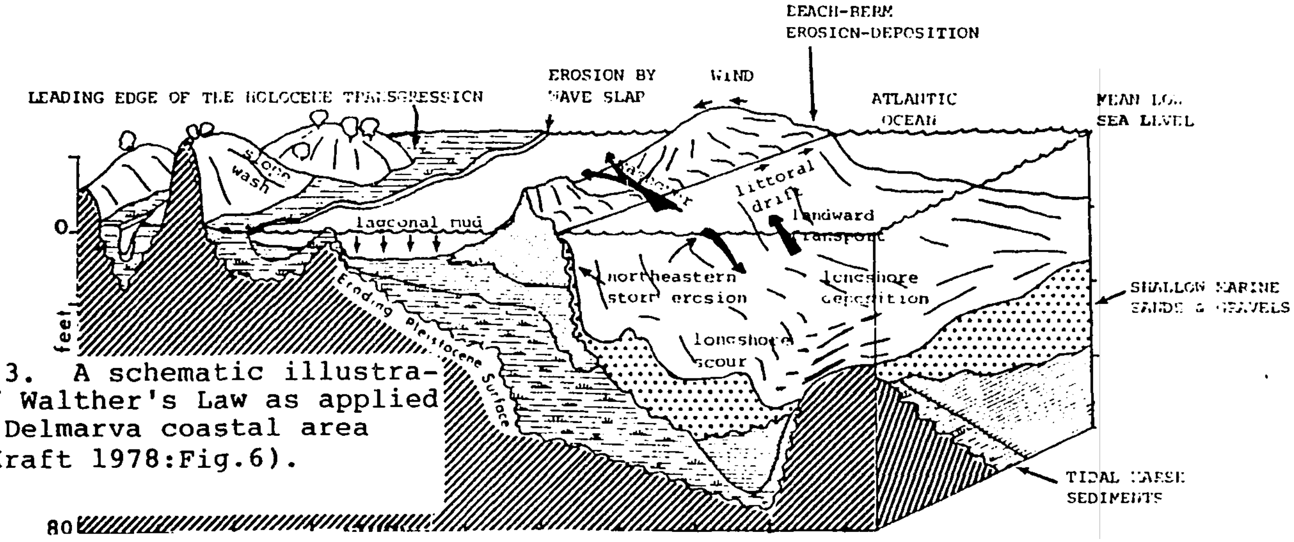


Figure 3. A schematic illustration of Walther's Law as applied to the Delmarva coastal area (from Kraft 1978:Fig.6).

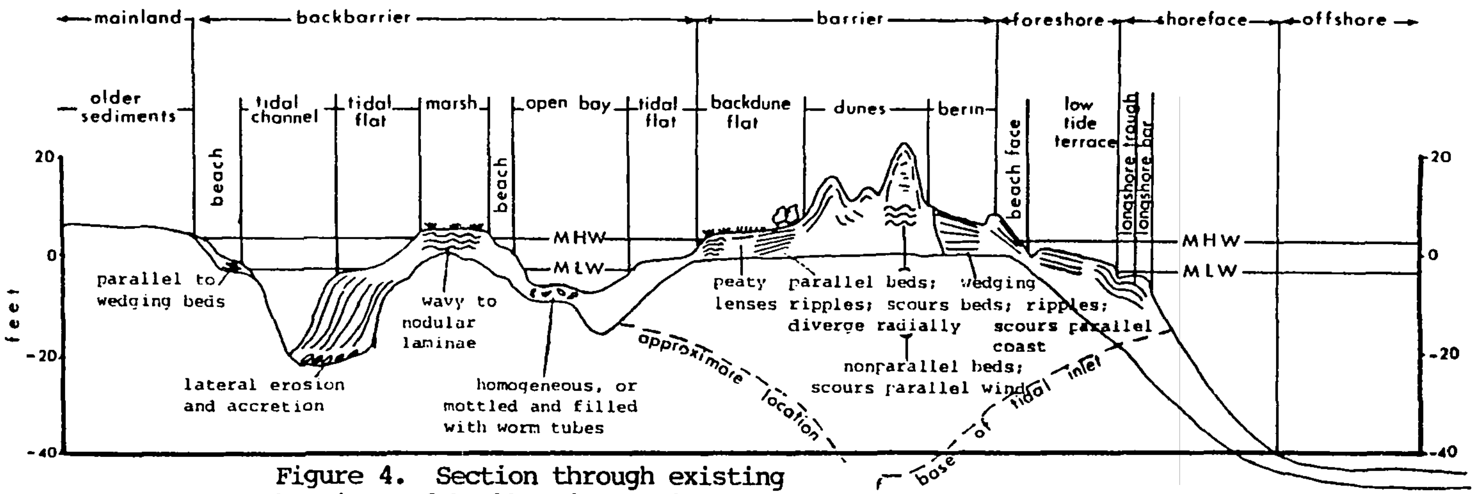


Figure 4. Section through existing barrier and backbarrier environments, Virginia coastal plain(after Oaks and Coch 1973:Fig.8).

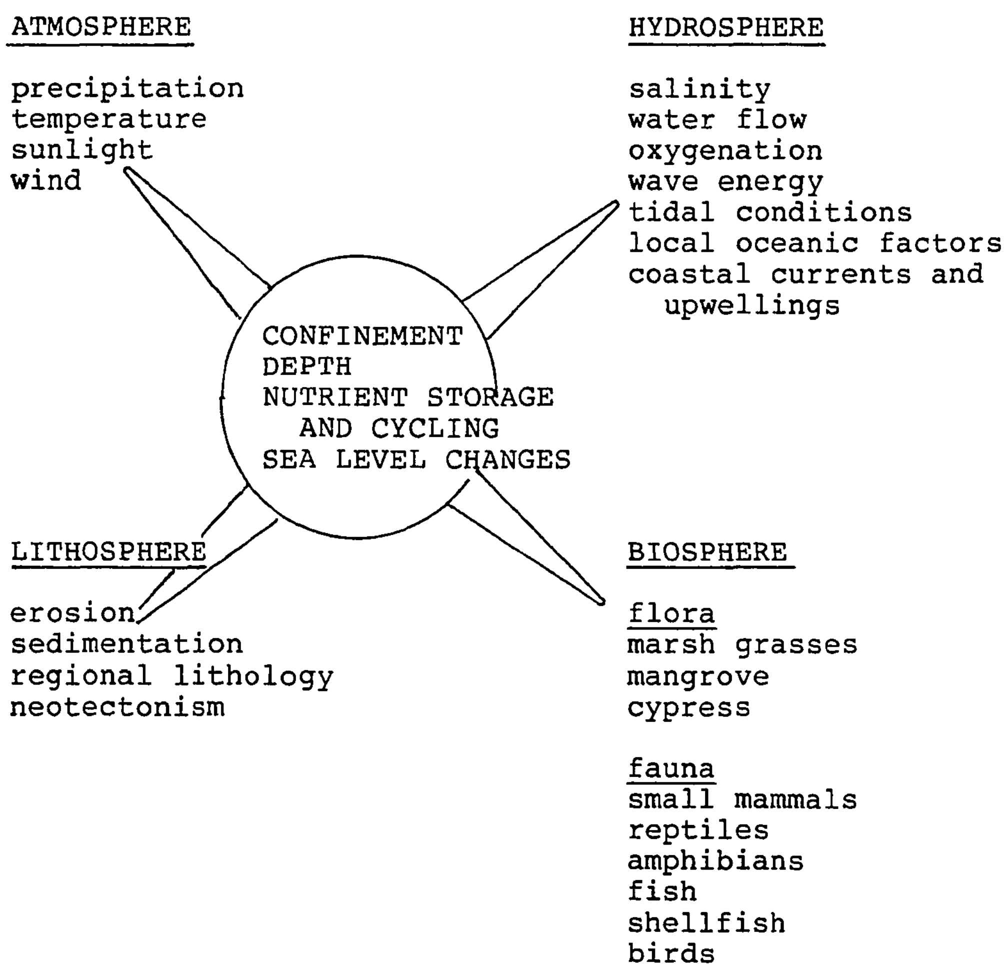
Figure 5. Estuarine elements and processes.

I. Types of Estuaries (according to geomorphic history)

a. drowned river valley
b. bar-built
c. tectonic
d. fjord

II. Estuarine Habitats

a. beach face
b. sand dunes
c. tidal flats
d. submerged grassbeds
e. shellfish beds
f. high marsh



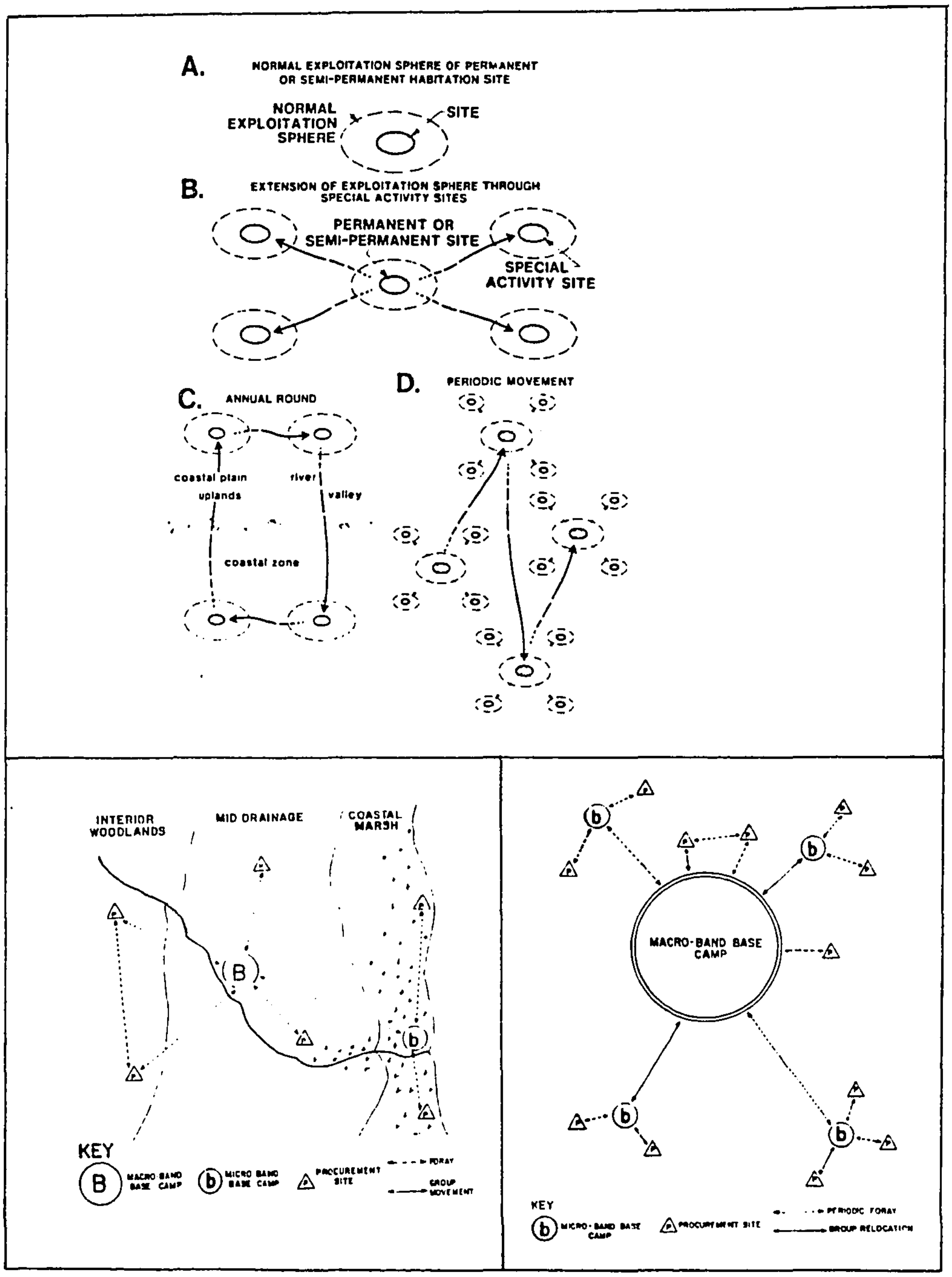


Figure 6. Hypothetical patterns of subsistence and settlement in the coastal zones of the Gulf Coast and Mid-Atlantic (Gagliano 1983: Fig.1.24; Custer 1984).

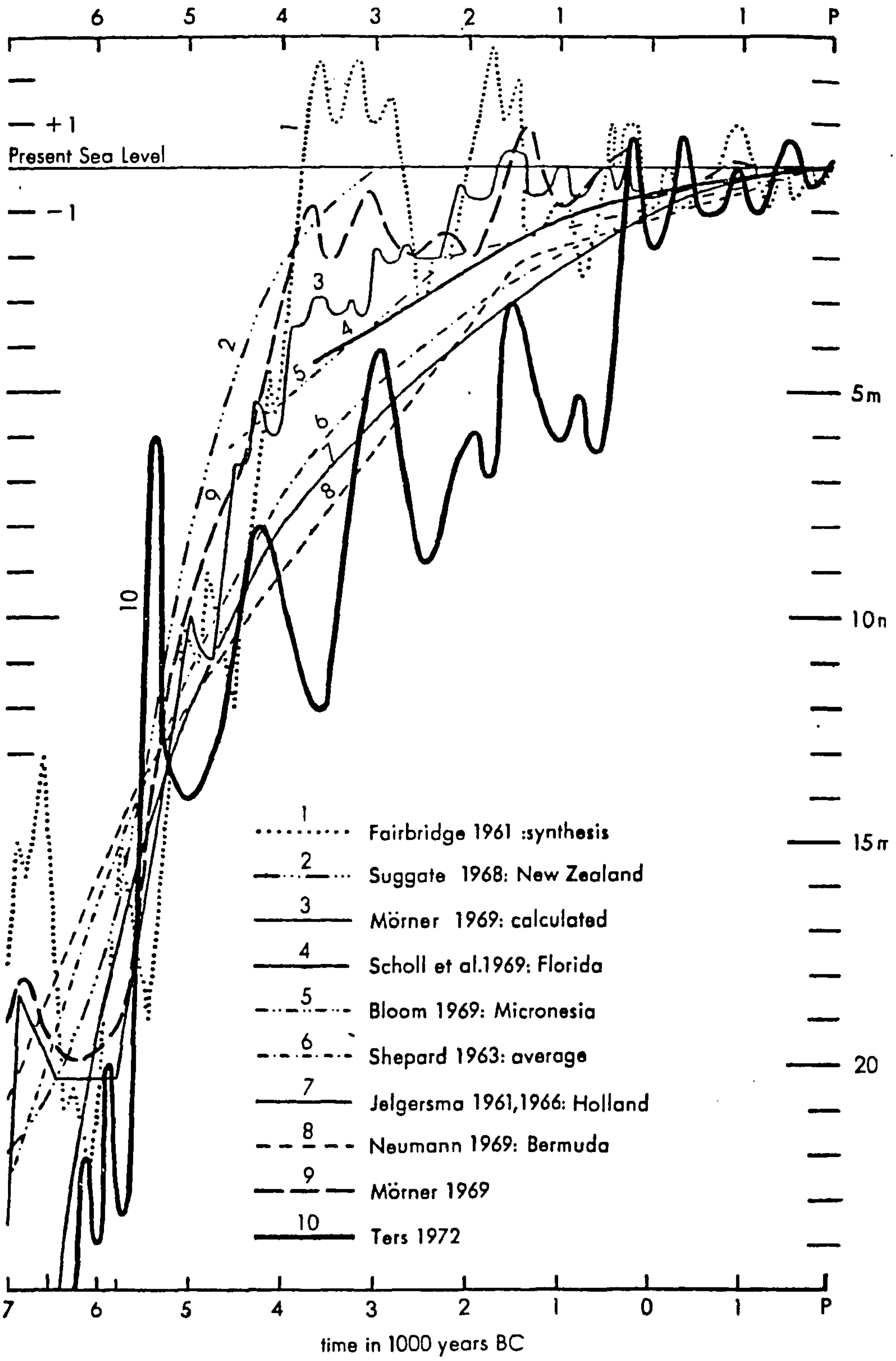


Figure 7. Global sea level curves for the Holocene Epoch (Everard 1980:Fig.2).

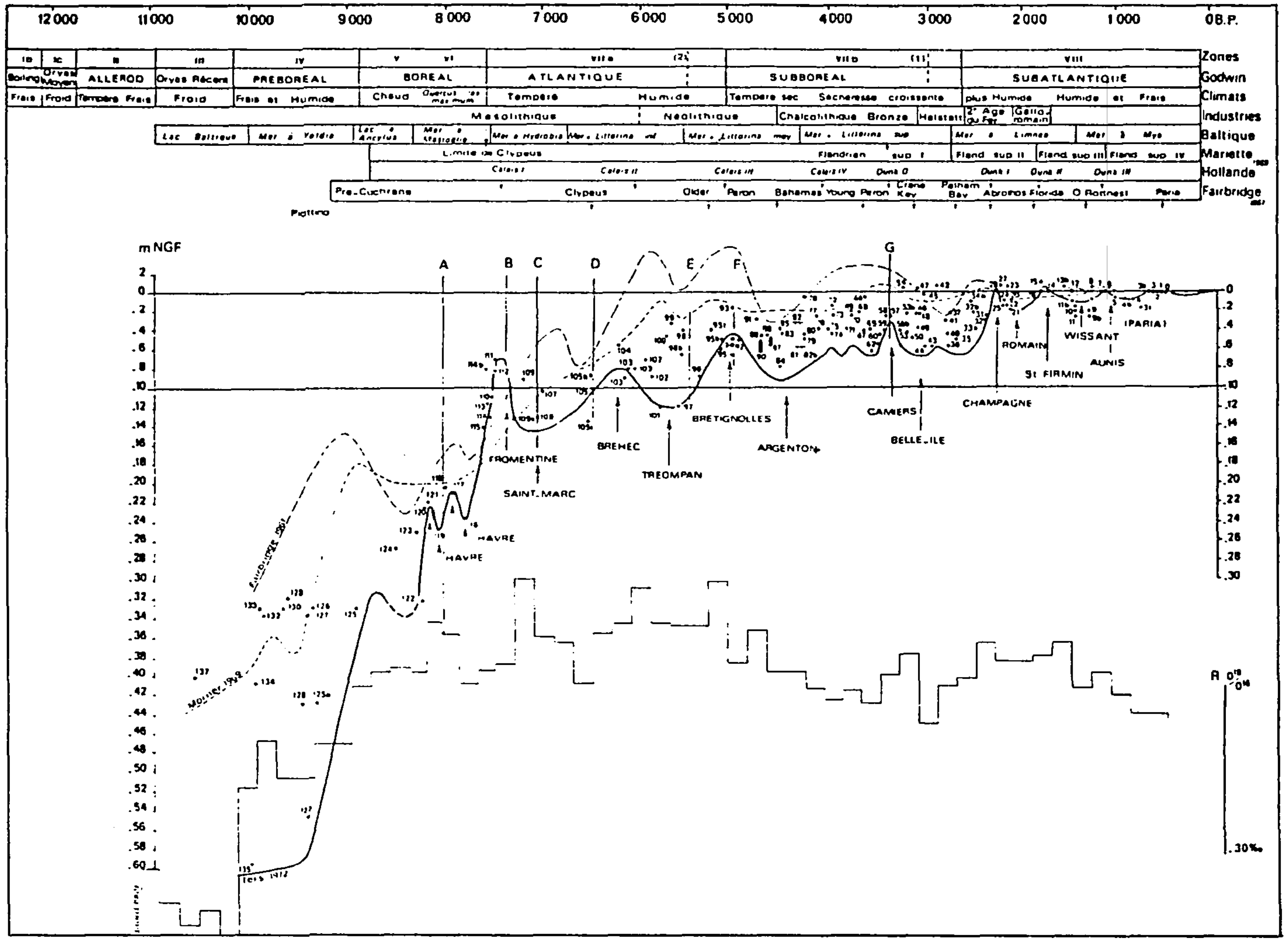


Figure 8. Sea level curve for the Holocene Epoch, Atlantic France (Ters 1976).

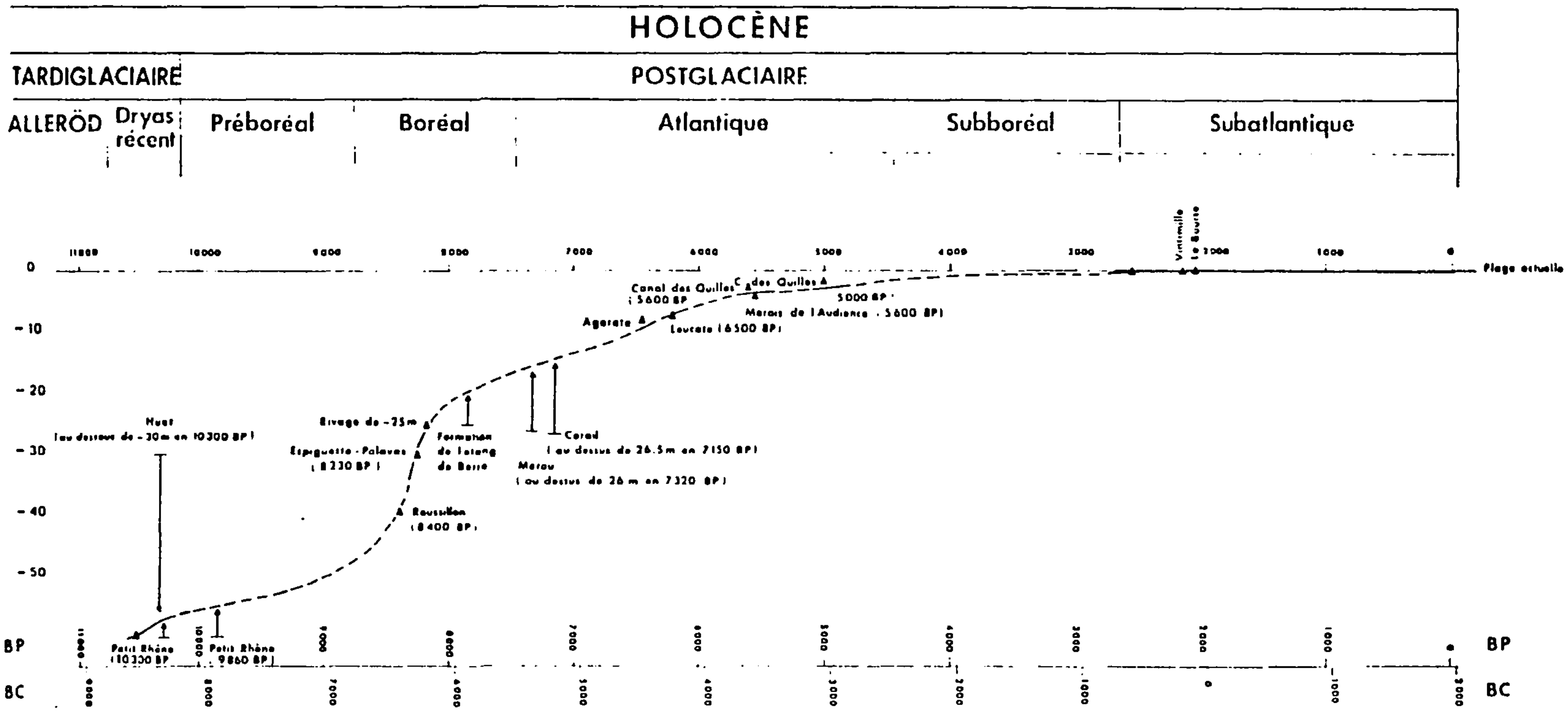


Figure 9. Sea level curve for the Holocene Epoch, Mediterranean coast of France (Lumley 1976).

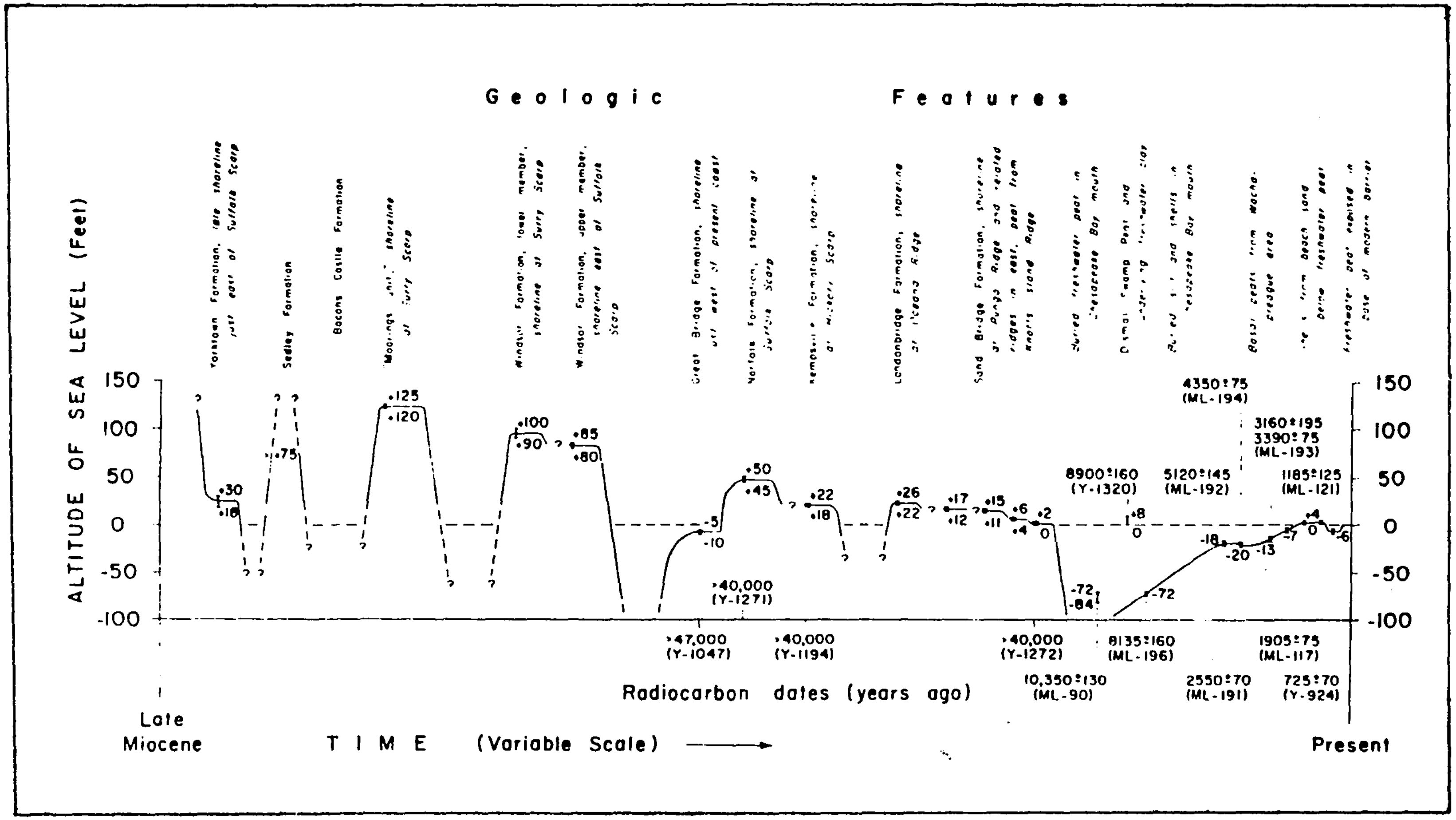


Figure 10. Sea level curve for the Mid-Atlantic region of the United States: southeastern Virginia (Oaks et al. 1974:Figure 12).

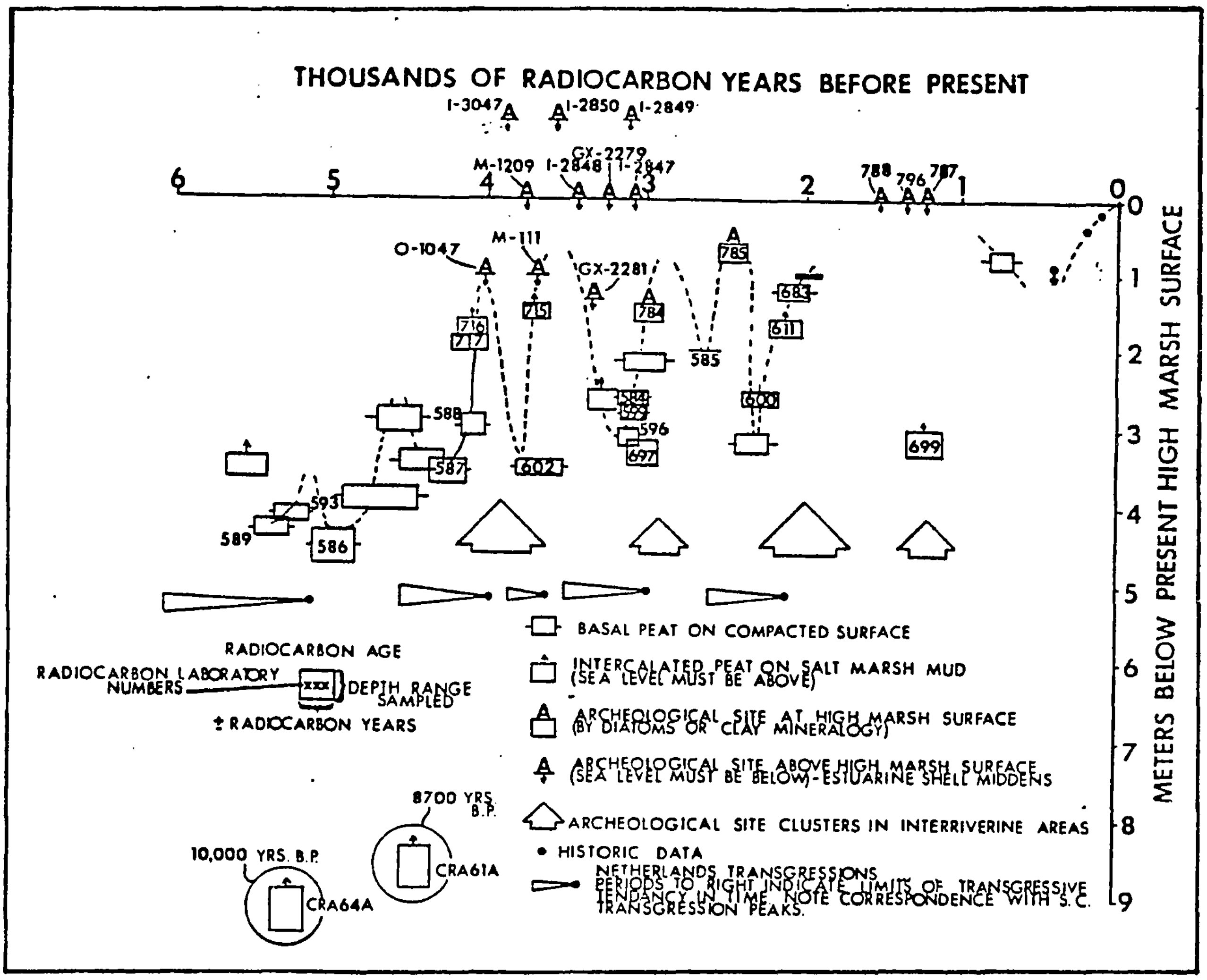


Figure 11. Sea level curve for the South Carolina coast (Colquhoun 1981: Fig.12).

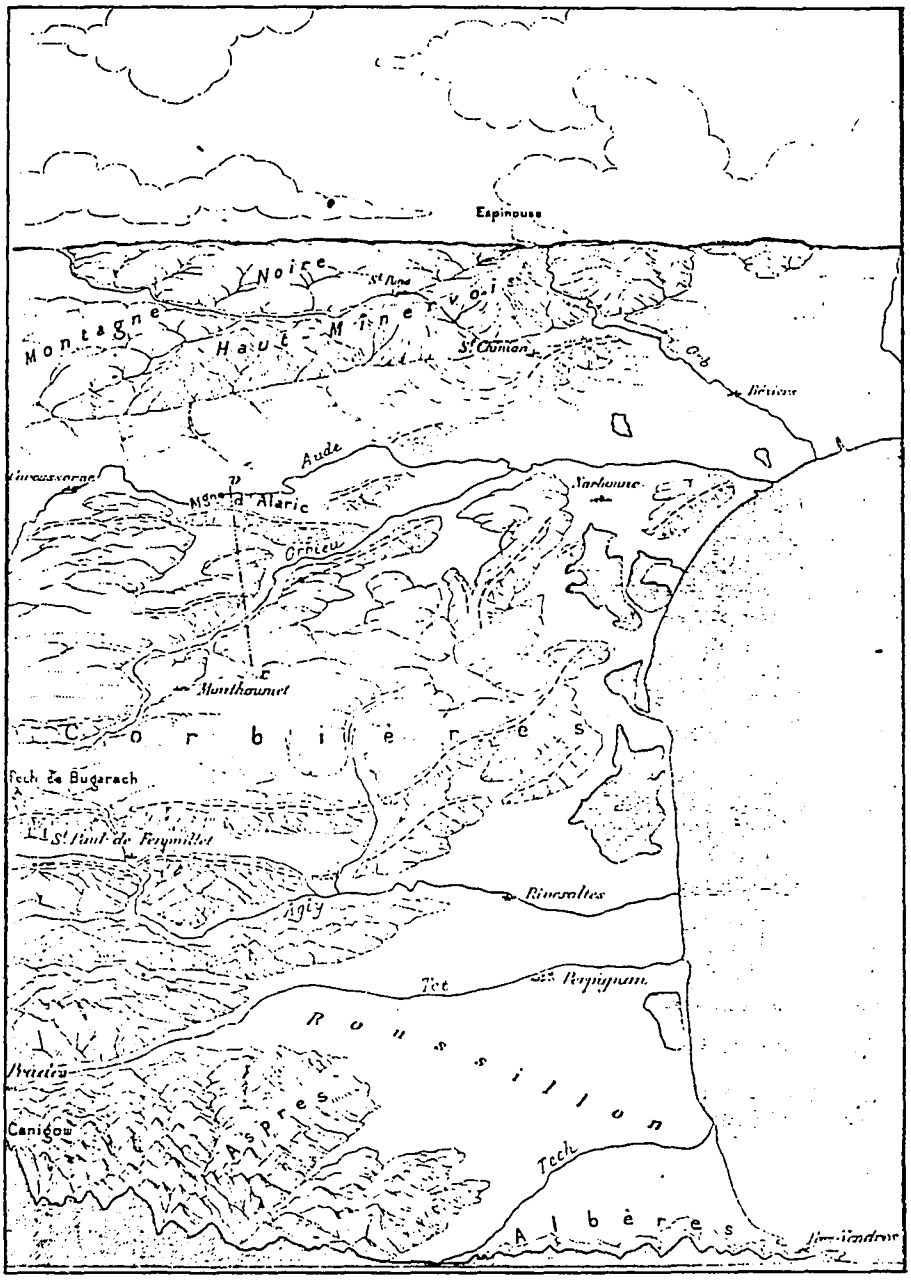


Figure 12. Landscape of Roussillon and western Languedoc (after Barre 1908:Fig.130).

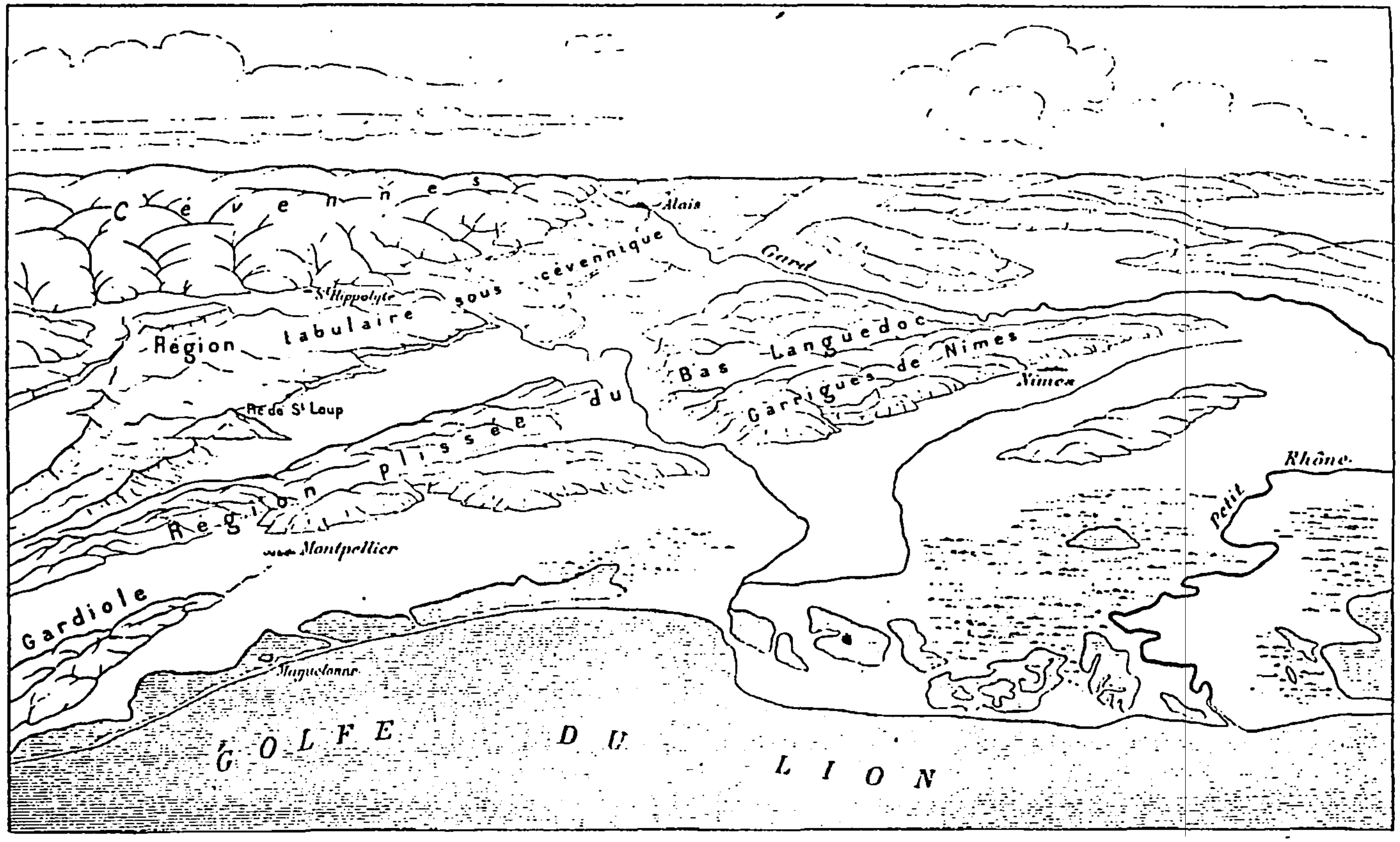


Figure 13. Landscape of eastern Languedoc and western Provence (after Barre 1908:Fig.132).

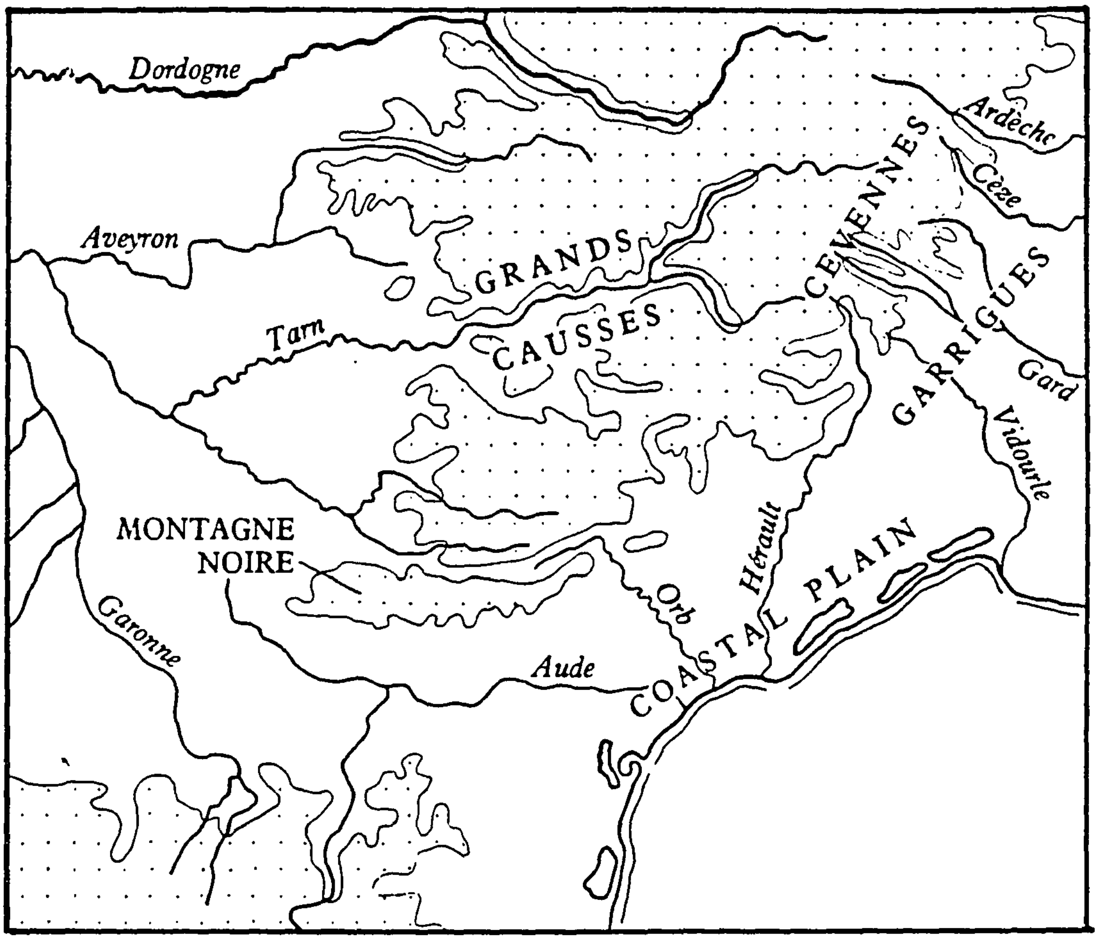


Figure 14. Languedoc: relief and drainage (land over 500 m elevation stippled)(Mills 1983:Fig. 5.1a).

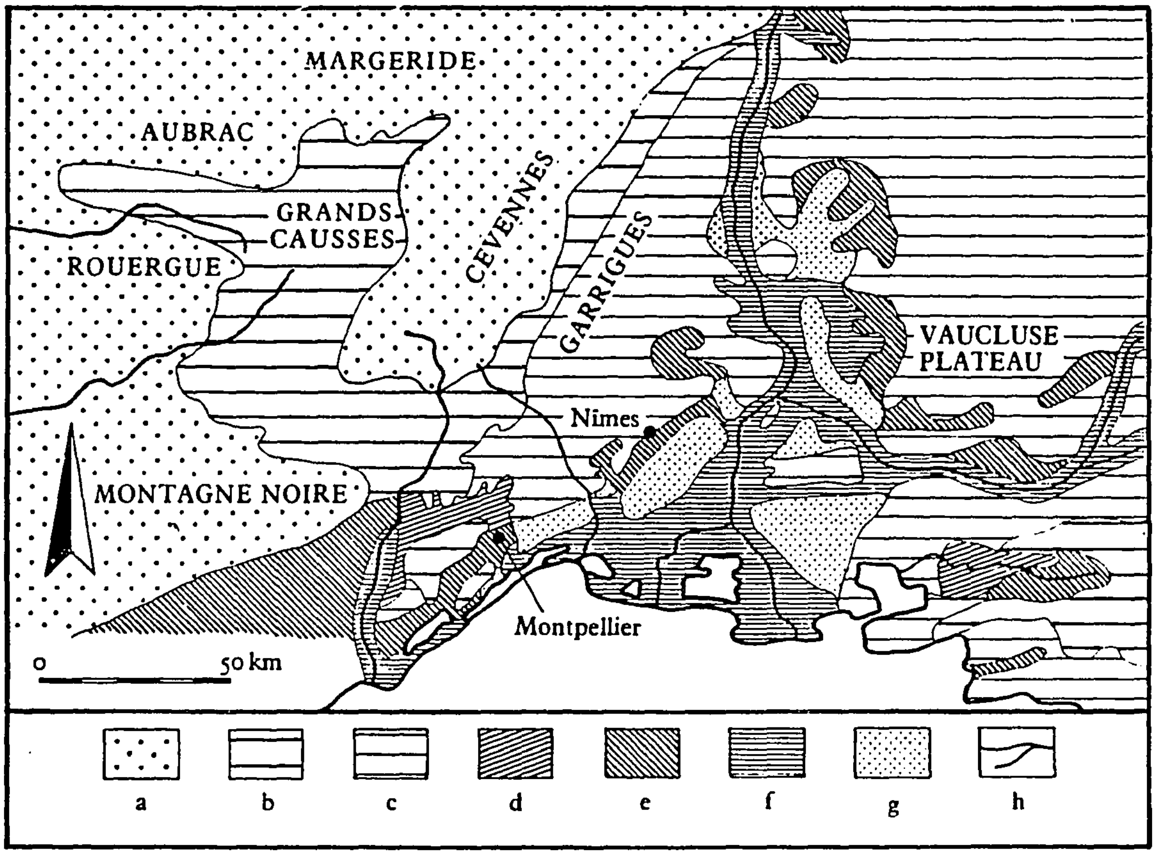


Figure 15. Languedoc and Provence: simplified geology. a) crystalline massifs; b) hard Jurassic limestones; c) Cretaceous marly limestones; d) Eocene limestone, sands, and clays; e) Pliocene sands and clays; f) Holocene fine alluvium; g) Pliocene and Quaternary gravels; h) rivers (Mills 1983:Fig. 5.2).

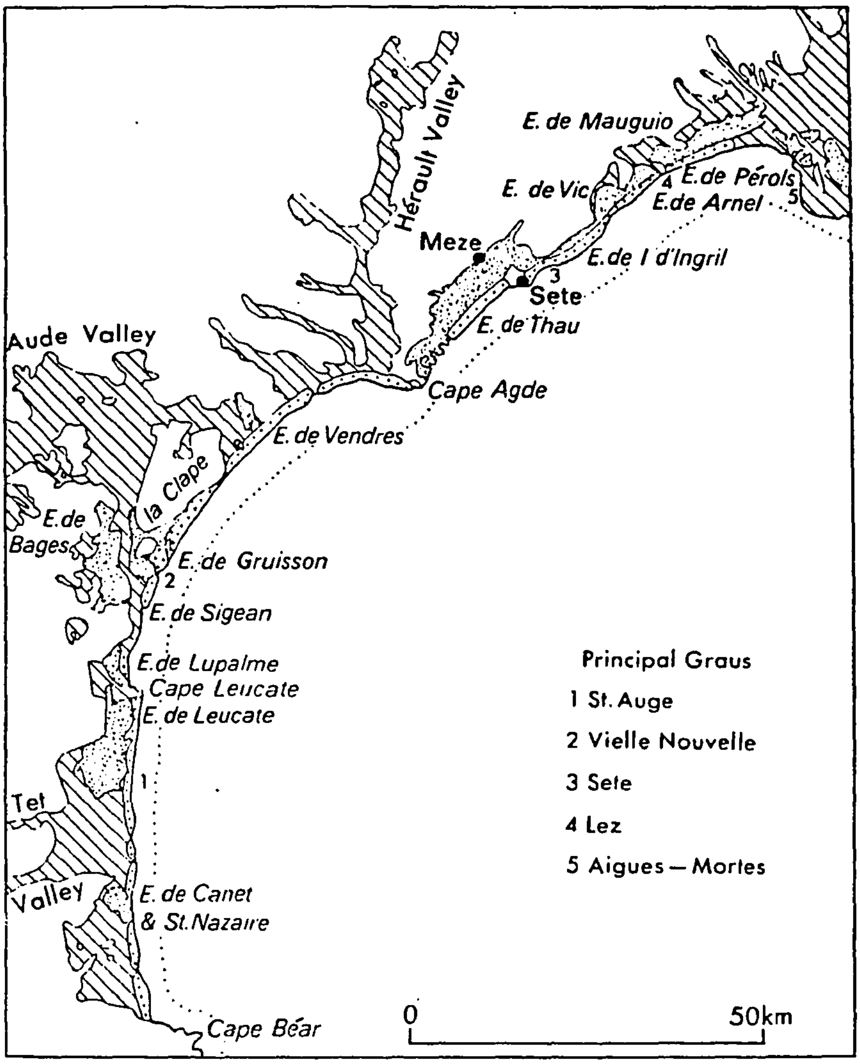


Figure 16. Lagoons (fine stipple) and sand dunes (coarse stipple) of Languedoc and Roussillon (Embleton 1984:Fig.9.19).

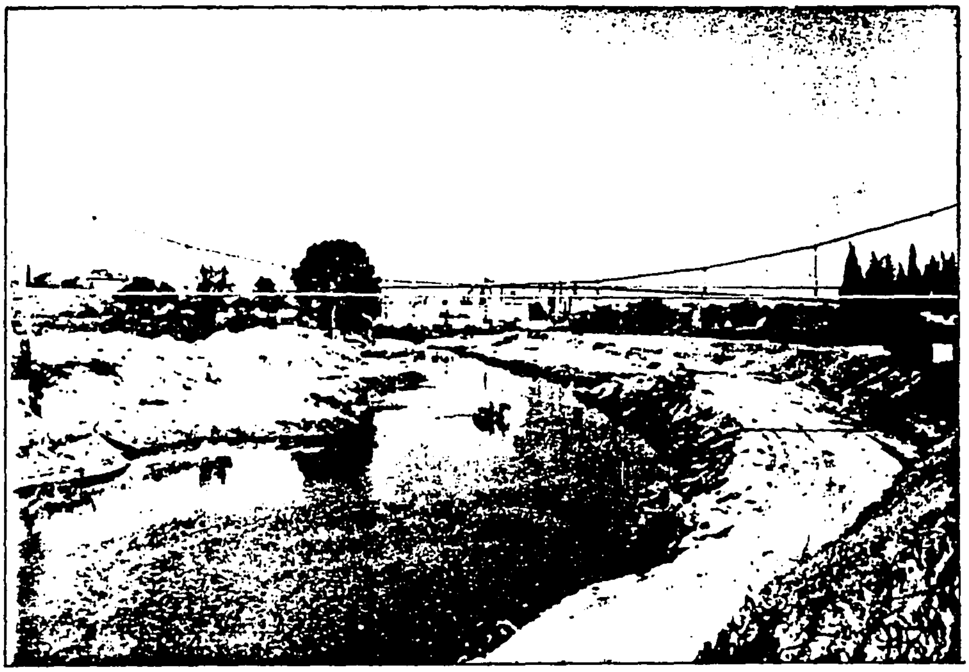


Figure 17. Channelized coastal plain stream south of Montpellier, France.

Figure 18. Vineyard located on archaeological site (Iron Age through Medieval periods) near the Etang de l'Arnel, south of Montpellier, France.

Figure 19. Marsh flats of the Etang de l'Arnel.

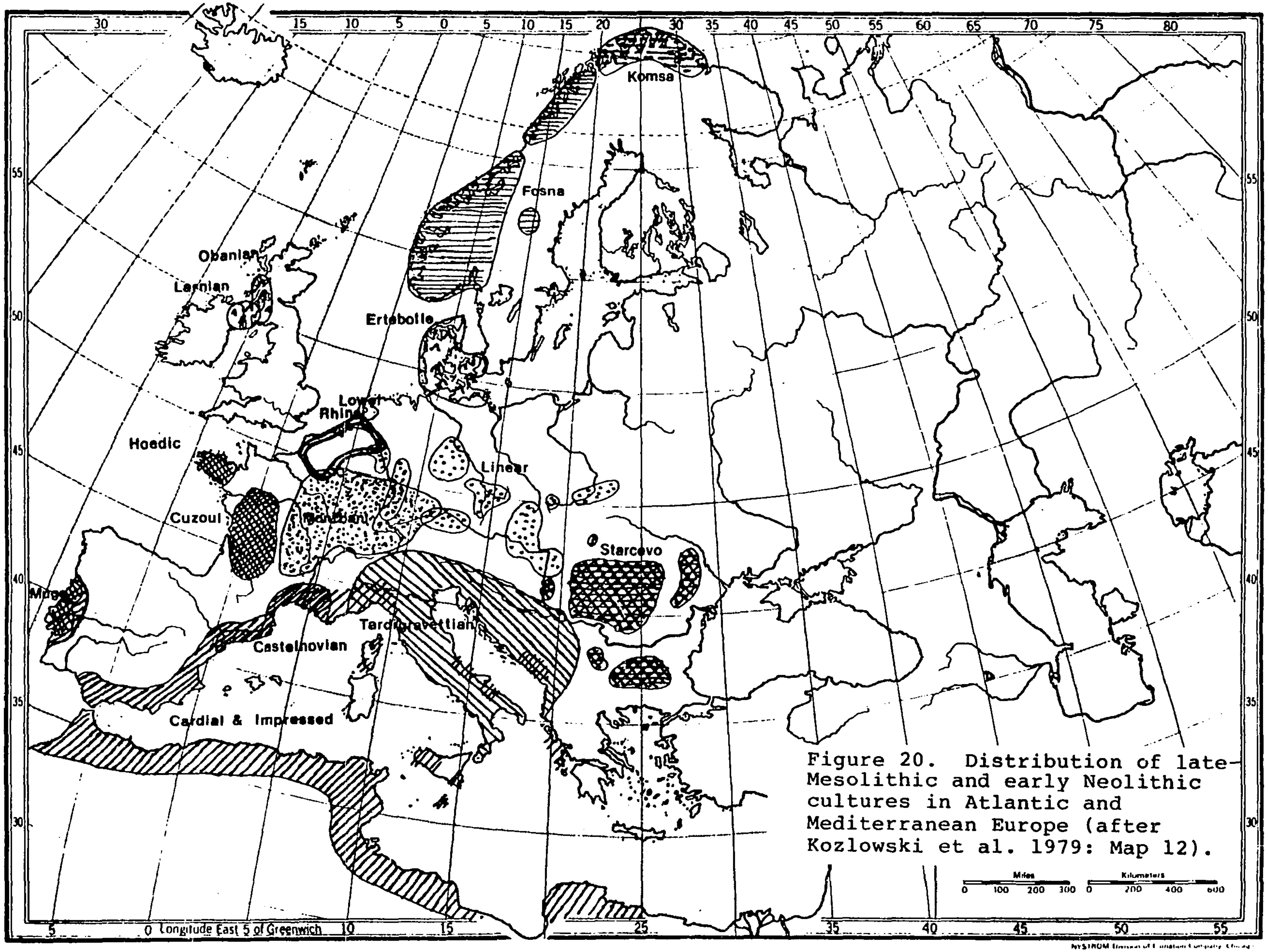
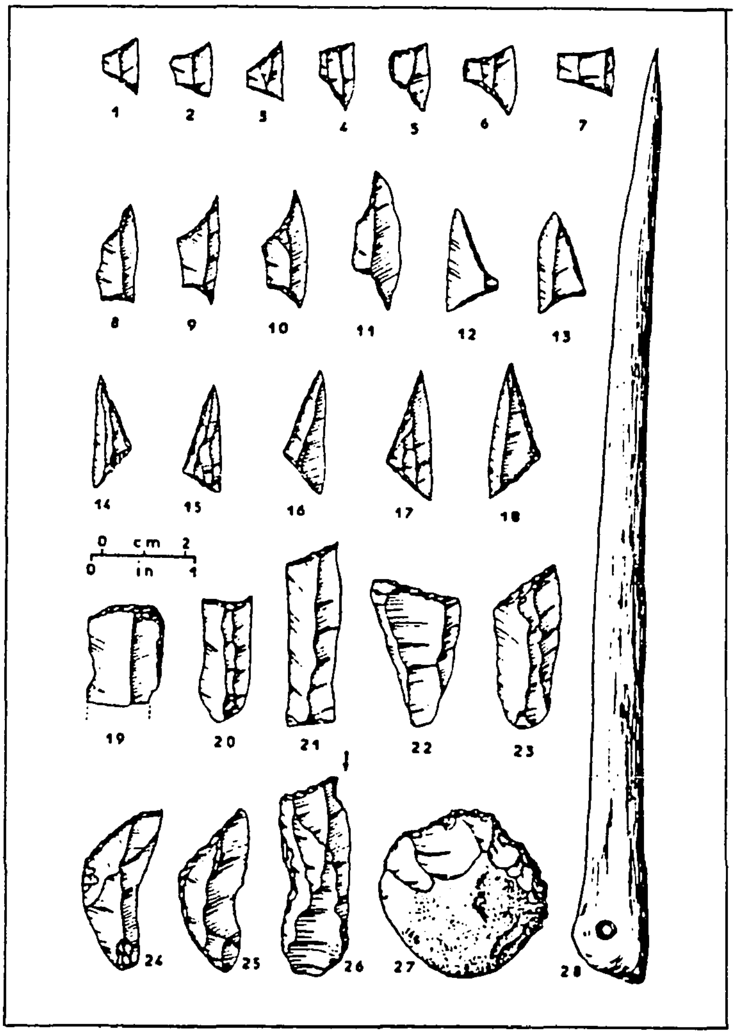


Figure 20. Distribution of late-Mesolithic and early Neolithic cultures in Atlantic and Mediterranean Europe (after Kozlowski et al. 1979: Map 12).

Figure 21. Coastal Mesolithic assemblage from Teviec in Brittany (Escalon de Fonton 1974:Fig.50, after Pequart).



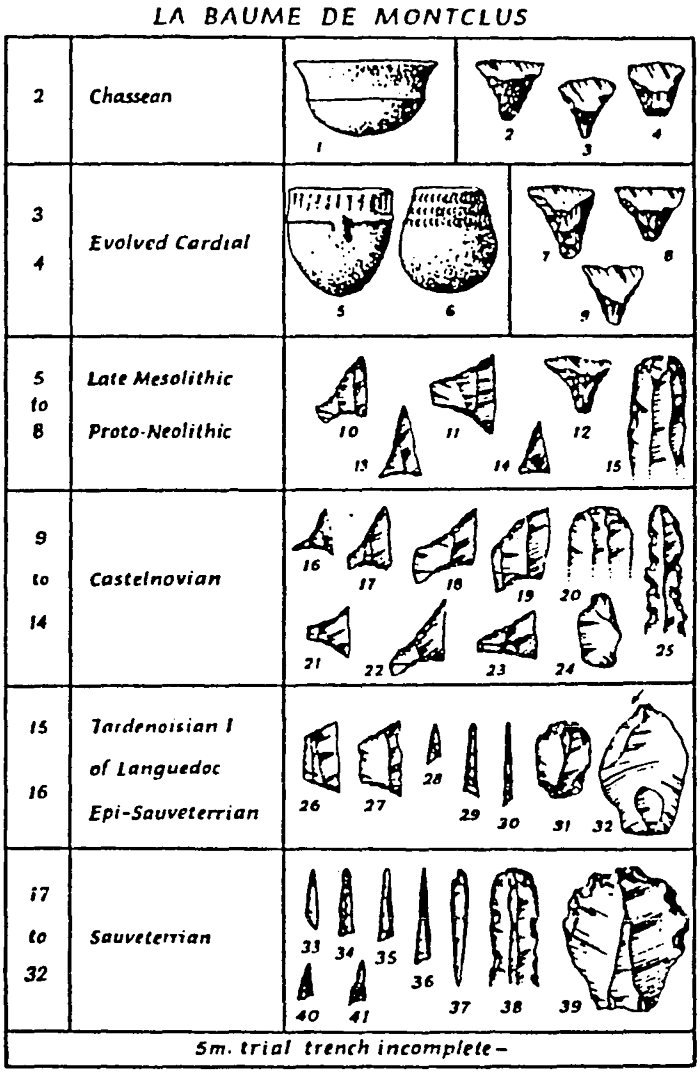


Figure 22. Late Mesolithic and Early Neolithic assemblages from Languedoc (Escalon de Fonton 1974).

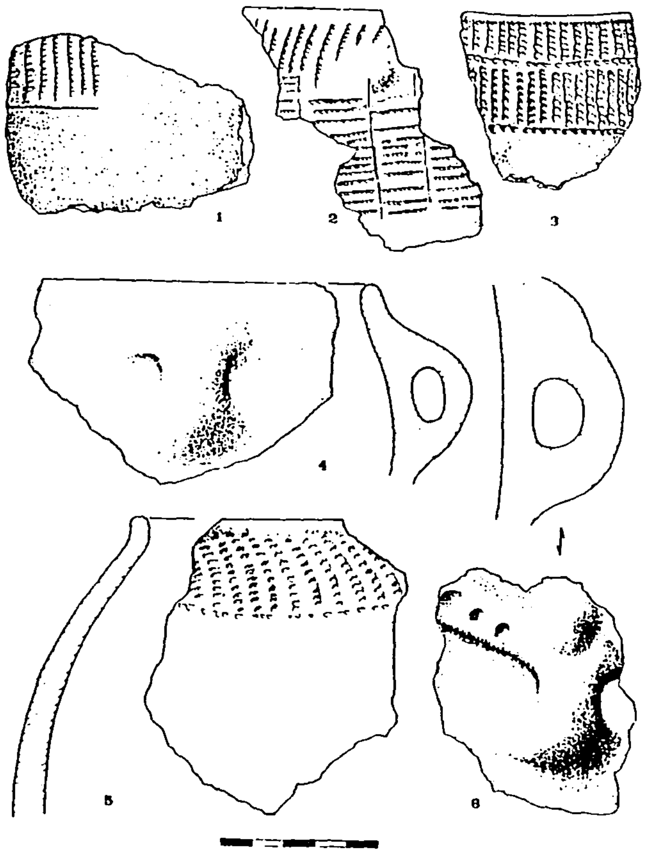


Figure 23. Early Neolithic Cardial ware from Languedoc (Roudil et al. 1979: Fig. 28).

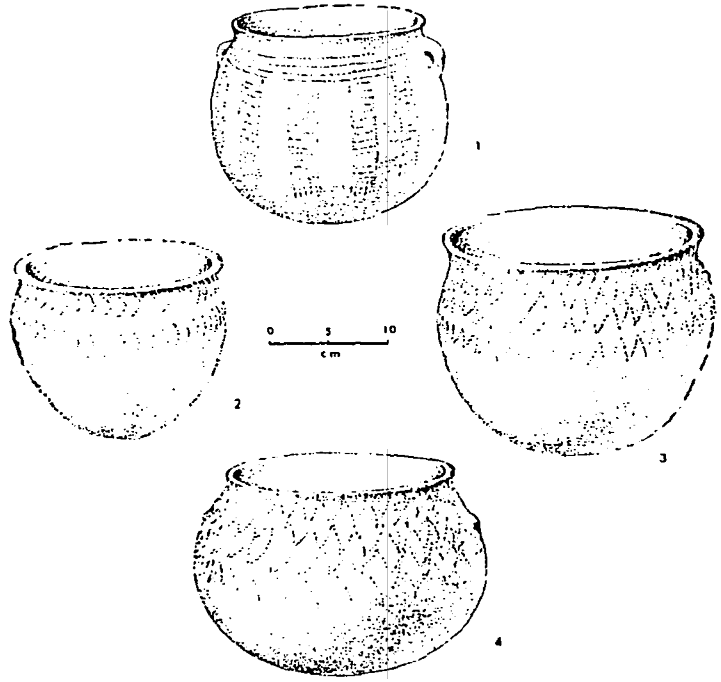
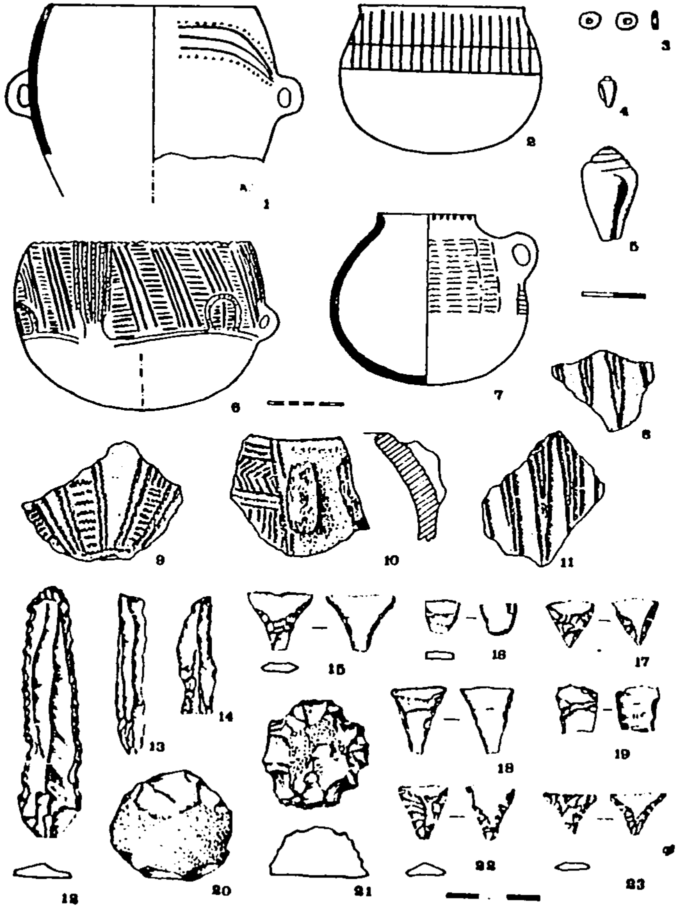


Figure 24. Cardial impressed ware from Languedoc (Arnal 1976: Pl. 3).



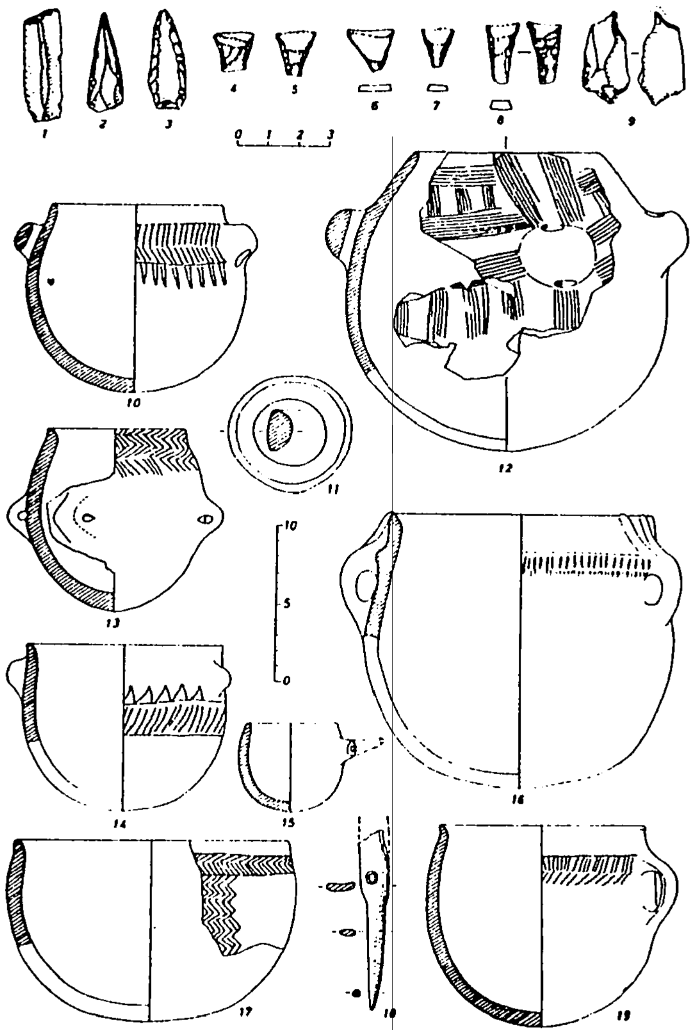


Figure 25. Early Neolithic assemblages from southern France (l.- Guilaine 1980: Fig.2; r.- Courtin 1976).

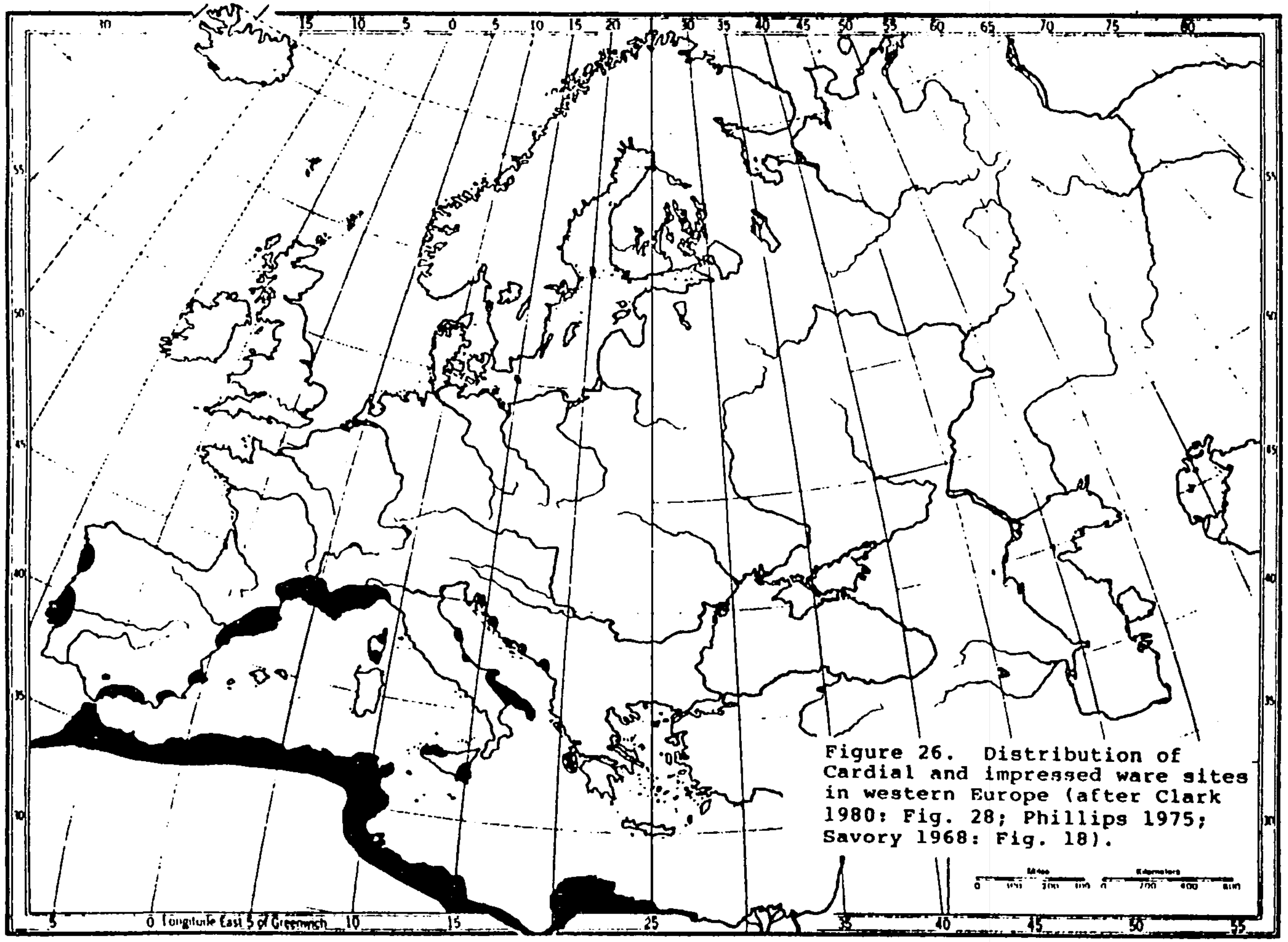


Figure 26. Distribution of Cardial and impressed ware sites in western Europe (after Clark 1980: Fig. 28; Phillips 1975; Savory 1968: Fig. 18).

Figure 27. Distribution of Cardial Impressed ware sites in eastern Languedoc (from Roudil et al. 1979: Fig. 35).

Certain points correspond to a single isolated sherd. The concentration of Cardial occupation in the north-eastern Gard is clear, and three fourths of the sites are in effect situated between the Gardon and Ardeche rivers. Numbers on the map correspond to the sites listed below. Site 46, Portiragnes, although shown is in fact an early Neolithic occupation of a completely different nature from the southern Cardial. Site 35, not shown, is found to the west of the map area.

1 Grotte d'Oullins
2 Grotte de Combe Obscure
3 Baume de Ronze
4 Grotte de Chazelles
5 Grotte de l'Olivier
6 Station du Mourre de Feli
7 Baume Bourbon
8 Baume Raymonde
9 Grotte de Paques
10 Grotte de la Roquette
11 Station du Jonquier
12 Les Baumes
13 Grotte de Breth
14 Grotte de l'Aigle
15 Grotte Feraud
16 Grotte Pradier
17 Grotte de la Sartanette
18 Grotte des Sables
19 Grotte du Tai
20 Grotte de la Salpetriere
21 Baume Latrone
22 Grotte Saint-Joseph
23 Grotte des Freres
24 unnamed site
25 Grotte Basse de la Fournarie
26 Cabane de Doustaly
27 unpublished site
28 uncertain site location
29 Station des Sables
30 Grotte Saint-Veredeme
31 Grotte des Trois Ours
32 Baume Clausido
33 Baume du Bourrut
34 Grotte de la Capelle
35 Grotte des Fees
36 Abri de Brugas
37 Abri de Saint-Privat
38 Aven de la Figueirolle
39 uncertain location
40 Baume Limonesque
41 Grotte de Camprafaud
42 Station des Carreiroux de Saint-Appolis de Fontenille
43 unnamed site
44 Station du Bois Martin
45 Grotte Lauriol
46 Station de Peiro Signado
47 Station de la Vigne Debru
48 Grotte de Bonnefont
49 Grotte IV
50 Grotte de la Combe de Bestiou

1 - 4	Ardeche
5 - 38, 51 - 52	Gard
39 - 50	Herault

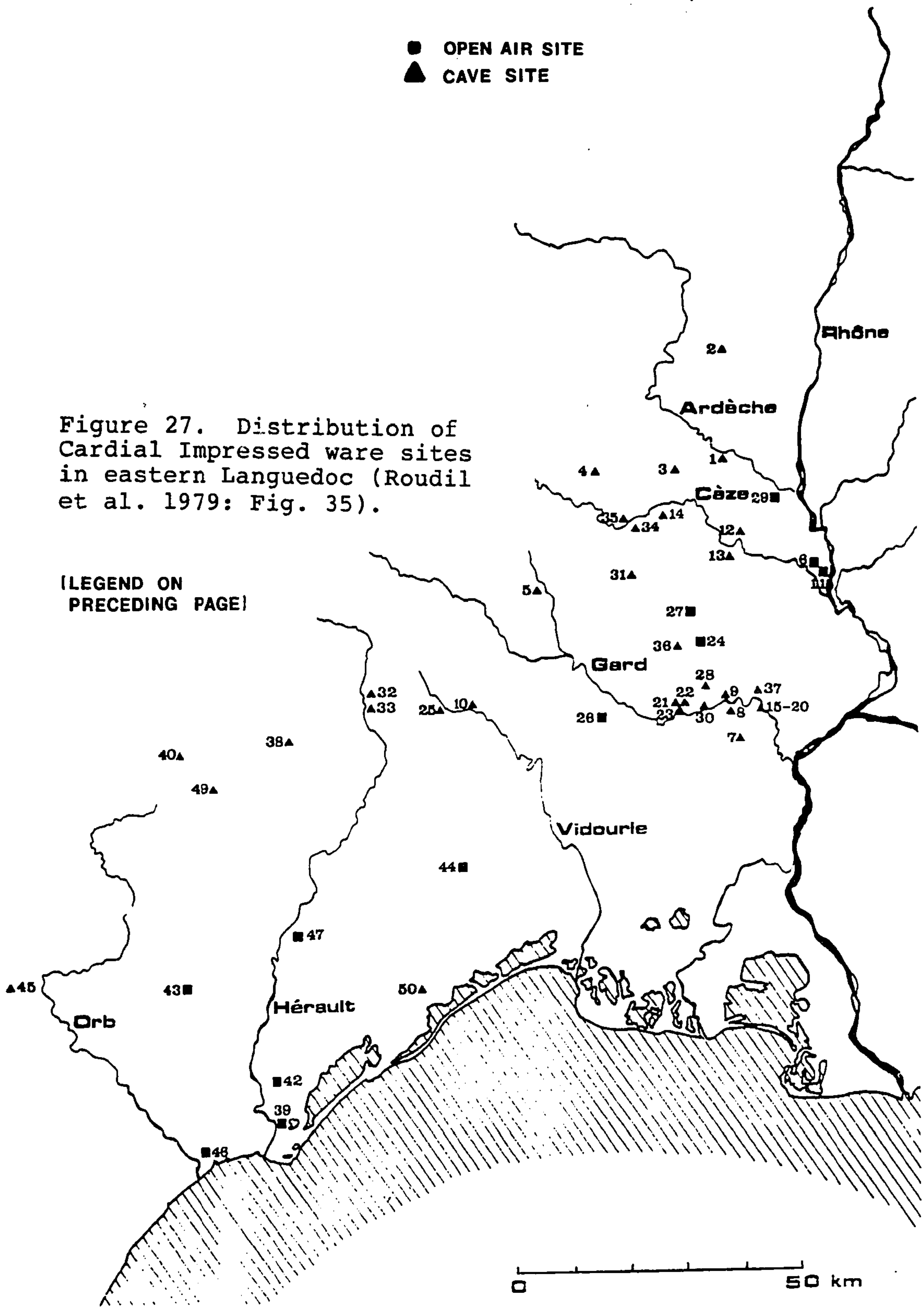


Figure 27. Distribution of Cardial Impressed ware sites in eastern Languedoc (Roudil et al. 1979: Fig. 35).

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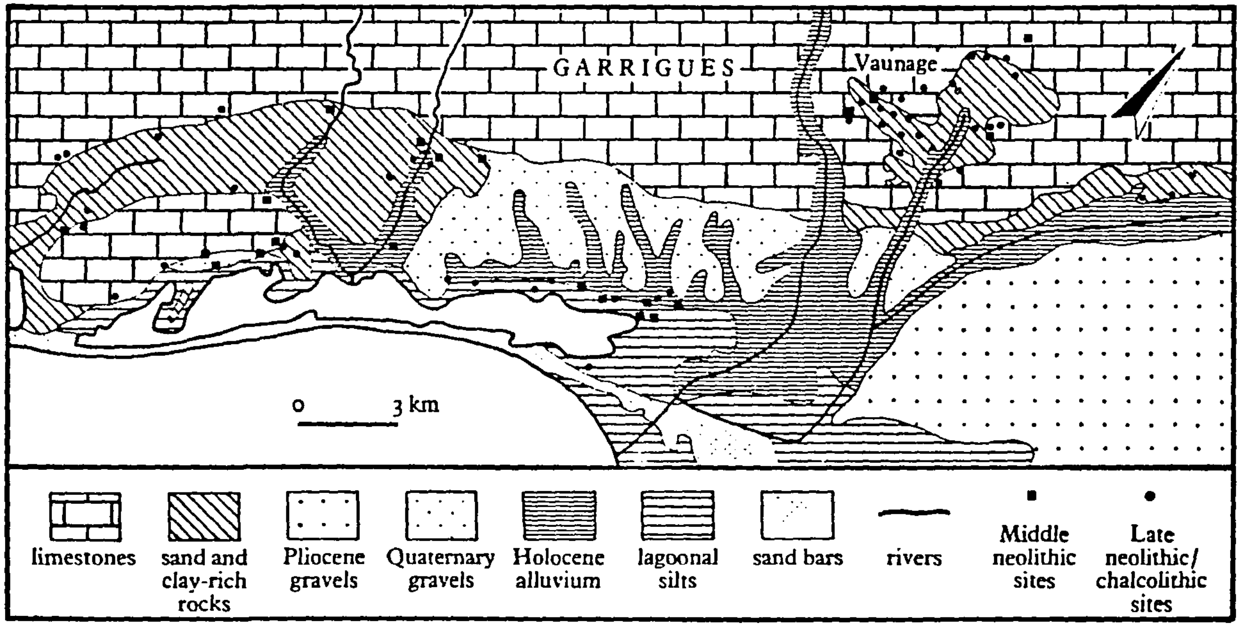


Figure 28. Eastern Languedoc: distribution of Neolithic and Chalcolithic open-air sites on the coastal plain (Mills 1983:Fig.5.12).

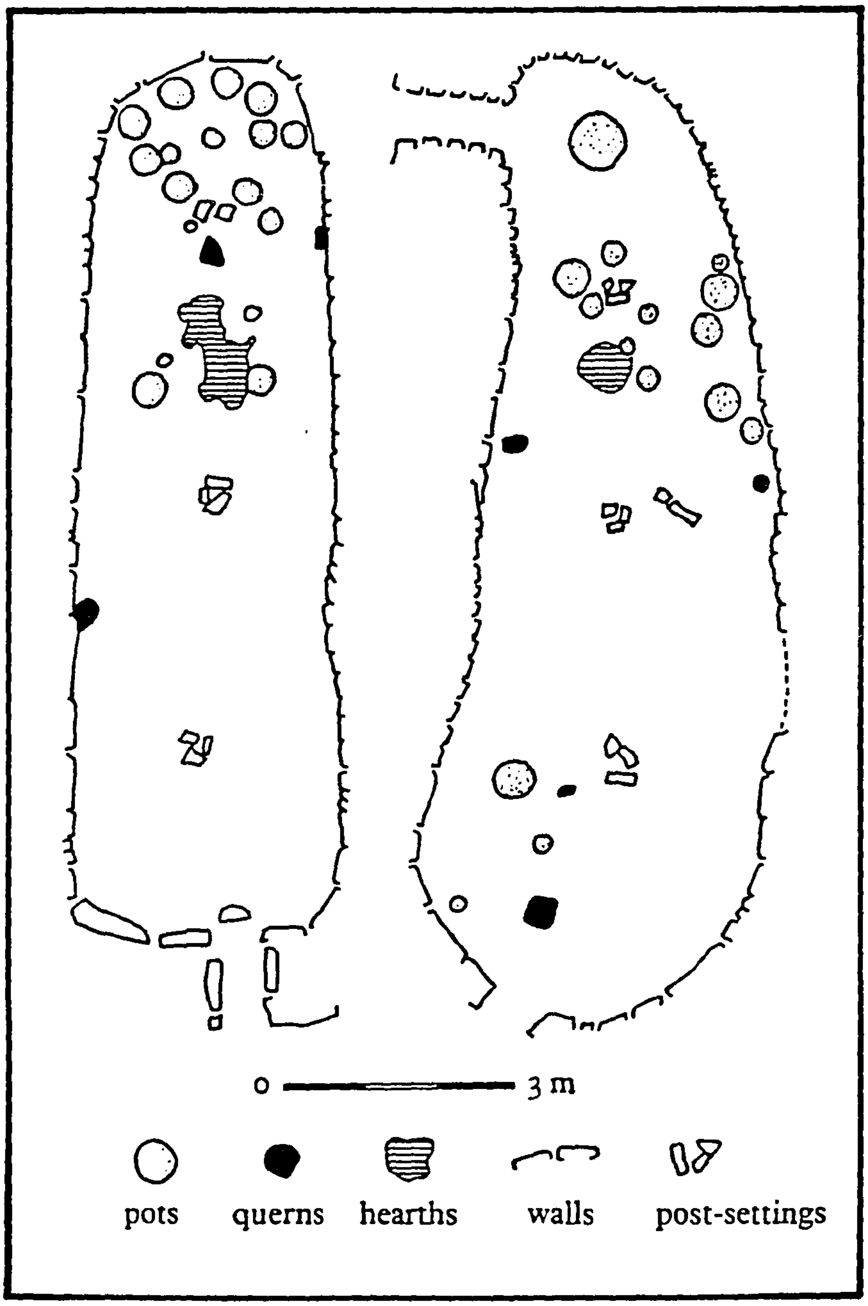


Figure 29. Internal plan and artifact distributions in Chalcolithic houses at La Conquette (Mills 1983:Fig.5.9, after Bailloud 1973).

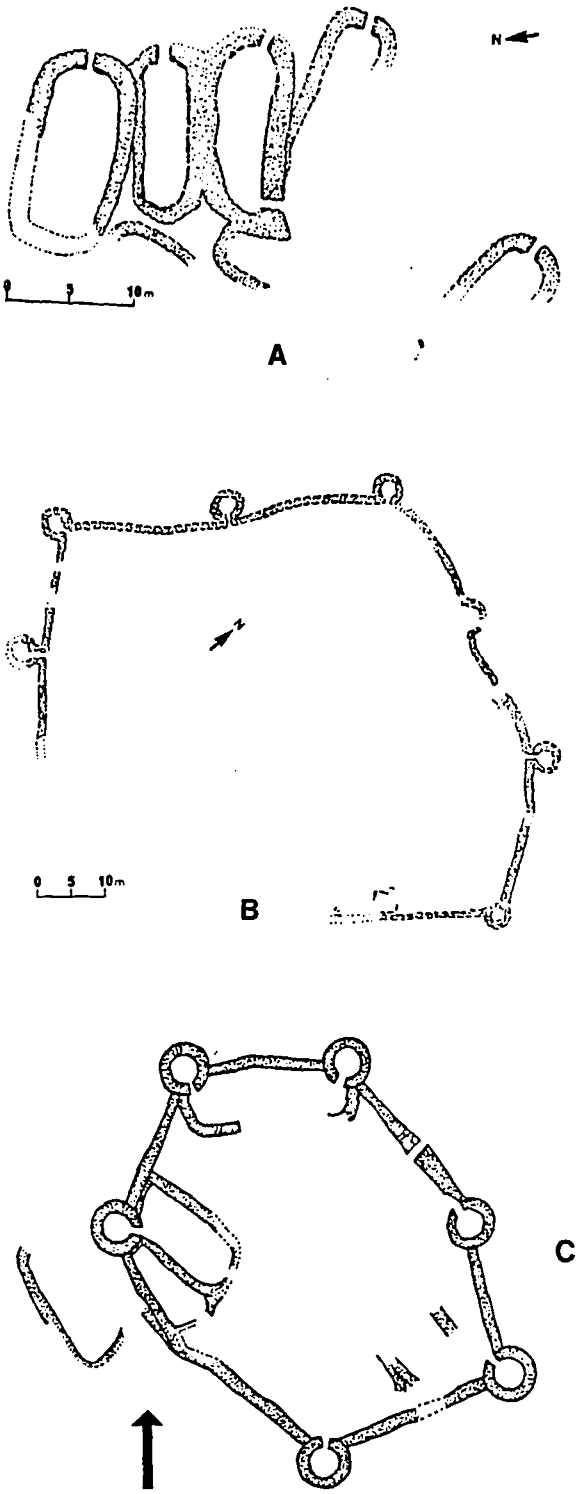


Figure 30. Chalcolithic settlements and fortifications of the Herault; a) Conquette; b) Lebous; c) Boussargues (Bailloud 1974:Figs.11-12; Mills 1983:Fig.5.10).

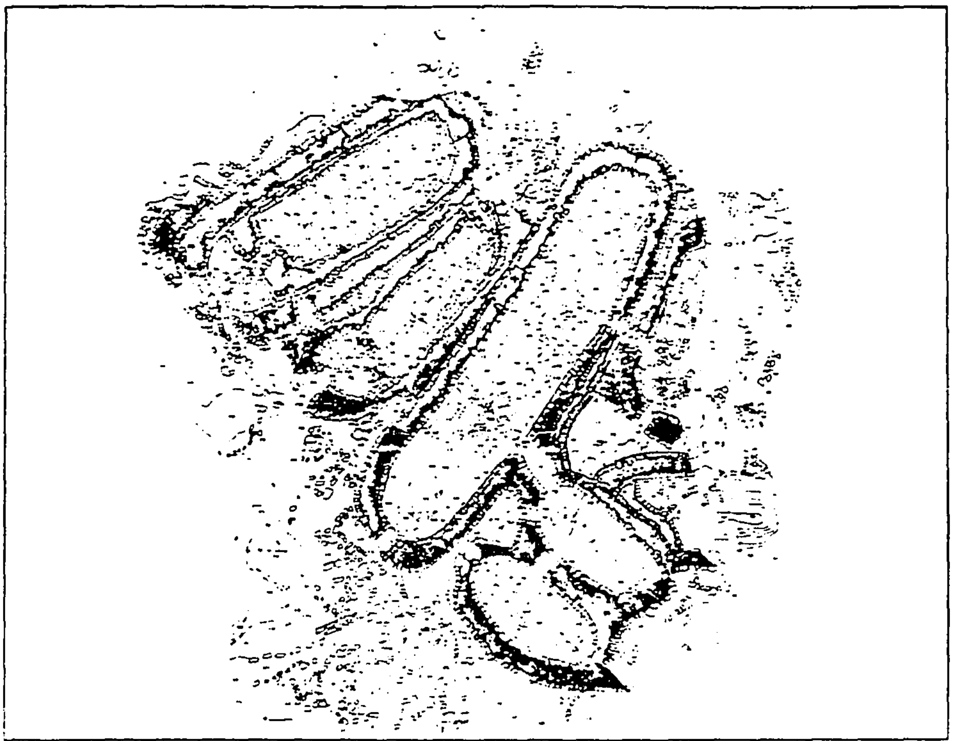


Figure 31. Chalcolithic settlement at Cambous, Herault (Roudil and Canet 1981).

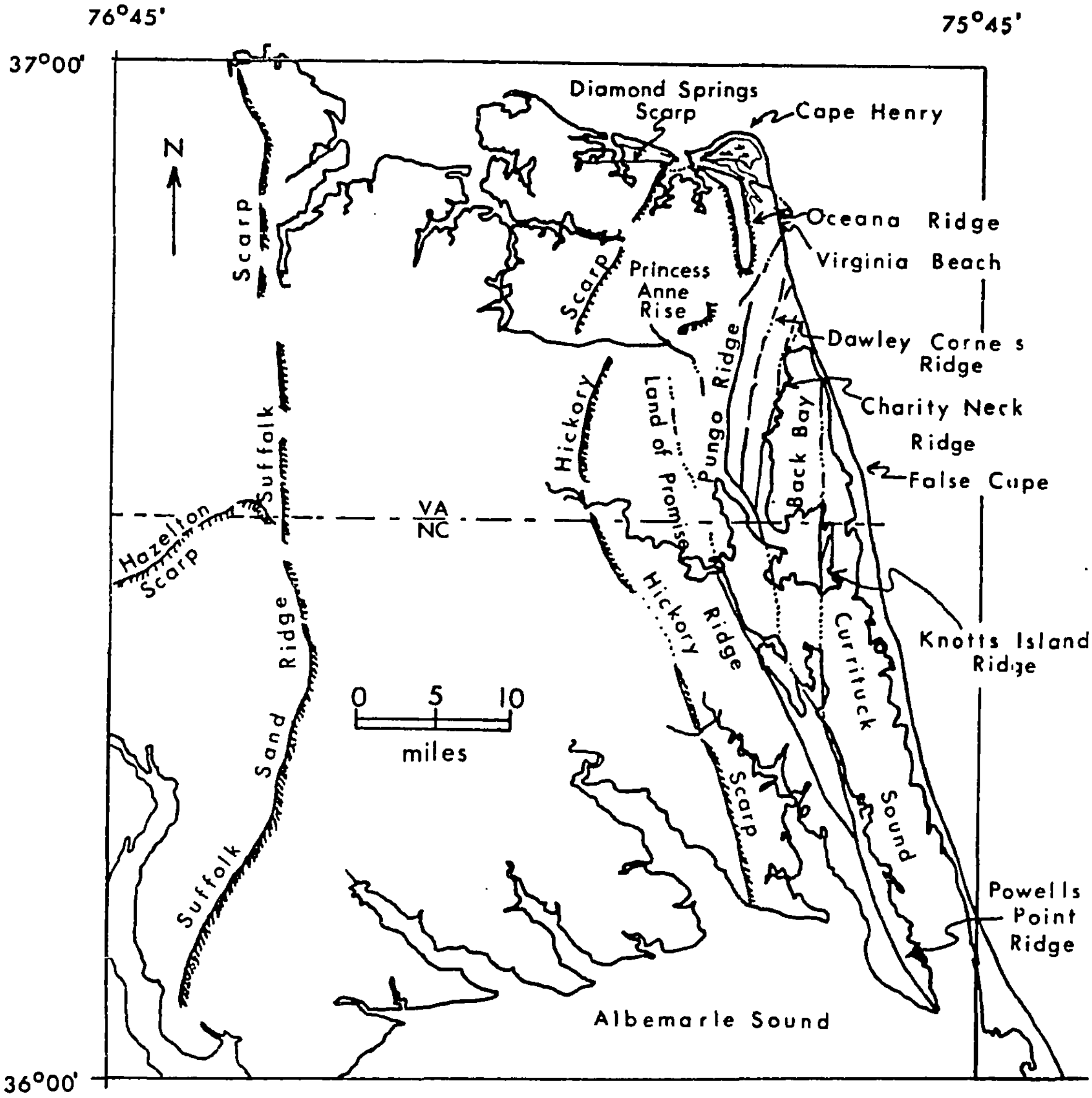


Figure 32. Scarps and ridges in southeastern Virginia and northeastern North Carolina (after Oaks and Coch 1974:Fig.7).

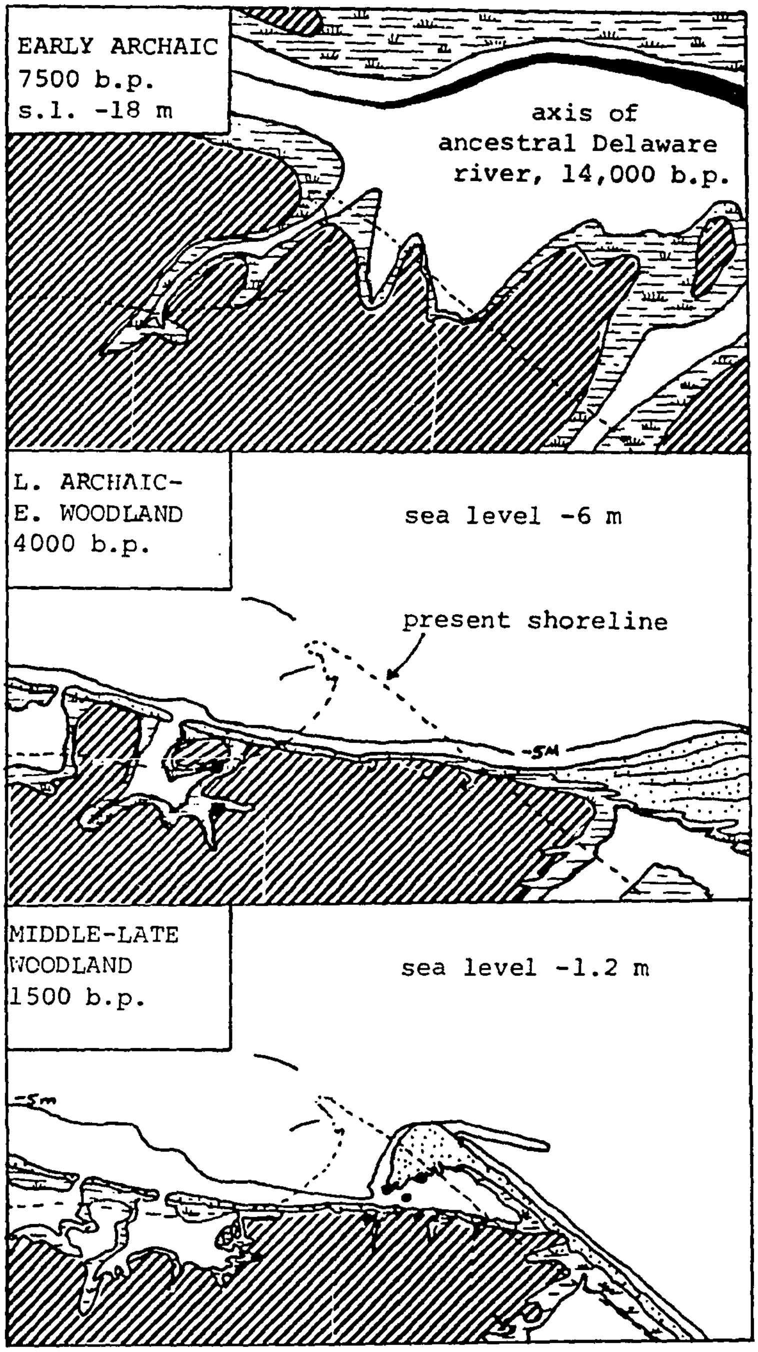


Figure 33. Reconstructions of the Cape Henlopen spit and dune-marsh area from Archaic to Woodland times (after Kraft 1976:Fig.18).

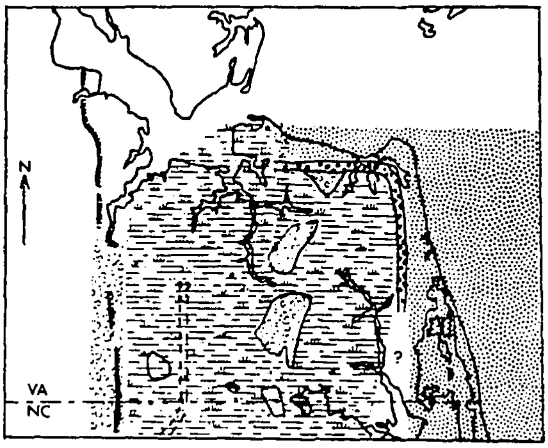
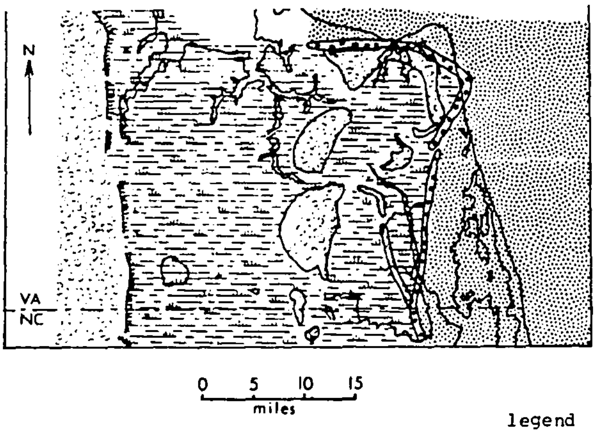


Figure 34. Paleogeography of south-eastern Virginia in London Bridge time; relative sea level near 24 feet; shoreline at Oceana Ridge and Diamond Springs Scarp (after Oaks and Coch 1973:Fig. 28).



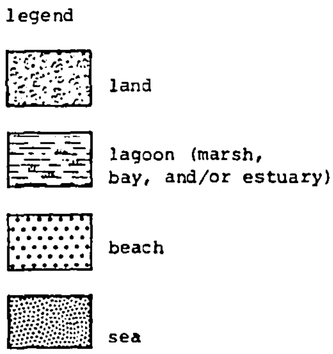


Figure 35. Paleogeography of south-eastern Virginia in earliest late Sandbridge time; relative sea level near 13 feet; shoreline at Pungo Ridge (after Oaks and Coch 1973:Fig.31).

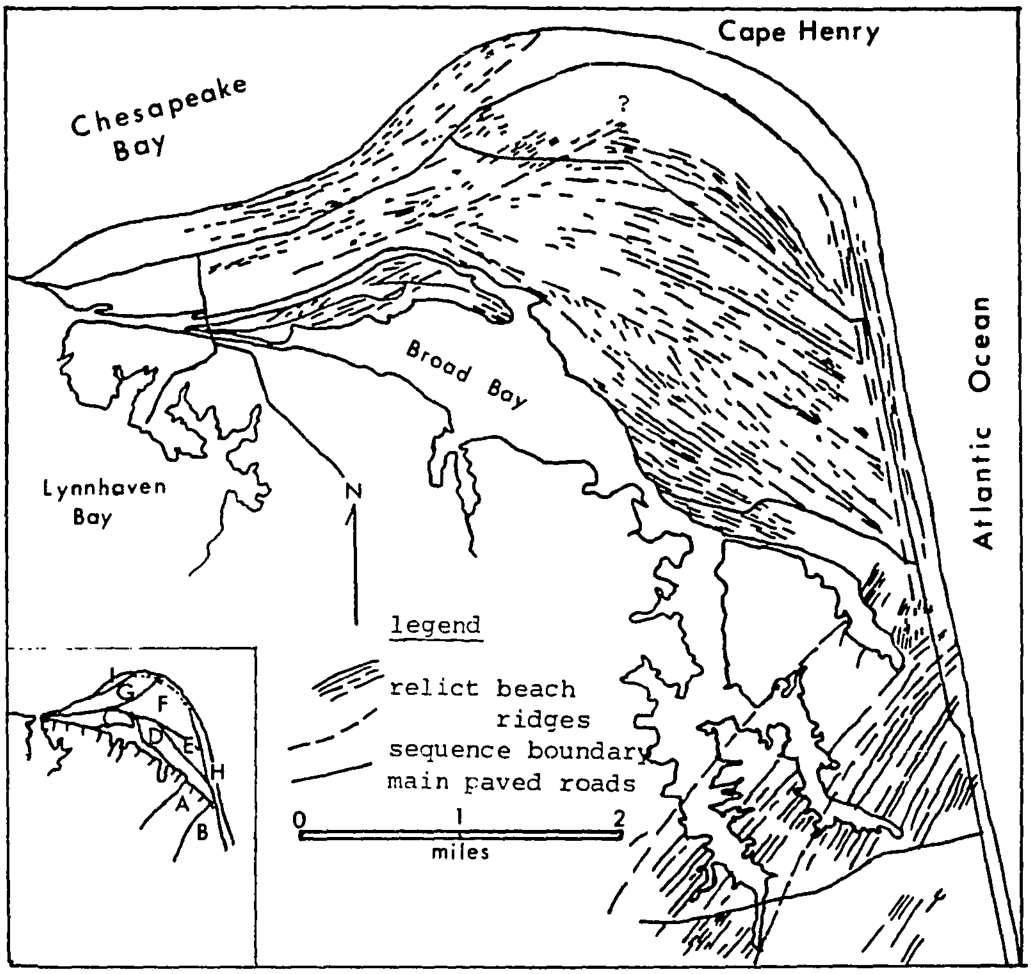


Figure 36. The Cape Henry dune ridge complex (after Fisher 1967:Fig.14).

Figure 37. Ancient cypress forest exhumed by severe storm erosion on Cape Henry, 1983.

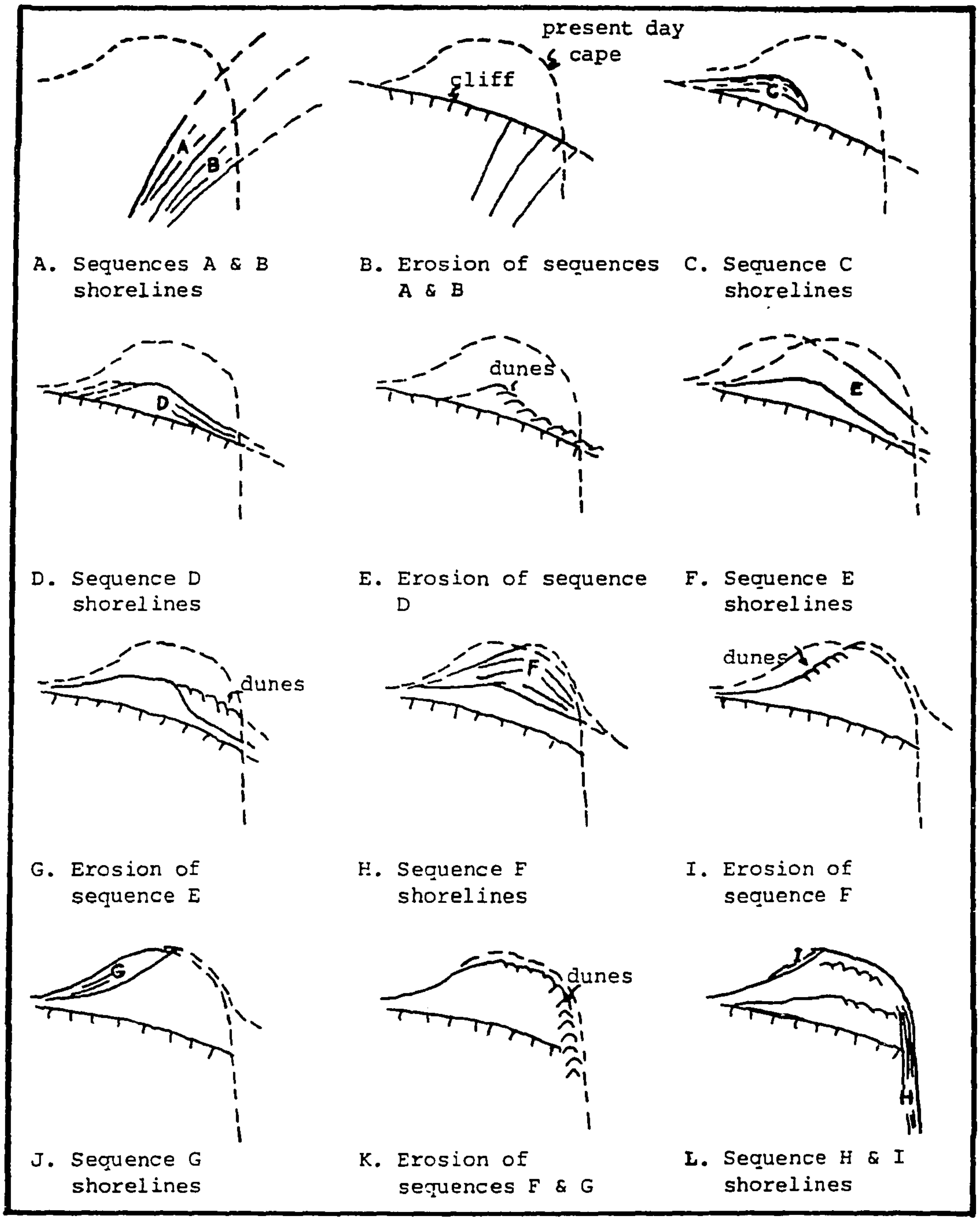


Figure 38. Development of the Cape Henry dune ridge complex (after Fisher 1967:Fig.16).

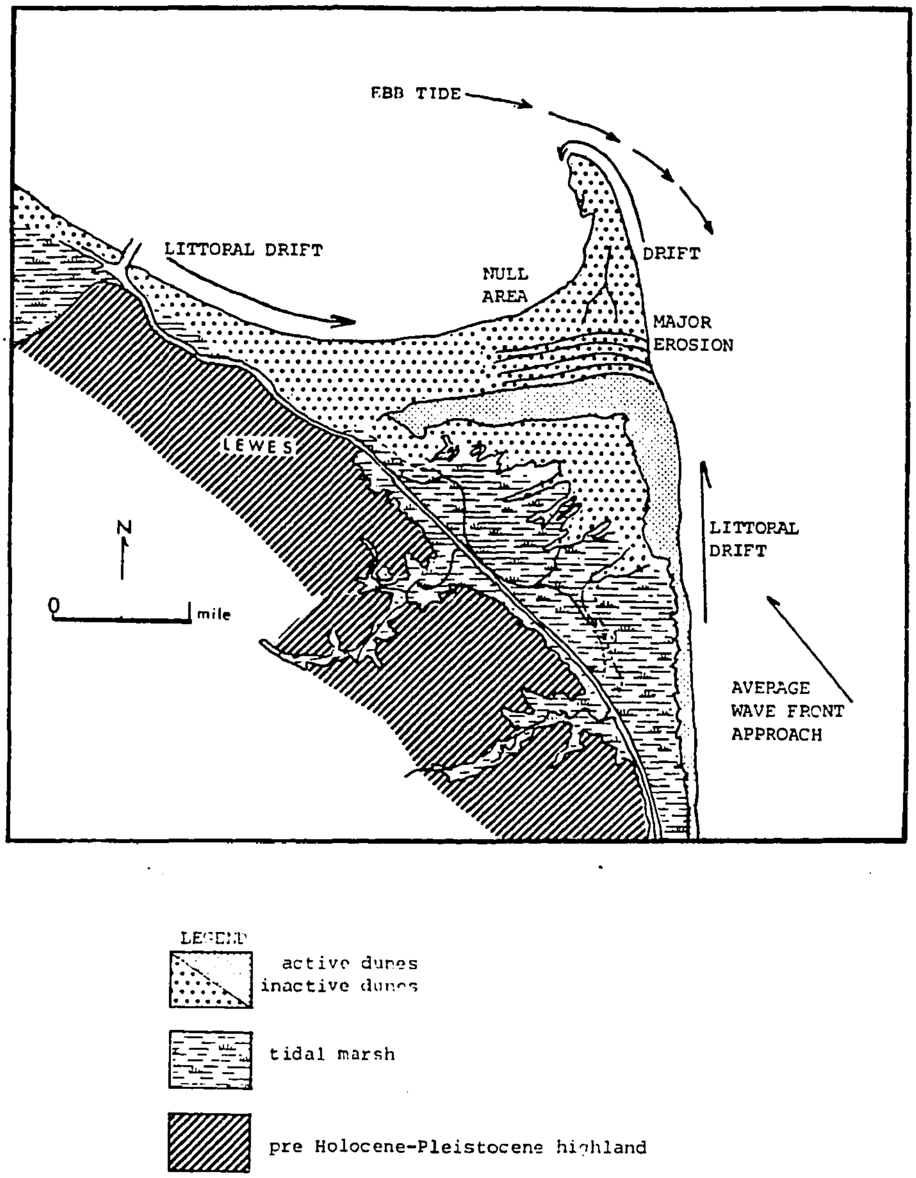


Figure 39. Geomorphic elements of the Cape Henlopen spit-dune-marsh complex (after Kraft 1971:Fig.78).

a) ca. 8300 b.p.

b) ca. 6000 b.p.

c) ca. 3500 b.p.

Figure 40. The evolution of Dismal Swamp topography (after Whitehead 1972:Figs.7-9).

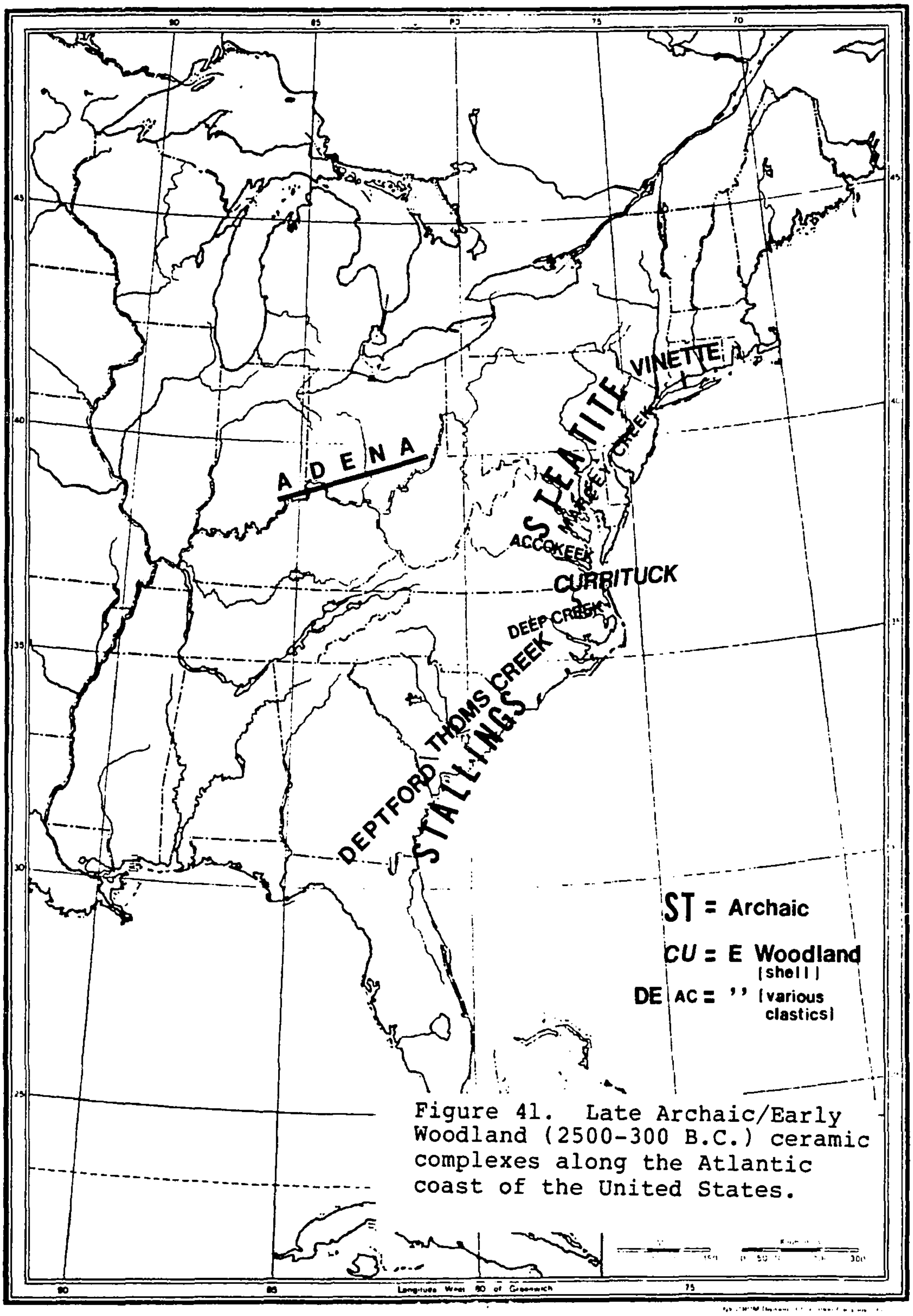


Figure 41. Late Archaic/Early Woodland (2500-300 B.C.) ceramic complexes along the Atlantic coast of the United States.

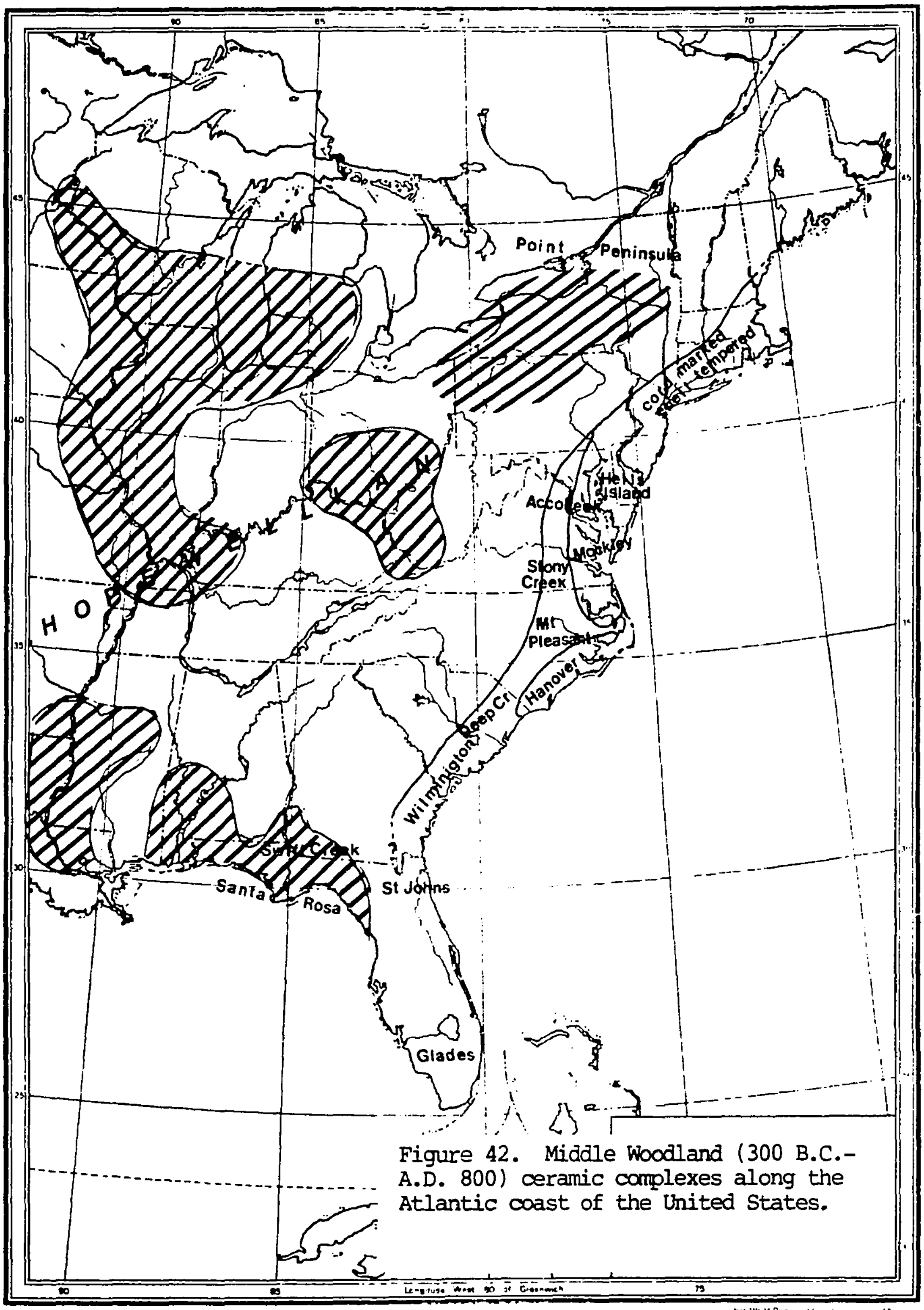


Figure 42. Middle Woodland (300 B.C.-A.D. 800) ceramic complexes along the Atlantic coast of the United States.

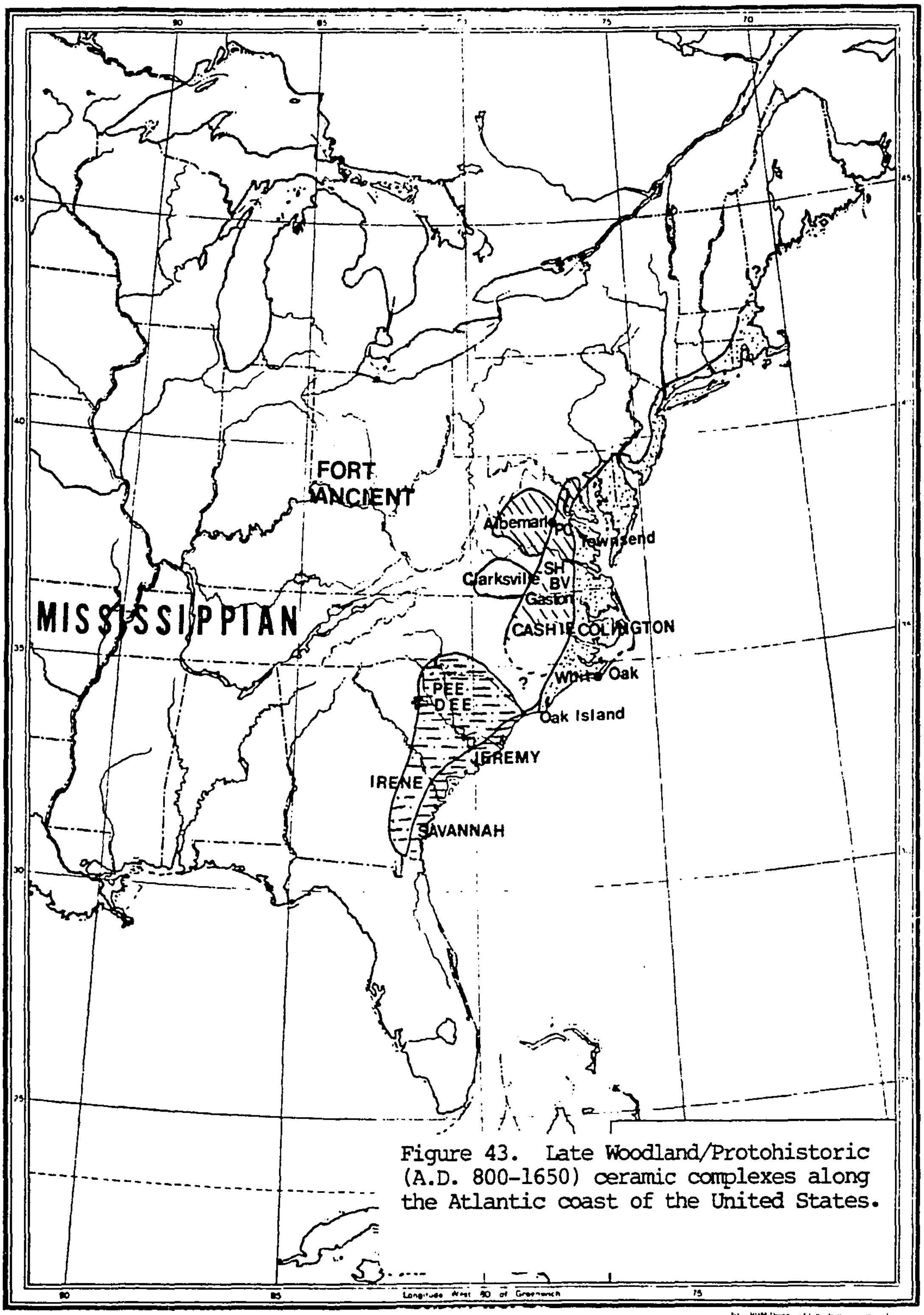


Figure 43. Late Woodland/Protohistoric (A.D. 800-1650) ceramic complexes along the Atlantic coast of the United States.

Figure 44. Carbonized maize cobs in a feature at 1BA196, Mobile Bay area, Alabama (Knight 1984:Fig.8.2).

Figure 45. Map showing location of selected sites in the Mid-Atlantic region (legend).

1	Accokeek Creek Site
2	Accotink Site
3	Bandon Site, 31CO1
4	Baum Site, 31CK9
5	Bluefish Beach Site, 44NB147
6	Briarfield Site, 44HT3
7	Camp Weyanoke Site, 44CC4
8	Cape Creek Site, 31DR1
9	Cedar Point Site, 44VB40
10	Chesopean Site, 44VB48
11	Chowanoke Site (Liberty Hill/Mt. Pleasant), 31HF20/30
12	College Creek Site, 44JC27
13	Comstock Site, 44CF1
14	Croaker Landing Site, 44JC70
15	Currituck Beaker Site, 31CK34
16	Fort Raleigh Site
17	Gaston Site
18	Great Neck Site, 44VB7/9
19	Hallowes Site, 44WM6
20	Hand Site, 44SN22
21	Hertzler Site, 44PO3
22	Hollowell Site, 31CO5
23	Hopewell Airport Site, 44PG1
24	John Green Site, 44GV1
25	Jordan's Landing Site, 31BR7
26	Kiskiak, 44YO2
27	Maycock's Point Site, 44PG40
28	Mispillion Site
29	Mount Airy, 44WM4
30	Moysonec (Richmond)
31	Parker Site, 31ED29
32	Phelps Lake sites
33	Pomeiooc (?) Site, 31HY43
34	Portsmouth Oil Refinery, 44PM13
35	Potomac Creek Site
36	Potts Site, 44NK10
37	Powhatan Creek Site, 44JC26
38	Pungo Site 1
39	Roberts Wharf Site, 31GA1
40	Shipyard Landing Site, 31BR1

Figure 45. Map showing location of selected sites in the Mid-Atlantic region (legend) (continued).

41	Skiffes Creek Site, 44NN7
42	Swing Site, 44VB16
43	T. Gray Haddon Site, 44KW4
44	Thorpe Site, 31NS3b
45	Tillett Site, 31DR35
46	Townsend Site
47	Uniflite Site, 31ON33
48	Upton Site, 44SK80
49	Waterlily Site, 31CK2
50	White Bank Park Site, 44CF67
51	White Oak Point Site, 44WM119
52	Wolfe Neck Site

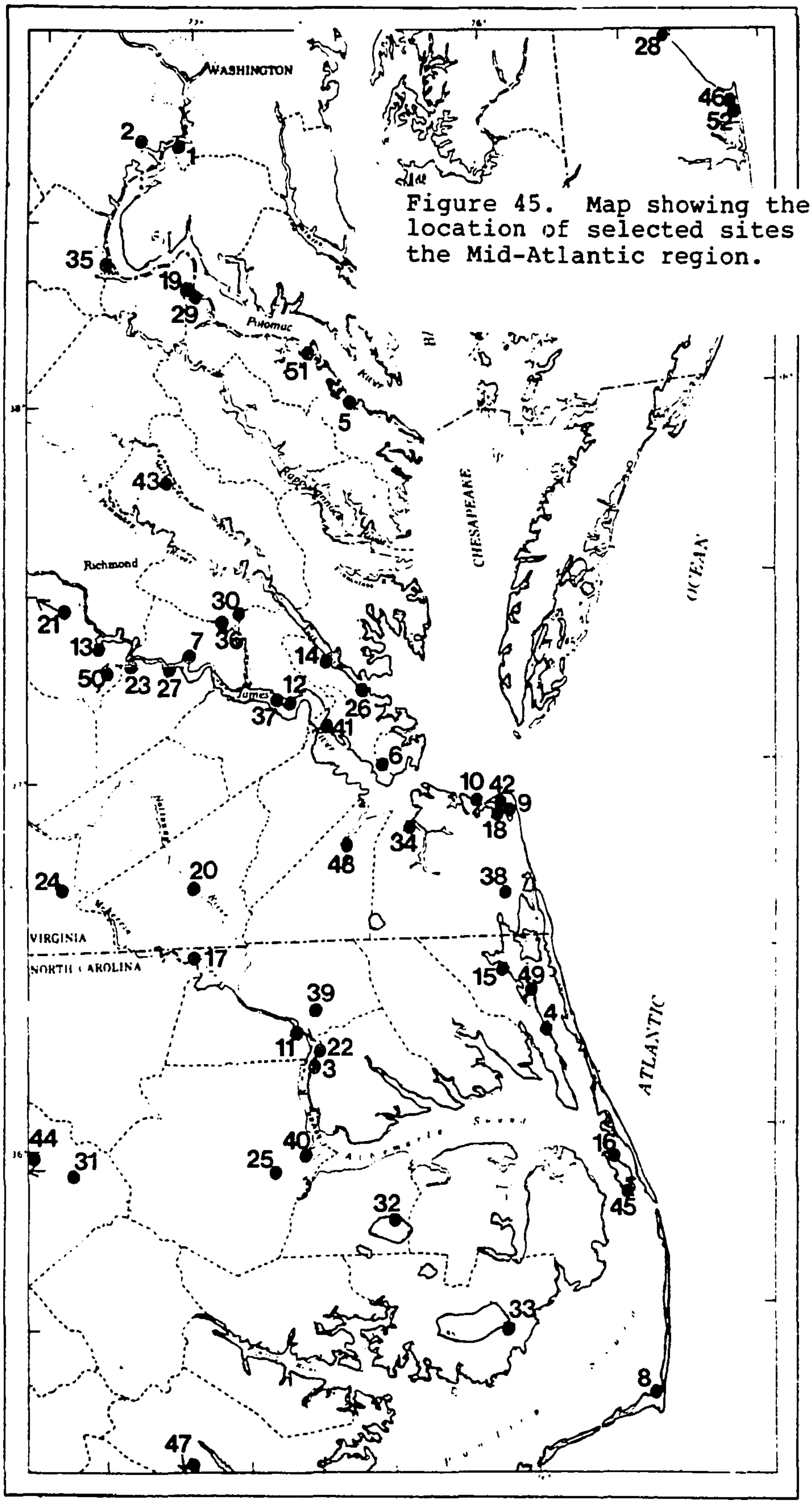


Figure 45. Map showing the location of selected sites in the Mid-Atlantic region.

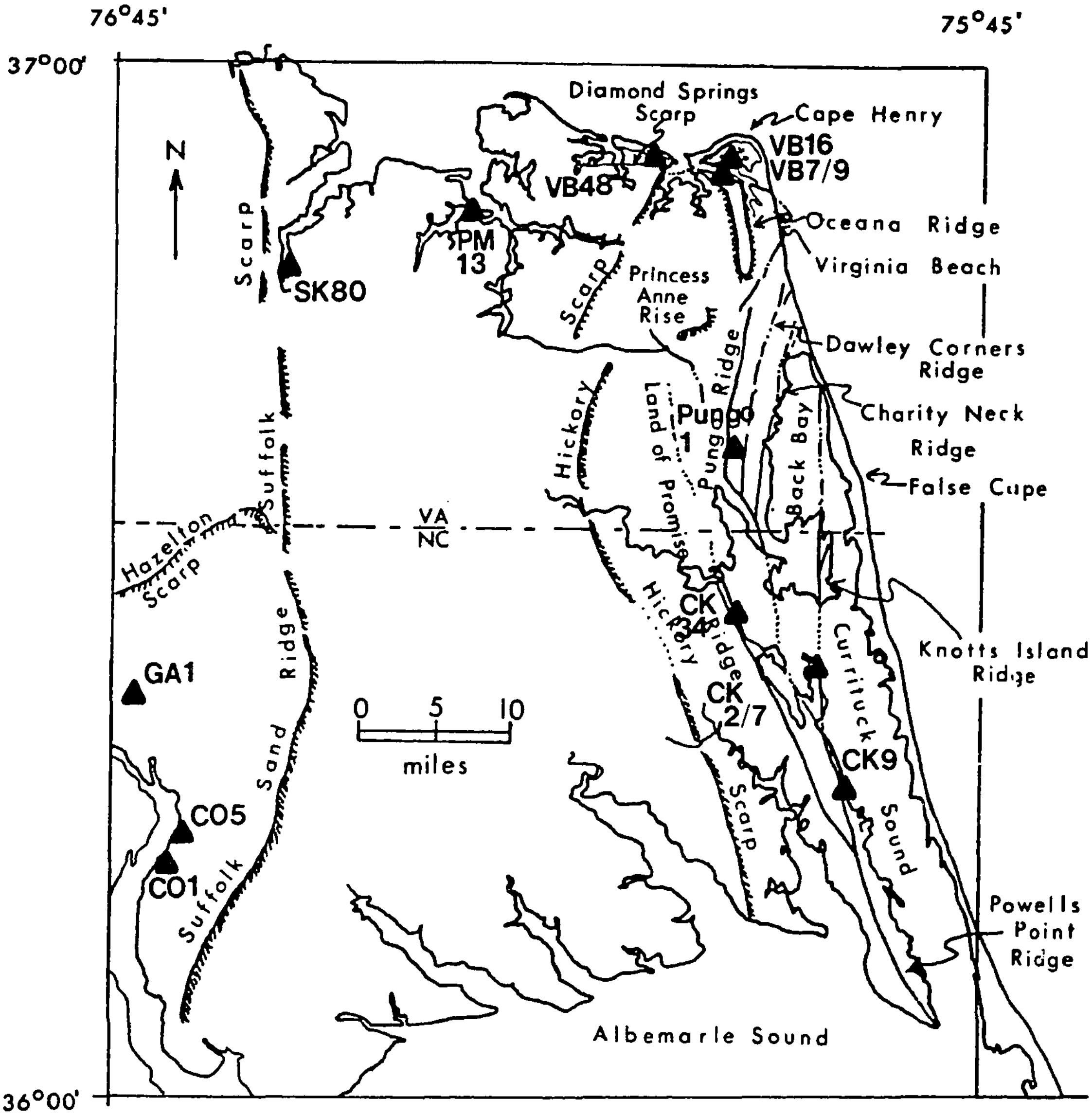


Figure 46. Archaeological sites in the lower Chesapeake Bay region.

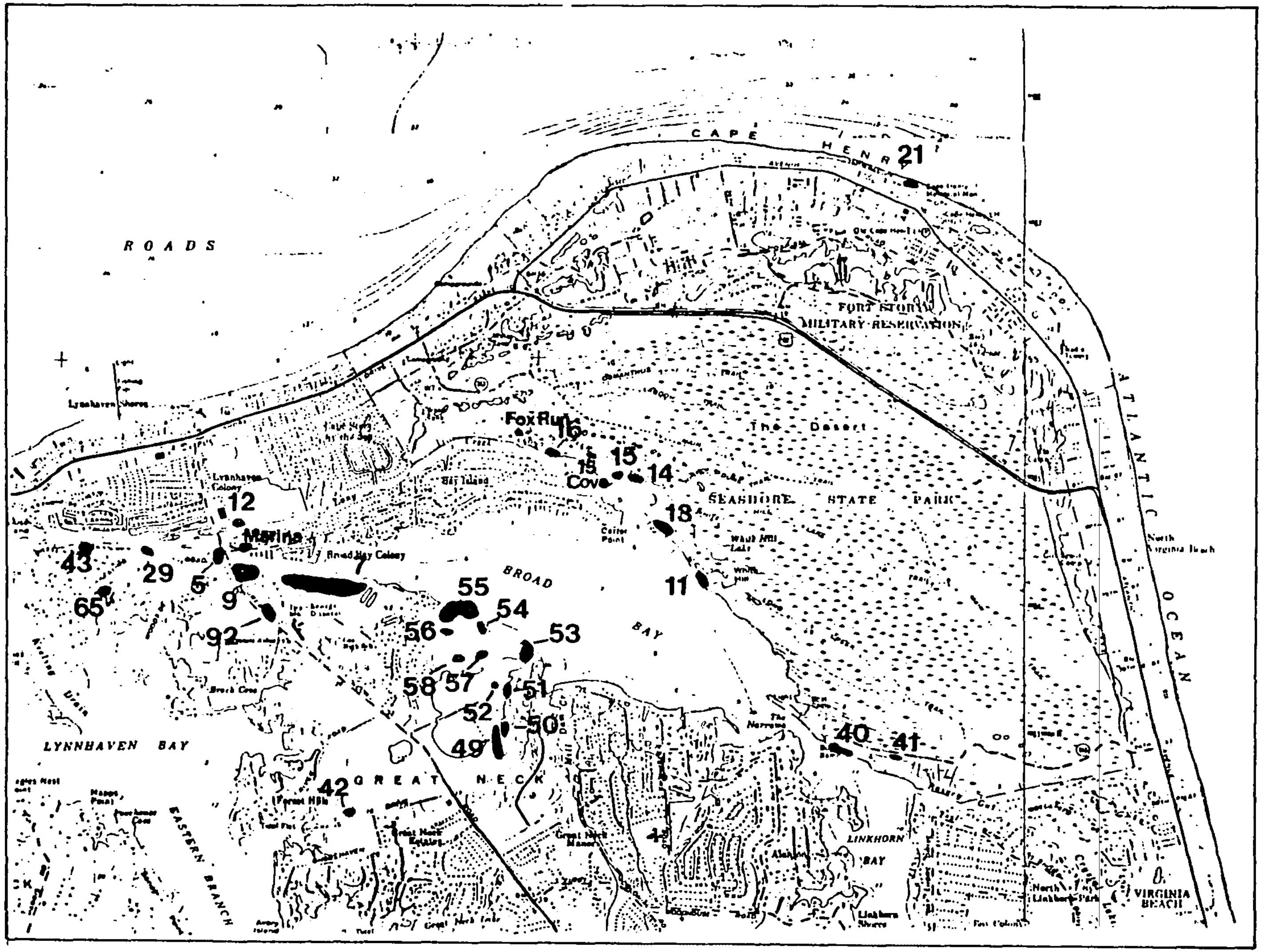


Figure 47. Distribution of archaeological sites in northern Virginia Beach.

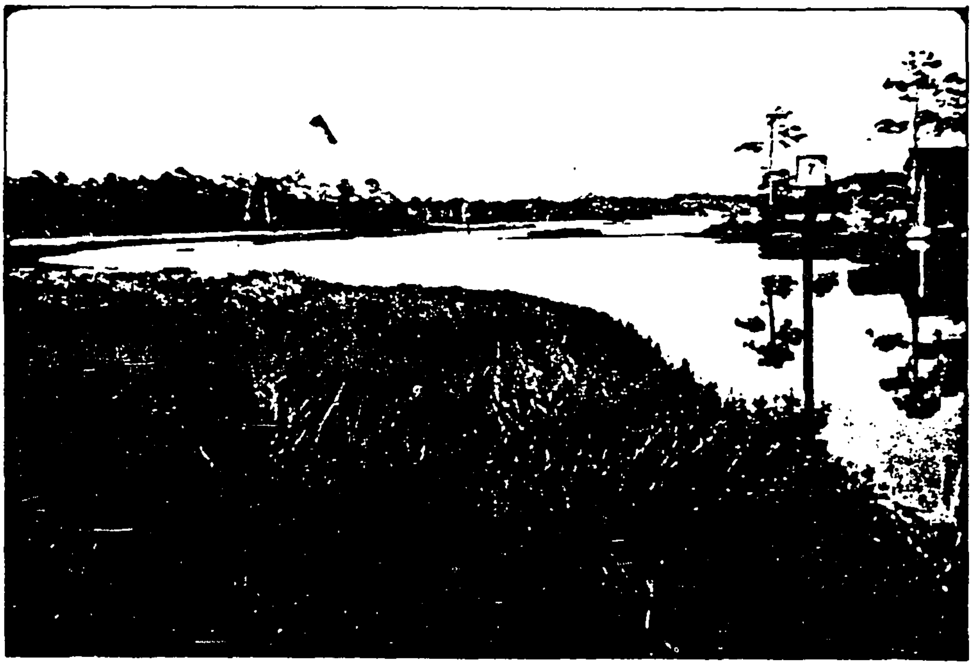


Figure 48. Long Creek, looking south-east from the Swing Site (44VB16); Bay Island on right.

Figure 49. White Hill Lake from the air; Seashore State Park.

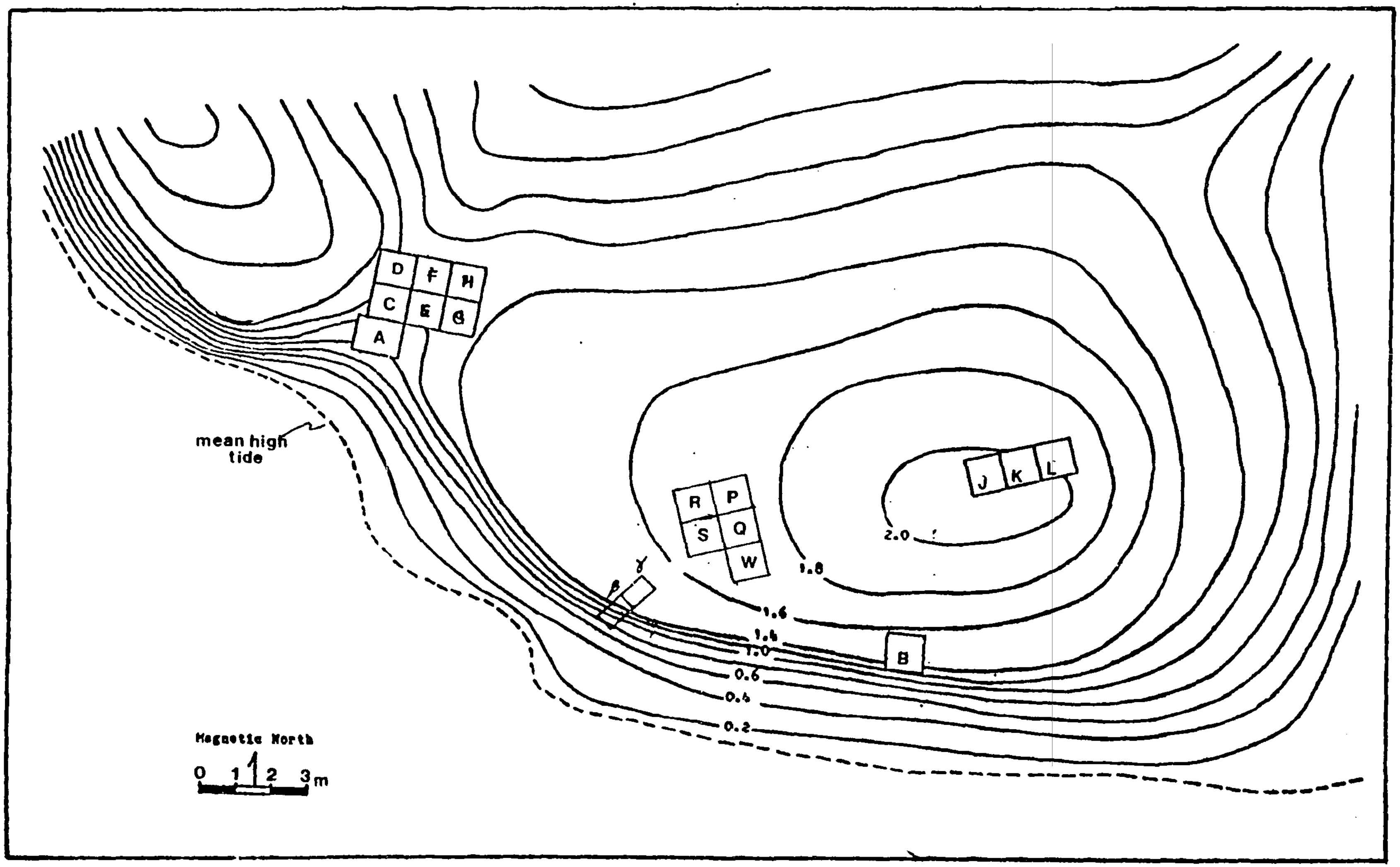


Figure 50. Map of the Swing Site (44VB16), showing excavated areas. Contour intervals in 0.2 meters.

Figure 51. Datum stump at the Swing Site (44VB16); note bank erosion.

Figure 52. Swing Site (44VB16) prior to excavation.

Figure 53. Colington Ware sherds being exposed, Unit C, 44VB16.

Figure 54. Large Colington Ware sherds *in situ*, Unit C, 44VB16.

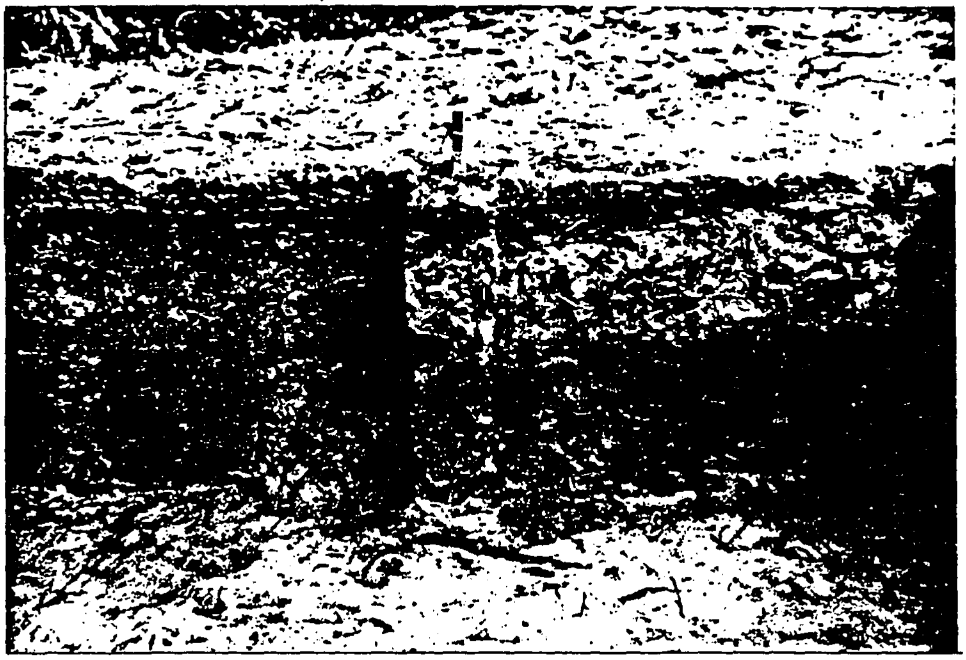


Figure 55. Swing Site (44VB16), Units E and F, east profile.

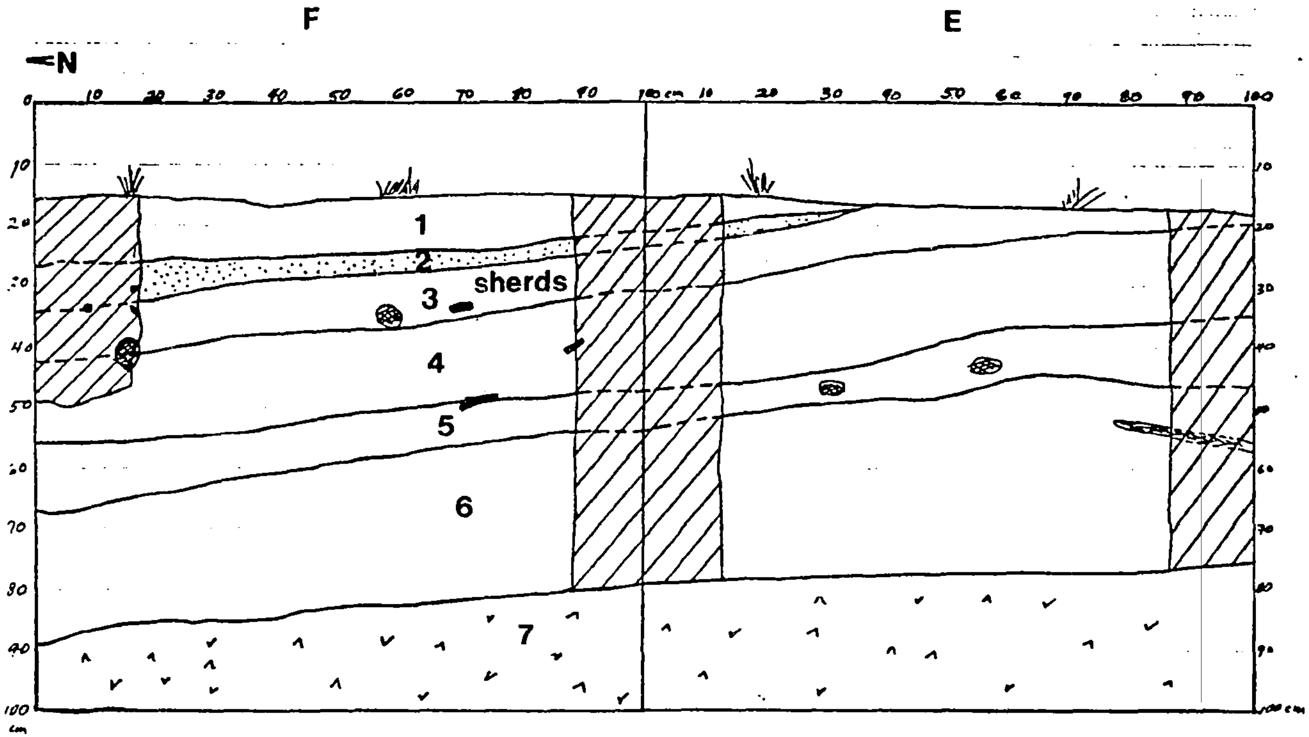


Figure 56. Swing Site (44VB16), Units E and F, east profile; schematic drawing of layers.

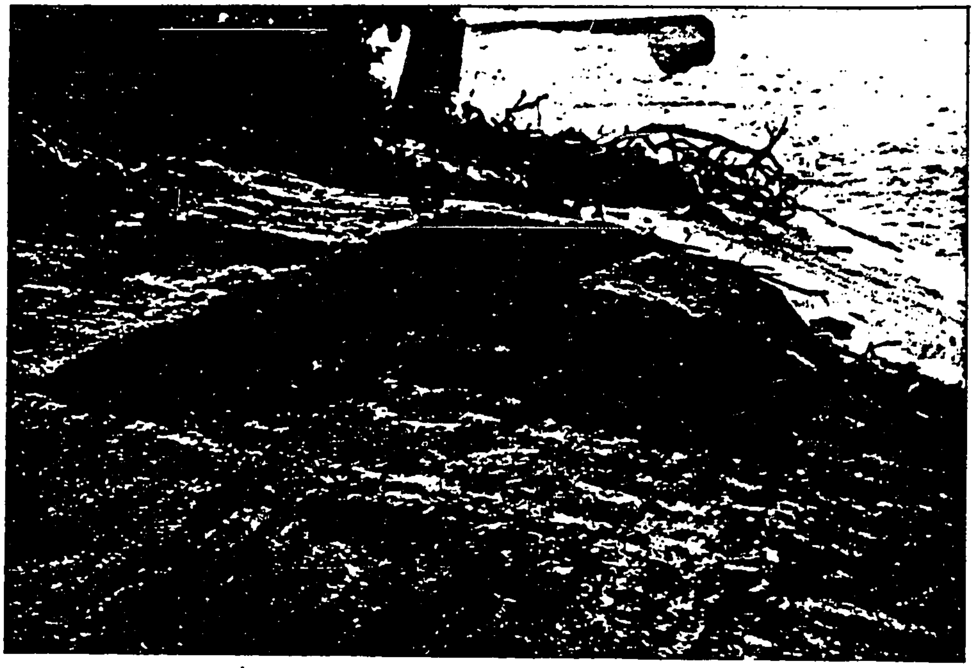


Figure 57. Swing Site (44VB16, second excavation block, Units P to S and W.

Figure 58. Swing Site (44VB16), south profile, Unit W; dark band in center of profile is midden.

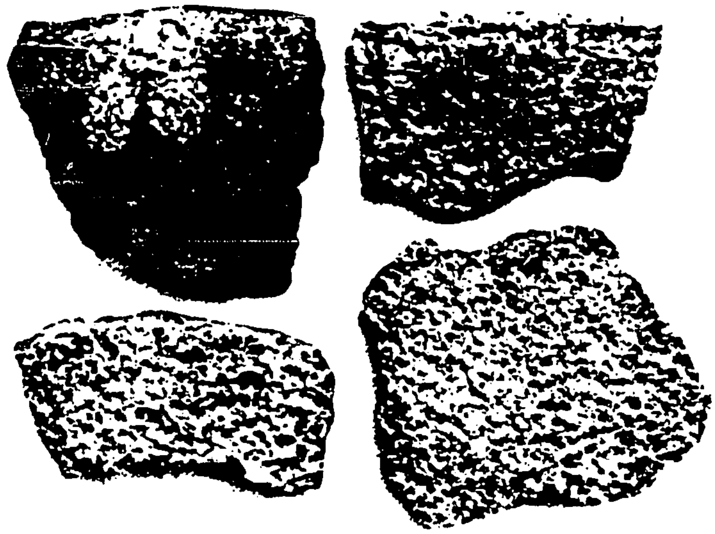


Figure 59. Mockley Ware, net impressed type; 44VB16; rim sherds (upper row) and body sherds (bottom row).

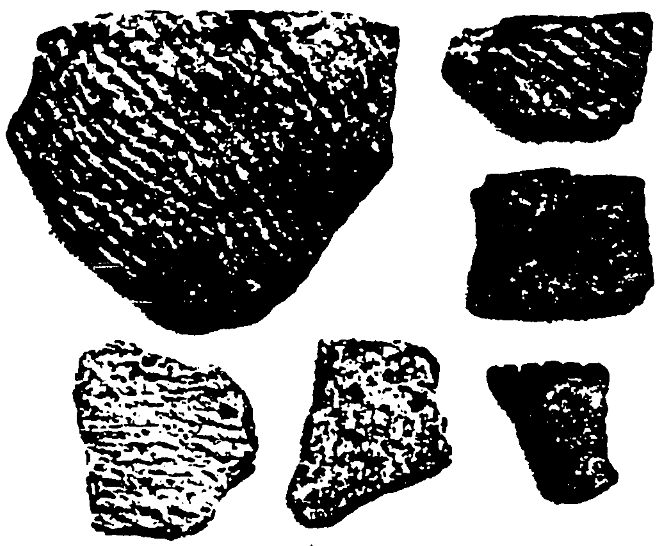


Figure 60. Mockley Ware, cord marked and plain types; 44VB16; all rim sherds except two on left bottom.

Figure 61. Colington Ware, fabric impressed type; 44VB16; note fabric wrapped paddle indentations on upper inside surface, third row on left.

Figure 62. Colington Ware, simple stamped type; 44VB16.

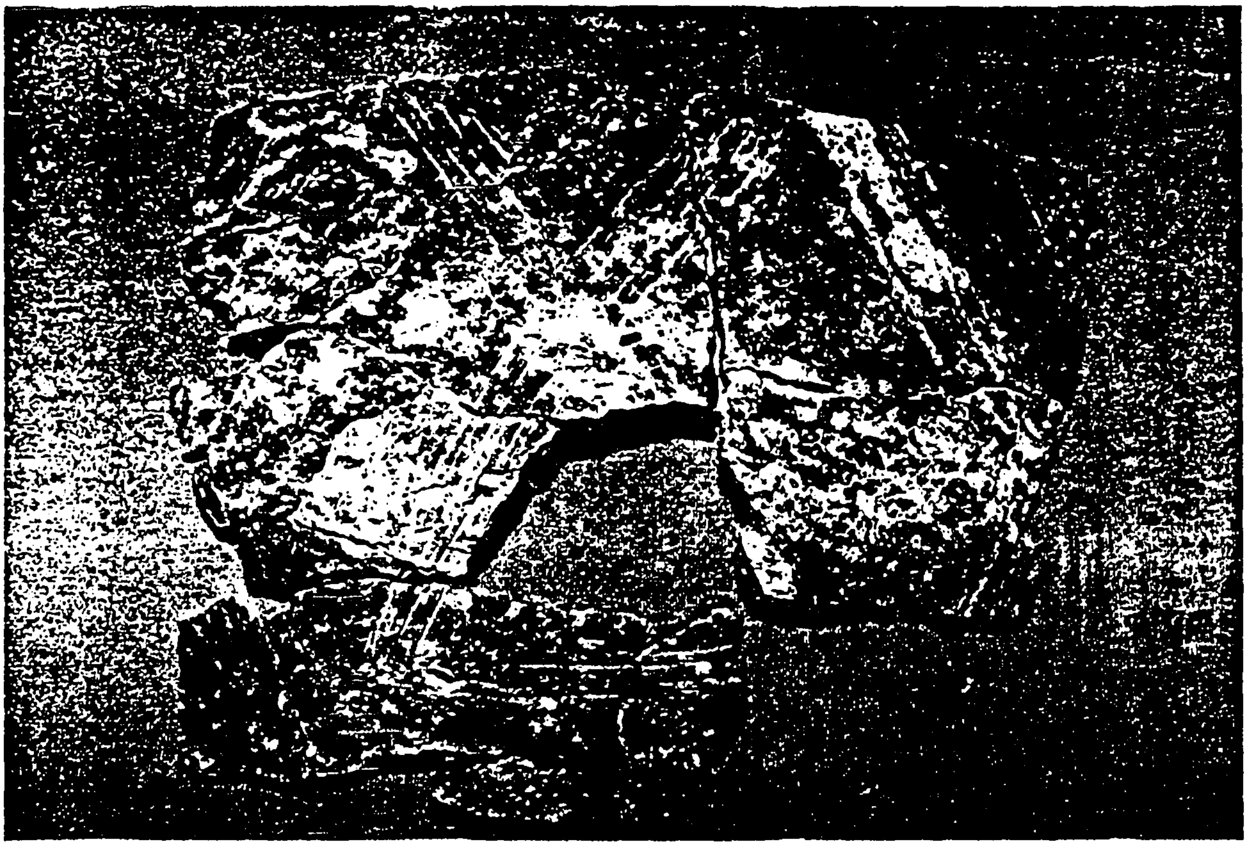


Figure 63. Colington Ware vessel, fabric impressed type, with incised bands in closed crossing patterns; 44VB16.

Figure 64. Colington Ware, fabric impressed type, with incision; rim sherds on top row; 44VB16.

Figure 65. Colington Ware, fabric impressed type, with incision and punctation; 44VB16.

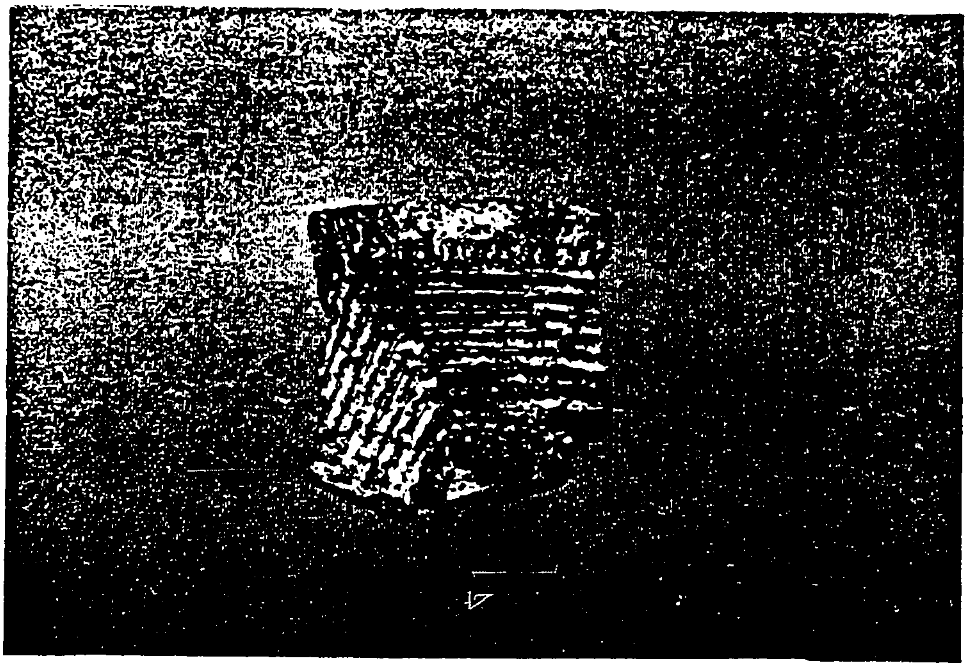


Figure 66. Colington Ware, fabric impressed type, with incision and punctation; 44VB16; rim sherd.

Figure 67. Colington Ware, fabric impressed type, with incision and punctation; 44VB16.

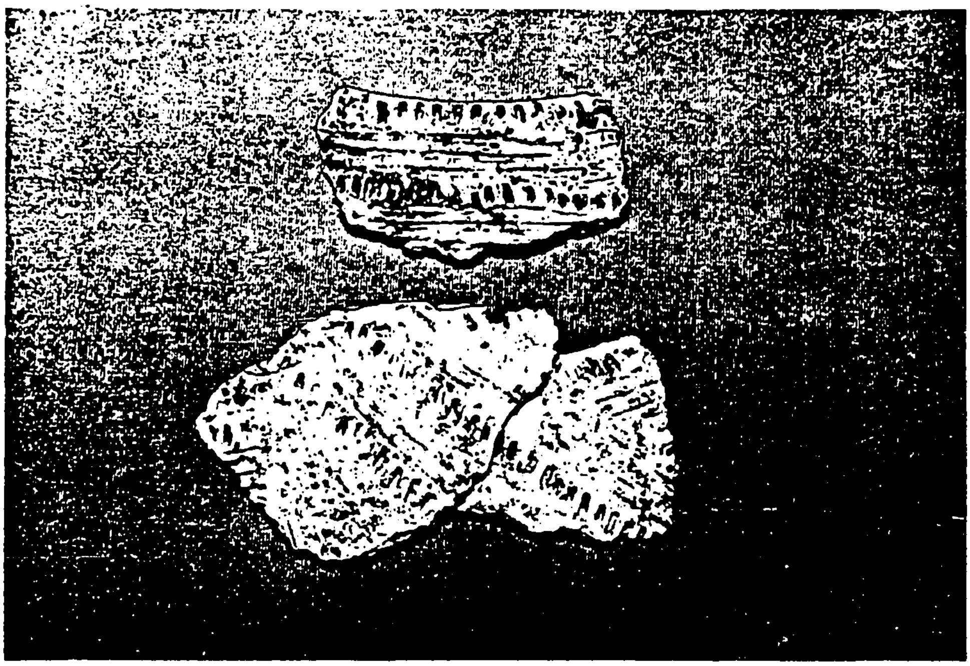
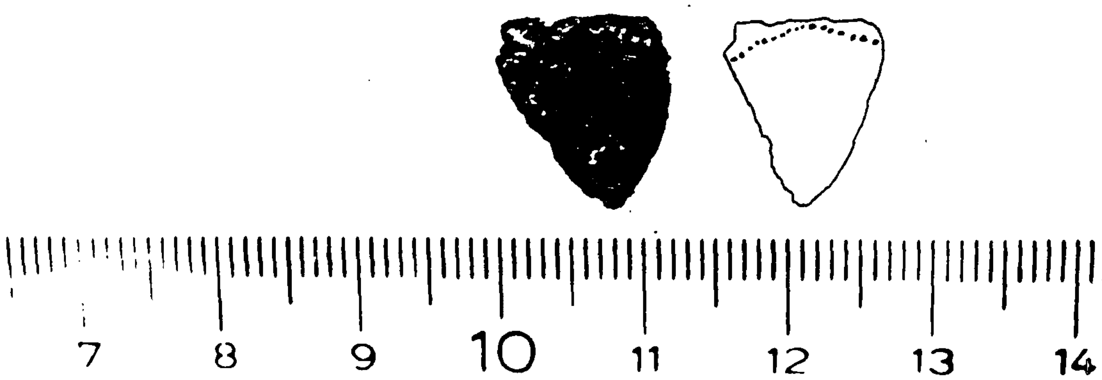


Figure 68. Pipe fragment with fine incisions; 44VB16.



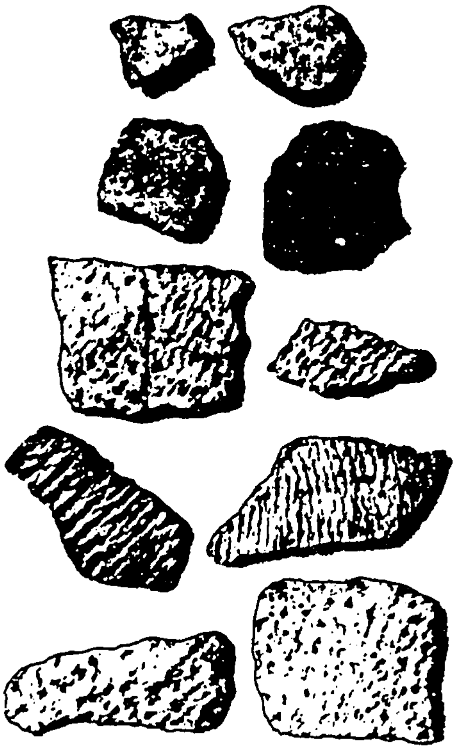


Figure 69. Ceramics, 44VB16; rows from top- clay tempered sherds; mica tempered sherds; Mt Pleasant Ware: fabric impressed, cord marked, and net impressed types.

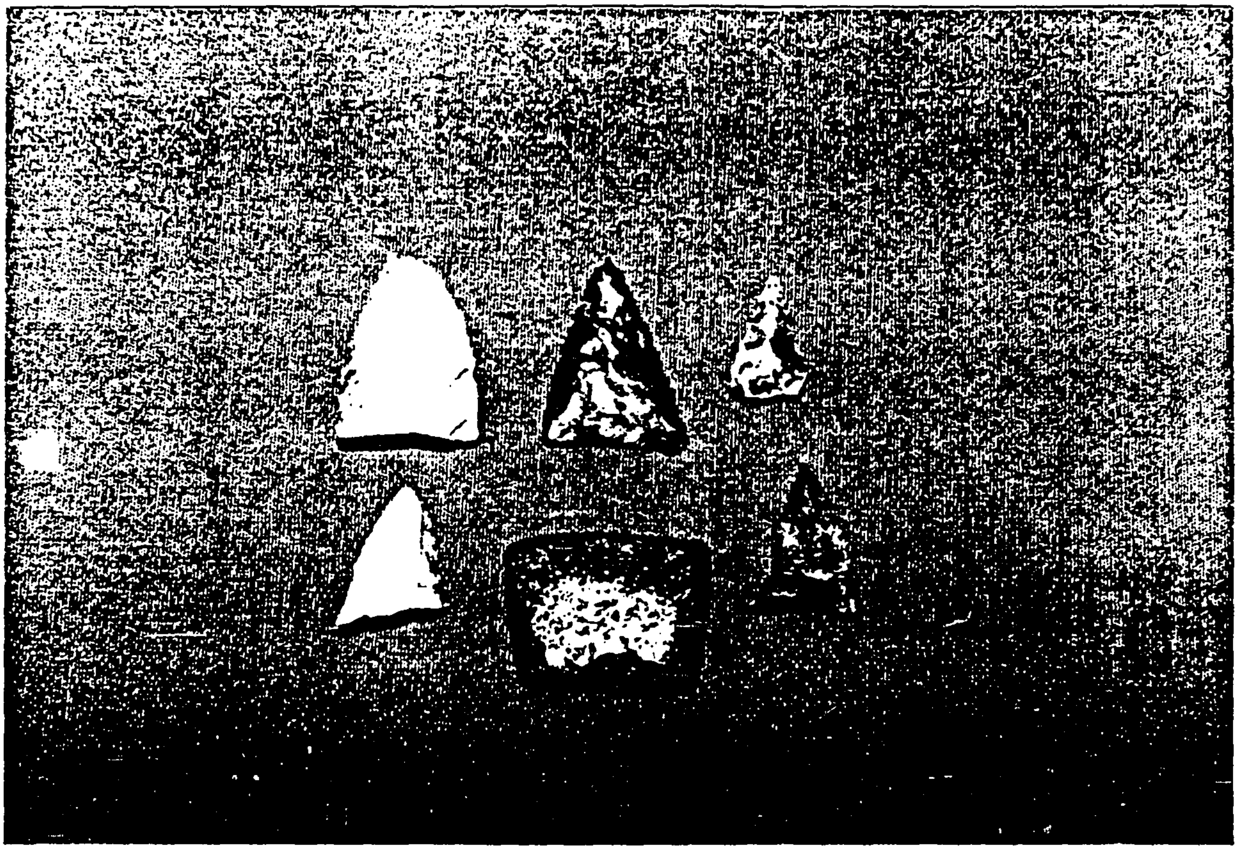


Figure 70. Lithics, 44VB16; upper row - point fragment and triangular points of jasper and chert; bottom row (l.-r.)- fragment, celt, point.

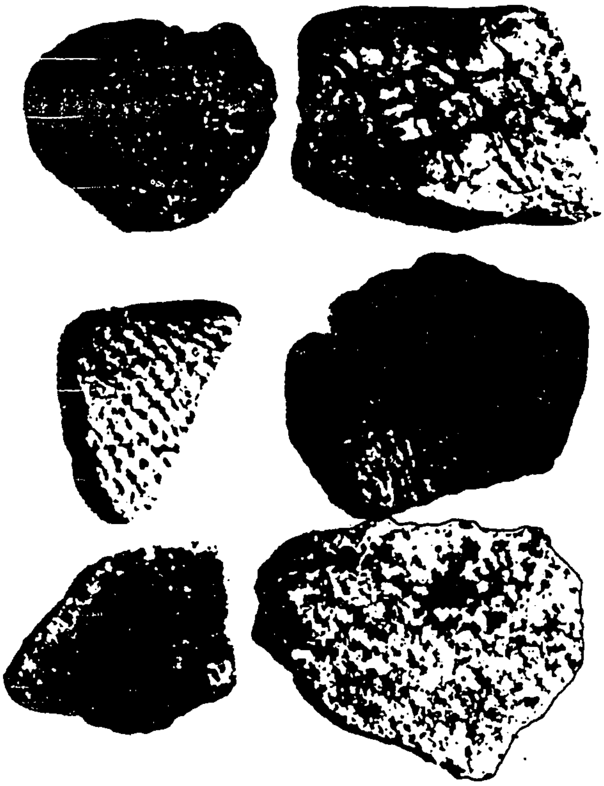
Figure 71. Lithics, 44VB16; upper row - points and point fragments; bottom row - microtools.

Figure 72. Lithics, 44VB16; microcores.

Figure 73. Lithics, 44VB16; cracked rock.

Figure 74. Lithics, 44VB16; debitage.

Figure 75. Ceramics, 44VB13; upper row - Mount Pleasant fabric impressed and net impressed types; second row - Deep Creek net impressed (left), Mount Pleasant cord marked (right); bottom row-Deep Creek net impressed type.



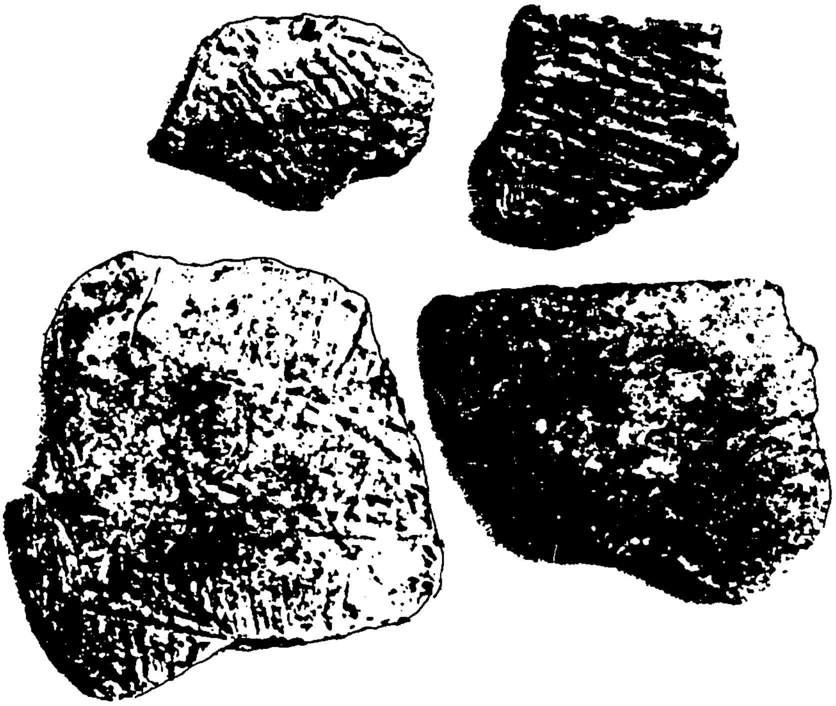


Figure 76. Colington Ware, simple stamped (upper row), open fabric impressed (lower left), and plain (lower right) types; 44VB13.

Figure 77. Lithics, 44VB13;
flakes and microtools.

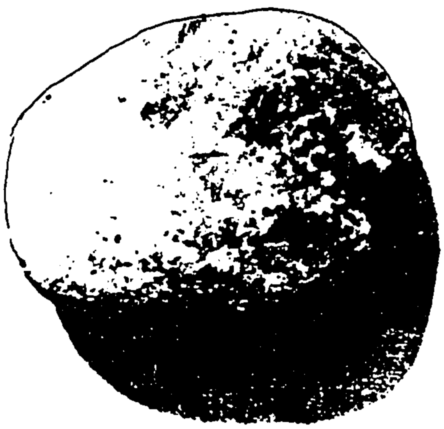


Figure 78. Lithics, 44VB13;
grinding stone.

Figure 79. Cedar Point Site (44VB40); Linkhorn Bay on right, site is on dune ridge to left.

Figure 80. Erosion of shoreline in vicinity of 44VB40 evidenced by stranded cypress and pine trees.

Figure 81. Approaching the Cedar Point Site (44VB40) from the northwest.

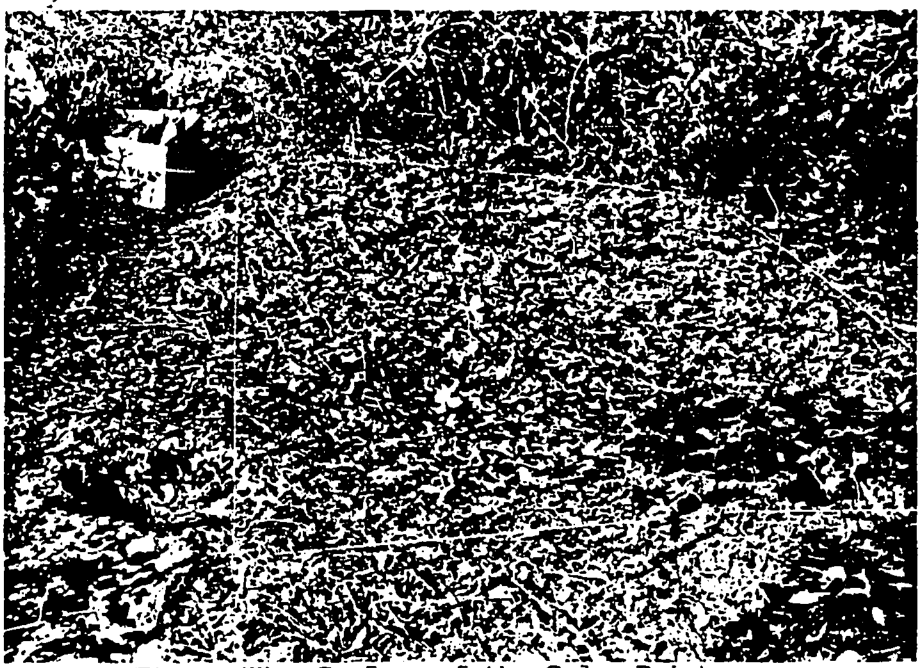


Figure 82. Surface of the Cedar Point Site (44VB40) prior to excavation; note possible pothole to lower left.

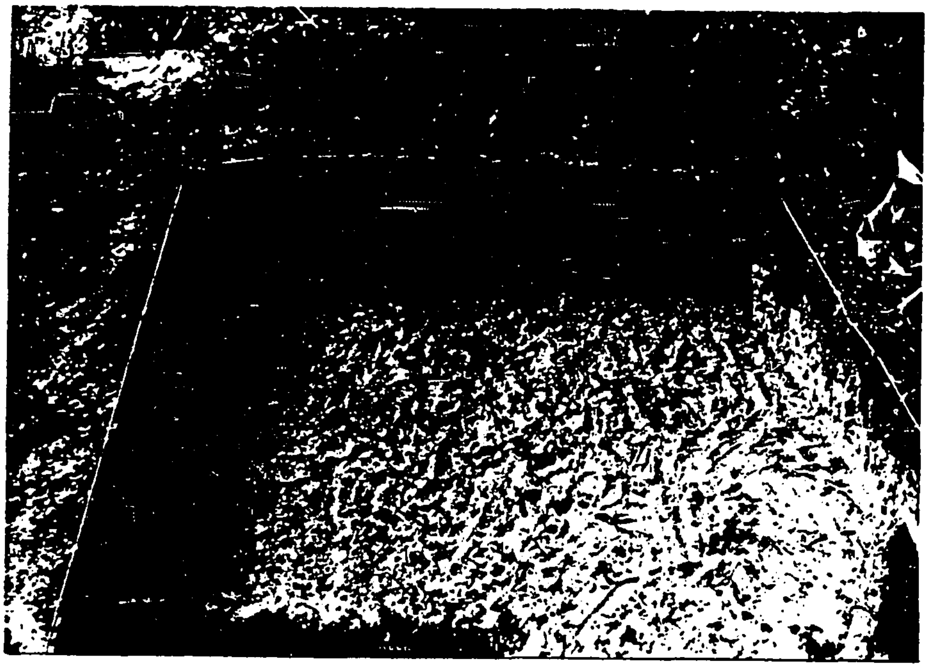


Figure 83. Excavation area, 44VB40; Zones I (humic matter) and II (gray sand) removed, looking northwest.

Figure 84. Excavation area, 44VB40; removal of sediment through Zone III (yellow sand), to northwest.

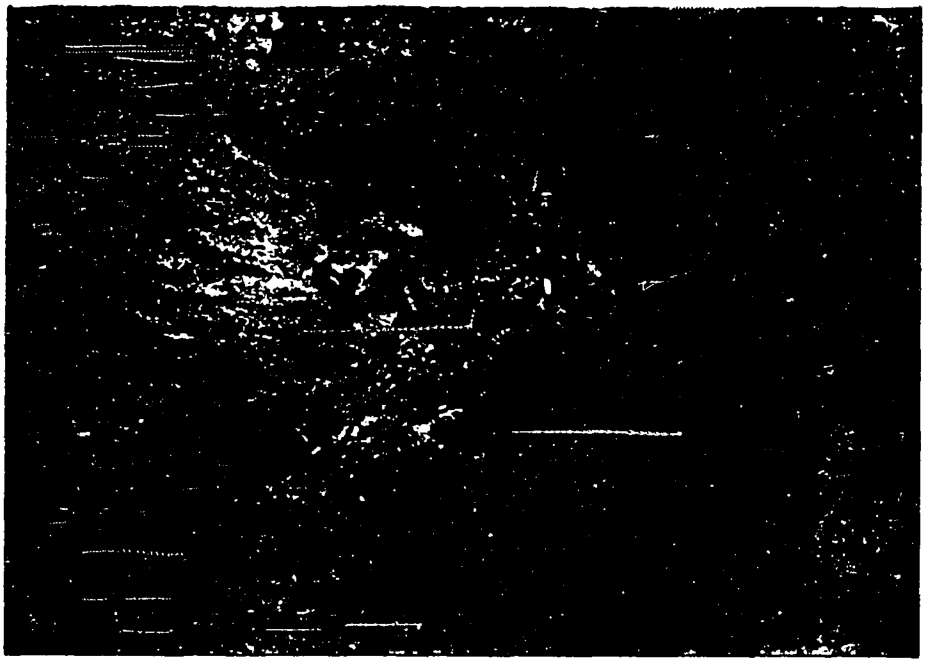


Figure 85. Feature 2, 44VB40; initial cleaning.

Figure 86. Feature 2, 44VB40; after excavation.

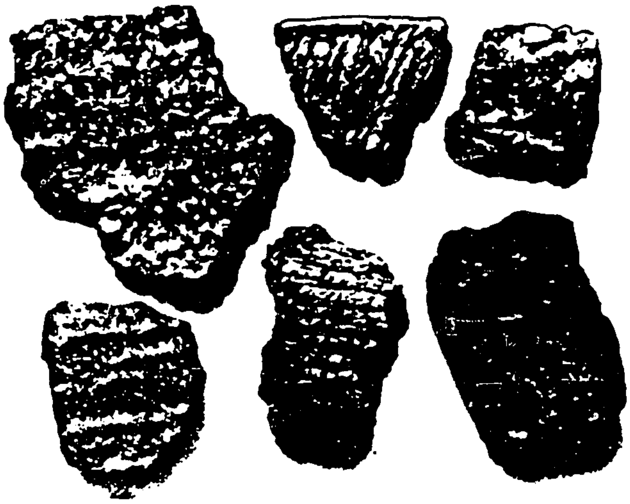


Figure 87. Ceramics, 44VB40; chert tempered, fabric impressed ware (upper left) and crushed quartz tempered, cord marked ware (upper middle).

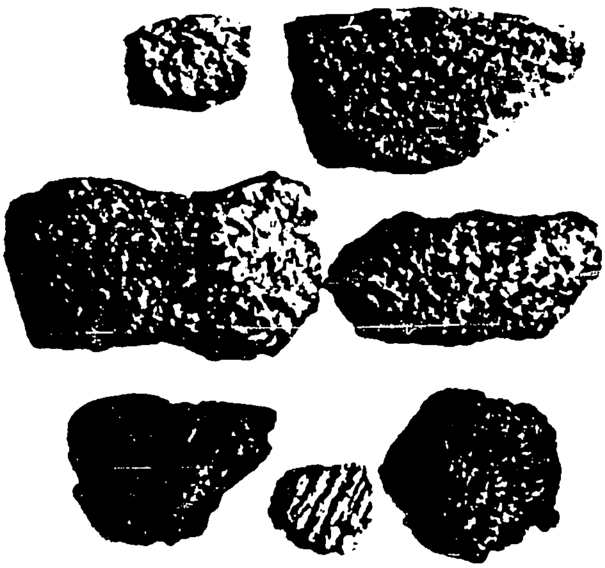


Figure 88. Mockley Ware, net impressed and cord mrked types; 44VB40.

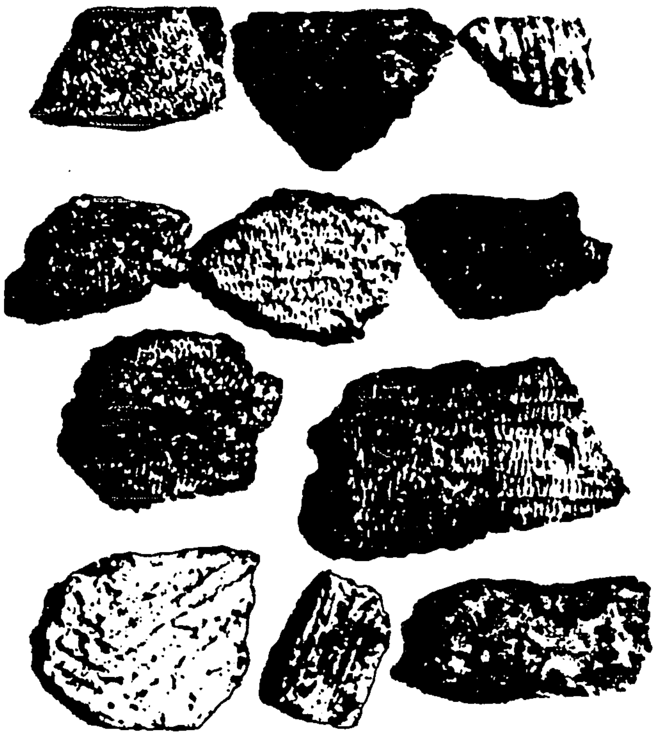


Figure 89. Colington Ware, fabric impressed, fabric impressed with incision, simple stamped, & plain types; 44VB40.

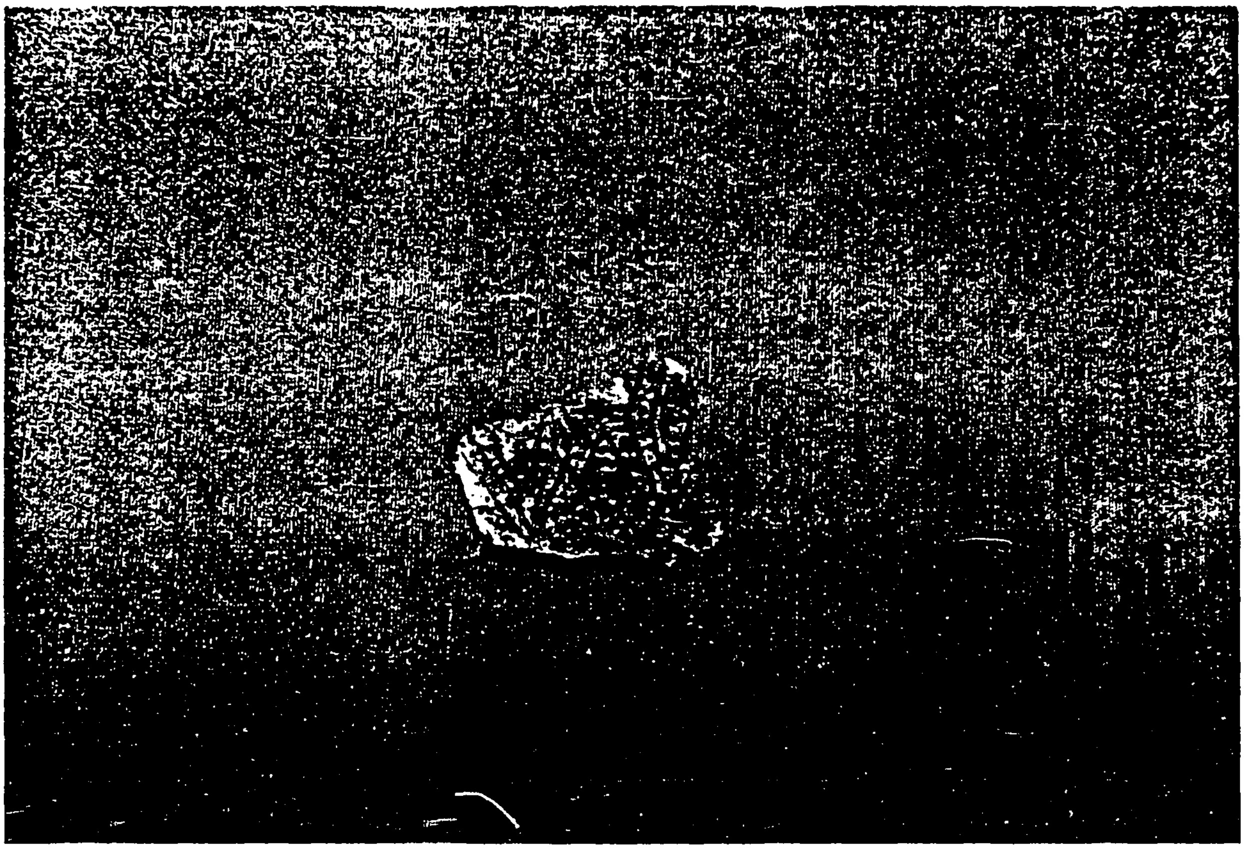


Figure 90. Colington Ware, body sherd with incised and nested lozenges <u>en echelon</u> over fabric impressed surface; 44VB40.

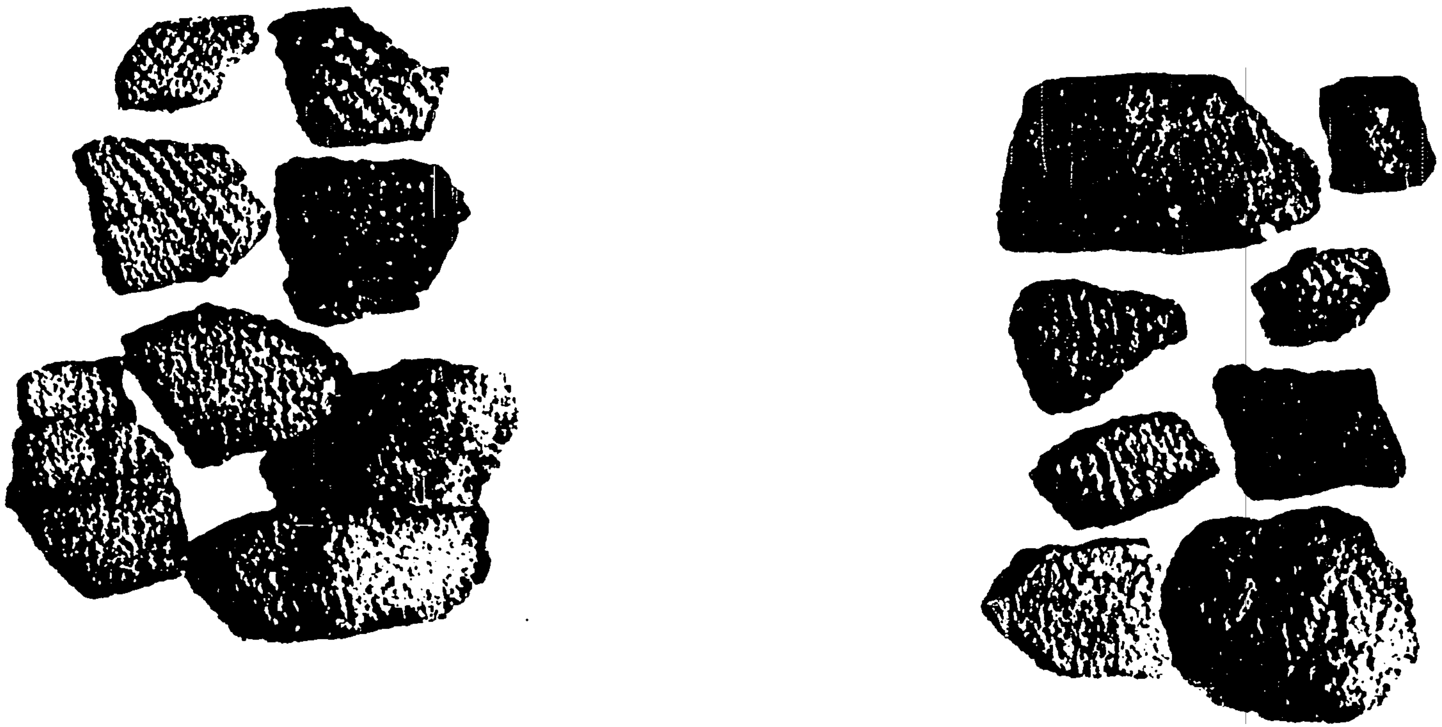


Figure 91. Mount Pleasant Ware,
net impressed type; 44VB40.

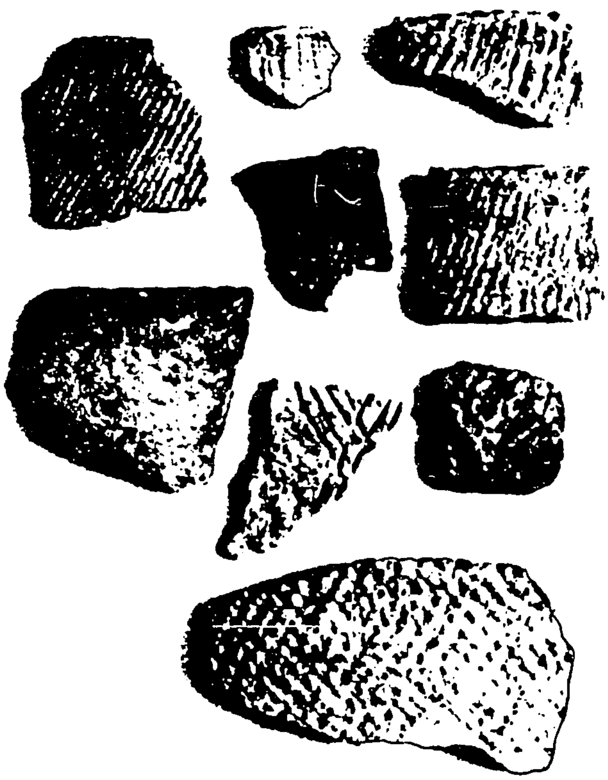


Figure 92. Various sand and pebble tempered ceramic wares; 44VB40.

Figure 93. Lithics, 44VB40; flakes, two-holed gorget fragment, microtool, preform, and projectile point.

Figure 94. Bridge over Long Creek, Virginia Beach. The Addington Site (44VB9) begins to the left of the foreground.

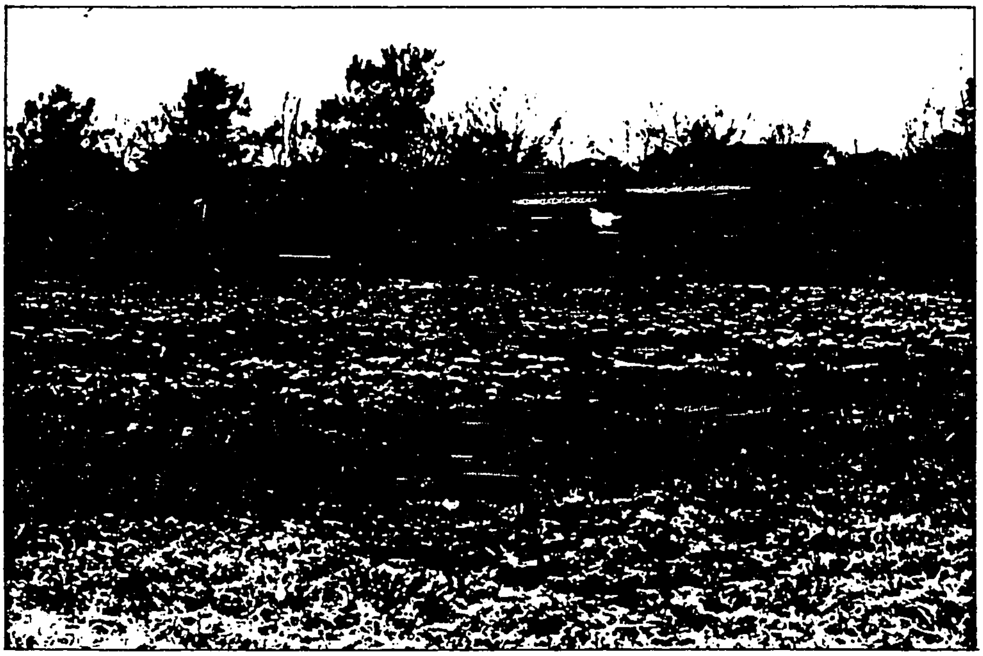


Figure 95. Addington Site (44VB9), looking northeast.

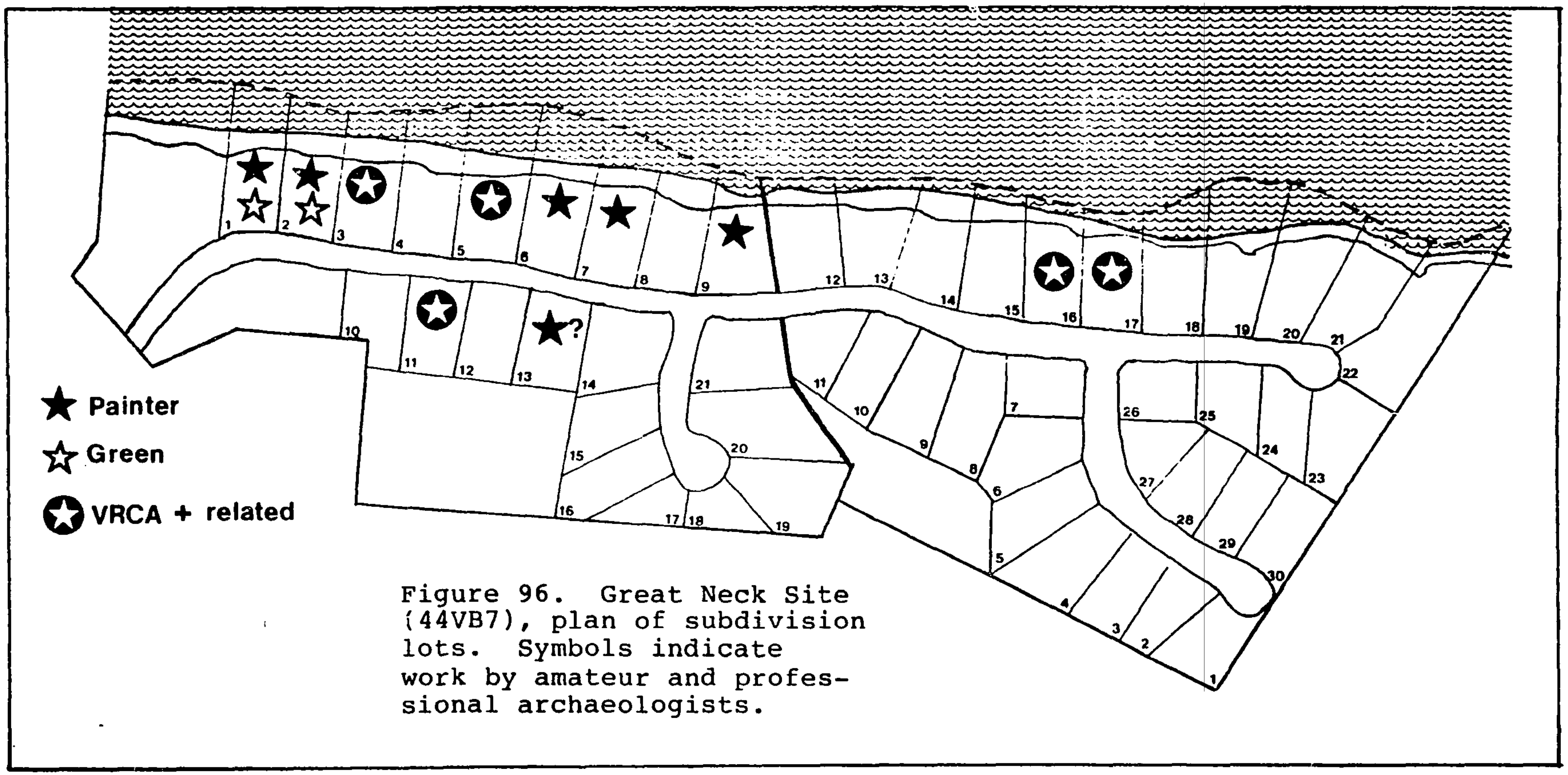


Figure 96. Great Neck Site (44VB7), plan of subdivision lots. Symbols indicate work by amateur and professional archaeologists.

Figure 97. Great Neck Site (44VB7); surface of Lot 7 in May 1979; backfilled trench by Painter on left.

Figure 98. Ceramics, Unit GN1, Great Neck Site (44VB7); all sherds but lower right are Colington Ware.

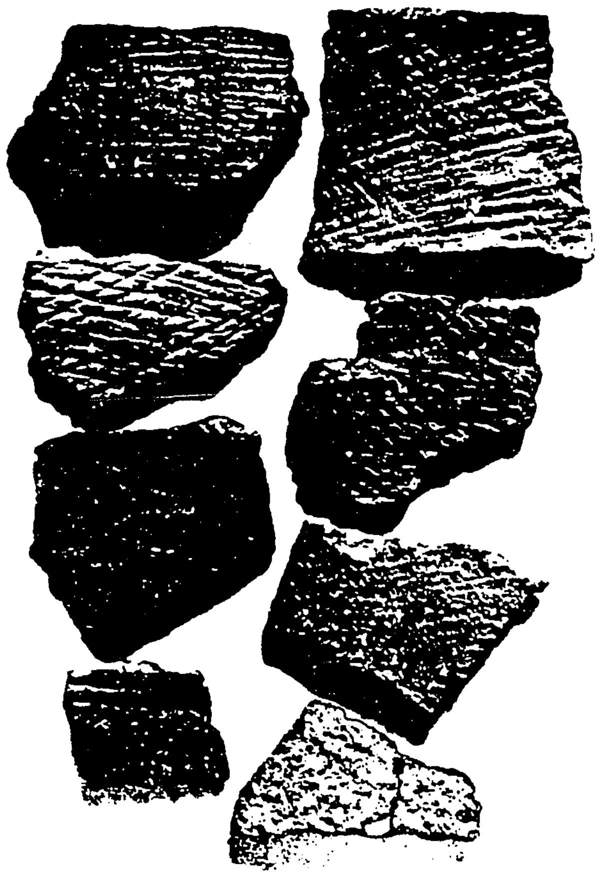


Figure 99. Unit GN1, Lot 7, Great Neck Site (44VB7); plow scars and intact features before excavation.

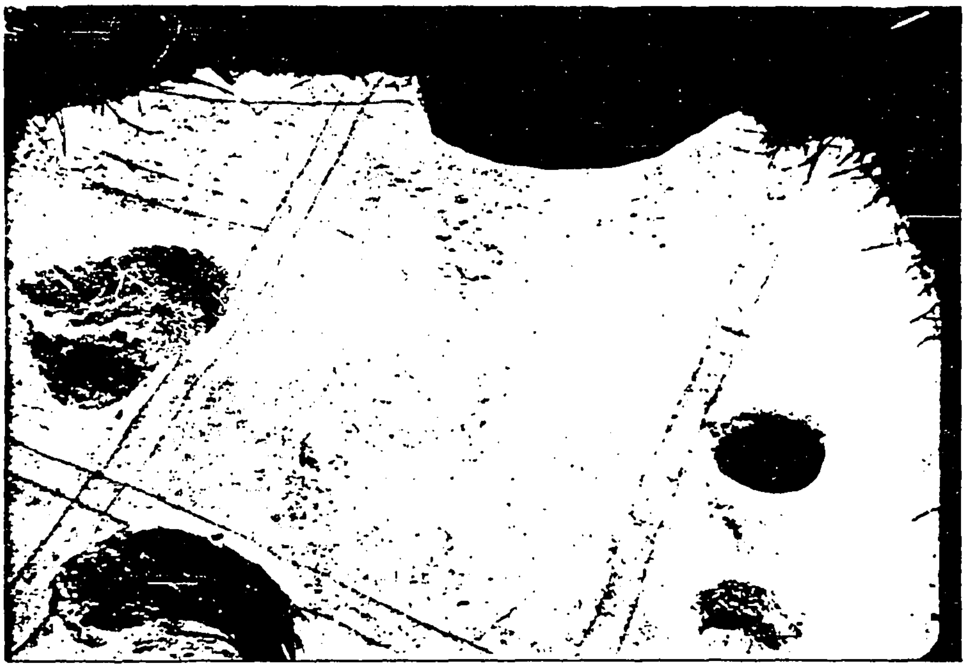


Figure 100. Unit GN1, Lot 7, Great Neck Site (44VB7); scribed plow scars and excavated features.

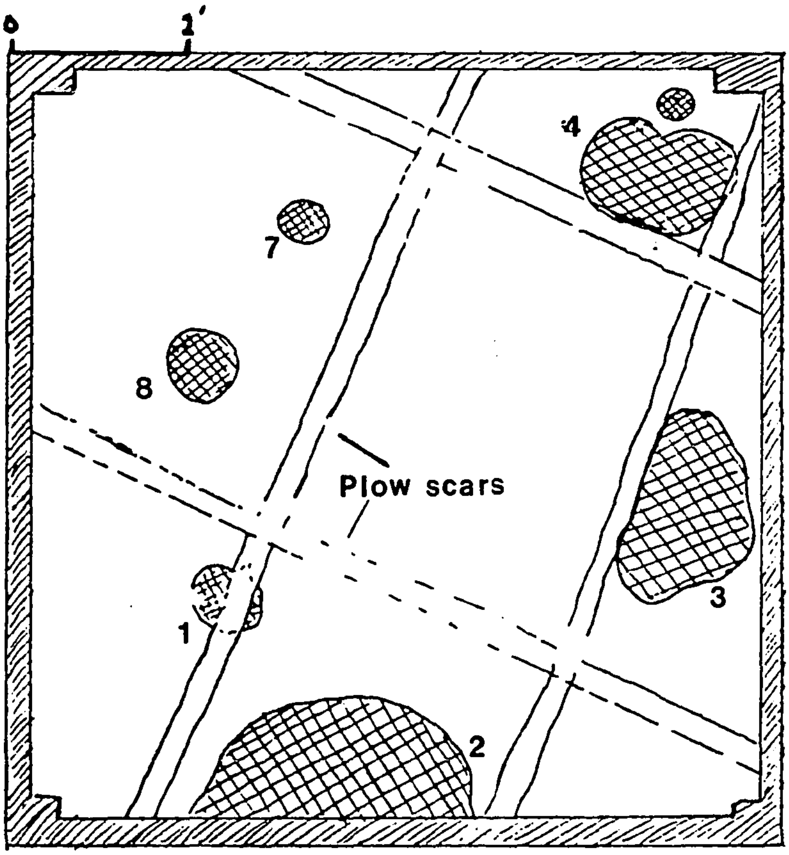


Figure 101. Unit GN1, Lot 7, Great Neck Site (44VB7); plan of plow scars and features in Zone II.

Figure 102. Great Neck Site (44VB7), early spring 1979; partially back-filled trenches left by amateur archaeologists.

Figure 103. Great Neck Site (44VB7); appearance of Unit GN3 in late summer 1979 after removal of features by amateur archaeologists.

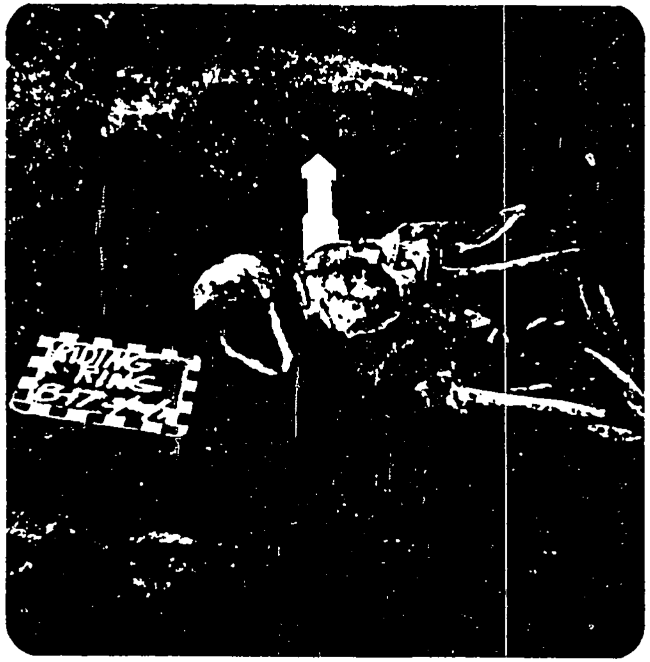


Figure 104. Painter's Burial No. 17, Early to Middle Woodland component (Lot 1), Great Neck Site (44VB7).

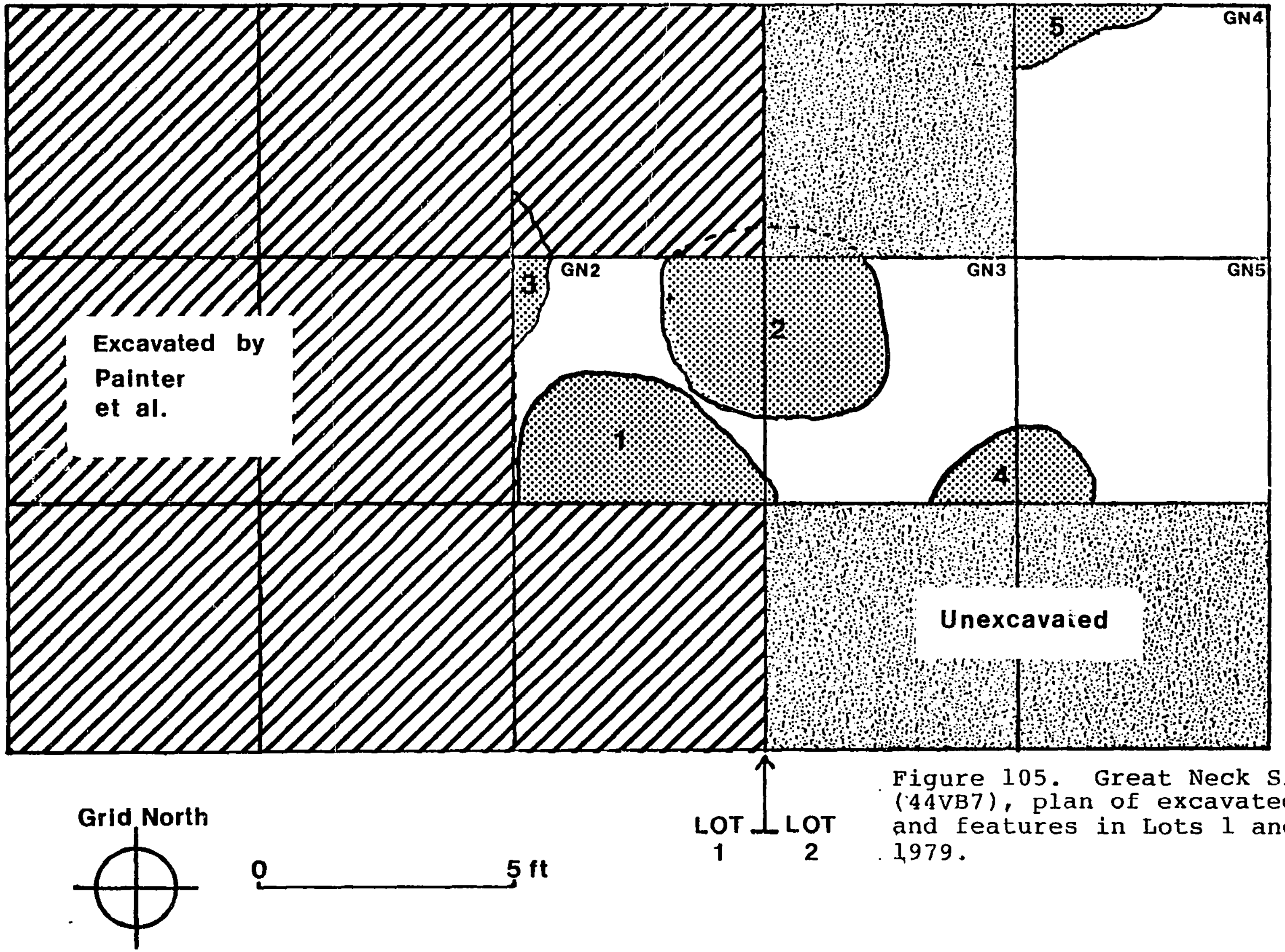


Figure 105. Great Neck Site (44VB7), plan of excavated units and features in Lots 1 and 2, 1979.

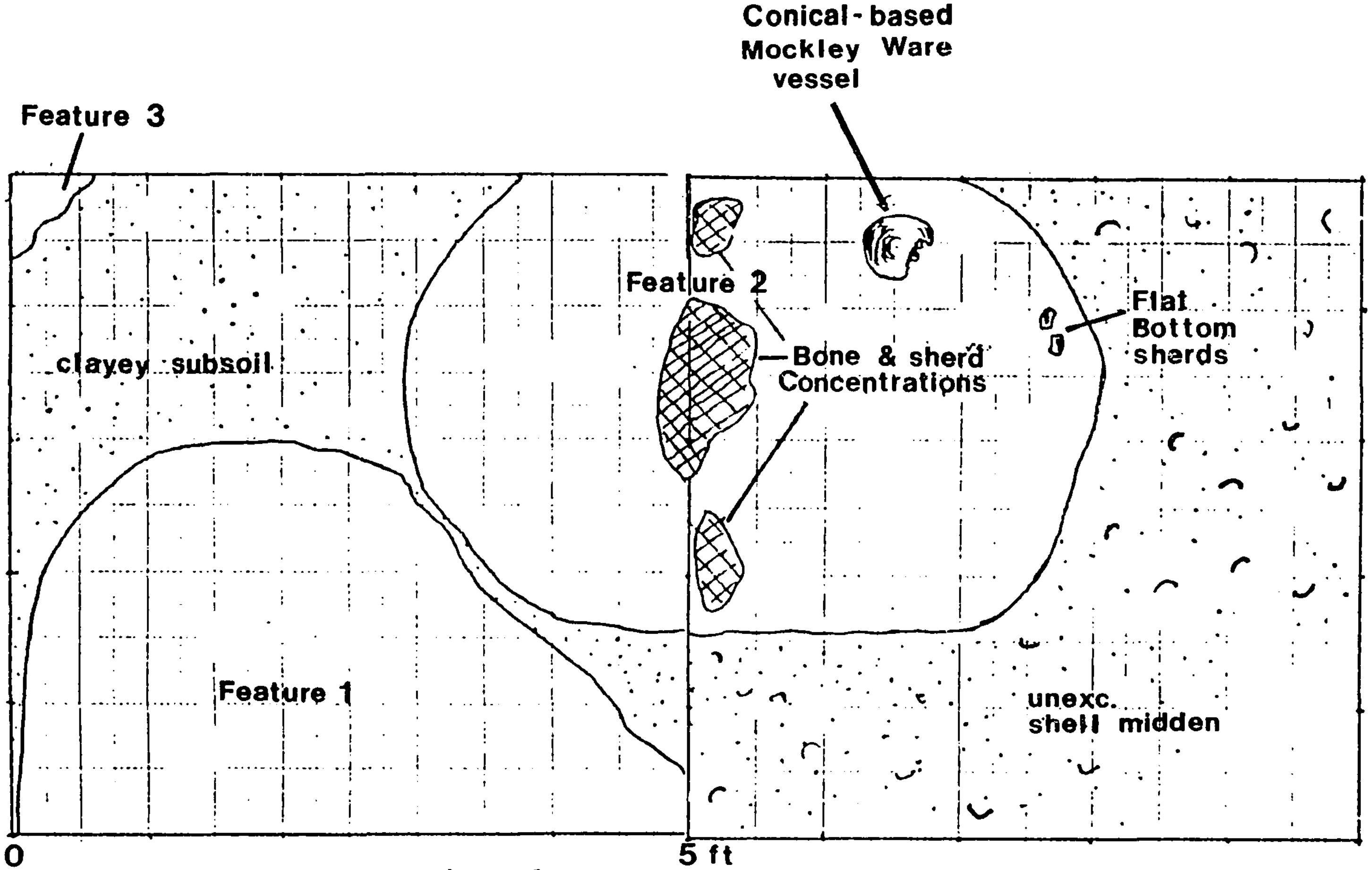


Figure 106. Plan of features, Units GN2 and GN3, 44VB7.

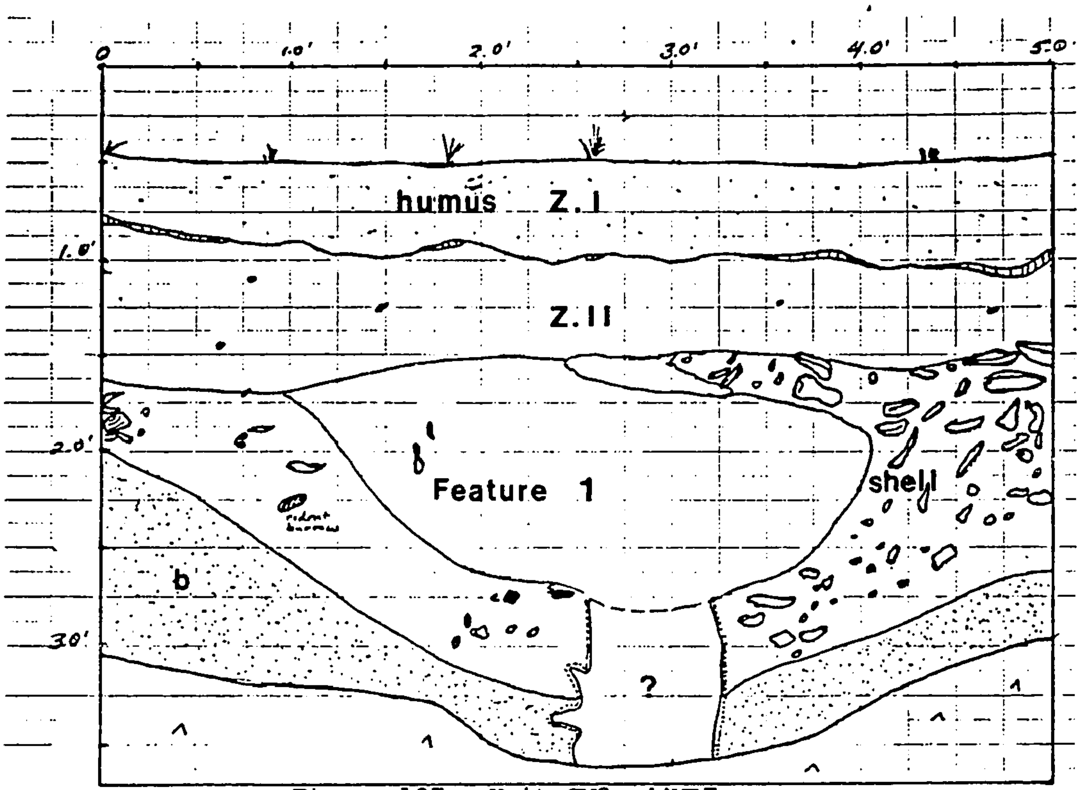


Figure 107. Unit GN2, 44VB7, south profile.

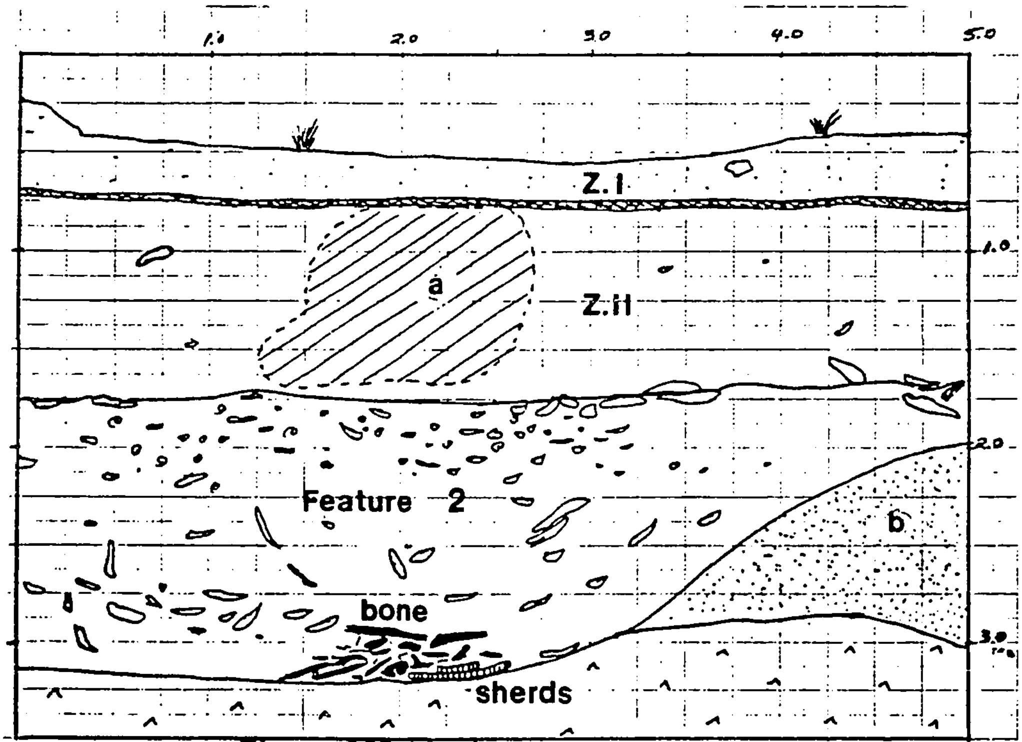


Figure 108. Unit GN2, 44VB7, east profile.

Figure 109. Unit GN2, 44VB7, after excavation, looking east.

Figure 110. Unit GN2, 44VB7, west profile.

Figure 111. Unit GN2, 44VB7, south profile.

Figure 112. Unit GN3, 44VB7, excavation of Feature 2; note conical based Mockley Ware vessel in center.

Figure 113. Mockley Ware, large net impressed sherds; 44VB7.

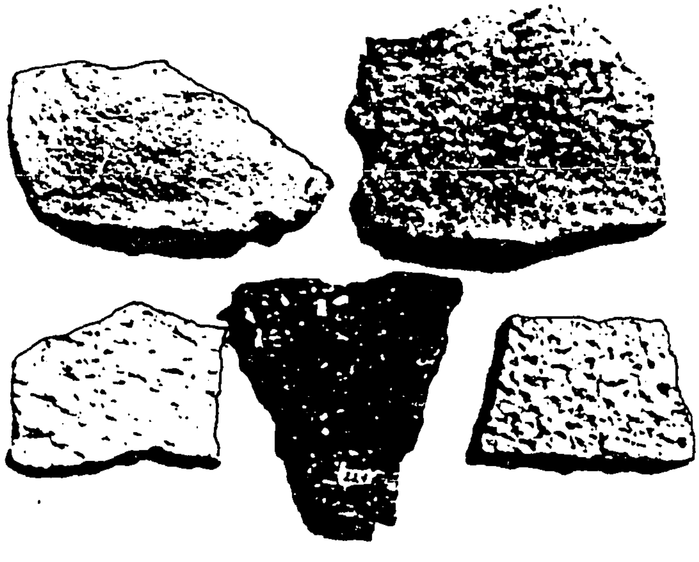


Figure 114. Mockley Ware, variable mesh sizes of netting on net impressed sherds; lower center sherd shows shell tempering on interior surface; 44VB7.

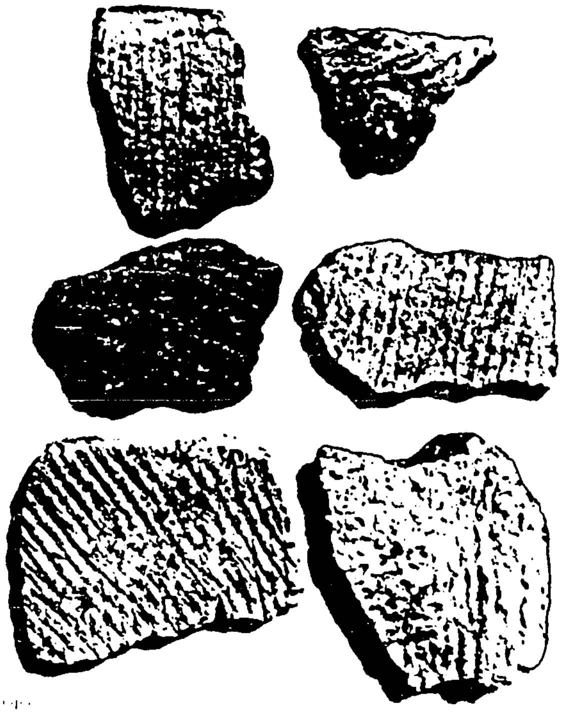


Figure 115. Mockley Ware, cord marked type; 44VB7.

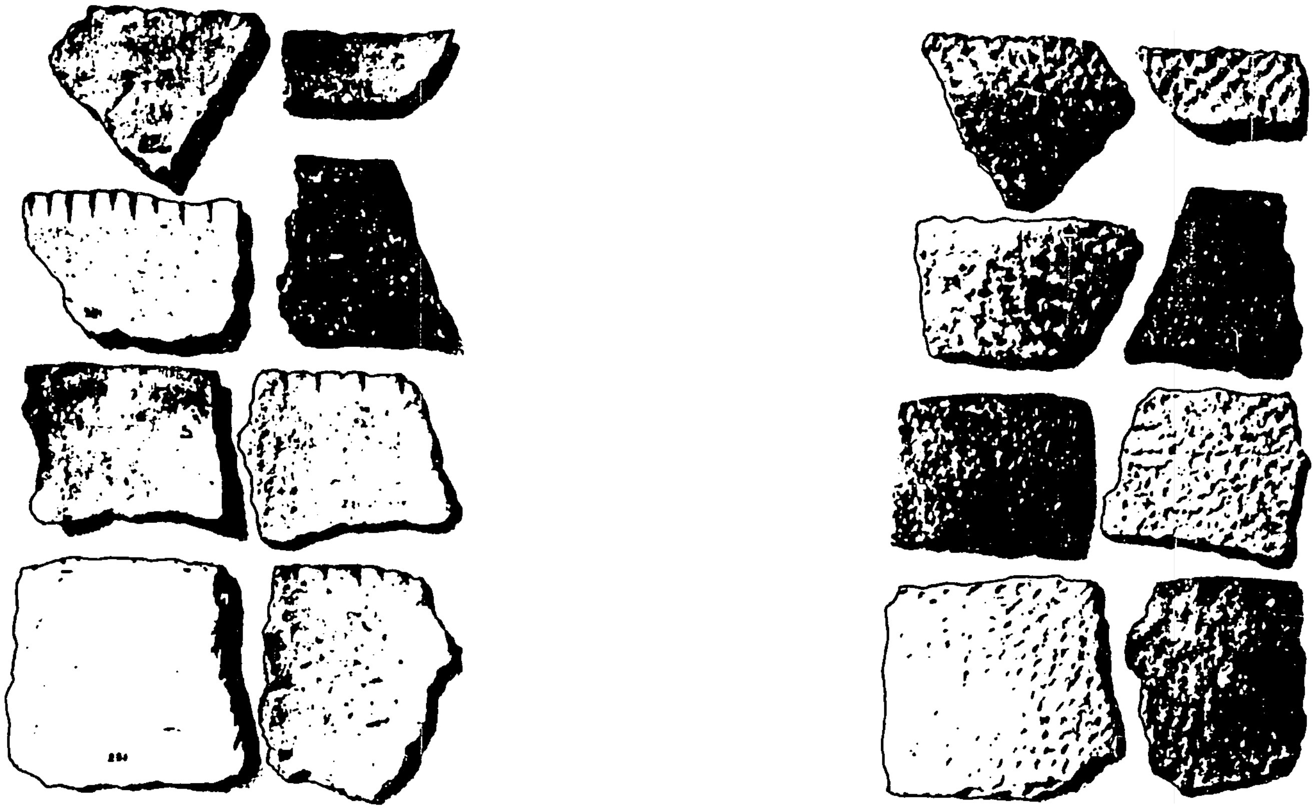


Figure 116. Mockley Ware, net impressed type; interior (a) and exterior (b) surfaces.

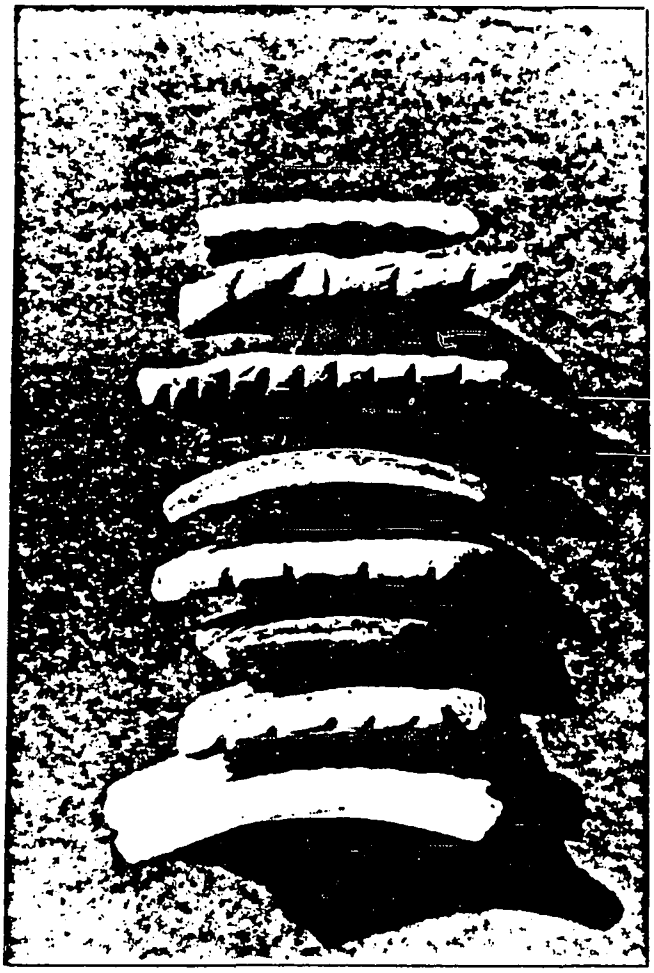


Figure 117. Mockley Ware, rim treatments; 44VB7.

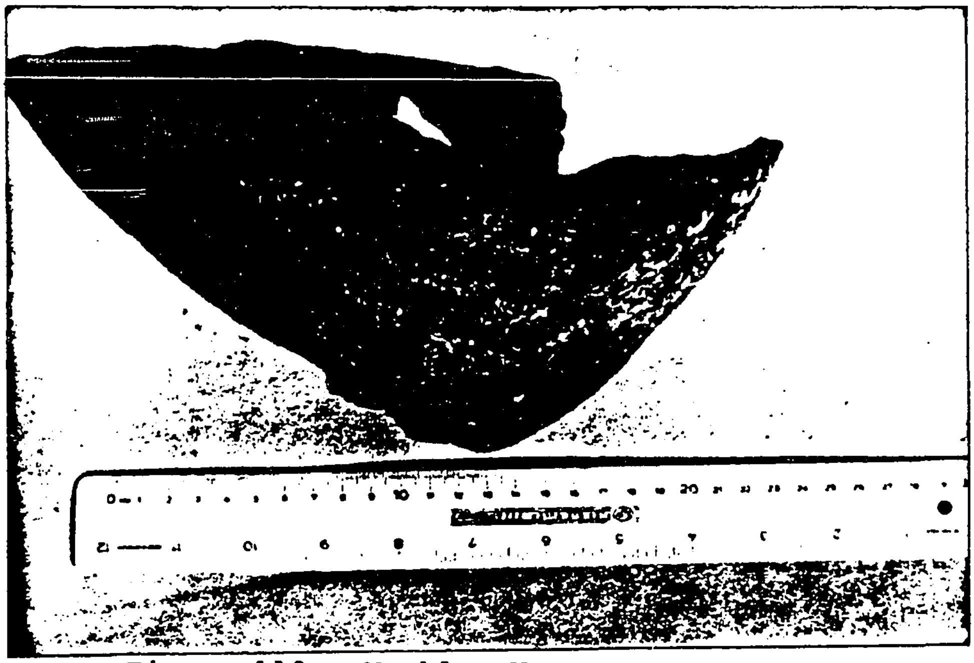


Figure 118. Mockley Ware, conical based vessel from Feature 2, Unit GN3; 44VB7.

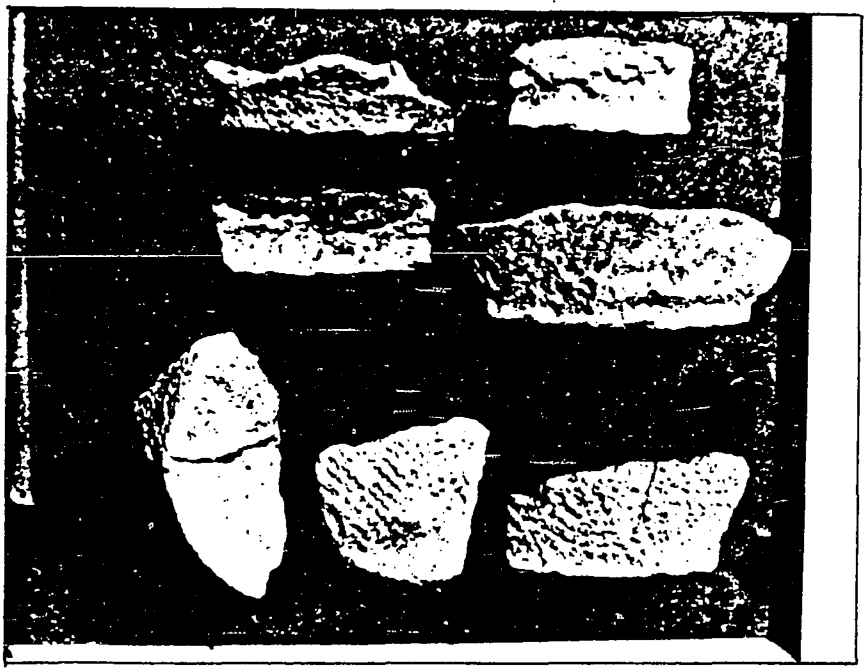


Figure 119. Flat basal sherds of Mockley/"Beaker" Ware, net impressed type, Units GN2 and GN3, 44VB7.

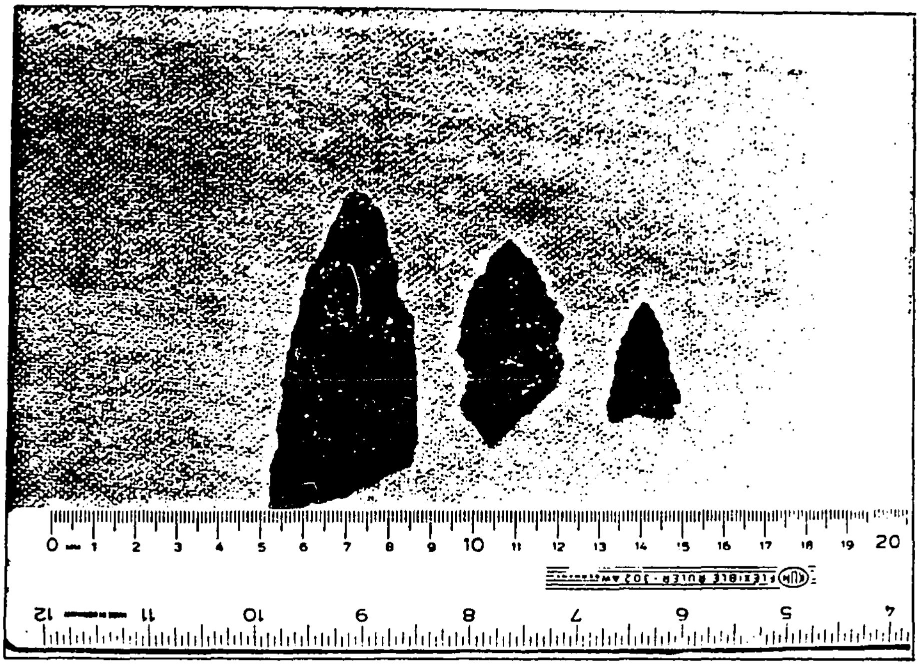


Figure 120. Preform, point fragment, and point; 44VB7.

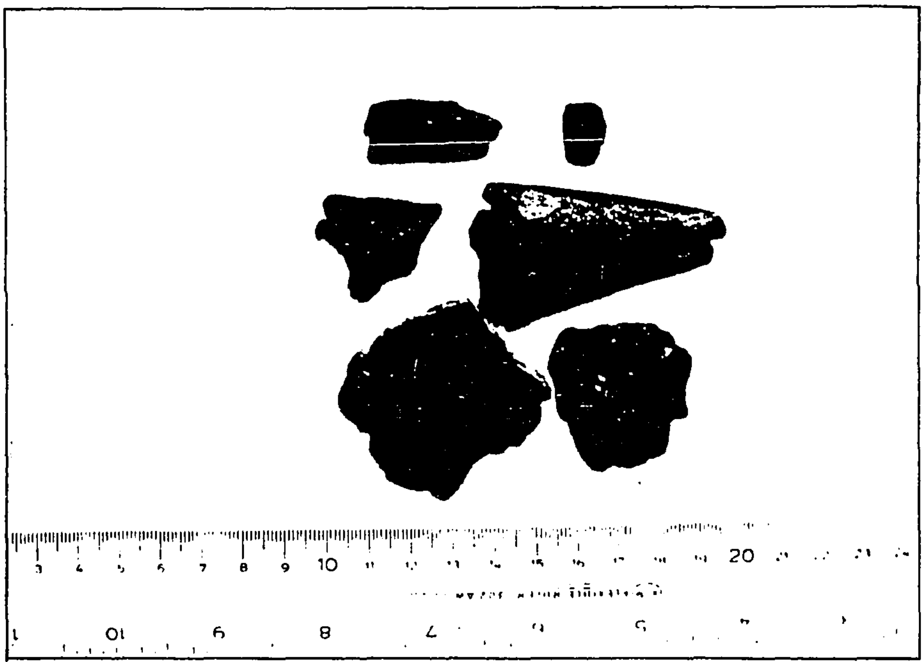


Figure 121. Pipe fragments and sherds with carbonized matter adhering to interior surfaces; 44VB7.

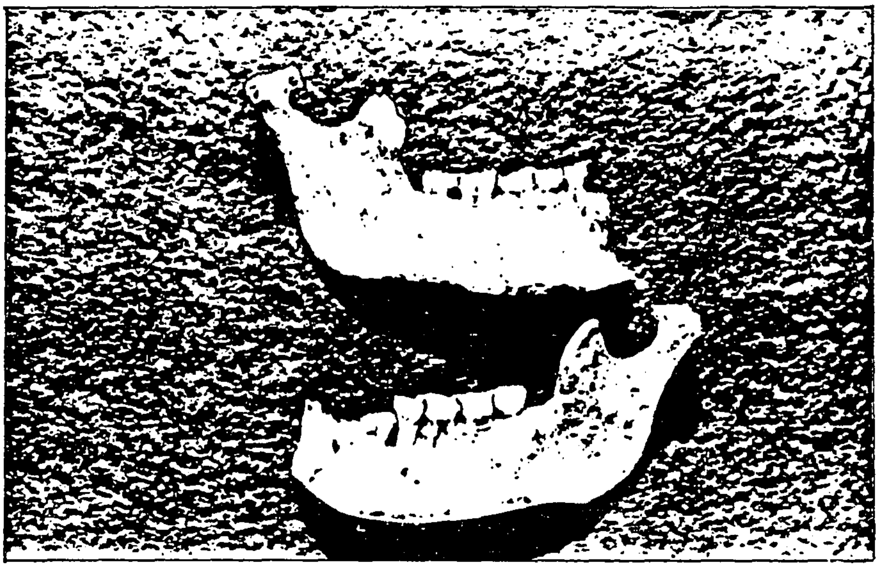


Figure 122. Human mandible, Feature 1, GN2, 44VB7.

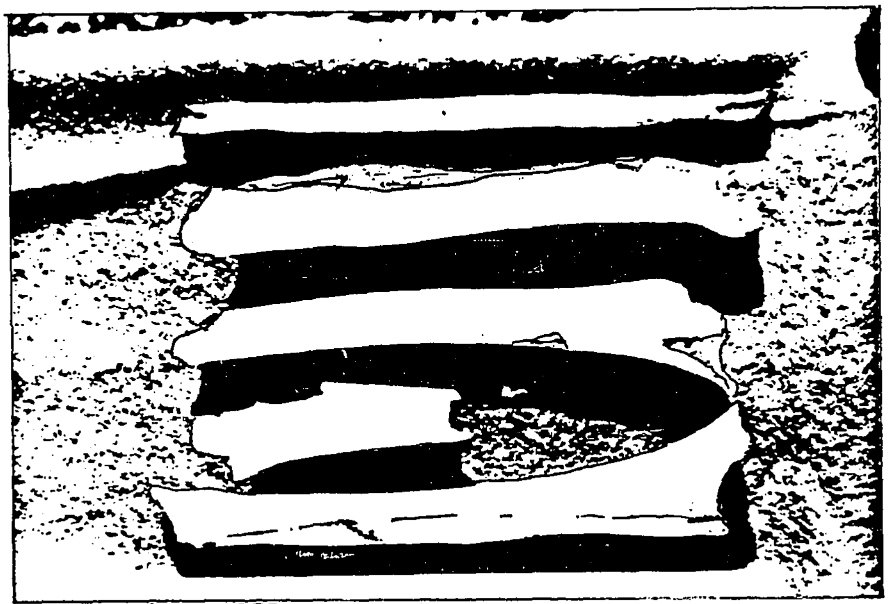
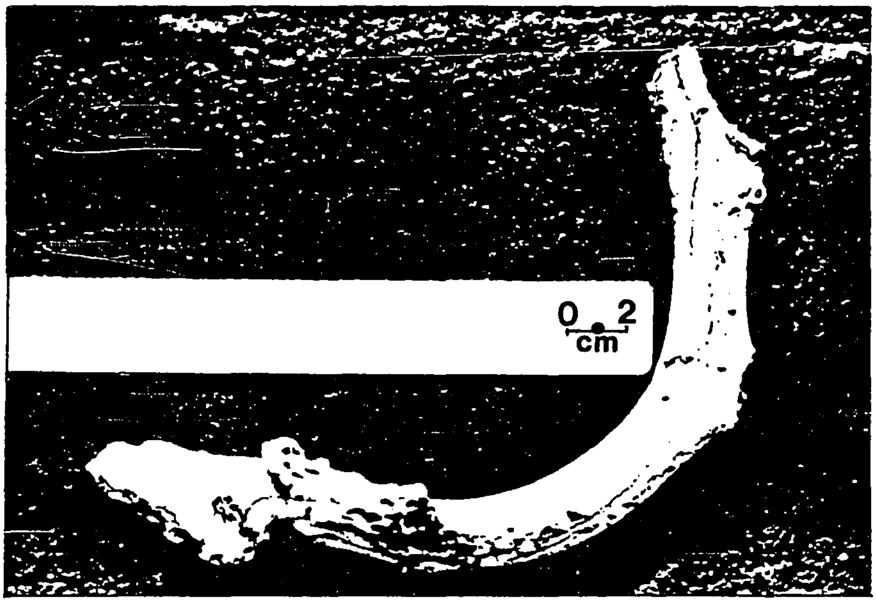


Figure 123. Human long bone fragments, Feature 2, GN3, 44VB7.

Figure 124. Deer bone from Feature 2, GN3, 44VB7: femur with marrow extracted ("beamer") (upper); antler with tines cut away (lower).



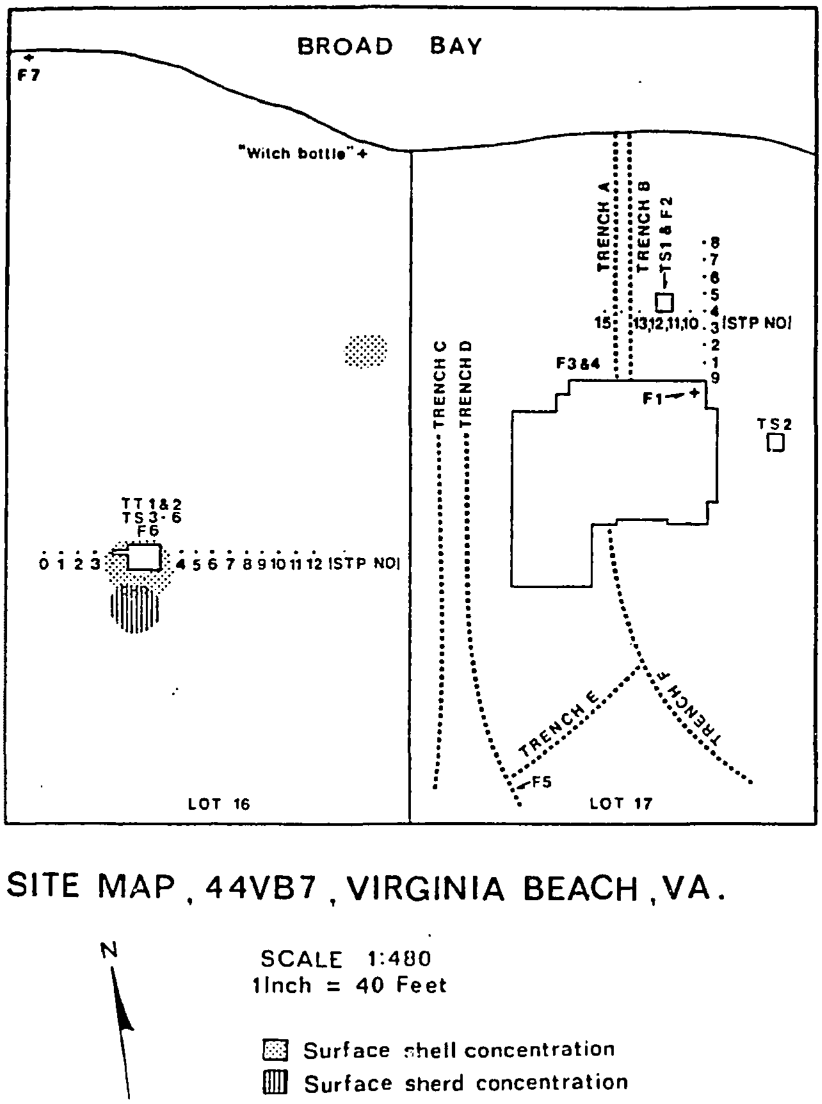


Figure 125. Plan of Fleming excavations, 1980-1981, Lots 16 and 17, Great Neck Site (44VB7) (Fleming 1981).

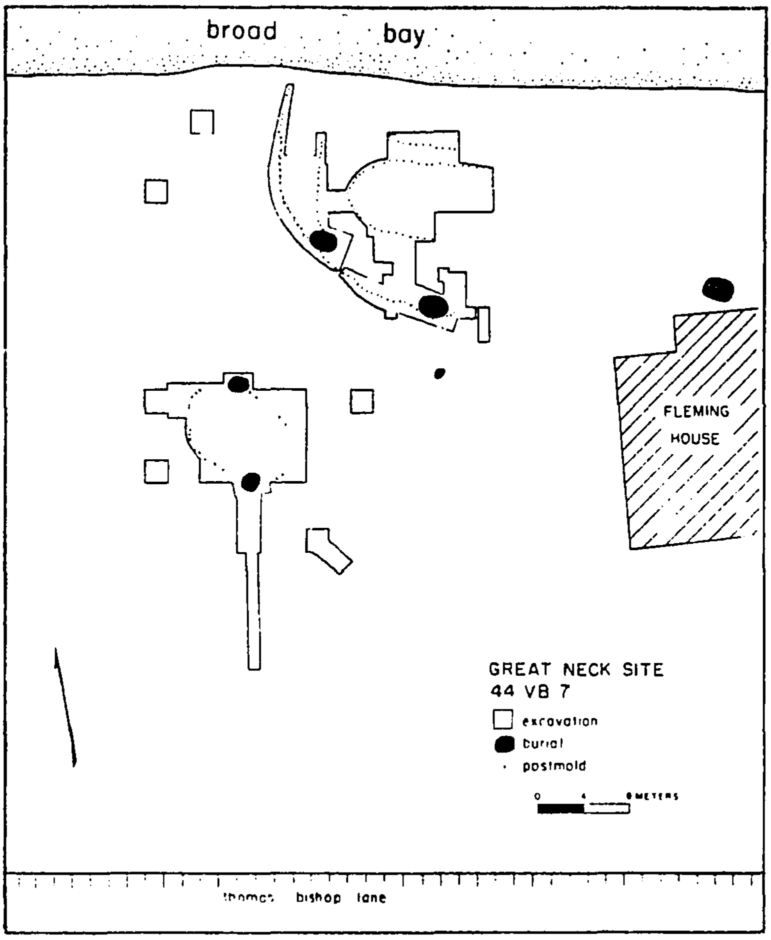


Figure 126. VRCA excavations at 44VB7, Lot 16, 1981 (from Egloff and Turner 1984).

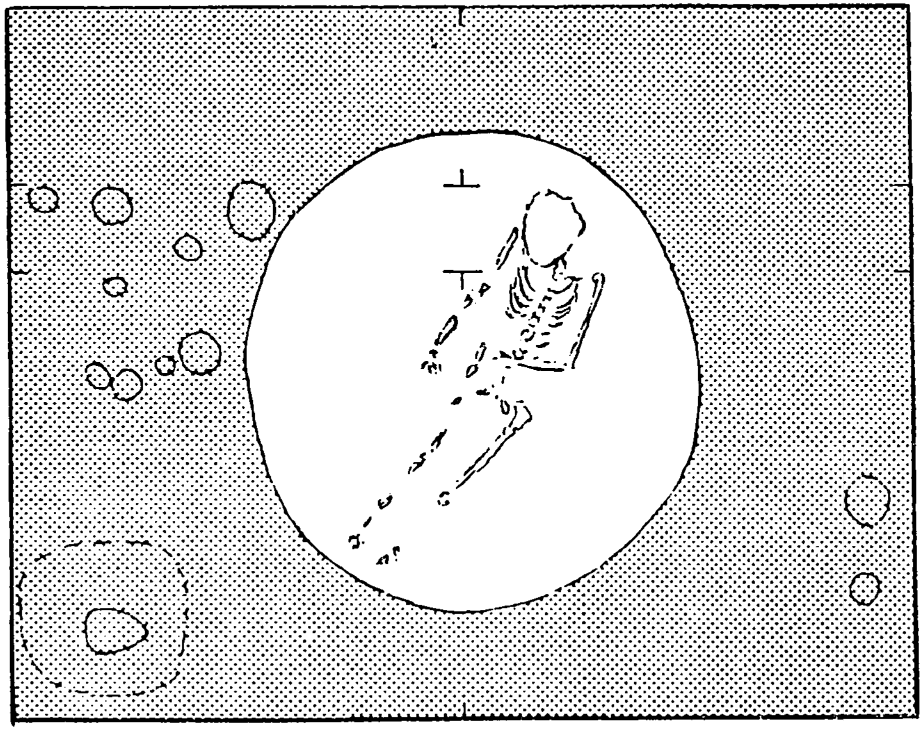


Figure 127. Plan of Feature 6, Lot 16, 44VB7 (after Fleming 1981:10).

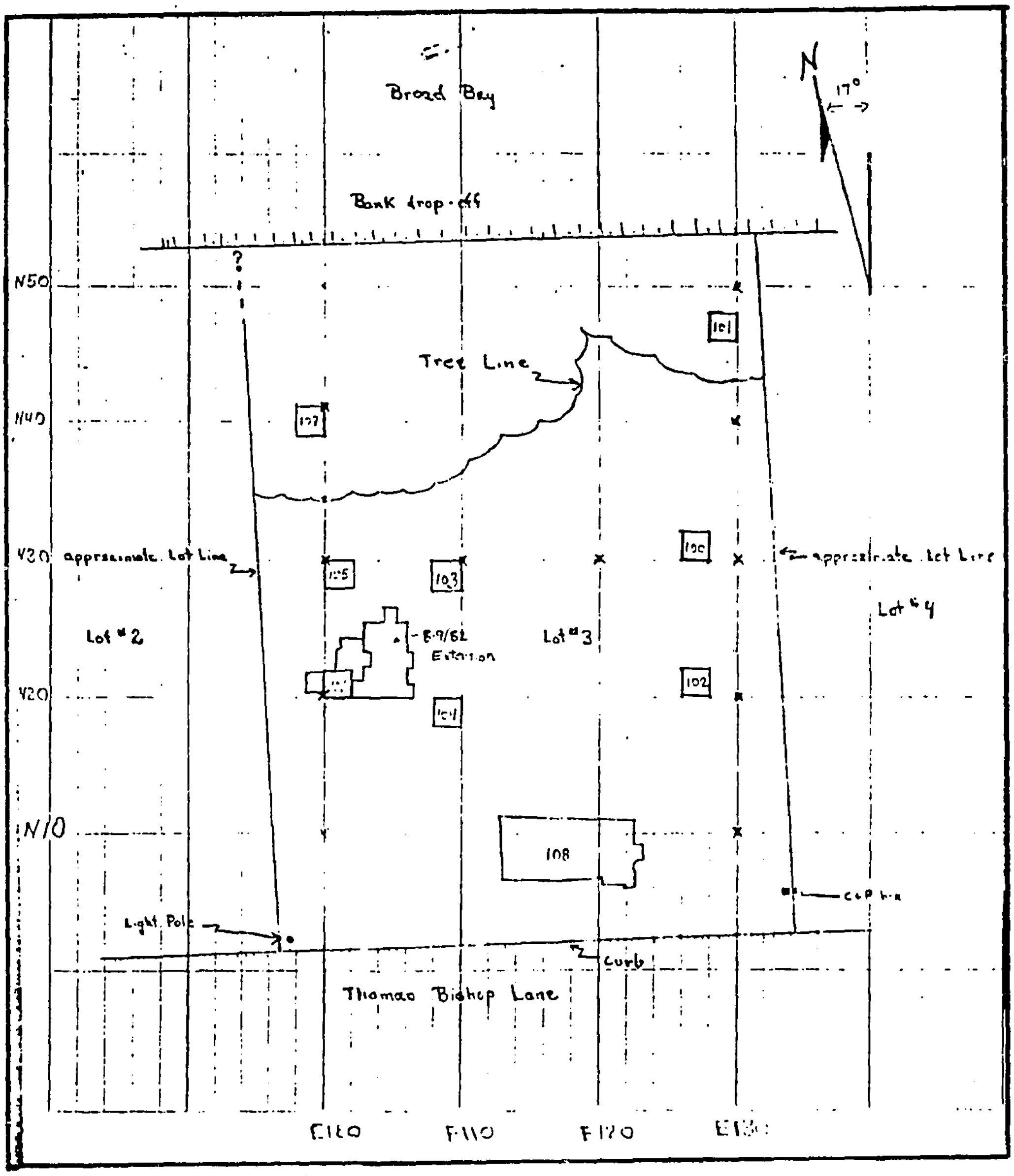


Figure 128. Lot 3, Great Neck Site, 44VB7, Plan of excavations by Virginia Research Center for Archaeology.

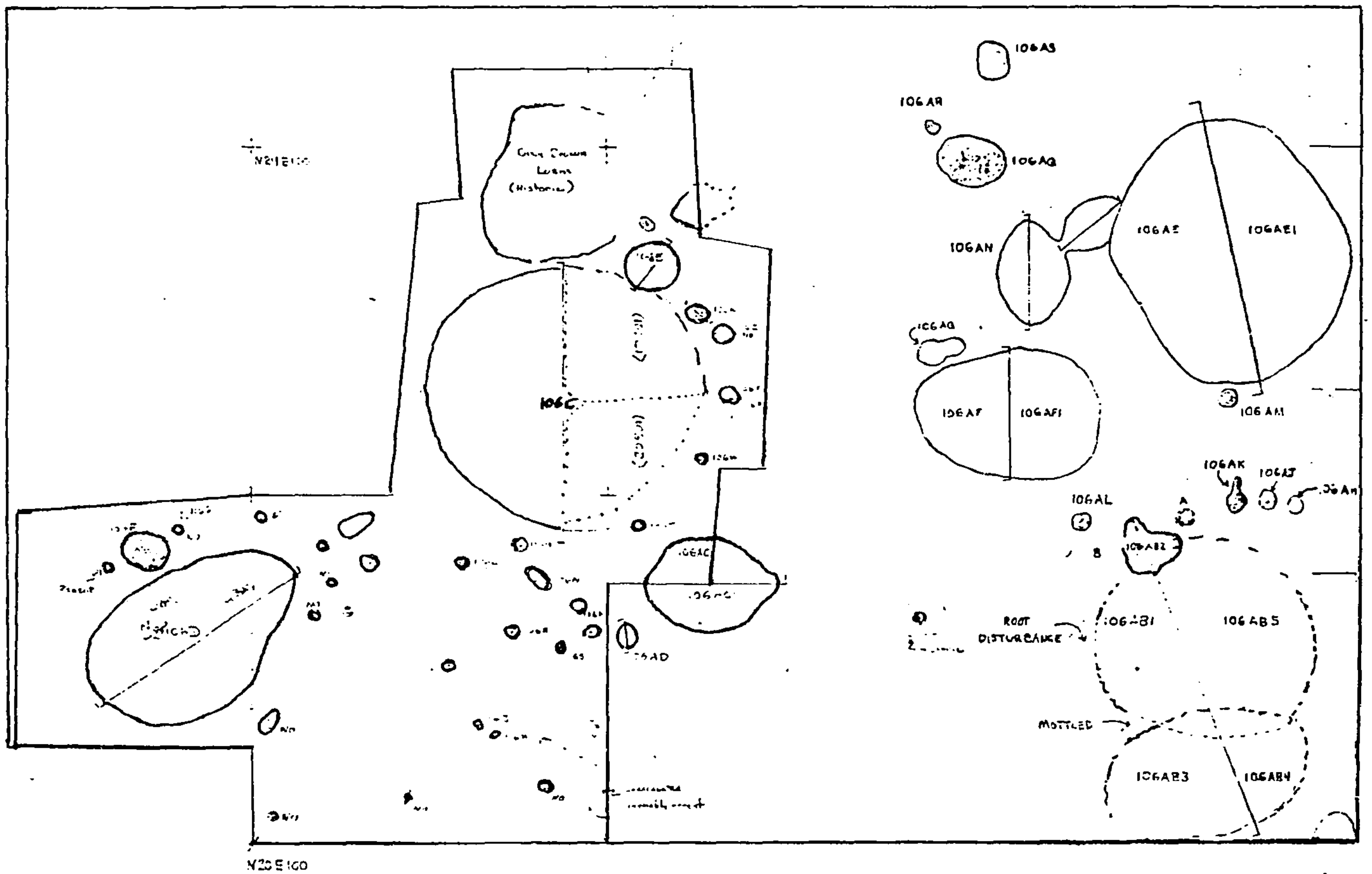


Figure 129. Detailed plot of selected features, Lot 3, 44VB7, excavations by VRCA.

Figure 130. Surface collection at Pungo Site #1.

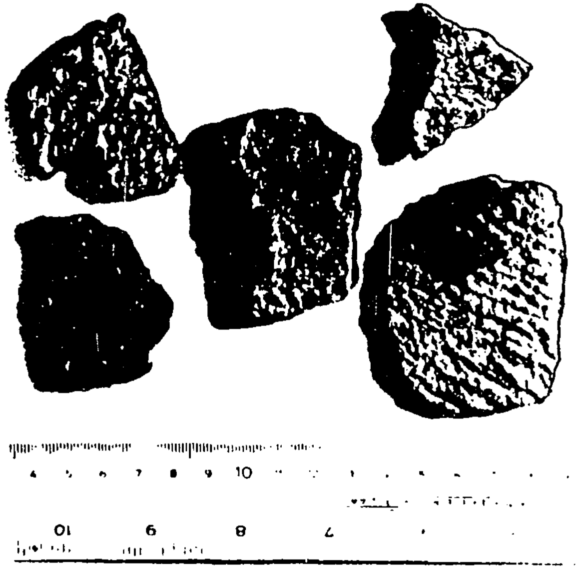


Figure 131. Ceramics, Pungo Site #1; Mount Pleasant net impressed (left two) and Mockley cord marked (center and right two) types.

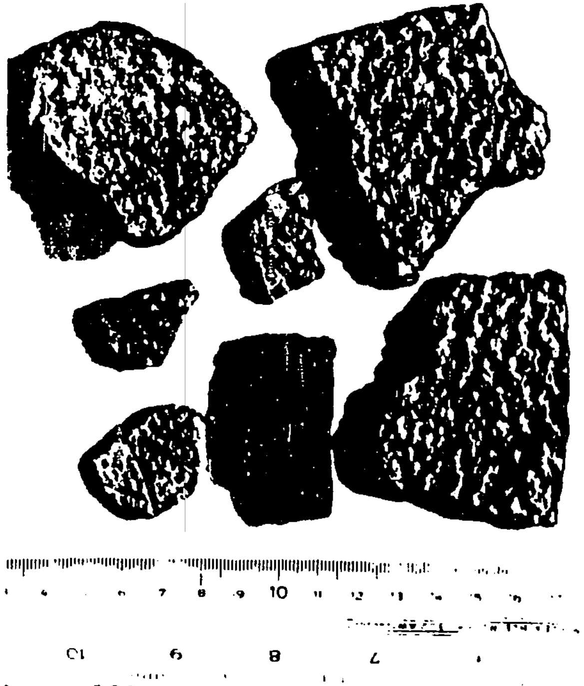


Figure 132. Mockley Ware, net impressed type; Pungo Site #1.

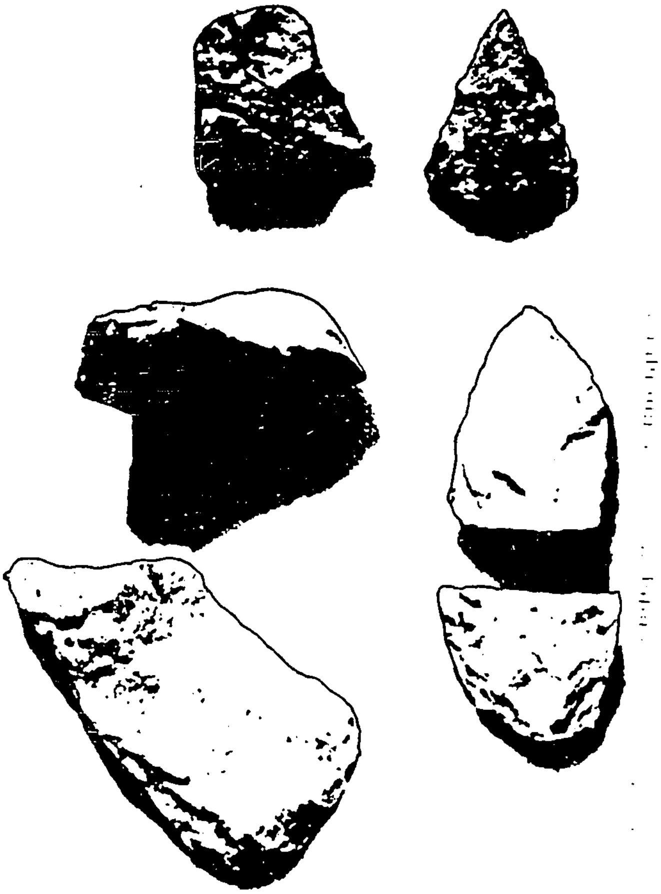


Figure 133. Lithics, Pungo Site #2.

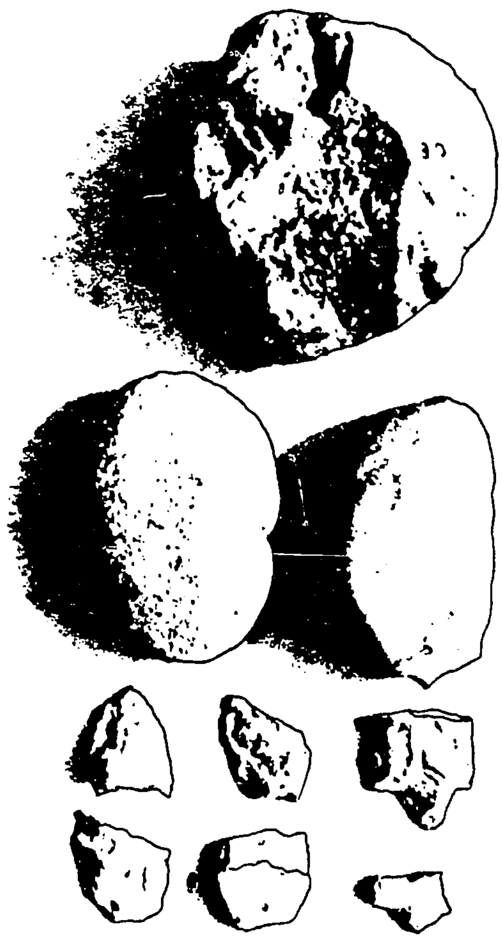


Figure 134. Lithics, Pungo Site #3.

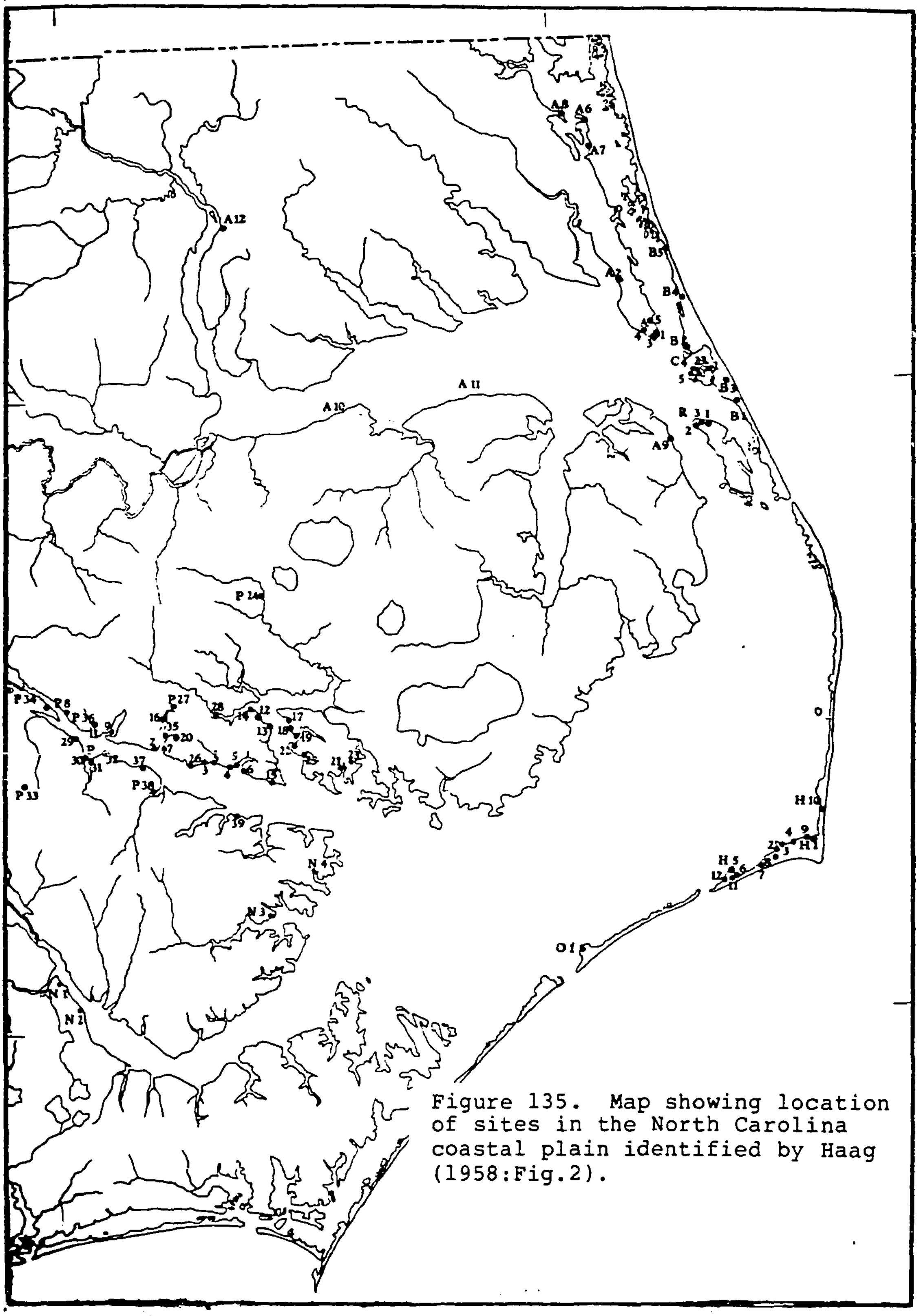


Figure 135. Map showing location of sites in the North Carolina coastal plain identified by Haag (1958:Fig.2).

Figure 136. Selected important archaeological sites in the North Carolina coastal plain (legend).

1 Bandon Site, 31CO1
2 Baum Site, 31CK9
3 Cape Creek Site, 31DR1
4 Chowanoke Site (Liberty Hill/Mt Pleasant), 31HF20/30
5 Currituck Beaker Site, 31CK34
6 Fort Raleigh Site
7 Hollowell Site, 31CO5
8 Jordan's Landing Site, 31BR7
9 Parker Site, 31ED29
10 Phelps Lake sites
11 Pomeiooc (?), 31HY43
12 Roberts Wharf, 31GA1
13 Shipyard Landing Site, 31BR1
14 Thorpe Site, 31NS3b
15 Tillett Site, 31DR35
16 Uniflite Site, 31ON33
17 Waterlily Site, 31CK2

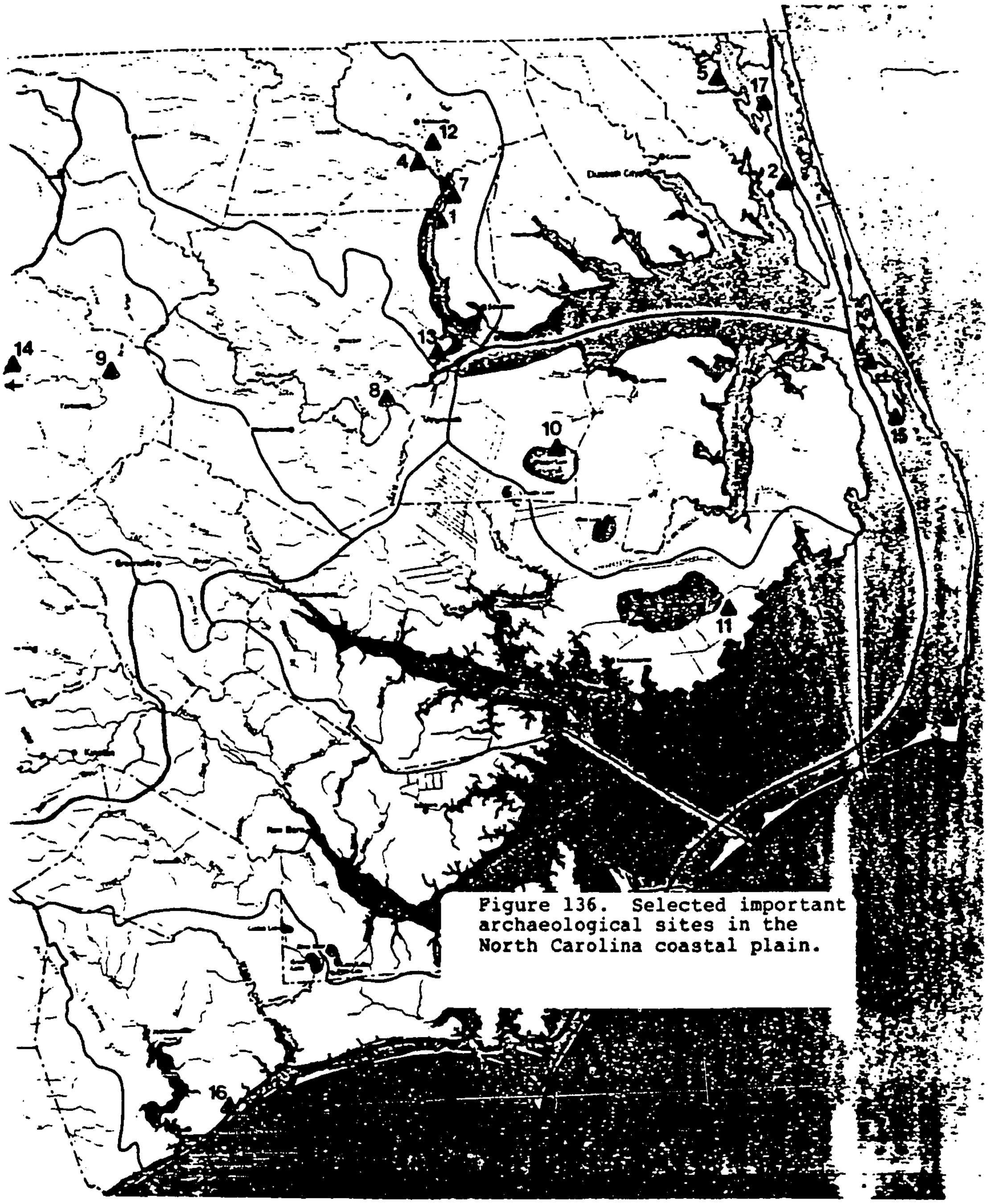


Figure 136. Selected important archaeological sites in the North Carolina coastal plain.

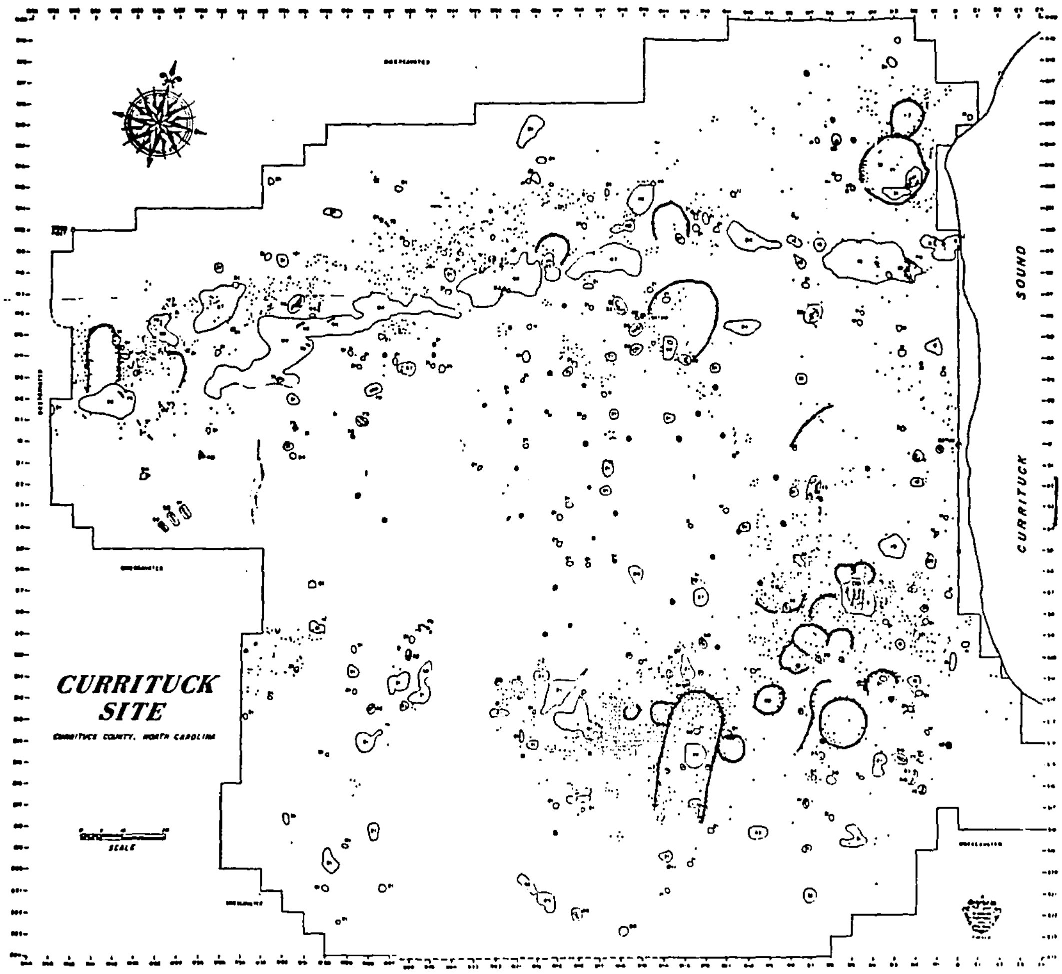


Figure 137. Map of excavated areas, Currituck Site (31CK34), (by permission of Floyd E. Painter).

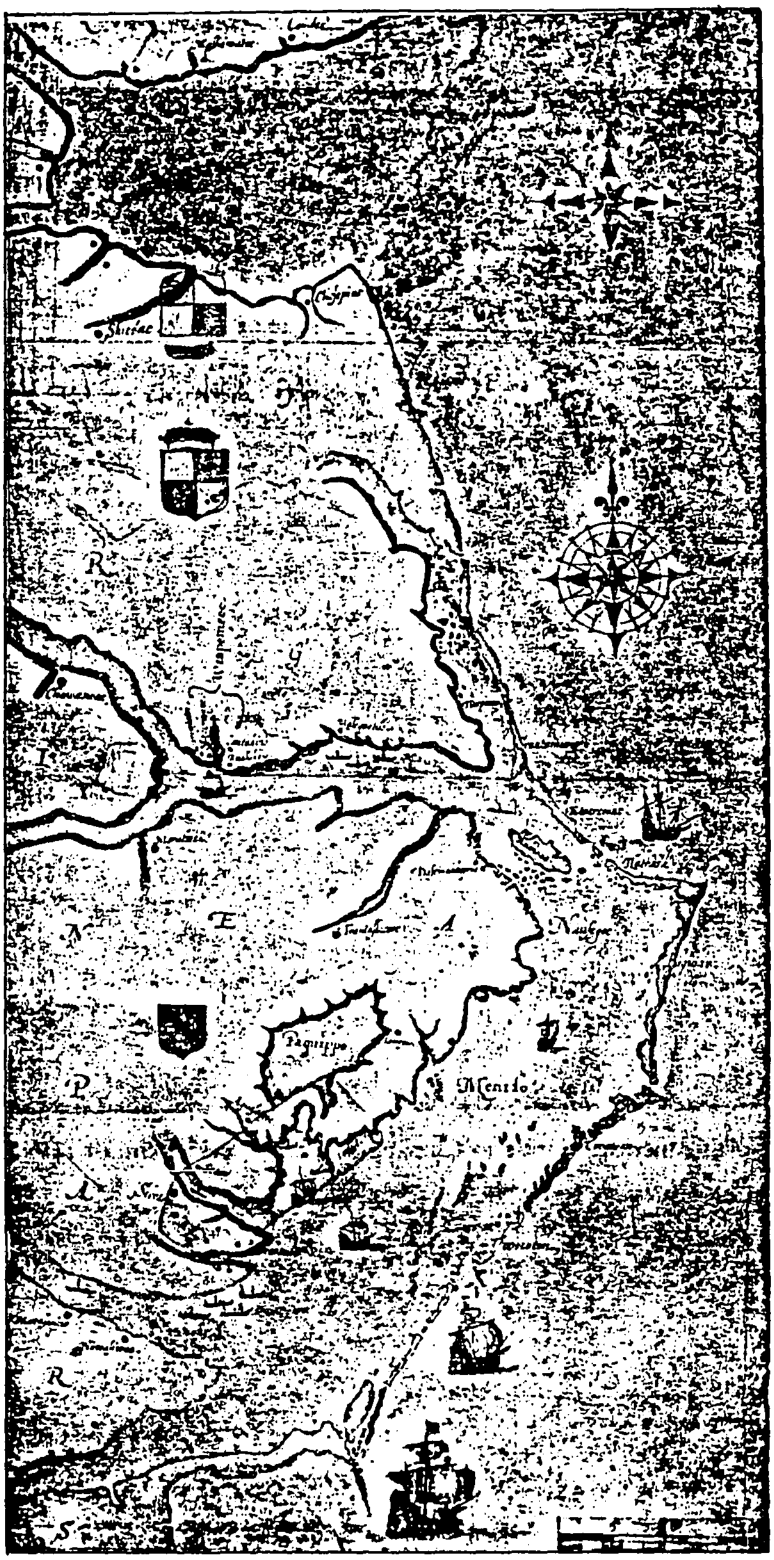


Figure 138. John White painting depicting coastal portions of Virginia and North Carolina in the 1580s (Hulton 1985: Plate 60).

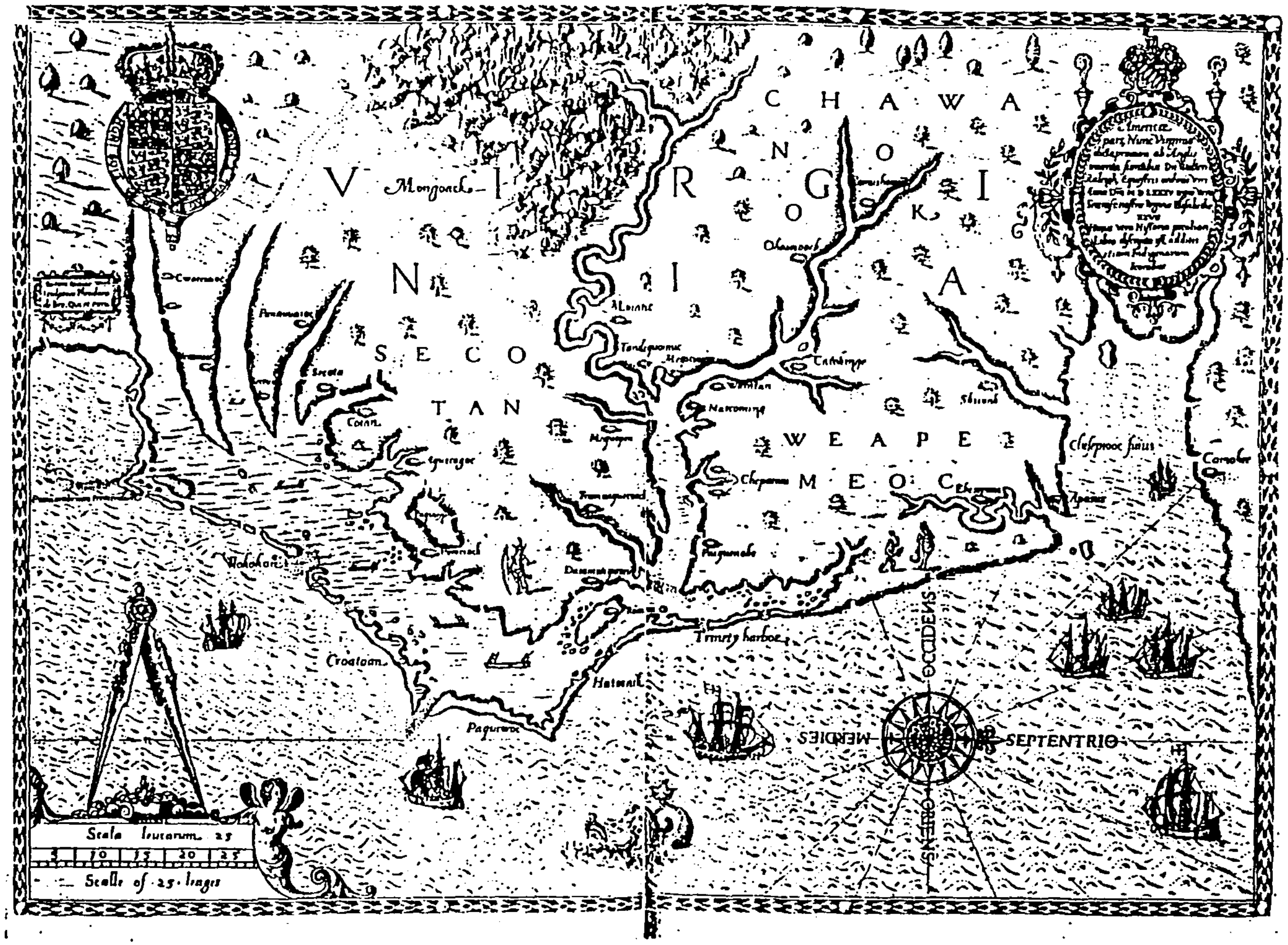
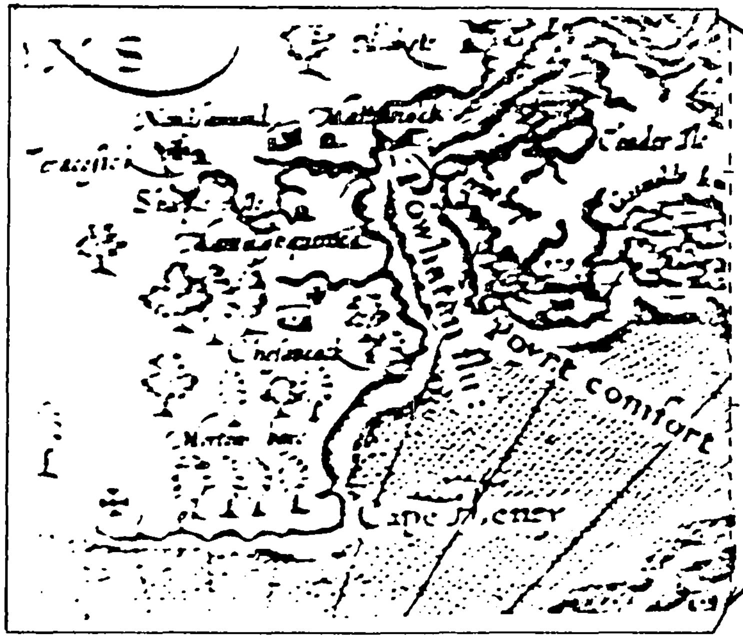


Figure 139. DeBry engraving showing the lands and Indian villages of Virginia and North Carolina, ca. 1590 (Hulton 1985: Fig.5).



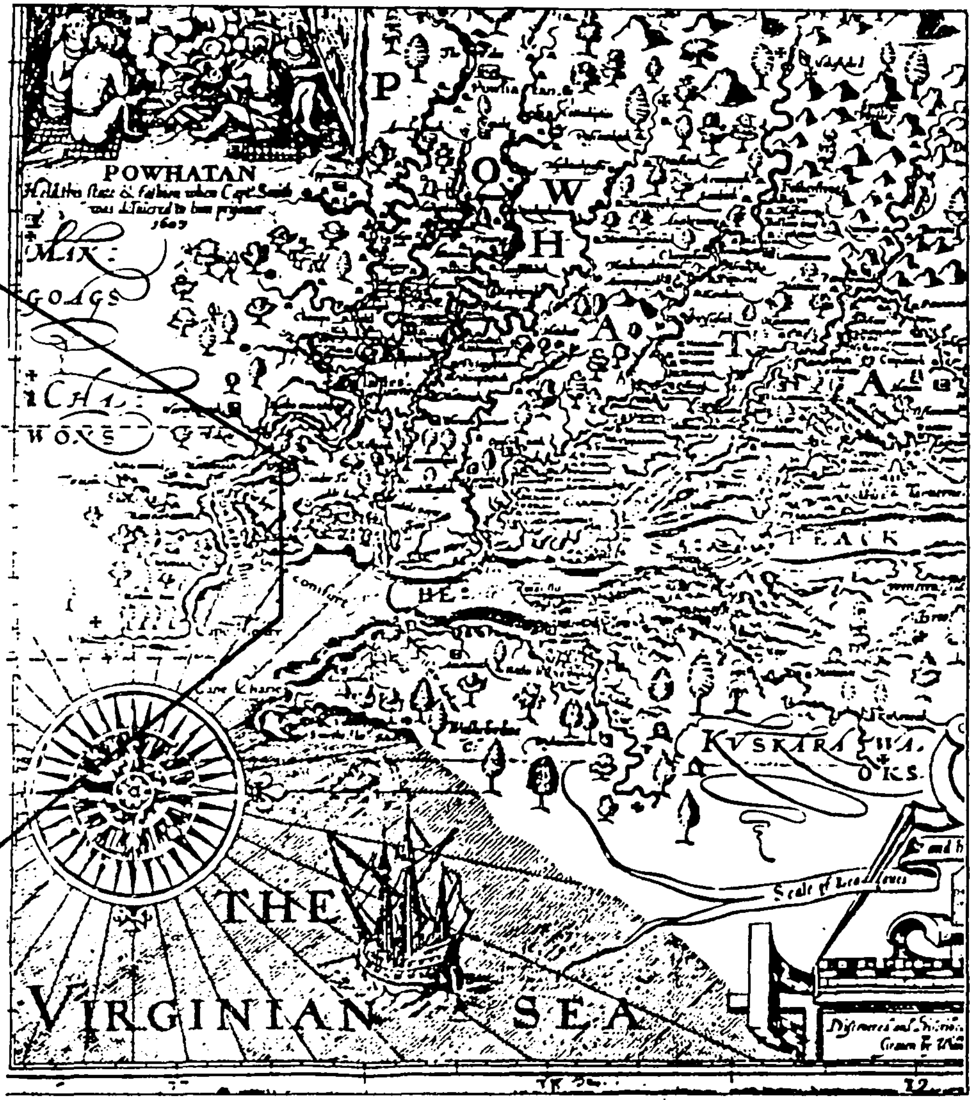


Figure 140. Map by John Smith showing locations of Indian villages in Virginia in the early 1600s.

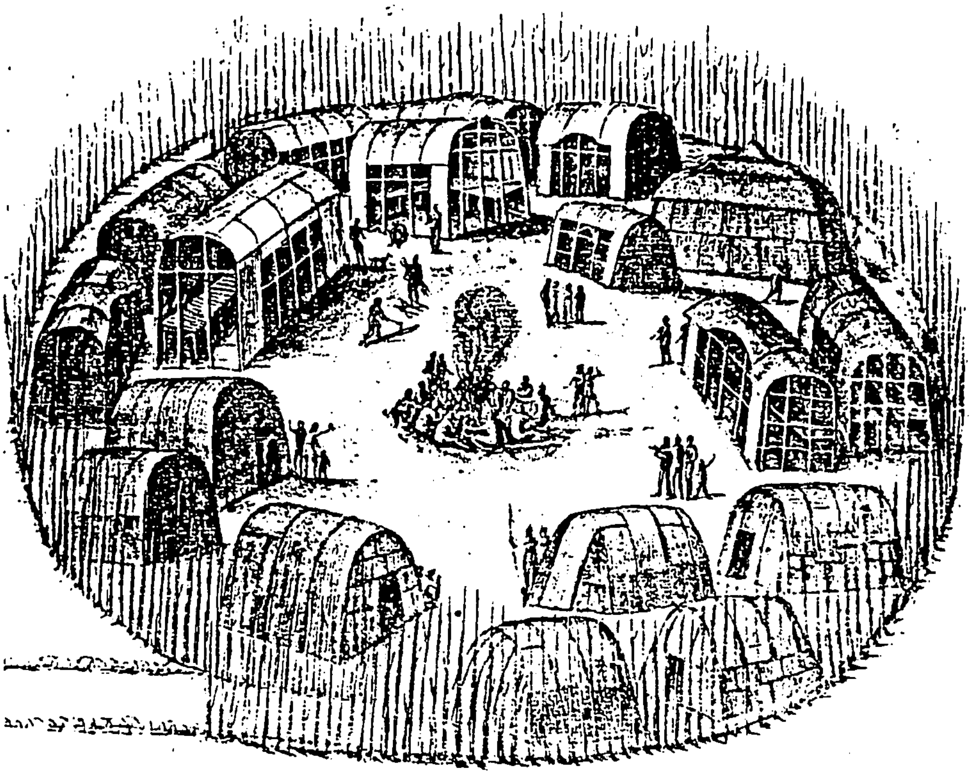


Figure 141. Algonkian Indian village of Pomeiooc; painting by John White, ca. 1585. (Hulton 1985:Plate 32)

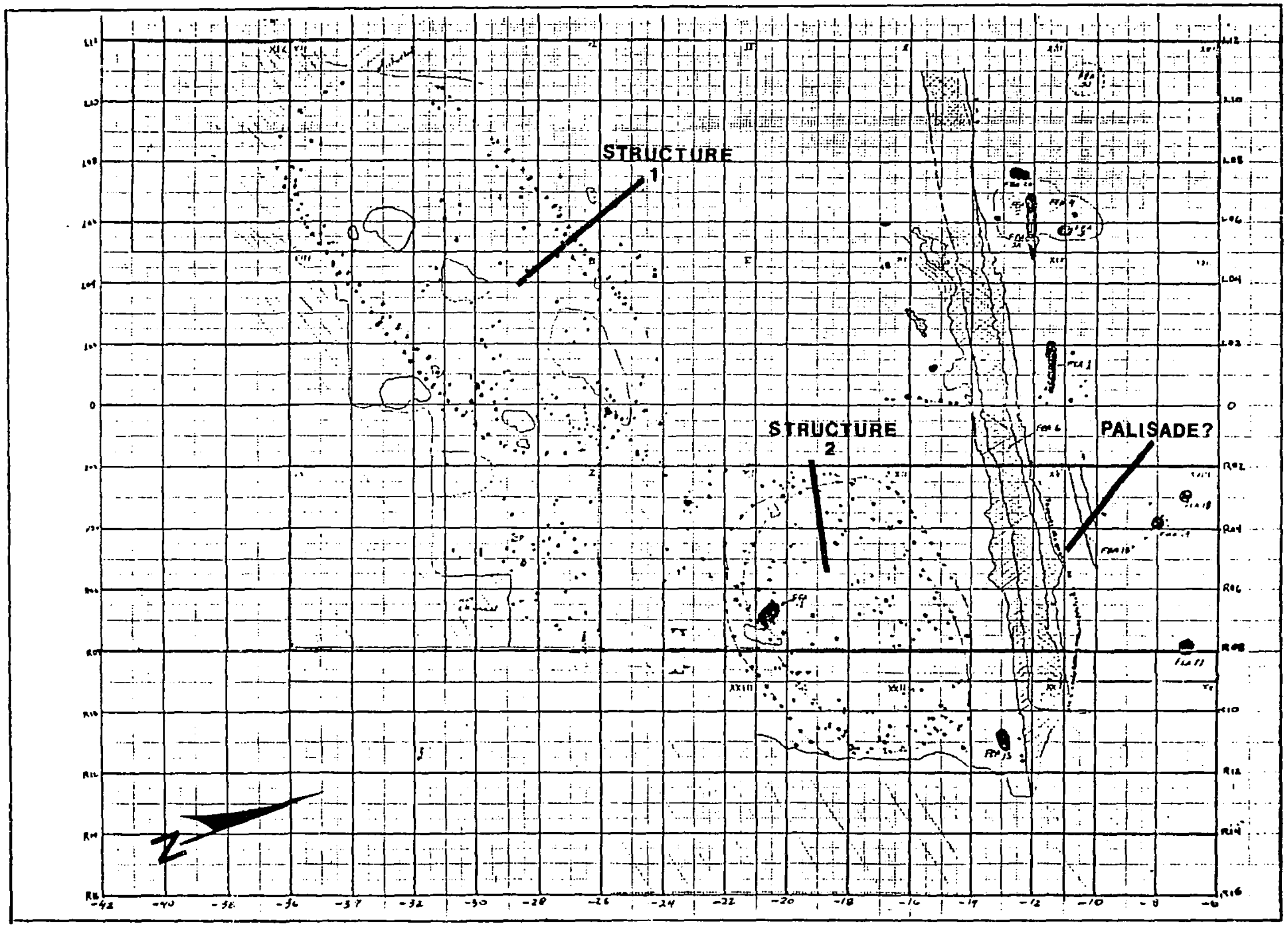


Figure 142. Field map of features and house patterns from 31HY43, a possible site of Pomeiooc, Hyde County, North Carolina.

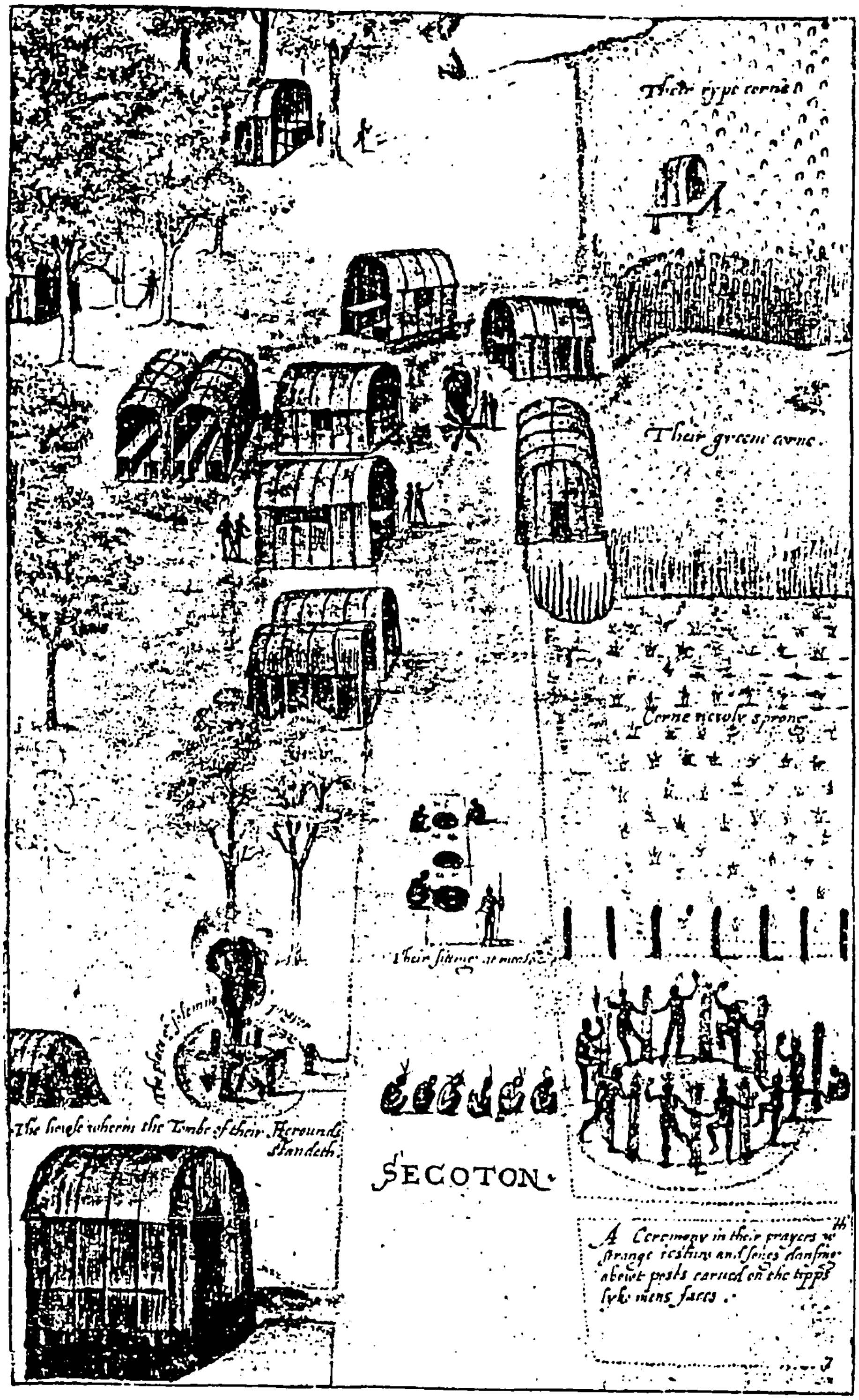


Figure 143. Algonkian Indian village of Secoton; painting by John White, ca. 1585 (Hulton 1965:Plate 36).

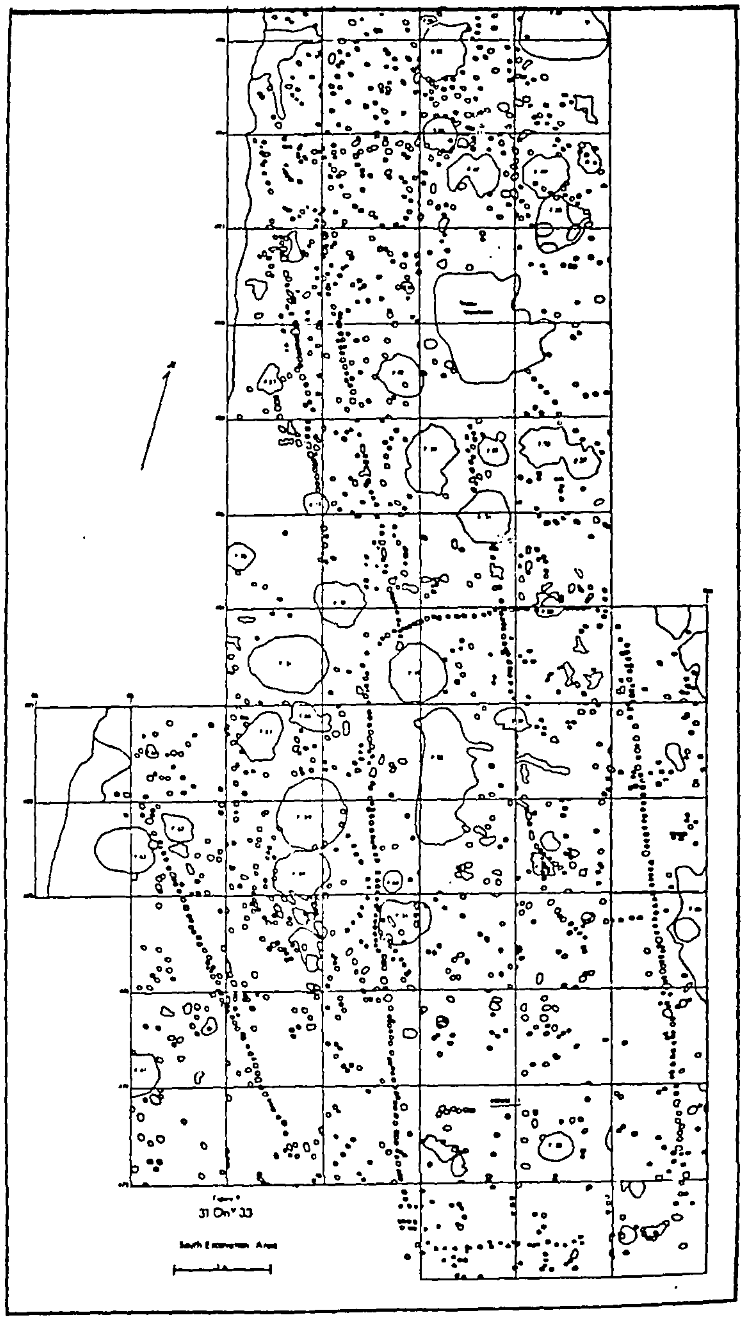


Figure 144. Long house postmold patterns associated with Colington/ White Oak ceramics, Uniflite Site (31ON33), Onslow County, North Carolina (Loftfield 1979:Fig.9)

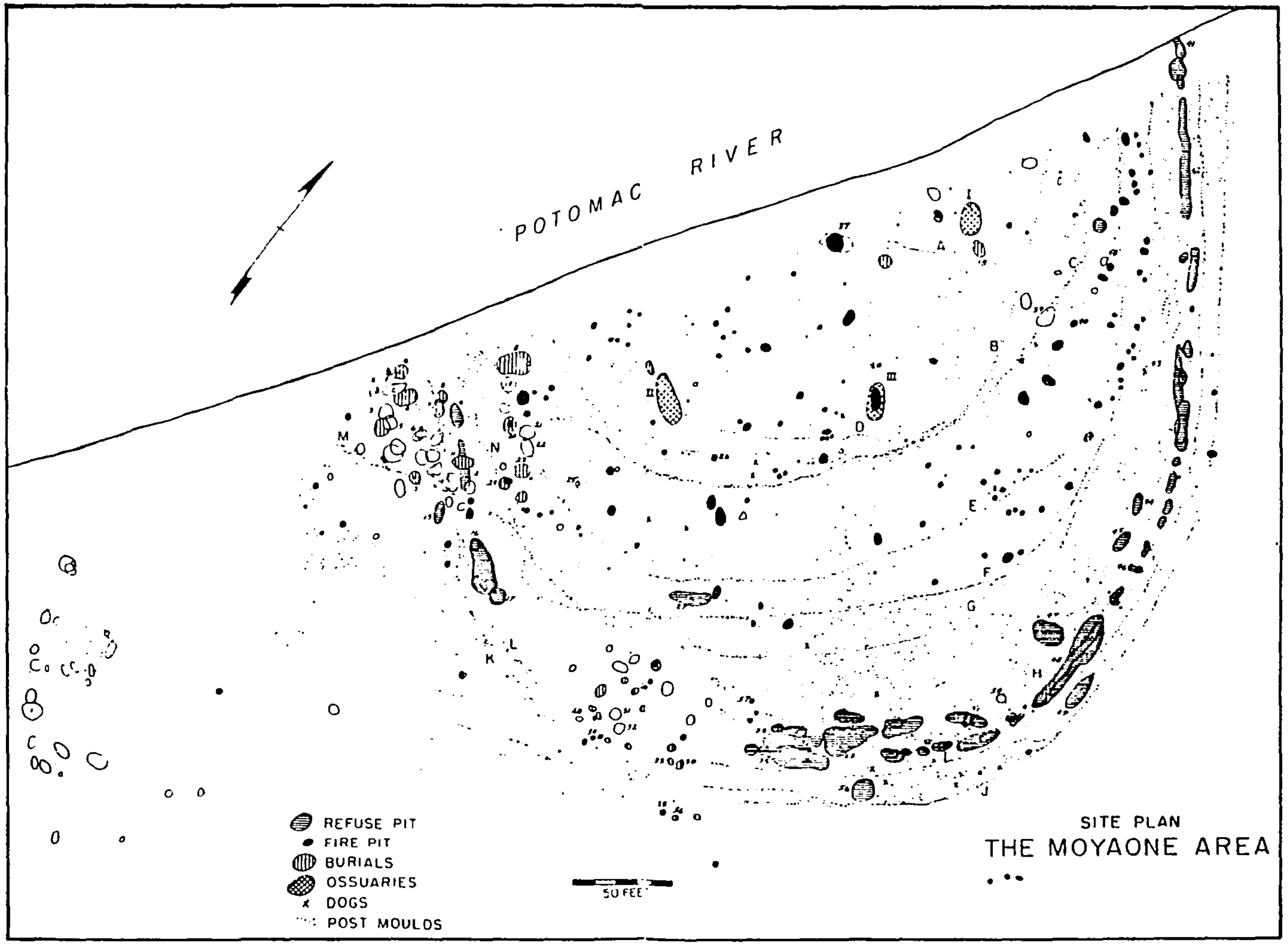


Figure 145. Plan of the Moyaone area of the Accokeek Creek site, Maryland (Stephenson and Ferguson 1963:Fig.6).

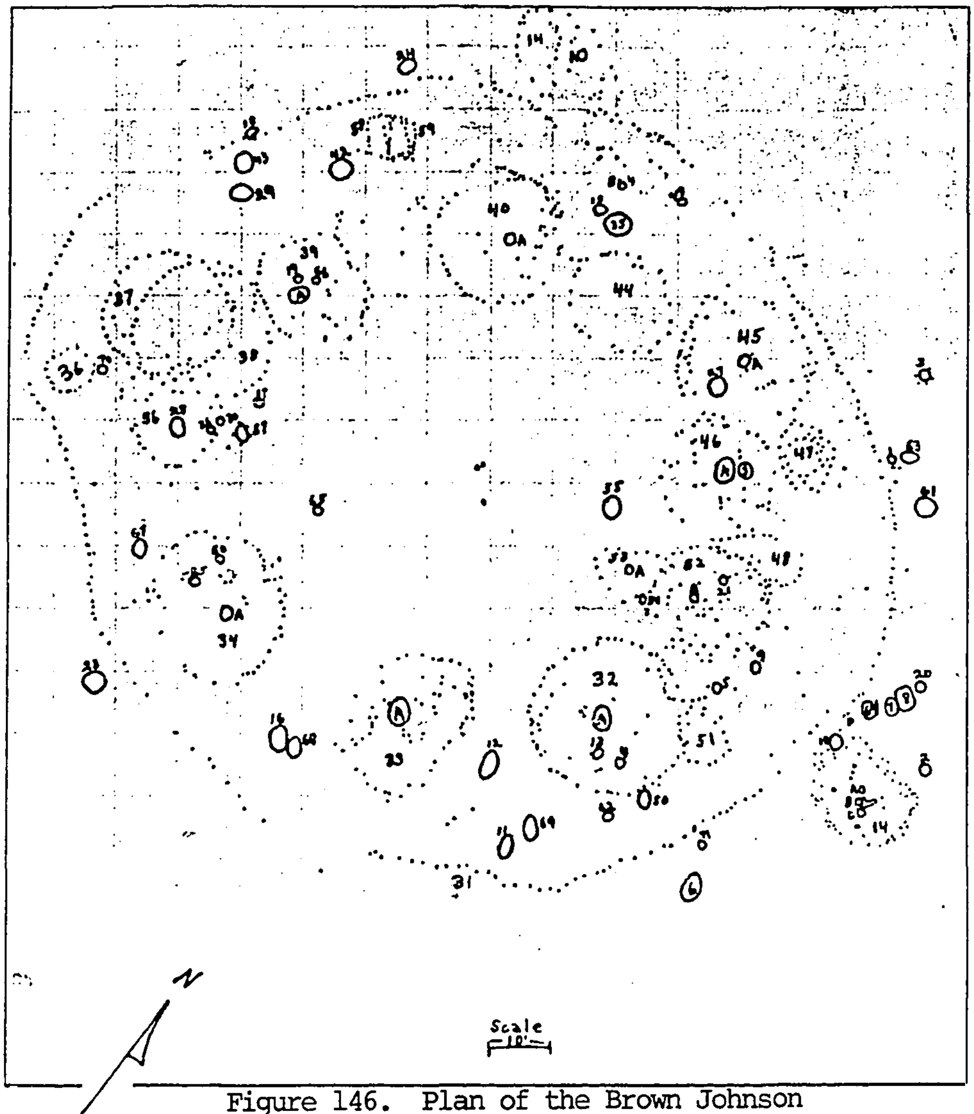


Figure 146. Plan of the Brown Johnson Site (44BD1), a Late Woodland (ca. A.D. 1500) village in Bland County, Virginia (MacCord 1971:Fig.2).

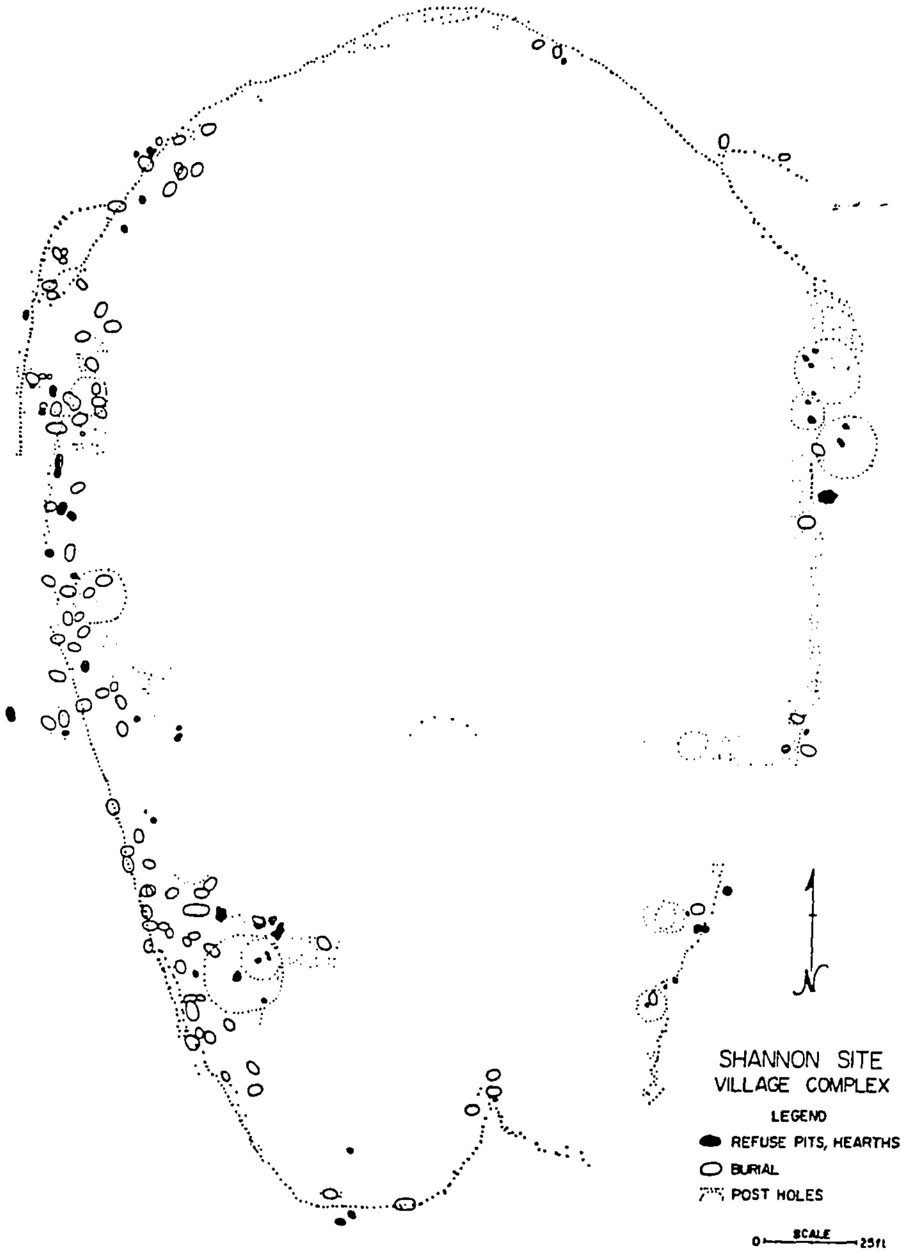
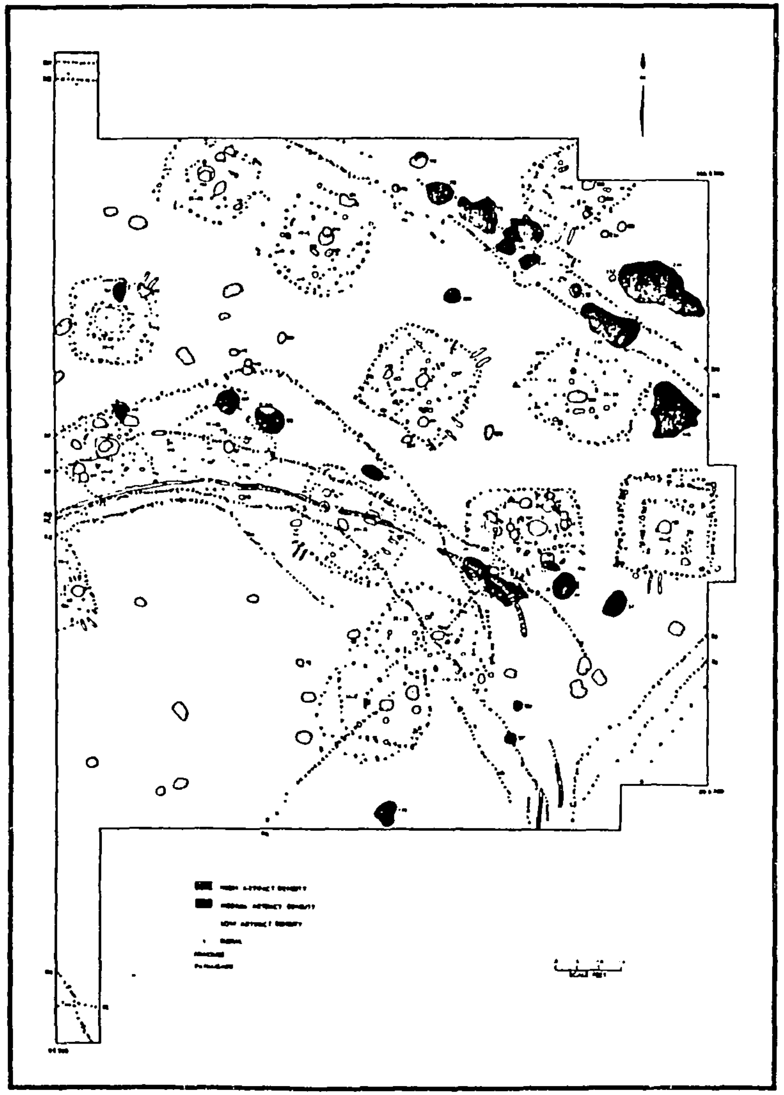


Figure 147. Plan of features, palisade, and houses at the Shannon Site (44MY8), Montgomery County, Virginia (Benthall 1969:Fig.10).



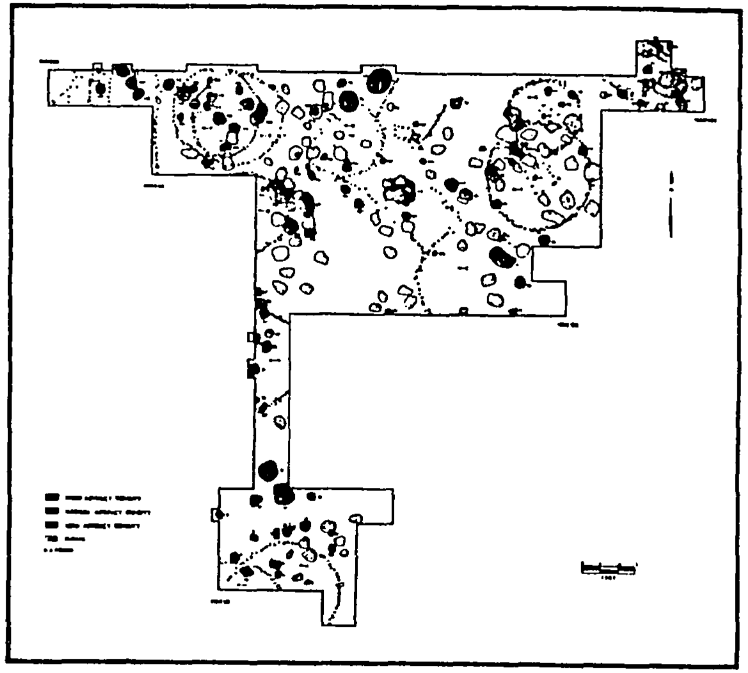


Figure 149. Plan of features and houses at the base of the plow zone, Upper Saratown (31SK1) (Ward 1985: Fig.4-2).

Figure 148. Plan of features, palisades, and houses at the base of the plow zone, Warren Wilson Site (31BN29) (Ward 1985:Fig.4-1).

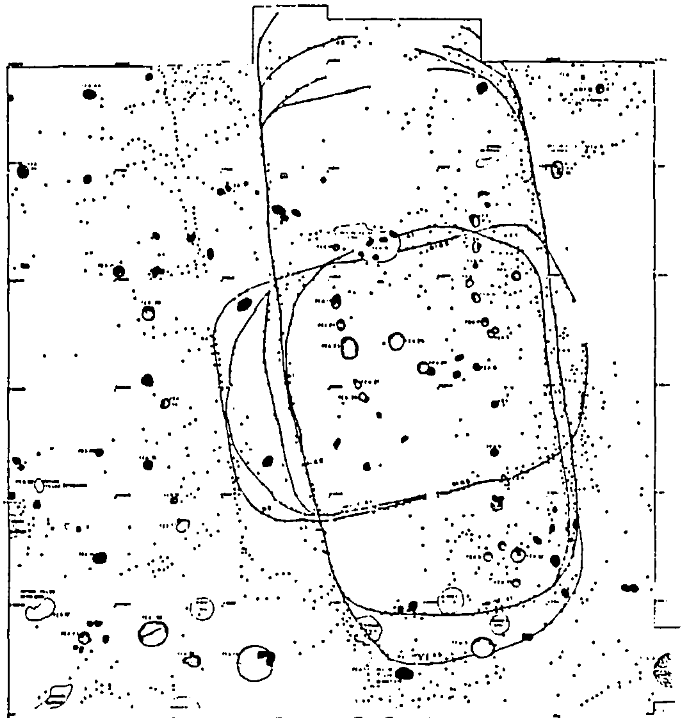


Figure 150. Plan of features and house patterns at the Maxon-Derby Site, New York, Carpenter Brook phase, Owasco culture (Ritchie 1969:Fig.9).

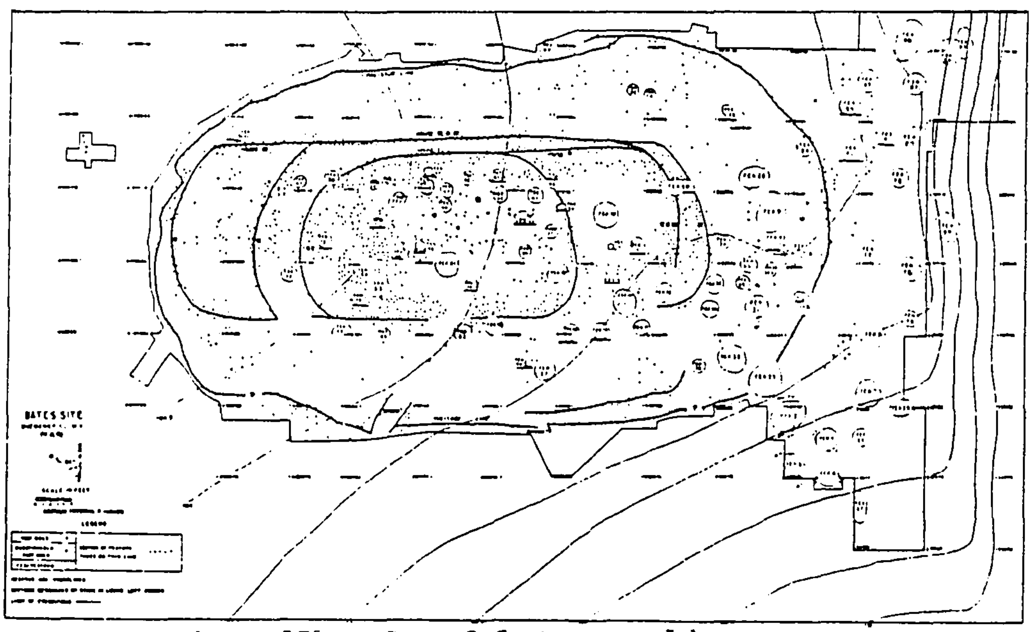


Figure 151. Plan of features and house patterns at the Bates Site, New York, Canandaigua Phase, Owasco culture (Ritchie 1969:Fig.10).

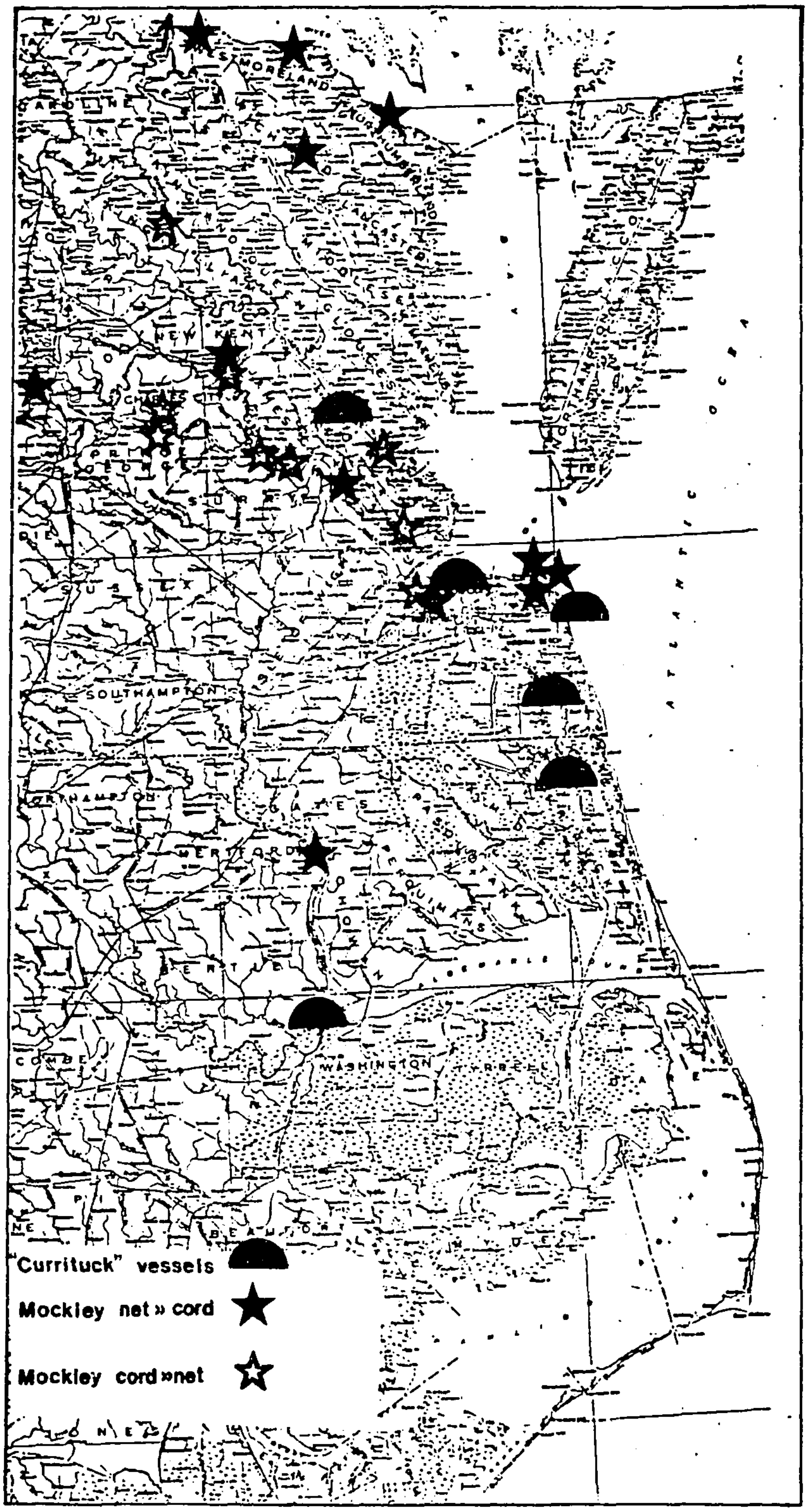


Figure 152. Distribution of Early and Middle Woodland shell-tempered ceramic complexes in the Chesapeake-Albemarle area.

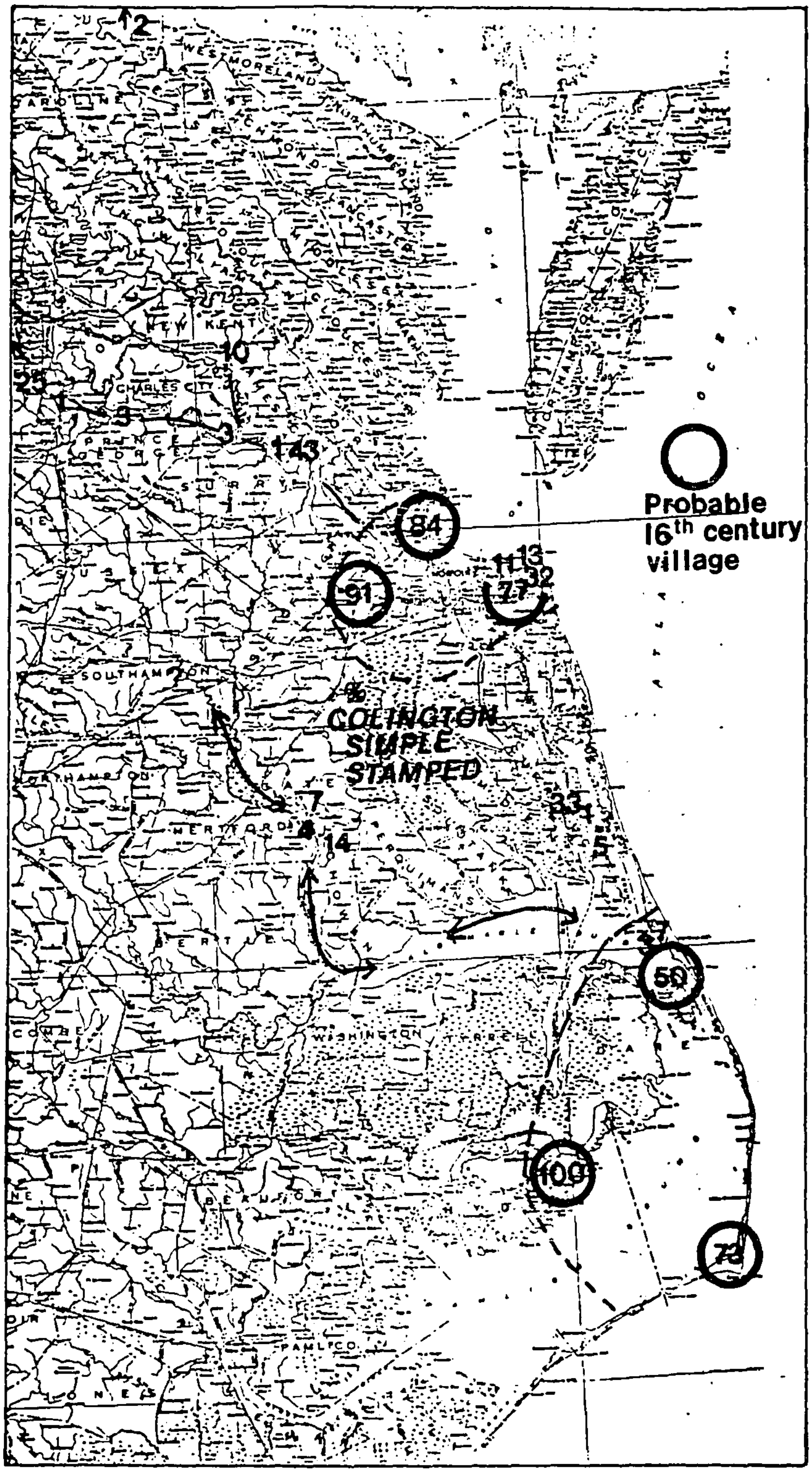


Figure 153. Distribution of Late Woodland/Protohistoric shell-tempered ceramic complexes in the Chesapeake-Albemarle area.

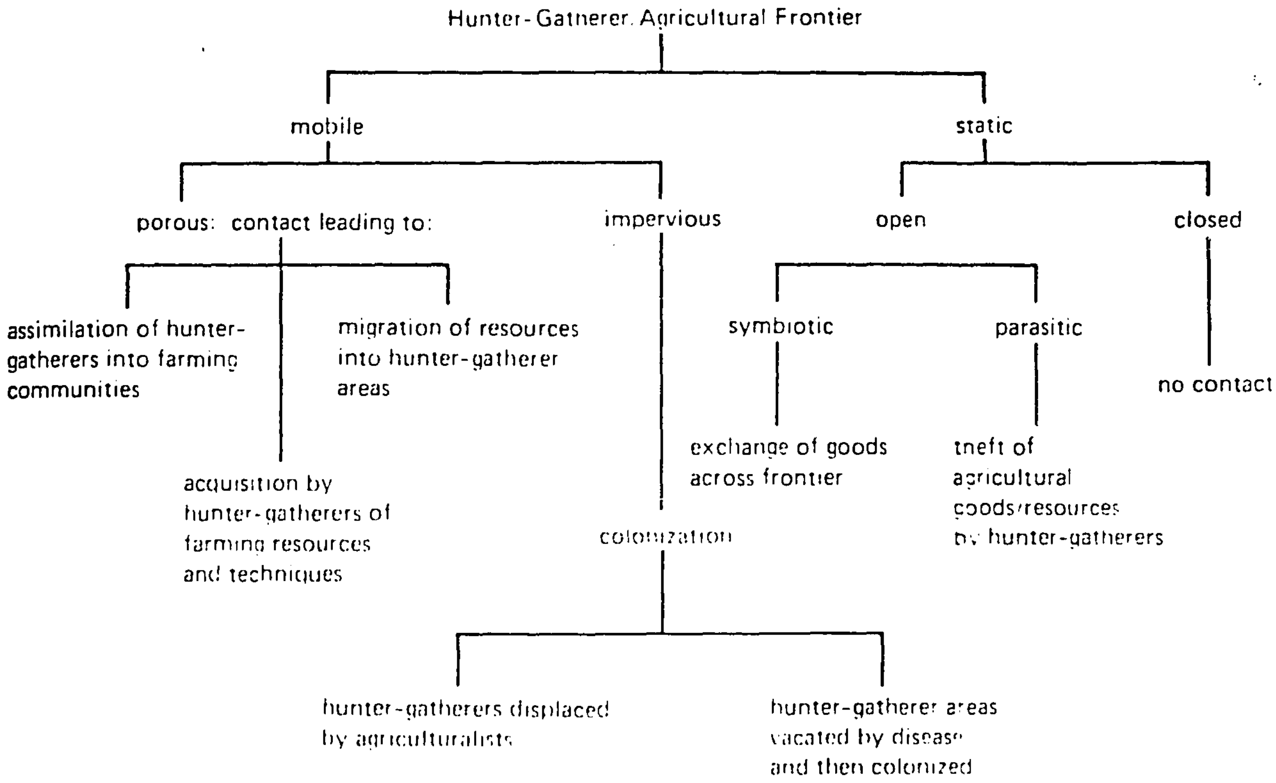


Figure 154. Examples of types of frontiers that may have existed in prehistoric Europe between early agriculturalists and hunter-gatherers (Dennell 1985:Fig.6.4).

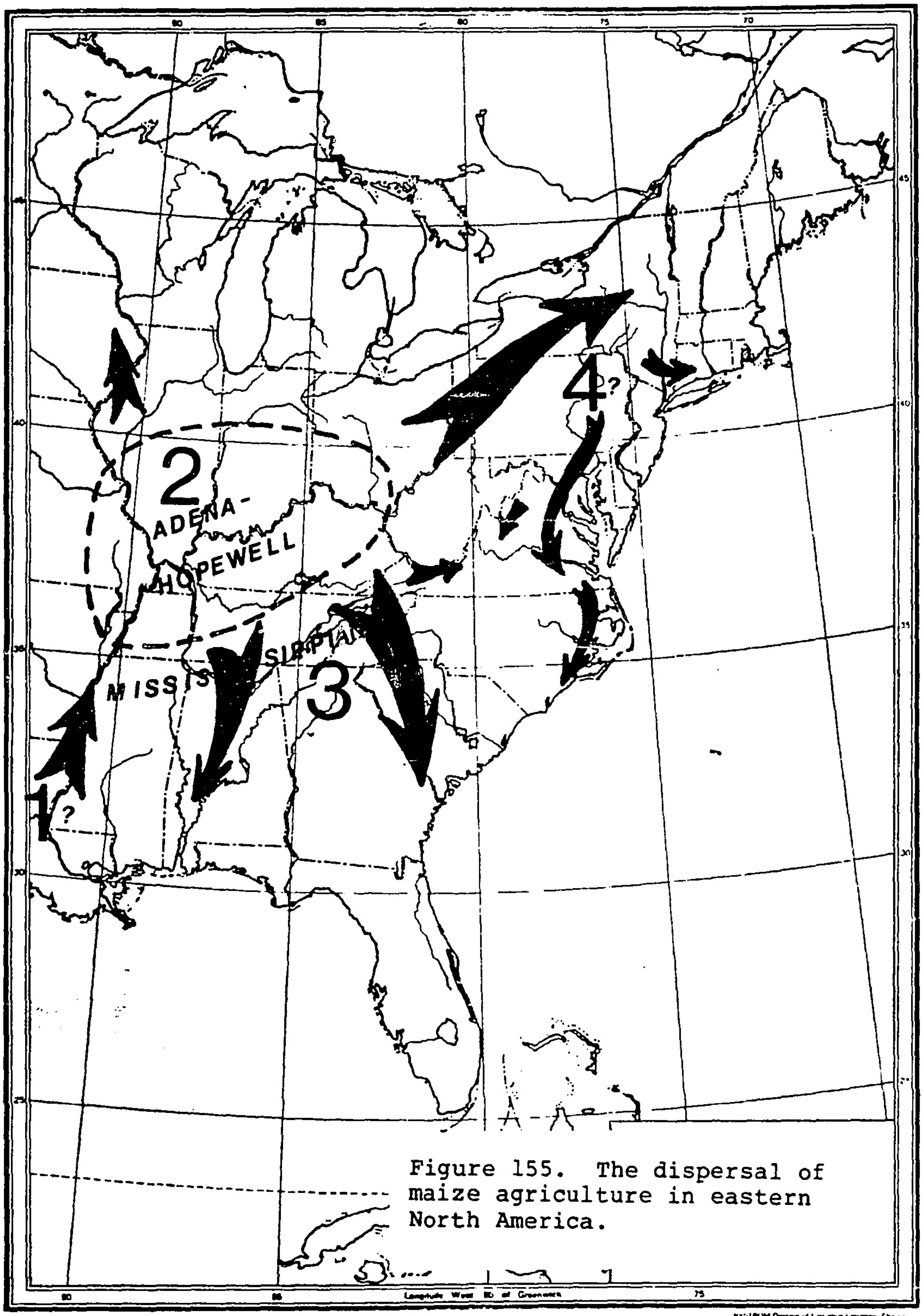


Figure 155. The dispersal of maize agriculture in eastern North America.

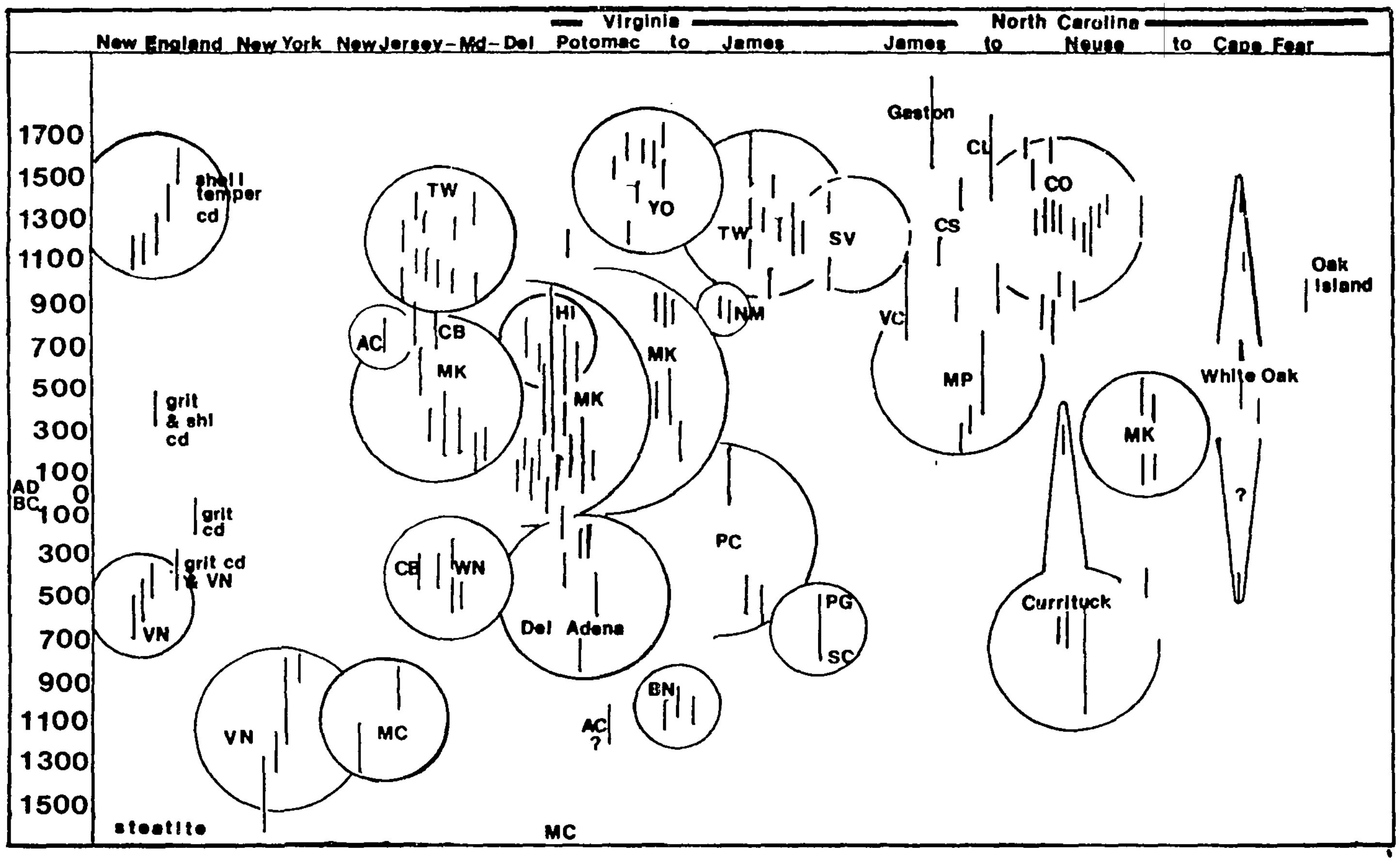


Figure 156. Radiocarbon chronology of ceramic complexes in Atlantic coastal North America.

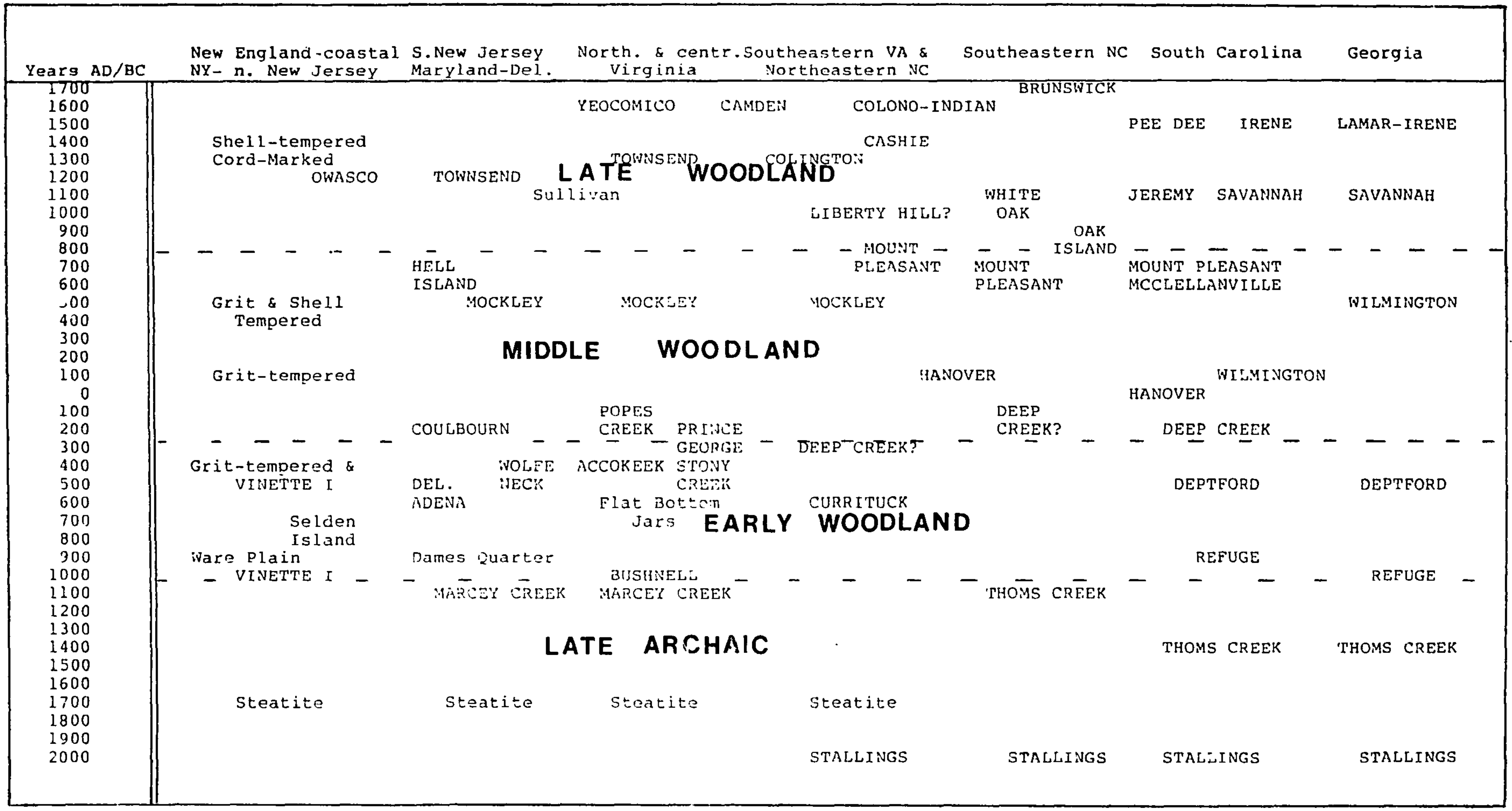


Figure 157. Chronology of Late Archaic to Protohistoric ceramic complexes in Atlantic coastal North America.

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