Stewart

THE 1984 MIDDLE ATLANTIC ARCHAEOLOGICAL CONFERENCE
APRIL 13, 14, AND 15
REHOBOTH BEACH, DELAWARE

John A. Cavallo, Program Chairman

A THEMATIC SESSION ON HISTORICAL ARCHAEOLOGY: ADAPTATION AND EVOLUTION ON THE AMERICAN FRONTIER

Chaired by
Dennis J. Pogue
Southern Maryland Regional Archaeologist

Session Abstract

Archaeology is a discipline particularly suited to the study of diachronic social and cultural evolution, and thus to such a study in frontier environments. How immigrants to the frontier adapt to their new and often hostile environment, the social/cultural characteristics of frontier populations/ communities, and how those societies evolve, all are questions that may be addressed via archaeolgoical research. This session provides a forum for archaeologists to address those issues and/or provide case studies of frontier culture history. Each of the Middle Atlantic states underwent a frontier, or more accurately, various frontier periods; thus, paper topics can range widely in date and thoughout the region (from the 17th-century Chesapeake tobacco frontier, to transmontane migrations, to such specialized frontiers as the fur trade, for example). However, even when or if the frontiers studied are temporally and locationally disparate, by (re)orienting research questions to frontier issues, mutually supportive data may be produced. Appropriate papers might be analyses/ inter-site comparisons ofmilitary installations, domestic sites, artifact assemblages, patterns of settlement, specialized frontier institutions, and architecture, for example (frontier versus non-frontier, their evolution, etc.).

HISTORICAL ARCHAEOLOGY: ADAPTATION AND EVOLUTION ON THE AMERICAN FRONTIER

Friday, April 13, 1984.

1:30 Armor Useage on the Seventeenth-Century Chesapeake Frontier, Charles Fithian (20 min.).

1:40 Euro-Indian Trade and Trade Materiqals on the Chesapeake Frontier, Michael A. Smolek (20 min.).

2:20 Material Culture on the West Jersey Settlement Fronteir, Robert W. Foss (20 min).

2:40 Break -- 20 minutes.

3:00 Diachronic Patterns in Seventeenth-Century Ceramic Ware Types in the Tidewater Chesapeake, Dennis J. Pogue.

3:20 Subsistence and Commodity in Colonial Pennsylvania: Frontier and the Market Economy, John P. McCarthy.

3:40 "Bermuda Hundred:From Frontier For to Planters Port, L. Daniel Mover and Frederick W. Gleach.

ABSTRACT

ARMOR USEAGE ON THE SEVENTEENTH-CENTURY CHESAPEAKE FRONTIER,
By Charles Fithian

In the curse of archaeological excavation in Virginia, numerous parts of body armor have been rcovered. In the summer of 1982, parts of armor were found for the first time in Maryland at St. Maries City. This paper will deal with the analysis of the use of armor in the Chesapeake region. Instead of being quickly discarded, it now appears that its use persisted well into the seventeenth century. The process of adaptation will be a major consideration of the paper.

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EURO-INDIAN TRADE AND TRADE MATERIALS
ON THE CHESAPEAKE FRONTIER

By Michael A. Smolek

Trade materials enumerated in several documentary listings and inventories will be examined and the general history of 17th century trade will be reviewed. Archaeologically derived examples of trade items will be compared with the documentary evidence and placed in historical contexts.

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MATERIAL CULTURE ON THE WEST JERSEY SETTLEMENT FRONTIER

By Robert W. Foss

The wave of early settlement moved through the Trenton, New Jersey vicinity between 1680 and 1710. This influx of settlement was marked by the establishment of several discrete farmsteads along the Delaware River and its major tributaries. Excavations at one of these sites, the Thomas Tindall Farmstead, during mitigation activities associated with the construction of Interstate 195 have yielded a sizable assemblage of artifacts which can be associated with this early frontier period. Analysis of the material addresses several questions related to the economic base of the frontier inhabitants. Specifically, the paper will be concerned with the relative frequencies of locally manufactured versus imported goods (particularly ceramics) and the possible implications of those patterns on our understanding of early frontier adaptations.

ABSTRACT

DIACHRONIC PATTERNS IN SEVENTEENTH-CENTURY WARE TYPES IN THE TIDEWATER CHESAPEAKE

By Dennis J. Pogue

The results of more than a decade of extensive archaeological research have served as an important contribution to the on-going historical interpretation of the seventeenth-century Chesapeake frontier. Yet, while material culture analysis -- especially pertaining to ceramics -- remains a major emphasis of the archaeological community, this activity has contributed little to the larger study of Euro-American adaptation to the region. In this paper, ceramic assemblages from several Tidewater sites spanning most of the century are compared -- revealing long-term trends in ceramic ware type useage that seem to support independently identified patterns of cultural evolution. This paper is only a beginning, however, as most of the data necessary for a complete analysis still are generally unavailable, with many associated issues yet to be addressed.

SUBSISTENCE AND COMMODITY IN COLONIAL PENNSYLVANIA: THE FRONTIER AND THE MARKET ECONOMY

By John P. McCarthy

The transformation from subsistence farming to commodity production in Colonial Pennsylvania is explored. The paper addresses observed "Frontier" phenomena in the archaeological record of farmsteads dating from the early 18th century. The effects of market participation on the archaeological record are also discussed. It is argued that farmsteads posses the potential to aid in the study of commoditization of the rural economy in the 18th and 19th centuries. Specific avenues of research are suggested.

FRIDAY EVENING SESSION ON ARCHAIC PROJECTILE POINT TYPOLOGIES

Chaired by

June Evans
American University

The Friday night session will start at 8:00 P.M. and will consist of a presentation of a paper entitled Archaic Projectile Points in the Middle Atlantic: What's in a Name?" by June Evans, session chairperson. This paper has been circulated to a number of people before the conference and they will be asked to comment upon it. After the presentation of their comments, a general discussion will follow.

TRADE AND EXCHANGE SYSTEMS IN THE MIDDLE ATLANTIC REGION

Chaired by
Cara Wise

ABSTRACT

The existence of regional exchange systems has been postulated in the past to account for the occurence in some prehistoric sites of artifacts made from non-local materials. Earlier studies focused primarily on tracing the source of exotic raw materials and documenting their distribution. More recently, attention has been directed at the nature of the trade and exchange networks themselves. the papers in this session illustrate several approaches to the study of such systems.

Saturday Morning, April 14, 1984

9:00 Session Introduction -- Cara Wise.

9:05 The "Meta-" Rhyolite Connection: A Perspective on Prehisoric Trade and Exchange in the Middle Atlantic -- R. Michael Stewart, Louis Berger and Associtates, Inc.

9:35 Ironstone Exchange Systems of the Upper Delmarva Peninsula -- H. Henry Ward and Keith R. Doms, Unviversity of Delaware.

10:05 A Contextual Analysis of Late Archaic Artifacts Manufactured from Non-Local Materials on the Delmarva Peninsula: Implications for Patterns of Trade and Exchange -- Jay F. Custer, University of Delaware.

10:35 Trade and Warfare in Southern New England: Archaeological and Thnohistorical Perspectives -- Kenneth L. Feder, Central Connecticut University.

10:55 Break -- 15 minutes.

11:10 Late Archaic Adaptations in New Jersey's Coastal Plain: A Preliminary Model of Environment, Society, and Exchange -- John A. Cavallo, Louis Berger and Associates, Inc.

11:40 Discussion -- Panalists: L. Daniel Mouer, William Boyer, William M. Gardner.

THE (META) RHYOLITE CONNECTION: A PERSPECTIVE ON PREHISTORIC TRADE AND EXCHANGE IN THE MIDDLE ATLANTIC REGION

By R. Michael Stewart

The appearance of (meta) rhyolite artifacts and raw materials on archaeological sites of the Middle Atlantic Region serves as one means of evaluating prehistoric trade and exchange through time. Primary sources of the material are limited to a relatively small area of the Blue Ridge physiographic province of Maryland and Pennsylvania. (Meta) rhyolite is easily identified by macroscopic features, is not readily mistaken for other lithic types, and has been referenced in the archaeological literature since the late 19th century. Artifacts fashioned from the material are known to occur several hundred miles from primary sources in Early Archaic through Late Woodland contexts. An analysis of the geographic distributions, frequencies of occurrence, and the types of artifacts fashioned from (meta) rhyolite is used as a basis for characterizing the nature and extent of prehistoric trade and exchange in the region.

IRONSTONE EXCHANGE SYSTEMS OF THE UPPE DELMARVA PENINSULA

By H. Henry Ward and Keith R. Doms
Center for Archaeological Research
University of Delaware

ABSTRACT

Ironstone, a sedimentary iron-cemented sandstone, is found in a series of somewhat restricted outcrops throughout the Upper Chesapeake Bay region, including the upper Eastern Shore of Maryland. Recent analysis, including field survey, excavations, and examination of collections, shows the existence of specialized quarry/production sites on the Eastern Shore of Maryland and a trade and exchange network that moves ironstone artifacts eastward to the Delaware Bay, northward into the Pennsylvania Piedmont, and southward into the Nanticoke and Pocomoke drainages.Projectile point styles indicate a terminal Late Archaic/Early Woodland (Clyde Farm/Wolfe Neck Complex) date for the exchange systems and finished tools and late stage bifaces are the major items of exchange. The exchange network is similar to that of low-level argillite and rhyolite networks.

A CONTEXTUAL ANALYSIS OF LATE ARCHAIC ARIFACTS MANUFACTURED FROM NON-LOCAL MATERIALS ON THE DELMARVA PENINSULA: IMPLICATIONS FOR PATTERNS OF TRADE AND EXCHANGE

By Jay F. Custer

ABSTRACT

Although the numerical analysis of distributions of exotic materials can provide insights to the structure of prhistoric trade and exchange systems, a more detailed analysis of the contexts of these finds has the potential for revealing additional interesting insights. Contexts of Late Archaic exotic materials in the Delmarva Peninsula show two levels of exchange systems as revealed by analysis of their contexts. In general, argillite, rhyolite, and steatite appear as finished artifacts throughout most of the Delmarva Peninsula with little if any evidence of primary manufacturing of artifacts from these materials present. However, on the St. Jones/Murderkill and Choptank drainages, evidence of primary manufacturing of artifacts from argillite is present as well as special artifact disposal pattens for non-local materials, including caches. These finds suggest different trade and exchange systems for these drainages during Late Archaic times and it is significant to note that both drainage systems are the foci of later Delmarva Adena complexes.

TRADE AND WARFARE IN SOUTHERN NEW ENGLAND: ARCHAEOLOGICAL AND ETHNOHISTORICAL PRESPECTIVES

By Kenneth L. Feder

ABSTRACT

It has long been recognized by archaeologists in southern New England, that Woodland period sites are often characterized by large percentages of exotic material, particularly flint, in their lithci assemblages. This contrasts sharply with Archaic period sites where lithic material exploited tends to be confined to less tractable local varieties, especially quartz and basalt.

Archaeologists have usually concluded that this change in the focus of raw materials exploited by the prehistoric inhabitants of southern New England between Archaic and Woodland times was the result of expanded networks of trade making available the more desireable flints of the Hudson River Valley in New York State.

This, however, raises the question of the significance of ealry ethnohistorical accounts that characterize the relationship between the Indians of southern New England and those of the Hudson Valley of New York (apparently the major source of flint) as extremely hostile and marked by raiding and warfare. It is here proposed that the level of trade indicated by the prehistoric record for the Woodland period could not have existed had the ethnohistorically reported warfare been aboriginal. Suggestions are here made concerning the impact of European trade on the aboriginal trading system, particularly the significance of the European replacement of flint as a major raw material for tools with metal. Ethnohistorical data are used to generate an explanation and archaeological data from Woodland and Contact period sites in Connecticut are used to test its validity.

PROTOHISTORIC AND CONTACT PERIOD SOCIETIES IN THE MIDDLE ATLANTIC REGION

Chaired by
Stephen R. Potter
National Park Service and Smithsonian Institution

Session Abstract

Ethnocentrically, the protohistoric period might be characterized as the "false dawn" of historic contact when Spanish, French and English explorers made brief incursions or established ill-fated settlements in the Middle Atlantic Region, circa A.D. 1500 to 1607. From an aboriginal perspective, it was a prelude to full-scale European invasion, begun in earnest in A.D. 1607. It is the purpose of this session to examine various aspects of culture change among the indigenous and instrusive societies of the region between approximately A.D. 1500 to 1750. The goal of the session is to contribute toward a better understanding of the different courses of culture change in the region, whether from the standpoint of aboriginal society, European society, or a comparison of the two.

PROTOHISTORIC AND CONTACT PERIOD SOCIETIES IN THE MIDDLE ATLANTIC REGION

Saturday, April 14, 1984.

1:30 Session Introduction -- Stephen R. Potter, National Park Service and Smithsonian Institution.

1:35 Protohistory and the Carolina Algonkians: Decimation and Acculturation -- David S. Phelps, East Carolina University.

1:55 Seventeenth Century Apartheid: The Suppression and Containment of Indians in Tidewater Virginia -- Martha McCartney, Virginia Historic Landmarks Commission.

2:15 Baubles and Burials: An Analysis of Nineteenth Century Archaeological Discoveries in the Vicinity of Potomac Creek, Virginia -- Stephen R. Potter, National Park Service and Smithsonian Institution.

2:35 The Significance of the Beaver Trade on Anglo-Indian Relations in the Early Chesapeake -- J. Frederick Fausz, St. Mary's College of Maryland.

2:55 Break -- 20 minutes.

3:15 Where are the Indian Towns? Archaeology, Ethnohistory and Manifestations of Contact on Maryland's Eastern Shore -- Thomas E. Davidson, Richard Hughes, and Joseph McNamara.

3:35 Silver Trade Goods as Indicators of the Acculturation Process: The Earliest Documented Lenape Examples Prior to 1750 -- Marshall Becker, West Chester State College.

3:55 The Foley Farm Phase: A New Look at Monongahela -- James T. Herbstritt, Pennsylvania Historical and Museum Commission.

4:15 Discussion -- 20 minutes.

"PROTOHISTORY AND THE CAROLINA ALGONKIANS: DECIMATION AND ACCULTURATION"

David Sutton Phelps
East Carolina University

In a brief moment of time between 1584 and 1587, Englishmen explored the northern coast of North Carolina and planted the first, ill-fated English colony on North American soil. Although the colony failed as was lost, we have from that period a unique set of maps and water-colored paintings illustrating the area and its native inhabitants, and descriptive accounts of their culture. The Native Americans of this region were the Carolina Algonkians, the southern-most speakers of the Eastern Division of the Algonkian language, whose complex culture included a number of discrete, class-stratified societies with a formal religious system and a political system at or near the chiefdom level.

After permanent colonization of North Carolina began in 1650, it took less than a century for the disappearance of the Carolina Algonkian Societies as recognizable socio-political entities; after 1750 there are no further references to them in the Colonial records. During that approximately 100-year period, the native population was decimated by diseases introduced as early as 1584 by Europeans and pushed from productive farmlands and hunting territories by Colonial expansion. Their response to the stresses of culture contact appears to have been a consciously decided process of acculturation to European Colonial culture rather than strong retention of traditional culture.

The archaeological and historical evidence for this type of culture change is discussed and evaluated.

"SEVENTEENTH CENTURY APARTHEID: THE SUPPRESSION AND CONTAINMENT OF INDIANS IN TIDEWATER VIRGINIA"

Martha McCartney
Virginia Historic Landmarks Commission

As early as 1611, Colonial officials argued for the exclusion of the aboriginal population from the James-York peninsula. Despite laws defining cultural interaction, the colonists' aggressive extension of settlement inland precipitated overt conflict in 1622. Subsequent defensive measures included depriving the Indians of their subsistence, prohibiting them from entering English settlements, and limiting official contact to a designated checkpoint. When the colonists, through the deliberate expansion of settlement from the James River to the York and westward, claimed the peninsula as their own, they again encountered concerted resistance on the part of the indigenous population -- the 1644 massacre. Thus, in 1645 Virginia official resolved to construct a line of strategically placed fortifications on the fringes of the settled area, territory which certain Tributary Indian groups legally ceded to the English the following year.

These early forts, besides providing an opportunity for military surveillance and containment, regulated the passage of Native Americans into the ceded area, a policy which can be likened to South African apartheid. Throughout the duration of the seventeenth century, the Virginia government relied upon this means of maintaining military control of the native population, shifting their successive lines of fortifications further westward, in accord with the spread of settlement. Archaeologists, by utilizing the data historians have gleaned on this topic, should be able to identify physically some of these fort sites, this expanding their knowledge of settlement patterning, trade and other forms of Native American/European interaction during the seventeenth century in Virginia.

"BAUBLES AND BURIALS: AN ANALYSIS OF NINETEENTH CENTURY ARCHAEOLOGICAL DISCOVERIES IN THE VICINITY OF POTOMAC CREEK, VIRGINIA"

Stephen R. Potter
National Park Service and Smithsonian Institution

Shortly after the end of the American Civil War, relic collectors were, once again, able to satisfy their passion for collecting "aboriginal art remains." A favorite haunt of theirs was Potomac Creek, in Stafford County, Virginia, reputed by Thomas Jefferson to be the location of the chief town of the historic Patawomeke Indians. A search of nineteenth century archival materials and archaeological collection indicates the discovery of a least five distinct areas of aboriginal occupation and three burial sites in the Potomac Creek locale. A comparison of these finds, especially from two of the burial sites, to subsequent twentieth century archaeological investigations at Potomac Neck supports the propo-

sition that the major locus of post contact occupation was at Indian Point and not at the archaeological site known as Potomac Creek. An analysis of these data and information gleaned from a variety of ethnohistoric sources provide for alternative interpretations of status, trade and acculturation among certain early seventeenth century Algonquian groups of the Tidewater Potomac.

"THE SIGNIFICANCE OF THE BEAVER TRADE ON ANGLO-INDIAN RELATIONS IN THE EARLY CHESAPEAKE"

J. Frederick Fausz
St. Mary's College of Maryland

A regional survey of Anglo-Indian relations along the mid-Atlantic coast in the period between the founding of Roanoke in 1585 and the founding of Maryland in 1634 allows us to compare the contact experiences that three different groups of English colonists had with tidewater Algonquian societies. Self-preservation and self-interest motivated all groups, and until 1634 a definite pattern governed relations between intruding and indigenous peoples, namely that proximity of settlement produced ideological confrontations and large scale isolated geographically and politically from the centers of aboriginal authority. However, the Chesapeake beaver trade in the 1620s and 1630s profoundly altered this pattern, encouraging new alliances and inter-ethnic interest groups, and in the case of Maryland, creating a situation where proximity of settlement produced long-term hospitality between the cultures and defense against common enemies, both English and Indian, in the struggle to control the resources of the Chesapeake.

"WHERE ARE THE INDIAN TOWNS? ARCHAEOLOGY, ETHNOHISTORY AND MANIFESTATIONS OF CONTACT ON MARYLANDS'S EASTERN SHORE"

Thomas E. Davidson, Richard Hughes and Joseph MacNamara
Salisbury State College, Maryland Historical Trust, and the Division of Archaeolgy, Maryland Geological Survey.

Despite the fact that documentary records note the presence of several historic period Indian settlements on the Eastern Shore of Maryland, the known archaeological evidence for these seventeenth and eighteenth century "Indian Towns" is decidedly meager. Even when the approximate locations of historic Indian towns can be established from documentary sources, these towns have proved to be very hard to identify on the ground. A systematic effort has been made to find two historically attested Indian towns, Chicone and Locust Neck, known to be located in Dorchester County, Maryland. By combining intensive, site-specific documentary research with aerial photographic surveys and traditional ground-level archaeological survey and testing, the authors have

suceeded in discovering the sites of both of these Indian towns. The archaeological evidence recovered from the Chicone and Locust Neck sites indicates that these and other historic Indian settlements may have been overlooked in the past because they did not exhibit the material culture traits that archaeologists expected to find at contact sites. The pattern of Indian/European interaction on the Eastern Shore is discussed in the light of this newly gathered archaeological and ethnohistoric data, and the material cultural correlates of the contact process are reassessed for the region.

"SILVER TRADE GOODS AS INDICATORS OF THE ACCULTURATION PROCESS: THE EARLIEST DOCUMENTED LENAPE EXAMPLES PRIOR TO 1750"

Marshall Becker
West Chester State College

The origins of trade silver, which rapidly became an important medium of exchange between colonials and various Native American groups, are documented by direct archaeological evidence in southwestern Pennsylvania. Although previous studies of trade silver suggest early eighteenth century origins, direct evidence now documents the earliest types of these goods and suggests how these interactions developed.

Two pieces of trade silver recovered from controlled excavations within the Lenape area predate 1740. One of these can be dated more precisely because it bears the touchmark of Cesar Ghiselin, the first goldsmith working in Philadelphia. Increasing use of silver trade goods now appears to correlate with the decline in the use of wampum. More significantly, resistance to acculturation is documented by a resistance to the use of silver artifacts among the Lenape, who had long before adopted the use of other aspects of European technology.

"THE FOLEY FARM PHASE: A NEW LOOK AT MONONGAHELA"

James T. Herbstritt
Pennsylvania Historical and Museum Commission

During 1983, archaeological investigations by the Pennsylvania Historical and Museum Commission were carried out at the Foley Farm located in western Greene County, Pennsylvania. These excavations confirmed the presence of a suspected midden dump and identified a major seventeenth century Monongahela settlement. This paper describes 1) the internal composition of the settlement; 2) compares the recovered native and European related articles; and 3) discusses the mortuary evidence for in-house (resident) burial. It is suggested that these various aspects of material culture constitute the Protohistoric phase of Monongahela (Foley Farm Phase) which appears to mark the end of Monongahela as a major culture entity of the Upper Ohio Valley.

GENERAL SESSION

Chaired by
R. Michael Stewart

Sunday Morning, April 15, 1984

9:00 Session Introduction -- R. Michael Stewart, Louis Berger and Associates, Inc.

9:05 Potential of Materials Science Approaches in the Study of Virginia Ceramics: An Overview -- Gordon Bronitsky, University of Arizona (Read by L. Daniel Mouer).

9:25 Evidence for a Late Woodland Migration from the Piedmont to the Tidewate in the Potomac Valley -- Howard McCord

9:45 Urban Waterfront Sites: Methods in the Mud -- William Sandy, Louis Berger and Associtas, Inc.

10:05 A LANDSAT - Generated Predictive Model for Prehistoric Archaeological Sites in Delaware's Coastal Plain -- Timothy Eveleigh, University of Delaware.

10:25 Break -- 20 minutes

10:45 Longhouses, Pit Houses, and Wigwams: Some Recent House Reconstructions and their Archaeological Implications -- Errett Callahan.

11:05 Diachronic Trends in Prehistoric Settlement in the Lower Patuxent Drainage, Maryland -- Laurie C. Steponaitis.

11:25 Use Wear, Projectile Point Morphology, and Activity Areas at the Hawthorn Site, 7NC-E-46, New Castle County, Delaware: Chronological Implications -- David C. Bachman and Jay F. Custer, University of Delaware.

11:45 Sites and other Spatial Units of Analysis: An Archaeological Frontier -- Francis P. McManamon, National Park SErvice.

THE POTENTIAL OF MATERIALS SCIENCE APPROACHES IN THE STUDY OF VIRGINIA CERAMICS: AN OVERVIEW

By Gordon Bronitsky

ABSTRACT

To the uninitiated, the ceramics of Virginia present a confusing picture. A wide variety of named types exists, based first on distinctions in technology such as shape, rim profile, paste, temper, firing and texture and, secondly, on surface manipulation. Many types have not been well-reported or thoroughly compared to existing ones. All too often radiocarbon dates and stratigraphic placement of ceramic types are lacking. Call for further analysis of the ceramic sequence abound in the literature.

Research underway at Virginia Commonwealth University is investigating the utility of selected analytical approaches of cermaics in teh archaeological study of social and economic change. Characterization describes those features of composition and structure of a material which are important for the preparation of a product, the study of its properties, or its ultimate use.

EVIDENCE FOR A LATE WOODLAND MIGRATION FROM PIEDMONT TO TIDEWATER IN THE POTOMAC VALLEY

(Prepared for presentation at the 1984 Middle Atlantic Archaeological Conference)

Assembled in this pape is the evidence which proves what has long been suspected by the region's archaeologists. The Montgomery Focus people, who made grit tempered ceramics usually called Shepard Cordmarked, disappear from the Pidemont Potomac around AD 1400. At about the same time, ancestors of the historic Patawomecke and Piscataway tribes occupy sites in the inner coastal plain of the Potomac Valley, from Washington, D.C. southward for about sixty miles. The timing has long been known, and the evidence in the ceramics has been recognized. It has been obvious that Potomac Creek wares share many attributes with Shepard Cordmarked, as well as with wares of the Shenk's Ferry and Monongahela Cultures. Testing the deep midden at the Potomac Creek Site has yielded proof that the cited wares form a continuum from before AD 1400 until after Contact in the first half of the 17th century. From this, it appears reasonably certain that the Montgomery Focus people moved downriver around AD 1400 to become the Potomac Creek and kindred people. The key attribute used in the ceramic analysis was the presence of an added rimstrip or a thickening of the rim on a jajority of the Shepard Cordmarked ceramics at the Piedmont sites (Winslow, Shepard, Fisher, Gore, and others) and

duplicated in the deeper levels of the Potomac Creek midden. Othe attributes, such as size and nature of tempering, vessel shapes and ornamentation, and the frequenct scalloping of upper rim surfaces, support the other evidence. Data furnished by community siting and layouts, subsistence technology, human burials, and stone and bone artifacts support the movement theory, or at least do not refute it. Post-Contact behavior of the Tidewater tribes continue to reflect their former Piedmont origins, as does the presence of Potomac Creek ceramics in historic and late prehistoric sites in the Maryland-Virginia Piedmont and in the Potomac-Shenandoah drainages.

"URBAN WATERFRONT SITES: METHODS IN THE MUD"

By William Sandy

ABSTRACT

Urban waterfront sites often present serious data retrieval problems. In order to deal with obstacles such as deep fill and high water tables, archaeologists must be ready to utilize the methods and machines of the construction industry. The equipment utilized and safety problems encountered on sites in the Middle Atlantic and Southern New England are presented and discussed.

ABSTRACT

The purpose of this paper is to describe the development of a quantified model that uses LANDSAT data to predict the locations of prhistoric archaeological sites in Delaware's Coastal Plain. The development of this model utilized a portion of the stratified random sample of archaeological sites gathered as part of the archaeological survey described in the portion of the St. Jones-Murderkill survey area utilized in this study. the size of the area utilized to develop the predictive model was dictated by the limitations of the Earth Resources Data Analysis Systems (ERDAS) computer used to analyze the LANDSAT satellite data. The selection of the section of the St. Jones-Murderkill survey area to be used in this analysis was made so as to provide almost complete coverage of a single drainage, the Murderkill, as well as to cross-cut all four major environmental zones.

LONGHOUSES, PITHOUSES, AND WIGWAMS: SOME RECENT HOUSE RECONSTRUCTION EXPERIMENTS AND THEIR ARCHAEOLOGICAL IMPLICATIONS

By Errett Callahan, PhD

ABSTRACT

In recent years the interest in an nature of aboriginal house reconstructions have changed dramatically. Not only has the number of such reconstructions increased rapidly but the

attiudes taken into the experiments is distinct as well. In the past, authenticity was given a back seat to function; today an unprecedented degree of authenticity is being attempted and is, in fact, resulting in vastly improved functional capabilities of the houses as well. Examples of such reconstructions are discussed and illustrated. Finally, sample projects are analyzed for their scientific merit and for their capabilities for reading of the archaeological record.

DIACHRONIC TRENDS IN PREHISTORIC SETTLEMENT IN THE LOWER PATUXENT DRAINAGE, MARYLAND

By Laurie Cameron Steponaitis

ABSTRACT

Analysis of data recovered in a systematic survey of the lower Patuxent drainage has provided information on diachronic change in prehistoric settlement patterns betwwn 4000 B.C. and A.D. 1600. This paper summarizes several aspects of temporal variation including: (1) component frequency; (2) component size; (3) spatial distribution of archaeological remains; and (4) functional diversity among contemporaneous components. The results indicate a gradual increase in the number of components through time, along with an increase in mean component size. It is also apparent tht differentiation of activities among environmental zones increases markedly in late prehistoric times.

USE-WEAR, PROJECTILE POINT MORPHOLOGY, AND ACTIVITY AREAS AT THE HAWTHORN SITE (7NC-E46), NEW CASTLE COUNTY, DELAWARE: CHRONOLOGICAL IMPLICATIONS

By David C. Bachman and Jay F. Custer

ABSTRACT

Recent excavations at the Hawthorn site (7NC-E-46) revealed a variety of morphological projectile point types within a single component, short-duration, Late Archaic staging/processing site. Soils data, refitted artifacts, and spatial separation of activity areas all clearly indicate a single, undisturbed context for the finds. Use wear analysis, including examination of point morphology and low power magnification studies, shows that the varied projectile point styles, which more traditional archaeologists might consider to be temporally diagnostic, are different functional types. Associations of styles and functions within the single component assemblage include side-notched late stage butchering tools of quartz, stemmed early stage butchering tools of ironstone and quartzite, and true projectile points with square bases and stems of various raw materials. These associations of varied styles of projectile points of different functions within

a single component suggest that many assumptions about "diagnostic projectile points" currently in use in the Middle Atlantic need to be rethought.

SITES AND OTHER SPATIAL UNITS OF ANALYSIS: AN ARCHAEOLOGICAL FRONTIER

By Francis P. McManamon

ABSTRACT

Appropriate spatial units of analysis vary according to the research question(s) at hand. These units may vary from vertical or horizontal subsite areas to entire settlement pattens. Typically, sites or even components as traditionally defined frequently are not sufficiently precise for either descriptive or explanatory behavioral analysis.

Using data from site areas discovered and examined as part of the Cape Cod National Seashore Archaeological Survey, a different method for identifying basic units of analysis is described. Examples also are given of how these basic units can be joined together for behavioral analysis at different spatial scales.

Stewart

USE-WEAR, PROJECTILE POINT MORPHOLOGY, AND ACTIVITY AREAS AT THE HAWTHORN SITE (7NC-E-46), NEW CASTLE COUNTY, DELAWARE: CHRONOLOGICAL IMPLICATIONS

David C. Bachman and Jay F. Custer
Center for Archaeological Research
Department of Anthropology
University of Delaware

INTRODUCTION

The purpose of this paper is to briefly describe the morphological variation within a series of projectile points that were recovered from the Hawthorn site (7NC-E-46), a single component, short duration Late Archaic site in the northern Delaware High Coastal Plain (Custer and Bachman 1983). The assemblage from the Hawthorn site is especially interesting because it contains a variety of projectile point forms that generally are not thought to have been used contemporaneously. The research reported herein was a part of data recovery excavations funded by the Delaware Department of Transportation and carried out by the University of Delaware Center for Archaeological Research. It should be noted that this paper represents a summary of the analysis carried out with the Hawthorn site data. Further supporting data are available in the complete site report (Custer and Bachman 1983) which is available from Kevin Cunningham, Delaware Department of Transportation. We also thank Kevin Cunningham and Dan Griffith for their support of our research at the Hawthorn site.

In a recent report on a regional survey in the Pennsylvania Piedmont, Snethkamp et al. (1983) have suggested that traditional interpretations of Late Archaic archaeological data have systematically ignored the varieties of projectile point types that are found together at a single point in time. By beginning from a series of assumptions, or "axioms" which have been lumped together as the "Coe Axiom" (Brennan 1967), most archaeologists working in the Middle Atlantic first assume that single projectile points will be found at single locations at single points in time. Limited co-occurrence of diagnostics is seen as possible in light of applications of seriations (Kinsey 1972:177, Fig. 54); however, single styles at single points in time characterize most chronological schemes (Coe 1964:121). If data from sites, in the form of "anomalous" associations of the "diagnostic" types, contradict these assumptions, the context of

the site is dismissed as mixed, or the assemblage is seen as the result of curation of "heirlooms" by prehistoric groups. In this manner, the point sequences and chronologies remain inviolate and pass every "test" of their validity.

Nonetheless, recent studies of a number of sites and collections (Snethkamp et al.; Stewart 1981; Custer 1982, 1983; Moeller 1982) have suggested that the traditional chronologies require some revisions, specifically with regard to the multiple occurrence of diagnostic types. More importantly, the implicit linking of projectile point "traditions" (Piedmont, Laurentian, etc.) to distinct social units has been questioned (Michlovic 1976).

In this paper we will follow a different approach in analyzing the Late Archaic archaeological record as manifest at a single site. First, we will consider the depositional context of the Hawthorn site to see if there is any empirical reason in light of the soil depositional data and artifact distribution data (other than projectile point styles) to indicate that the site is mixed. Then, we will consider the morphological variety of the projectile points found at the site. Finally, we will consider explanations for the assemblage variability. No a priori assumptions, such as the Coe Axiom, will be utilized.

SITE CONTEXT

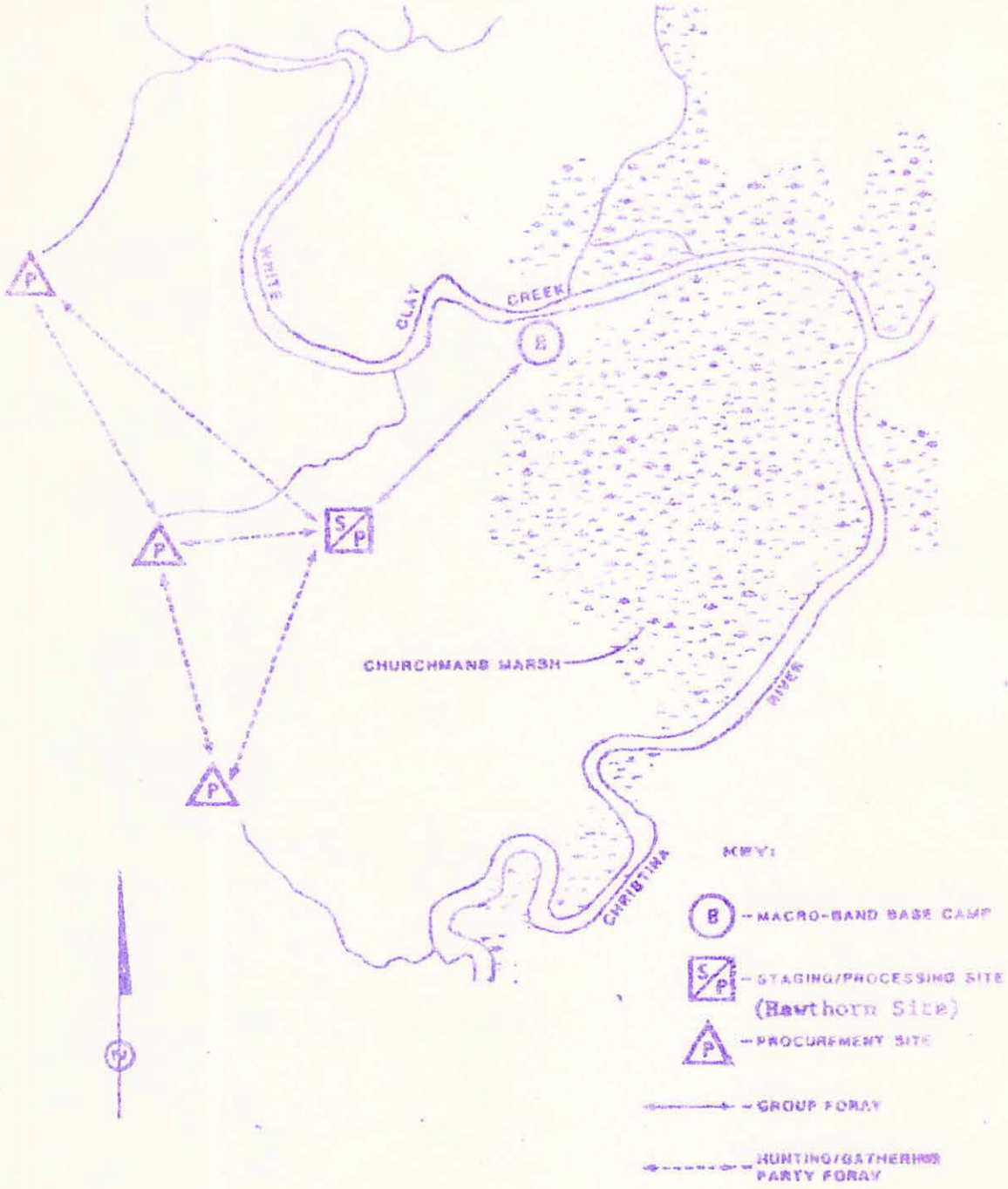
The Hawthorn site is located in the Delaware High Coastal Plain approximately five kilometers south of the Fall Line. It is also within five kilometers of Churchmans Marsh, a large estuarine marsh complex that is the focus of intensive prehistoric settlement (Custer 1982). On a more detailed level, the Hawthorn site is located adjacent to a small springhead that feeds an unnamed tributary of the White Clay Creek (Figure 1).

The Hawthorn site was discovered during Phase II testing of an 18th-19th century farmstead when prehistoric artifacts were discovered in a buried soil horizon that showed some pedological development. A small pit feature was also encountered during the test excavations and was interpreted as an indication that a portion of the site may have contained in situ deposits.

Phase III data recovery excavations consisted of 55 five-foot squares and focused on the area containing the in situ feature. A buried B-horizon containing numerous prehistoric artifacts was discovered. It was overlain by an old plowzone that was primarily composed of recent slopewash and which contained both prehistoric and historic artifacts. Pedological analysis of the plowzone and underlying B-horizon (Custer and Bachman 1983:Appendix I) indicated that the B-horizon had been intact as an old land surface approximately 4000 - 5000 years ago and had not been subject to erosion or disturbance since that date. More recent (post-17th century) slopewash had buried this

FIGURE 1

LOCAL SETTLEMENT MODEL



soil and then the slope wash and top parts of the B-horizon were disturbed by historic plowing activities. Finally, sometime in the late 19th century, most of the site was covered by sterile sand fill and a macadam driveway. Figure 2 shows the general profile of the site.

In sum, the buried B-horizon represents an old landscape that was buried rather quickly by slopewash during the post-3000 BC time period. Later additional slopewash buried the site even deeper such that a portion of the site approximately 10 - 20 cm thick was protected from later plow disturbance. Artificial burial by driveway construction further protected the site from later historic erosion and mixing. Pedological development, including formation of clay skins and some incipient blocky structure, clearly indicates that the soil profile below the plow zone, including the artifact bearing layers, had not been disturbed for 4000 to 5000 years. Clearly, there are no empirical data from the analysis of the depositional context of the artifacts to suggest that any mixing of the site.

Nonetheless, the burial of the site by colluvium may have allowed some displacement of artifacts and mixing of associations. In order to see if this kind of mixing took place, a variety of analyses were undertaken. First, if colluvial deposition had displaced artifacts, it should not be possible to discern activity areas within the site. Figure 3 shows three clear-cut activity areas that were delineated from the analysis of the distribution of various classes of artifacts and features. Area I is characterized by a small pit feature that appears to have been associated with the processing of nuts and seeds, a discarded axe which showed striations indicative of reuse as a plant processing tool, concentrations of fire-cracked rock, concentrations of charred hickory nut hulls, and concentrations of charred Chenopodium and Amaranth seeds. All sections of the site were subjected to analysis for the presence of these ecofacts; therefore, their presence in this area of the site is not a result of analytical bias or re-deposition.

Area II was characterized by a variety of projectile points, cutting and scraping tools that had been broken in use and discarded, and some debitage (Figures 4 and 5). Small debitage from resharpening of tools was also especially abundant in the flotation samples from this section of the site. Area III was characterized by the presence of an oval ring of stones that is similar to features identified as tent-rings by Fitzhugh (1972). This area also was free of artifacts within the tent ring structure, but did have some associated accumulations of flakes and discarded and rejected tools adjacent to the structure.

In general, three clearly defined activity areas were present at the site. One was associated with processing of plant foods, another seems to be a butchering and animal resource processing area, and the third seems to be a temporary residential area with associated tool kit refurbishing activities. We suggest here that a site that had been subject to

FIGURE 2

GENERAL PROFILE

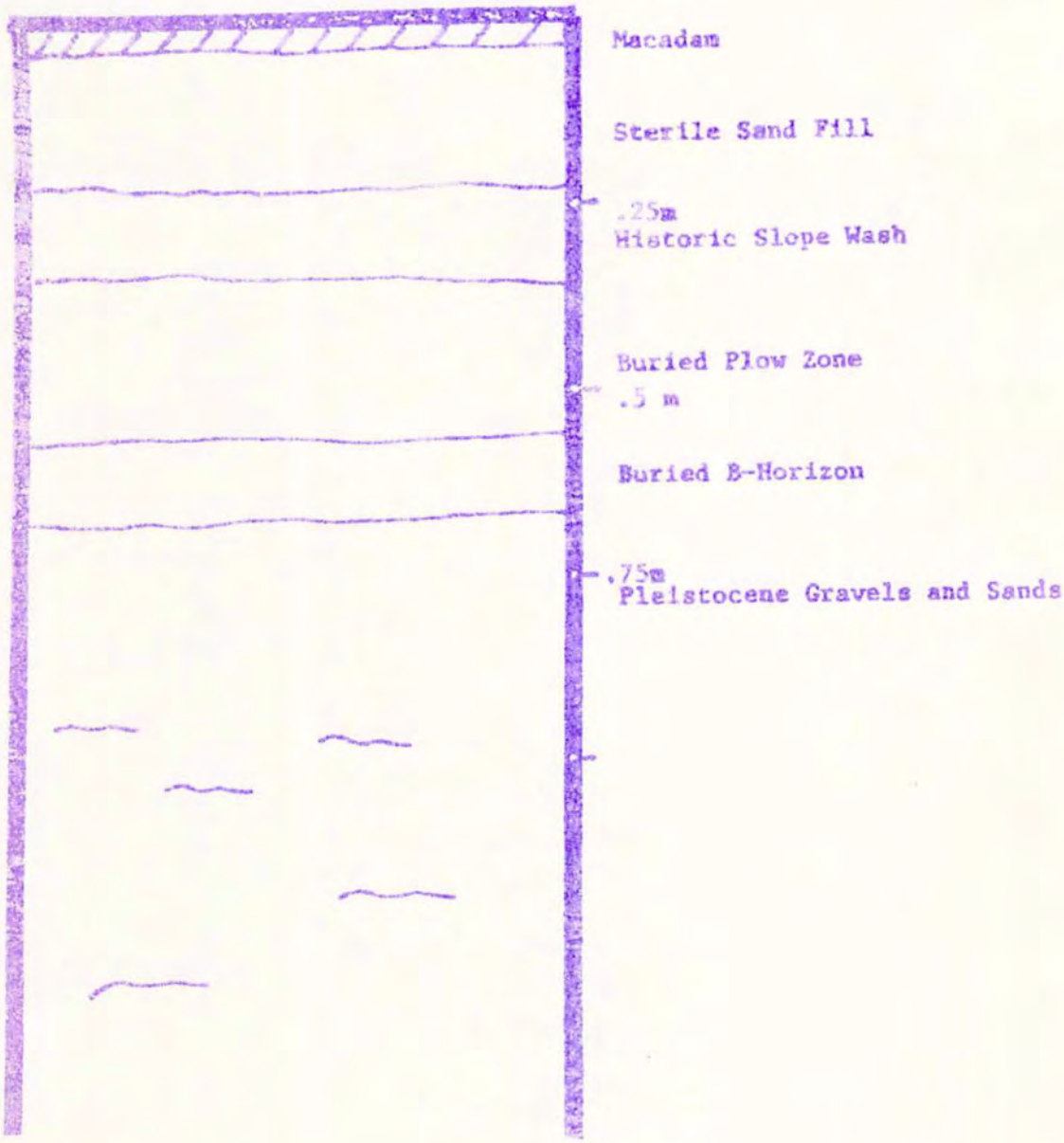


FIGURE 3

ACTIVITY AREAS

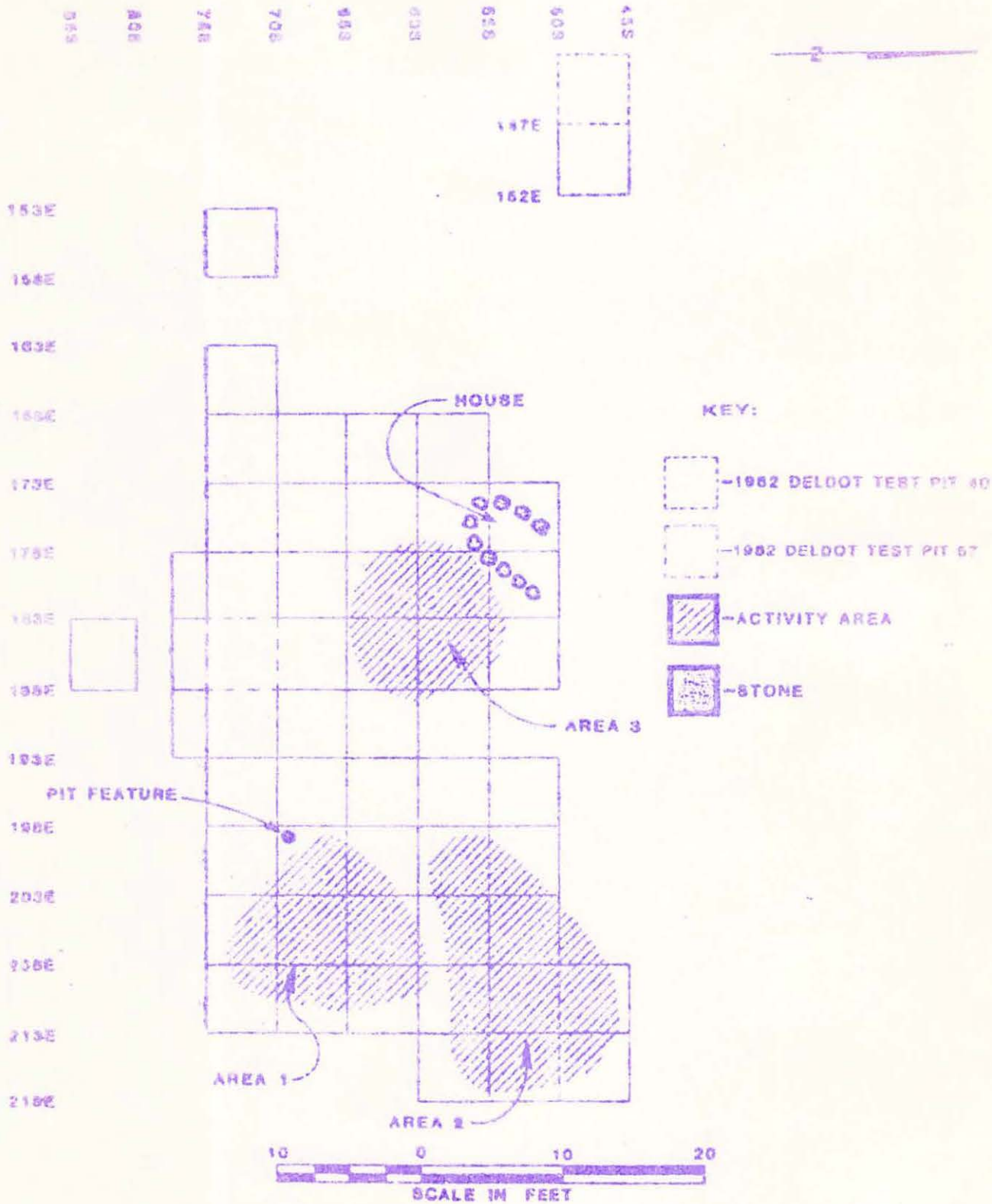


FIGURE 4

DISTRIBUTION of BIFACES and FLAKE TOOLS

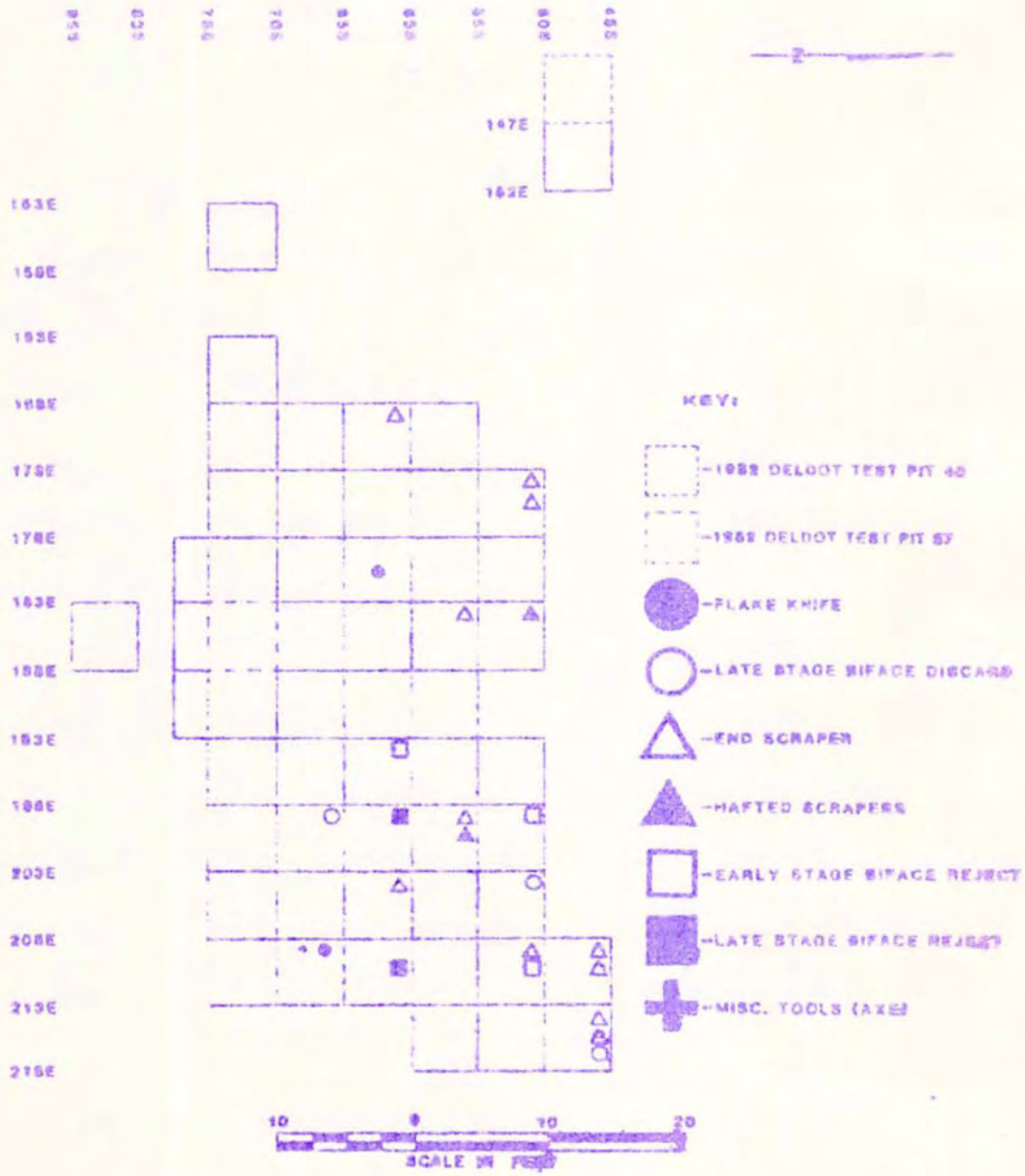
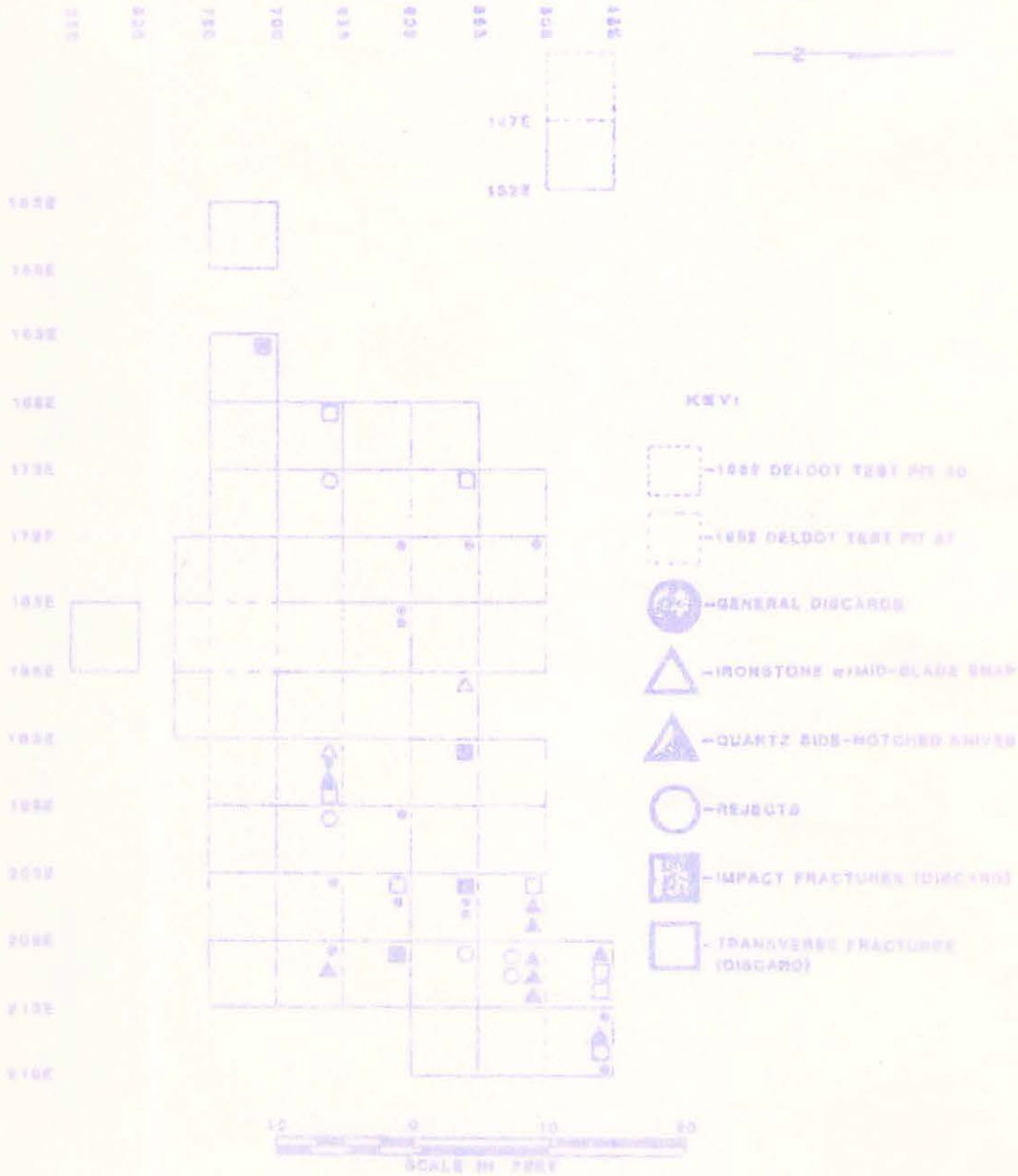


FIGURE 5

DISTRIBUTION of POINTS of VARIED FUNCTIONS



artifact redeposition associated with colluvial activity would not be likely to show such clear-cut activity areas. Therefore, the artifact distributions do not indicate any mixing. In fact, the presence of concentrations of charred hickory nut hulls and seed remains in pits and in general excavation levels indicates very little redeposition of even very small artifacts and ecofacts at the site within the buried soil.

Another line of evidence in the artifact distributions that indicates little redeposition of the artifacts is the fact that many of the broken tools and bifaces could be refitted. Figure 6 shows the distribution of these refitted artifacts. The fact that the refitted artifacts link together the separate activity areas indicates that all three activity areas represent the same occupations of the site. Also, the discrete nature of the artifact associations within the activity areas also argues against multiple occupations of the site. Thus, the data on artifact distributions indicate that the assemblage of artifacts from the Hawthorn site represents a single, short-term occupation of the site. The burial of the site was quick enough to preserve activity areas, but was of sufficiently low energy to not destroy artifacts associations and features. Other sites with similar colluvial depositional histories are known from the Middle Atlantic (Carr 1975).

PROJECTILE POINT ASSEMBLAGE

Within this discrete single-event occupation of the Hawthorn site a variety of projectile point types were recovered. Figure 7 shows the four major types encountered: a generalized side notched form usually manufactured of quartz, a long narrow blade, contracting stem variety usually manufactured from ironstone, a small narrow blade stemmed variety usually made from chert or jasper, and a broad blade broadspear-like form. We would suggest that we could place different specimens of each of these morphological forms in most of the point types illustrated by Evans (1954) in her recent synposis of Late Archaic projectile point types recognized in the Middle Atlantic.

A few sherds of Wolfe Neck ceramics were also found at the Hawthorn site and on the basis of the variety of projectile points forms, especially the broadspear varieties, and the Early Woodland ceramics we would suggest a date of ca. 1200 BC - 500 BC. Processing of radiocarbon dates from the site is still in progress. Thus the variety of projectile point forms described above all co-occurred within a single cultural group sometime at the very end of the Late Archaic period and the very beginning of the Early Woodland period.

FIGURE 6

HORIZONTAL DISTRIBUTION OF REFITTED ARTIF

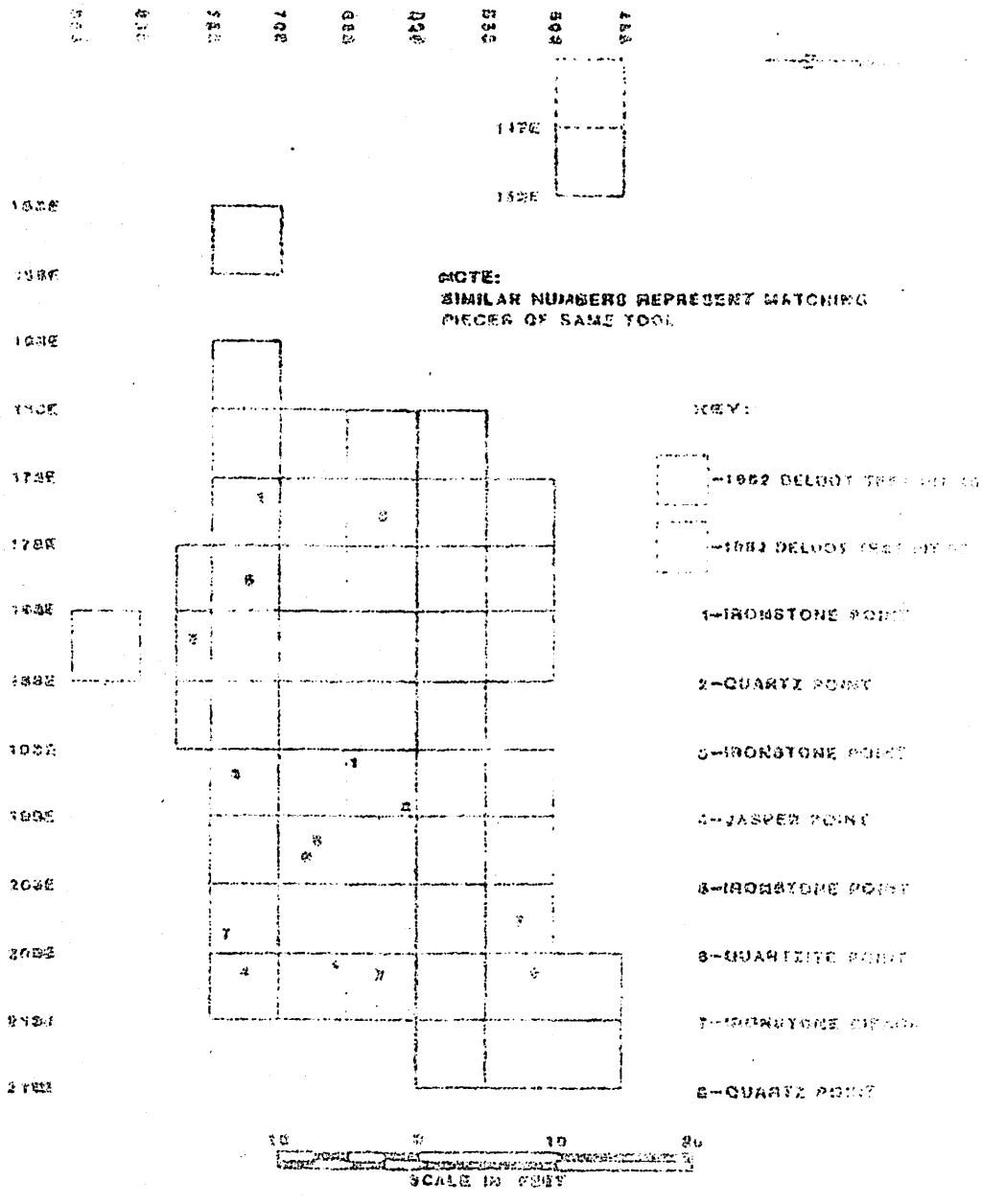


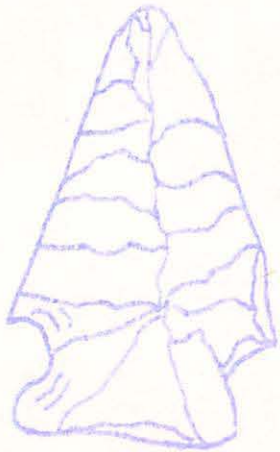
FIGURE 7

BASIC POINT MORPHOLOGIES

Large Stemmed

Side-Notched

Small Stemmed



Broadspear

DISCUSSION

The variety of morphological forms encountered in the single occupation at the Hawthorn site would seem to confound any of the standard explanations of changing projectile point morphology that focus on changes in mental templates through time. However, analysis of wear patterns, through both macroscopic and microscopic analysis, provides an alternative explanation. The quartz side-notched points recovered from the Hawthorn site all shared the following attributes which can be related to their possible function: asymmetrical blade shape, moderate rounding and crushing of edges, striations along the lateral edges that run perpendicular to lateral edges, and rounding of flake ridges perpendicular to the lateral edges. In various experimental studies (Ahler 1971; Keely 1980; Odell 1980; Odell and Odell-Vereecken 1980; Semenov 1964) these attributes have been linked to cutting or sawing motions, perhaps associated with butchering. Asymmetrical blade shape is indicative of repeated resharpening activities. Most of these tools are found concentrated within Activity Area II (Figure 5).

The large, narrow-blade stemmed points of ironstone show a different wear pattern. These tools are characterized by a high incidence (~30%) of transverse medial fractures, and heavy rounding, polishing, and crushing of edges. The experimental wear studies noted above have linked these wear patterns with heavy cutting and prying activities which would be associated with the initial stages of butchering. These tools are also found in Activity Area II, however they are slightly spatially discrete from the side-notched points (Figure 5).

The small, narrow-blade stemmed points showed different forms of wear and were primarily characterized by impact fractures and some polishing on their distal edges. These types of wear are linked with use as projectile points (Ahler 1971). Interestingly, the small stemmed points were found in the few areas associated with tool kit refurbishing in Area III (Figures 4 and 5). The few broadspear-like specimens analyzed showed no consistent wear attributes and may be best characterized as generalized cutting/processing tools.

The fact that these different morphological forms are associated with varied wear patterns and functions suggests that several of the co-occurring "types," which have been thought to be different diagnostic styles, are really different functional tools, not varied mental templates of the same functional tool types. All of these varied projectile point types could easily be manufactured from the same basic biface and their varied forms may only be the result of different production, use and maintenance trajectories (see Figure 8).

The variety of morphology is especially apparent with regards to stemmed points. The numerous Late Archaic stemmed forms noted as different diagnostic types including Bare Island, Lackawaxen, Lamoka, Piscataway, Vernon, Halifax, Holmes, and

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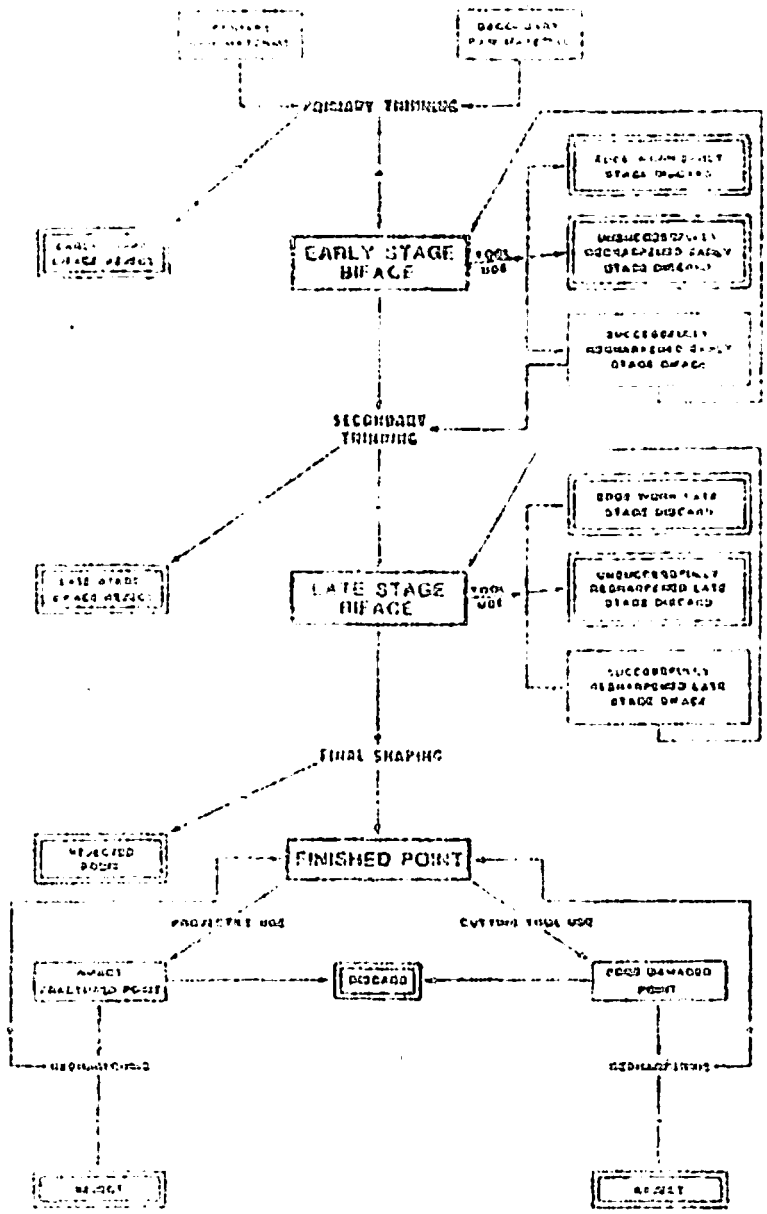
FIGURE 8

TOOL PRODUCTION, USE, and MAINTENANCE ACTIVITIES



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Stewart

DIACHRONIC TRENDS IN PREHISTORIC SETTLEMENT IN THE LOWER PATUXENT DRAINAGE, MARYLAND

by

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(Paper presented at the Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware, on April 15, 1984.)

In recent years, analyses of prehistoric settlement patterns have been an important component of archaeological research in the Northeastern and Middle Atlantic states. The interest taken in studies of this sort stems largely from the premise that information about diachronic change in the frequency, size, and spatial distribution of archaeological sites can be used as an indicator of prehistoric population dynamics, and of the structure of social, political, and economic activities. Given the importance of these analyses in developing and evaluating interpretive frameworks for the archaeological record, it is unfortunate that the regional survey data on which they are based often reflect either known, or unknown and unstated, sample biases.

Recently, an increasing emphasis has been placed on the use of survey methodologies that are designed to recover a more representative sample of the archaeological site population. In 1981, a regional survey of this sort was carried out in the Patuxent River drainage under the sponsorship of the Maryland Historical Trust and the Tidewater Administration, Maryland Department of Natural Resources (Steponaitis 1983a, 1983b). In this paper, diachronic change in settlement patterns for the period between 4000 B.C. and A.D. 1600 will be examined with data from this survey. Two variables will be considered: (1) component frequency; and (2) component size. Before documenting diachronic change in these variables, the survey methodology and the procedures used to define components will be briefly reviewed.

The Patuxent, located on the Western Shore of Maryland, is the longest river contained entirely within the state. It originates in the Piedmont Province north of Washington D.C., and flows south through the Coastal Plain to enter the Chesapeake Bay just north of the Potomac River. However, the study area, as defined for this research project, includes only the southeastern portion of the watershed

(Figure 1).

The study area, which encompasses some 500 sq km, was much to large to be completely surveyed, given the time and resources that were available. Instead, a probability sampling technique, specifically a stratified random sample, was employed in selecting places to survey (Steponaitis 1983a:46-62, 1983b:1-2). This methodology ensured that the distribution and frequency of archaeological sites within the survey area could be evaluated with a data base in which the sample biases were minimized.

After six sample strata were established on the basis of environmental criteria, quadrat-like sample units were delineated within each stratum (Steponaitis 1983a:54,56, Figures 4.6,4.8, 1983b:2-3, Figures 2,3). Thirty-two sample units were examined during the survey. These include 12 randomly selected units, two within each stratum, and an additional 20 sample units that were selected for survey on a judgemental basis.

In order to maximize data recovery, survey was limited to those areas with good surface visibility, specifically cultivated land. Using the boundaries of agricultural fields to define manageable survey tracts within each sample unit, all areas were subject to controlled surface collection along regularly spaced transects (Steponaitis 1983a:64-77). In all, 5.25 sq km were surveyed within the 32 sample units, representing 1% of the study area.

The data recovered as the result of regional survey indicate, not surprisingly, that prehistoric artifacts can be found throughout the entire study area. However, this distribution is not uniform. Instead, artifact clusters of differing size and density, resulting from a wide range of prehistoric activities, are differentially dispersed across the landscape. While surface collections from some of these clusters produced artifacts which indicate utilization during a single archaeologically recognized time unit, the majority of the clusters represent a palimpsest of artifacts dating to many times. In order to examine diachronic change in settlement patterns in terms of component frequency and size, temporally discrete components contained within both the simple and the more complex artifact clusters had to be distinguished.

A very simple method was used to identify the components and define their areas. Information on the spatial distribution of artifacts within each field was available as the result of controlled surface collection (Figure 2a). Using these data, temporally diagnostic artifacts were plotted by collection unit (Figure 2b). Components were then defined to include both the collection units containing diagnostics and all spatially adjacent

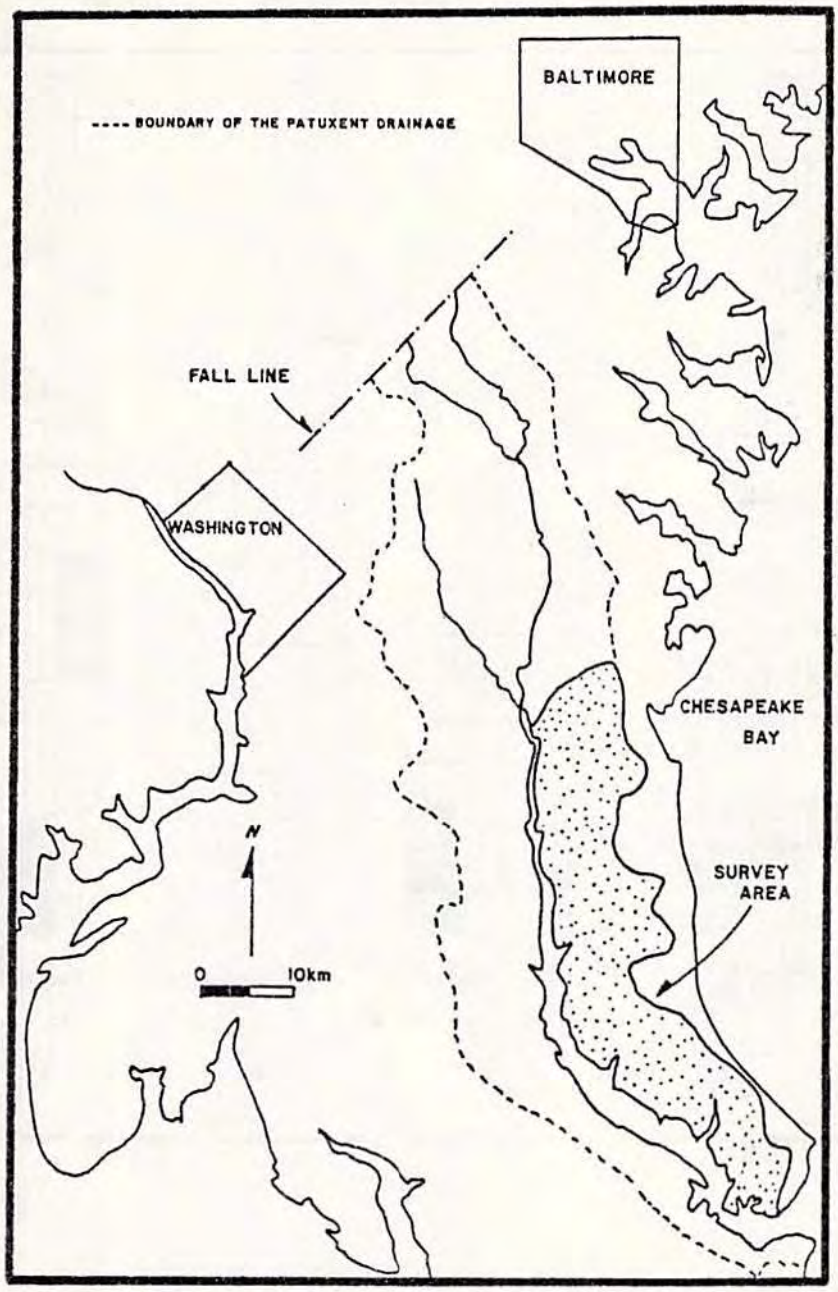

Figure 1. The location of the survey area within the Patuxent drainage.

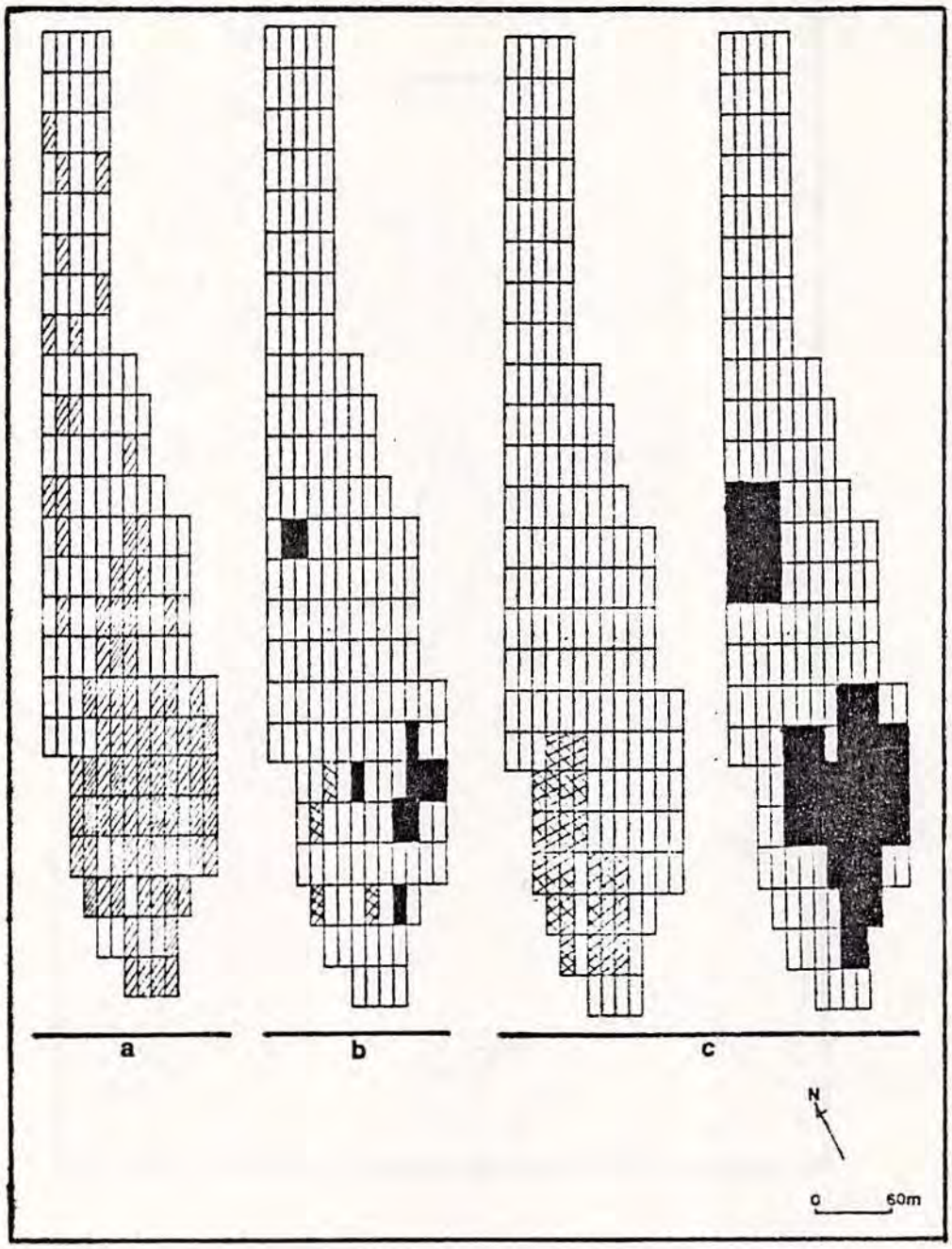

Figure 2. An example of the method used to define components: (a) the spatial distribution of prehistoric artifacts in a field subjected to controlled surface collection is mapped by collection unit; (b) the locations of diagnostic artifacts, in this case dating to the Middle Woodland (cross-hatching) and the Late Woodland (black shading), are plotted; and (c) components are defined to include both the collection units containing diagnostic artifacts and all spatially adjacent units.

units (Figure 2c). The value assigned for component size is equal to the total area encompassed by these collection units. It is important to note that this method is simply a heuristic device, and the resulting values for area are not an absolute measure of component size. However, it is assumed that these values can be used, for comparative purposes, as a relative indicator of size.

Having outlined the nature of the data base, some of the results of analysis can be presented, emphasizing four time periods: (1) the Late Archaic (4000 B.C.-1000 B.C.); (2) the Early Woodland (1000 B.C.-200 B.C.); (3) the Middle Woodland (200 B.C.-A.D. 900); and (4) the Late Woodland (A.D. 900-A.D. 1600). Earlier components, although present in the study area, are very infrequent.

In order to examine change in component frequency, a number of assumptions must be made. Two of these are particularly important: (1) that the frequency and duration of occupation at components remains constant throughout the periods being considered; and (2) that the disposal rate of diagnostics remains constant over time.

In Figure 3, component frequency is plotted by period. In order to observe change between periods, it was necessary to standardize the results to account for variation in period length. Thus, the value given for component frequency actually represents the number of components per 1000 years of period.

Figure 3 indicates a substantial increase in component frequency from the Late Archaic to the Early Woodland, followed by a decrease in the Middle Woodland, and another increase during the Late Woodland. Does this change in component frequency accurately reflect change in prehistoric population size? Although component frequency is often assumed to be positively correlated with population size, there are several questions which must be raised before this untested assumption can be adopted.

The first question is related to the fact that the lower Patuxent is an estuary, developed as the result of post-Pleistocene sea level rise. It is possible that the inundation of the river valley has biased against the recovery of Late Archaic sites located along ancestral shorelines. The degree to which this factor has artificially decreased the frequency of earlier components in the sample can be addressed by using data from only the northern half of the study area, where the horizontal impact of inundation has been much less. When component frequency is calculated for this subset of the data base, the shape of the resulting curve is similar to that documented for the study area as a whole (Figure 4). Thus, it can be assumed that biases against Late Archaic components, at least in

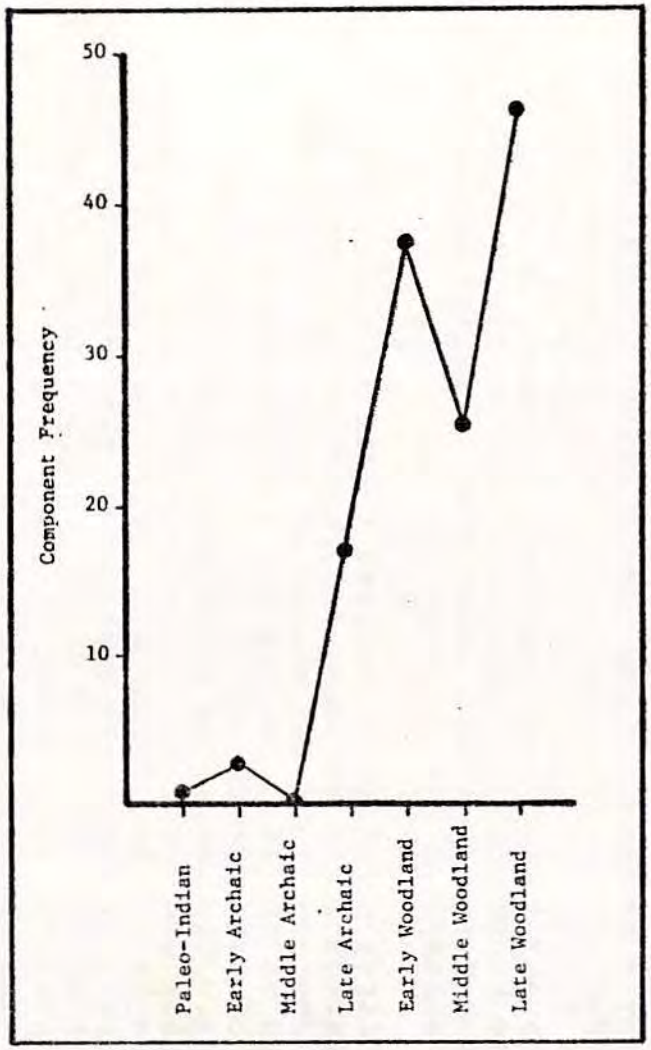

Figure 3. Graph of component frequency by period. The results are standardized to account for variation in period length. Thus, the value given for component frequency actually represents the number of components per 1000 years of period.

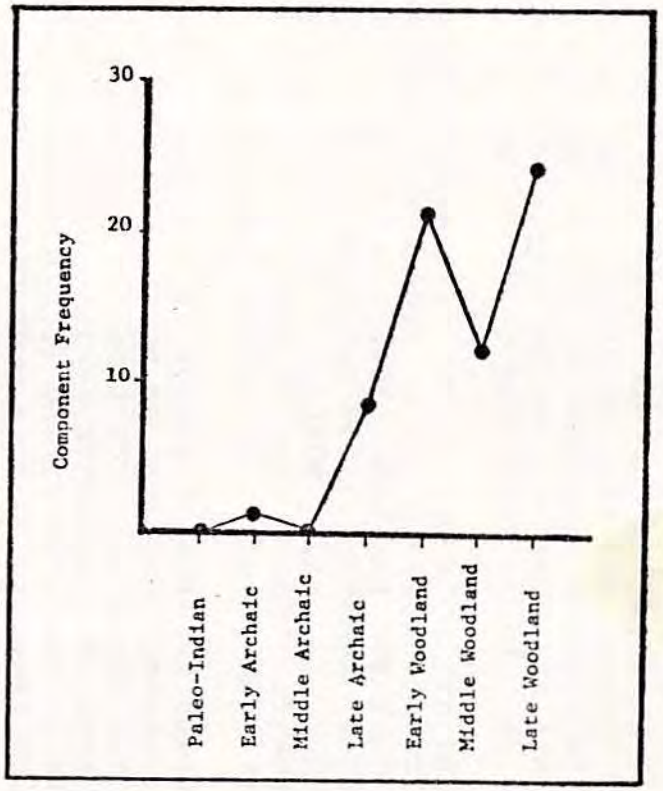

Figure 4. Graph of component frequency by period computed with data from the northern half of the study area. The results are standardized to account for variation in period length. Thus, the value given for component frequency actually represents the number of components per 1000 years of period.

this regard, are minimized.

Although most artifact clusters recorded within the study area appear to be relatively shallow and confined to the plowzone, site burial is another factor which may bias against the recovery of earlier sites. Given the lack of subsurface testing in the present study, it is difficult to control for this variable.

The substantial increase observed in component frequency between Archaic and Woodland times may reflect an increased recognition of more recent components. Archaic components could be identified only on the basis of temporally diagnostic point types. In contrast, Woodland components were identified on the basis of two types of diagnostics, points and ceramics. The degree to which this identification procedure inflates the number of more recent components can be examined by plotting change in the density of points, a temporal diagnostic common to all periods. The curve produced by plotting point density against time still shows an increase from the Late Archaic to the Early Woodland, but one that is less marked than in previous graphs (Figure 5). Interestingly, there is still a dip in the curve at the Middle Woodland, followed by a substantial increase during the Late Woodland.

As noted previously, fluctuation in component frequency has often been considered as a relative indicator of change in population size. However, variation in component frequency may also result from change in social, political, or economic organization. The possibility that component frequency is correlated with these factors rather than population size can be investigated by looking at component area.

If it can be assumed that the total amount of area encompassed by all the components associated with any particular archaeologically recognized time unit is correlated with population size, then the sum of component areas may be a useful relative indicator of change. How that area is divided into individual components is not an issue. When the sum of component areas is plotted against time, the resulting curve is similar to the one generated by plotting component frequency (Figure 6). The one major difference between these two curves is the more limited increase evident between the Late Archaic and the Early Woodland in Figure 6 as compared to Figure 3.

Taken together, these lines of evidence support the hypothesis that population growth occurred within the study area between 4000 B.C. and the contact period. The greatest change appears to have taken place between the Late Archaic period and earlier times, and again between the Middle Woodland and the Late Woodland. Based on evidence other

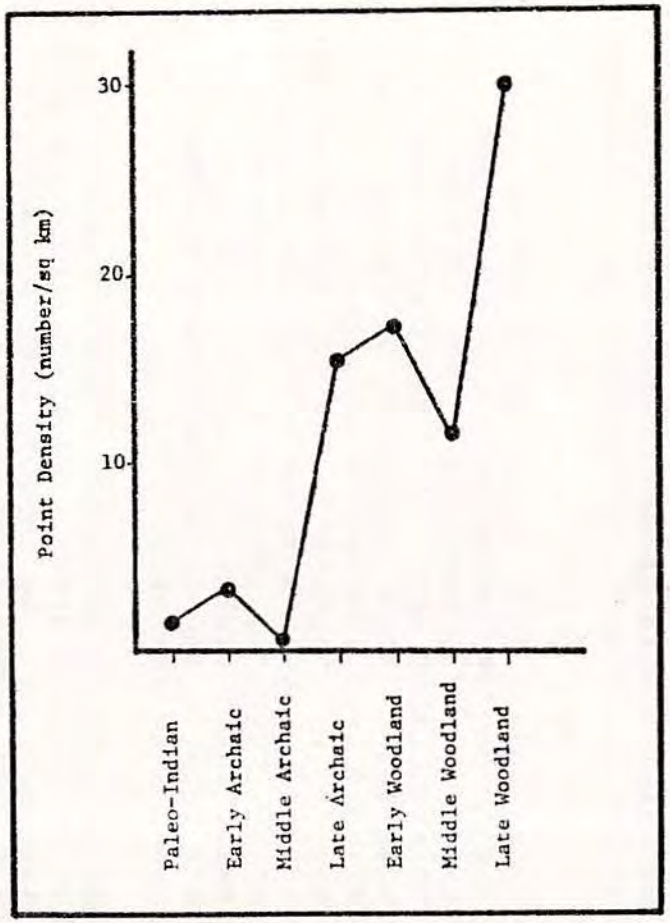

Figure 5. Graph of point density by period. The results are standardized to account for variation in period length. Thus, the value given for density actually represents the number of points per sq km per 1000 years of period.

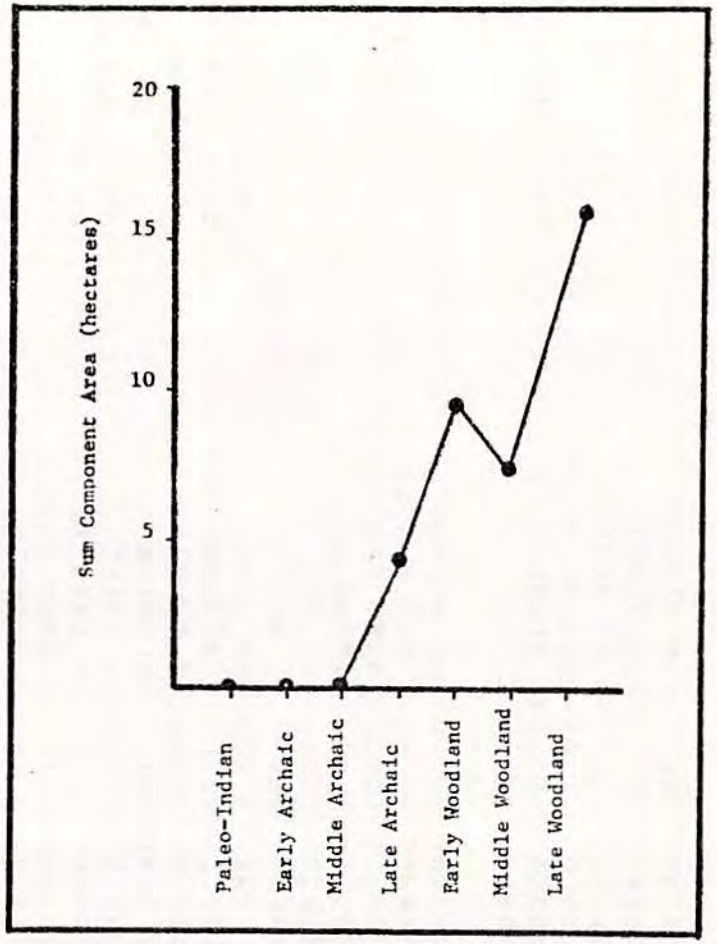

Figure 6. Graph of the sum of component areas by period. The results are standardized to account for variation in period length. Thus, the value given for the sum of component areas actually represents the sum area per 1000 years of period.

than component frequency, the change in population size between the Late Archaic and the Early Woodland may have been less marked.

In contrast, the Middle Woodland appears to be characterized by a drop in component frequency and all the other variables used to monitor population size. In the past, environmental stress, assumed to result from fluctuation in climatic conditions, has been cited as a causal explanation for this phenomenon. For example, a decrease in site frequency in the upper Susquehanna River valley during the terminal Late Archaic and Early Woodland has been explained as a reflection of population decrease linked to a decline in resource productivity (in particular mast production) assumed to have occurred during the transition between the sub-Boreal and sub-Atlantic climatic episodes (Funk and Rippeteau 1977:48-49, Figure 1). However, the growing body of regional survey data from the Northeast indicates that the observed decrease in site frequency is accompanied by a substantial increase in mean site size (McBride and Dewar 1981:45-48, Figures 1-3). Thus, the causal links between climatic conditions, component frequency, and by implication, population size, are not entirely clear.

Environmental explanations for the decrease in component frequency during the Middle Woodland in the lower Patuxent drainage cannot be entirely ruled out. In fact, the period between A.D. 200 and A.D. 700 may have been characterized by climatic conditions warmer and drier than those evident today (Carbone 1976:200). It is also possible that Middle Woodland sites are under represented in the data as the result of some unknown sample bias. However, it is far more likely that the decrease in component frequency observed for the Middle Woodland may be related to a wide range of factors, of which environment is only one. For example, it is possible that the organization of subsistence activities was undergoing a change during this time, from an earlier economy which relied on hunting and gathering of a diverse range of resources to one characterized by more intensive exploitation of a subset of the resource base. There is, as yet, no good evidence for plant cultivation from coastal areas of the Middle Atlantic region prior to the Late Woodland period. However, it has been suggested that cultigens may have played an increasing role in the subsistence strategies of the Middle Woodland subsequent to A.D. 700 (Potter 1982:338). More permanent occupation of habitation loci may have been correlated with change in the pattern of resource utilization (Potter 1982:346). Further, in contrast to earlier times, the Middle Woodland in the lower Patuxent drainage is characterized by the extensive, almost exclusive use of exotic raw materials drawn from western Maryland, Pennsylvania, and New York (Steponaitis 1983a). Acquisition of these materials, either through the

establishment and maintainence of exchange networks or through primary recovery over fairly long distances, may be related to changes in the social or political organization of the indigenous population and/or in its interaction with neighboring groups. Establishing a link between change in social and economic behavior and decreased component frequency is not a straight forward matter. Nonetheless, one explantation, increasing sedentism, comes readily to mind (Potter 1982:346; see also Handsman and McNett 1974:26,31).

Having identified some aspects of change in population size, one might then ask how that population is aggregated into residential units. Change in community size can be evaluated by looking at the frequency distribution of component size. Two important assumptions are required for this analysis: (1) that the spatial dispersion of artifacts reflects group size in a relative but consistent way; and (2) that non-contiguous overlap of contemporareous components is limited.

A box plot is one method which can be used to illustrate the frequency distribution of component size (Velleman and Hoaglin 1981:65-70). Several observations can be made on the basis of the box plot illustrated in Figure 7. First, the median value for component size remains fairly constant over time. The mean value for component size also fluctuates only slightly from the Late Archaic to the Middle Woodland. However, in the Late Woodland, the mean value shows a sharp increase. Likewise, the boxes, which enclose approximately 50% of the components (the upper and lower boundaries of the box being defined by the hinge values of the distribution), remain within a very similar size range until the Late Woodland when there is a sharp shift upwards. With the exception of a single Late Archaic component, a gradual increase in maximum component size over time is evident. The frequency of larger sites also increases. This trend is perhaps more visible in histograms of component size (Figure 8). Figure 8 also indicates that there is an increase in the bimodality of component size from the Middle Woodland to the Late Woodland.

To summarize, the following trends have been observed in the data: First, there is an increase in component frequency and all other variables used to monitor population size for the period between 4000 B.C. and A.D. 1600, with the exception of a dip during the Middle Woodland. Second, mean component size remains fairly constant until the Late Woodland, when it increases sharply; Third, with the exception of a single Late Archaic component, maximum component size and the frequency of larger components increases over time. Fourth, bimodality in the frequency distribution of component size becomes more marked in the Middle and Late Woodland.

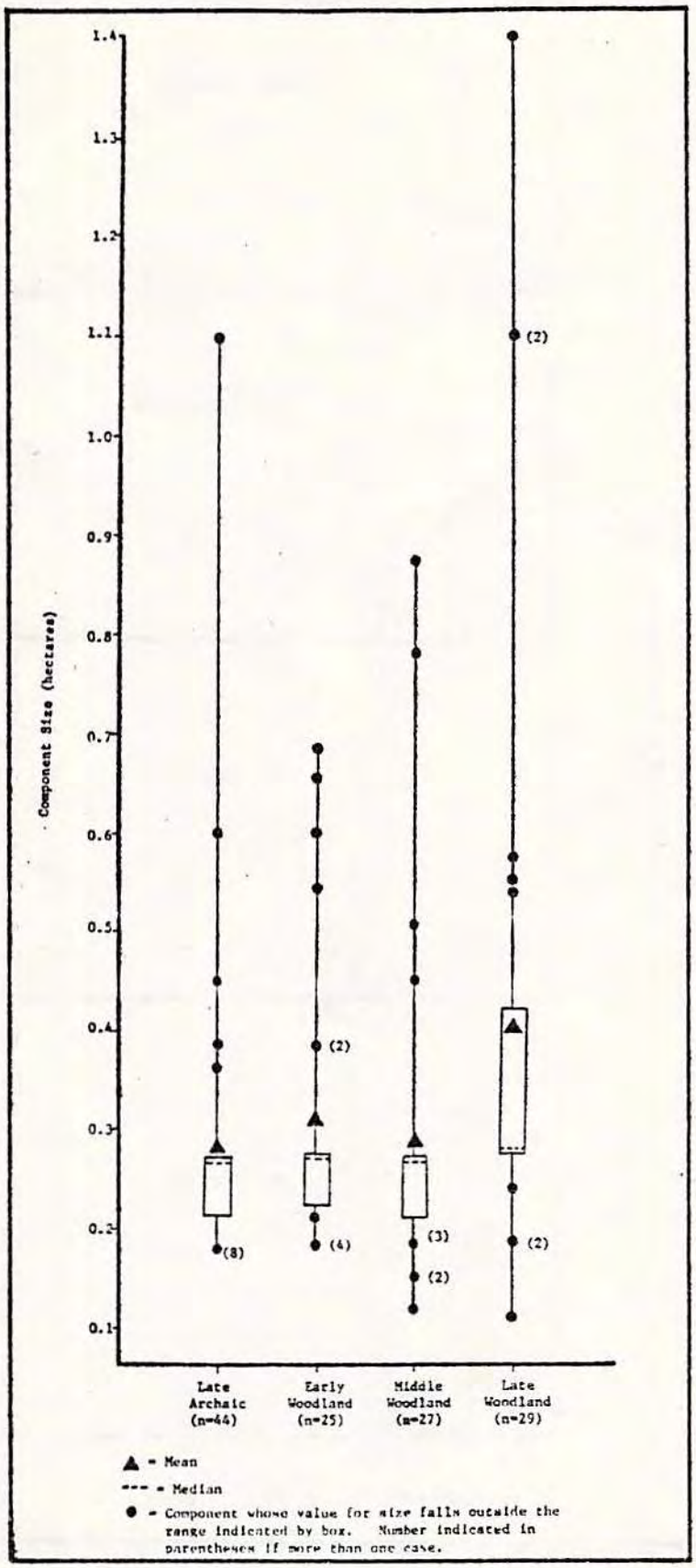

Figure 7. Box plot of the frequency distribution of component size by period.

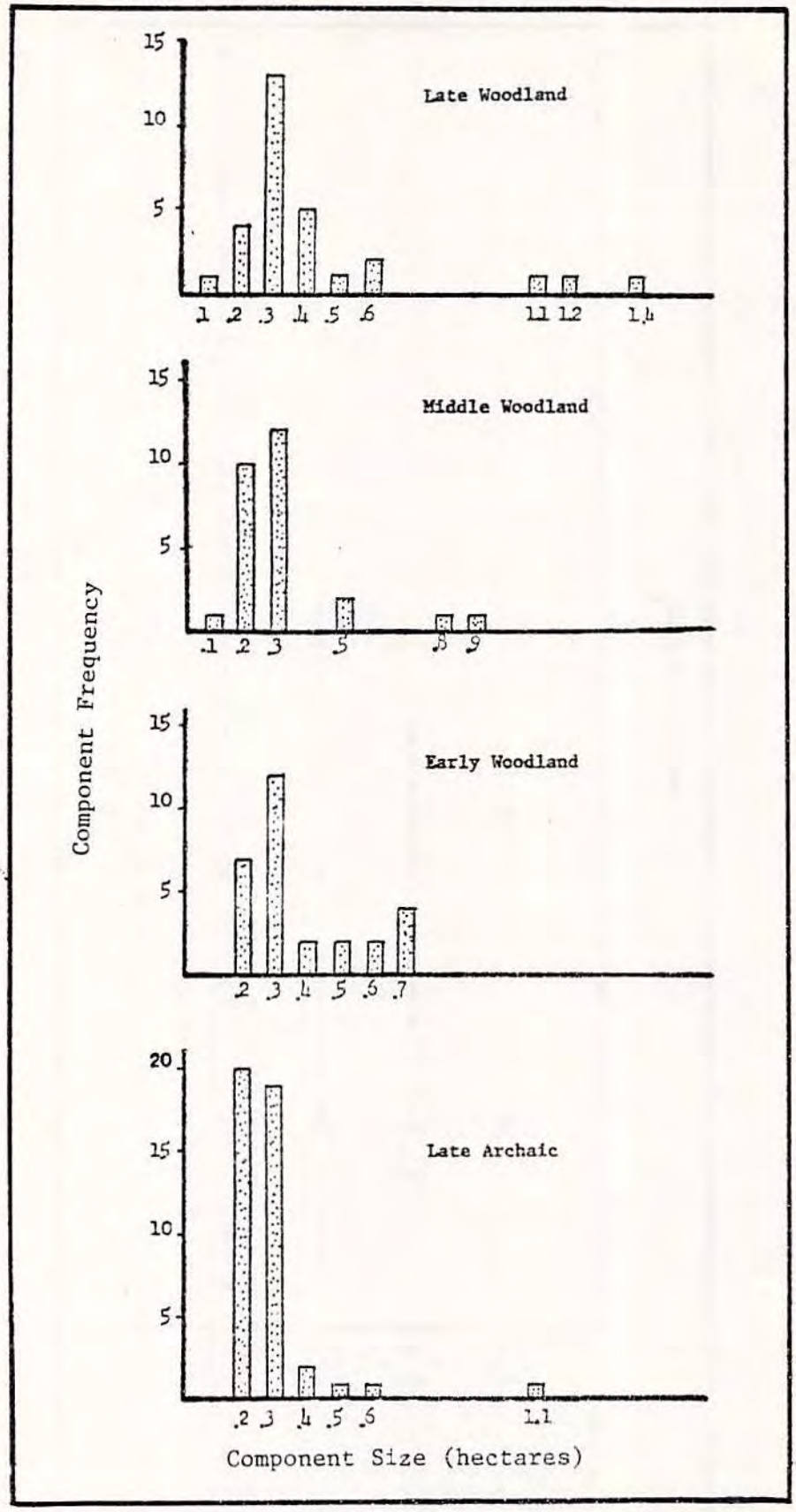

Figure 8. Histograms of component size for the Late Archaic, Early Woodland, Middle Woodland, and Late Woodland.

It can be argued that these changes in the frequency and size of components reflects not only population growth, but also change in organization. The earlier pattern, characterized by a high frequency of small sites, evident in the Late Archaic and to a lesser degree in the Early Woodland, may indicate a smaller, more mobile population organized into small residential or work groups. The single larger Late Archaic component may reflect periodic aggregation of the population into larger residential units. If Binford's (1980) "foraging" and "collecting" strategies can be viewed as two points along a continuum of hunter-gatherer behavior, then the pattern observed in the Patuxent might be considered to be closer to the foraging end of the spectrum. This conclusion has been tentatively supported by the results of a still ongoing analysis of the frequency and diversity of artifact types within assemblages. On the whole, there appears to be only limited differentiation between components dating to the Late Archaic and the Early Woodland, at least on the basis of surface collections of non-perishable artifacts. A generalized and opportunistic pattern of resource acquisition is suggested.

In contrast to earlier times, the Middle Woodland demonstrates an increased frequency of somewhat larger sites, in the apparent absence of population growth. It is possible that this pattern is linked to the increasing importance of more permanent habitation loci. Analysis of assemblages dating to this time indicate functional differentiation between components. The assemblages associated with most of the components appear to reflect a wide range of activities. In other cases, activity specialization, recognized in components with a low diversity of artifact types relative to the total number of artifacts, is apparent. These data may indicate a more diversified and complex settlement pattern in which decreased population mobility, larger group size, and increased specialization of activities (carried out in areas peripheral to habitation loci) play an important role. This pattern, coupled with a substantial increase in population size appears to continue into the Late Woodland.

In conclusion, the data which have been presented form a basis for evaluating various hypotheses about diachronic change in settlement patterns. Until very recently, these hypotheses have been employed as explanatory frameworks without being tested in a critical or systematic way.

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Stewart

Trade: The View from the Valley -- Comments presented at the Middle Atlantic Symposium on Trade, Rehoboth Beach, Delaware, April 1984

At all the local trading fairs,
Minnehontas could be seen plying her wares.
I can still hear her, as if it was only yesterday
cajoling each young brave as he went along his way,
"For some New Jersey argillite,
I will hold you tight.
For Pennsylvania yellow flint
you get a longer stint.
And if you have Maryland rhyolite
I will stay all night.
But if you've only marginella,
forget it fella."

My role in this symposium was supposed to be that of a discussant. As usual, I have no advance copies of the papers. Therefore, I have taken the liberty of arming myself with my own presentation. My initial Middle Atlantic encounter with "non-local" artifacts came when I took Thunderbird site jasper to an Eastern States Federation meeting in 1971, and was told that it was Pennsylvania jasper, with some even venturing to specify the exact quarries. I soon put such nonsense to rest by pointing out that this was from a local outcrop near Front Royal, Virginia, and subsequently noted that jasper outcrops occur at various points from Pennsylvania to northern Alabama. I am proud to be able to stand here today and inform this audience that approximately 75% of my colleagues, particularly those from the more northerly areas, still claim all jasper comes from Pennsylvania, and are even more confident about the locations of other chert sources. 24.5% of the others, who all happen to live and work south of Front Royal, are convinced that all jasper comes from the Flint Run outcrops.

Somewhat less facetiously, but no less sarcastically, in the matter of lithics which are presumed to be non-local, I would suggest that the naivete displayed by archeologists about things geological is paralleled only by some of the questionable classification schemes and interpretations of geologists. Two examples of this should suffice to underline my point. First, a geological map of the Front Royal quadrangle which required months or years of specific field studies failed to mention the local jasper outcrops. I can only presume this is because jasper was not something which was of concern to the geologists involved. Second, in my relatively recent involvement in the Savannah River

Piedmont, intensive local field studies by archeologists and their companion geologists resulted in virtual non-comparability with seven different lithic classification schemes by seven different investigating teams with the only common element being quartz and the prefix "meta-" on most, but not all, other lithic categories. One interesting fall-out of this investigation was the discovery that not all chert along the Savannah River was "Coastal Plain" or "Ridge and Valley" and that there are indeed localized South Carolina-Georgia Piedmont sources.

Having worked in the Shenandoah Valley where lithics are tremendously varied, I am most appreciative of the difficulty in attributing chert to specific sources. In examining collections, I have seen everything from "Onondaga chert" to "Knife River flint". In examining debitage, often with cobble cortex, I have seen virtually the same range. I have often thought that it would be worthwhile to visit all the known sources of chert in the Valley, gather samples, put them in boxes, and visit archeologists around the country seeking identifications. It would not be surprising if I was able to establish one of the world's great trade networks with its focal point, the Northern Shenandoah Valley.

The lithics in other areas are only slightly less varied. I need hardly caution that the Coastal Plain is laden with secondary cobble and pebble sources which reflect river and marine transport and that the types of lithics which can be present will be a product of the lithology through which a particular river system flowed, and that these can be further transported by oceanic currents and deposited on old marine terraces. It would also seem unecessary to remind this audience that the current mouths of rivers are not necessarily the prehistoric mouths, or that there are ancient rivers which are no longer extant. I would also expect any competent investigator to be aware that the present topography of the Coastal Plain is not really representative of the past topographic situation and that alluvial, colluvial, and aeolian sediment transport has resulted in a false leveling and possible masking of cobble and gravel deposits. Of particular importance here is the infilling of local streams and rivers which, in past periods of lowered sea level, may well have exposed some of these deposits.

For those of us who work in non-Coastal Plain environs, we must also be aware that most Ridge and Valley and Piedmont river systems have cut a series of terraces which will often contain cobbles and gravels left behind when that part of the valley was the bed of the river. These, again, will reflect the lithology through which the river flows or has flowed. Rivers such as the Delaware, Susquehanna, Potomac, James, and Roanoke flow through most of the Middle Atlantic's varied physiographic provinces, and will contain the most diverse lithic materials. Piedmont or Coastal Plain heading streams will generally contain less diversity, except

in the case of Coastal Plain segments which cut across older deposits and have served as tertiary transporters.

Rhyolite is almost equally problematical. It occurs not only in the Blue Ridge of Maryland and adjacent Pennsylvania, but also in the same mountain system in northern North Carolina, where it is transported westward in cobble form by the New River. Various types of rhyolite have also been noted for the Blue Ridge outliers in the North Carolina Piedmont and further east in the Carolina Slate Belt there is a bewildering array of rhyolite and argillite, as well as a range of other material which seemingly defies easy classification but was extensively utilized and can be confused with a variety of materials.

Lithic material is not all that is discussed when non-local items are imputed to trade and the analyst is probably on safer ground when dealing with artifacts made of such material as marine shell, copper, mica, steatite, slate, shark's teeth, or even finished items specific to a certain region. Even here, however, the archeologist must walk with caution, for many of these raw material categories have a much wider distribution than was previously thought. For instance, Williams and Thomas (1982) raise the possibility of copper and mica in New Jersey, historic copper mines were numerous in the Blue Ridge, outcrops of steatite occur in a number of areas of the Piedmont, slate is common in the North Carolina Piedmont and probably Virginia, and mica occurs all over the Piedmont.

The point of all of this is to encourage caution less we lead ourselves and our colleagues astray. Having belabored this, I will turn to some observations from the Northern Shenandoah Valley. The initial evidence of non-local material occurs in the form of lithics: in this case, rhyolite at the Early Archaic levels at Thunderbird and Fifty. It is presumed that the source is in the Maryland-Pennsylvania Blue Ridge. The earliest definite association is with Side Notched points which, in our sequence, fall between Palmer-Kirk Corner Notched and Kirk Stemmed and Serrated, or somewhere between 7500-7000 B.C. A cache containing two hand sized slabs of rhyolite was found at Thunderbird in probable association with a point which was the typological equivalent of Amos, but may simply be a resharpened Palmer/Kirk. This may push the local presence of rhyolite slightly earlier.

It is evident this rhyolite was considered important because, along with other objects, it was cached, although never reclaimed. Its value is also expressed in it being held on to in the midst of a wealth of jasper. The points which are made of rhyolite, most but not all of which come from the nearby 50 site, show use and curation but not exhaustion. Given my interpretation of the 50 site as a satellite support site of Thunderbird, these rhyolite

points apparently still had some life left and were in use while these populations were encamped at Thunderbird. At neither site is there any rhyolite debitage, so it can only be assumed the points came into the area already completed and used to varying degrees. It is, therefore, not likely that they arrived in the area through trade, but instead reflects the extensiveness of the Early Archaic exploitive rounds, or at least one of the routes along which they traveled.

The "pseudo-blanks" may have come to Thunderbird through trade, or could have been brought in as part of the baggage being carried by an individual who passed through the rhyolite quarries. It is difficult for me to accept trade at this early period in time, but it is equally difficult for me to see an individual carting two pieces of rhyolite over a distance approximating between 50-70 miles. Still, I favor this interpretation, as opposed to trade, because the rhyolite points do show signs of use and curation, but of the kind that seems short term given the distance involved. If this is true, then the time between movement from the rhyolite to the jasper quarries could have been quick, thus accounting for the presence of the "pseudo-bifaces". Other explanations such as arming themselves with numerous rhyolite points and blanks, or unsuccessful hunting are also alternatives.

In conversations with William Boyer of James Madison University, he informs me that rhyolite side notched and stemmed variants of Kirk occur in some numbers in the Gathright area of the upper James drainage. He is by no means wedded to my idea of extensive exploitive rounds for Early Archaic populations, pointing out that this would not really be necessary for successful adaptation in the Blue Ridge environment, and he would not dismiss trade. For the reasons already noted, I cannot see an exchange network at such a low level of population density, and Boyer does admit that the rhyolite outcrops of Mount Rodgers are not too far beyond the 50-70 mile exploitive range suggested for the Early Archaic in the Front Royal area. This, of course, need not necessitate a continuous range, but simply a series of movements which took one or more social units between quarry sources at relatively short intervals. Given the apparent fluidity of larger group membership at this time, this is not difficult to envision.

For a comparison, in a recent draft of a synthetic interpretation of work in a portion of the Savannah River Piedmont, I was able to note ranges of greater than 80 miles from the Paleoindian to the Stanly phase of the Middle Archaic along the Savannah River corridor. Much more localized patterns prevailed for the remainder of the Middle Archaic. This was, of course, in the Piedmont which may have been qualitatively and quantitatively different in terms of productivity than the Ridge and Valley, although I do not think this is quite that simple. More to the point, trade along the Savannah River is not really indicated until the Late Archaic which, as we

will see, almost exactly parallels the Shenandoah Valley.

Other non-jasper artifacts show up at Thunderbird, at the Paleoindian as well as the Early Archaic levels. Some of this is from local chert cobbles, since debitage with cobble cortex is present. Most of the remaining non-jasper artifacts are heavily curated discards which were replaced by jasper during tool kit replenishment activities. This further suggests to me that at least some of the rhyolite was brought in as the result of rather hurried trips between Thunderbird and the Maryland/Pennsylvania area.

Whether or not my interpretation is correct, it does bring up the point that artifacts of non-local raw materials, once demonstrated to be non-local, cannot automatically be assumed to have been traded. The rounds of hunters and/or general foragers can take them through a variety of lithic materials which, if they carry artifacts or material away to another area, become non-local when they are deposited in their new location. I suspect that the frequency of occurrence of this will vary through time with changes in exploitive ranges, environment, population density and subsistence with this type of artifact transport decreasing in importance through time as these other factors change.

Rhyolite is also not uncommon during the first part of the Middle Archaic as a number of bifurcate points of this material have been observed. These are invariably extensively altered through resharpening and discarded since they were beyond any further curation. This suggests exploitive rounds at this time similar to those of the Early Archaic. By the time Morrow Mountain points appear, my impression is that rhyolite use in the Valley area, exclusive of the very northern Valley close to the outcrops, all but disappears. Instead, there is extensive use of a variety of local material, especially on a propinquity basis. Curation also becomes unimportant except during the part of their rounds which took them into lithic poor areas in the mountains.

The first reasonably clear-cut evidence of trade comes during the Late Archaic with the appearance of steatite bowls. I am unsure whether this can be associated with the early part of the Late Archaic, or whether is is after 2,000 B.C., since I know of no local associations of steatite with what are presumed to be the slightly earlier large Savannah River broadspears. At the Corral site across the river from Thunderbird, Susquehanna Broadspears of rhyolite, and steatite bowl fragments have been found. This is currently the southernmost extension within the Valley of a pure component of this type and, as far as I am aware, the southernmost extension of Susquehanna Broadspears of rhyolite.

At present, I consider the Susquehanna Broadspear manifestation in the Valley to represent a migration and it is probable that some

of this non-local material was brought with them during this initial spread, but much of it must have been subsequently acquired through an exchange network that extended back to the Potomac Piedmont homeland. Boyer's 1975 excavations at Dry Run, a site located directly across the river from Corral, produced steatite bowl fragments with unknown point associations. Eighteen rhyolite flakes and an extensively worked amorphous stemmed point of rhyolite was recovered. An analysis of the steatite provided by the University of Virginia indicated two possible sources, one in Albemarle County, the other in nearby Greene County (Boyer 1976), which complicates this picture somewhat.

It is evident that not all steatite in the Shenandoah Valley, particularly to the south of the known distribution of Susquehanna points, is associated with these groups. Some must be linked with groups manufacturing the Savannah River derived points, but I know of no direct associations. If this was an exchange network, it was probably different from that of the Susquehanna components given the lack of any other evidence of interaction between the two traditions. It is, of course, not beyond comprehension that, rather than trading for this material, it was procured directly through quarry visits.

Returning to rhyolite Susquehanna Broadspears, they are common in collections from north of the Front Royal area to the mouth of the Shenandoah near Harpers Ferry. Bifaces or preforms as well as relatively unmodified slabs of rhyolite also become common along this same corridor. It is unclear whether all of this is associated with Susquehanna Broadspear components, but the juxtaposition of both in surface sites, all unfortunately multi-component, suggests this. This would indicate that at least a portion of the rhyolite was being transported in biface, preform or slab form. Unfortunately, no sites of this time have been excavated or systematically collected which would show the range of debitage.

Movement of rhyolite or steatite by whatever mechanism drops out during the Early Woodland, at least rhough the central and southern portions of the Valley. Locally, Early Woodland point styles are not clearly known: both small stemmed and small side notched, some resembling Orients made of local material, may occur. In the adjacent Potomac Piedmont, rhyolite use continues, probably procured through quarry visits or else through localized exchange systems, while point styles continue in the Susquehanna-Drybrook-Orient tradition. This indicates that the links which existed in the Susquehanna manifestations between the Shenandoah Valley and Potomac Piedmont were broken prior to 1,000 B.C. Steatite tempered ceramics in the Marcey Creek series do occur as far south as Port Republic and Bath County along, paralleling and even exceeding, the older distribution of the Susquehanna Broadspears. Thus, while the exchange network dissolved and stylistic drift occurred, the

technological innovation of ceramics quickly bridged any gap which existed. After the development of ceramics, steatite bowls lost their functional value and rapidly dropped out of the technological inventory, occasionally being recycled into temper. This whole set of changes are a further indication that the transition from the terminal Late Archaic to the beginning Early Woodland involved something more than the simple addition of ceramic technology to a Late Archaic base.

After what appears to be a dormant period in trade for anywhere from 600-700 years, exchange once again comes into the Valley archeological record, this time in the early Middle Woodland Stone Burial Mound Complex. Unfortunately, the only excavations or views of habitation sites of this period, from ca. 500 B.C. to A.D. 100-200, have been exceedingly narrow windows, so we have only minimal information on the artifact content of the settlements. Given the general picture elsewhere, however, I am assuming that most of the non-local items wind up in the graves contained within the mounds. Since it is evident that the burial mound part of this has to be viewed over a period of time from sometime in pre-Hopewell Adena into post 200 B.C. Hopewellian, it is difficult to easily categorize the artifact complex. This is compounded by limited systematic excavations.

With this caveat in mind, some things can be noted. Non-local items do occur. They include such things as blocked end tubular pipes, platform pipes, projectile points/knives/bifaces, copper items, gorgets, and bladelets of non-local materials. These items, as far as can be determined, are relatively rare, although there does seem to be an increase in quantity toward the later end of the complex. Throughout, a significant portion of the artifacts included in the mound graves, especially projectile points and cache blades, are made of local or nearby materials. These points include a diversity of types, some of which probably reflect earlier and non-associated components, others of which fall into more standard, if locally interpreted, Adena and Hopewellian forms.

The western Virginia Stone Burial Mound Complex is, in part, temporally concurrent with Delmarva Adena manifestations in the eastern coastal portion of the Middle Atlantic and there are some rather close as well as vague stylistic similarities. The closest relationships are, however, westward across West Virginia where numerous stone burial mounds dot the landscape of the major drainages ultimately merging into the earthen burial mound complexes of the Ohio Valley. The Shenandoah Valley manifestation represents the maximum eastward extent of the burial mound complex in the Middle Atlantic. This may in some way have influenced the construct of the artifacts which were interred in the mound as material indicating long distance trade is minimal, while medium distance material is somewhat more frequent and short distance or local material

is maximal. Certainly, while it is judgemental, the stylistic treatment of the points known to be included with the burials seem to be poor imitations of the more exotic productions of these styles in funerary settings elsewhere. It is possible that these were made purposefully for interment with the dead in much the same manner as some of the Gulf Coast pottery in Swift Creek and Weeden Island mounds, or it is equally possible that these people did not have access to the "real thing".

It is tempting to view these mounds as "distant, but poor, cousins", but the numbers of mounds, their occurrence in clusters, and the distributional resemblances to more westerly burial mound complexes indicates the social systems were equally as complex, so this may not be correct. While I am not normally given to such theoretical maundering, I am intrigued by a recent discussion by Upham (1982) on trade and symbolic activity. Distilling the ideas from a number of people, Upham notes that "long distance exchange" is one of the essentials in the development of complex societies. Discussing Kent Flannery's work in particular, Upham states that "long distance exchange transactions were strictly managed by the ruling elite and were intimately linked to the perpetuation of status systems and to the spread of esoteric cosmological beliefs". In this case, the items exchanged are assumed to be symbols that "not only signified the wealth and power of the ruling elite, but also embodied sacred and esoteric religious concepts".

Now I will readily admit that if an archeologist searches long and hard enough, or simply idly reads that an explanatory model can be found for anything, even if they have to go to Melanesia. I will also point out that Flannery's work deals with the Olmec and cultural manifestations in the Oaxaca Valley, which were almost certainly at a different level of complexity than that of the early Middle Woodland of the Shenandoah Valley. Nevertheless, the contemporaneity of the trade items, the burial mounds, and their tendency to cluster, is an indication that all this was linked and the acquisition of the non-local items transcended simple exchange. This, of course, does nothing to explain why these people should ever become involved in this in the first place. I do think, that it certainly implies a fundamentally different level of socio-cultural complexity than existed in the preceding Early Woodland. There must, however, be some indications of a transition from the one to the other and I suspect that once habitation sites of the appropriate time period are excavated, one of the initial indicators of this transition will be participation in an exchange network.

At the end of the first phase of the Valley's Middle Woodland, arbitrarily set at A.D. 200, the burial mounds disappear and so, apparently does trade. This has to be stated with caution since our windows into sites between A.D. 200-900 are minimal. Currently, this does seem to be the situation, and as best as can be determined,

this 700 year period is marked by an inexplicable inwardness. This, of course, contrasts markedly with what was happening in the Virginia-Maryland Coastal Plain during the Mockley phase of the same general time span.

By A.D. 1000-1100, the situation changed and non-local items appear once again. To date, all we have definitely been able to point to as trade items are ceramics. Two sources of trade are evident. One is from the south and includes limestone tempered ceramics, which I classify as Radford. From the north or northeast comes decorated ceramics in the mold of Bowmans Brook and Overpeck Incised. The former I interpret as associated with the northward expansion of populations making limestone tempered pottery and the first stage of interaction prior to expansion into the Valley and subsequent coexistence and ultimate assimilation of the local Albemarle tradition into the blended series known as Page. The latter is simply an indication of the widespread nature of the contacts that seem apparent in a number of areas during the early part of the Late Woodland.

To the south, in the extreme southern part of the Shenandoah Valley and further south are accretional burial mounds. Marine shell beads and other items of shell are, as far as I can determine, the only objects of trade. In this instance, the long distance exchange model for the Middle Woodland does not seem to work, or at least in the same way. There is no indication of ranking or differential access to non-local items, but certainly there is a significant change in social or political organization, for it would appear these mounds represent focal points for a number of different hamlets, suggesting organization at the tribal or confederation of hamlets level. The range of dates from A.D. 1050-1350 is somewhat bothersome and I am inclined to feel that the later end is more nearly correct.

Marine shell beads also appear in a number of Dan River sites in the Inner Piedmont of south central Virginia. There may also be trade in non-local lithics, perhaps even completed projectile points. Also hinted at in these sites is a greater complexity than a hamlet centered level of organization as some have produced associated single "long houses" which do not seem to be dwellings and could possibly be council houses.

Marine shell beads were also recovered at the 17th century Cabin Run village. Neither this site nor any of the other excavated Keyser component sites in the Shenandoah Valley have produced Euroamerican artifacts, a fact which suggests abandonment of the Valley under Susquehannock and/or Iroquoian pressures at some time around the middle of the 17th century, or, at best, very low level trade.

In summary, non-local lithics occur in the Shenandoah Valley sites as early as the Paleoindian period. In the Paleoindian period, this is in the form of heavily curated tools which were discarded at the quarry base camp and replaced during tool kit replenishment activities. In the Early Archaic, rhyolite projectile points as well as some cache material are present. The absence of any rhyolite debitage and the curation on these points is interpreted as a reflection of the extent or track of the exploitive rounds. This same pattern continues into the early Middle Archaic in bifurcate points, but disappears during the Morrow Mountain phase. During the remainder of the Middle Archaic, with one exception, non-local lithics do not occur. The exception is in lithic poor locations where tools were transported during exploitive rounds. This material, however, is local in the sense of being available within a distance of three or four miles. This pattern is essentially similar to the earlier one, but there was an obvious reduction in territory.

Clear-cut evidence for exchange first comes in the latter part of the Late Archaic. Bowls made of steatite work their way into the Valley and are associated with two distinct traditions: evolved Savannah River and Susquehanna Broadspears. Trade probably accounts for their presence in the former, although quarry visits and subsequent transport cannot be discounted. In the Susquehanna components, rhyolite projectile points as well as stone bowls occur. Part of this was probably brought in through a migration, with the remainder coming in through interaction with people in the previous homeland. The numerous bifaces and performs of rhyolite which occur in many collections can probably be attributed to this period.

Exchange networks break down at the beginning of the Early Woodland and neither steatite nor rhyolite finds its way into the Valley (at least as far as we can tell from present evidence). In at least one case, steatite bowls, a causative factor is the invention and dissemination of pottery. As far as rhyolite is concerned, the projectile points show a stylistic drift which indicates a break in the previously existing Shenandoah Valley-Potomac Piedmont connection. The two taken together probably point to some substantive changes in inter-areal relationships.

In the early part of the Middle Woodland, while there is some evidence of interaction to the east, e.g. commonality of social systems and net marked exterior surfaces of ceramic vessels, the primary source of interaction is to the west. This is rather weakly manifested in direct exchange as non-local items are not particularly common, but is quite strongly evident in areas such as the adoption of burial mounds and development of parallel social and and belief systems. This is also the period when there is the clearest indication of what could be termed "long distance exchange", but even this seems surpassed by medium distance and local exchange.

This gives way to a long period of apparent insularity which is also mirrored to the north, and west. It is again obvious there were major changes both on an inter-regional and internal basis. By A.D. 1000-1100, exchange once again occurs. In the Valley, one aspect of this seems to be a prelude to the in-migration of an alien group and could be interpreted as reflecting bargaining prior to what becomes friendly colonization. Further to the south but outside the Valley, exchange and substantial social structural change occurs during the 13th and 14th centuries.

During the final phase of the Late Woodland, inter-ethnic (as this is defined in different ceramic traditions) hostilities are evident in the contraction of certain ceramic traditions and expansion of others and resultant lack of attribute exchange, loss of the dispersed hamlet pattern and settlement coalescence, and construction of stockaded villages. Trade goes on, at least to the east, but is reduced to a single category, marine shell beads.

Trade is not evident between Valley prehistoric populations and Europeans, probably as a result of the control and filtering effect of intervening middle men such as the Susquehannock and Iroquois, as well as abandonment of the Valley somewhere around the Mid-17th century.

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Stewart

A CONTEXTUAL ANALYSIS OF WOODLAND I ARTIFACTS MANUFACTURED FROM NON-LOCAL MATERIALS ON THE DELMARVA PENINSULA: IMPLICATIONS FOR PATTERNS OF TRADE AND EXCHANGE

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INTRODUCTION

In a recent review of my contribution to Roger Moeller's volume, Practicing Environmental Archaeology, Steve Potter (1983:337) noted that the data upon which I based the identification of a two-level Late Archaic exchange system in the Delmarva region were somewhat "tenuous". This is a valid criticism and my purpose in this paper is to present the basic data which I feel are supportive of my earlier statements about Late Archaic - Middle Woodland exchange in the Delmarva region. In many ways the research reported herein began long before Potter's comments were published. In 1980, Michael Stewart and I circulated, through Pennsylvania Archaeologist, a questionaire on rhyolite artifacts and their distribution. As we viewed the data that were returned to us it became clear that certain portions of the Middle Atlantic had anomalously high percentages of occurrence of this "exotic" material. Often these areas were far removed from outcrop sources. My attention was drawn to the local Delmarva Peninsula where rybolite percentages were as high as 12-15%. However, even more interesting was the fact that the sites with high percentages of rhyolite had even higher percentages of argillite, another non-local material. In many cases more than 70% of the artifacts from Delaware Coastal Plain sites were argillite. Similarly, steatite bowl fragments were also common in collections from these sites. The co-occurrence of these three materials seemed interesting and I began an intensive analysis of collections from southeastern Pennsylvania and the northern two-thirds of the Delmarva Peninsula (Figure 1). This paper describes the results of that analysis.

RAW MATERIAL DISTRIBUTION

Before further considering the artifact analysis, it is

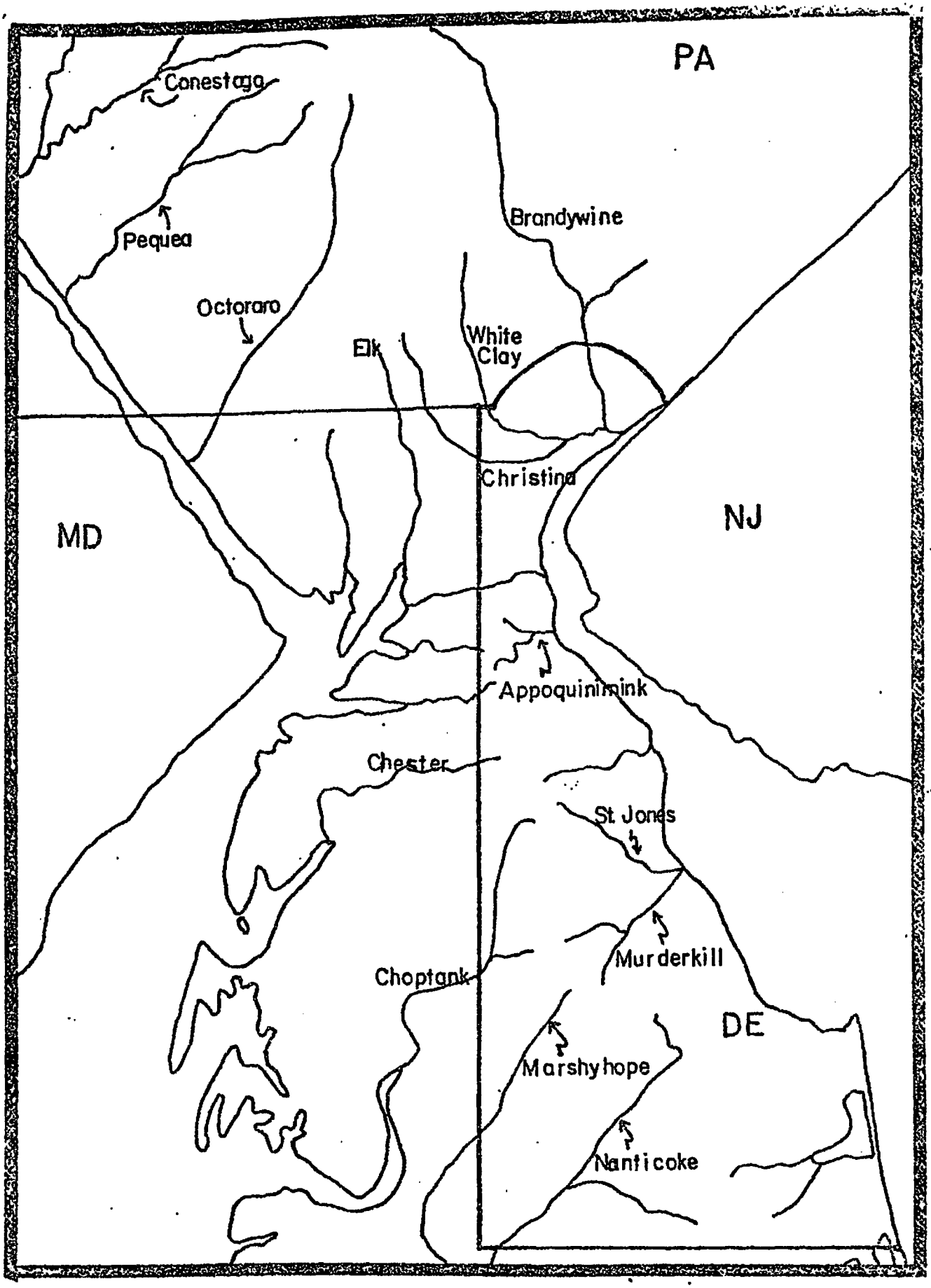

Figure 1: Study Area

important to briefly comment on the natural distribution of argillite, rhyolite, and steatite in order to underscore the "exotic" nature of these raw materials when they occur in the study area. Rhyolite is a metavolcanic lithic material found in the Blue Ridge physiographic province (Stewart 1980, 1981; Pennsylvania Geological Survey 1960) of south central Pennsylvania, western Maryland, and western Virginia, more than 300 km from the study area. While it is possible that some rhyolite may be deposited in Chesapeake Bay cobble beds, the frequency of its occurrence is low (Jordan 1964). Furthermore, when rhyolite is present in cobble beds, it would be more common on the western shore of the Chesapeake Bay and would be limited to areas south of the mouth of the Potomac River (Custer and Galasso 1980).

Argillite, and related hornfels and siltstones, are metamorphosed sedimentary lithic materials which are found within the Triassic Lowlands of the Middle Atlantic (Didier 1975). These Triassic formations are found in a broad belt stretching from New York City southwest through Reading, Pennsylvania, to the vicinity of Gettysburg, and from there further southwest. The northern edge of the study area adjoins the southeastern limit of the Triassic formations and argillite outcrops. Argillite weathers easily and is very rarely found in Delaware and Susquehanna cobble beds below the Fall Line (Custer and Galasso 1980).

Steatite naturally outcrops within a "chromite belt" within the Piedmont Uplands physiographic province of southeastern Pennsylvania and northeastern Maryland (Pennsylvania Geological Survey 1960; Cleaves 1968). Steatite weathers easily in water and is not found in cobble deposits. Furthermore, there are no major drainages to provide natural transport to southern parts of the Delmarva Peninsula. Trace element analysis also indicates that the steatite from the Delmarva Peninsula archaeological sites is derived primarily from the Pennsylvania Piedmont sources (Holland, et al. 1981).

In sum, rhyolite is clearly a non-local material within the study area. Argillite and steatite are found within the study area, but only within its northern portion. In many ways, the study area represents a north-south transect running from areas of high natural availability of these materials to areas where they are absent. This transect represents an ideal setting for studying "fall-off" models of decreasing frequencies of materials with increased distances from sources as noted by Renfrew (1977).

SAMPLE SITES

Table 1 lists the surface collections analyzed as a part of this study. The most systematic data come from the surface

TABLE 1: Surface Collections Studied

Collection (Curation Location)	Reference	Total Sites (# with A,R,S)	Total Artifacts (# of A,R,S)
Delaware Surf. Collections (Island Field Museum)	None	520 (320)	45,893 (5,751)
Dutt Coll. (William Penn Museum)	None	32 (32)	26,000 (3,850)
Eckman Coll. (North Museum)	Kinsey 1977	63 (22)	1,044 (341)
Smoker Coll. (Private)	None	141 (41)	1,293 (401)
Wilke/Thompson Coll. (MD Geo. Survey)	Custer and Doms 1983	90 (45)	37,728 (1,135)
Tuckahoe St. Park Coll. (MD Geo. Surv.)	Handsman and Borstel 1974	13 (6)	120 (25)
Upper Chester Watershed Surv. (MD Geo. Surv.)	Kavanagh 1979	28 (5)	330 (42)
Futer Coll. (North Museum)	Parry and Custer 1976	12 (8)	3,134 (418)
TOTALS		887 (479)	115,542 (11,963)

TABLE 2: Excavated Collections Studied

Site	Reference	Site	Reference
7NC-A-2	Custer 1980	7NC-E-6	Custer 1982a
7NC-E-41	Thomas 1981	7NC-E-42	Custer 1982a
7NC-E-46	Custer and Bachman 1983	7NC-F-7	Thomas 1966
		7K-D-13	Custer 1984
7K-F-38	Custer 1984	7K-F-13	Custer 1984
18CE29	Thomas 1982	18CE146	Ward 1983
18TA3	Custer and Doms n.d.	18CE14	McNamara 1983
		36CH51	Custer n.d.b

West Dover ByPass Sites (Griffith and Artusy n.d.)
Route 4 Sites (Custer, Catts, and Bachman 1982; Bachman and Custer 1983)

collections for Delaware maintained at the Island Field Museum. Private collections provide good coverage of much of the Pennsylvania Piedmont. The Wilke/Thompson collections provide some coverage for coastal areas for the Maryland Eastern Shore; however, coverage for the Maryland and Virginia portions of the Delmarva peninsula is generally poor. In addition to surface collections, excavated collections were also considered. Table 2 lists the excavated site collections considered. Over 200,000 artifacts from 1000 sites were studied including approximately 21,000 argillite, rhyolite, and steatite artifacts from 540 sites.

METHODS OF ANALYSIS

Two basic kinds of data were gathered during the collection analysis. Relative proportions of argillite and rhyolite and the presence/absence of steatite were recorded for all sites and plotted. These plots of percentage values were then used as the basis for the preparation of synagraphic (contour) maps of rhyolite, argillite, and steatite artifact densities. The work of Findlow and Bolognese (1982) with New Mexico obsidian was used as a model for these research and analysis methods.

The second type of data collected was what may be called "contextual data" following the work of Hodder (1982). Contextual data consist of both qualitative data on the archaeological settings of the artifacts, such as whether the artifacts were normal refuse, part of an isolated cache, or grave goods, and attributes of the individual argillite and rhyolite chipped stone artifacts. The attributes recorded included length, width, thickness, length/width ratio, width/thickness ratio, presence/absence of resharpening, presence/absence of humps (protrusions on the face of the artifacts surrounded by step and/or hinge fractures), reduction stage (following the work of Callahan 1979), and cultural-historical identification. When reduction stages were noted, a distinction between discarded, resharpened tools and rejected, unfinished tools was noted. For the rhyolite artifacts, the types of rhyolite (following the work of Stewart 1981) were recorded.

RESEARCH QUESTIONS

The general research problem toward which this project was directed was to see if detailed distributional data and contextual data supported my earlier contentions that certain

portions of the Delmarva Peninsula were characterized by highly developed exchange systems during Woodland I (Late Archaic - Middle Woodland) times (Custer 1982b). The presence of Adena artifacts of copper and Flint Ridge chalcedony at Delmarva Adena sites clearly showed the existence of specialized exchange systems (Thomas 1970). However, the precursors to the Delmarva Adena networks were not as clearly identified. Similarly, the nature of the exchange systems that followed those of the Delmarva Adena complex in time were not as well known. Thus, my overall goal is to present the data on the general chronology and distribution of specialized exchange systems in the Delmarva region.

At this point it is necessary to more carefully define what is meant by "specialized exchange". Based on ethnographic (Rappaport 1968; Harding 1970; Oliver 1955) and archaeological (Ericson 1977; Dalton 1977; Custer 1982b, n.d.a) data it has been argued that two kinds of exchange networks exist for egalitarian and very simple ranked societies. Low-level networks are web-like sets of personalized relationships that move artifacts with primarily technomic functions among societies. High-level networks are more formalized relationships that move artifacts with sociotechnic and ideotechnic as well as technomic functions. In the archaeological record, these two types of networks can be distinguished from one another by the fact that high-level networks are characterized by larger volumes of non-local artifacts and raw materials, differential use patterns for non-local materials, and specialized archaeological contexts for non-local materials. The specific research questions addressed in this paper will be to see if any of these attributes characterize Delmarva exchange systems.

DISTRIBUTION AND CHRONOLOGY

Figure 2 shows the distribution of data points used to map out non-local lithic artifact distributions and Figures 3 - 5 show synagraphic maps of argillite, rhyolite, and steatite for the study area. Concentrations are readily apparent and are noted in Table 3. In many cases, two or three exotic materials occur in the same locale (Table 3, Nos. 1,3,5,7,9,10,12). Some of the concentrations of single materials are explained by the proximity of outcrops such as the eastern Lancaster County/western Chester County, Pennsylvania, argillite outcrops (Table 3, No. 4) and the Georgetown/Christiana steatite outcrops (Table 3, No. 6). Other concentrations of single materials are outliers of larger concentrations (Table 3, Nos. 2,8) while one is probably a result of poor data coverage from surrounding areas (Table 3, No. 11).

The concentrations of multiple exotic materials fall in the

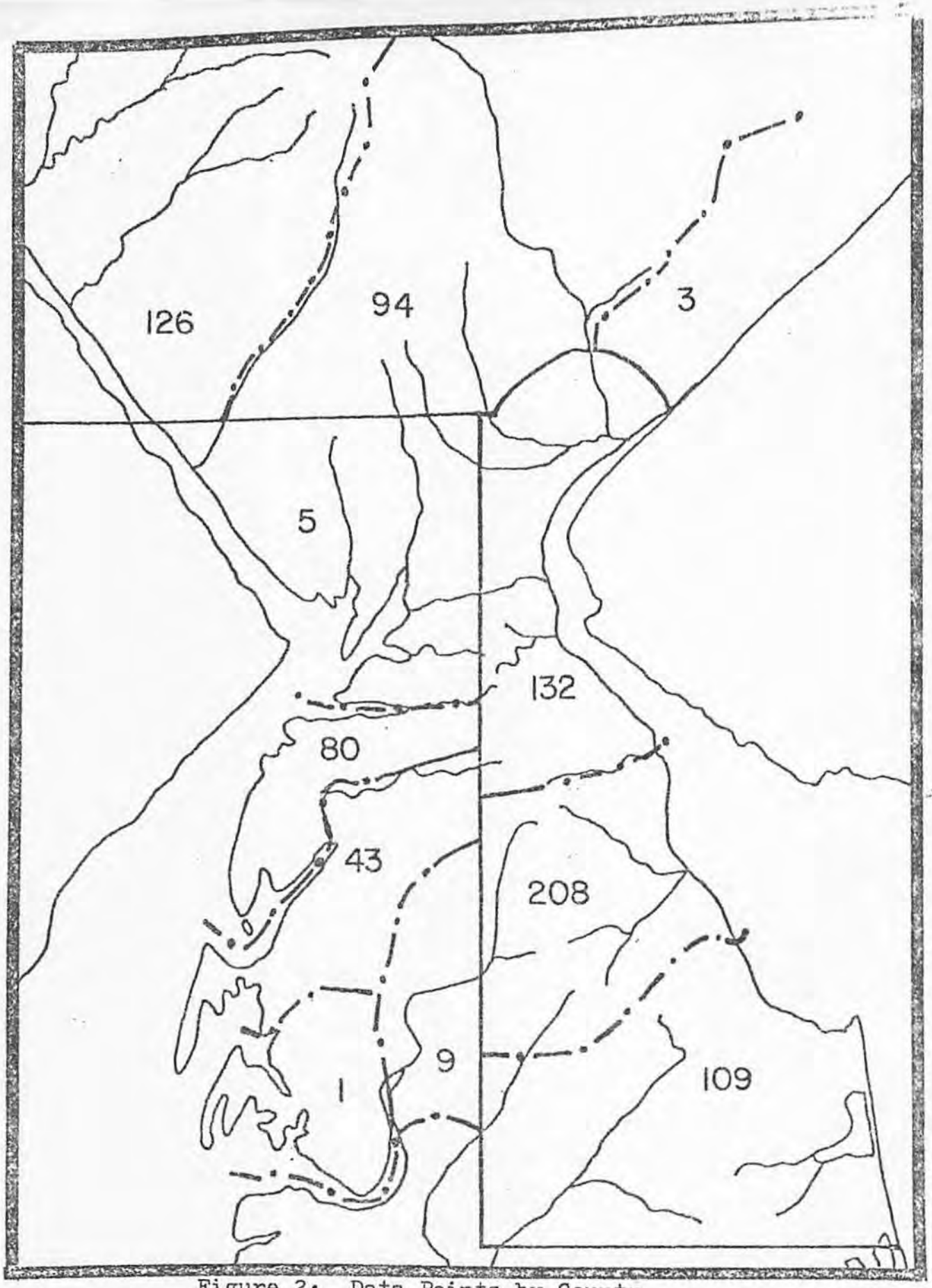

Figure 2: Data Points by County

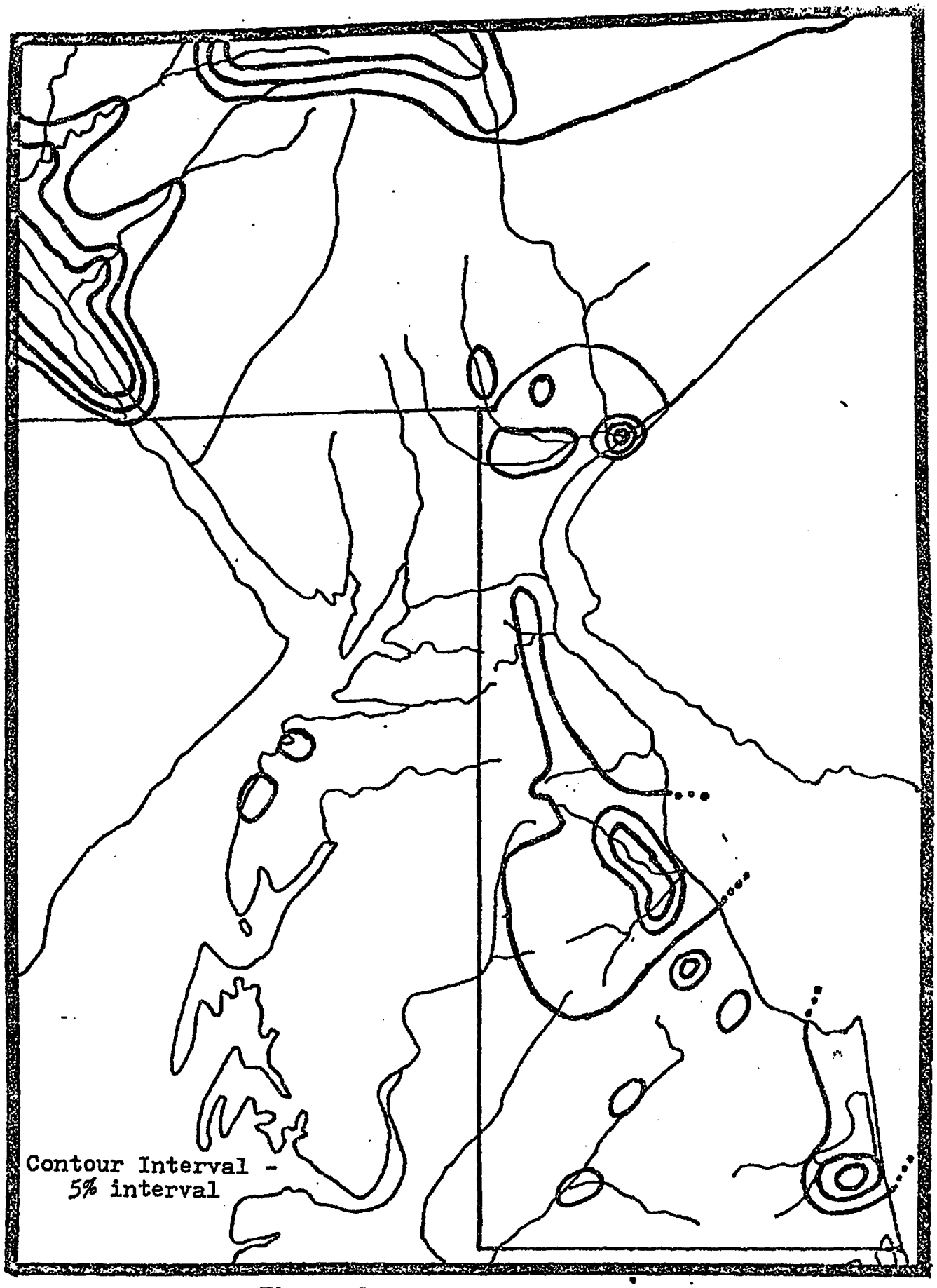

Figure 3: Argillite Distribution

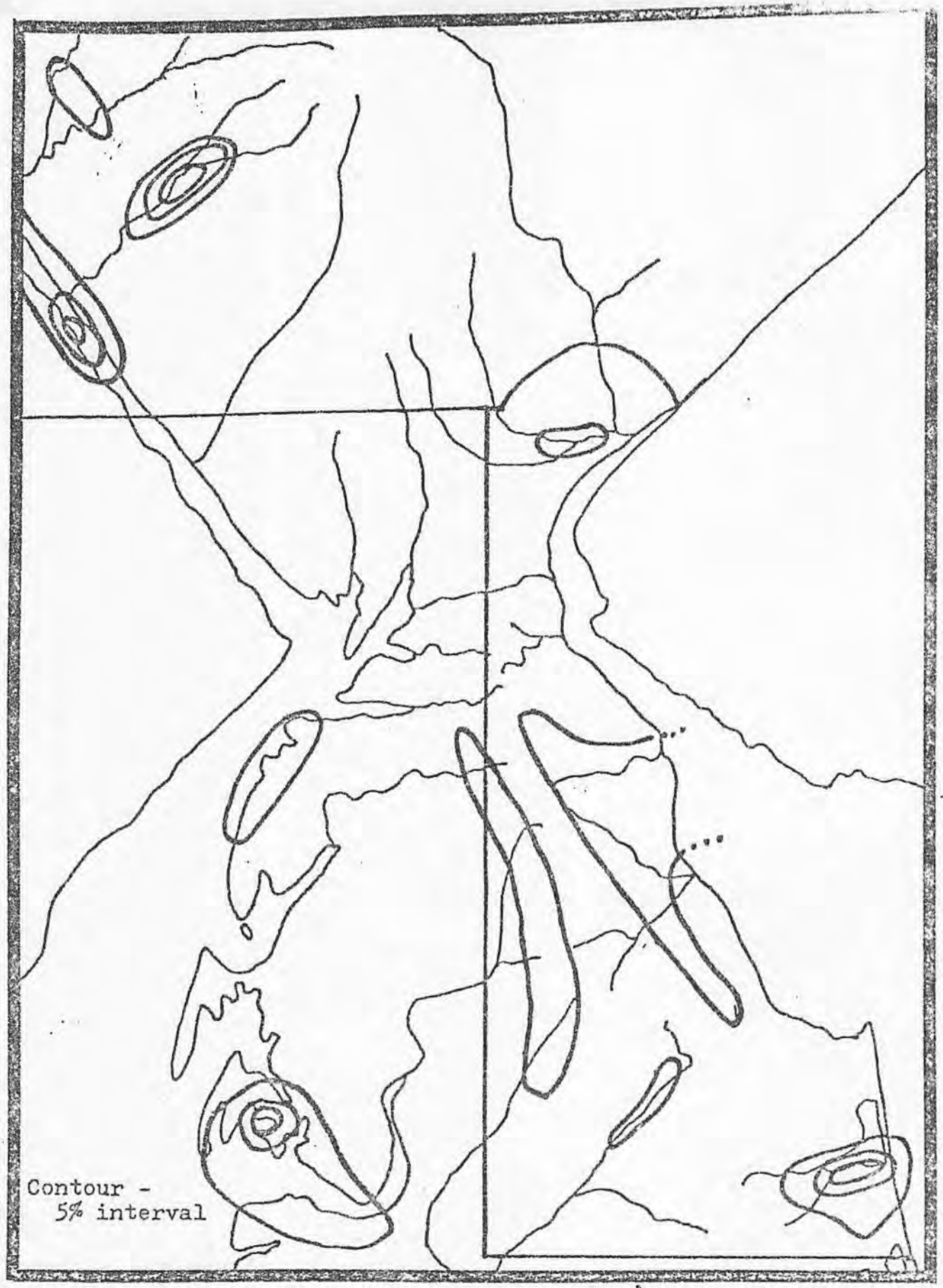

Figure 4: Rhyolite Distribution

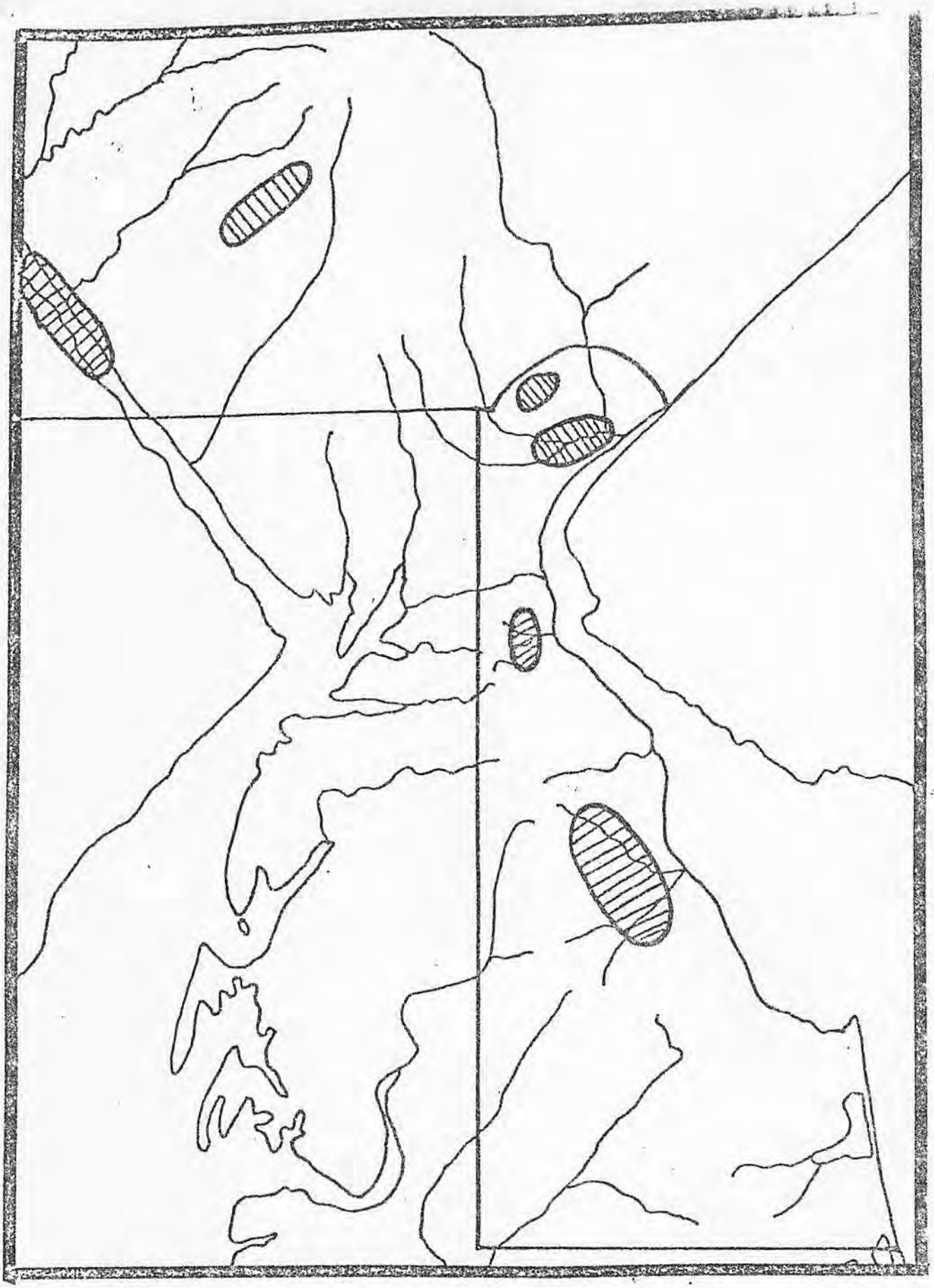

Figure 5: Steatite Distribution

TABLE 3: Argillite, Rhyolite, and Steatite Concentrations

Concentration	Argillite	Rhyolite	Steatite
1) Main Branch, Susquehanna Piedmont Lowlands	X	X	X
2) Conestoga	X	-	-
3) Pequea	X	X	-
4) Eastern Lancaster County/ Western Chester County	X	-	-
5) Hockessin Lowlands	X	-	X
6) Christiana/Georgetown, PA	-	-	X
7) Churchmans Marsh/Lower Christina River	X	X	X
8) Delaware Mid-Drainage - Appoquinimink/Leipsic Rivers	X	-	-
9) Delaware Mid-Drainage - St. Jones thru Slaughter Crk.	X	X	X
10) Upper Choptank-Upper Marshy-hope	X	X	-
11) Lower Choptank	X	X	-
12) Indian River/Atlantic Coast	X	X	-

X - Present
- - Absent

environments of major Woodland I settlement focus: the main stems of higher order drainages, well-watered limestone lowlands, interior swamp/marsh complexes, and mid-drainage settings adjacent to the oligohaline (Custer 1982a, 1983a, 1983b; Custer and Wallace 1982). Tabulation of diagnostic artifacts also shows the overwhelming Woodland I age of most of the exotic materials (Table 4, Figures 6 and 7).

Better chronological data can also be developed to document changing spatial distributions of exotic materials during the Woodland I period. Following the chronologies of Woodland I diagnostic artifacts used in Delaware (Custer 1983a) and Maryland (Wesler 1983:27), a simple sequence might be: broadspears and stemmed points (Late Archaic, 3000 BC - 500 BC), stemmed and notched points (Early Woodland - early Middle Woodland, 500 BC - AD 500), Fox Creek and stemmed points (late Middle Woodland, AD 500 - AD 900). Tabulation of diagnostics by physiographic provinces (Table 4) shows that the Low Coastal Plain area has the largest proportion of later Middle Woodland Fox Creek materials, particularly of rhyolite, while all other zones to the north have primarily Late Archaic/Early Woodland exotics (Figures 8 and 9). Application of the difference of proportion test (Parsons 1974:445-449) to a comparison of percentages of Fox Creek points from Low Coastal Plain sites and all other sites (Table 5) shows that the Low Coastal Plain percentages of Fox Creek points are significantly higher than those of other areas. Thus, the exchange networks of the southern portion of the study area that produce the concentrations of exotic artifacts occur slightly later in time compared to the northern areas. These southern networks also seem to be more closely linked to areas to the west, across the Chesapeake Bay, while the earlier more northern networks show connections primarily to the north.

In general, a simple consideration of overall rhyolite, steatite, and argillite distributions shows that several areas have high concentrations of multiple exotic materials. These same areas are foci for Woodland I settlement and may represent possible locations of high-level exchange systems. Analysis of artifact use and context can help to clarify the nature of these exchange systems.

DIFFERENTIAL REDUCTION AND EXCHANGE

Hodder (1982; Hodder and Lane 1982:225-230) has noted that attributes of individual artifacts made from exotic materials can be studied to determine the kinds of exchange networks that might have been operative in the prehistoric past. Hodder and Lane studied length/width and width/thickness ratios of Neolithic axes and celts from Great Britain and using these attributes it was possible to distinguish axes that were exchanged in finished form

Table 4: Rhyolite and Argillite Diagnostics by Physiographic Province

Point Type	Total	Physiographic Zones Pied.Low.	Pied.Up.	Fall Line	High C.P.	Low C.P.
RHYOLITE						
Kirk	34(4)	4(4)	23(8)	No Data	1(4)	6(1)
Bifurcate	16(2)	2(2)	12(4)	No Data	0(0)	2(1)
Stemmed	265(34)	50(51)	101(38)	No Data	13(52)	101(25)
Notched	100(13)	7(7)	42(16)	No Data	0(0)	51(13)
Broadspears	158(20)	15(16)	59(22)	No Data	4(16)	80(20)
Basal Notched	3(1)	0(0)	1(1)	No Data	4(16)	2(1)
Fox Creek	139(17)	7(7)	7(3)	No Data	0(0)	121(30)
Triangles	4(1)	1(1)	0(0)	No Data	0(0)	3(1)
Other	64(8)	11(12)	15(6)	No Data	3(12)	35(8)
TOTALS	783	97	260		25	401
ARGILLITE						
Kirk	2(1)	0(0)	1(1)	0(0)	0(0)	1(1)
Bifurcate	3(1)	0(0)	2(1)	0(0)	0(0)	1(1)
Stemmed	891(61)	190(72)	334(69)	18(64)	81(79)	268(46)
Notched	49(3)	9(3)	19(4)	0(0)	3(3)	18(3)
Broadspears	268(18)	39(15)	78(16)	3(11)	3(3)	145(25)
Basal Notched	1(1)	1(1)	0(0)	0(0)	0(0)	0(0)
Fox Creek	131(9)	8(3)	18(4)	1(3)	5(3)	99(17)
Triangle	3(1)	0(0)	1(1)	0(0)	2(2)	0(0)
Other	110(7)	15(6)	32(7)	6(21)	9(9)	48(8)
TOTALS	1458	262	485	28	103	580

NOTE: Numbers in parentheses represent column percentages.

Figure 6

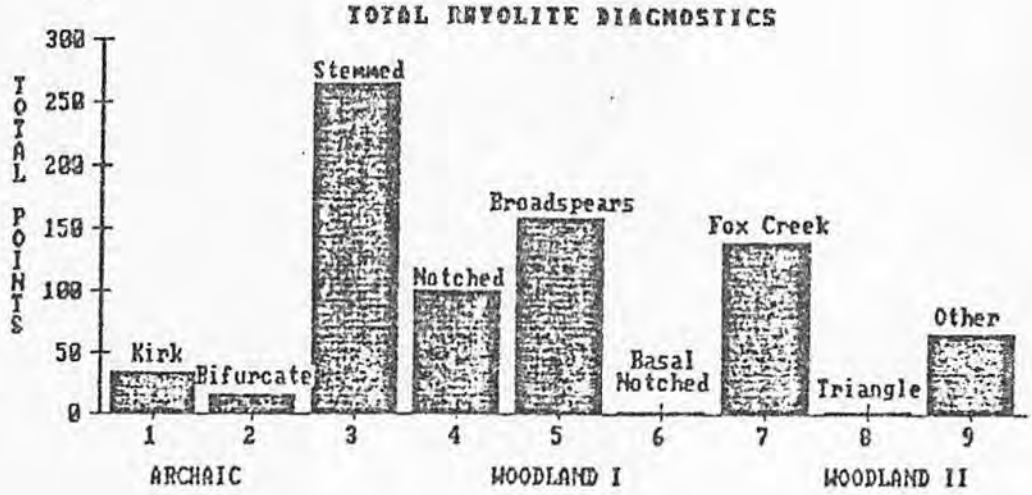

Figure 7

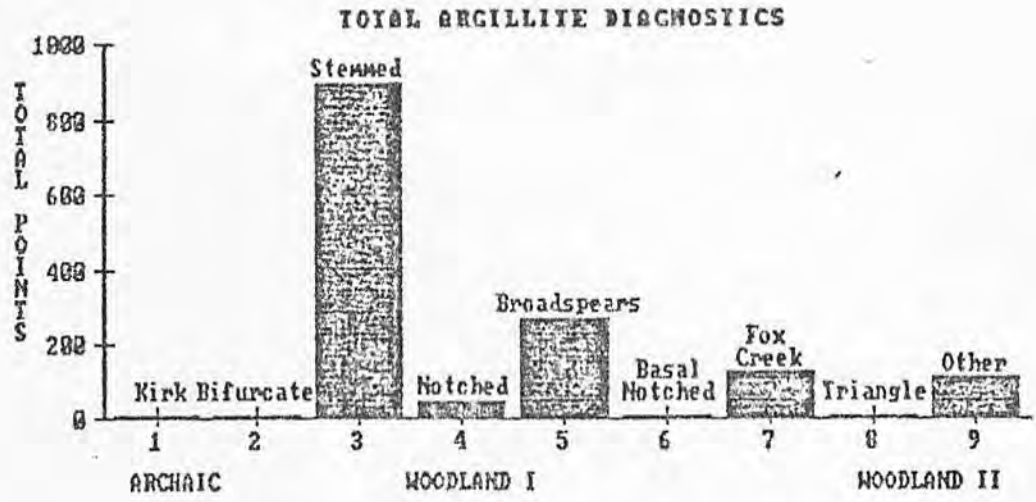

Figure 8

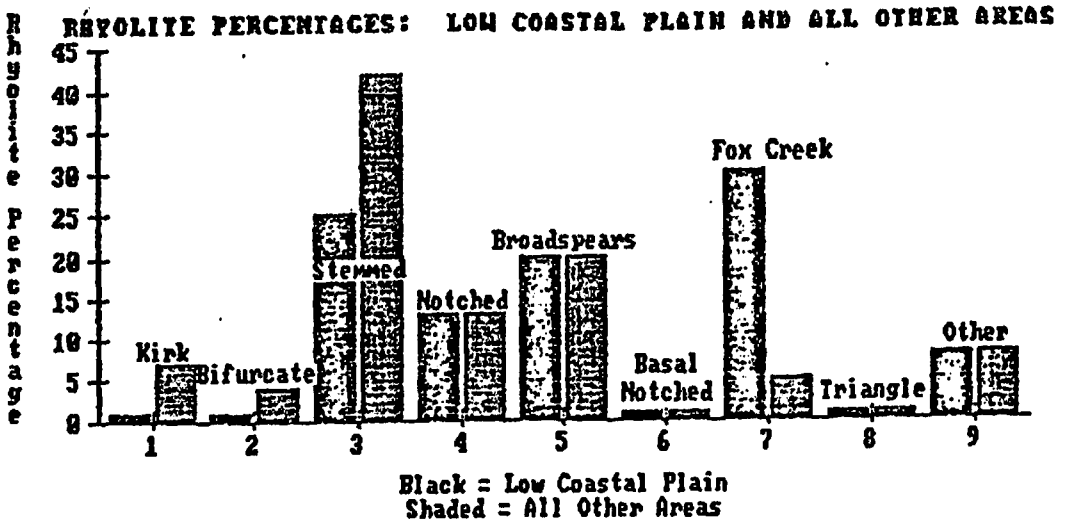

Figure 9

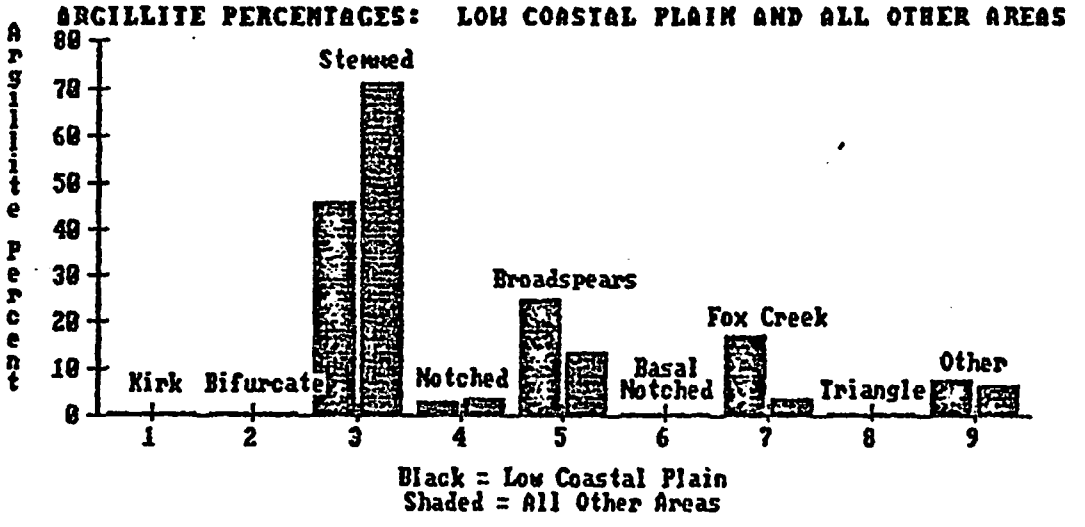

TABLE 5: Fox Creek Difference-of-Proportion Test

Physiographic Zone	Total Fox Creek	Total Diagnoistics	%
RHYOLITE			
Low Coastal Plain	121	401	30
All Other Zones	14	382	4
Z=8.66 p<.01			
ARGILLITE			
Low Coastal Plain	99	580	17
All Other Zones	32	878	4
Z=13.00 p<.01			

and continually reduced in size as the were traded increasingly greater distances from their quarry sources. It was also possible to identify axes which may have been manufactured from traded non-local raw materials. The differences between exchange of finished artifacts and exchange of raw materials are significant with movements of raw materials being viewed as evidence of more complex (higher level) exchange networks (Hodder and Lane 1982:227).

Analysis of differential reduction was carried out in this study by considering both reduction stages of rhyolite and argillite artifacts and metric attributes of individual rhyolite and argillite artifacts. Steatite artifacts were not considered because all specimens studied were fragments of finished bowls. Nonetheless, it can be noted that few, if any, "quarry picks", which have been identified at various steatite quarry sites (Wilkins 1962; Holmes 1897:120-143; Parry and Custer 1976), have been noted in any of the collections examined except for the steatite quarry sites. These observations would suggest that steatite exchange primarily involved finished artifacts.

Table 6 shows that percentages of various reduction stages for rhyolite and argillite points and bifaces by physiographic provinces. Among the rhyolite artifacts, points outnumber bifaces by approximately six-to-one indicating that most exchange of rhyolite artifacts was in finished, late stage forms. Among rhyolite bifaces, later stage discard and rejected bifaces were more common than early stages for all zones except the High Coastal Plain. When rhyolite points are considered, the majority are discards rather than rejects. These findings would indicate that the majority of rhyolite exchange was in the form of finished tools, specifically later stage bifaces and points. Argillite points show a similar pattern to rhyolite points; however, the pattern for argillite bifaces differs significantly from the rhyolite biface stage pattern. In the Piedmont Uplands, High Coastal Plain, and Low Coastal Plain zones there are more early stage bifaces than other stages. The occurrence of higher numbers of early stage rejects in the Piedmont Uplands is understandable because it is the area in which argillite naturally occurs. Following models of quarry activity behavior (Gardner 1977; Goodyear 1979; Stewart 1980), one would expect the frequency of early stage bifaces to decrease as the distance from the quarry sources increases. Moving north away from the argillite sources into the Piedmont Lowlands and moving south into the Fall Line the expected pattern occurs. However, the frequencies of early stage bifaces increase with increasing distance from the quarry sources moving into the Coastal Plain. This anomaly indicates that in certain areas of the Delaware Coastal Plain, the exchange of early stage bifaces was more common than later stage bifaces and points.

Better distributional data on this special feature of argillite exchange were developed by plotting argillite biface reduction stage relative frequencies by individual drainages in a north to south transect running from the argillite outcrop

TABLE 6: Reduction Stages by Physiographic Setting

Physio. Zone	Bifaces ESR	LSR	LSD	Unknown	TOTAL	Points LSR	LSD	Unknown	Total
RHYOLITE									
Pied. Low	0(0)	7(100)	0(0)	0(0)	7	19(20)	71(73)	7(7)	97
Pied. Low	1(3)	11(42)	6(23)	8(32)	26	23(8)	228(88)	9(4)	260
Fall Line	0(0)	0(0)	4(100)	0(0)	4	0(0)	7(100)	0(0)	7
High C.P.	11(37)	10(33)	6(20)	3(10)	30	2(11)	16(89)	0(0)	18
Low C.P.	8(6)	25(19)	15(12)	81(63)	129	48(12)	336(84)	17(4)	401
ARGILLITE									
Pied. Low	25(29)	39(46)	2(2)	19(23)	85	28(11)	219(84)	15(5)	262
Pied. Up	61(52)	21(18)	10(8)	26(22)	118	50(10)	384(79)	51(11)	485
Fall Line	6(26)	5(22)	7(30)	5(22)	23	1(4)	15(54)	12(42)	28
High C.P.	49(53)	27(29)	3(3)	14(15)	93	8(8)	92(89)	3(3)	103
Low C.P.	251(46)	44(8)	29(5)	219(41)	543	26(4)	520(90)	34(6)	580

Numbers in parentheses indicate row percentages.

KEY: ESR-Early Stage Rejects, LSR-Late Stage Rejects, LSD-Late Stage Discards

sources in the northern portion of the study area to the southern border of Delaware. Table 7 shows these percentage data for selected drainages. The drainages chosen were those with the highest frequencies of argillite bifaces. Figure 10 shows a plot of the early stage biface percentages and distance from the quarries. The increase in the frequency of early stage bifaces in the south central portion of the study area can be clearly seen, especially in the St. Jones, Murderkill, and Marshyhope drainages. Clearly, there is a focus on the exchange of early stage bifaces, in a sense raw materials, within these drainages.

A related topic to consider is change in argillite artifact sizes among the drainages along the north-south transect. Table 8 shows the mean and standard deviation of length, length/width ratio, and width/thickness ratio for argillite points and bifaces. Generally, it would be expected that all three values should decrease with increased distance from the quarries for both points and bifaces (Turnbaugh 1970). When argillite points are considered, there is a clear contradiction of the expected pattern (Figure 11). The Murderkill and Upper Marshyhope drainages show significant increases in point length and the Murderkill drainage also shows a higher standard deviation. This finding reflects the presence of greater numbers of larger points that are either rejects or unfinished tools. The length/width and width/thickness ratios show no clear-cut patterns for argillite points. The argillite biface data show similar patterns with a pronounced increase in length culminating in the Murderkill drainage area. The larger sizes of argillite artifacts in the St. Jones and Murderkill drainages can be directly correlated with the increased frequency of early stage artifacts in these drainages. The early stage artifacts, and points that had not been subjected to extensive resharpening, are larger (longer) with higher length/width ratios. Thus, the artifact size data reinforce the notion that argillite exchange in the St. Jones/Murderkill/Marshyhope region focused, to a degree greater than that of any of the other areas considered, on exchange of early stage artifacts.

REGIONAL CONTEXT: FALL-OFF DATA

Changes in frequencies of argillite among the drainages used in the north-south transects noted above can also be used to analyze the regional context of the argillite artifact data. Renfrew (1977:72) notes that in the absence of "highly organized directional (i.e. preferential, non-homogeneous) exchange, the curve of frequency of abundance of occurrence of an exchanged commodity against effective distance from a localized source will be a monotonic decreasing one." Figure 12 shows the curve for the argillite artifacts in the study area and Table 9 shows the supporting data. The curve is obviously <u>not</u> a monotonic decreasing curve and is more similar to curves presented by

TABLE 7: Argillite Bifaces Stages by Drainages

Drainage	Total	ESR	LSR	LSD	Undetermined
Brandywine	31	61	22	0	17
Pequea	48	33	31	6	30
Mill Creek	32	53	9	25	13
White Clay	16	18	12	0	70
St. Jones	213	22	7	3	68
Murderkill	243	72	7	6	15
Marshyhope	14	71	28	0	1

Figure 10

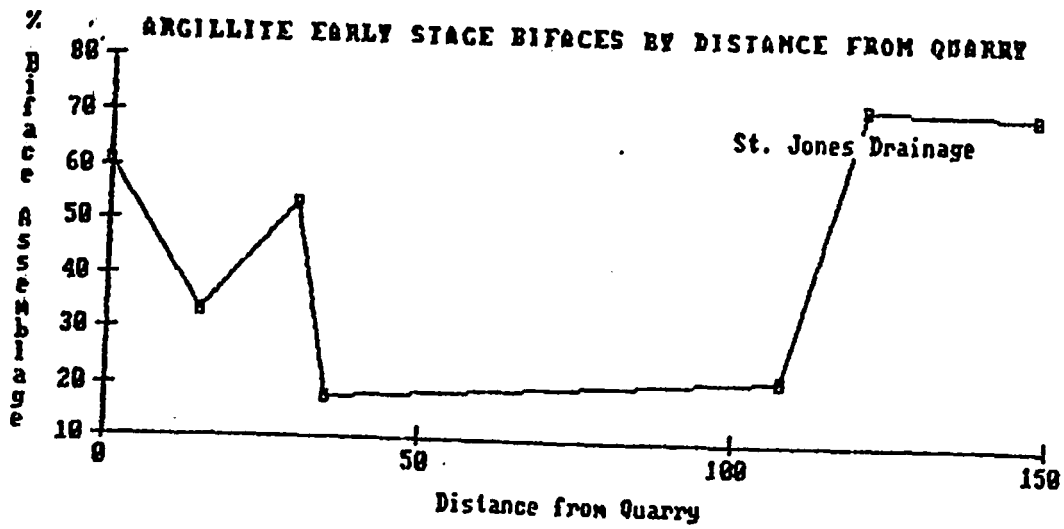

Figure 11

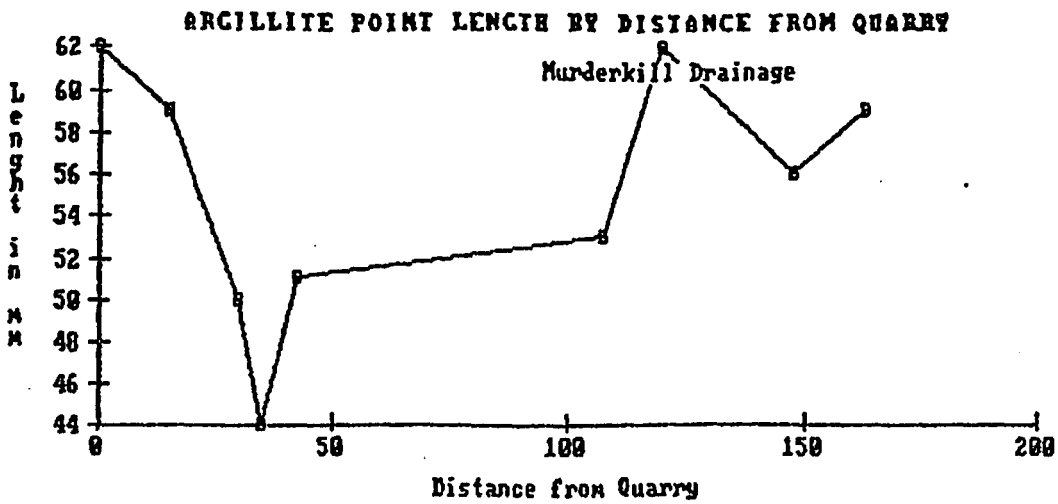

TABLE 8: Argillite Artifacts Sizes by Drainages

Drainage	Total	Length Mean	Length S.D.	L/W Ratio Mean	L/W Ratio S.D.	W/T Ratio Mean	W/T Ratio S.D.
ARGILLITE POINTS							
Brandywine	150	62.42	16.43	2.33	.67	2.98	.77
Pequea	64	59.97	15.13	2.34	.65	2.75	.62
Mill Creek	33	50.61	8.49	2.47	.68	2.70	.80
White Clay	10	44.20	17.38	1.87	.50	3.97	1.81
Christina	26	50.69	12.77	2.27	.50	2.67	.84
St. Jones	91	53.77	15.16	1.99	.52	3.44	1.19
Murderkill	97	62.62	26.68	2.06	.54	3.98	1.76
Marshyhope	59	56.03	18.41	2.06	.48	3.42	1.14
Nanticoke	24	59.54	17.80	2.33	.66	3.58	1.03
ARGILLITE BIFACES							
Brandywine	20	76.85	18.48	1.84	.39	2.29	1.10
Pequea	16	82.69	21.26	2.21	.69	2.55	.74
Mill Creek	13	71.23	21.24	2.02	.55	3.10	.99
White Clay	NO DATA						
Christina	NO DATA						
St. Jones	49	77.42	26.01	1.63	.73	2.58	.84
Murderkill	200	121.41	28.28	1.63	.37	2.75	.84
Marshyhope	8	79.25	25.37	1.99	.52	2.52	.73
Nanticoke	NO DATA						

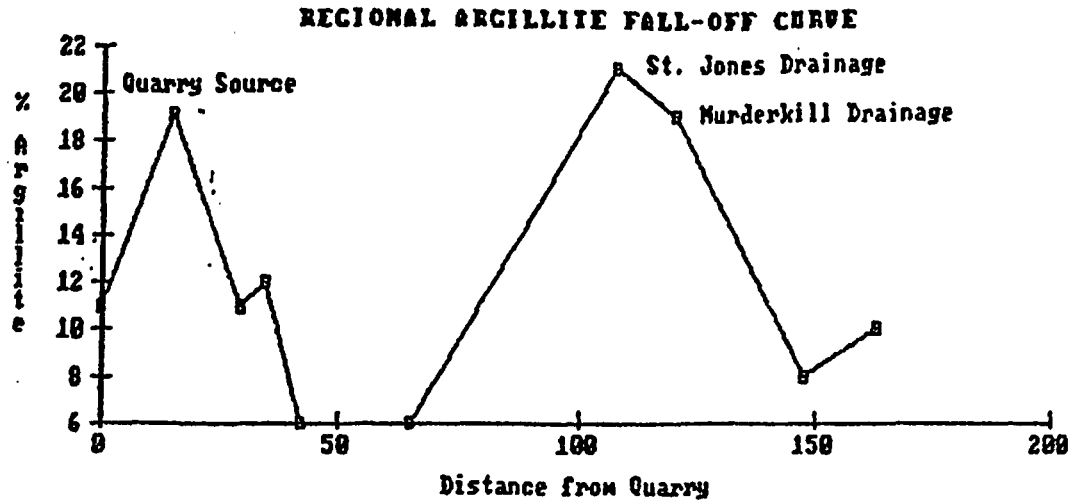
REGIONAL ARGILLITE FALL-OFF CURVE
% Argillite
22
20
18
16
14
12
10
8
6
Quarry Source
St. Jones Drainage
Murderkill Drainage
0
50
100
150
200
Distance from Quarry

Figure 12

TABLE 9: Argillite Percentages by Drainage

Drainage	Distance from Quarry in Kilometers	# Sites w/ Arg	Mean Arg. %
Brandywine	0	72	11.29
Pequea	15	23	18.55
Mill Creek	30	8	10.87
White Clay	35	7	12.29
Christina	42.5	10	6.20
Appoquinimink	65	5	5.60
St. Jones	107.5	24	21.29
Murderkill	120	25	18.72
Marshyhope	147.5	25	7.76
Nanticoke	163	12	9.5

Renfrew (1977:86) as typical of a kind of directed exchange with central places. The important point to note is that the curve is not indicative of simple "hand-to-hand" or "down-the-line" exchange. The St. Jones/Murderkill region clearly stands out as a special area which is consistent with its focus of exchange of early stage artifacts and raw materials.

SITE CONTEXT

The site context of exchanged artifacts can be studied in several ways. The first is to consider the occurrence of steatite, argillite, and rhyolite artifacts among the various functional categories of sites. Table 10 shows these percentages for argillite and rhyolite. The functional site types considered are drawn from the work of Gardner (1982) as adapted for the Delmarva Peninsula (Custer 1983a, 1983b; Custer and Galasso 1983). Rhyolite and argillite occur at all classes of sites; however, the percentages are highest at the more sedentary base camp sites. These findings indicate that rhyolite and argillite artifacts have functional contexts that include activities at all site types. Argillite and rhyolite are clearly used as tools at all site types within the study area (Custer 1983a:109-110). The predominance of stemmed and broadspear forms (Figures 6 and 7) suggests that these artifacts primarily functioned as projectile points and generalized processing tools (Ahler 1971; Cook 1976). The presence of transverse fractures on many argillite and rhyolite tools (10% of rhyolite, 15% of argillite) also shows the use of these artifacts as generalized processing tools (Ahler 1971).

A different pattern is seen for steatite. As can be seen from Table 11, steatite is found only at base camp sites. The primary functions of stone bowls are thought to be cooking and storage (Gardner 1975) and their presence only at base camps in the study area supports this contention.

Although the data described above seem to indicate that rhyolite, argillite, and steatite artifacts are mainly utilized in a technomic functional context, there are other features of these artifacts' contexts that suggest other functions as well. For example, the Kiunk Ditch cache of 198 argillite early stage bifaces from the Murderkill drainage (Omwake 1955) is one example of non-technomic functions as are two other caches from the Smyrna River drainage. Even more important is the fact that rhyolite bifaces are present in the grave assemblages from the St. Jones Adena site. Other Middle Atlantic sites from outside the study area also show grave and cache contexts for Woodland I argillite and rhyolite artifacts and include caches from the Susquehanna drainage (McCann 1972) and New Jersey (Cross 1941) and mortuary contexts from the Savich Farm site (Regensburg 1970). Thus, argillite and rhyolite artifacts in the study area

TABLE 10: Rhyolite and Argillite Percentages by Site Types

Site Type	Arg. Sites	Arg. %	Rhy. Sites	Rhy. %
Macro-band Base Camp	46	14	41	6
Micro-band Base Camp	8	16	5	4
Base Camp	102	12	83	10
Procurement/ Base Camp	16	11	6	3
Procurement	17	5	14	4

TABLE 11: Steatite Sites by Functional Type

Site Type	Total Sites	Sites with Steatite
Macro-band Base Camp	46	31
Micro-band Base Camp	10	2
Base Camp	115	46
Procurement/Base Camp	16	0
Procurement	28	0

represent artifacts with both a technomic and sociotechnic functional context (Custer n.d.a). The sociotechnic contexts in the study area are most readily apparent in the St. Jones/Murderkill area.

DISCUSSION

St. Jones/Murderkill Characteristics

The data described above show that there are several distinctive attributes of the argillite, rhyolite, and steatite artifacts and their distributions from the St. Jones/Murderkill drainages within the study area. First, there are more non-local materials from these drainage areas when it is compared to other regions. Most of the study area is characterized by non-local artifact percentages on the order of five percent or less, whereas the St. Jones/Murderkill region sites may have as much as 70 percent non-local materials. Within the study area, there are only two other comparable concentrations: the lower Christina River/Churchman's Marsh area and the main branch of the Susquehanna River within the Piedmont Lowlands and the northwestern Piedmont Uplands (Table 3). However, the second special characteristic of the St. Jones/Murderkill region, its high proportion of early stage tools and raw materials, sets it apart from the other areas with comparable concentrations. The movement of large quantities of early stage artifacts represents a unique occurrence in the coastal Middle Atlantic. The uniqueness of the distributions is further underscored by the fact that the St. Jones/Murderkill drainage is an anomaly in the regional fall-off patterns for argillite.

The fact that these special characteristics are present in central Delaware during Late Archaic/Early Woodland times should not be surprising. Later Delmarva Adena sites represent some of the most spectacular mortuary sites of the Middle Atlantic and some of the best evidence for ranked social organizations (Custer 1982b). The existence of specialized exchange networks during the Late Archaic and Early Woodland times can be directly linked to the more complex social organizations and distinctive settlement systems as well (Custer 1983a:107-113). In sum, the progenitors of the Delmarva Adena networks most likely were the argillite, rhyolite, and steatite networks of the "Transitional" period cultures.

Regional Exchange Considerations

In addition to clarifying the data that indicate special exchange systems among the Woodland I cultures of the central Delmarva Peninsula, the data presented here also indicates some interesting patterns of regional Woodland I exchange in the central Middle Atlantic. One interesting pattern that is clearly

exchange of early stage tools and perhaps raw materials. This concentration did not correlate with any of the other exotic raw materials considered here. However, it does coincide with a localized exchange network that moves ironstone into the Delmarva Coastal Plain and Pennsylvania Piedmont from the upper Eastern Shore of the Chesapeake Bay (Ward 1983; Ward and Doms 1984). It almost seems as if the networks, or short-term visits to the procurement areas, that provide access to the ironstones also allow a slightly more intensive interaction with groups to the west that brings in more early stage rhyolite materials. Thus, the existence of specialized local exchange networks may help to intensify the exchange in other more exotic materials.

As a final note, I should point out that many of the observations made here are only a starting point for further research. The data file that was generated for the preparation of this report could be used for many other analyses. Furthermore, if comparable data could be generated for additonal areas within the Middle Atlantic, it would be possible to generate many more insights about the prehistoric exchange networks of the Middle Atlantic region.

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THE POTENTIAL OF MATERIALS SCIENCE APPROACHES IN THE STUDY OF VIRGINIA CERAMICS:

An Overview

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To the uninitiated, the ceramics of Virginia presents a confusing picture. A wide variety of named types exist, based first on distinctions in technology such as shape, rime profile, paste, temper, firing and texture and, secondly, on surface manipulation (e.g., Evans 1955: 38). Many types have not been well-reported or thoroughly compared to existing ones. All too often radiocarbon dates and stratigraphic placement of ceramic types is lacking. One of the earliest attempts to establish an absolute chronological sequence for area ceramics was Wright's publication of An Archaeological Sequence in the Middle Chesapeake Region (1973). Here he defined a series of phases primarily on the basis of ceramic change and shifts in subsistence and settlement patterns. Even so, later work reversed the temporal placement of this Late Woodland sequence (Clark 1976; Griffith 1976). Calls for further analysis of the ceramic sequence abound in the literature (e.g., MacCord 1974; Artusy 1976; Winfree 1972; Reinhart 1979; Gregory 1980).

Research underway at Virginia Commonwealth University is investigating the utility of selected analytical approaches from the discipline of materials science toward the characterization of ceramics in the archaeological study of social and economic change. Characterization describes those features of composition and structure of a material which are important for the preparation of a product, the study of its properties, or its ultimate use (Hench 1971: 1). Archaeologists have been aware of the existence of a variety of measures for ceramic characterization and their potential utility in archaeological research at least since the pioneer work of Shepard (1957; see Matson 1952 for a review of earlier studies). Until recently, little use has been made of such measures beyond an increased emphasis on analysis of materials for provenience studies. The neglect of other aspects of ceramic characterization has not stemmed from the inconclusiveness

nor complexity of the methods but rather from the absence of theoretical problems for which such data would be relevant (see Shepard 1966). Most studies have regarded technological aspects of ceramics such as temper, wall thickness and so on as due primarily to idiosyncratic cultural and individual preference. Most ceramic studies have focused on the construction of descriptive typologies as a basis for the establishment of temporal frameworks and cultural boundaries. For such purposes, stylistic attributes often are most easily analyzed and most sensitive to temporal and social variability. Accordingly, archaeological analysis of a cermic collection in such a case would simply provide an additional data appendix which would be both costly and relatively meaningless.

Recent archaeological research has suggested that changes in ceramic technology, such as shifts in types, grades or amounts of temper, have ramifications beyond simple changes in cultural preferences. In the Midwest, Braun has demonstrated a relationship between shifts in temper and types and increased dependence on maize due to physical properties of shell temper which enabled vessels to better withstand repeated heating and cooling cycles which occur in cooking of maize-based stews and gruels. Decreasing thickness of vessel walls through time was another mechanism employed by prehistoric potters to further reduce breakage due to thermal shock (Braun 1978, 1983). Other research has examined the relationship between size grades of temper and vessel resistance to mechanical stress and thermal shock (Steponaitis 1981, 1982a, 1982b). Still other work has pointed out the link between changes in physical characteristics of ceramics and the rise of specialized social and production systems (e.g., Bronitsky 1982, 1984; Rice 1981; Rye 1981).

The study of such production changes involves, first, an analysis of sources of ceramic materials. The shift to specialized production is often manifested in a decline in production sources co-occurring with an increase in the

real distributions of such wares. Ceramics and clay sources are currently undergoing analysis through a variety of techniques, including petrographic analysis, sedimentary analysis, and x-ray diffraction. This analysis will be a first step in understanding the relationship between changes in ceramic technology and the rise of complex societies, for Virginia offers an invaluable data base for the study of the development of social complexity.

Available ethnohistoric and archaeological evidence indicate the Woodland period was one of increasing social differentiation, culminating in the historic Powhatan confederacy encountered by English colonists. This society controlled much of the area below the fall-line and was characterized by inherited ranked statuses and the centralized control of economic production (Turner 1976); some have even called the confederacy a "small-scale monarchy" (Feest 1978: 261). In contrast, contemporaneous societies in the piedmont area above the fall-line were organized into assemblages of relatively autonomous social groups (Mouer 1980, 1981).

The considerable time depth of the Virginia ceramic sequence provides an excellent opportunity to look at yet another aspect of ceramic change, namely the increasing standardization of particular wares and the increasing skill of potters in achieving the standards of acceptability (Rice 1981: 222). Such standardization is a concomitant of specialized production (see Rice 1981; Rathje 1975). Here archaeologists are just beginning to tap the resources of materials analysis (e.g., Rye 1976, 1981; Braun 1982; Rice 1981, Steponaitis 1979, 1981). A vast literature deals with suitability of different clays and materials for differing ceramic functions. There is also an ongoing concern in this field with ceramic products and manufacturing processes, as evident in the literature dealing with characterization of ceramics in terms of factors relating to product function, reliability and durability (e.g., Allen 1968; Azaroff 1963; Coble 1958; Davidge 1969, 1974, 1979; Dinsdale, Camm, and

Wilkinson 1967; Gericke 1974; Grim 1968; Hadden and Sedlacek 1968; Hasselman 1969, 1970; Jones and Berard 1972; Kirchner 1979; Koenig 1949; Norton 1974; Van Vlack 1964, 1968, 1980; Wolkodoff et al. 1968).

Current research at Virginia Commonwealth University has initiated studies of ceramic paste and temper composition, test of thermal shock, impact resistance, hardness and chipping resistance in order to assess changes in technology and ceramic expertise in central Virginia. Studies of modern non-Western potters (e.g., Rye 1981) indicate that, as ceramic specialization develops, potters become more capable of producing vessels technologically designed for different function (see Ericson et al. 1971; Steponaitis 1979, 1981, 1982a, 1982b). Further, as specialized production increases, vessels within the same functional classes should exhibit greater consistency of materials and test performances. Individual potters producing for household consumption generally employ a broader range of clay and temper materials, as well as more variable production methods and design styles. In this research program, the use of petrographic and other methods of provenience analysis, already well established in archaeological analysis (see Peacock 1970 for one review), has already begun to provide a baseline for cross-checking information about specialized production derived from the materials testing program.

Although pioneers such as Shepard called for the use of ceramic technological analyses in archaeological research (e.g., 1942, 1957; earlier studies in Matson 1952), the use of these techniques to provide information beyond provenience data received new impetus in the late 1960s (e.g., Ericson et al. 1971; Matson 1971). Current research has focused primarily on the relationship of vessel function to thermal shock resistance capabilities. Most of these studies, however, have assumed rather than tested links between features such as wall thickness and thermal shock resistance (e.g., Braun 1978, 1983; see Steponaitis 1981, 1982a,

1982b, for an actual attempt to test some of these relationships). Research has already begun to systematically test this link as well as the link between vessel function and differential materials performance.

The Virginia Commonwealth University research program will provide crucial information to archaeologists concerned with function of ceramics, changes in ceramic technology and the nature of these changes in regard to larger changes in socioeconomic systems (e.g., Smith 1980; Steponaitis 1979, 1982a, 1982b; Van der Leeuw 1981; Rye 1971; Rice 1981). Ultimately, this work may enable archaeologists to estimate the fitness of particular ceramic techniques and materials for specific functions. It has the potential to further provide a means of assessing the expertise of particular potters in producing vessels for these functions. Accordingly, it may also begin to resolve some of the confusion of Virginia ceramics by looking at materials and their relationship to different vessel functions in differing socioeconomic contexts (see Mouer and Bronitsky 1981). Through an understanding of changes in vessel composition and performance, we may then be able to relate the array of surface finishes, tempers, paste materials, shapes and rim profiles produced by prehistoric Virginia potters to changes in the social and economic systems of which they were an integral part.

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"Urban Waterfront Sites: Methods in the Mud"

by William Sandy

Abstract

Urban waterfront sites often present serious data retrieval problems. In order to deal with obstacles such as deep fill and high water tables, archaeologists must be ready to utilize the methods and machines of the construction industry. The equipment utilized and safety problems encountered on sites in the Middle Atlantic and Southern New England are presented and discussed.

The archaeologist conducting modern fieldwork must be somewhat of a jack-of-all-trades. In addition to the considerable number of hats worn by the rural archaeologist, the urban archaeologist must wear a few more. Both are involved in a variety of diverse fields like history, social geography, cartography, geology and photography, In addition , the urban archaeologist must be a part-time public relations man, safety officer, and must be familiar with the methods and machinery of the construction industry, in order to support and supplement traditional hand excavation. This paper will examine the methods and equipment utilized on a variety of urban waterfront sites, including the Federal Reserve Bank Site of Baltimore, excavated by Mid-Atlantic Archaeological Research, the Wilmington Boulevard sites excavated by Soils Systems Inc., the Abbott Farm excavations conducted by Louis Berger and Associates near Trenton, and the Providence Covelands sites excavated by Engineering Sciences.

The archaeologist working in the city today faces a series of logistical nightmares. The problems of where to dig, and with what equipment are complex. These problems are compounded in the waterfront cities of New England and the Mid-Atlantic states by the large amounts of fill and reworking of the landscape, and by high water tables. In addition to dealing with historic resources, the urban archaeologist must be prepared to deal with complex prehistoric sites, such as those found in Providence, Rhode Island and near Trenton, New Jersey.

In order to sucessfully understand a site or a portion of a site, one must first understand the natural environment and setting of the site and the interrelationships between natural and cultural

systems.

The concept of studying sites on on such a large scale has been pioneered by the work of Edward Rutsch, and is known as macro-archaeology, or as Rutch prefers "Big Boy Archaeology". One of the basic tenets of "Big BoyArchaeology" is the "Steal a Map" rule. Together with drawings, plans and photographs, the maps form the foundation for all historical archaeological investigations.

- Nowhere are maps more vital tools for predicting possible site locations than in the urban environment. The rural investigator can look for surface indicators like unusual vegetation, ground configurations and surface scatter, but the urban archaeologist has only the written, drawn and photographed records of the past, his wits, and a lot of macadam.

-This 1846 watercolor of the Providence Cove showns the North Shore settlement in the background to the right.

-By the 1850's the cove was contained by an elliptical cove basin, and the railroads were beginning to occupy a considerable portion of downtown Providence. The two sites that will be mentioned later are the North Shore site, here, and the sandy peninsula known as the Carpenters Point Site.

-This is aoSanborn insurance map showing the North Shore settlements,

-and this is a photo with the North Shore in the foreground, during the construction of the Rhode Island statehouse at the turn of the century.

- This slide shows the Carpenters Point site as it appears today.

It is unrealistic to take methods traditionally used on non-urban sites, such as augering and test pitting, and apply them wholesale to urban archaeology. On a recent survey in down town Washington, Paul Inashima of the National Park Service discovered four buried prehistoric sites located along Rock

Creek. Evaluation of a variety of field techniques showed ~~that~~ small test squares and augering to be "..ineffective in detecting artifact presence in conditions where artifacts occur in a buried context and are of limited density.."

On the data recovery of sites of the Wilmington boulevard project in Wilmington Delaware, hand augers were ineffective, and although hand excavated units were used to locate shallower remains, a backhoe was needed to examine deeper deposits.

Those who propose unrealistic excavation methods for urban areas will soon encounter obstacles like macadam and concrete, immovable amounts of fill, mazes of utility lines, and water percolating up from the bottom of their excavations. The urban "Big Boy" archaeologist does his homework with the documents and has heavy equipment available early in the project, before valuable field time is wasted. Selecting the right type of equipment can have a great effect on an archaeological project. Heavy equipment should be available to remove deep fill deposits, so that archaeologists can quickly get down to the business at hand.

Construction equipment of the right type can greatly increase the speed of archaeological investigations. At the Federal Reserve Bank, Baltimore excavations there was certainly no shortage of construction equipment. The upper 15 feet of most of the 3 block site had already been removed for the bank foundations before archaeologists could be brought in. The site contained ~~contained~~ scores of privies, wells, cisterns and other features. No sooner would the archaeological team complete the excavation of a

feature, then it would be removed by some of the 40 pieces of construction equipment excavating for the foundation. Unlike many urban sites, publicity was well handled , and both informed the community and presented the positive side of archaeology. Working as volunteers, local avocational archaeologists got some hands on experience, and the project got skilled excavators who didn't put a strain on the project's rather small budget. So you can see that the urban archaeologist must also wear the hat of a public relations coordinator and reluctant T.V. star.

As in many waterfront cities, archaeological excavations in Providence Rhode Island often encounter deep fill and high water tables, and many archaeologists are not prepared to deal with the problems they present. Several years ago, a team from Brown University attempted to use backhoe trenching and hand excavation to test the site of the first European settlement in Providence. (MAP CIRCA 1800) These methods failed because of water problems and the unstable nature of the fill. The excavations were shut down by the University safety officer after a serious accident resulting from a trench cave in was narrowly averted. A large truck mounted auger was then brought in to test for deep deposits. While the resulting report presented data about 19th century occupation, it failed to provide much information regarding earlier occupations. The problems presented by the deep fill were considered to be insurmountable, given the physical and fiscal constraints.

The Providence Covelands Archaeological Project successfully located important prehistoric and historic archaeological resources, but first, large quantities of maps, drawings and photographs were examined. In fact,the Phase I study consisted

entirely of documentary research. The final Phase I Report included a paleo environmental reconstruction and a series of overlays based on a collection of maps. The presence of deep fill makes small scale testing difficult in urban waterfront areas. A document search proved to be the more expedient way of predicting possible site locations. 1827 VIEW OF COVE

Phase II testing concentrated on 7 areas pinpointed through examination of the extensive documentary record. Phase II testing began in December 1981 . It had to be accomplished quickly in spite of the deep fill, logistical constraints and the New England winter weather. In several locations, sites were predicted to exist under fill of five to ten feet and more. Our ability to find and study the cultural resources of the project area was dependent on the ability to move large amounts of fill quickly, and to control the substantial water problems we encountered.

P.C.F To quickly remove deep fill we used a Case Extend-A-Hoe, which can excavate several feet deeper than a regular backhoe. Luckily for us, it was driven by an Operating Engineer with over 30 yearsof construction experience. The importance of a skilled operator to the success of an urban archaeological project can not be over emphasized. In addition to doing a superb job of equipment operation and planning, he also supplied the expertise needed to overcome the water problems of several test locations. To quote New Jersey's first archaeologist, Charles Abbott "The practical knowledge of a contractor whose business it is to excavate for cellars, sewers, and other work necessitating removal of large quantities of sand, gravel and clay, is of real value and should be given the consideration which it deserves;"

CF?

On the Covelands data recovery, most of the fill was removed

by the same Operating Engineer, this time operating a Dyna-Hoe, a backhoe with an especially large bucket and loader. Note the blade welded onto the backhoe bucket to give a smooth cut. Another piece of heavy equipment that was used was the Gradall. Not to be confused with the Grader, or pan, the Gradall has an extendable arm, which can move large amounts of soil accurately, even in confined areas. When great amounts of soil were to be moved, the Gradall was assisted by the the backhoe or a Payloader.

The road grader, or pan, is a machine of relatively little use to the urban archaeologist, and should not be used in wet areas or those with clay soils.

TO GIVE YOU AN IDEA ABOUT THE AMOUNT OF FILL INVOLVED

These are a few of the machines archaeologists can use to remove the large amounts of fill covering urban sites. We should know the strengths and limitations of each.

It has long been known that prehistoric sites occur well below the water table. In describing aboriginal shell heaps, Charles Abbott stated that the "..base of more than one well-defined heap has been found to be at least four or five feet below low-water mark." (Abbott 1907;60).

At the Koster site, wells were used to lowerethe water table to permit deep excavations to continue. Stuart Struever has criticized archaeologists for their unwillingness to use new methods and machines to aid excavation.

On two sites in Providence, through the use of pumps,we were able to lower the water table and excavate sites that for all intents and purposes, WERE underwater. A series of gravel packed sump holes were established in lieu of the much more expensive wells that were used at Koster. Most of the water was removed by a Mudsucked gas pump.

The Mudsucker easily passes the silt and sand that clogs other types of pumps. We also used electric pumps that were designed with a special feature to pass silt and sand. Water from the pumps was used to speed up the sifting process.

Screens are, of course , the dominant tools for the recovery of archaeological materials, and their efficiency can be a major factor effecting the speed and efficiency of excavation. Factors effecting screening speed and efficiency include: soil type, screen mesh size, amount of agitation and the availability of water. - An immovable screen like this, while O K for water screening is just about useless for dry screening.

Stanley South demonstrated the value of gas-powered mechanical screens through his discovery of the Spanish site of Santa Elena. His test excavations were done on a very limited budget, and the discovery of the site is at least in part due to the fact that the screen could rapidly sift large amounts of soil. -This mechanical screen, dating to the Middle Woodland, was used with great success by Alan Mounier at a variety of sites in Sothern New Jersey.

Recent experiments by Kalin have demonstrated the importance of using fine mesh screens, and clearly the use of 1/8 " and 1/16" screens is required to assess the amount and type of lithic debris passing through the ubiquitous 1/4" mesh screens.

S. Payne has shown that water screening is more efficient than dry screening, and in many instances, water is almost required if 1/8" mesh is used.

In Providence, pumps and wells were often used to supply water for water screening. In addition, more simple methods of water screening were developed. These tripod shaker screens were used as both wet and dry screens, using wheelbarrows as water sources. In these ways , soils from both Providence Covelands sites were sampled with 1/8" and 1/16" mesh screens. In addition, a good sample of a variety of material was recovered through flotation, including small lithics, bone, fish scales , and charred seeds. Flotation equipment of this type uses water flowing under pressure to seperate these materials from site soils. Chemicals are not required, and these devices are capable of processing very large amounts of soil. For example, at both the 1981 Delaware Park Site excavations and during the most recent field season on the Abbott Farm, over 10,000 liters of site soils were processed through flotation.

In Practicing Environmental Archaeology, Rodger Moeller has refuted the excuses of archaeologists who do not use flotation. Now that simple flotation devices are commercially available, there is one fewer excuse.

Here I am doing "bucket flotation" in a tiny stream on the Route 55 project in Gloucester County N.J. The most common mistake made when using this method is that the dip net is often not fine enough to recover very small seeds.

Urban archaeologists are often under pressure to complete fieldwork as quickly as possible, and can not afford delays due to weather. Some protection from rain can be obtained by using plastic as tarps. This 12' wide greenhouse, available commercially, proved ideal for inclement weather because it was lightweight, portable,

quickly assembled, and relatively inexpensive, especially when compared to the cost of down time. This larger, 24 foot diameter, dome shaped greenhouse was designed and built by Bob Copley and myself, covered a much greater area. Here it is seen protecting an entire early 19th century foundation. Together, these two greenhouses just about prevented delays due to bad weather.

Simpler, less expensive structures were used on the most recent excavations on the Abbott Farm. Here are a couple of huts constructed of PVC plastic pipe, in use at the Gropp's Lake Site. Total cost was about $40. per unit. This slide shows a much larger variant of the PVC huts, constructed on the sloping Slump Block of the Carney Rose Site. Here is a simple A-frame structure, built of 2 by fours in use at the Carney Rose Site.

Kerosene salamander heaters are most commonly used to heat winter excavations. Their drawbacks are that they require electricity and can make an enclosure too warm, although the latter problem can be eliminated through the use of a thermostat. Kerosene radiant heaters do not require electricity and provide excellent supplemental sources of heat and light. Materials that can be used to insulate the ground against freezing include hay, fiberglass insulation, and garbage bags filled with leaves.

Of course, even with heaters and greenhouses, excavations in sub-freezing temperatures are substantially less efficient and more expensive than excavations during other times of the year, and should be avoided whenever possible.

~~ANOTHER~~ A major concern of the urban archaeologist is the maze of utility lines, both active and relict, which underlie most urban areas. A project area may appear rather sizeable, but when the locations of sewer, water, gas, electric, and other lines are considered, the area where excavations can be safely located can be very limited. Anyone excavating in an urban area should notify the local utility companies. Some states have one toll-free number which will alert all the concerned who have utilities in your project area. That is, all that they know of. It is not too uncommon, unfortunately, to encounter active lines which haven't been acurately recorded. While

excavating in an old railyard, we encountered live signal lines in an area ~~they~~ THAT AMTRAK had assured us was free of lines. Amtrak then brought in a cable tracing machine to determine the position of the lines we found and assure us there were no more in the area.

Safety should be a major concern, if not an obsession of the urban archaeologist. Some of the major hazards presented by urban excavations include the danger of cave-ins caused by unstable fill and high water tables as well as the hazards associated with working with construction equipment. Everyone working on the Providence Covelands Project had to attend a wide ranging safety orientation presented by a safety expert. This was supplemented by an in-depth safety lecture presented by the archaeological staff. This presentation covered,in detail, how to keep excavations safe, how to behave around power equipment, and other safety related matters. The importance of safety and safety orientations can not be overemphasized. No one wants to work on a project where someone is killed or hurt. In the construction industry, weekly safety meetings are not unusual. Until safety is covered in the classroom along with archaeological methods, it is the duty of anyone running an urban site to become familiar with safety procedures and to discuss them with everyone on site.

While there are numerous logistical problems presented by city archaeology, it also has certain advantages. Nearby buildings can be utilized for the urban equivalent of aerial photography. ~~Backhoe~~ LADDERS ~~buckets~~ are rapidly replaced BY BACHOE BUCKETS ~~ladders~~ as the favorite mode of obtaining photographs from above a site. The use of perspective correction lenses can eliminate much of distortion from these shots.

The Providence Cove Lands Archaeology Project is part of the multi-million dollar Capital Center/Rail Relocation/I-95 Interchange Project. Naturally, a project of this magnitude involves numerous government agencies and private concerns and numerous subcontractors. We ~~have~~ developed an excellent working rapport with many of these subcontractors, and it has worked to our mutual benefit.

The C. E. Maguire Co. and others have contracted for dozens of test borings in the project area in the last ten years. Boring data was used extensively in the Phase I Archaeological Survey to asses possible test locations, depth of fill, and water conditions. Although a useful tool, boring records are certainly not without their limitations and innacuracies. The supervising geologist is not particularly attuned to cultural remains. Water table levels are only as reliable as the reading is recent, i.e. seasonal variation & drought. During Phase II and III of the Cove Lands Archarological Project, archaeologists from ~~Debeuw, Cather/Parsons~~ ENGINEERING SCIENCES ~~have~~ monitored many of the borings in the area of what was the Great Salt Cove.

KOS 18th cent

Peat samples recovered from the borings were radiocarbon dated to establish the date of the formation of the salt cove. In addition, other organic sediments were also dated in order to to supply some absolute dates for the creation of a pollen column. Palynological Analysts, of Colorado analyzed pollen ~~samples taken~~ from many of the boring samples. A large body of climactic and vegatative data was obtained for a modest capital outlay. In the pollen record we were able to document the effect of human influence on the vegetation in early historic times.

Many of the proposed test borings could not be completed in their predesignated positions because they were obstructed by the numerous railroad related foundations beneath the parking lot NEAR ~~SOUTH OF THE~~ STATEHOUSE. This is the proposed location ~~for~~ will be THE SITE OF the new train station and parking garage. The structures are to be built on precast concrete pilings, so the obstructions presented by the old foundations and turntables worried the engineers. For the first time, many of them began to see a value in archaeology, as they came to us asking for old maps and the results of our excavations. In order to accurately assess the amount of demolition required before pile driving, and its cost, engineers from Mueser, Rutledge, Johnston and DeSimone decided to initiate a series of backhoe test pits. In addition to the ~~MRJD~~ geologists, engineers, the excavations were also monitored by the DC/P archaeological staff, who supplied information AND interpretations, ~~and a signboard~~.

~~This is a portion of a massive car house constructed by 1880.~~

Archaeologists have traditionally been at odds with the construction industry. ~~They were~~ ARCHEOLOGISTS often viewed CONSTRUCTION PERSONNEL as people only concerned with their deadlines and contracts, and with no regard for the past. Conversely, we were viewed as eggheads who did something of no particular value, and were ready, at the drop of a trowel, to stop a multi-million dollar project to protect some old pottery. I HOPE THIS TALK DEMONSTRATES Experience in the cities of the ... FOR ~~[illegible]~~ THE BENEFIT OF ... the deep fill

Stewart

LATE ARCHAIC PROJECTILE POINTS IN THE MIDDLE ATLANTIC: WHAT'S IN A NAME?

Discussion paper for the Friday evening workshop,
1984 Middle Atlantic Archeological Conference
Rehoboth, DE

June Evans
The American University

March 1984

"Look at it this way also: do not the same stones or sticks appear equal to one person and unequal to another?"

Plato, 4th century B.C.

Introduction

In a paper presented at last year's MAAC I identified four "problem areas" or topics of concern in Mid-Atlantic contract archeology. One of these is the organization of our prehistoric data base to better meet the interpretative needs of both CRM and basic research:

> The first thing that needs to be done is to standardize the typologies of our diagnostics: projectile points and ceramics. This seems to be a problem that causes a great deal of frustration and vexation, at least vocal, not only among ourselves but among those who come from outside the Mid-Atlantic region to work here. It is time to stop ducking this issue. We need more than type names that reside mostly in the heads of people who either coined the terms or have their own mental templates of what they mean... we certainly need more accessible sources than unpublished draft manuscripts. We need a consensus, an up-to-date sophisticated and comprehensive system we all agree on, for describing and classifying our diagnostics...I would like to propose that the MAAC begin again to tackle this problem of standardizing typologies, this time in real earnest. For a beginning, let's seriously consider a Friday evening workshop on Archaic period projectile pointstypes for next year's MAAC (Evans 1983:3).

In response to this, it was agreed at the MAAC business meeting last year that I would coordinate a Friday evening workshop/discussion session on Archaic point types at this year's MAAC in April. This short working paper is offered as a departure point for discussion in that session and a first step toward addressing the problem area described above. The Late Archaic period, arbitrarily defined as the period from approximately 4000-1000 B.C. (following Fitzhugh (1972), Steponaitis (1980), Wesler (1983) and others) has been chosen for discussion because the number and variety of points associated with it have proven particularly bewildering to deal with.

The paper has three goals. The first is to pull together in one place brief descriptions of the most commonly accepted named Late Archaic projectile points"types" in the Mid-Atlantic. The second is to stimulate some discussion about whether or not we accept these names as "types" and, if so, what kind(s) of types. The third goal is to make some suggestions about how we can move beyond initial description and classification of points to typologies which are useful for interpretive purposes.

Point Descriptions

I begin in this paper with the premise that there are Late Archaic point "types" which we have named and which are so commonly accepted in the literature of the Mid-Atlantic that they are used without description or definition in reports, articles, site forms, etc. As such, they seem to represent accepted data descriptors used as if we all had a "mental template" of a form wach conjures up for us when we hear its name. The points in Table 1 are drawn from the lists and descriptions in several widely-used sources, including Ritchie (1961), Kinsey (1972), MacCord and Hranicky (1979) and Stephenson and Ferguson (1963). Also referred to are Maryland Historical Trust and Fairfax County Archaeological Survey data recording forms, two listings with which I am particularly familiar and which include between them most of the Late Archaic points in the Mid-Atlantic region. Each point name appears in at least two of these references. This list is by no means all-inclusive but does seem to represent the major Late Archaic point names in the Mid-Atlantic.

I'm sorry to hear that this is widely used in Virginia or anywhere else.

Coe? Funk?

With each brief written descriptive summary on the pages which follow is a sketch which attempts to be a composite drawing of a "typical" point form of that name. Ideally, reproductions of photographs from the original sources should accompany these to show the range of variation in form for each point described, but this was not possible for this paper.

TABLE 1

Late Archaic point type	Ritchie (1961)	Kinsey (1972)	Stephen. & Ferg. (1963)	MacCord & Hranicky (1979)	Md. Hist. Trust	Fairfax County
Piscataway			x		x	x
Otter Creek Side-Notched	x	x			x	x
Vernon			x		x	
Halifax				x		x
Brewerton Side-Notched	x	x		x	x	x
Brewerton Corner-Notched	x	x		x	x	x
Brewerton Eared-Notched	x	x		x	x	x
Brewerton Eared-Traingle	x	x		x	x	x
Vosburg	x	x				(x)*
Lamoka	x	x		x		x
Holmes					x	xx
Bare Island	x		x**			
Lackawaxen		x				
Clagett			x		x	x
Normanskill	x	x				x
Savannah River Stemmed				x	x	x
Koens-Crispin/Lehigh		x			x	
Susquehanna Broadpoint	x	x		x	x	x
Perkiomen Broadpoint	x	x			x	x
Orient Fishtail	x	x		x	x	x
Dry Brook Fishtail		x			x	

*listed with Brewerton

**McNett says these are Holmes

PISCATAWAY

Characteristics: small, narrow, thick point with rudimentary shoulders, sharp tip, contracting stem, and pointed or rounded base; well-made by pressure flaking (Stephenson and Ferguson 1963:146); "tear-drop shaped" (Handsman and McNett 1974:6); McNett (n.d.) sees 3 varieties of this type: a small thin quartz and occasionally quartzite variety; one which is similar but typically broader with a slight rounded stem; and a larger, thicker rhyolite version.

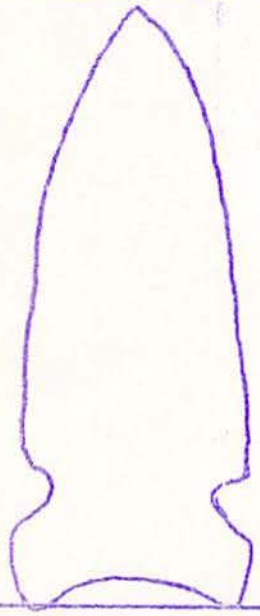
Dimensions: Length - 24-58 mm; width 10-30 mm

Material: Typically quartz; also quartzite, rhyolite (Piedmont)

Dates: No good C^{14} dates; stratigraphically below Vernon at Fraser site in Potomac Valley; estimated 4000-3500, 3000 B.

(see also MacCord and Hranicky 1979:43)
I'm not familiar w/ this ~~[illegible]~~ site. It looks as if they had Morrow Mountain points there.

OTTER CREEK SIDE-NOTCHED



Characteristics: large and thick, roughly made, with a narrow to medium width blade, pronounced side notches, round to square tangs and a concave or straight base. Bases and tang edges are often ground (Ritchie 1961:40-41; Kinsey 1972:407)

Dimensions: Length - 57-114 mm; width - 2-3 times as long as wi

Material: quartzite, local cherts (flints), siltstone, slate

Dates: NY - 3780±110 B.C.; 4340±100 B.C.; 4610±100 B.C.

VERNON

Characteristics: short, thick, wide point with pronounced shoulders, constricted stem and expanded straight base; crudely to moderately well-made by percussion chipping and pressure flaking (Stephenson and Ferguson 1963:144); side-notched (Handsman and McNett 1974:6; notching and basal shape more variable than in Coe's Halifax, which is very similar (Wanser 1982:95); bases may be concave, straight or rarely convex (McNett, n.d.)

Dimensions: Length - 24-49 mm; width 16-30 mm

Material: most often of white quartz; also quartzite, occasionally shale, chert, argillite

Dates: VA - 3170±160 B.C.; stratigraphically below Holmes; Estimated 3500-2200 B.C.

Wading River?

HALIFAX

Characteristics: slender blade with slightly restricted base and shallow side notches; base and side notches usually ground (Coe 1964:108); frequently a thick point (MacCord and Hranicky 1979:33)

Dimensions: Length - 25-62 mm; width - 17-25 mm

Material: usually vein quartz; also quartzite, argillite, rhyolite, rarely chert or jasper

Dates: NC - 3490±350 B.C.; 2330±350 B.C.

↖ This one seems like it might be too recent, based on the placement of Halifax points and hearths below a separate Savannah River stratum.

BREWERTON SIDE-NOTCHED

Characteristics: broad, thick, side-notched points, medium-sized; slightly excurvate traingular blade, basally expanded stem sometimes with "ears"; base straight, slightly convex or less often mildly concave; base often ground smooth (Ritchie 1961:19)

Dimensions: Length - 18-100 mm; width - 1¼-2 times as long as wide

Material: local cherts (flints) preferred; rhyolite, quartzite; quartz and jasper in VA (MacCord and Hranicky 1979:31)

Dates: NY - 3780±110 B.C.; PA - 2350±180 B.C.

See also Kinsey 1972:404-405

BREWERTON CORNER-NOTCHED

Characteristics: broad, thick, corner-notched point, with slightly excurvate traingular blade; corner notches form prominent barbs; expanded base straight, slightly convex or rarely slightly concave, often ground smooth Ritchie 1961:16)

Dimensions: Length - 20-80 mm; width - 1½-2 times as long as wide

Material: local cherts (especially black flint) preferred; rhyolite, quartzite; quartz and jasper in VA (MacCord and Hranicky 1979:31)

Dates: similar to Brewerton Side-Notched

See also Kinsey 1972:405

BREWERTON EARED NOTCHED

Characteristics: broad, thick, weakly sidenotched, small to medium sized; broad base with flanges that extend beyond blade edges and have been chipped into small delicate "ears"; ears and base are sharp, base mostly concave; occasionally ears and base ground smooth (Ritchie 1961:17).

Dimensions: Length - 20-60 mm; width - 1½ - 2 times as long as wide

Material: local cherts (flints) preferred; rhyolite, quartzite; quartz and jasper in VA (MacCord and Hranicky 1979:31)

Dates: PA - 3230±200 B.C. (Kinsey 1972:406-7)

BREWERTON EARED TRAINGLE

Characteristics: relatively thin, isosceles triangular points, small to medium sized; small delicate chipped ears on either side of base, which is slightly concave or infrequently straight, sometimes ground smooth (Ritchie 1961:18); edges more excurvate than on Brewerton Eared-Notched (Wanser 1982:96)

Dimensions: Length - 20-55 mm (longer on Patuxent examples Steponaitis 1980:41); width - 1½ - 2 times as long as wide

Material: local cherts (flints) preferred; rhyolite, quartzite, argillaceous shale; quartz and jasper in VA (MacCord and Hranicky 1979:31)

Dates: similar to Brewerton Side-Notched

See also Kinsey 1972:406

VOSBURG

Characteristics: medium sized, broad, relatively thin point; edges may be slightly serrated; small to medium corner notches on a short stem with straight or slightly concave base usually ground smooth (Ritchie 1961:55); has shorter stem, smaller notches, weaker barts than Brewerton Corner-Notched (Ritchie 1961:16)

Dimensions: Length - 25 - 70 mm

Material: cherts (flints) preferred; argillite, quartzite, jasper, shale, quartz

Dates: NY - 2780±80 B.C.; 2524±300 B.C. (Kinsey 1972:402)

HOLMES

Characteristics: long, narrow, thick with rudimentary shoulders and a straight or converging stem and straight, rounded or concave base. A few have slightly expanded stems (Wanser 1982:96; Handsman and McNett 1974:6) Stephenson and Ferguson (1963:141-2) call these Bare Island points.

Dimensions: Length - 45-100 mm; width - 16-30,mm

Material: typically quartzite; rarely quartz or shale

Dates: VA - 2155±85 B.C.; 1955±95 B.C.

BARE ISLAND

Characteristics: medium to large finely flaked, symmetrical poin ts having slender isosceles traingular blades; straight parallel-sided stem and straight base; shoulders angled,,not conspicuously rounded as on similar Poplar Island points; often traces of grinding along stem edges and at base (Kinsey in Ritchie 1961:14-15)

Dimensions: Length - 30-100 mm (average 55 mm); width - one half to one third total length

Material: chiefly quartz; siltstone, quartzite, rhyolite, argillite

Dates: NY - 2200 B.C.

See also MacCord and Hranicky 1979:36

LACKAWAXEN

Characteristics: long, narrow blade, stemmed point; most bases straight to convex and possibly smoothed; 3 subtypes: (1) expanded stem - straight to mildly excurvate blade edges, rounded shoulders; (2) straight stem - mildly excurvate blade edges, rounded to shrply barbed shoulders; (3) converging stem - some have irregular edges (knives?); rounded shoulders (Kinsey 1972:408-10)

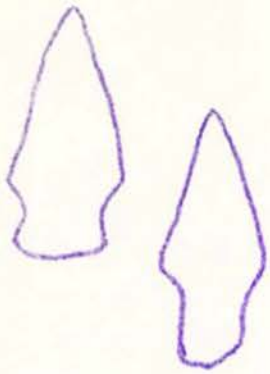
Dimensions: Length - 35-100 mm; width - 2½ to 3 times as long as wide

Material: shale, argillite, argillaceous shale

Dates: PA - 1710±120 B.C.

Kinsey suggests that converging stem subtype is earliest, expanding the latest.

LAMOKA



Characteristics: small, narrow thick points with weak to moderately pronounced side notches or straight stemmed with slight, usually sloping shoulders; base has thick unfinished appearrance; is straight, oblique or slightly convex, thick, crudely shaped (Ritchie 1961:29)

Dimensions: Length - 20-65 mm; width - 2 to 3 times as long as wide

Material: cherts, quartzite, quartz, jasper, rhyolite, argillite - generally local materials

Dates: NY - 3433±250 B.C.; 3430±700 B.C.; 2020±100 B.C.; 1930±100 B.C.; 1890±100 B.C.; 1800±95 B.C.; 1700±700 B.C. and a large number of other dates clustering around 2500 B.C.

See also Kinsey 1972:421 and MacCord and Hranicky 1979:22

CLAGETT

Characteristics: a long, slender, thick point with pronounced shoulders, constricted stem and expanded, straight or concave base. Well-made by percussion chipping; similarities to later Orient Fishtail (Stephenson and Ferguson 1963:142-143). Wanser (1982:96-97) suspects this may be a catch-all category for a variety of side-notched points, given the variation

Dimensions: Length - 43-89 mm; width - 15-29 mm

Material: quartzite; rarely quartz or argillite

Date: Estimated 2200-1900 B.C.

Who the Hell uses this type!?!
Why is this book used so heavily as a reference when the context of most of the types at the site is bunk?

NORMANSKILL

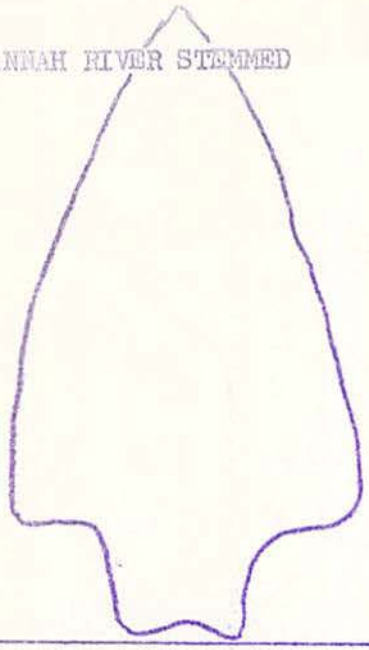
Characteristics: slender, thick straight-edged points of medium size with prominent side notches; base expanded with straight or very slightly concave edge; some have asymmetrical shoulders (one acute, one obtuse) (Ritchie 1961:37; Kinsey 1972:414-15)

Dimensions: Length - 36-70 mm; width - 2 to 3 times as long as wide

Material: local cherts (flints) preferred; argillite; chert; argillaceous shale

Dates: PA - 1440±100 B.C.; 2030±160 B.C.; 1940±120 B.C.
NY - 2210±140 B.C.; 1930±100 B.C.; 1820±125 B.C.; 1735±100 B.C.; 1660±95 B.C.

SAVANNAH RIVER STEMMED



Characteristics: large, thin, broad bladed points with straight squared stems, concave bases, straight shoulders at right angles to stem (Coe 1964:44)

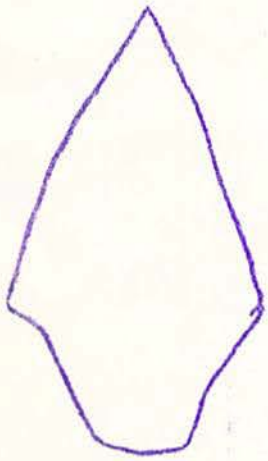
Dimensions: Length - 50-175 mm; width - 35-70 mm

Material: rhyolite, andesite, argillite (NC); also quartzite, quartz (VA) (MacCord and Hranicky 1979:32)

Dates: NC - 1944±250 B.C.

These are dates throughout the southeast from Georgia to the mountains of N.C. that are older than this. A few are ca 3,000 B.C. With respect to the NE, the younger dates are probably more relevant, however.

KOENS-CRISPIN BROADSPEAR/LEHIGH



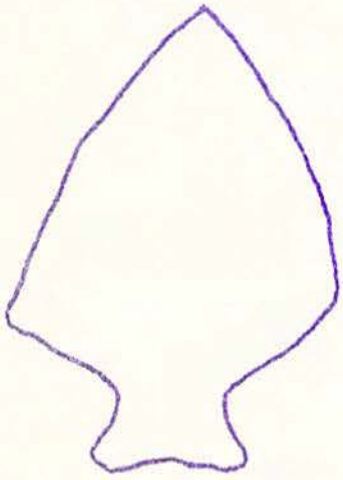
Characteristics: well-made, broad, slightly asymmetrical points with wide trapezoidal stems; shoulders sharp or rounded; base edges mostly convex, some straight, with grinding frequent on chert and jasper specimens (Kinsey 1972:423)

Dimensions: Length - 45-90 mm; width - 30-45 mm

Materials: argillite, jasper, chert, quartzite (MD)

Dates: PA - 1720±100 B.C.;
NJ - 1720±120 B.C.

PERKIOMEN BROADPOINT



Characteristics: very broad, thin, boldly flaked points of semi-lozenge shape, often very asymmetrical; blade often offcenter in relation to stem; shoulders may be somewhat acute or obtuse, thin and sharp, carefully retouched, rarely symmetrical; stem always constricted, base expanded, with edge convex or straight; stem often small with rounded corners, sometimes with ground edges (Witthoft in Ritchie 1961:42-43)

Dimensions: Length - 50-100 mm (or more); width - half as braod as long

Material: PA jasper, rhyolite, cherts

Dates: PA - 1720±120 B.C.; 1620±100 B.C.; 1500±120 B.C.
NY - 1475±95 B.C.

(Kinsey 1972:426-7)

SUSQUEHANNA BROADPOINT

Characteristics: broad, boldly flaked points, roughly semi-lozenge to rough corner-notched shape; frequently not symmetrical; shoulders jut in an angular fashion, forming an obtuse angle, sometimes somewhat rounded, always thin and sharp; stem is constricted, always with concave base and acute, prominent ears; all tang edges ground smooth (Witthoft in Ritchie 1961:53)

Dimensions: Length - 40-100 mm (a few larger); width - half as braod as long usually

Material: rhyolite, especially; local flints, quartzite (MD)

Dates: PA - 1650±80 B.C.
NY - 1330±90 B.C.

See also Kinsey 1972:427-30

ORIENT FISHTAIL

Characteristics: slender, gracefully formed point of medium size, with narrow lanceolate blade with sloping shoulders merging into a flaring, "fishtail" shaped or sometimes straight stem; wide shallow side notches may be asymmetrically shaped; ears sharp and pointed or rounded (Ritchie 1961:39; Kinsey 1972:432-3)

Dimensions: Length - 40-75 mm; width - 14-28 mm

Material: quartz, quartzite, cherts (local flints), jasper, argillite, rhyolite, shale

Dates: NY - 1043±763 B.C.
PA - 1220±120 B.C.; 1170±120 B.C.; 810±B.C.

See also MacCord and Hranicky 1979:30

DRY BROOK FISHTAIL

Characteristics: moderately broad to narrow points; distinct, wide shallow side notches, though some have moderately deep notches; shoulders well-defined, ranging from sharp to rounded, may be asymmetrical; ears rounded and rarely sharp; bases straight to mildly concave, often ground (Kinsey 1972:430-31). Dry Brook similar to Orient but broader, with more prominent shoulders and wide shallow notches

Dimensions: Length - 28-70 mm; width - 15-28 mm

Material: non-local cherts, flints preferred; rhyolite (MD)

Dates: PA - 1280±120 B.C.; 1170±120 B.C.
NY - 1250±100 B.C.

What do the Point Names Represent?

Do we accept these names as valid categories? That is, are the "mental templates" in our heads such that we can consistently categorize points according to the names we've given them?

At the Friday evening workshop we will attempt to address this by performing an experiment which asks participants to take a series of Late Archaic points and assign each to one of the named categories on the list above, or to some other or unnamed category. If a large number of people consistently put the same points in the same categories, we can begin to get an idea of how accepted and valid these categories as categories are to us.

If most of these categories are valid (and I suspect they are, or they wouldn't have gained such wide use over the years by professional and amateur archeologists alike in the Mid-Atlantic), on what terms can we accept them as "types"?

Perhaps we should first look at what we mean by type. Type can be defined in a number of ways; indeed, the concept and usefulness of types and typologies have been the subjects of much debate in archeology for years (cf. Spaulding (1953), Ford (1954), Rouse (1960)). For this discussion I will define type as Hill and Evans (1972:233) do:

> It type refers to the division of an assemblage of materials or events into groupings based on the consious recognition of dimensions of formal variation possessed by these phenomena. A 'type', then, is a group that has been formed on the basis of a consistent patterning of attributes of the materials or events and it is distinguished from other types, which are different patterns of attributes.

As Thomas (1979:213) points oout, types are "abstract forms, ideal constructs created by the archaeologist to facilitate analysis", and there are many types of types. What type(s) we devise depends on our purpose for classification. Stweard (1954:54-57) designated four types of types, which provide a useful framework for our discussion:

1. morphological type - based solely on form, i.e., physical or external properties; also called descriptive type
2. historical-index type - also defined by form, but reflecting differences in time; this type has chronological significance, is a time-marker; also called temporal type
3. functional type - again defined largely by form, although less obvious attributes may also be important; based on use or function
4. cultural type -"represents a classification of whole cultures in terms of the functionally most important features" (Steward 1954:57)

At one level the point names we use in the Mid-Atlantic are certainly morphological/descriptive types. Attributes of size, raw material and shape play a large role in differentiating one type from another. A study of the point descriptions and a glance at the sketches demonstrate this. However, the ultimate question is how do we lmake our types the most useful in interpreting data, in providing our basic tools of analysis. Obviously, descriptive/morphological types are only a first step; the types we recognize, and have named, in the Mid-Atlantic are surely more than just descriptive. But how much more? Beginning with a consensus that we may have some valid types (those we have named) we need to carefully and completely describe them, using statistical tests of metric variation to document distinctions, so that we can go well beyond the brief descriptions and sketches in this paper to know more about kinds and ranges of variation.

Then we need to put these types in a chronological framework by regions, using dated stratigraphic contexts to do so. Some dates are given with the type descriptions; many more must be out there in the literature. With tighter descriptions and confirmed dates in hand, we can then look at other components of the assemblages, as well as at environmental variables. Fitzhugh (1972:3) points out that these "may be just as, and sometimes more, meaningful as points are in yielding additional information on technology, typology, function and subsistence adaptation". At a higher level of definition point types must take into account the cultural and social matrix of the associated artifacts, yielding what Thurman (1971:56) referred to as "activity types", categories which can include function, choices, style, etc. The ultimate step is to move beyond this to cultural types, diagnostic of cultural systems. ?

At this point in time, however, I think we are still at the level of morphological/historical-index typologies in the Mid-Atlantic, since we are still trying to work out regional sequences. Simplification and standardization of point type sequence can lead to testable model tools of analysis, such as the one Wesler has presented in his recent paper "Typology and Sequence in the Maryland Archaic" (1983). It should be possible to standardize our projectile point types if we can agree on what attributes to record to give us useful space-time markers. Obviously this can range from the comprehensive attribute recording systems of Binford (1963) and Benfer (1967) to the more simplified system of recording a limited number of raw material, haft, base, and blade attributes that Mike Johnson uses, in conjunction with commonly accepted type names, for his Fairfax County Archaeological Survey computerized data management system. For quick recording of data in large assemblages or collections and later comparisons, Mike's system works quite well, although I think I would add some size attributes to his list. A good feature of this system is that it allows for the recording of all kinds of points, including those which don't fit under the named types.

We should constantly keep in mind that there is no such thing as a best or true type, except as it pertains to the question or hypothesis we are concerned about. In other words, types should not be considered as static, but as subject to change and refinement as our questions and needs change. If our immediate concern is with how to put some order into our data to help us sort out regional sequences, then we can begin by agreeing on some valid point types, such as those described and illustrated here, which we carefully characterize morphologically and chronologically. When we move beyond these normative and space-time comparisons, we will undoubtedly need to construct different types and typologies with different sets of attributes.

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← Why are dates and types from this volume not given as primary references? I hate to see them 2nd hand in the VA p. point guide which is an abortion.

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Stewart

IRONSTONE EXCHANGE SYSTEMS OF THE UPPER DELMARVA PENINSULA

by

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ABSTRACT

Ironstone, a sedimentary iron-cemented sandstone, is found in a series of restricted outcrops throughout the Upper Chesapeake Bay region, including the upper Eastern Shore of Maryland. Recent analysis, including field surveys, excavations, and the examination of collections, shows the existence of specialized quarry/production sites on the Eastern Shore of Maryland and a trade and exchange network that moves the ironstone artifacts eastward to the Delaware Bay, northward into the Pennsylvania Piedmont, and southward into the Choptank and Nanticoke drainages. Projectile point styles indicate a terminal Late Archaic/ Early Woodland date for the exchange system. Both finished tools and bifaces in various stages of reduction are the items of exchange. The exchange network appears to be similar to that of low-level argillite and rhyolite networks.

Paper prepared for the symposium "Trade and Exchange Systems in the Middle Atlantic Region" at the 1984 Middle Atlantic Archaeological Conference, Lewes, Delaware.

IRONSTONE EXCHANGE SYSTEMS OF THE UPPER DELMARVA PENINSULA

INTRODUCTION

This paper is a summary of the preliminary findings of ongoing research into the patterns of ironstone procurement and utilization in the Upper Delmarva Peninsula. The project was sparked by the discovery and systematic investigation of a major quarry and reduction site for this material on Herring Island (18 CE 146) along the eastern shore of the Elk River, a northeastern tributary of the Upper Chesapeake Bay (Ward 1984). Although this lithic material was a well known component of archaeological assemblages throughout the Upper Chesapeake region, this site was the first verified source of the consistently high quality raw material that was evident in artifact collections. This limited natural distribution of a raw material contrasted with the widespread distribution of the material in prehistoric cultural contexts suggested some form of an exchange system (Ward 1982). In order to compile a body of empirical data with which to test the exchange hypothesis the Ironstone Project was initiated. This paper is intended to present the preliminary results of this investigation and suggest directions for continued research.

In detail, the Ironstone Project to this point has consisted of 1) basic research into geological constitution and natural distribution, 2) a subjective analysis of unique physical properties and their significance to the sourcing and artifactual analysis, 3) an outline of the archaeological data from the Herring Island quarry/reduction site (including discussion on intra-site patterning, lithic procurement and reduction strategies), 4) An analysis of the distribution of constituent sites in the Upper Delmarva Peninsula (including discussion of regional distribution, artifact patterning, intra-site spatial analysis), 5) a short discussion of regional cultural context and general exchange models and 6) recommendations for further research. This preliminary research strategy is an attempt to address the program for exchange analysis outlined by Earle and Ericson (1977).

Ironstone Background

Ironstone is the generic name assigned to the iron-cemented sandstone commonly utilized for lithic tool production. Geologically, these ferruginous minerals represent zones of porous sedimentary sands which have been lithified by the precipitation of iron oxide or carbonate. In all probability, the material which represents the most useful lithic resource are the hematite cemented structures of the Potomac Group and the overlying Magothy Formation (Doyle 1983). While various iron-cemented sandstones form the majority of the bedrock for the entire peninsula, this study focuses on the limited outcroppings of the completely lithified, fine-grained material exposed in the extreme northeastern drainages of the Chesapeake Bay. It is not that these formations are the only possible sources of artifact quality ironstone; however, they are sources of demonstrable accessibility and relatively consistent high quality. The characteristics discussed for these sources and their related sites are only presented as an example of patterns which might occur on a larger, and as yet unrealized, scale.

At this time, the exact mineral identity of the prehistorically utilized material is not clear. For this reason the use of the commonly understood term of ironstone seem advisable. The lack of a clear definition of this material has lead to confusion within the literature and data record. The common reference to the material as ferruginous quartzite has often lead to a lumping of ironstone within quartzite counts in artifact and site records. The fact that the material represent a minority component in sites outside the direct access zone often relegates it to the obscurity of the "other" column. Additionally, this material has been referred to as "tough-stone" informally, and siderite in the professional literature. These identity problems, coupled with the varying levels of accuracy and completeness of the survey record for sub-areas of the study area, has limited the quantitative utility of the data base. As a result, most of the general analysis will be discussed in qualitative terms, and limited quantification will be reserved for specific site for which more accurate data is available.

In its raw form, the ironstone in the project area most commonly occurs in generally flattened plates and blocky slabs, of less than one centimeter to thirty centimeters in thickness. The homogeneous interior is compact, finely grained and a dark grey/brown. The high ferric content stains the highly weathered cortex a bright iron oxide red or orange. The physical characteristics of the raw material give it a number of unique properties. The flattened form severally retards hydrolic movement, and the grainy consistency does not withstand physical abrasion well. As a result, it is extremely unlikely that the material would survive even short range fluvial transportation and secondary redeposition. Therefore, usable sources of ironstone are tightly limited to the proximity of primary outcrops. The lack of appreciable wear on artifacts would also suggests limited exposure and redeposition. Prehistorically fractured surfaces do not weather enough to become stained. This allows for the clear identification of any remains of the original cortex. This is useful for identifying decortication flake from early stages of biface reduction, while the retention of flat sections of cortex on bifaces helps to verify the characteristic plate form of the study area lithic sources.

DATA ANALYSIS

Herring Island Quarry/Production Site

The Herring Island site (18 CE 146) has yielded a major base camp dating from Middle Archaic to Late Woodland times (Ward 1984). One section of the island revealed a particularly intensive occupation during the Late Archaic/Early Woodland period. Systematic collection and the spatial analysis of artifact distributions in this component delineated two significant activity areas. The first represented a tightly localized concentration of habitation associated artifacts (ceramics, fire-cracked cobbles, flake tools and discarded implements). This area also represented the highest concentration of lithic debitage on the site, including the full range of lithic materials found on the site (ironstone, quartz, chert, jasper, quartzite, argillite and silicified sandstone). Furthermore, an essentially

equal proportion of both classes of debitage forms which had been identified as the remains of primary and secondary biface reduction activities (Callahan 1979) were present.

Adjacent to, yet spatially distinguishable from the habitation zone, was another activity area B. In contrast to the occupation related material of the first area, this portion of the site yielded minimal levels of fire-cracked cobbles and no ceramics. Rather it was characterized by a concentration of ironstone debitage and primary biface rejects. The proportion of ironstone debitage from primary biface reduction was higher in the second area than in the first or the rest of the site. On the basis of this distinct patterning, a preliminary conclusion was reached that a spatially distinguishable portion of the site had been the location of the specialized production of primary bifaces. While it was not possible to draw the conclusions that these bifaces were intended for transportation off the site for the purpose of exchange, the island clearly represented a major source for high quality ironstone.

The unique plate form of the ironstone on Herring Island and the surrounding shorelines of Herring Creek and the Elk River present a number of technological advantages which appear to balance out the mediocre choncoidal control and sharpness of cutting edge. With few exceptions, finished ironstone artifacts from the island and the rest of the study area represent large (minimum length of approximately 5 cm.) broad stemmed points and broad-spears. As the other available lithic sources are limited to generally small, redeposited cobbles (Custer and Galasso 1980), the systematic production of adequate cores for the production of large tools is difficult and unpredictable. In contrast, there is an essentially unlimited supply of ironstone plates of various sizes and thicknesses. This raw form offers a tool preform with a high initial width/thickness ratio. As the reduction of blade thickness is the first critical stage in successful biface production (Callahan 1979), ironstone represents a highly efficient raw material for the production of large tools.

Evidence from the quarry/reduction site suggests that the reduction sequence began with the selection of a plate of between 0.5 to 2 centimeters thick. Most of the cortex was removed from both plate faces in the process of initial edging. Reduction continued, producing a crude, blocky primary biface with large, deep flake scars indicating hard hammer percussion. Additional refinement resulted in a more uniformly flaked and shaped secondary biface. Final thinning, edge retouch and the shaping of the stem form completed the process. Although the amount of retained cortex is reduced with each reduction step, it is not unusual to find cortex on one of more faces of secondary biface and even completed tools. Due to the proximity of the raw material source, bifaces of insufficient quality and flaws in workmanship were often rejected in all stages of manufacturing. Finished tools damaged in use were also discarded in proximity to the quarry as new material was selected. Little resharpening is in evidence, due to the reduced need for careful tool maintenance at the source of the raw material. This follows the quarry related lithic utilization patterns identified by Gardner(1977) and Carr(1975).

While Singer and Ericson (1977:186-187) have demonstrated a method for

defining the existence of an exchange system through debitage patterns of tool production and utilization at the quarry itself, the data base from Herring Island is to small and has been the subject of too much nonsystematic collection of tool forms to allow for such a quantitative treatment. Evidence for the exchange of ironstone from the vicinity of the Elk River must rely on an analysis of the regional distribution pattern of sites with ironstone components. The location, artifact assemblages and intra-site spatial patterning of these sites yields evidence to support the regional exchange model. For this purpose, site data was collected for all available sources on the location of ironstone component sites in Cecil and Kent Counties, Maryland and New Castle, Kent and Sussex Counties, Delaware.

Regional Distribution

The distribution data of the sites with an ironstone component within the study area have been drawn from a variety of data sources. Many subareas are incompletely represented due to gaps in the regional data base and existing survey biases (ie. lack of interior sites for Kent County, Maryland). Due to the limits of the data base, only the most rudimentary quantification will be attempted. The distribution of all sites with ironstone will be indicated by a simple point value scatter [see Fig. 1]. The cluster of sites which clearly represent major component sites is enclosed by a circle. The rough quantitative values in the following discussion are calculated from only those sites for which systematically collected bodies of data exist. These treatments are attempts to identify general patterns and may not characterize all the sites in the study area.

The vast majority of ironstone components rarely exceed more than a few percent of the total lithic sample. The most notable exception to this rule is a tight cluster of sites in the upper Elk River, although the proportion of ironstone on most of these sites does not exceed 20%, there are sites with proportions as high as 80%. These major component sites are never more than 9 kilometers from the Herring Creek source zone. The sites are situated along the stream tributaries and wetlands at the head of the Elk. Most of these sites are of substantial size, and are multi-component with a significant Late Archaic/Early Woodland focus. Discarded stemmed points are the most common artifact class. Outside of this direct access zone, the proportion of ironstone drops off dramatically. To the north, minority components are light concentrations of debitage and an occasional discarded point. These sites are invariably located on small, well drained knolls overlooking the low order streams that flow down out of the Piedmont.

Another significant clustering of sites occurs well to the south of this central area, situated along a series of tidal marshes and coastal lagoons on the upper coast of Kent County, Maryland. While the ironstone component on individual sites may be higher, the average for the cluster is around 8%. However, the five largest sites have an average of over 20%. These sites yield significant numbers of early and late stage biface rejects (more of the former), and higher debitage levels compared to rest of the sites in the study area. However, these large sites rarely yield many projectile points in any form.

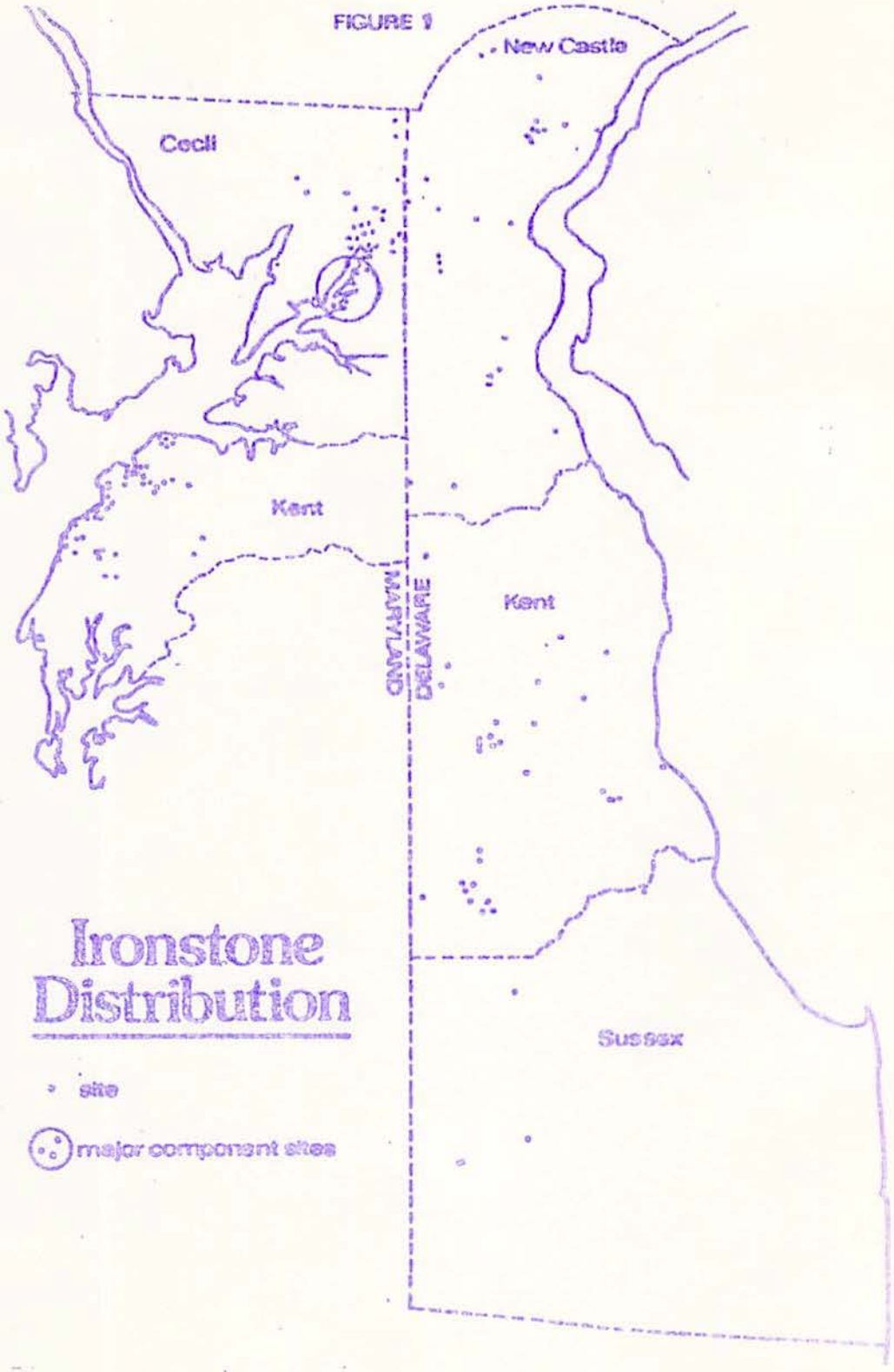


FIGURE 1
New Castle
Cecil
Kent
MARYLAND
DELAWARE
Kent
Ironstone Distribution
Sussex
site
major component sites

Beyond these primary concentrations, there are secondary clusters within the Delaware portion of the study area. Moving north to south, these clusters are found at the confluence of the Christina River and Mill Creek, and the interior drainages of the upper tributaries of the Appoquinimink, Choptank and Nanticoke Rivers. These first two locations drain into the Delaware Bay, the second two into the Chesapeake Bay. The Christina cluster includes one major site with a significant number of rejected points, while the other sites are characterized by early stage biface rejects. In the Appoquinimink area, minor sites have a different pattern, with an emphasis on later stage bifaces and discarded points. Sites along the Choptank drainage also exhibit the late stage focus, with high proportions of late stage biface rejects. The evident pattern of earlier stage forms of ironstone to the north (in closer proximity to the Elk River area) is reversed in the Nanticoke. The majority of sites in this most southern cluster exhibit concentrations of early stage bifaces.

Lumping all the available quantitative data together yields a tentative characterization for the overall exchange pattern. Out of a total universe of approximately 600 sites, ironstone components were verified at 143 of these. Systematic data sources were available for approximately 105 of these. The sample included less than 400 worked artifacts, approximately 30% of these were finished and discarded projectiles. The major point styles in descending order were parallel/lobate/contracting broad stemmed points (Bare Island/Lackawaxan) and Broad-spears (Lehigh/Koens Crispin). 30% of these points had been discarded due to a transverse fracture of the distal blade. About 15% of the total sample were bifaces rejected during early stage reduction. Almost 70% of these preforms had identifiable cortex surface area. The remaining 25% of the sample were late stage biface rejects, around 50% of these had identifiable cortex. The debitage sample also yielded a significant 30% cortex proportion.

DISCUSSION

Regional Distribution Pattern

In summary, the distribution data presents a number of patterns which lend support to a hypothetical exchange system centered on the Herring Creek/Elk River ironstone outcroppings. The concentration of major component sites in close proximity to this source zone, together with a dramatic decrease in material quantity with distance, is a clear illustration of the drop-off pattern basic to material exchange patterns (Earle and Ericson 1977:5-9). However, the limited percentage data outlined above does not appear to show a symmetric monotonic decrease (Renfrew 1977:71-74). The secondary clustering of sites to the south exhibit a much higher quantity ratio than do more proximal sites to the north or the east. Although a number of other factors may be involved, water-borne transportation south would much easier than up-stream movement north into the piedmont, or portage movement east into the Delaware drainage system. The significance of topographic barriers (Findlow and Bolognese 1982:71-72) and transportation paths (Ericson

1977:125-126) as a factor in transport costs seems to be indicated.

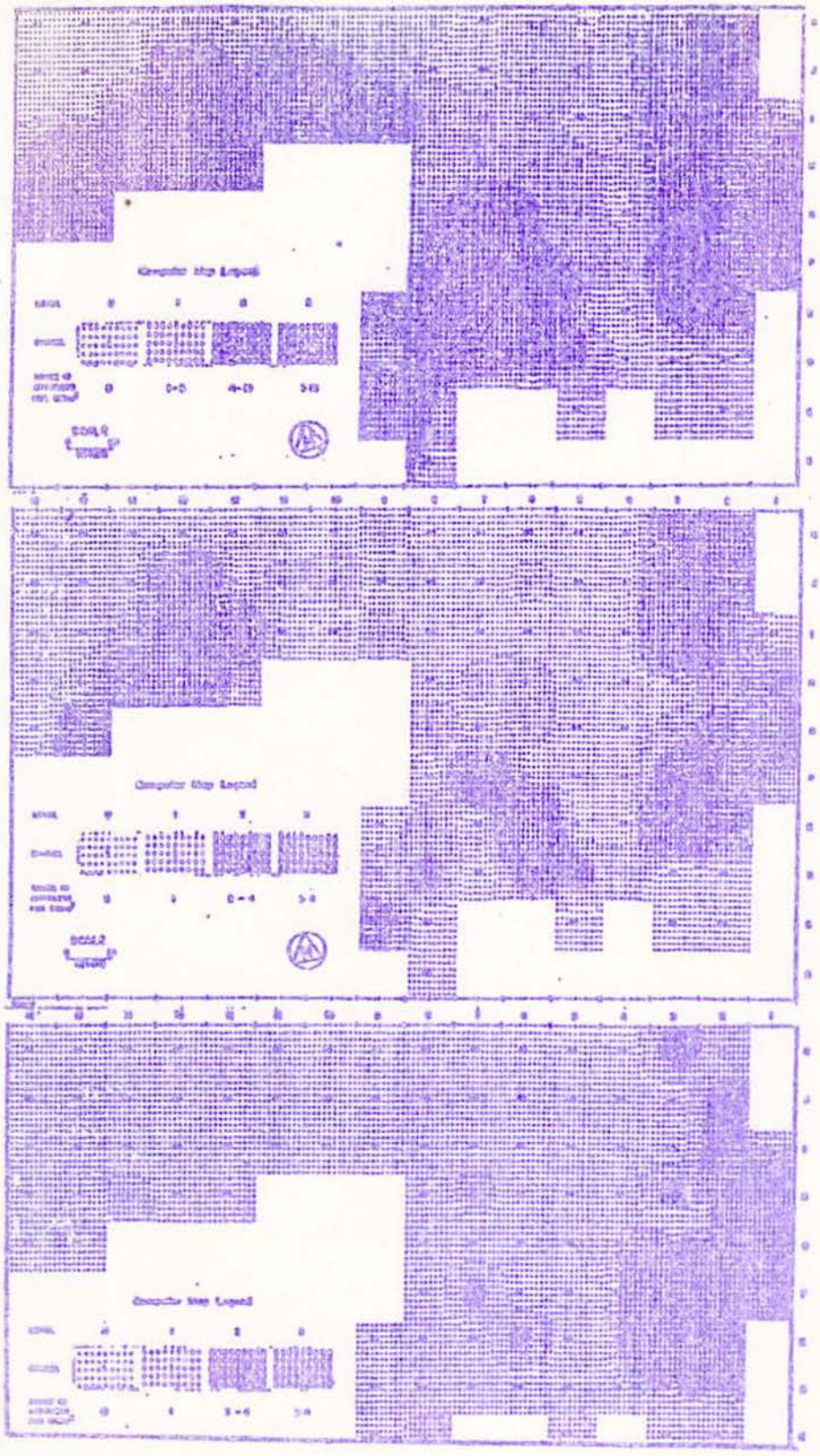
The over-all pattern of the ironstone distribution does not clearly indicate the exact form in which most of the material would have been moved. However, the evident pattern of early stage forms giving away to later stage forms with distance from the source does match expectations for decreasing the net weight of exchange materials as a function of transport efficiency (Gardner 1977). This pattern might also indicate a system of secondary distribution, with larger, more proximal sites receiving quantities of material in bulk early stage form, and redistributing them in later stage forms to smaller, more distant sites (Hodder and Lane 1982: 217-219). The flexibility of this network system may be able to explain the non-linear character of the artifact pattern from the Nanticoke site cluster.

The high proportion of tools exhibiting transverse fractures has been suggested to relate to their use as butchering and cutting tools (Custer and Bachman 1984). The evidence for tool re-use appears to be quite limited, except for a few resharpened points and points reworked into drills. The lack of systematic tool re-use in the case of a lithic material of limited availability does not match the expected pattern of careful tool kit maintenance and curation indicated by other lithic procurement systems (Gardner 1977). This unique pattern presents a double paradox, given the elevated socio-technic value often ascribed to exchange items. It seems possible that this inconsistency may relate to the poor fracturing control of ironstone, which would make re-working the already reduced tool too difficult. The frequency of transverse blade rather that tip fractures may also reduce the remaining blade size beyond a salvageable size.

The intra-site distribution of the ironstone material also presents a unique pattern. A reanalysis of an extensive spatial analysis of a significant sample of minor component sites found that many ironstone components exhibited a tightly circumscribed spatial cluster when compared with the pattern for other lithic materials (Custer and Doms 1983). On small sites, this may just be factor of the limited number of reduction episodes for the rare ironstone. On the large sites, this spatial distinction would indicate a more systematic pattern of specialized activity related to the utilization of this material. A graphic representation of this pattern on a typical large site is shown in Figure 2. These patterns may relate to specific functional activities associated with a limited portion of the site. On the other hand, the accessibility to the material may be limited to a specific segment of the population, and the pattern reflects this limitation spatially. In either case, the distinctive nature of the material in technomic or socio-technic terms highlights the special qualities of "exotic" exchange materials.

The high frequency of cortex on the study area bifaces and debitage suggest two probable conclusions. It would appear that the ironstone utilized throughout the region exhibits the high cortex surface/mass ratio characteristic of the plate shaped resources of the Herring Creek-Elk River area. The retention of cortex also verifies that the specialized plate reduction sequence detailed at the Herring Island quarry/reduction site is active on the constituent sites in the study area. The regional occurrence of

FIGURE 2



COMPARATIVE SURFACE DISTRIBUTION OF LITHIC DEBITAGE.

(18 CE 48)

(Wilke and Thompson 1977)

this ironstone technology, coupled with the stylistic homogeneity of the tool forms, is strong evidence that the regional material exchange system was paralleled by information exchange network (Hartmann and Plog 1982:238-240). As the technological advantage of ironstone became evident, inter-group contacts would soon spread the demand for the material through the region. As access to the material grew, the necessary technical knowledge would diffuse along the same paths the material had traveled. Just as initial access to the material would have prompted the innovation of the ironstone technology, the intensive social organization and inter-regional influence of the Herring Creek population would serve as the conduit for the information flow (Hartman and Plog 1982:240-241).

Regional Context for Exchange

The intensity of the Late Archaic/Early Woodland occupation on Herring Island has been tied to the attractiveness of the estuarine ecosystem in light of the climactic and environmental instability resulting from the xerothermic conditions of the Sub-boreal climactic episode (circa 3000 B.C.). Estuarine settings provided access to the continued stability of the higher order drainages, and the developing shellfish and anadromous fish resources (Custer 1983a). Base camps established under these conditions have been found to be the foundations for the development of more complex, sedentary settlements (Catlin et al 1982). With increased infrastructural stability, the intensified exploitation of available resources provides the conditions for the development of an external exchange system. The ability to produce desirable goods in excess of local demand, often sparks the development of a mechanism for the regional redistribution of exchange goods (Harris 1980:Chapter 4). The early and intensive occupation of Herring Island would have provided the impetous for the development of the ironstone technology. The technical advantages of the material, coupled with the durability and extensive edge area of the large bladed tools, would have provided ample attraction to neighboring groups. This would give local groups access to a great quantity of significant readily produced, technologically valuable and geographically limited exchange resources.

The Herring Island vicinity not only represents a prime location for the procurement of ironstone exchange materials, it is also situated in a particularly active zone for potential inter-regional contact. The Upper Chesapeake Bay is at the confluence of three major waterway communication corridors. The Susquehanna River flows out of the piedmont from the northwest. The Chesapeake Bay itself provides the major north-south connection. And there are numerable east-west portage points linking the upper tributaries of the Chesapeake and the Delaware Bays across the upper peninsula. The strategic location of the Elk River ironstone network would allow for the channeling of ironstone to Late Archaic/Early Woodland groups throughout the region. It appears that the network would have continued until the large point forms began to be supplanted by the smaller projectile forms which characterized later periods (Kinsey 1972; Ritchie 1961).

During the same time period, there were other exchange networks bringing

non-local materials into the region (Custer 1983a; Custer and Bachman 1984). While there is clear evidence that the rhyolite, argillite and steatite networks extend into the territory covered by the ironstone network,(the four materials are occasionally found on the same sites) any direct connection between them is tentative. Unlike the "exchange package" which appears to have moved the other three materials as a unit, the ironstone system seems to have operated independently. It is possible that the existence of the ironstone exchange system may have provided a low-level network which acted as the local connection to the broader regional exchange networks. Once established, the regional networks for the exchange of material and technologies would continue to have a significant influence on the continued cultural developments of the Herring Creek/Elk River area through later periods. An analysis of the ceramic assemblage from Herring Island seems to support this pattern. The site yielded a remarkably varied selection of wares with stylistic affinities to traditions from all three adjacent regions (Custer, Macnamara and Ward 1982). Evidence of two Delmarva Adena blades of Ohio Flint Ridge Chalcedony, indicated at least a peripheral involvement with the long-distance exchange network moving exotic materials to the early ranked settlements further down the peninsula (Thomas 1970; Custer 1983b). It appears that the local ironstone exchange network may have established the foundation for the routes these later external elements would travel.

RECOMMENDATIONS

From the preliminary evidence, there appears to be a significant amount of empirical and theoretical support for the continued analysis of ironstone utilization pattern in the Upper Delmarva Peninsula in the context of an exchange model. In order to provide a data base to adequately test the hypothesis, the continuing research will address the following concerns:

1. A more detailed, possibly chemical, characterization of the ironstone material, in order to confidently identify artifacts to source of material.

2. A more complete field survey of the actual distribution of ironstone sources within the study area.

3. The expansion and refinement of the site data base to include a more systematic sample of the total sites in the study area.

4. The expansion of the study area to include those adjacent areas which show evidence of involvement in the exchange network.

5. The dissemination of information on the unique characteristics of ironstone, in order to spark a reevaluation of existing information and a hightened appreciation of the significance of ironstone to the study of low-level exchange.

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