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Ronald A. Thomas

Robert Hoffman

It is with great regret and sadness that we report the passing of Ronald A. Thomas on January 19, 2004. Ron's career spanned 42 years and involved archæological research in the Eastern United States from the state of Maine down to the U.S. Virgin Islands. His principal research interests were centered in the mid-Atlantic region, and focused primarily on prehistoric sites archæology and such topics as mortuary practices and lithic procurement and exchange networks. As his career advanced, his interests expanded to include historic archæology and architecture. Ron's interest in archæology came to him early in life and unlike most of us who drift through our early years, he pursued his chosen vocation with enthusiasm and determination, obtaining a degree in Anthropology from Pennsylvania State University in 1962. He furthered is education by obtaining a Masters Degree in Anthropology/Public Archæology under the mentoring of Dr. McGimsey at the University of Arkansas as well as course work toward a PhD at the University of Pittsburgh and subsequently at Temple University in Philadelphia.

His first employment in the field of archæology was a learning position as a Research Assistant at the University of Arkansas and then as an instructor at the University of Pittsburgh. Due to the exigencies of having to support his newly acquired family and the difficulty of doing so on the salaries then prevailing in academia, Ron applied for a newly created position with the State of Delaware. The newly created position was that of State Archæologist, given impetus by a series of unfortunate incidents involving the looting of prehistoric burial sites. The public outcry following the desecration of those sites was such that the Governor and the General Assembly charged the Delaware Archæological Board with the task of hiring an archæologist to manage and protect Delaware's archæological resources. Ron applied for the position and, in spite of his youth, so impressed the members of the board that he was hired to fill the position; thus becoming the youngest State Archæologist ever hired in the United States as well as Delaware's first and only State Archæologist.

Ron served in the position of State Archæologist from 1965 to 1976, and was largely responsible for establishing the state's first full time professional Historic Preservation Office, which at the time was called the Section of Archæology. Ron first embarked on a program of site registration to supplement the existing site register and developed close ties with all the chapters of the Archæological Society of Delaware. He viewed the members of the society as a valuable resource both in terms of their knowledge of the local archæology and as a constituency or support group for the programs he hoped to create and develop. These initial contacts led to a lifelong commitment to the involvement of the public in archæology as well as to the education of the avocational community through exposure and involvement with the professional community. Shortly after becoming State Archæologist, Ron began to explore the Island Field Site, a Middle Woodland Period cemetery containing exotic grave goods and evidencing complex ceremonialism and societal organization. Ron used the Island Field Site as a selling point to encourage interest in the heritage of those who came before as a way to establish a solid foundation for the state's archæological program. His efforts paid off and the state came up with the funding needed to establish a museum/research facility build around the cemetery. In the following years the Island Field Site became one of the state's most visited museums and it was a rare elementary or middle school class that did not undertake a field trip to the unique museum. Through Ron's efforts and research the life ways of the native peoples whose remains were displayed were brought to light. He did so in a manner that was respectful and was always conscious of the archæologist's responsibility to, in so far as possible given the limitations of the craft, portray the lives of the people they study in a fair, accurate, and balanced way. He sought to restore the identity and dignity of a people who were largely forgotten and who when remembered were often portrayed in an inaccurate and sometimes less than favorable light.

In 1976 with Delaware's Archæological Program on a sound footing, Ron decided to resign his position as State Archæologist in order to further his education and to get in on the ground floor of what he currently perceived would be the future of archæology. He founded Mid-Atlantic Archæological Research, Inc., a private sector firm, to pursue what is known today as "Cultural Resource Management" at a time when it was still in its infancy. Over the next 28 years he was involved in the performance and supervision of over 700 archæological investigations and was the author of numerous reports, articles, and monographs.

In addition to his work related contributions to the field of archæology, Ron was actively engaged in a number of professional associations as a founder, and officer, and/or a participant. He was a charter member of the Mid-Atlantic Archæological Conference and the Editor of the bulletin for a period of time. He served as Recording Secretary, President, and as Delaware's representative to the Eastern States Archæological Federation. He also volunteered his time to serve on a variety of committees having to do with Delaware' Archæological Month, the State Review Board which netted National Register Nominations and the Board's Grants Selection Committee. He also served as the President of the Delaware Academy of Science in the 1980s and was throughout his long career continuously involved in the affairs of the Archæological Society of Delaware as Editor of the bulletin, Membership Chairman and as the author/editor of *Inksherds*, the society's newsletter. More recently he served as the gubernatorial appointee to the State of Delaware's Committee on the Disposition of Unmarked Human Remains.

What is most memorable about Ron Thomas is not just his contributions to the profession of archæology, but the warm personal touch that he brought into his relationships with friends, associates, and colleagues. Throughout his career he advised, guided, and provided opportunities for others to advance in their careers. He shared his views, his knowledge, and his intellectual curiosity with all who approached. He was an optimist, always hoping for the best that people must have to offer, and unafraid of failure. He loved golf, he loved his saxophone and he loved jazz.

A well known and powerful and somewhat cynical French reader, when asked what would happen after his death, observed that "the cemeteries are full of indispensable men". That may be true, but it in no way diminishes the sense of loss that is felt or fills the void that is created when a member of the community dies, particularly one who contributed so much. He will be missed and remembered.

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<u>Gathering at Island Field</u>: During early seasons at Island Field, the Delaware Archæological Board efforts attracted attention from professional and avocational archæologists throughout the region. This picture was taken at a meeting convened by Ron soon after the cemetery was discovered. Only four or five of the individuals in this picture are still living.

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Clay in Your Teeth:

The Importance of Experimental Archæology in Pottery Studies

Chris Espenshade
Skelly and Loy, Inc.

Abstract

The past 20-30 years have seen a shift in pottery studies away from basic culturo-historical sequences and typology, toward a more behavioral consideration of technological choice, pots as tools, scales of production, the roles of style, and the lifespans of vessels. An important adjunct to these new approaches has been experimental archæology. In this paper, 11 reasons are presented for inclusion of experimental archæology in pottery studies. The wall between ceramicist (pottery analyst) and ceramist (potter) should be torn down, and all serious pottery analysts should occasionally have clay in their teeth.

INTRODUCTION

In graduate school, I saw a fellow student with some small clay bowls with red slip on them. She noted that she had been experimenting with the recipe that Weeden Island potters of prehistoric Florida had used for their red slip. I was impressed, but when I asked her if she made the bowls, her response was "No, I am an analyst, not a potter." Perhaps not coincidentally, this was the year that I began experimenting with traditional pottery-making. I have always been suspect of lithic analysts who do not knap, and I am likewise wary of pottery analysts who do not make pottery. In this paper, I hope to demonstrate why every pottery analyst should get clay in their teeth (one way of field testing clay is to work a small bit with your tongue and teeth). It should also be remembered that practical experience is an area where the avocational archæologist can match or surpass the professionals, and, indeed, many of the best in experimental potting are avocational archæologists. To put it another way, the clay does not know what your day job is and the clay does not care what degrees you hold.

In this paper, experimental potting means more than simply playing around with some commercial clay. It means using traditional materials and methods to create reproductions of archæological or ethnographic pots. The creation of reproductions can be for a strict experiment (such as comparing boiling times for shell-tempered vs. quartz-tempered pots) or to gain a general understanding of the attributes of a clay, temper, and production method.

ELEVEN REASONS

In looking back at my 20 years of playing with clay, I have identified 11 reasons that experimental archæology is important to ceramic studies. There may be additional

Figure 1: Lump-formed colono reproduction. Photograph by the author.

Figure 2: Propane Kiln disaster, 1995. Most of the pots were damaged by overly fast heating of the kiln. Photograph by the author.

reasons, and there is some overlap between these 11 reasons. Nonetheless, I think these 11 create a compelling call for existing or aspiring ceramic analysts (or avocational archæologists with an interest in pottery) to get their hands dirty.

1. Experimental potting allows one to evaluate the feasibility of technological reconstructions. Although experimental archæology will never provide "proof positive" that an archæological pot was made via a specific method, experimental potting can show that a given method is feasible and creates the distinctive production attributes seen on the prehistoric vessel. As an example, I have been repeatedly told over the past 15 years that the medium-large slave jars from coastal South Carolina must have been made by coiling, because it is impossible to lump form such a vessel. This concerned me because we do not find any coil breaks or unused coil ends in the slave assemblages. Finally, I undertook an experiment. Even though I was used to coil building and did not have much background in lump forming, I was able to make medium to large jars by lump forming (Figure 1). It was with great satisfaction that I pulled out one of my jars at an SHA forum, when again somebody claimed the impossibility of lump forming such jars.

2. Experimental potting allows one to recognize which sherd attributes were likely unintentional results. Certain pottery analysts see significance in any measurable attribute. Experimental potting allows you the perspective to address which attributes were probably only incidental.

Slave-made bowls from coastal South Carolina serve as an example. These bowls are often black to dark grey on the interior surface and mottled orange/red/tan on the exterior surface. Imagine my surprise to hear that this color duality clearly indicated that the

Figure 3: Experimental firing 1983 The shell-tempered pitcher (bottom left) disintegrated to a pile of clay and temper by next morning. Photograph by author.

bowls had been twice fired. Nonsense. Experimental firings have shown – as ceramic science would anticipate – that mouth down (inverted) firing of these bowls can create oxygen-poor blacks or dark greys on the interior and better oxidized oranges/reds/tans on the exterior, in a single firing.

3. Experimental potting provides a familiarity with the characteristics of a given clay body. Not all clays are equal. Not all tempers are equal. Only by gathering local clays and experimenting with pottery-making and firing can one gain a detailed understanding of the strengths and weaknesses of a specific clay body. For example, more than 20 years ago, I gathered muck clays for my thesis. I also did background research, and I found that sponge spicules (the tiny skeletal elements of freshwater sponges) are present in many muck and lake-bottom deposits throughout the state of Florida. I also talked to sponge biologists and observed sponges in the wild. So, you must imagine my surprise to hear that just recently, two archæologists were positing that the prehistoric potters had harvested spicules from sponges for intentional addition to their clays. These people had not seen the tiny sponges. These

Figure 5: Child using traditional tools and methods. Photograph by Barbara Gundy.

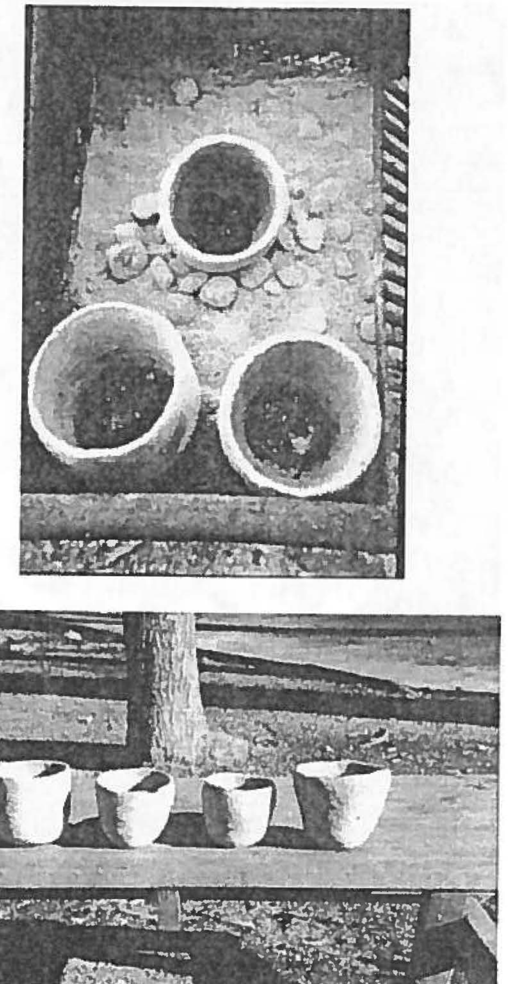

Figure 4: Food residue experiments: Creating residues (above) and four of the pots (below)

people had not addressed how the Indians would have known that sponges had spicules (spicules are microscopic). These people had not addressed exactly how such a harvesting and processing would have occurred. Instead, they sampled a single clay source and found fewer spicules than seen in vessels.

4. Experimental potting provides an insight into and appreciation of household pottery production. In most Woodland groups in the eastern United States, pottery production was completed at the household level. Given ethnographic data on pottery lifespans and the

average number of vessels per household, a given potter probably produced only 5-10 pots per year. Potting was a very minor part of her annual work, and analysts must be careful not to expect absolute consistency batch to batch. For those of us who experiment with pottery in our free time, our yearly production is often similar in scope to prehistoric potters. We can appreciate how our skills respond to an intensive period of potting activity or to a long layoff. We can imagine, being generally self-taught and working in relative isolation, how the prehistoric potter evolved slowly through the years. This background provides perspective when a non-potter starts waxing eloquent about what this variation must mean.

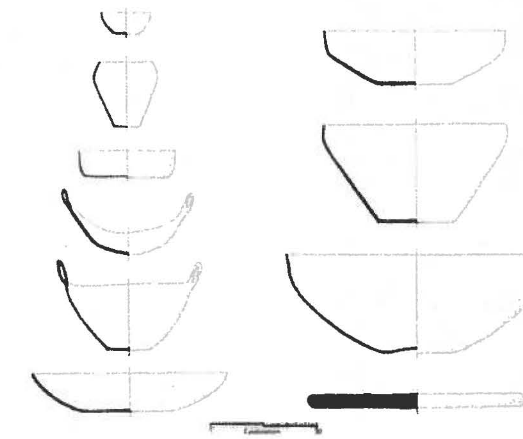

Figure 6: Typical presentation of pottery assemblage (From Espenshade 2000)

Experimental potting also fosters an appreciation of native accomplishments. We learn from our mistakes (Figure 2). We learn how

Figure 7: Clint Swink with his Anasazi and Mimbres reproductions, photo by Rickie Londe-Swink, courtesy of www.swinkart.com.

tenuous the process of changing moist clay into fire-hardened pottery can be under conditions of minimal control. Against this backdrop of humbling experiences, we better appreciate the abilities of thousands of ordinary native women, who collectively produced efficient pots for more than 3,000 years.

Experimental potting also highlights the artistic abilities of Native Americans. To create an Arkansas head pot, a Caddo stepped jar, or a Mississippian dog pot is to expose the public to a lost art form. Because ethnohistoric illustrations focus on big, simple, unadorned pots, the experimental archæologist is vital in broadening the public's knowledge of native ceramic art.

5. Experimental potting provides signatures of failures. As disheartening as it may be to hear the spalling of a pot heated too quickly, or to see the disintegration of a shell tempered pot, we learn from those mistakes (Figure 3). We can define signatures for various failures, allowing us to better understand the problems faced by specific potters. For example, slave-made pottery of the South Carolina coast was temperless, burnished, and spalled at a much higher rate than Native American wares. Experiments have shown that spalling most commonly occurs due to overly rapid heating during firing, and the spalling can be minimized or avoided through the addition of coarse temper. Furthermore, burnishing can aggravate a tendency to spall. If the Colonoware

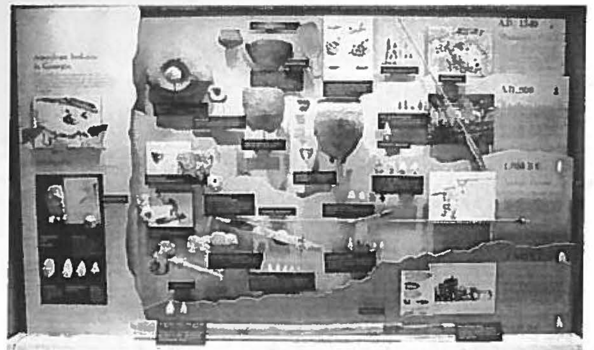

Figure 8: Display in the Georgia Capitol Museum. Tetrapod pot in center is reproduction. Photo courtesy of Georgia Secretary of State web-site.

pottery tradition had evolved from local Native American traditions (as some researchers have suggested), one would expect tempering patterns that would lessen the spalling problem. Instead, the widespread use of temperless paste suggests a non-local tradition, one brought from Africa and/or the Caribbean.

6. Experimental potting provides reasonably accurate reproductions for experimentation. In

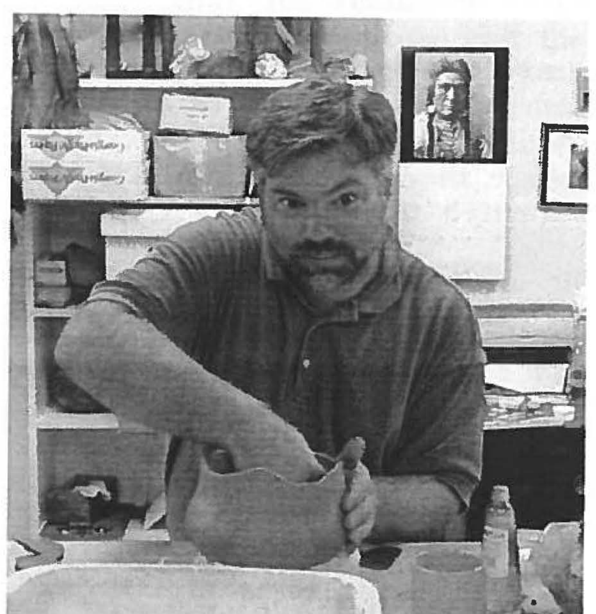

Figure 9: Patrick Severts working on an archæological reproduction. Photograph by David Diener, courtesy of severts.50megs.com web-site.

the upper Susquehanna region, there is an entrenched belief that the Late Woodland saw a shift away from coil building to "paddle and anvil construction." As a first step to addressing the fallacy of this idea, Janet Schulenburg at Penn State sought vessels of known production technique for x-ray study. The goal of her study was to show that even if a vessel did not break on coil lines, it may still have been made by coiling. The answer was to make reproductions, break them, and x-ray them.

Dr. Schulenburg also wanted to experiment with food residues as part of her dissertation research (Figure 4). Her idea was to create models of food residues, controlling the content. Her research was tied into a broader investigation of when maize became important in the Northeast. Again, the State Museum was not eager to allow boiling of foodstuffs in their museum pieces. Instead, I provided 16 coil-built pots of natural clays from the upper Susquehanna.

7. Experimental potting provides accurate reproductions that can be handled by the public. There is a growing movement toward greater public education and participation in archæology. As you all have probably recognized, the teaching process is more successful and more enjoyable if the public can handle objects (Figure 5). Nobody would propose that we take the preserved cord-wrapped paddle from the Sheep Rock Shelter (Pennsylvania) and pass it around a bunch of school kids. Likewise, a Susquehannock burial pot probably would not survive many Cub Scout meetings. However, their learning experience would not be lessened by the use of reproductions. If a kid breaks my cord-wrapped paddle, I'll make another.

Experimental potting can also provide tools for living archæology

demonstrations. The Late Woodland encampment won't look very accurate with a brass kettle over the fire, and no museum is going to release prehistoric pots for modern use. Experimental potting can provide accurate reproductions with the appearance and performance characteristics of their prehistoric counterparts. When the observer asks "how long would it take to boil water?" the demonstrator can show them the answer.

Experimental potting can also remind professionals of what the social unit of information was in the past (i.e., a whole pot). Pottery analysts are too often focused on sherds, small fragments of a cultural unit. We may rely on rim profiles or vessel reconstruction drawings to give some sort of idea of the whole pot(s) (Figure 6). However, only through experimental potting can we gain a feeling for a vessel assemblage. My experience with this was eye-opening. For a 1990 paper, I addressed a ca. A.D. 650 household pottery assemblage from south-central Puerto Rico. To determine volumes and to provide illustrations for my presentation, I created an example for each size/form class. For those who have never done this, let me say that you get a much better "feel" for the vessels when you actually carry one, fill it with water, and try to pour from it. Also, those who attended the paper better related to and appreciated a 3-dimensional representation rather than a flat slide and a numeric data.

At its best, archæological replication can also undercut the market for looted artifacts. Clint Swink's work with Anasazi and Mimbres pottery is an example (Figure 7). Swink, an avocational archæologist, uses only traditional materials, techniques, forms, and decorations. When you can legally buy a completely accurate reproduction

Figure 10: Members of Nanticoke Community experimenting with traditional decorative techniques. Photograph by Barbara Gundy.

of a Mimbres pot for $1,000.00, why buy a looted example for $60,000.00? In addition, with Swink's products so good, how do you know whether you are getting a prehistoric pot or a Swink replica?

8. Experimental potting can provide display pieces and replace NAGPRA returns. Reputable museums will not accept a wheel-turned, commercial clay replica of a Middle Woodland pot. If they need an example for display, they want one made by traditional methods and traditional materials (Figure 8). Likewise, with the NAGPRA-mandated return of burial/ceremonial items to Native American tribes, there is a need to replace many display items (the best pots always seem to have come from graves). For example, Patrick Severts (Figure 9) of Brockington and Associates is currently replicating the entire "Pot Room" at the University of Georgia Laboratory of Archæology. This entails the reproduction of 50 vessels, including classic type examples from many Mississippian sites.

9. Experimental potting provides an illustration of an entire process. The modern observer often

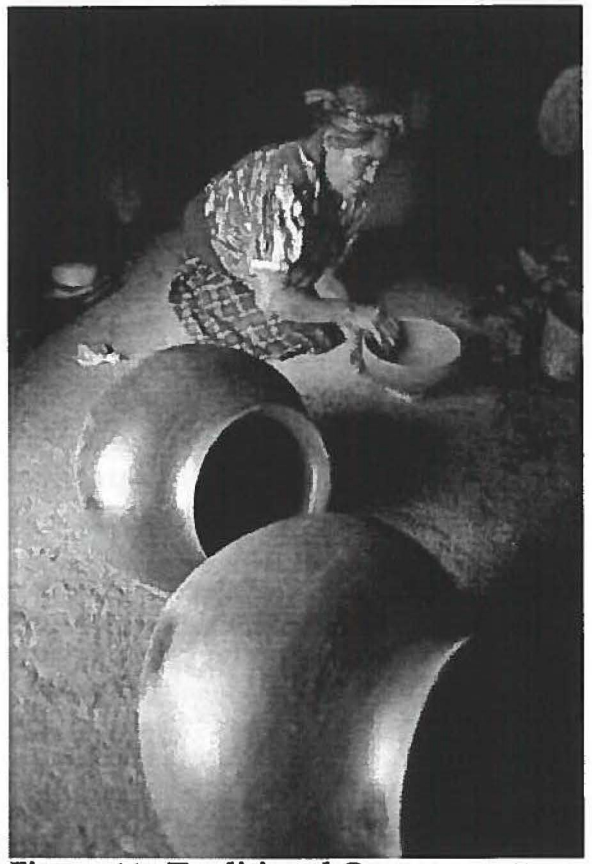

Figure 11: Traditional Oaxacan potter, Catalina in San Marcos Village. Photograph by Eric Mindling, courtesy of www.manos-de-oaxaca.com.

thinks about pottery-making starting with the opening of a bag of commercial clay and ending with the completion of the pot-building. In Native American contexts, the actual construction of a pot was a very small part of a lengthy process. By discussing the entire process, the archæologist emphasizes the location, procurement, aging, and preparation of clay and temper, the gathering of wood fuel, and the sequencing of production steps, the drying, and the firing. Last summer I had the pleasure to see Daniel Firehawk Abbott – a Native American, avocational archæologist and potter – discuss and demonstrate the entire process for making shell-tempered pots.

Experimental potting also underlines the role of the individual in past culture. All too often when you read archæological reports or listen to a lecture from a pottery analyst, the sherds, attributes, or assemblage is the subject of the sentences. Even when process is discussed, it too often sounds like "clay is gathered, temper is added, the pot is formed through coil building, the pot is allowed to dry, the vessels are fired, etc." We should be talking about how specific potters (actual people) did things. We should be considering the contexts in which the pottery was made, and what else those potters were doing at the same time.

10. Experimental potting can provide a linkage to Native American groups. Native American groups like to know that we (archæologists) are interested in their heritage. In the East, especially, many of these groups lost their pottery-making traditions to displacement, population decimation, and forced acculturation. The ability to reproduce their traditional pottery, and more importantly, the ability to teach (to reintroduce) the tradition can help forge a relationship with tribes (Figure 10).

11. Experimental potting creates educated observers. Archæology draws on ethnographic information from modern potters working in traditional ways. Whether interviewing a Oaxacan (Figure 11) or a southern stoneware potter, it is important to have enough practical knowledge to ask the right questions and to record the important data. In addition, you gain some level of respect with your informants if you have practical experience. Tamara Beane, an archæologist and excellent potter, has been working with Cherokee potters. She has heard the potters comment that an archæologist should have made and fired pots before they start to lecture on how it was done.

CONCLUSION

Archæology is changing, and experimental archæology is slowly becoming an important part of those changes. The archæologists that immerse themselves in the traditional processes of pottery-making and pottery use will have more relevance in today's archæology than the lab/sherd-oriented analyst. There are a lot of good reasons to undertake experimental pottery; I have just suggested 11 reasons. The possible reasons for a pottery analyst not to embrace experimental archæology - stubbornness, conservativeness, fear, and/or perceived lack of talent - are not convincing. I encourage all existing or aspiring pottery analysts to go get some clay in your teeth. Take classes in pottery-making. Observe traditional potters. Get out and find your own clays. Make mistakes and learn. More broadly, I encourage all archæologists to consider how experimental archæology can strengthen our changing discipline. If pottery is not your interest, learn to flint knap, carve traditional traps, or make bone tools.

Acknowledgments

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The Archæology of Tillage

Edward F. Heite

Heite Consulting, Inc.

A few years ago, working on a DelDOT project north of Dover, we were faced with the problem of interpreting agricultural fields as archæological sites. In normal practice, agricultural fields are identified as "vacant," unless some "obvious" artifacts, unrelated to tillage, are discovered.

In view of former owners' prominence in nineteenth-century scientific agriculture organizations, project-area fields were deemed to be a proper laboratory for examining the potential for archæological study of agricultural practices.

"Book farmers," as they sometimes were derisively called, introduced many new agricultural practices during the nineteenth century. Farm periodicals were required reading for these people, who were quick to experiment with the latest technique for increasing fertility.

Best sellers included scientific volumes like Edmund Ruffin's *Essay on Calcareous Manures* of 1832, or monthly periodicals like the *Albany Cultivator or the American Farmer*, which were eagerly read and discussed at agricultural society meetings (Scharf 1888:436; Anderson 1967).

John Hare Powel, secretary of the Pennsylvania Agricultural Society, proclaimed in 1824 that "Science is essential to the agricultural art — chemistry aids it at every turn — cooking is a chemical process..." (Pennsylvania Agricultural Society 1824: 259).

In Delaware, where the land had suffered badly from poor farming practices, some of the book farmers were spectacularly successful and some were to become spectacularly wealthy. A considerable portion of the profits generated by agricultural enterprise was invested in internal improvements, which in turn produced yet more wealth. By the middle of the nineteenth century, progressive farmers had changed the state's landscape.

The Delaware Rail Road Company was dominated by such progressive farmers as Manlove Hayes, Henry M. Ridgely, and Charles I. duPont, all of whom owned farms in the west Dover area. It was no mere coincidence that the secretary of the railroad company would be simultaneously the secretary of the state board of agriculture (Scharf 1888:431).

During the nineteenth century, it was difficult to distinguish industry and agriculture. Industries depended heavily upon their agricultural surroundings. It was impossible to run a factory without a complementary farm, and bigger factories required bigger

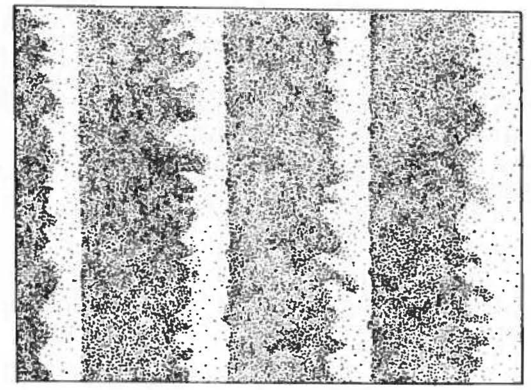


Figure 1: This is a set of plowscars typical of those made by a mouldboard plow, recorded at the White Marsh site in Kent County (Heite and Blume 1992:82)

agricultural establishments. Animals for motive power and transportation, wood for building and fuel, food for man and beast, all were provided by farmlands.

Co-minglings of agriculture and industry were the rule in America during most of the nineteenth century. In 1832, W. W. Young reported that his company's activities at Rockland comprised several farms, plus wool and cotton spinning and weaving, which "necessarily, are blended with each other, and there is much difficulty to identify them separately with exactness." A Wilmington tanner reported a similar difficulty of separating his tannery from his farms, which he described as "intimately connected" (Porter 1990:61).

Some of the upstate owners in Kent County may have been looking for additional acreage to supply their factories, or they may have been seeking cheap land for their agricultural experiments.

While many agriculture-related, or "agribusiness," sites have been

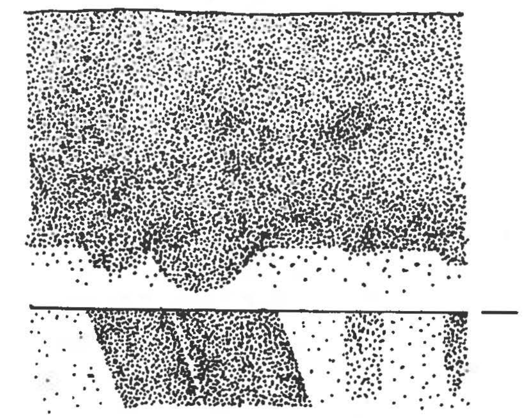


Figure 2: A test at the White Marsh site revealed several passes of a shovel plow and harrows. At the bottom is a partial plan and above is a profile. The plowzone depth was about 40 centimeters.

excavated, the fields themselves have received little attention in the literature of American archæology.

Agribusiness site investigations chronicled in the DelDOT series include an implement factory (Coleman, Cunningham, Catts and Custer 1985), a market hamlet (Cavallo, Friedlander and Bowers 1988), a feed mill (O'Connor, Cunningham, Coleman, and Brockenbrough 1985), and two canning factories (Coleman, Hoseth, Custer, and Jaggers 1988; Heite 1990).

Since agricultural fields have traditionally produced most of the data for survey archæology, interpretation of their agricultural component requires nothing but a re-examination of, and sensitivity to, data that already is being collected, but has been under-evaluated.

Such events as mechanization, chemical fertilization, substitution of row crops for orchards, or introduction of the use of marl, should be reflected in the soil record. Poor husbandry and attempts to recover from its effects, should be dramatically recorded in the soil.

These events, in turn, are the stuff of archæological interpretation, wherein the archæologist can provide insights independent of the documents. Schuyler (1977) demonstrates that this emic/etic duality is inherent in the raison d'etre of archæological evidence when applied to historical conclusions.

Everything written about Delaware agricultural history to date has been derived from documentary sources, without reference to input from archæology (e.g. Passmore 1978).

European researchers, on the other hand, have devoted considerable attention to the field as an archæological site category. A journal, *Tools and Tillage*, published by a secretariat of the Danish Academy of Sciences, is devoted entirely to agricultural practices, implements, and their effects on the archæological record.

Some potential agricultural data has been noted and dismissed as mere annoyance. Plow scars, which obscure the outlines of underlying features, traditionally are dismissed unrecorded, unless they have damaged another feature, in which case they are first labelled "intrusions" and then dismissed.

Scattered bits of historic pottery and glass found in cultivated fields are traditionally dismissed as manuring spread, unworthy of further analysis.

Drainage ditches, too large to ignore, are traditionally recorded, but are analysed only as part of a domestic or industrial context, as landmarks defining site boundaries.

Planting holes, post holes, and burned soil patches, are interpreted when they contribute to understanding a toft, but seldom have been analysed in relation to the croft.

Pieces of farm implements likewise are traditionally regarded as isolated finds, out of context, even when they are recovered from their proper archæological context: the plowzone of the field itself, where they were made to be used and ultimately were lost.

It can be argued that, of all the artifacts found in plowzones, only agricultural artifacts are in their original contexts. By the same argument, any agricultural artifact found in the plowzone should be regarded as having come from its original, readily definable, stratum, which happens to be the most recent plow zone in most sites.

If only because they exist, agricultural remains must be interpreted, since every archæologist is duty-bound to interpret everything he or she finds on the site, whether or not the finds happen to belong to the researcher's own subspecialty or personal research biases.

In an experimental archæological study of Danish plow furrow profiles, Grith Lerche (1986) has shown that it is possible to determine not only the design of the plow, but the direction it was travelling and other details of the tiller's craft.

Ditches

If any theme runs through the history of Delaware agriculture, it is ditching and drainage, both of tidal marshes and of upland swamps. Few parts of the state are without ditches, and few downstate farms could have prospered without them.

High organic content and mineral richness attracted farmers to wetland soils. The earliest settlers had drained Delaware salt marshes, or meadows, to create hay fields and pastures. Peaty freshwater bog soils, a natural compost, were recognized for their properties as soil conditioners, and were sometimes mined.

Marsh farming practices originally had nothing to do with the scientific agriculture movement, but rather were rooted in the fenland drainage practices of England and the Netherlands, where techniques had been developed over centuries of lowland farming.

Marsh meadows finally fell into disuse early in the twentieth century as the banks deteriorated. A farmer in Salem County, New Jersey, related to the author that there was no money during the Depression to pay Irish laborers who would come out of Philadelphia to repair breaks in the marsh dykes. After a few years, vast meadowlands disappeared from cultivation.

Drainage of freshwater wetlands accelerated during recent generations. Abetted by publicly-funded programs, farmers aggressively claimed freshwater wetlands for farming, until public policy reversed during recent decades, and the freshwater wetlands became valuable resources to be husbanded. Now, instead of draining every possible wet tract, public policy mandates preservation or replacement of these resources. Whereas previous generations had sought to remove water from the land, we build detention basins to allow the soil to absorb the water.

The most imposing agricultural features of most Delaware localities are the ditches.

Delaware farmers tiled their fields frequently with locally-produced tiles. Bay/basin features, which frequently are ringed by high ridges, are particularly susceptible to tile drainage.

Plow scars and planting holes

Anyone who has read a seed packet is aware that each cultivated plant species requires individualized spacing, planting depth, and cultivation practices. Through time, these practices have changed in response to new technologies and changing methods of cultivation.

Small grains, formerly broadcast, are now planted in rows.

Vineyards appear as rows of rich, deep, soil punctuated and terminated by the posts that supported trellis structures.

Orchards typically are a grid of trees planted in rows separated by driveways. Nurseries have a distinctive footprint, since a sizable root ball of soil is removed with each plant. An abandoned nursery resembles nothing so much as a bombed battlefield pockmarked with unfilled craters and wooded with partial rows of overgrown ornamental shrub species.

Smaller-scale crops, while leaving distinctive imprints, may not be as spectacularly distinguishable as these examples. What will distinguish a soybean crop from a corn crop in the archæological record? How would one determine which crop came first? Who cares?

Only the farmer really has any reason to care about which crop is planted on which field, year-to-year, even though crop rotation practices probably could be reconstructed from evidence in the ground.

Archæologists and historians of agriculture are more likely to want to know about any damage the farmer did to the soil, or any change in husbandry practice that might have had a long-term economic or social impact.

Far from being a single type of feature, plow scars come in a variety of types, reflecting a variety of origins. Some of the features labelled "plow scars" are not, in fact, scars left by a plowshare cutting the subsoil.

Pointed, or v-shaped, plow scars may not have been made by plows at all, but by harrows or cultivators (Lerche 1981: 114), especially if they cross the plow furrows at right angles. Spike harrows, and more recently disk harrows, are used to smooth fields and loosen soil after plowing.

A shovel plow, such as were favored through much of the South into the twentieth century, scratched a shallow groove across the ground, whereas a mouldboard plow cuts and lifts a block of the soil and turns it over.

Mouldboard plows have been used in European agriculture at least since the middle ages, but they have not been uniformly adopted in America. In some parts of America, notably Tidewater Virginia during the eighteenth century, plows were disdained as effete by farmers who spaded and hoed their fields.

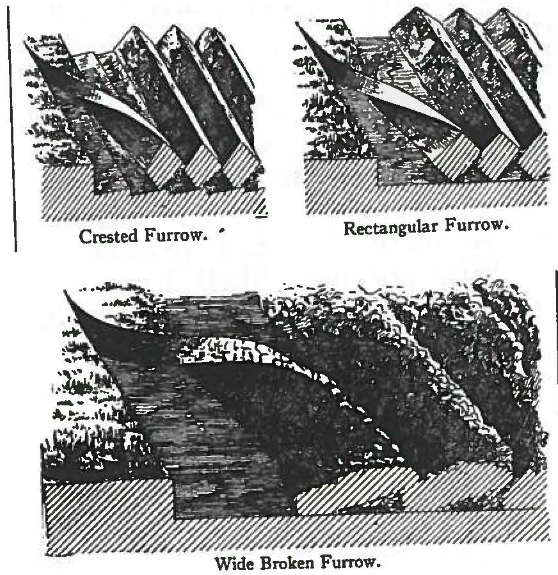


Figure 3: Each implement leaves a distinct furrow type. These illustrations from the eleventh edition of the *Encyclopedia Britannica*, show types that will leave distinctive patterns in the archæological record.

Shovel plows were commonly used in some areas until the Civil War era, by which time more progressive farmers had adopted the mouldboard exclusively (Hurt 1985). Such plows had no mouldboard, but operated by a scratching rather than a cutting action. The Delaware Agricultural Museum holds several shovel plows from Delaware. The museum also has several chisel-type cultivators.

A scar left by a mouldboard plow is a flat-bottomed feature about ten to fourteen inches wide. At the edge of the plowscar is a little row of subsoil clods mixed with the topsoil (Figure 1).

Lerche (1986) demonstrated in field experiments that mouldboard plows leave a polished face on loamy soil, which can be recovered even after centuries, given correct soil conditions.

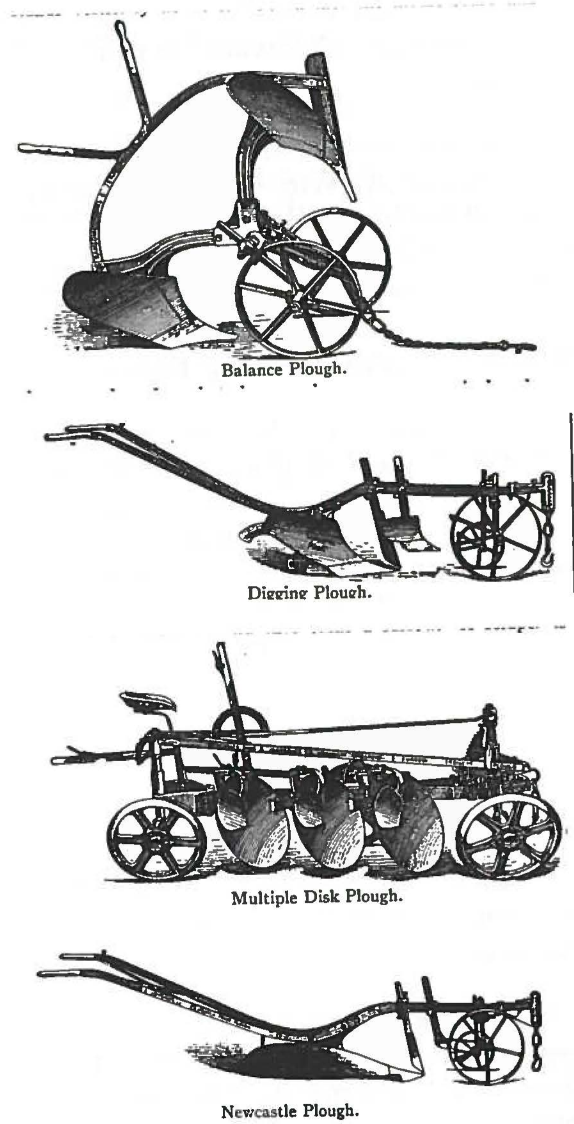


Figure 4: These are four of the plow types illustrated in the early twentieth century eleventh edition of the *Encyclopedia Britannica*. Each will leave a distinct footprint.

At the White Marsh site near Dover, there was a correlation between plowscars and remains of plants. Immediately under each plowscar was a linear arrangement of rootmolds left by the plants that grew in the plowed furrow. If the plowscar has been

scraped away, only the line of rootmolds will survive.

Since plows have been growing progressively bigger and deeper, evidence of earlier cultivation should be expected to have been wiped out by later plowing. Earlier cultivation practices, therefore, should be sought in abandoned fields, at the bottoms of recent alluvial layers, or in other places where modern deep plows have not reached. This is how the Danes have located Viking period field cultivation features under sand dune layers.

In Delaware, we have had considerable success recovering old field surfaces in hedgerows and field edges. Increased mechanization has caused changes in field shape and cultivation methods. As tractors have become larger, they have been forced to avoid the overhanging trees along field boundaries. Each generation of heavy machinery has prompted the farmers to shy away from the field edges. The resulting succession of field boundaries has buried earlier field surfaces with plowscars, A horizons, and manuring spread. At the Achmester cemetery in New Castle County (Figure 5), the succession of buried field edges was striking. After the dig was completed, we recommended backfilling that would preserve the profile of the historic field edge that had taken centuries to develop.

Keeping in mind the fact that features called "plow scars" are not all plow scars, the linear features found on the White Marsh and the nearby trailer sale sites fell into several catergories.

First were the broad, flat scars of a large mouldboard plow that crossed the White Marsh site in regular order, north to south. These scars generally were about ten to fourteen inches wide and penetrated the subsoil seldom more than an inch or two. The scars were more prominent on the more elevated parts of the site, and appeared to be regularly spaced.

Regular spacing and prominence on the higher locations may be taken to indicate that all these scars belong to a single recent season's cultivation, when conditions permitted the plow to bite more deeply than usual.

One of these conditions could have been soil loss from sheet erosion on the hilltops. If erosion lowered the elevation of the field an inch, the plow would bite to its prescribed depth, taking an inch of the subsoil, in turn creating conditions favorable to more erosion.

This appears to be precisely what happened at White Marsh, since there were other, nearby, lines of rootmolds, possibly left by earlier crops.

It is impossible in typically narrow archæological trenches to make out patterns of such molds that might betray the presence of an orchard. Patterns of burned areas could be explained by the burning of tree waste. Old orchards typically exhibit patterns of burnt wood in the plowsoil, many years after the last fruit tree was removed.

Plow depth and subsoiling

A plowman's doctrine holds that "subsoiling," driving the plow into the subsoil, will increase fertility by bringing to the surface valuable minerals from below. Subsoil plows frequently strike buried foundations and trash pits that had lain undetected below the reach of smaller plows.

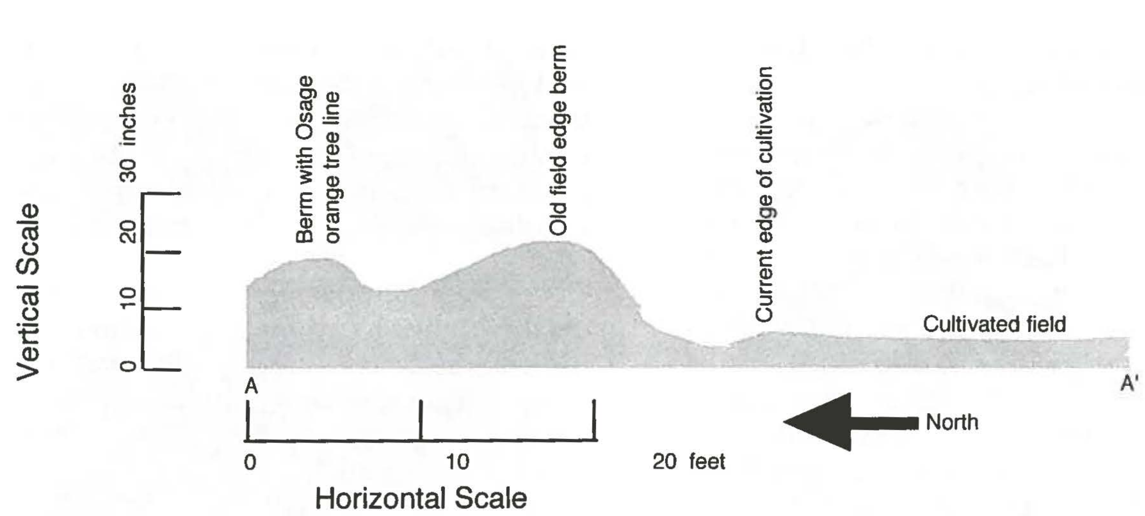


Figure 5: The profile of the hedgerow next to the Achmester cemetery site in New Castle County illustrates the effect of cultivation edges creeping farther into the field as machines became larger. The burial ground was delineated by Heite Consulting for New Castle County.

The depth of a plow is measured by the depth of the mouldboard, which carries the soil up and turns it over. This depth is twice the actual depth of penetration, but farmers are sometimes unwilling to accept this premise, since they evaluate their plowing while the furrows still lie open. After the field has been levelled by harrows, the true depth of the plowing becomes evident. Modern plows seldom create a plowzone deeper than nine to twelve inches, and shovel plows stayed in the top three inches of the soil.

In addition to the damage it does to the cultural resource below, plowing encourages a gradual reshaping of fields through increased sheet erosion and alluvial infilling of low places. This loss of relief can destroy surface indications of roads, graveyards, foundations, fortifications, wells, or other earthworks.

Fertilization

Agricultural practices are sometimes the stuff of legend. We no longer put a dead fish in the bottom of each corn hill, and we have no archæological evidence that prehistoric people in this area did so, either. We do have evidence for other soil supplements, some just as noisome as dead fish.

In the argot of early farm literature, the term "manure" was not confined to "excrementitious animal substances," but included any material that could be spread on fields, including tanyard and slaughterhouse offal, hair, feathers, rags, and horn. The noted English chemist Sir Humphry Davy recommended spreading all these materials on fields (Pennsylvania Agricultural Society 1824:261). He also noted the value of gaseous ammonia and carbon dioxide as fertilizers, but

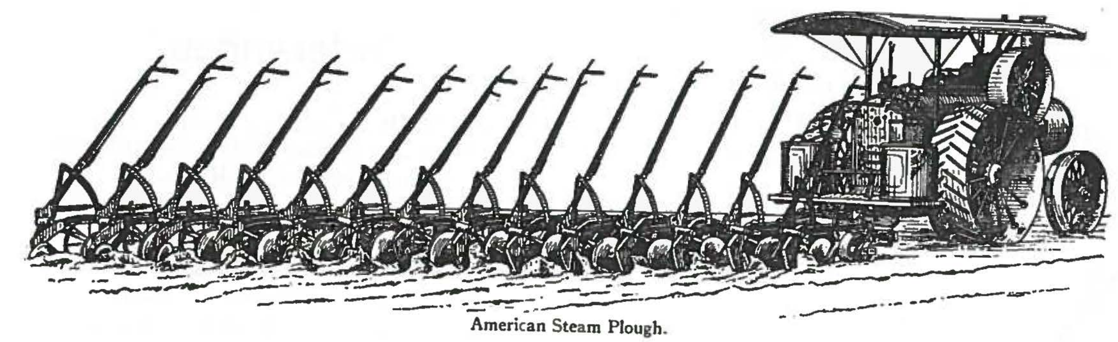


Figure 6: The *Britannica* article identified this rig as peculiarly "American," even though there were similar machines tilling British fields. American open-field agriculture lent itself to very large machinery. The plowscars left by this rig will be evenly spaced and of even depth.

could suggest no way then available to apply them to the soil.

Nineteenth-century farmers were admonished by the experts to use barnyard manure, pigeon droppings, and even the contents of their own privies. Lime, derived from calcined oyster shells or limestone, was a major component of any soil improvement program.

Street sweepings were so valuable that municipalities charged fees for the privilege of cleaning the streets; one Wilmington manure collector was Jacob Broom, a signer of the United States Constitution (Heite 1987: 63). Collectors were constrained to pick up material only after it had lain 48 hours, to give adjacent homeowners ample opportunity to claim it.

Night soil from urban privies in Philadelphia and Baltimore was sold as a raw material for fertilizer. It was mixed with street sweepings and garbage to produce a product called poudrette. Addition of gypsum and charcoal was expected to make the product less objectionable and more useful (Roberts and Barrett 1984).

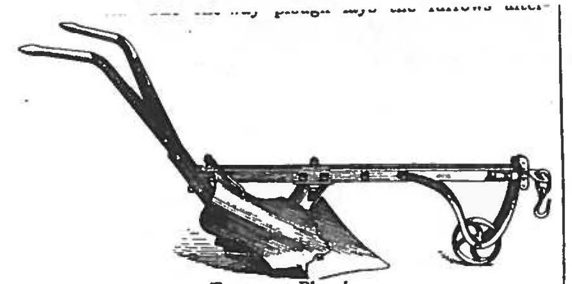
A readily identified artifact category best called "manuring spread", consists of small bits of redeposited domestic ceramics, brick chips, coal, and other domestic artifacts in extremely fragmentary form.

Distribution of this artifact category was congruent with certain soil characteristics in the north Dover project areas.

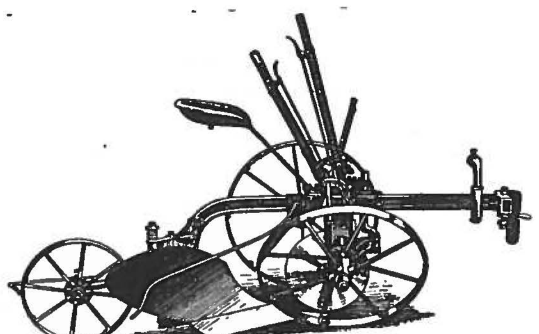
Such materials were absent from the Sassafras, but were found in the poorly-drained Pocomoke soil at the north end of the same field. Prehistoric artifacts, on the other hand, tend to be scattered throughout the well-drained Sassafras soils, where their makers lived.

In this case, the two classes of artifacts represent exactly opposite indications of habitability. The prehistoric artifacts on this field are primary deposits, and may be taken to represent human occupation and use of the locus; the secondary deposits of historic artifacts in the same field indicate uninhabited land that the

Fertilization schemes attempt to change one or more of three properties of soil: chemistry, physical characteristics, and organic content. Chemical analysis can detect evidence of all three types of soil alteration (Custer, Coleman, Catts, and Cunningham 1986).



Turnwrest Plough.



Riding Plough.

Figure 7: The turnwrest plow and the riding plow were among the horse-drawn implements in use early in the twentieth century, according to the *Britannica* article.

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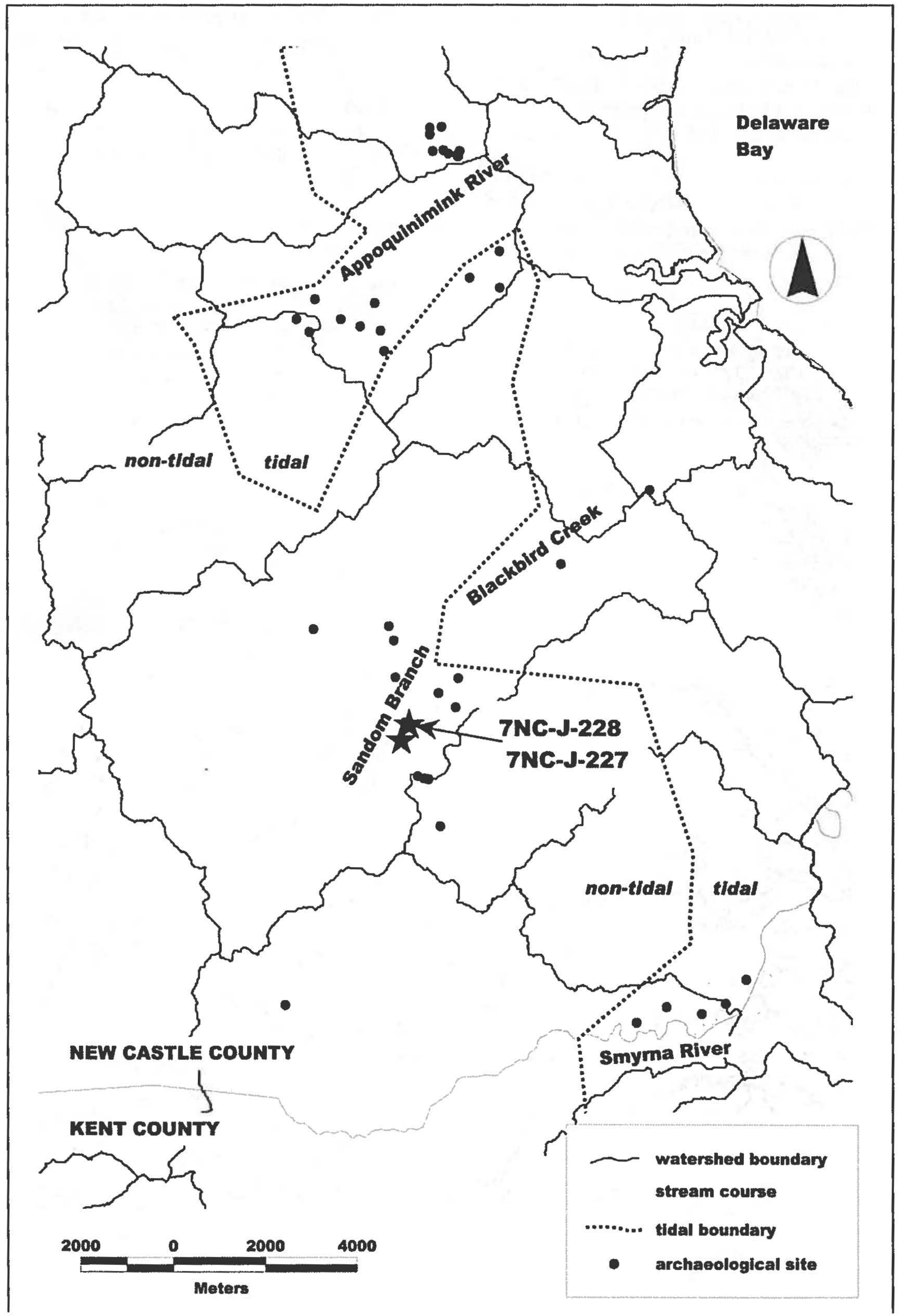

Figure 1: Late Woodland site distribution

Regional site distribution

in South-Central New Castle County

as seen from the Sandom Branch Site Complex

Dennis Knepper
and
Chris Bowen
Parsons, Fairfax, Virginia

Abstract

The distribution of prehistoric archæological sites in the central part of Delaware is examined using Cultural Resource Survey data from the Delaware State Historic Preservation Office, in Dover. Environmental variables found to be useful in the study were limited, due to constraints inherent in the database. The main finding of the analysis was a varying correlation between site distribution and proximity to streams in tidal and non-tidal areas.

Introduction

Planning and construction of the State Route 1 corridor, that connects Wilmington and Dover, has resulted in almost 20 years of archæological investigations throughout central and northern Delaware. Prior to construction activity between Smyrna and Pine Tree Corners, data recovery excavations were conducted by Parsons at the Sandom Branch Site Complex, 7NC-J-227 and 7NC-J-7NC-J-228 (Bowen and Knepper 2003). The sites were situated on terraces overlooking a low-order tributary of Sandom Branch above its confluence with Blackbird Creek. The sites were generally characterized by a series of large, fire-cracked rock features representing discarded stone from indirect heating or stone boiling. Temporal data from the sites spanned most of the Archaic and Woodland periods, but the most intensive occupations, and those associated with the heated rock features in particular, appeared to have occurred in the Early-to-Middle Woodland period.

Methods

To assess the regional context of the Sandom Branch sites, locational data for known prehistoric site components were plotted on maps of the southern part of New Castle County. Since modern political boundaries typically have little relevance to prehistoric settlement patterns, major watersheds were used as geographic bounds for the study.

The Blackbird Creek watershed, within which the Sandom Branch Site Complex was situated, was the central focus of the study, while data for sites in watersheds to the north (the Appoquinimink River) and to the south (the northern half of the Smyrna River Valley) were included for comparative analysis.

Cultural Resource Survey (CRS) data were obtained from the Delaware State Historic Preservation Office (DESHPO), which provided site locations in a digital database. Site attribute data were later transcribed from hard-copy site forms in the DESHPO site files, and the attribute data were correlated with the locational database for spatial analysis through CRS numbers.

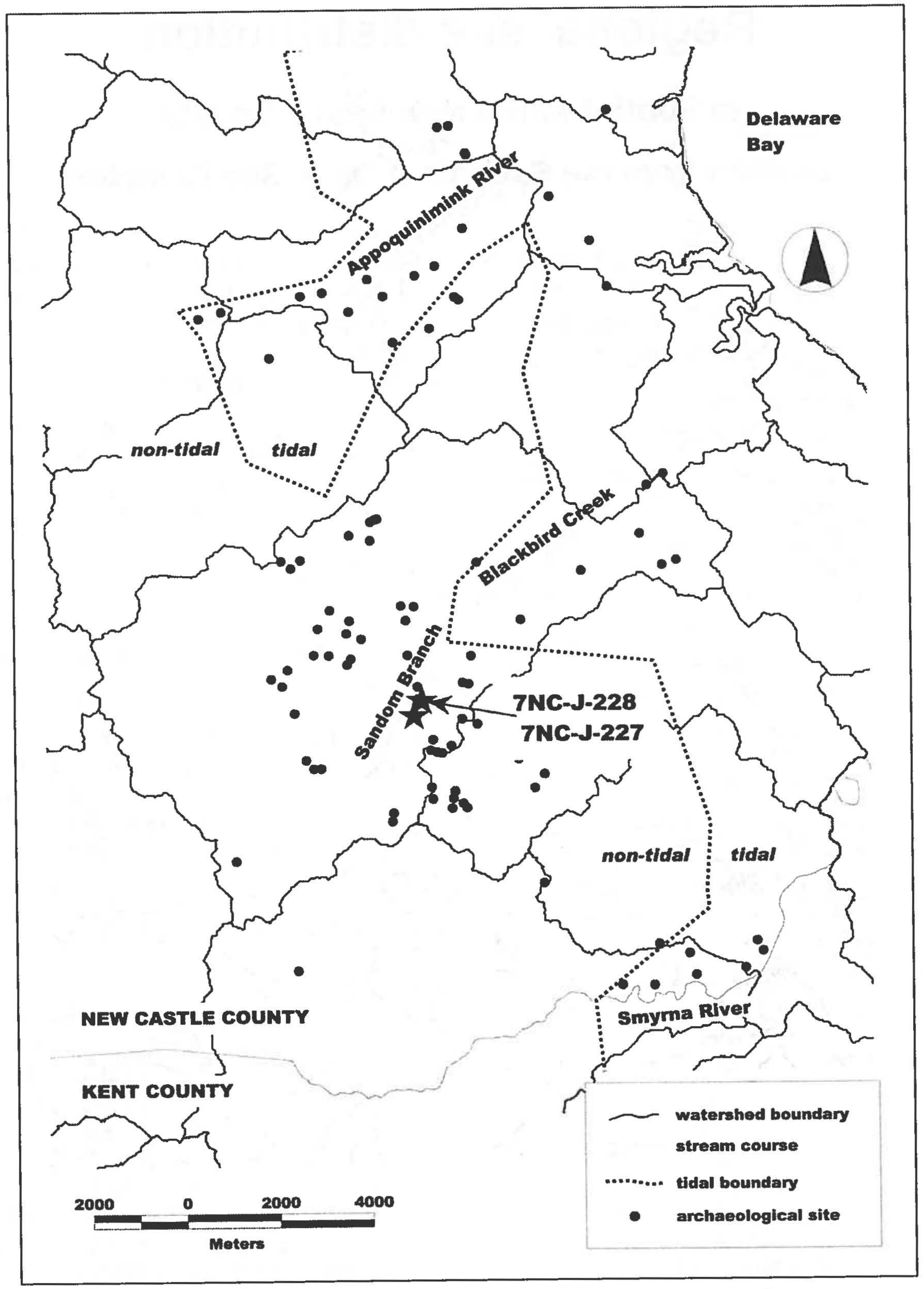

Figure 2: Woodland 1 distribution

Watershed maps used in the study were obtained from the Watershed Delineation Project, posted by the Spatial Analysis Lab of the University of Delaware (Mackenzie 1999). The hydrology (stream location) dataset was comprised of hydrographic linear features originating from USGS 1:24,000-scale digital line graphs for the State of Delaware, obtained through the Delaware Data Mapping and Integration Laboratory, also located at the University of Delaware (UDEL 2002).

Results

In total, 424 prehistoric sites were recorded in the database within the portions of the three watersheds mapped in the study. Breaking down the total by temporal component, 41 sites were identified as having Late Woodland components, as plotted in Figure 1. Differentiating pre-Late Woodland components proved more difficult. The chronology employed throughout on CRS site forms is the system proposed for Delmarva by Custer (1989).

This chronology does not distinguish sub-periods between the start of the Late Archaic and the end of the Middle Woodland, grouping them instead under a single rubric, Woodland I. The chronology does, in fact, use regional complexes, such as Barker's Landing, Carey, or Webb, to subdivide the Woodland I. But these divisions were not reported consistently in the site files. Therefore, totals representing the more comprehensive Woodland I period were used in distribution plots (Figure 2) and the ensuing analyses.

The most obvious difference in the distributions was the seemingly lower frequency of sites containing Late Woodland components in comparison with earlier site components: 41 Late Woodland components *versus* 95 Woodland I components. This variation may be in large part an artifice of the way in which the data were grouped, since two very different time ranges are represented. The earlier, Woodland I distribution includes occupations spanning three sub-periods—the Late Archaic, Early Woodland, and Middle Woodland—and represents a range of as much as 2,500 years. The Late Woodland data, in contrast, represent a single sub-period comprising the last 600-700 years of regional prehistory, less than one-quarter of the time encompassed by the Woodland I period.

In addition to overall frequencies, other variations were noted in the distributions, including differences in the numbers of site components between the three watersheds—for example, more than twice the number of sites were documented in the Blackbird Creek watershed in comparison with the Appoquinimink River watershed. These differences appeared to be as much a factor of sampling bias as of actual distribution patterning, since survey coverage of the regions has not necessarily been systematic.

Distance to Streams

Geographic data available for use in comparative analyses were limited. The major environmental variable that was reported consistently and thus could be mapped throughout the region was surface water in the form of streams. Using the USGS hydrology data noted above, the distance to streams was calculated for each site component from the Late Woodland and Woodland I groups. The results were plotted as cumulative frequency distributions (Figure 3). The charts

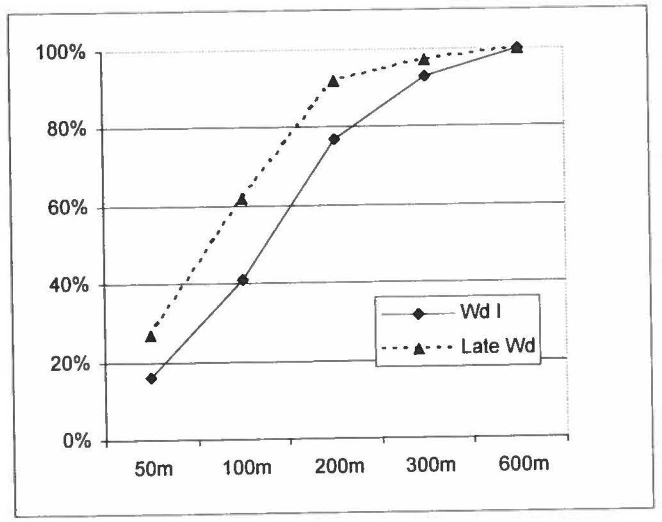

Figure 3.: Cumulative Frequency Distributions for Distance to Streams Among Woodland I and Late Woodland Components.

compare the proportion of sites lying at progressive intervals from streams during the two periods. Given confidence that the data are representative of actual settlement patterns, the analysis suggested minor differences over time in the focus of site location with respect to streams. Specifically, components tended to be situated close to water sources more frequently in later periods. For example, 60 percent of the Late Woodland sites occurred within 100 meters of streams, in contrast to 40 percent of the earlier sites. The difference narrowed at greater distances: the points in the two line charts converged at 300 meters, indicating that over 90 percent of the sites from each period were at least 300 meters from streams, while all sites were located within 650 meters of streams.

Tidal vs. Non-Tidal Locations

The Sandom Branch sites were located in a physiographic zone known as the Mid-Drainage zone, an area that straddles tidal and non-tidal environments (the approximate tidal limit is mapped in Figures 1 and 2 as a heavy dotted line). The sites occurred above the tidal zone of Blackbird Creek, but within 50 m of streams. To determine how common this placement might have been, and whether the location of sites in similar, non-estuary environments accounted for any variation in regional site distribution, the spatial analysis was re-run for subsets of the settlement data based on the tidal limits of regional streams.

In tidal areas, Woodland I and Late Woodland components were proportionately distributed in terms of distance to streams (Figure 4). The frequency curves showed little variation at any distance interval, the difference generally being less than 10 percent. In contrast, site components in tidal areas displayed a greater degree of variation (Figure 5). Site frequency was highest among Late Woodland components in the interval nearest streams (50 meters and 100 meters), but dropped off in the mid-range (between 200 meters and 300 meters), where the line in the chart representing Late Woodland components falls below the line representing Woodland I components. This finding indicates lower frequencies of Late Woodland components at these distances. The analysis suggested that in tidal areas, settlement was more frequently focused on streams and their immediate resource bases. In non-tidal areas, by contrast, water may have been a less consistent factor in site location selection. That is, specific resources

may have provided a more common motivation for site selection than proximity to streams. A variety of factors may thus have influenced the shapes of the curves in the chart in Figure 5, with time period and proximity to streams being only one set.

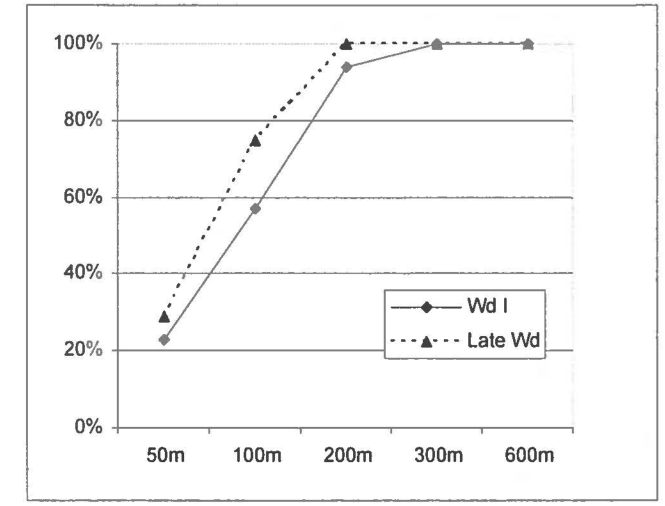

Figure 4.: Cumulative Frequency Distributions for Distance to Streams Among Woodland I and Late Woodland Components in Tidal Areas.

These findings — including a greater focus on near-stream settings in tidal areas during the Late Woodland — in part conform to existing models of Late Woodland settlement in central Delmarva. These models propose an increase in sedentism during the period, seen especially in the intensified use of major floodplain settings associated with the introduction of horticulture (Thomas et al. 1975; Custer 1989). The models hold that non-tidal, upland areas continued to be used for specific resource collection.

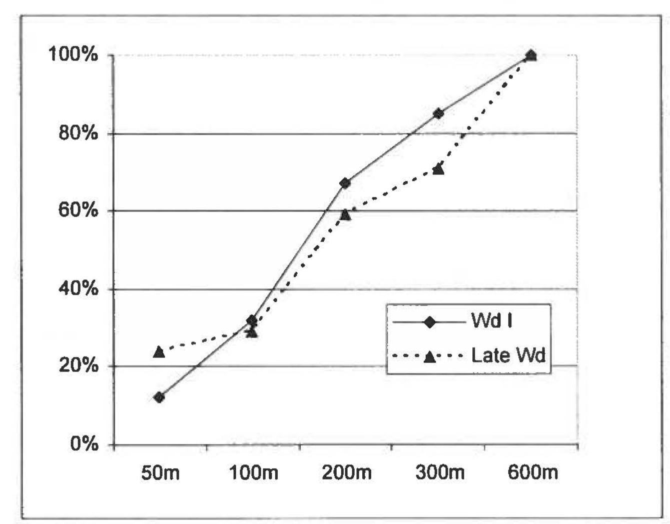

Figure 5.: Cumulative Frequency Distributions for Distance to Streams Among Woodland I and Late Woodland Components in Non-Tidal Areas.

The exploitation of wild resources was an enduring practice that was particularly important in Delmarva, where reliance on cultigens does not seem to have developed to the extent that it did in other parts of the Middle Atlantic. And in fact, Custer suggests that little significant change in upland landscape use can be demonstrated in central and northern Delmarva throughout the Woodland period. He notes that Late Woodland base camps in the region lack evidence, such as house patterns, storage pits, or middens that would imply long-term habitation. Further, Late Woodland sites tend to be located directly over Woodland I sites, indicating little change in settlement patterning. The results of the current analysis similarly suggest that in non-tidal, upland areas, a varied resource focus prevailed from earlier periods.

Conclusions

The data set used in this analysis, while limited in terms of systematic coverage and the extent of the environmental variables employed, did provide indications of variability in site settlement patterning in the region based on both occupation period and location with respect to estuary environments. In this simplified analysis, variations in site selection and the focus of site activities were suggested between Late Woodland and earlier, Woodland I occupations, as well as between sites in tidal and non-tidal areas. Further analyses conducted with larger, probabilistic samples might be able to elicit more significant trends in the data and likewise determine sources of any variation discovered. By broadening the depth of the database to include consideration of other variables, such as site size, artifact assemblage characteristics, or landform attributes, additional context for interpretation of the analytical results should be possible.

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Uncovering Invisible Industries

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American schoolchildren learn that President Washington sent troops to put down the Whiskey Rebellion. The circumstances surrounding the rebellion are explained briefly in terms of portability, if not potability.

According to conventional wisdom, the home distillation of whiskey was a method frontier farmers used to compress their grain into something that could be shipped to distant population centers. But that's only part of the story, and the tip of an industrial iceberg that has been ignored and neglected by historians and archæologists.

American industry typically is interpreted as a two-stage system. First there was the small, dispersed, water-powered industry of what Brooke Hindle called the "wooden age" followed by the steam powered, concentrated, ever-larger so-called "modern" industry that gave rise to the industrial city of the late nineteenth century.

When standard works of historical statistics are compiled, the break between old and new is comfortably apparent. Steam power, then electricity, freed industries

from the waterways. The locomotive, then the truck, then the Interstate system, released transportation into a uniform coverage, allowing the swift and comprehensive movement of goods to all corners of America uniformly and simultaneously.

The only problem with this model is that it misses the point and neglects huge segments of industrial America.

Different industries moved through the various stages of development at different rates. Take for example, the embroidery industry. Ed Rutsch often regaled us with tales of his father's business of putting out embroidery work among families in the community. While embroidered cloth may have been a late manifestation of the practice, there was a time when major segments of major industries were dispersed across the countryside in places we would not identify as industrial.

Our image of the industrial site is tempered by our familiarity with big business and the wage economy, both of which are relatively recent phenomena. Until the large blast furnaces of the eighteenth century, all manufacturing industry was dispersed across the countryside. Until the introduction of wage labor, the price of goods was a function of what the producer needed and what the buyer was willing to pay.

In the popular literature, ironmaking, textiles, and forest products were among the first primary industries to go big. Local producers were eliminated as the biggies came on line. The model assumes that concentration was a one-way superhighway, with everyone travelling along.

Anthropologists have made lifetime careers of finding backwaters where the superhighway didn't run. East African ironmaking, where quaint native craftsmen made wrought iron in old termite hills, for example, are cited as technological backwaters where the tendrils of United States Steel did not reach.

But what if an apparently primitive technology was, in fact, the most appropriate for a particular circumstance? What if the supposedly primitive approach actually represented sophisticated understanding of market requirements?

Before the American Revolution there were two blast furnaces in the lowlands of southern Delaware, both of which failed. Maybe they were too big for the local economy, but they didn't survive. Instead, dozens of small-scale bloomery ironworks were established, often in connection with mill seats that also supported sawmills and gristmills. Clearly these smaller operations were able to serve the market without the expenditure of capital that the larger blast furnaces required. Water-powered bellows and hammers, one might suppose, would make small-scale ironmaking practical for a few men working seasonally or part time at the trade.

We were able to live with these assumptions, while still adhering to the general idea of industrial progress, until last summer.

In the course of a CRM survey, we found some bloomery ironmaking slag in a plowed field, about a half mile from a known mill site in southeastern Sussex County, Delaware. Aha, we thought, they were blooming iron over there at the mill.

Subsequent excavation of the site revealed pits with bloomery slag and the slag produced by a blacksmith's fire. My mind immediately raced back to those quaint fellows in East Africa, pumping air into termite nests.

We don't fully understand what was going on at this site, but it is clear that a lot of hand labor was going into a process that involved bloomery slag and production of useable pieces of iron.

While this farm was obviously at the far distal end of the distribution system, it would have been possible for the locals to transport a few bars of iron without spending a day pumping a bellows. Such reasoning, of course, presumes that these people placed a cash value on a day's work, which was not necessarily the case.

But there again we are reasoning from the vantage point of industrial society and the wage economy. To the farmer in the backwoods, subsistence was the main objective of farming. Grow a good crop and your family will not starve. Generate some excess cash, and you may drink tea from a fine teacup. The way to generate cash, or a cash equivalent at the store, was to produce something that people would buy.

And so this attitude toward values explains backyard ironworking. If you buy some bar iron, you will need precious cash generated from some other activity. If you sell bar iron, you can obtain some luxury you want, without first obtaining cash. In this environment, it makes sense to produce something valuable, even if it requires a great deal of effort that would be considered disproportionate in a wage economy. Remember, the concept of wage labor was not current in the backwoods. If you pumped a forge all day to make enough iron to buy the wife a tea cup, then you have used your time profitably. The social value of the teacup may in fact be equivalent to a day's hard work at the forge.

Any wrought iron scrap was quickly converted into useful products, sometimes by the farmer himself. Cast iron, on the other hand, could not be reprocessed locally, which may explain why almost all the iron waste on an archæological site is likely to be cast, except the nails.

We cannot archæolgically recover the timbers that were reused, sometimes several times, but they frequently are found in old buildings. Other rehabilitated "trash" would include the stoneware jug at Bloomsbury that served as a cup long after its neck was broken off. Also at Bloomsbury was a red earthenware vessel with drilled holes from a repair. Nothing was wasted; as the saying went, they used everything in the pig but the squeal and the curl in the tail.

In a subsistence economy, the storekeeper is the broker through whom the country produce reaches the cash economy. Whether the produce was eggs, or bar iron, cattle on the hoof, or barrels of salt pork, products of rural industry began outside the money economy, and appeared on the marketplace only after they had been aggregated by the storekeepers and traders who took them to the cities.

We therefore need to be acutely aware that there were no factories producing bar iron or pearl ash, or oak bark, out in the countryside. If we look at these industries, we must look in the back yards of subsistence farmers. At the Bloomsbury site, we found considerable evidence for soap making and pearl ash refining, both of which would have resulted in conversion of "free" domestic resources into cash. Historians of the frontier have noted that pearl ash was one of the first cash products to come from newly-cleared land, for it allowed the farmer to quickly produce cash from felled trees that otherwise would be worthless.

If a sizable segment of American manufacturing functioned outside the factory system and outside the money economy, it behooves us to look at the dispersed and isolated farm sites as elements in the production system. Even as late as the twentieth century, in addition to embroidery, country people were manufacturing woven rag rugs, Christmas decorations, and reed-stem clay tobacco pipes, for exchange into the money economy.

If we are going to produce a balanced picture of American manufacturing, we must examine the hidden industries as rigorously as we examine the bigger and more obvious ones that dwelt in large factories.

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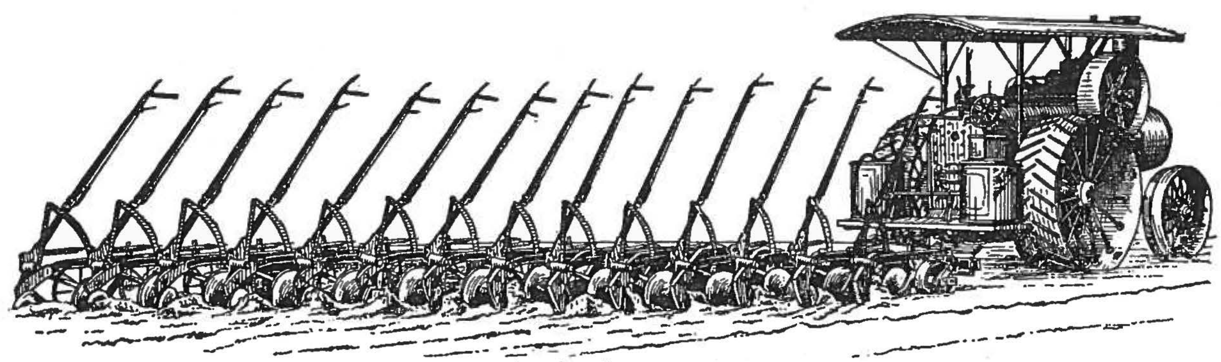

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