

CHAPTER V SUBSISTENCE

The goal of archaeology is not just to map features and catalog artifacts, but to learn about how people lived. By combining the findings of our excavations with the scientific analyses performed after we left the field, the findings of other nearby excavations, and historical documents recording how Delaware's Indians lived in the seventeenth century, we can say quite a lot about the inhabitants of Puncheon Run. The next three chapters describe our main findings.

This chapter discusses our findings in the area of subsistence. Before people can do anything else, they have to eat, and the ways they obtain food have a profound impact on everything else about their societies. Hunter-gatherers typically move through their environments in search of the food resources that provide the biggest return on their investment of time and effort; therefore, the distribution of those resources determines, to some extent, their movements. In simple terms, while nomadic farmers take their crops and animals with them wherever they go, hunter-gatherers take themselves to the food. Whole communities may decamp and move from one spot to another, taking advantage of different environmental niches, so that the entire group is constantly on the move. Alternatively, small parties may leave the main camp to visit sites where food or other essentials are found, collecting them and bringing them back to the main community. What combination of these practices is used in a given society depends on the cultural and individual preferences of the people (Plate 31), their history, their environment, their technology, and their level of social organization.



PLATE 31: *Theire sitting at meate*

SOURCE: *Painting by John White, circa 1585*

The lack of detailed information about subsistence practices is a major handicap to our understanding of the Woodland people of Delaware. The investigation of the Puncheon Run Site has therefore included a broad-based attempt to learn about the subsistence practices of the site's residents through a variety of techniques. These techniques included review of ethnohistorical literature focused on the foodways of the Indians who lived in the Middle Atlantic region in the 1500s and 1600s, soil flotation to recover botanical remains, study of plant phytoliths, analysis of soil chemistry, analysis of protein residues on stone tools, and study of possible storage pits.

A. ETHNOHISTORY

1. *Plant Foods*

One way to approach the study of subsistence practices of prehistoric Native Americans is through the documented lifeways of their descendants in the sixteenth and seventeenth centuries, and the Puncheon Run project has included a substantial component of ethnohistorical research. (The results of this research are given in more detail in Volume II, Appendices D and E.) Because the sources on the Lenape, the main Native American group of the lower Delaware Valley, are sketchy and rather late, the study had a regional perspective, drawing on much better accounts written in North Carolina, Virginia, New York, and New England. The intent of this research was not to use seventeenth-century records as a direct source on prehistoric life in Delaware's Woodland I period, but to learn about some of the possible ways of living in the Middle Atlantic environment. The Indians observed by European explorers, after all, were different in many ways from their Woodland I ancestors. They were agriculturalists who relied on corn and beans raised in their garden plots for much of their food. These crops seem to have been introduced into Delaware around AD 1000, and their importance was underscored by all of the European observers. William Penn noted, "their Diet is Maze, or Indian Corn, divers ways prepared. . . . They have likewise several sorts of Beans and Pease, that are good Nourishment; and the Woods and Rivers are their Larder" (1908 [1682]:5). Isaack de Rasieres (1909 [1628]:103) mentioned areas of good soil "where the savages plant their maize, upon which they live." Yet although they planted corn and beans, the Indians of eastern North America were not completely dependent upon their crops. They were generalists who used a wide variety of resources and traveled widely to obtain them. Agriculture seems to have been adopted gradually in the region, over 300 or 400 years, and there was much continuity with earlier practices (Potter 1993:143). Since much of the knowledge historic Indians possessed about wild foods and how to collect and prepare them was probably inherited from their distant ancestors, that knowledge can help us understand how those ancestors lived.

Our sources tell us that the Indian diet varied greatly over the course of the year, depending on what was available. The classic account of the Native Americans' seasonal round was given by John Smith in his description of the Virginia Algonquians. He wrote,

In March and Aprill they live much upon their fishing wires; and feed on fish, Turkies, and Squirrels. In May and June they plant their fields, and live most of Acornes, Walnuts, and fish. But to mend their dyet, some disperse themselves in small companies, and live upon fish, beasts, crabs, oysters, land Tortoises, strawberries, mulberries, and suchlike. In June,

July, and August, they feed upon the rootes of Tochwough berries, fish, and greene wheat. It is strange to see how their bodies alter with their dyet, even as the deere and wilde beasts they seeme fat and leane, strong and weake [Smith 1986 (1608):116-117].

Smith also described many of the wild plants on which the Indians depended. He mentioned several kinds of berries and other fruits, and he experimented with making wine from local grapes. John Lawson (1952 [1714]:178) noted that the Carolina Indians eat “all wild fruits that are palatable, some of which they dry and keep against Winter.”

Nuts seem to have been quite important food sources. Smith described Indians eating chestnuts, walnuts, acorns, and *Chechinquamins* (chinkapins), and he gave a detailed description of the manufacture of walnut milk, a native delicacy:

When they need walnuts they breake them betweene two stones, yet some part of the shels will cleave to the fruit. Then doe they dry them againe upon a Mat over a hurdle. After they put it into a mortar of wood, and beat it very small: that done they mix wit with water, that the shels may sinke to the bottome. This water will be coloured as milke, which they call *Pawcohiccora*, and keepe it for their use [Smith 1986 (1608):109].

Walnut milk was also described by several later observers among the southeastern Indians and the Iroquois, so almost certainly it was also used by the Lenape of Delaware. Indeed, accounts of the southeastern Indians describe very great use of nuts. John Lawson, who traveled widely in the Carolinas around 1700, recorded that the Indians he met kept great stores of nuts and nut oil, especially hickory nuts and a fine oil made from the acorns of live oaks. William Bartram, traveling among the Creeks in 1757, observed that some families has as many as 100 bushels of hickory nuts in storage (Waselkov and Braund 1995:39). The Pilgrims found acorns stored in Indian houses around Plymouth (Cheever 1848:39). Because our accounts mention that nuts were processed with wooden mortars, or with a combination of wood and stone, we should not expect large stone mortars to necessarily accompany nut-processing in the eastern woodlands.

John Smith (1986 [1608]:109) was one of the very few observers to note the Native Americans’ use of small seeds, describing a variety that he called Mattoun: “Mattoun groweth as our bents do in meddows; the seed is not much unlike to Rie, though much smaller. This they use for a daintie bread buttered with deare suet.” Smith’s Mattoun was probably amaranth or some variety of *Chenopodium*, meadow-dwelling plants whose seeds are commonly found on archaeological sites throughout eastern North America.

To Smith the most important wild food of the Powhatans was the root of a plant called Tockawhough, which “groweth like a flag in the marshes” and are “much of the greatness and taste of Potatoes” (1986 [1608]:110). Modern experts do not agree on the identity of this “Tockawhough,” or tuckahoe, but it may have been pickerel weed or arrow arum. (Indeed, the word may have been a general term referring to any root gathered from the marsh.) Smith tells us,

They use to cover a great many of them with Oke leaves and Ferne, and then cover all with earth in the manner of a Cole-pit; over it, on each side, they continue a great fire 24 houres

before they dare eat it. Raw it is no better then poyson, and being rosted, except it be tender and the heat abated, or sliced and dried in the Sunne, mixed with sorrell and meale or such like, it will prickle and torment the throat extreamely, and yet in sommer they use this ordinarily for bread [Smith 1986 (1608):110].

Thomas Hariot gave a very similar description of a plant he called Cocushaw, which was used by the Indians of North Carolina, and which “groweth in very muddie pooles and moist groundes”:

The juice of this root is poison, and therefore heede must be taken before any thing be made therewithall: Either the rootes must bee first sliced and dried in the Sunne, or by the fire, and then being pounded into floure wil make good bread: or els while they are greene they are to bee pared, cut into pieces and stamp; loves of the same to be laid neere or over the fire untill it be soure, and then being well pounded againe, bread, or sponne meate very good in taste, and holesome may be made thereof (Quinn 1991 [1588]:349).

None of our accounts of the Lenape mentions the eating of marsh roots, but since the large marshes around the Delaware Bay abound in such plants, it would be surprising if they were not exploited, and the siting of prehistoric sites near marshlands suggests that they may have been important food sources in earlier times.

Other roots used by the historic Indians included the ground nut or wild potato (*Apios americana*), which was mentioned by Lawson, Hariot, and Bartram; sassafras; and a number of species not now identifiable.

2. *Fishing*

Some of our European sources were professional seafarers who were very knowledgeable about fishing, and their accounts contain a great deal of detail about Indian fishing practices (Pearson 1972). All of the accounts emphasize the importance of fishing to the Indians' diet, especially at certain times of the year. Isaack de Rasieres observed, “they support themselves by hunting, and when the spring comes, fishing. In April, May, and June, they follow the course of these [the fish], which they catch with a drag-net they themselves knit very neatly, of the wild hemp, from which the women and old men spin the thread” (1909 [1628]:105).

Fish were found in great abundance in New World waters, especially during the spring and fall fish runs, when the sheer number of fish in the rivers amazed European observers. Along the Delaware the runs of shad and herring were sometimes stupendous: “one might believe, when he sees such terrible amounts of them, there was as great a supply of herring as there is water. . . . One must behold the sight oneself” (Byrd 1972 [1737]:834). Among the other fish regularly mentioned are striped bass, eels, salmon, pike, trout, flounders, and lampreys. In the spring sturgeon were common, sometimes measuring up to 5.5 meters (18 feet) long. Crabs, lobsters, oysters, clams, mussels, and sea turtles were also common, and commonly eaten by the Native Americans.

Many different fishing techniques are described. Van der Donck (1967 [1655]:97) tell us that “their fishing is done with seines, set-nets, small fikes, weirs, and laying hoods.” Other accounts describe

shooting with bows and arrows, spearing, and angling with a bone hook on a line. Sometimes spear fishing was done at night, and a fire was used to draw fish to the surface. Among the fish caught this way were the great sturgeons, which might also be snagged in small nets mounted on poles (Wood 1865 [1634]:100). The Nanticoke of the early twentieth century used baskets for catching eels, like European eel pots, but there are no seventeenth-century descriptions of this technique (Porter 1987). South of New York, most of the boats the Europeans saw were dugouts, some large enough to hold 40 men (Smith 1986 [1608]:117). However, canoes made of birch or elm bark were also observed; John Smith encountered one at the northern end of the Chesapeake Bay.

Two kinds of fishing weirs were built. In coastal areas weirs were made of reeds and nets, often in the form of a complex maze. At the fall lines Indians built stone dams that closed off most of the river, then closed the gaps with large nets or waited with small nets on poles. Archaeological remains of both kinds of weirs have been found. Stakes that were probably parts of a prehistoric weir were found in the Delaware River near the Naaman's Creek Site, and weirs about 2,000 years old have been identified near Boston (Custer 1989:204). Stone weirs, which are very difficult to date (and may have been reused and rebuilt over centuries), have been found in many tributaries of the Chesapeake Bay and in other parts of North America (Dent 1995:204).

Native Americans did not salt or pickle fish, but they had some techniques for preserving their catch. Van der Donck (1967 [1655]:97) tells us that "they do not know how to salt fish, or how to cure fish properly. They sometimes dry fish to preserve the same, but those are half tainted, which they pound to meal to be used in chowder in winter." Sometimes drying was done over fires (Plate 32),

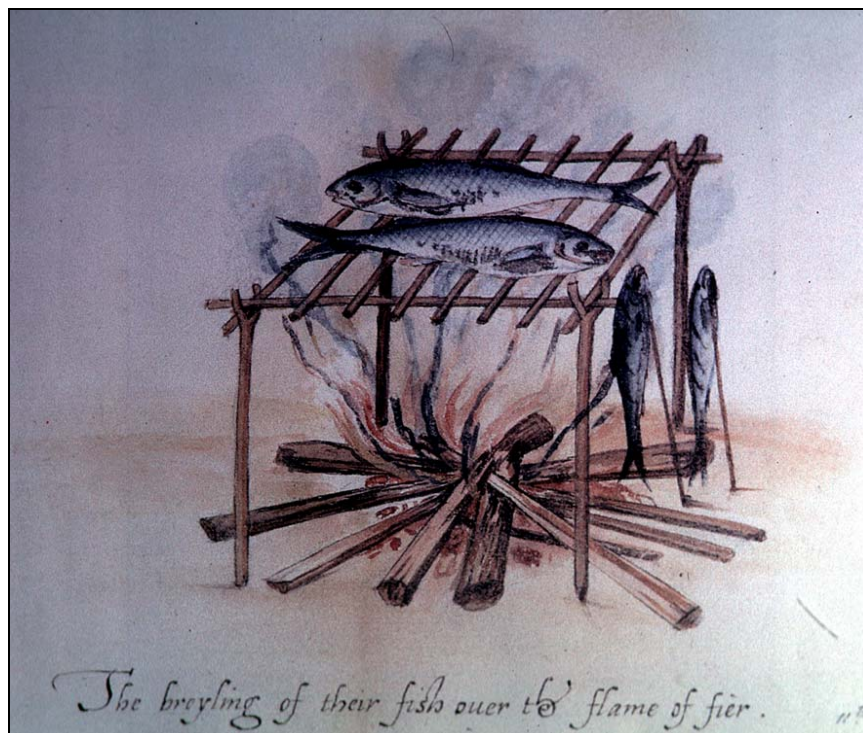


PLATE 32: *The broyling of their fish over the flame of fier*

SOURCE: *Painting by John White, circa 1585*

but this does not seem to have been “smoking” in the European sense. Most often Indians did not gut the fish they ate, but cooked them whole.

Many Native Americans in the Pacific Northwest relied heavily on salmon caught during the spring runs to sustain them year-round, and we possess a rich store of ethnographic data on their practices that may have some relevance for the study of eastern woodland Indians (Hayden 1997; Teit 1906). Salmon, caught in nets, were dried on wooden racks in the sun. Gutting and drying the fish was much more time-consuming than catching them. Drying fish was women’s work, and men who controlled productive fishing stations sometimes took several wives, at least in part to help them dry their catch. The fish were then stored in pits, and they lasted through the winter. White observers, however, agreed with their seventeenth-century ancestors in thinking that preserving fish by drying left many of them “half tainted.” One traveler commented that the practice of storing dried fish within pit houses “causes an unbearable repugnance to anyone who has not grown up in the midst of such stench” (Hayden 1997:94).

3. *Hunting*

Among the woodland Indians hunting was a means of obtaining food as well as a great pleasure. European observers described two kinds of hunts: ordinary year-round local hunts, and large annual fall hunts. Throughout the year, individuals or small groups of men would hunt around their dwellings, taking whatever they could find. Deer was the main quarry, but turkeys and bears were also mentioned regularly. Several European observers commented on the Indians’ willingness to eat almost any animal they came across. According to Holm (1834:16), “they eat all kinds of wild animals and productions of the earth; fowls, birds, fishes, and fruits, which they find within their reach.” Daniel Denton (1845:7) wrote that “the meat they live most upon is Fish, Fowl, and Venison; they eat likewise Polecats, Skunks, Raccoon, Possum, Turtles, and the like.” John Lawson (1952 [1714]:178) described Carolina Indians eating all sorts of turtles and even “young wasps, when they are white in the Combs, before they can fly,” which were “esteemed a Dainty.” John Smith summed up the Powhatans’ habits by noting, “they devoure all they can catch in their power.”

In the fall, large, communal deer hunts were organized by the chiefs. These hunts made a great impression on European observers, and we have many accounts of them. Peter Lindeström (1925 [1691]:213) recorded one of the more detailed descriptions somewhere near the Swedish settlement at Wilmington:

Now as soon as the winter bids good night, they begin with their hunts, which is done with a fine innovation. Now at that time of the year [November] the grass which grows there, as has been said, is as dry as hay. When now the sachem wants to arrange his hunt, then he arranges his people close together in a circle of ½, 1 or 2 miles, according to the number of people at his command. In the first place each one roots up the grass in his position in the circumference, to the width of about 3 or 4 yards, so that the fire will not be able to run back, each one then beginning to set fire to the grass, which is mightily ignited, so that the fire travels away, in towards the center of the circle, which the Indians follow with great noise, and all the animals which are found within the circle, flee from the fire and the cries of the Indians, traveling away, whereby the circle through its decreasing is more and more

contracted towards the center. When now the Indians have surrounded the center with a small circle, so that they mutually cannot do each other any harm, then they break loose with guns and bows on the animals which they then have been blessed with, that not one can escape and thus they get a great multitude of all kinds of animals which are found there.

Van der Donck (1967 [1655]:97) said that Indians sometimes united for “rare sport” in companies of 100 to 200, when “they drive over a large district of land and kill much game.” Indians who lived near the coast typically traveled inland to hunt, since the deer had been so heavily hunted around their villages that few remained. Isaack de Rasieres (1909 [1628]:108) wrote that Indians near New York “go . . . in October to hunt deer, leaving at home with their maize the old people who cannot follow.” John Smith (1986 [1608]:118) gave a similar account of the Powhatans, and John Lawson (1952 [1714]:206) also observed that the North Carolina tribes traveled several days from their villages to hunt. In their hunting territories, “they go and fire the Woods for many Miles, and drive the Deer and other Game into small Necks of Land and Isthmus’s, where they kill and destroy what they please” (Lawson 1952 [1714]:207).

These accounts provide some suggestions for the kinds of resources that may have been exploited from the Puncheon Run Site. Annual fish runs on the St. Jones are a strong possibility. Today, the marshes in the river contain large numbers of pickerel weed, arrow arum, and golden club, the main candidates for tuckahoe, and gathering of marsh roots was also a likely activity at the site. Other possibilities include hunting for turtles (Plate 33) and other small animals, and gathering seeds, nuts, and fruits.

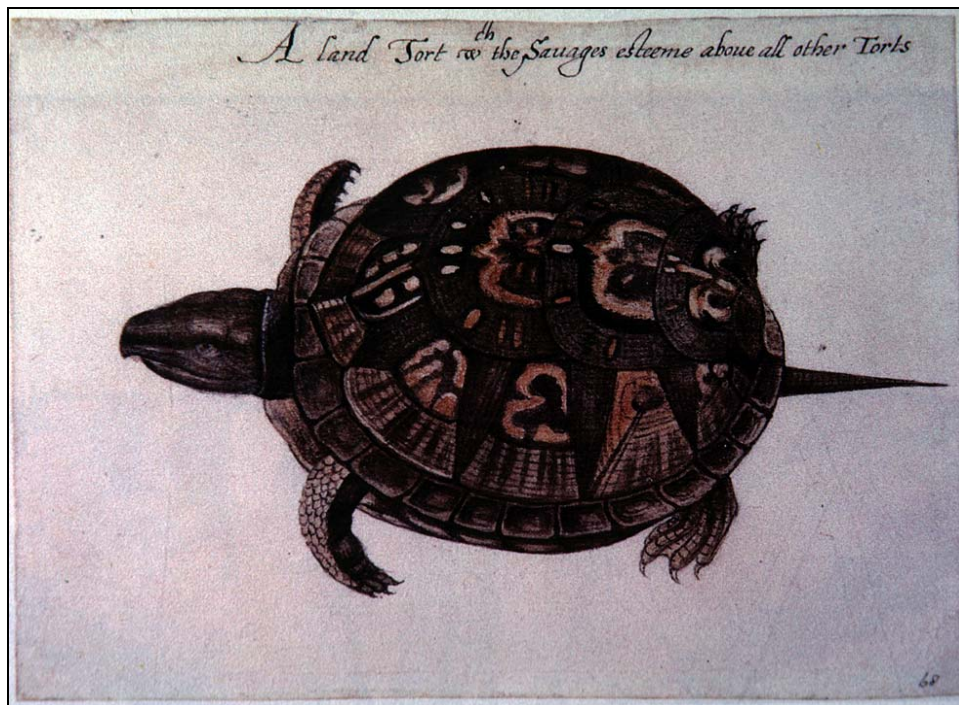


PLATE 33: Common Box Tortoise

SOURCE: Painting by John White, circa 1585

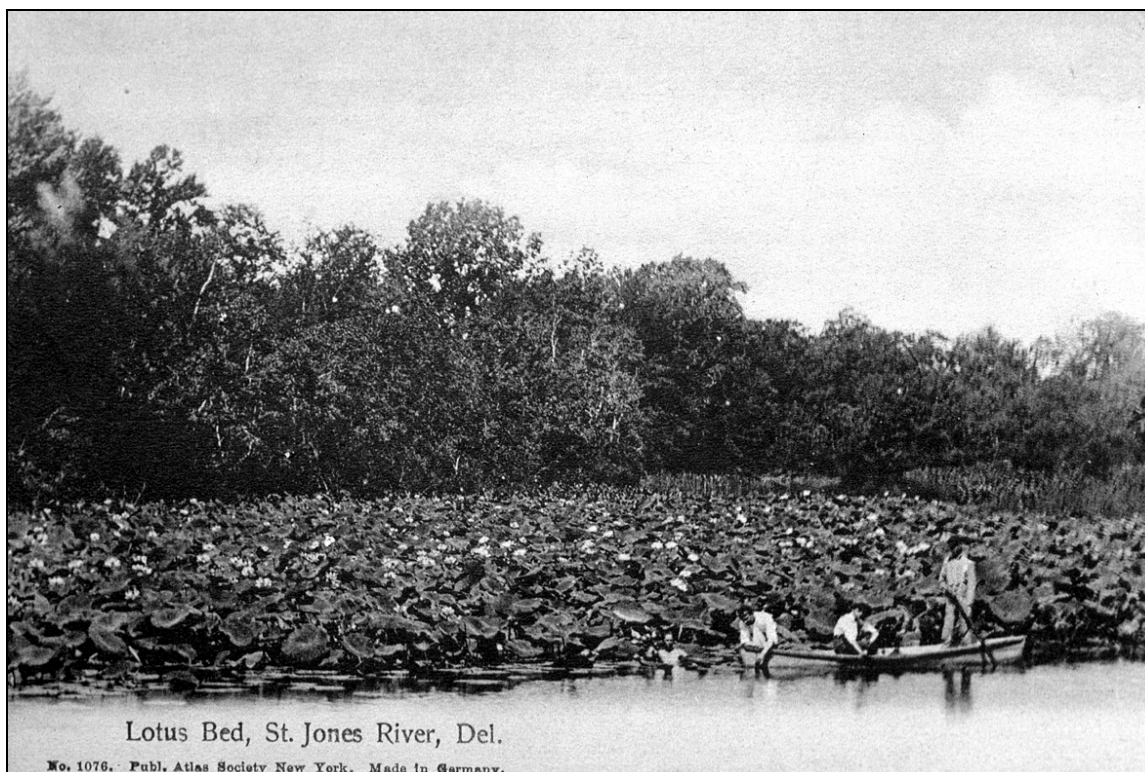
B. FLOTATION PROCESSING

The use of flotation to recover plant remains from soil has revolutionized the study of prehistoric subsistence in North America, demonstrating the great reliance of Native Americans on plant foods for at least the past several thousand years. In Delaware, however, flotation has had only limited success, at least partly because of soil conditions. The soil on most Delaware sites is highly acidic, a characteristic that inhibits preservation of charred seeds, and it is also sandy, so that modern seeds and other contaminants work their way into soil samples even when taken from the bottom of deep features.

During the course of Phase II and Phase III investigations at Puncheon Run, 134 soil samples containing 265.5 liters of soil were floated by paleoethnobotanist Justine Woodard McKnight. (For the full technical report, see Volume II, Appendix C). Although wood charcoal was obtained from almost all of the samples, very little direct evidence of Native American subsistence was found. In addition, two-thirds of the samples contained uncharred seeds, indicating that the samples contained modern materials. The identifiable wood charcoal consisted primarily of oak, along with a smaller amount of hickory. These two trees were common, and because they produce a large amount of heat when burned, their dominance is hardly surprising. The other species represented, and therefore known to have been growing on the site, were sassafras, black locust, maple, chestnut, dogwood, persimmon, ash, holly, black walnut, sweetgum, tulip poplar, red mulberry, black cherry, and various types of pine.

The samples from Locus 1 included small amounts of charred hickory nutshell (<0.02 gram per sample) and two very small fragments of charred acorn. These small amounts of nutshell indicate that nut-bearing trees were present on the site, but they do not provide any information about prehistoric subsistence, because charred nuts in similar quantities were found in the control samples. The only indication of subsistence was one American lotus seed recovered from Feature 66, one of the silo pits; this single charred seed may provide significant information.

Nelumbo lutea, the American lotus (Plate 34), is a native aquatic herb with fleshy rhizomes (swollen stems like those at the base of an iris) that grows in quiet fresh water in isolated populations (Brown and Brown 1984:459). The starchy seeds, the shoots, and the rhizomes are edible. No direct documentation of the use of the lotus by the natives along the eastern seaboard of North America has been located, and we have found only one other example from an archaeological context, a charred seed found at the Hughes-Willis Site just a few miles east of Puncheon Run. The lotus is actually rather rare in the east, but it is quite common in the Mississippi drainage and in the Great Lakes, and accounts of its use by Native Americans in those regions are common. The Comanche boiled the roots for food (Carlson and Jones 1940:523); the Dakota made soup with the hulled seeds combined with meat, and cooked peeled tubers with meat or hominy (Gilmore 1919:79). The Meskwaki cooked the seeds with corn, and they cut terminal shoots crosswise and strung them on strings to be dried for use in the winter (Smith 1928:262). The Ojibwa Indians roasted the seeds in their hulls and ground them into a sweet meal; they also cooked the shoots with venison, corn, or beans (Smith 1932:407). The Huron Indians considered lotus root a starvation food when it was used along with acorns (Aller 1954:63).



Lotus Bed, St. Jones River, Del.

No. 1076. Publ. Atlas Society New York. Made in Germany.

PLATE 34: The 'Lotus Lilies' of the St. Jones River

SOURCE: Postcard of the Atlas Society, New York. No. 1076. Collection of William McAvoy

Given the importance of the American lotus to many Indian groups and its rarity in the east, it is possible that the plant was not native to Delaware but was introduced to the area by Native Americans. The seed from Feature 66 at Puncheon Run suggests that the plant may have grown in Delaware more than 1,500 years ago, and it certainly suggests that it was used by the Native American inhabitants.

Fragments of burned hickory nuts were recovered during the excavations of Features 30 and 37 in Locus 3, and hickory nutshells were also recovered from the Feature 30 flotation samples. Two samples from Feature 24, a small pit excavated in Phase II Block 4, contained a possibly significant concentration of 13 charred goosefoot (*Chenopodium*) seeds. Although possibly of some cultural significance, the quantities of nuts and seed in these samples were still too small to suggest that they represent major activities at the site. It seems unlikely that the large pits in Locus 1 or Locus 3 were used to store nuts or seeds, or anything else that would have had the potential to survive; if such foods were stored in the pits, more evidence ought to have been preserved. It is unclear what type of food could have left such limited remains; McKnight speculated that the pits could have been used to store roots of marsh plants, such as arrow arum, pickerel weed, or golden club. However, no evidence was found to substantiate this hypothesis.

C. PHYTOLITH ANALYSIS

Phytoliths are small siliceous bodies formed by plants in their cell walls. Some plant families or genera form phytoliths in distinctive shapes or in distinctive patterns of shapes, so the presence of these plants in large numbers can be detected from the presence of their distinctive phytoliths on the site. Because phytoliths are essentially rocks, they are extremely durable; however, because they are microscopically small, they can move fairly easily through soil and can be transported by wind and water, just as soil particles can. Soil samples for phytolith analysis were taken from many contexts at the Puncheon Run Site as part of the standard sampling regime; 27 of these samples were sent to Dr. Irvin Rovner for analysis.



PLATE 35: Microphotograph of Phytoliths from Pickerel Weed (*Pontederia corodata*), Leaf Showing Articulated Rods or Raphides

The existing phytolith type collections for plants native to eastern North America are not complete, and they do not include some of the plants of interest for the study of the Puncheon Run Site, especially marsh plants with edible roots. To provide the necessary database for identifying the processing of such plants, examples of several important species were collected from the Puncheon Run vicinity, dried, and then reduced to extract the phytoliths. The plants collected were arrow arum (*Peltandra virginica*), pickerel weed (*Pontederia cordata*) (Plate 35), golden club (*Orontium aquaticum*), broad leaf cat-tail (*Typha latifolia*), jack-in-the-pulpit (*Arisaema triphyllum*), skunk cabbage (*Symplocarpus foetidus*), and Turk's cap lily (*Lilium superbum*). Golden club, jack-in-the-pulpit, and Turk's cap lily

produced no phytoliths. The other plants produced some phytoliths, but no strongly diagnostic shapes or patterns. Phytoliths were more common in the leaves and stems, with only arrow arum producing significant numbers of phytoliths from the roots. However, the root samples from the plants growing in water contained many diatoms, despite the careful laboratory washing of the specimens. Rovner suggested that soil from areas where marsh plants were processed or stored ought, therefore, to produce diatoms in abundance.

Rovner described the phytolith assemblages from most of the Puncheon Run contexts as the "truncated grass assemblage." That is, the phytoliths were mostly of grass types, but many of the more diagnostic types were missing. Rovner attributed the "truncation" of the assemblage to postdepositional damage, since he has observed the same truncation in samples from alluvial soils on other sites. Soils that are moved by water seem to lose many of their diagnostic phytoliths. There was a small difference between samples from the Metate block and samples from Locus 1 in the presence of phytoliths from the grass groups known as Festucoid and Panicoid. Phytoliths from Panicoid grasses, which tend to favor hot, dry environments, were more common in Locus 1,

whereas those from Festucoid grasses, which generally prefer cooler, moist environments, were more common in the Metate block. In the absence of more detailed information, this difference could reflect microenvironmental differences within the Puncheon Run Site landscape, climatic change, or a seasonal variation in landscape use, with the Metate block representing a spring occupation and the Silo Pit area representing a summer camp.

No evidence of the processing of marsh plants was found in any part of the site. No phytoliths were found that closely resembled those recovered from the studied marsh plants. Only one diatom was noted in the samples; Rovner thought this argued strongly against any close connection to the marsh. Interestingly, sponge spicules (Plate 36), which could have come from the marsh or from flowing water, were rather common. Sponge spicules are common in flood-deposited alluvium, but there has been no alluvial deposition on the Puncheon Run Site for about 10,000 years. The spicules may therefore represent a significant connection to the free-flowing part of Puncheon Run. Soil from the creek may have been brought onto the site attached to plant roots gathered there, or simply on the feet of people who had waded across the creek.

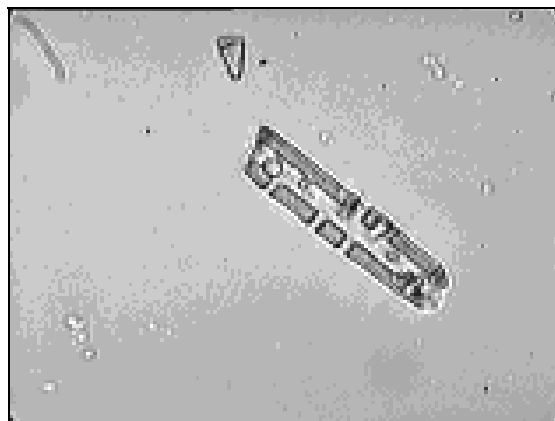


PLATE 36: Microphotograph of Sponge Spicule Body Identified During Phytolith Analysis

Two phytolith samples stood out from the rest, one from the Silo Pit area and one from the Metate block. A sample from Stratum D of Feature 98, the very bottom of the feature, contained a surplus of Panicoid grass phytoliths, perhaps the remains of a basket or grass lining. The use of such pit linings is widely attested in the ethnohistoric record (Weslager 1972:51), but archaeological evidence has been very sparse, and the confirmation provided by these phytoliths is welcome. The presence of such a lining also supports the interpretation of Feature 98 as a storage pit and, by implication, the interpretations of similar features on the site.

The second anomalous sample, taken from Unit 397 in the Metate block, contained a surplus of Festucoid grass phytoliths. The meaning of this anomaly is unclear, but it has no obvious natural explanation. It could represent cultural use of grasses in this location, such as for basket-making, or it could show how the natural environment responded to human activity. If people cleared an area around their habitations, the result would be a new microenvironment where grasses and weeds could grow. The excess grass phytoliths are not likely to have accumulated in a single season, so they may represent such an area that was kept clear for years by repeated visits to the spot.

Although the Puncheon Run phytolith assemblage did not provide any definite information regarding prehistoric subsistence patterns, the application of phytolith studies to archaeology is still rather new, especially in the Middle Atlantic region. Like pollen analysis, phytolith analysis provides as much information about how the local environment was changed by or responded to human use, as opposed to direct cultural use of certain plants, as about subsistence, technology, or

medicine. The Puncheon Run assemblage is one of the first elements of a regional database. Type collections for the Middle Atlantic region are still far from complete, and they do not include many culturally significant plants. Many phytoliths were found at Puncheon Run that cannot now be identified. When more information is available, these unknown phytoliths may be found to represent plants that were used as food or medicine. Microenvironmental zones, represented by distinctive floral communities, may be associated with various types of prehistoric settlements.

D. SOIL CHEMISTRY ANALYSIS

1. *The Human Imprint*

A large number of soil samples from the Puncheon Run Site were analyzed for information on soil chemistry in an attempt to learn about human activity on the site (Volume II, Appendix A). Excesses of calcium in the soil can represent the disposal of bone or shell. High levels of phosphorous, which is concentrated in all organic matter but especially in animal wastes, have often been associated with human activity, as have high levels of barium and potassium. During the extended Phase II study of Puncheon Run, a localized spike in the distribution of strontium was identified in Locus 3, and it was thought that this might represent the processing of anadromous fish.

The first impression given by the soil chemical data from Puncheon Run is that the human imprint on the site is quite weak. Levels of organic matter were uniformly low across the site because of the sandy, acidic soil. The chemical background, resulting from natural processes and modern agriculture, was quite complex, with rather large variations between control samples. For example, the concentration of calcium at a depth of 50 centimeters below the bottom of the plowzone varied from 73.4 to 205.7 parts per million (ppm) within the control samples at Locus 1. The highest levels of phosphorous on the site were recorded not in cultural features, but in a groundhog den (Volume II, Appendix L).

Against this varied background, the features stood out rather poorly; the concentration of calcium in several of the Locus 1 silo pits was lower than the 205.7 ppm value recorded in the control sample, and this was also true for the concentrations of phosphorous and organic matter. Still, some results seem to indicate cultural activity. Overall, the cultural features throughout the site tend to have higher concentrations of calcium, phosphorous, barium, and strontium than the control samples; this finding tends to confirm their association with human activity. Elevated values of both calcium and phosphorous (more than one standard deviation above the mean) were recorded in some of the pits, especially in Features 50, 51, and 66, all in the Main Pit Cluster of Locus 1, suggesting the disposal of bone or shell and other organic matter. A high level of calcium was also recorded in Feature 41 in Locus 1, but not in the Main Pit Cluster, and high levels of phosphorous were recorded in Features 30 and 38, the two very large pits in the Feature 30 block of Locus 3.

2. *Strontium and Anadromous Fish: An Unresolved Question*

During the initial testing of Locus 3, high levels of strontium were observed in two of the soil samples. Most of the samples from the site had strontium levels in the range of 4 to 12 ppm. These two samples, one from Feature 25 and one from the subsoil adjacent to this feature, had levels of 87 and 70 ppm, respectively. Also, the levels of strontium in Locus 3 were higher, on average, than the levels in Locus 1, with a mean of 9.5 ppm versus 6.7 ppm, respectively. Even excluding the two extraordinary readings, the mean in Locus 3 was 8.4 ppm, a full standard deviation above the Locus 1 mean.

Although strontium is rare in Delaware's soils and most other soils in North America, it is common in sea water (Burton and Price 1999). Archaeologists and biologists have tried to use this piece of information in a variety of ways to study the diets of animals and people (Bagenal et al. 1973; Sealy and Sillen 1988; Sillen and Kavanagh 1982). Studies have shown, however, that the level of strontium in the bones of humans who rely heavily on fish and other marine foods is not uniformly elevated relative to populations relying on terrestrial food. The level is effected by many other factors, including the amount of plant food consumed. Moreover, the bones of marine organisms do not have uniformly higher strontium levels as compared to the bones of terrestrial organisms (Burton and Price 1999).

The data from Puncheon Run, however, suggested a way to bypass the complexity of determining how and to what degree strontium is incorporated into animal bone by focusing directly on the soil. Presumably, if Locus 3 was a fish-processing site, the soft tissues of anadromous fish that had very recently been living in salt water would be strewn over the ground every year, possibly raising the strontium level in the soil regardless of whether strontium was incorporated into the bones of the fish or those who ate them. Discussions ensued on how to proceed with this approach and what validity it might have. An attempt was made to locate soil samples from features excavated many years ago at Woodland II sites in southern Delaware that contained large quantities of fish bone; however, the Delaware State Museum was unable to locate such samples. In any event, no additional spikes in strontium were discovered during the final investigations. Based on this finding, and because of the uncertainty as to whether the level of strontium in the soil would provide information on prehistoric behavior, investigations of soil strontium levels were not pursued.

E. PROTEIN RESIDUE ANALYSIS

Archaeologists often rely on the remains of animal bones recovered from excavations to make statements about the hunting practices and diet of the people who are being studied. Bones left at a site may be the byproducts of butchering activities or the leavings after a meal, and can impart information in a number of ways. However, skeletal remains are adversely affected by acidic soils and can completely decay in decades or centuries, depending on the local conditions. This is the situation found generally in the Middle Atlantic Coastal Plain, and in particular at the Puncheon Run Site, where high soil acidity at least partially explains the absence of faunal remains in the excavations. Since no identifiable bone or shell was found at Puncheon Run, other sources of information had to be sought regarding the animals pursued and eaten by prehistoric hunter-gatherers. One technique is protein residue analysis. Some researchers believe that proteins found

in animal blood and body tissue may adhere to the surface of stone tools used for hunting or butchering, and that these proteins may persist for thousands of years. In theory these protein residues can be detected and identified by taxa, although various experimental studies disagree on the level of confidence of these procedures (see Volume II, Appendix I).

The method of residue analysis utilized for the current study is called cross-over immunoelectrophoresis (CIEP), which refers to the laboratory testing of immunological reactions to indicate the presence of protein residues on artifacts. In brief, this analysis takes advantage of the normal immunological processes of all animals, the foundation of the body's ability to fight infections. When bacteria enter a healthy body, they are met by antibody molecules that bind with the bacteria, rendering them moribund. Because antibodies are specific to the invading microbe (termed an "antigen"), it should be possible to identify a specific antigen on a tool if it is paired with a known antibody and binds with it. This understanding of biochemical reactions was at the core of the CIEP procedure to identify potential relict proteins on stone tools recovered from Puncheon Run excavations. The selection of test antibodies, in turn, was made primarily on the basis of the environmental setting of the site, located on the tidal St Jones River in proximity to extensive wetland and estuarine areas. Because of the likelihood that local inhabitants exploited these aquatic resources, several fish species native to the Delaware Bay and St. Jones River basin were caught and processed for antibody propagation (termed an "antiserum"). Selected fish included alewife, American eel, Atlantic croaker, bay anchovy, gizzard shad, striped bass, sturgeon, and weakfish. In addition, several species of commercially available antisera were used to test against the artifacts. This group included catfish and trout, bear, deer, guinea pig, rabbit, and turkey.

The group of indigenous fish was intentionally selected to test a range of species behaviors that included spawning in the spring (alewife, gizzard shad, striped bass, and sturgeon), summer (Atlantic croaker, bay anchovy, and weakfish), and fall (American eel), as well as a range of variously sized fish. Preindustrial-age sturgeon were reported to grow to 5.5 meters (18 feet) long, while mature bay anchovy grow to between 5 and 10 centimeters (2-4 inches). Striped bass grow to 1 meter (3 feet) long, and the other species average between 30 and 60 centimeters (1-2 feet) long. Positive results from the residue testing could indicate the season(s) of site occupation and provide a measure of the type of fishing gear used by the resident Indian community. Fishing gear, whether it be hook, net, weir, or basket trap, has a selective bias that will be appropriate for some species but not others. Nets meant to catch foot-long shad will not trap bay anchovies or immature shad, and fine-meshed nets or baskets for anchovy will be overwhelmed by sturgeon or large stripers. By testing a range of fish available to the Native American hunter-gatherers who visited the site, we were hoping to obtain information not only on what they ate, but also when and how they fished (Plate 37).

The results of the protein residue study suggest a heavy reliance on aquatic resources. Positive reactions were obtained to American eel, Atlantic croaker, striped bass, and deer at the Metate block; eel and gizzard shad at the Feature 30 block; eel, bay anchovy, catfish, and deer at other Locus 3 locations; deer from Feature 64 in the Silo Pit area; and eel, deer, shad, and guinea pig at the Buried Plowzone area. If the test is viewed as reliable, the results show likely visits to the site during spring, summer, and autumn, in response to the periods of abundance for each spawning cycle. The possible multiseasonal use of the site is not necessarily an indicator of permanent or even

semisedentary settlement patterns, but it suggests, along with other evidence, that the geographic range of movement of the social group was rather narrow and probably limited to similar landscapes in central Delaware.

F. PITS

1. Ethnohistory of Storage Pits

The digging of storage pits was a common, though not universal, practice among the Indians of eastern North America (DeBoer 1988; Stewart 1975). Peter Lindeström (1925 [1691]:253) described their use among the Lenape of the lower Delaware: “Their larders they dig down in the ground, close to their dwellings, wherein they have their maize, their beans, tobacco and other provisions, such as deer-meat, elk-meat, bear-meat, birds, fish and other such things, which may serve for the sustenance of man.”

In 1628 Isaack de Rasieres (1928:107-108) described similar pits among the Lenape of the lower Hudson, associating the pits with the practice of seasonally abandoning their villages: “The grain being dried, they put it into baskets woven of rushes or wild hemp, and bury it in the earth, where they let it lie, and go with their husbands and children in October to hunt deer, leaving at home with their maize the old people who cannot follow.”

Pits could also be lined with matts (Morton 1967 [1634]:160) or bark (Wood 1865[1634]:106). According to Weslager, who based his work on historical documents and conversations with Delaware Indians in the 1960s, their pits were commonly placed in front of the house (Weslager 1972:51). Most of our accounts mention the storage of food, but William Strachey (1953 [1612]:115) described the Powhatan Indians placing not just food, but other objects of value (“most things with them of value according to their owne estimation”) in pits, in order to hide them from their neighbors.

The most detailed descriptions of storage pits were provided by the Pilgrims of Plymouth, who dug up several in their first weeks in America. As described in the chronicle known as *Mourt's Relation*, the newly arrived Pilgrims were exploring when they came across several recent excavations. The first one they investigated proved to be a grave; however,



PLATE 37: Indians Fishing

SOURCE: Painting by John White, circa 1585

There was also an heape of sand, made like the former, but it was newly done, (we might see how they had padled it with their hands,) which we digged up, and in it we found a little old Basket full of faire Indian Corne, and digged further & found a fine great new Basket full of very faire corne of this yeare, with some 36 goodly eares of corne, some yellow, and some red, and others mixt with blew, which was a very goodly sight; the Basket was round, and narrow at the top, it held about three of foure bushels, which was as much as two of us could lift up from the ground, and was very handsomely and cunningly made. . . . We concluded to take . . . as much of the Corne as we could carry away with us [Cheever 1848:34].

At other times they found acorns and “a Botle of oyle” in similar pits (Cheever 1848:37).

Only a few observations were made on the size of pits. Samuel Champlain (1922:III:410), writing in 1605 about an area that was probably in Massachusetts, said the Indians “dig holes some five to six feet deep more or less, and place their corn and other grains in large grass sacks, which they throw into the said holes, and cover them with sand to a depth of three or four feet above the surface of the ground.” Wood (1865 [1634]:106) described the storage pits of Massachusetts as “great holes,” which seems to imply something along the lines of the 5- to 6-foot depth recorded by Champlain.

Why did Indians dig storage pits? Pits were not the only kind of storage these people knew. According to Smith and Harington, the Virginia and North Carolina Algonquins kept most of their corn in above-ground granaries. Eighteenth-century accounts of the Lenape mention provisions hung from the roofs of houses (Loskiel 1794:26). Besides looting storage pits, the Pilgrims entered some empty Indian houses and found in them dried fish and baskets of acorns; they also found venison hanging in a hollow tree nearby (Cheever 1848:39). Ceramic vessels were also used for storage, sometimes in pits and sometimes outside them (Gardner 1975).

This problem has been raised forcefully by DeBoer (1988), who noted that our accounts often mention specifically that pits were intended to protect stored goods from theft. In particular, pits were intended to protect stored food during times when most of the inhabitants had left the settlement. De Rasieres, in the passage cited above, says the Lenape buried their maize when they left their villages to go hunting, and there are similar accounts from the Huron, the Mandan of the Missouri Valley, and other tribes (DeBoer 1988).

On the other hand, it must be said that burying food does not seem to have offered any real protection. The Pilgrims, despite their ignorance of local customs, apparently had little trouble finding and digging up several pits. During a 1696 campaign against the Onandaga, the French officer Frontenac and his men spent two days “digging up the caches, or hidden stores of food, and destroying their contents”; in the nineteenth century, among the Pawnee, “theft from, or destruction of, these cache pits by enemy while the tribe was away on the winter hunt, was a frequent cause of privation” (cited in DeBoer 1988:1-2). Other modern ethnohistorians have emphasized the politics of pit storage, suggesting that Indian commoners used their pits to store food that they wanted to conceal from chiefs demanding tribute, while the chiefs used above-ground granaries to display their wealth (Potter 1993:170-173). The role of pits and pit storage in these societies, it must be said, remains unclear.

Most of our accounts describe the foods stored in pits as corn or beans. The discovery of buried acorns by the Pilgrims is significant, because it shows that pit storage was not simply part of the agricultural complex. It seems possible that other wild foods were frequently stored, but that most of our sources, who limited themselves to one or two sentences about pit storage, focused on the most commonly stored items.

The ethnohistoric data have many interesting applications to the archaeological record. It is sometimes said that the presence of storage pits implies a certain degree of residential stability. However, since pits were often used to protect food when people left their villages, the connection between storage and stability may not be very strong. Wandering hunter-gatherers may have had good reasons to use storage pits as well, caching food where it was gathered while they continued on their seasonal rounds. The occasional use of pits to store non-food items may also be significant, since many archaeologists seem to assume that all storage pits were used for foodstuffs. Pits obviously had a wide variety of uses, from human burials, to the temporary storage of corn, to the caching of valuables, and their use may have social and political as well as technological implications. The ethnohistorical literature forces archaeologists to consider interpretations beyond that of “storage pit,” and to ask what factors, beyond the need to save food for later, might have led people to dig pits in a given time and place.

2. *A Comparative Approach to Pit Clusters*

Two groups of pit features were found at Puncheon Run, the large cluster in Locus 1 and Features 30, 37, and 38 in Locus 3. These clusters have several parallels at other sites in Delaware and elsewhere in the Middle Atlantic region. Although it was previously believed that pit storage was associated with the development of agriculture in Late Woodland times, it is now clear that the practice is much older. Pits are actually quite common on sites dating to the Early and Middle Woodland periods and are documented on Late Archaic sites. However, they are by no means universal, and there are many sites where extensive areas have been exposed without locating storage pits. The significance of storage pits and pit clusters is not fully understood, although much information is available and many interpretations have been offered. Even though thousands of pits have been investigated in Delaware alone, it is not generally known what was stored in the pits, what time of year they were used, or how long a given pit or group of pits remained in use.

The analysis of pit clusters is complicated by difficulties in dating the features. Without precise dating, it is very difficult to know whether the pits were in use simultaneously, and thus it is very difficult to estimate the storage capacity of the cluster. When pits overlap substantially, they were probably not used simultaneously, but beyond this simple observation we usually have only limited information. It cannot be said that pits that do not intersect were contemporary, although it is suggestive when several pits are close together but do not overlap at all. Since all of the Delaware examples are from plowed sites, we have no stratigraphic information. When pits are grouped in tight clusters, with usable, feature-free space around them, it certainly appears that they were in some way related. Pits dug without reference to each other ought to be distributed more randomly across the sites. On the other hand, two of the pits in Locus 1 at Puncheon Run were radiocarbon dated to 500 years earlier than the others, so it is not necessarily true that all pits within a group are contemporary or even related to each other.

a. *Delaware Park*

The first site in Delaware to produce large numbers of pit features from pre-agricultural times was Delaware Park, excavated in 1980 by MAAR, Associates (Thomas 1981). Delaware Park was located in New Castle County, on high ground overlooking White Clay Creek. At that point White Clay Creek is a freshwater, non-tidal stream, but the site was near large expanses of swamp and marsh. During the excavation of the site, the plowzone was removed from an area measuring about 200 square meters. In this area, 164 prehistoric features were excavated, including 31 large silos, eight small silos, 64 deep basins, 47 shallow basins, and four large, shallow basins interpreted as structures. The large silo features were similar in size to those found in Locus 1 at the Puncheon Run Site, with an average volume of 2,900 liters.

Radiocarbon dating placed the pit features in the Early and Middle Woodland periods (730 BC to AD 640, with dates throughout this continuum). The dates from the two dated “house pits” were both substantially earlier, in the second millennium BC. The features were bunched tightly together and many overlapped. Given the large number of features and the long time span they represent, it is not possible to state whether any of them were in use simultaneously. However, the features could certainly represent a number of clusters that are now so intertwined that we cannot separate them.

The Delaware Park Site yielded a large number of stone artifacts but only 151 potsherds, including some Late Woodland varieties not related to the storage pits. Extensive soil flotation resulted in the recovery of only a few charred seeds and nut hull fragments, along with a single concentration of fish scales. The soil chemistry from several pits was analyzed, and in every case the pit soils showed levels of phosphorus two to three times those of the surrounding subsoil. Calcium levels were also elevated. The investigators thought the excess calcium probably came from disintegrated bone, although shell is also a possible source. The phosphorus may have come from other organic matter.

b. *Lums Pond*

At the Lums Pond Site (Petraglia et al. 1998) in southern New Castle County, a cluster of at least nine storage pits was found (Figure 58). The Lums Pond Site was located along a small, swampy stream, without access to the breadth of resources found around estuarine sites or at Delaware Park. The pits at Lums Pond were significantly smaller than those at Delaware Park, Carey Farm, or Puncheon Run, with an average volume of 558 liters. (The average volume of pits in the Locus 1 cluster at Puncheon Run was 1,200 liters.) All of the Lums Pond pits had been excavated through the B-horizon into sandy soils. Five features were radiocarbon dated, and all of the dates clustered around 2,800 BP, or about 950 BC in calendar years. The features did not overlap, and they may all have been used simultaneously; certainly, they seem to represent one continuous episode of use, even if that episode stretched over many years. Substantial quantities of fire-cracked rock and debitage were found around the features, but little pottery was found. Small stemmed and teardrop projectile points were found in the features; these forms may date to the period when the features were in use. Recovery from soil flotation was very limited, amounting to only a few burned nut

hulls and some wood charcoal. Analysis of soil chemistry showed that two of the pits had elevated calcium levels, which the investigators attributed to disintegrated bone.

c. *Carey Farm*

Carey Farm was a large and very complex site on the St. Jones River about 1.6 kilometers (1 mile) downstream from Puncheon Run (Custer, Watson, and Silber 1996). A number of distinct feature types were found at the site, including large numbers of the oval or semicircular pits whose origins are so disputed. Custer believes that many of these features are storage pits that were once within semisubterranean houses. Others suspect that these features are natural disturbances, burials, exterior storage pits, or some combination of these and other explanations. More than 1,900 pit features were excavated at the Carey Farm and Island Farm sites, and more than 800 were interpreted as cultural. Because of this enormous amount of data, only a few features are described in detail in the site report. Still, it is possible to identify at least one feature cluster at the site similar to those at Puncheon Run.

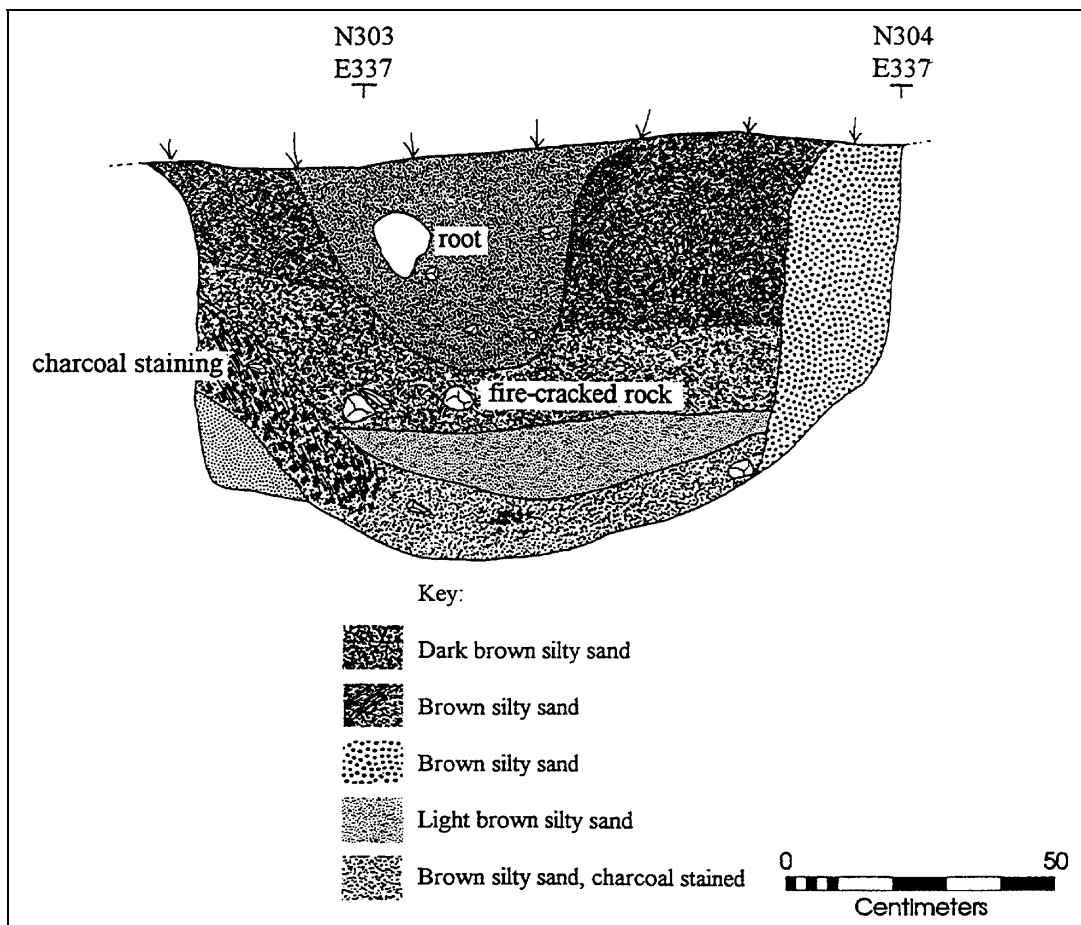


FIGURE 58: Stratigraphic Profile, Feature 19, Lums Pond Site

SOURCE: Petraglia et al. 1998

Cluster III in the South Central portion of Carey Farm included 18 pit features (Figure 59). Seven of these were “house-related” oval or semicircular pits. Six features were straight-sided, flat-bottomed silo pits, two were deep basins, two were shallow basins, and one was a large, somewhat amorphous shallow basin. All of the features seemed to date to the Middle Woodland period, based on the presence of Mockley ceramics in substantial quantities. Radiocarbon dates were obtained from two features in this cluster: $1,560\pm 50$ BP, or about AD 535, and $1,240\pm 60$ BP, or about AD 785. This rather long time span suggests that all of the pits in the cluster were not in use at the same time.

One of the round silo pit features contained a human burial. The skeleton was poorly preserved, and no grave goods were found. Another pit contained the remains of a nearly complete Mockley pot with a volume of 48 liters; because the pot was uncharred, and because mending holes were present, the excavators believed it had been used for storage rather than cooking.

d. *Discussion of Woodland I Feature Clusters*

The feature clusters reported in Delaware show substantial variety. The date range extends from the Early Woodland, around 900 BC, to the Late Woodland, circa AD 1000 to 1600. The size of the pits varies from an average of less than 600 liters at Lums Pond to more than 2,000 liters at Delaware Park, and more than 4,000 liters in the Feature 30 block of Puncheon Run. There are no clear patterns in the artifacts found in or around the features. One of the striking characteristics about the feature clusters at Delaware Park, Lums Pond, and Puncheon Run is that prehistoric pottery is rather rare. Work at Delaware Park yielded 151 sherds (Thomas 1981:IV-13) while only 28 sherds were recovered at Lums Pond (Petraglia et al. 1998:vol II-433). At Carey Farm, however, large amounts of pottery were found, including at least one complete large pot that appeared to have been used as a storage compartment within a silo feature. One pit at Puncheon Run also contained a large amount of pottery; Feature 69 yielded more than 100 steatite-tempered sherds, which date this feature to before 800 BC. The presence of these ceramics shows that at least some of the people that frequented the site also used pots as storage vessels. Substantial numbers of stone artifacts were found in and around the features at Lums Pond, Delaware Park, Carey Farm, and in the Feature 30 block, but not in Locus 1 of Puncheon Run. The environments of the sites were also different. Puncheon Run and Carey Farm were located along the St. Jones River near large, estuarine marshes. Delaware Park was located along a small river near freshwater swamps and marshes, and the Lums Pond Site was near a small, swampy stream. It seems unlikely, given the differences in the environmental conditions surrounding the sites, that the various pits were used to store the same food items, or for any other common purpose.

It seems, from the available evidence, that storage pits that appear to be similar could be used for different purposes. A pit was a multipurpose storage device, and it might have had other functions as well. When nothing was being stored in it, a pit became a convenient spot to throw trash, or even to perform a hurried burial. The pit clusters at Puncheon Run and Lums Pond fit into the model proposed by Roger Moeller (1992), based on his work on the upper Delaware River. Moeller suspected that the pits on the Late Woodland sites he studied were used for short-term caching of food near the place it was procured, rather than long-term storage within a base camp site. Carey Farm, on the other hand, was a large, intensely occupied site, probably a base camp; evidence from the one pit with good organic preservation suggested a fall/winter occupation. Because of the long occupation period at Delaware Park, it is difficult to estimate what kind of use it may have seen at various points in its history; the number and range of stone tools at the site suggest that it was something more than a short-term processing camp, but the absence of ceramics perhaps argues against interpretation as a long-term base camp.

3. *Pits and Subsistence*

The most important conclusion to be drawn from the ethnohistoric and comparative studies of pit features is that while the pits may have been intended for storage, their mere presence does not imply any particular activity or any particular type of site. Custer (1994) associates the digging of storage pits with increased use of plant foods in the Late Archaic period, but many site excavations have produced little archaeological data that would support this model. Numerous flotation studies and the Puncheon Run phytolith analysis have failed to identify conclusively the plants putatively

being stored. Pits can be used to store other things, such as dried fish, and the elevated calcium concentrations in the pits at Delaware Park and Lums Pond tend to suggest animal rather than plant processing. Because pits may be associated with the concealment of food, their increased use in any given period may be caused by social or political changes, not technological developments. Furthermore, the use of pits on a site does not necessarily imply long-term occupation of the site. Indeed, the best interpretation of the pits at Puncheon Run is that people paid rather brief visits to the site, gathered some locally available item, cached it in the pits, and then left, returning to collect their stored goods when and if they were needed.

G. SEASONALITY

At what time or times of the year did people live at Puncheon Run? For most of the components of the site, no direct data are available. No identifiable animal bones were found at Puncheon Run, and very few charred seeds or nuts were recovered. The problem is a common one in Delaware and throughout the Middle Atlantic Coastal Plain, where soil conditions prevent the preservation of the large numbers of animal bones and charred seeds that have been used successfully in other environments to determine what times of year sites were occupied (Winters 1969). The settlement models proposed by Thomas et al. (1975) describe a variety of strategies that may have been used by prehistoric Native Americans on the eastern Coastal Plain, and these models can only be tested through the recovery of subsistence information.

The only preserved plant remains of possible cultural significance at Puncheon Run were a few fragments of acorns and hickory nutshells, a handful of *Chenopodium* seeds, and one seed from an American lotus. All of these would have been available in the fall, the nuts in October-November and the seeds in September-October. However, this evidence does not necessarily indicate that people were present on the site at those times, because both nuts and seeds were widely stored for later use, particularly during the lean times of late winter and early spring.

No identifiable bones were found on the site, but there was some evidence of animal food in the form of protein residues. Although difficulties were encountered with this analysis that raised questions about its accuracy (see Volume II, Appendix I), the data may reflect prehistoric behavior, including the seasonality of the occupations. Particularly significant was the evidence of fish. Several stone tools in Locus 3 yielded positive results for fish antisera, including American eel (five tools), gizzard shad (three tools), Atlantic croaker (one tool), striped bass (one tool), and bay anchovy (one tool). The American eel is a catadromous fish that is most easily caught in the fall, when the fish are running out to sea to breed. Gizzard shad, Atlantic croaker, and striped bass are all catadromous fish that run in the spring. This evidence suggests that in Locus 3, the part of the site located closest to the St. Jones River, people were catching fish in the fall and in the spring. Residues of both American eel and gizzard shad were also detected on tools from the Buried Plowzone area.

Beyond these small clues there are only indirect indications. The presence of large numbers of storage pits in the Silo Pit area and the Feature 30 block suggests an occupation when food suitable for storage was being procured, and most of the ethnohistoric accounts of storage refer to foods gathered in the summer (marsh roots) or fall (nuts and seeds). However, no direct evidence was

found of what might have been stored at Puncheon Run, no firm conclusions can be made based on the mere presence of the pits. The possible role of Puncheon Run in the regional system, including the seasons when it may have been used, is discussed more fully in Chapter VII.