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Elwood S. Wilkins, Jr.

Elwood S. Wilkins, Jr. passed away at his home in Stricklersville, Pennsylvania on December 11, 2002. Elwood, who was 97, is survived by his son, ASD life member, Elwood S. Wilkins, III (Wilkie), as well as by a daughter, Clara M. Streets and her family, of Newark, Delaware. Elwood was a retired pharmaceutical chemist with the duPont Company where he spent a good part of his career in cancer research. In 1934, Elwood published an article on the detection of lead as an indicator of cancer. For his efforts, he was named a member of "Men of Science." Elwood was a 1927 graduate of the University of the Sciences in Philadelphia. Elwood was predeceased by his wife, Maria, and his brother, Clarence, both long-time ASD members.

A long-time member of the Archaeological Society of Delaware, Elwood will be remembered by his tireless efforts on behalf of the Society as well as his long time involvement with the archaeological excavations at the Oppisiscunk Site, the Harland Mills Steatite Quarry, and at the Buck Tavern. His major contributions to the study of lithic source analysis are also to be noted.

Elwood began his career by collecting "Indian Relics" near his boyhood homes in Chester County, Pennsylvania and New Castle County, Delaware. At various times Elwood served as an officer of the ASD, including a stint as President, as well as being a long-term representative of the ASD to the Eastern States Archeological Federation. Along with his three brothers, he would walk the fields of the family farm as well as those of friendly neighbors in search of the abundant stone artifacts that could be found lying on the surface throughout the area. At this time Elwood began to study the close dependency of the Native Americans to their local environment, a relationship that consumed much of his effort in future years.

In 1915, Elwood found his first "fluted point", an artifact that he treasured throughout his life. The identity of this Paleo-Indian projectile point, found along Welsh Tract Road in New Castle County, was later verified by John Witthoft, Pennsylvania's State Anthropologist. John and Elwood remained life-long friends and cooperated over the years on a number of projects contributing to the advancement of Middle Atlantic archaeology. In 1935 he moved to a farm near Mill Creek Meeting (Elwood and his family were practicing members of the Society of Friends) where he began collecting from what was known as the Minguannin Site (later Oppisiscunk).

In 1940 or 1941, Elwood participated in a group outing of the Archaeological Society of Delaware during a visit to the nearby Christiana, Pennsylvania steatite outcrops. There he met Archibald Crozier, H. Geiger Omwake, Jim Akerman, and many other ASD members, with whom he remained friends for many years. Continuing with his interest in lithic studies, he guided the group to a subsequent visit to the Macungie, Vera Cruz, and other Pennsylvania Jasper Quarries.

In 1958, Elwood invited the ASD to join with him in the excavation of the Oppisiskunk Site, located a few miles from his home in the White Clay Creek valley. As "Site Supervisor", and working under the guidance of John Witthoft, Elwood kept detailed records

of the excavations, including a field journal, plan views and profiles, as well as photographs, of the effort and set up a temporary "lab" at his home in order to process and analyze the thousands of artifacts recovered. This effort continued for many years, often conducted by Elwood, and Maria, along with their son, "Wilkie" and brother Clarence. The site was reported on at various archaeological meetings and in short articles in archaeological publications. Recently, Elwood and Ron Thomas published a detailed account of the field investigations in a *Bulletin of the Archaeological Society of Delaware.*

Among the researches conducted by Elwood were detailed surveys of various crypto-crystalline lithic sites within Delaware, northeast Maryland and southeastern Pennsylvania. It was Elwood, following his nose to the west of his former home on Welsh Tract Road, who first identified the Heath Farm (in Cecil County, Maryland), as well as numerous nearby outcrops of "Newark Jasper" and "Cecil County Black Flint." It was Elwood, following the distribution of these lithic materials, who subsequently identified sources of, and scientifically described the nature and origin of these materials as well as that of "Broad Run Chalcedony", a related material that occurs primarily in southern Chester County, Pennsylvania.

In 1960, Elwood was awarded the "*Archibald Crozier Award*" by his fellow members of the Archaeological Society of Delaware. The award is given annually to a person or persons who have contributed substantially to the advancement of the science of archaeology within the State of Delaware. In 1961, he received the "*Archy*", a similar award given out by members of the Society of Pennsylvania Archaeology. Both awards continue to identify outstanding achievements in the field of archaeology. In 1975, Elwood was given a Certificate of Appreciation by the Eastern States Archeological Federation, for his many years of service as representative from the Archaeological Society of Delaware.

Although his first love may have been with "prehistoric site" archaeology, Elwood soon became embroiled in the field of historical archaeology when he took on the task of supervising the ASD in the excavations of what was believed to be the "Buck Tavern." In cooperation with the Delaware Public Archives Commission, Elwood and his fellow ASD members assisted Leon deValinger, State Archivist, in excavating the grounds surrounding an early brick structure which was subsequently moved from Summit, on the south bank of the Chesapeake and Delaware Canal, to its present resting place at Lums Pond, north of the canal. The Buck, as it was called, was reputed to have been a well-known tavern visited by numerous luminaries before, during and after the Revolutionary War. Among others, George Washington, and various Generals of the British Army, were said to have spent time there.

The excavations, however, failed to discover any evidence that the site of the brick structure had been occupied prior to the beginning of the 19th century, a fact that surprised the investigators, including Elwood. A well-known publication detailing the excavations and the analysis of the data recovered was authored by Elwood and published as a Special Publication of the ASD. Continuing with his efforts on behalf of historic site archaeology, Elwood began to use his scientific background to assist in the identification of historic artifact materials and manufacturing processes. Recognition for this, and subsequent efforts in the field of historical archaeology, is characterized by the fact that Ivor Noël Hume dedicated his well-known 1968 book *Historical Archaeology* to Elwood and fellow ASD member, Allen G. Schiek.

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After The Delaware Park Site: Twenty-five Years of Flotation

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Abstract

Nearly 25 years ago, a team of archaeologists excavated the Delaware Park Site, near Stanton, Delaware, and started a flotation revolution. This Woodland site was crammed full of deep silo features, and the experts knew that flotation, and lots of it, was critical for maximum recovery of information. So, Jack Cresson and the author designed and built a plastic barrel flotation device that easily processed more than 10,000 liters of feature soils from Delaware Park. These "Delaware Park" flotation devices have since become a standard of the archaeological field, with more than 200 such devices in use across 47 states, Territories and foreign countries. The resulting "flotation revolution" has dramatically improved data recovery and site interpretations. Using Delaware Park data combined with research from dozens of sites from Virginia to New York, a better understanding of prehistoric use of plants and fungi is presented. The presence of bayberry (Myrica) at numerous sites is problematic. It has countless medicinal uses, along with cooking uses and the "seeds" are a rare source of vital wax. The presence of charred fungi, known as sclerotia, at Delaware Park and countless other sites, also has many possible explanations. These tough fungi may have been roasted under campfires, prior to being used as a grain substitute. A plea is made to the more than 150 groups using Delaware Park-type flotation devices to share their data for a better understanding of the past. Insights into the future of flotation, including the possibility of reviving extinct plants, are offered.

A "flotation revolution" has increased recovery from archaeological sites. Recovered plant remains have increased our knowledge of the prehistoric use of plants. This paper discusses the recovery of the seeds of bayberry from sites in eastern North America. In addition, the discovery of fungal sclerotia from many sites is discussed. Also, the future of flotation is discussed, including the possibility of reviving extinct plants from archeological seeds.

Dr. Stuart Struever revolutionized prehistoric archaeology in the United States in the 1960s, with his environmental archaeology at sites like Koster in Illonois. His work at the Apple Creek Site proved that flotation of archaeological soils in water could recover important information about prehistoric use of plants, animals and fish. Archaeologists long knew that the types and sizes of artifact and ecofacts (animal and plant remains) that they recover from sites are directly related to the recovery techniques they employ (Struever 1968). As Struever showed at Apple Creek, when only coarse screens are used, only large floral and faunal remains are found. Flotation uses flowing water and fine screens to recover small seeds, bone fragments, fish scales, snails, beads, and other tiny artifacts.

There are several types of flotation systems, including bucket, drum and mechanical systems. Bucket systems are the smallest and most versatile. I have used them at sites at 12,000 feet on Mt. Jefferson, Nevada, in Honduras and on the Route 55 Project in Deptford, Gloucester County, NJ (Sandy 1983a, 1983b, 1985). Mechanical systems are large, costly, expensive, and consequently rare. Drum devices are most common, and the most practical for processing large volumes of soil.

Working with the Rutgers Archeological Survey Office, I helped build my first drum flotation device and used it on sites in Monmouth County, New Jersey in the late 1970s (Grossman 1979). It was fairly small, and metal. In 1980, Jack Cresson and I got ready to build a drum-flotation device, for the Delaware Park Site in New Castle County, Delaware (Thomas 1981). When I complained of the difficulties of working with metal, Jack suggested building the device primarily of plastic, a plastic barrel and plastic pipe.

Since then I have built more than 200 "Delaware Park" flotation devices, and they are in use by contract archeologists, museums, universities and others in 47 states and countries. I have also conducted dozens of flotation projects in the eastern United States over the years. Flotation studies, like contract archaeology reports in general, are not widely distributed. This report details the discovery of the seeds of bayberry and fungi sclerotia at prehistoric sites in eastern North America. It encourages other workers conducting flotation studies to share results and bibliography. This sharing will result in a better understanding of the prehistoric use of plants, fungi and the environment. It also looks at the question of long-term seed viability and the future of flotation.

Flotation drums like the Delaware Park type flotation systems use water flowing under pressure to reduce the archeological soil sample into two components — a "heavy fraction" and a "light fraction". The heavy fraction collects in a piece of nylon window screening, and recovers small artifacts, bones, snails, charcoal, and other non-floating remains. The light fraction captures floating floral materials, such as seeds — along with other lighter-than-water objects (Thomas 1981; Sandy 1985). The Delaware Park drum flotation device is based on a design by Williams (1973) and is very different than the SMAP-style flotation system (Pearsall 1989:32-35). Unlike the SMAP type systems, the Delaware Park system is built primarily of plastic components, and utilizes lightweight, removable fraction collectors.

BAYBERRY SITES

Bayberry, also known as wax myrtle or candleberry is a shrub and small tree that grows over much of the east coast and along the Great Lakes. American Bayberry (Myrica cerifera) and its relatives worldwide have evergreen leaves with a balsamic aroma. The small "berries" are coated with wax.

Bayberry has been recovered from five sites in New York, two upstate and three from Long Island. In New Jersey, bayberry was found at two Manasquan River sites and four from the Abbott Farm National Landmark. It has also been found at sites in Delaware, Rhode Island and Virginia, a total of 14 sites.

In the late 1970s, the Rutgers Archeological Survey Office (RASO) discovered bayberry through flotation during Stage II testing of two Outer Coastal Plain sites, on the Manasquan River in Squankum, Monmouth County, New Jersey. At the Kandy Bar Site (28Mo70), bayberry came from Feature 4. This shallow storage pit also held prehistoric pottery, debitage and a projectile point fragment (Grossman 1979:54-57, 107-109, Figure 8). Across the river, bayberry also came from the multicomponent Dowd Site (28Mo60) (Grossman 1979).

The 1980s saw the mitigation of many archaeological sites in and around the Abbott Farm National Landmark, near Trenton, Mercer County. Bayberry was found at four of the Abbott Farm Sites – Bordentown Waterworks Site (28Me37), Carney Rose Site (28Me106), Abbott's Lane Site (28Me1I) and the Area B Site (28Me1-B). At the Bordentown Waterworks Site (28Me37) bayberry was found in Feature 6, a Woodland feature (Dumont and McLearen 1986:147-149). At Carney Rose Site (28Me106) bayberry came from a deep pit feature, which had been truncated by another feature. Feature 68 held two typical Late Archaic points: a Koens-Crispin and a Poplar Island

point. It held four small sherds of Type IA pottery. The pit was evaluated as containing mixed contents. A radiocarbon date came in at AD 480 ± 60 (Beta 11764)(Foss 1986:161-162). At the Abbott's Lane Site (28Me1A), bayberry came from Archaic contexts, the only Archaic context with bayberry in this report (Perazio1986:107). Close to Crosswicks Creek, bayberry was found in level contexts at the Area B Site (28Me1B).

The Delaware Park Site in New Castle County, Delaware was an Archaic/Woodland site that had many deep pits. The decision by the Delaware Historic Preservation Office, DELDOT, Deleuw Cather/Parsons, and MAAR to stress environmental archaeology started a flotation revolution. Over 10,000 liters of soil were processed from prehistoric pits (Thomas 1981). The 55-gallon plastic flotation device invented for this site soon became a standard for the east. About 15 years ago, a new smaller 30-gallon version led to shipments throughout the USA and beyond. Bayberry was found in Feature 57 at Delaware Park. Feature 57 was one of four very large features on the site. A smaller Feature 36 was intrusive on Feature 57, and it was radiocarbon dated to A.D. 190 ± 75. Feature 57 was interpreted a possible semi-subterranean house, or sweat lodge (Thomas 1981; Crabtree and Langendorfer 1981). MASCA provided technical support at Delaware Park.

At the urban Providence Cove Lands prehistoric sites in Providence, Rhode Island, bayberry in small numbers were found at the buried Carpenter's Point Site (Sandy 1985).

The Jennings Pasture Site (44Sm245) is in Smyth County, in western Virginia. Bayberry was recovered from six of 55 feature samples (Features 129, 151, 185, 222, 283 and 330) (Sandy 1999). This mountainous area is likely beyond the range of bayberry. Four radiocarbon dates have been received for this site, although not for these features. The dates were 3630 ± 70 BP, 690 ± 90 BP, 680 ± 60 BP and 330 ± 40 BP (Lyle Browning, personal communication, August, 2003).

Bayberry was found in Feature 9 at the Twin Lakes site, Town of Bedford, Westchester County, New York. No radiocarbon dates were obtained from this Hudson Valley dig (Greenhouse Consultants 1997). The Palatine Bridge area along the Mohawk River in upstate New York has a long archaeological history, and is perhaps best known for the Early Woodland occupation (Kuhn 2000; Ritchie 1944:193-197). Recent archaeological investigations of a proposed commercial development found burials, and non-burial pit features. Four pit features, all in close proximity produced bayberry: Features 8, 9, 10 and 11. Feature 8 was probably a storage pit that produced debitage, food bone and one ceramic sherd. Feature 9 was also probably a storage pit, and produced debitage and potsherds. Feature 10 was another probable storage pit and held a point tip, debitage, a hammerstone, prehistoric ceramics (probably Oak Hill), and other cultural material. Feature 11 produced a carbon sample and debitage. Radiocarbon dates have not been obtained from this site yet, although they are anticipated (Sandy and Waleski 1999; Greenhouse1999b; Archaeological Conservancy 2000; Kuhn 2000).

The strongest and best dated evidence for the prehistoric use of bayberry comes from contract investigations conducted in the last 10 years in New York, specifically coastal Long Island. Recent advances in

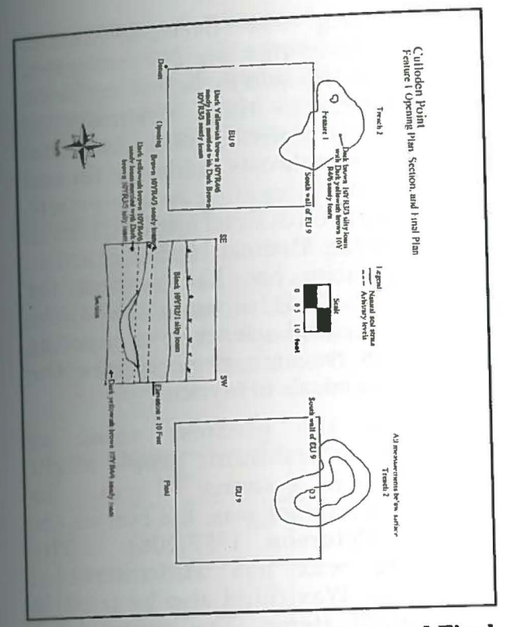

Figure 1: Opening plan, Section, and Final Plan of Culloden Point Area C Feature 1 (Greenhouse Consultants 1999a, Figure 13)

radiocarbon dating now allow dating of small samples, less than a gram of carbon is now required, while years ago, an ounce of clean carbon was needed. Flotation concentrates carbon from soil, allowing for radiocarbon dating of features, along with recovering charred seeds. Thus, flotation has led to better dating of ceramic and stone artifacts, along with charred seeds, wood, fungi and more.

The Culloden Point development is located near Montauk, Town of Easthampton, on the end of Long Island, New York. Most of the archaeological resources were preserved, but portions of two sites, Areas C and E, were excavated prior to construction. Bayberry was recovered from features at both sites. Culloden Point Area C, Feature 1 was a shallow basin that held seven charred bayberry "seeds" (Figure 1) Area C Feature 28 was a large pit, about 2.5 feet wide and 1 foot deep with 2 charred bayberry seeds. It was radiocarbon dated around 710A.D (Figure 2). A short walk from Area C was Area E. Feature 4 was a very large storage/refuse pit. Carbon, some of which was recovered from flotation, was dated around 600 A.D. Also recovered were a netsinker and hammerstone. Both these dates are within the Clearview Phase of the Middle Woodland (Greenhouse 1999a). The latter date could not have been obtained without flotation.

Bayberry was recovered in a feature by the Greenhouse Consultants excavations at the James and Klugh Subdivision (James Hotel) site in Water Mill, Town of Southampton, Long Island, New York. This multicomponent site includes a Late Woodland occupation. Bayberry came from Feature 1 (Context # 6001), as did a lot of prehistoric ceramics, including Windsor Brushed and Sebonac Stamped specimens, two quartz Late Woodland Levanna projectiles and quartz lithics,

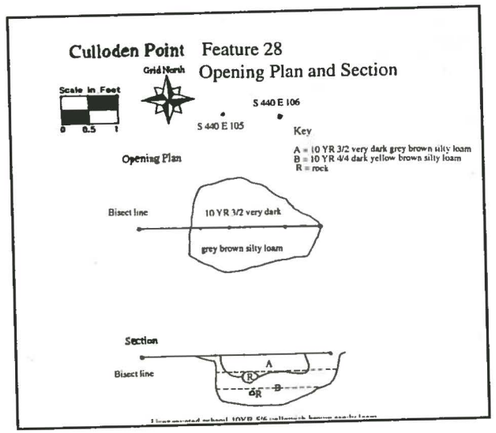

Figure 2: Opening plan and section, Culloden Point Area C, Feature 28. It dates to about 710 A.D.± 80 (Greenhouse Consultants 1999a: Figure 25)

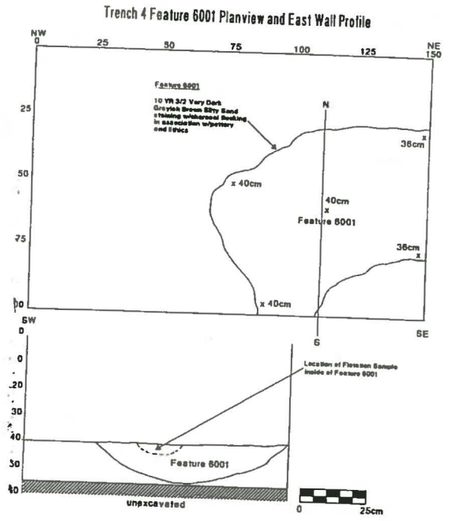

Figure 3: Plan and Section of Feature 1 (6001) at the James and Klugh Site. Flotation derived charcoal dated to about 1030 AD ±40 (From Greenhouse consultants 2001: Figure 16).

but only a trace of charcoal. However, when the feature matrix was subjected to flotation, enough charcoal was recovered for a radiocarbon date around A.D. 1030 (Greenhouse Consultants 2001; Figures 3 and 4).

The table documents some of the many ways different parts of the bayberry plant can be used for a variety of food and medicinal uses. In fact, it has so many medicinal uses that it, not sassafras, might be the "universal Plant" of the Iroquois, as noted by the early explorers (Tuck 1972:4). *Medicinal Plants of Native America* contains many references to the use of bayberry by Native American groups throughout the east (Mooreman 1986:301).

Colonists made full use of Myrica's remarkable properties. It remained a standard for treating a variety of ailments, well into this century (e.g. *The American Materia Medica, Therapeutics and Pharmacognosy* 1919). It is still sold by herbal medicine practitioners to treat a variety of ailments, like diarreah, colitis, intestinal parasites, sore throats, colds, the flu and acute fevers. According to one expert, "Bayberry is considered one of the most useful in the Medical Herbal practice. Its popularity has had respect for generations" (Hutchens 1991:28). Modern medical science is conducting numerous research projects into the various chemicals in Myrica.

But the greatest value of bayberry to prehistoric people might have been as a source of wax. To produce a fragrant wax, the berries are boiled (Peterson 1977:206). The resulting wax has anti-microbial properties. Wax could also be used to waterproof items. The waxmaking process could result in some of the seeds carbonizing if overheated or discarded into the fire. And carbonized seeds would be much more likely to survive in the archaeological record than root bark or leaves.

Another possible use for bayberry leaves and berries would be as an aromatherapy in a sauna or sweatbath. Sweatbaths, also called sweatlodges or bagnios, were a nearly universal part of prehistoric and contact-era Native life. They were used in a ceremony preceding and following major events, a routine aspect of life, and in curing ceremonies for the sick (Bruchac 1997). An early explorer described a sweatlodge among the Choctaws of Louisiana. They were "steam cabinets in which are boiled all sorts of medicinal and sweet smelling herbs" where "the vapors filled with the essence and salts of these herbs enter the patients body through his pores and his nose and restore his strength" (Bruchac 1997:24). Because of Myrica's medicinal properties, an "incense" would have medical effects. It would cause blood vessels close to the skin's surface to expand, which might cool the rest of the body and break a fever.

SCLEROTIA SITES

Sclerotia are ball-shaped fungi fruiting bodies that are common on sites in the Northeast (Grossman 1979; McWeeney 1989; Sandy and Crowley 1991; Sandy 1992a; n.d.; Crowley and Sandy 1992; Sandy and Waleski 1999; Greenhouse Consultants 1999b, 2000, 2001). Sclerotia were first formally documented by Lucinda McWeeney of Yale University in her landmark *North American Archaeologist* article. This article did not reference the sites that were the source of the sclerotia (Mc Weeney 1989).

A decade before the Mc Weeney report, archaeologists of the Rutgers Archaeological Survey Office found fungi fruiting bodies at several Coastal

Uses of Bayberry

Use	Plant Part	Notes	References
beer		used instead of hops	Mooreman 1986:301; Schonbeck 2003
wax	drupes (berries)	candles, waterproofing	Speck 1941:56
barber's wax	drupes	antimicrobial wound plasters; shaving cream	Erichsen-Brown 1979:190-192; Schonbeck 2003
lye	drupes	cleaning agent by Seminole	Sturtevant 1954:80
medicine	root	blood, kidney & gynecological aid	Tantaquidgeon 1972:35, 42
herb	leaf and drupes	seasoning	Foster and Duke 1990:254
insect repellent	leaves on fire	M. gale	Erichsen Brown 1979:190-192
insect repellent	planted to repel fleas	leaves repel cockroaches	Floridata
snuff	leaf	treats headaches	Moerman 1986:301
tobacco substitute	leaf		Moerman 1986:301
exhillarant/stimu lant	drupes, bark & leaves	among Micmac of Canada & Maine	Moerman 1986:301
tea	leaves or root bark	herbalists treat fevers, diarrhea, dysentery, jaundice & ulcers	Foster and Duke 1990:254; Mooreman 1986:301
composition medicine ingredient	root bark	treat colds and chills	Foster and Duke 1990:254

Plain sites.

They included the Dowd (28Mo60) and Kandy Bar (28Mo70) Sites on the Manasquan River in Monmouth County, New Jersey (Grossman 1979).

Sclerotia in very large numbers are often found in flotation samples at sites throughout New York State. Sclerotia were discovered at the Woodland Site in Palatine Bridge (Sandy and Waleski 1999; Greenhouse 1999b). Sclerotia were found in large numbers at the Twin Lakes #3 Site in Westchester County (Greenhouse 1997; Sandy and Krause 1997). The River Bend Site is located on the Hoosic River, near Troy. A flotation sample from a pit, with radiocarbon dates of 1470 B.C. ± 100 and 1860 B.C. ± 180, contained sclerotia (Sandy and Crowley 1991). Flotation recovered sclerotia from two prehistoric sites on Saratoga Lake. Large numbers of sclerotia were recovered through flotation from all three samples of the Rafters Site (Crowley and Sandy 1992). Sclerotia were found in good numbers in many samples from Water's Edge (Vista) Locus1 Site (Sandy 1992).

Using flotation on Long Island, sclerotia were reported from two Long Island sites. Sclerotia were found in one of four flotation samples at the Cedar Creek Park Archaeological Site, Seaford, Nassau County, New York (Cammisa, Sandy, Claasen and Cammisa 1993). Both flotation samples at the James and Klugh Site in Suffolk County produced sclerotia. Over 100 sclerotia were found in the sample from inside Feature 1, while only four were found in the other sample (Greenhouse Consultants 2001).

Investigations of the Woodland/Contact Era Chuck Thomas Site in Chester, Orange County, New York showed that flotation is not the only way to recover sclerotia. A soil sample was water sceened with 1/16 inch mesh window screening, and sclerotia were recovered (Greenhouse 2000).

Sclerotia were found in a flotation sample from the Holland Site, and 50 samples from the Jennings Pasture Site, both in Smyth County, Virginia (Sandy 1999). Radiiocarbon dates range from 3630 ± 70 B.P to 330 ± 40 BP at Jennings Pasture (Lyle Browning, personal communication, 2003).

Surprisingly, sclerotia were found in all 38 flotation samples at the Bloomsbury (Hurd Site) in Kent County, Delaware (Sandy n.d.). This historic site had a prehistoric component in the plowzone, but no prehistoric features in the subsoil (Ned Heite, personal communication, September, 2003).

USES FOR SCLEROTIA

The reason sclerotia are ubiquitous on prehistoric sites in the region has never been adequately explained. The reason may be that sclerotia were used as a survival food during periods of famine and/or as a source of medicine.

Tuckahoe is a common placename in the Algonquin speaking world, including New Jersey, Maryland, Virginia and New York. Tuckahoe is commonly thought to refer to various monocots especially from Liliaceae and Alismataceae families, grouped as bread roots. One of the best descriptions is John Smith, see for example *Journal of Middle Atlantic Archaeology* 1992 8:107-138 (Stuart Reeve, personal communication, 2001).

Tuckahoe is an English loan word from Powhatan, and that its meaning was "green arum" or "arrow arum," the roots of which were were pounded into a fine powder to make bread. The Lenape name for this plant was "maksaweek," which *Zeisberger's Indian Dictionary*, pages 1 and 161, translates as "Aaron root." "Aaron root" is undoubtedly, "Arum root" — the Greek form of "Arum" being "Aron." In his *History of the Northern American Indians*, Zeisberger calls this plant "wild parsnip." (Raymond Whritenour, personal communication, 2001).

Dr. Marshall Becker of West Chester University provided important information on tuckahoe and their preparation. According to Barbour's *The Jamestown Voyages Under the First Charter, 1606-1609*: II:247-248 "The chiefe roote they have for foode is called Tockawhoughe, It groweth like a flagge in low muddy freshes. In one day a Savage will gather sufficient for a weeke. These rootes are much of the greatnes & taste of Potatoes. They use to cover a great many of them with oke leaves & ferne, and then cover all with earth in the manner of a colepit; over it, on each side, they continue a great fire 24 houres before they dare eat it. Raw it is no better than poison, & being roasted, except it be tender and the heat abated, of sliced and dried in the sun, mixed with sorrell and meale or such like, it will prickle and torment the thrat extremely, and yet in sommer they use this ordinarily for bread."

However, one native of Tuckahoe, New York has another view, he thinks tuckahoe are not a plant at all, but sclerotia. He has a website:

http://www.tuckahoe.com/tuckahoe_is_a_mushroom.htm

This view of sclerotia as tuckahoe is shared by a published medical anthropologist (Heinerman 1996 241-243).

If sclerotia were ever also called "Tuckahoe" we can not be sure. We do know that some species of sclerotia produce potato-like tuberous growths which are extremely tough. Native peoples softened the sclerotia in the same way they processed plant based "tuckahoe", by burying them beneath a campfire. The cooked sclerotia (except for those accidentally carbonized) were then dried, ground and mixed into flour. In Asia, sclerotia have long been used as medicine (Heinerman 1996 241-243).

An alternative explanation of the presence of sclerotia on sites has nothing to do with eating them. Fungi are sometimes used to preserve or enhance the ember from firemaking (R. Alan Mounier, personal communication, 2003). Certainly using fungi to preserve a glowing ember would result in charring.

HOW LONG ARE SEEDS VIABLE? – FLOTATION VS. EXTINCTION?

How long seeds survive on archeological sites depends on a number of factors including the type of seed, moisture, salinity and carbonization. A unique study on seed viability began in East Lansing, Michigan in 1879. Dr. Beal's seed viability experiment showed that most seeds buried in Michigan soils were not viable after 100 years (e.g. Kivilaan and Bandurski 1973). Archaeological and other evidence from around the world indicates that, under special conditions, the seeds of some species can remain viable for hundreds, and even thousands of years.

Until a few years ago, seabeach amaranth stood on the edge of extinction, only a couple thousand plants in coastal South Carolina. In the last three years, more than 5,000 plants were discovered in 12 coastal New Jersey locations. Seabeach amaranth

became extinct in New Jersey by 1913. Dr. Stewart Farrell, well known professor of marine science and geology at Richard Stockton University attributes the seabeach amaranth's return to a beach replenishment project which disturbed an ancient beach, submerged since the last glaciation. Farrell believes that the amaranth seeds may have survived in the oxygen-depleted sands, and were recently pumped ashore (AP 2002).

Peter Thomas, then with the University of Massachusetts – Amherst, sprouted several seeds of horsetail grass (Equisetum arvense) recovered from a Woodland archaeological site in the Connecticut Valley (Mullholland 1998).

Investigators of the sunken Spanish galleon *Atocha* reported sprouting seeds that lay on the ocean bottom for 365 years. Corey Malcom an archaeologist with the Mel Fisher Maritime Heritage Society reported growing four seeds found inside the hull (UPI 1987).

On a drier note, the Suzuka Municipal Museum of Archaeology in Japan reported growing peas from Tutankhamen's tomb in Egypt (Ananova 1998).

In China, archaeologists sprouted tomatoes from a charred mass at a 2,000 year old Han Dynasty tomb in Chengddu, Sichuan province. Previous theories held that tomatoes were not native to China, but were introduced in the 19th Century from South America (AP 1985). Tomato seeds are known for their vigor, today passing through both digestive systems and sewer plants unscathed. They are related to ground cherries, uncharred specimens of which were recovered from Paleo-Indian contexts at the Shawnee-Minisink site, in the Upper Delaware (Dent 1979).

FUTURE OF FLOTATION

Flotation will continue to grow within historic and prehistoric archaeology. On prehistoric sites, knowledge of plant foods and medicines will continue to grow. The study of fungal sclerotia will become important. Using reports from various groups in many states, regional paleoethnobotany studies will, like long dormant seeds, sprout forth and refine the field.

Future archaeologists will concentrate on sprouting seeds recovered through flotation from historic and prehistoric archaeological soils. They may focus on dry sites, marine and other submerged contexts, and sites destroyed by fire. Plants sprouted from archaeological contexts can be used to increase genetic diversity and vigor of domestic plants. They may also be used to increase populations of threatened and endangered species. Perhaps they might even be used to bring back extinct plants!

CONCLUSIONS

These are exciting times to be working in archaeobotany in the region, with many important discoveries being made throughout the region (e.g. Hart 1999). Particularly remarkable was the discovery of domesticated sumpweed (Iva annua) at the Two Guys Site in Sussex County, Delaware. Domesticated sumpweed, previously know from Middle to Early Late Woodland sites in Illinois, Kentucky and Mississippi, was found in features dated from 960 B.C. ± 130 to 1240 A.D. ± 80 at Two Guys (7S-F-68)(LeeDecker, Kolderhoff and Holt 1996).

Some archaeobotanists routinely identify the species of the trees burned into site charcoal (e.g. Greenhouse 1999a; McKnight 1998). Starchy roots

have been identified at Pequot sites in Connecticut.

Compared to cultigens like corn and beans, bayberry seeds are rarely reported from Woodland sites in the region. However, this may be due to their relatively small size, and the lack of flotation at many previous excavations. Excavations of prehistoric sites in the New Jersey Coastal Plain have recovered bayberry from Archaic and Woodland contexts. Bayberry has also come from sites in Rhode Island, Delaware and Virginia. The strongest evidence for Woodland use of bayberry comes from upstate New York and Long Island. At a site on the Mohawk River, bayberry was recovered from four proximal features. On Long Island, flotation has recovered charcoal to date features, and also recovered bayberry. These dates and floral remains have allowed a more detailed understanding of Sebonac site types.

Bayberry was used for various food, medicinal and utilitarian purposes. Some of these, like wax making, and medicinal use in sweat lodges are likely sources of the bayberry seeds found in archaeological matrices in the eastern United States.

While information on floral remains is increasing rapidly, with hundreds of similar flotation devices in use, flotation data is not always well distributed. We must work to improve flotation studies, and see that they get incorporated into local and regional archaeological studies. Patterns of such finds could be of great interest. North Carolina has solved the information distribution problem by establishing an ethnobotanical finds website, that sorts by seed type and physiographic region. NYAC Abstracts of NY Stage II and III contract archaeological reports includes "seeds" in their index, which aids Empire State ethnobotany (e.g. Bagdon 1990; Garrow 1992).

The data from the three Long Island sites – Culloden Point Areas C and E, and the James and Klugh site -- have combined to give us a better understanding of prehistoric Sebonac Late Woodland site types (Figure 3). Flotation has concentrated charcoal, seeds and fungi from feature matrices, and allowed us to date the organics and, by association, the lithic and ceramics in the features. Bayberry appears to have been important, whether it was used primarily for food, utility or medicine remains uncertain. Sclerotia are another enigma. Were they used for a grain substitute, or a medicine, or both?

The first Sebonac sites investigated were large, well drained locations on bays and streams, and close to shellfish beds. The Sebonac type-site had loads of artifacts of all varieties, various types of features and long list of faunal remains. These large village sites were the focus of archeological investigations in the first half of the twentieth century. They were easy to find, and productive in terms of artifacts and faunal remains (Ritchie 1980). Since previous archeologists concentrated on one type of site, the analysis of the constellation of local and regional distribution of sites was meager. The methodology error from earlier times introduces a bias into the definition of what constitutes a typical Sebonac phase site. Focus on large villages, in fact threw a focus on sites with historic components, since large villages are now thought to be a response to historic conditions. Sebonac sites include many different types of sites, base camps, shellfish processing stations, hunting camps and possibly villages. These late prehistoric villages were very different from the compact, often palisaded villages of the historic period. The

prehistoric equivalent was a dispersed village, with individual houses or family group of houses spread out over the countryside. Sites like Culloden Point Area C, Culloden Point Area E and James and Klugh are typical of the constellation of site types of the Sebonac Phase of the Windsor Tradition. These sites are probably typical of a family group engaging in specialized activities, before moving on to another location in their seasonal round. Flotation has enabled us to date these sites to the Sebonac, and given us insights into prehistoric use of plants and fungi for food and medicine.

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Blue Ball Tavern Excavations

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Abstract

The Blue Ball Tavern site has allowed for the study of several aspects of the developing economic landscape in New Castle County during the late eighteenth, nineteenth, and early twentieth centuries. The site originally functioned as a tavern, with documentation beginning in 1787 and continuing to 1849, thereafter functioning as a tenant farm until 1909, when the Blue Ball Dairy occupied the site. Each occupation is historically and archaeologically discernable. The "Tavern Era" can be archaeologically subdivided into an earlier unit of 1787 to 1828/9 and a later unit up to 1850. The "Tenant Farm" phase spans the years from 1850 to 1909, and can also historically and archaeologically be subdivided into an earlier unit of 1862 to 1890 and a later unit up to 1909. The "duPont Dairy/Farm" phase begins after 1909 when A. I. duPont purchased the property and lasts until 1938, when duPont died and the property was transferred to various Florida based companies and leased to independent dairymen.

The Blue Ball site was located (Figure 1) north of Wilmington at the intersection of Concord Pike and Rockland Road on a parcel of the Chestnut Hill Plantation. A tavern is documented at the site from 1787 to 1850, after which it was converted and operated as a tenant farmhouse by the E.I. duPont de Nemours powder company. In 1909 Alfred I. duPont purchased the property and continued to run it as a tenant farm. After 1914, A. I. duPont's Blue Ball Dairy operation occupied the site. DuPont died in 1935, and the property subsequently transferred to various Florida based companies and leased to independent dairymen.

Hans Peterson obtained this land (Table 1) through a 1678 New Castle Court warrant (F2:245), and a 1681 Indian deed signed by the "natural owners & Indian proprietors". In 1685 and 1700 Peterson sold the tract to Cornelius Empson (A1:113; Q1:598), who deeded the west half, where the Blue Ball Tavern would later stand, to his son Ebenezer in 1708 (C3:395). In 1722 Hans Peterson's son, Israel, bought Chestnut Hill back (G1:225). He died intestate leaving ten children as heirs, eight of whom sold their shares to Joseph Mortonson (F2:245, 297, 298), married to Regina, one of the heirs.

Joseph Mortonson's 1771 will (O:558) left three acres, a loft, and dwelling to Regina; property in Cherry Island Marsh to his son Joseph; and, the Chestnut Hill tract to his son Joshua.

When Regina Mortonson deeded her portion of the property to Joshua she is mentioned as the widow of Joseph Mortonson, Innkeeper (F2:246). Through a series of purchases (F2:294, 510), John Dickinson came to own the Chestnut Hill tract by 1786. Regina Mortonson is listed intermittently in the tavern license petitions from 1787 through 1798 as one of a group wishing to keep taverns in their respective dwellings.

In 1799 Lancelot Law Smith took over the "long accustomed public house ...kept for some years by [the late] Mrs. Regina Mortonson". Smith was licensed until 1807, in which year Thomas McKee assumed the "Tavern...lately occupied as house of Public entertainment by Lancelot Law Smith".

McKee continued as proprietor until 1810 when George Miller took over. Public elections were held at the inn during Miller's tenure, and it was during his keep that the tavern became known for its fine food.

Figure 1. Location of the Blue Ball Site.

Miller kept the tavern until 1816, when John Dickinson's daughter, Maria, inherited his property. In 1819 Robert Galbreath petitioned to keep the "Blue Ball Tavern...which license had previously expired".

YEAR	GRANTOR	GRANTEE	CONVEYANCE
1678	Court of NC Co.	Hans Peterson	warrant
1681	"Indian proprietors"	" "	Indian Deed
1685, 1700	Hans Peterson	Cornelius Empson	deeds
1710	Cornelius Empson	Ebenezer Empson	deed
1722	Ebenezer Empson	Israel Peterson	deed
1749	Israel Peterson	10 children	intestate
1749-1755	8 Peterson siblings	Joseph Mortonson	deed
1771	Joseph Mortonson	Joshua Mortonson	will
1772	Regina Mortonson	" "	deed
1777	Joshua Mortonson	Andrew McKee, Jr.	deed
1785	Joshua Mortonson	John Dickinson	deed
1804	John Dickinson	Maria Dickinson	will
1860	Maria Dickinson	Mary Morris Logan	trust
1862	Mary Morris Logan	Jonas Miller	deed
1862	Jonas Miller	E.I. duPont de Nemours	deed
1908	E.I. duPont de Nemours	A.I. duPont	deeds
1935	A.I. duPont estate	various	deeds

TENANT	YEARS	OCC.
Regina Mortonson & Joshua McLean	1787 1794-98	Tavern
Lancelot Smith	1799	
Thomas McKee	1807	
George Miller	1810	
Robert Galbreath	1819	
Isaac Anderson	1828	
Joshua Hutton	1859	?
?		Farm
Mr. Bishop	1920	Dairy
Mr. Thurber	1921	
Andrew Fullarton	1921	
Maxey Bland	1926-35	

Table 1. Chain of Ownership and Tenancy.

He kept the tavern until 1827, after which it was taken over by Isaac Anderson, an announcement stating "Isaac Anderson has taken the Tavern by name of Blue Ball...formerly kept by Robert Galbreath, now deceased". Anderson farmed and kept the tavern until his death in 1850.

One hundred features, including the tavern/house foundation, were identified and excavated (Figure 2).

The tavern/house foundation was constructed of uncut mortared stone. Interior basement partition walls formed a three room L-shaped structure (Figure 3), with access to the basement provided at various times by four stair courses, two of which were sealed off by mortared stone partitions. The northern room had an interior staircase, the remains of a basement hearth or hearth support, and cement flooring, which

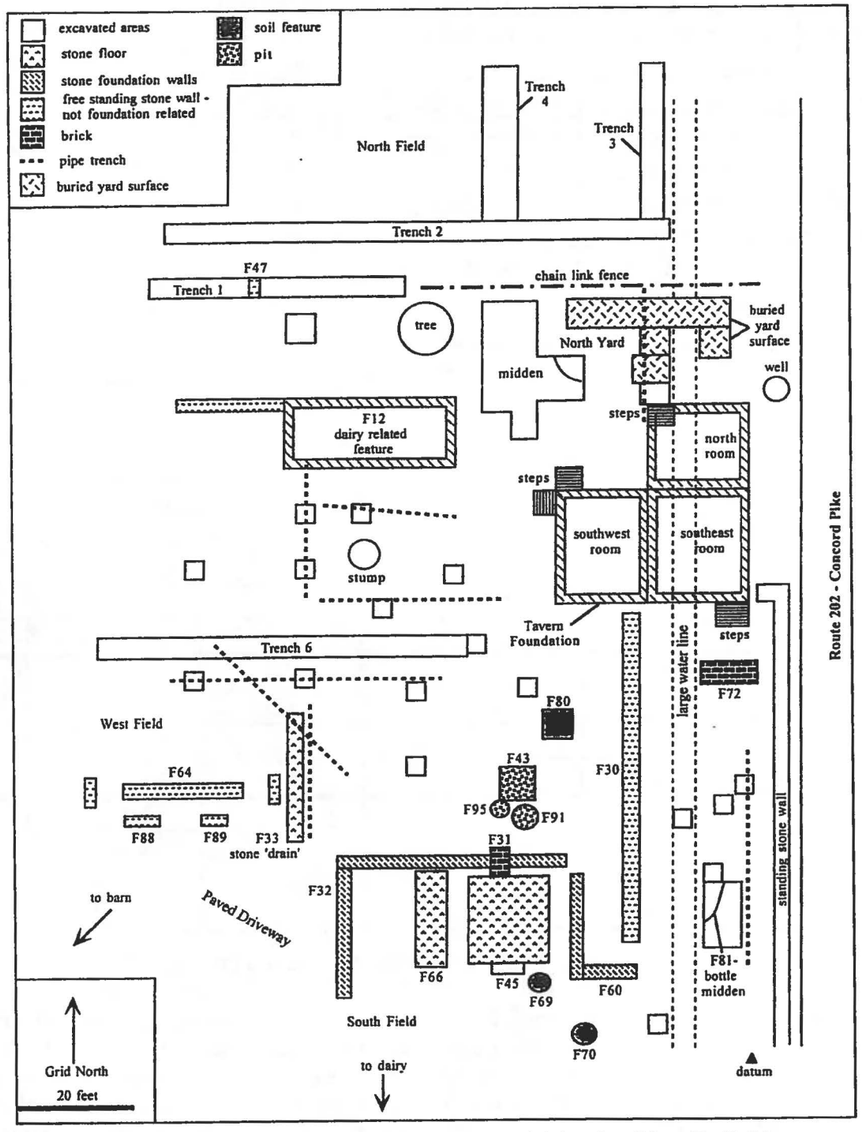

Figure 2. Plan map Showing Major Features Within the Blue Ball Site.

when removed revealed an anthrosol, yielding artifacts indicating it was in place in the late eighteenth century, and the cement poured after 1864. A well adjacent to Concord Pike outside this room was cross-sectioned by backhoe, the buckets examined for artifacts, but none were found.

The other two rooms had brick flooring laid over a bright orange æolian

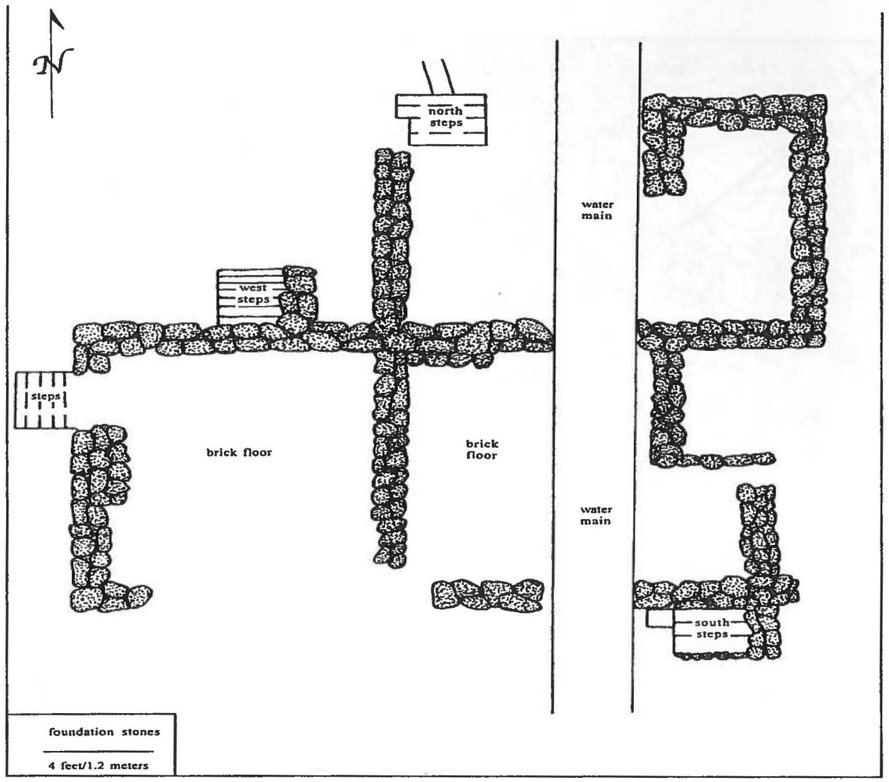

Figure 3. Tavern/House Foundation.

sand of the Pliocene Bryn Mawr Formation (Figure 4) that was three and a half feet deep, and which was underlain by gray gleyed clay. These rooms were joined by an interior passageway, and separated from the other by two stone walls, one of which was once exterior. A builder's trench along a stair course leading into these rooms dates its construction at post-1890, and glass from between the brick floor and sand dates the flooring at post-1910.

Contexts associated with the early portion of the tavern operation include the north foundation room, an adjacent buried yard surface, and three pit features. One was an eight-foot deep, four-foot diameter circular pit (Feature 43), with a flat bottom comprised of thin bands of clay and wood planking. The other two (Features 91 and 95) were three-foot deep, four-foot square pits with flat bottoms. Ceramic fragments from these contexts include refined and unrefined jugs, bottles, tankards, crocks, bowls, plates, creamers, platters, saucers, cups, and chamber pots. Glass remains consisted of pre-1830 manufactured case gin, ale, brandy, wine, and medicine bottle fragments, bottle stoppers, snuff and ink jars, plates, tumblers handled wine glasses, goblets, and lamp chimneys. Clay pipe fragments, faunal remains, a jewelry box piece, slate

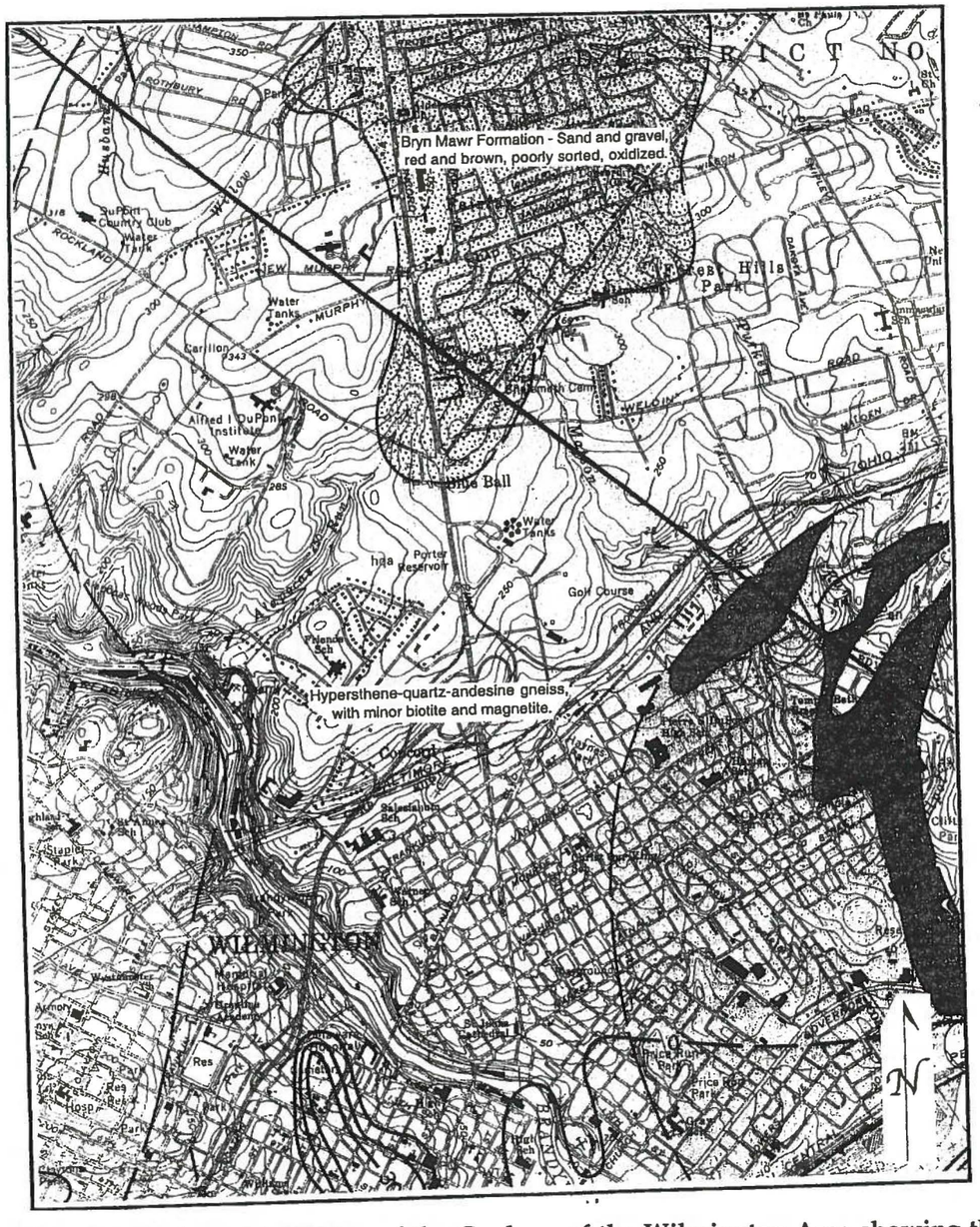

Figure 4. Portion of 1975 Map of the Geology of the Wilmington Area showing the Bryn Mawr Aeolian Formation. Scale 1" = 2000'.

pencils, and a brass suspenders clasp were also recovered.

The artifact assemblages from these features are comparable, distinguished from one another mainly

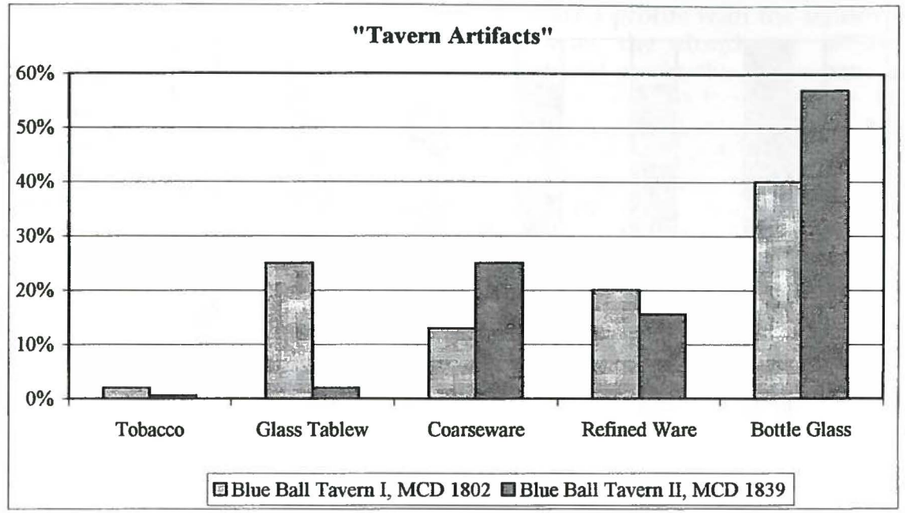

Figure 5. Distribution of "Tavern Artifacts" from Earlier to Later Tavern Occupation.

by the presence of unique personal items, and larger artifacts from the pit features. The average Mean Ceramic Date for these contexts is 1803, with average Mean Beginning and Ending Dates providing a bracket between 1776 and 1829.

The buried yard as an accretional surface, was exposed over an approximate 58-year period that could include all tavern keepers up through Robert Galbreath. The Terminus Post Quem for the pit features indicate they are largely associated with the George Miller and/or Robert Galbreath occupations.

The only context associated with the later tavern operation is an eight-foot long deposit south of the foundation characterized by a high proportion of mortar, plaster, brick, and pre-1860 manufactured glass from spirits, mineral water, and medicine bottle fragments. The Mean Ceramic Date is 1839, however, wire nails recovered from beneath the feature soil indicate post-1890 deposition. Isaac Anderson kept the tavern until 1850 and his widow, Ann, may have continued the operation, though by 1859 Maria Logan's will indicates Joshua Hutton residing on the tract. These items may represent Anderson's term at the tavern as well as the Hutton occupation, yet would have been discarded after the duPont company came into ownership.

Tavern assemblage" for the early and later tavern phases (Figure 5) indicates more glass and refined ceramic tableware and tobacco pipes and snuff containers in the earlier component and more coarse ceramic wares and bottle glass for the later component. Clearer patterning emerges from a comparison conducted from the probates for Blue Ball Tavern keepers Regina Mortonson, Robert Galbreath, and Isaac Anderson, Samuel Landers of the Green Tree Inn in

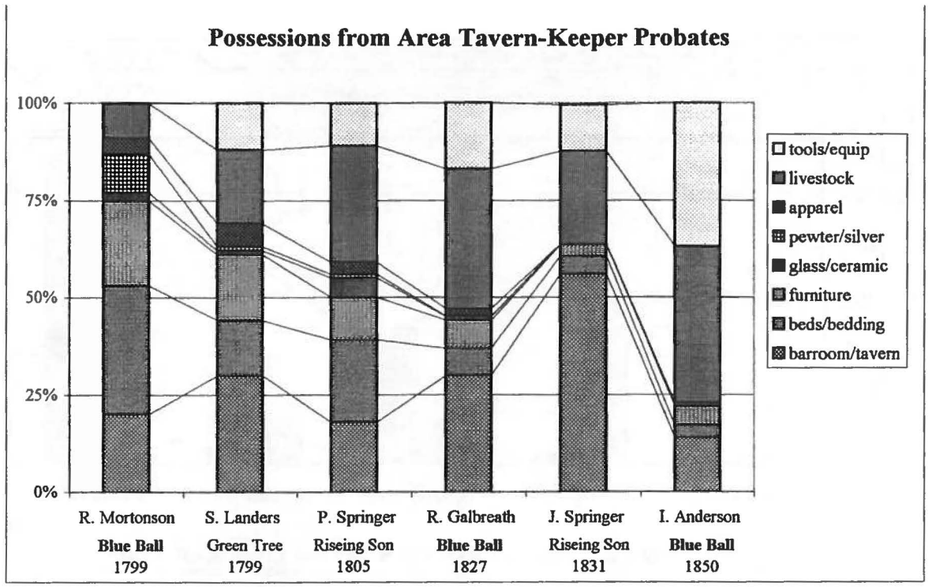

Figure 6. Distribution of Possessions from Area Tavern-Keeper Probates.

Brandywine Village, and Peter and Joseph Springer of the Rising Son Tavern in Mill Creek Hundred. Categories of items consist of (Figure 6) (1) beds and bedding, (2) furnishings such as desks, tables, chairs, clocks, tablecloths, (3) glass and ceramic, (4) pewter and silver, (5) "waring apparel", (6) livestock, and (7) tools.

Regina Mortonson's probate shows a proportionally high presence of bedding, furnishings, pewter, silver, and personal possessions, and low presence of livestock and tools, suggesting a tavern that provided dining and overnight accommodations for travelers. Over half of Samuel Lander's probate consisted of livestock and tools. A relatively low proportion of bedding, and greater investment in "waring apparel", furniture, and food preparation and service items may indicate it provided dining and entertainment in a semi-urban setting, rather than for overnight stays. Peter Springer's probate shows a comparatively high proportion of bedding to other types of furnishings, more glass and ceramics than pewter and silver, and a high proportion of livestock and tools. The establishment probably provided basic overnight accommodations and was a working farm. This contrasts with his son Joseph's probate, consisting mainly of agricultural equipment or tools, and including seemingly insufficient furnishings and kitchen implements to provide overnight accommodations and food service, suggesting that it largely serviced the local community, rather than as lodging for travelers.

Most of Robert Galbreath's probate consisted of livestock, equipment, or blacksmithing tools "in the barn", while other items were noted "in the bar". During Galbreath's term, the Blue Ball Tavern appears to have functioned as a traveler's inn, providing food service, lodging, and

blacksmithing. The majority of Isaac Anderson's inventory consisted of agricultural items, including tools used for grain cultivation, and dairy production, facilities for raising chickens and pigs, a slaughterhouse, a blacksmith shop, and a barn. The dining and bar rooms were listed separately, so while dining and accommodations were available, the property was also a working farm. This probate demonstrates the mid nineteenth century trend toward agricultural intensification and diversification throughout the state.

The second phase of the site's use can be described as farm tenancy, characterized by a non-landowning, but land holding class of farmers and managers, who often owned livestock and shared profits with the landowner. This was the dominant mode of agricultural production in the area until a shift in the 1930's to wage labor (DeCunzo and Garcia 1992). Maria Logan left the "Blue Ball Farm" in trust for her daughter who later sold it to the E.I. duPont de Nemours powder company (Q7:247, 250). The 1880 Brandywine Hundred Agricultural Census lists the company with income from hay, corn, wheat, and cut wood. Two hundred dollars was paid for labor and board for 33 weeks, or the equivalent of one person at six dollars per week. Artifact distributions indicate an intensification and expansion of land use outward from the main structure. Associated contexts include the remains of a 54-foot long mortared stone yard wall two feet south of the foundation, and the foundation remains of a thirteen by fourteen foot mortared stone structure 50 feet south of the foundation (Figure 7), and a large midden.

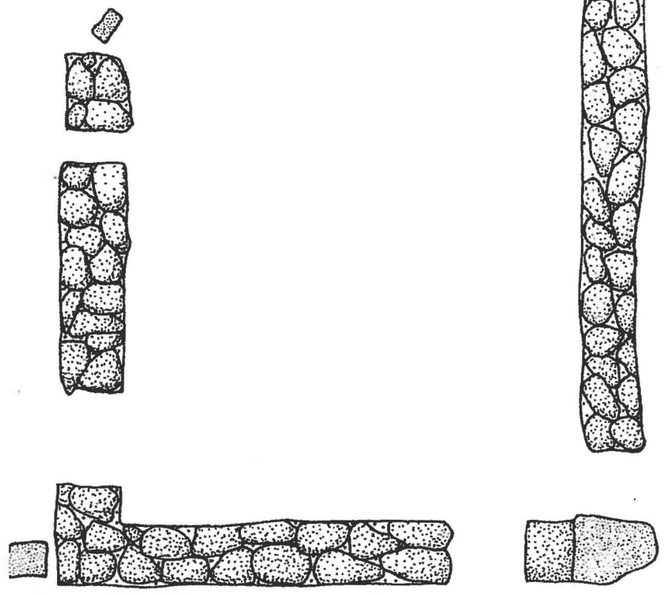

Figure 7. Feature 69.

The midden was a foot and a half deep basin covering a 65 square foot area northwest of the foundation. A wide range of ceramics from jugs, crocks, cups, pitchers, bowls, plates, platters, saucers and chamber pots were recovered, providing a Mean Ceramic Date of 1847, and Mean Beginning and Ending dates of 1809 and 1884.

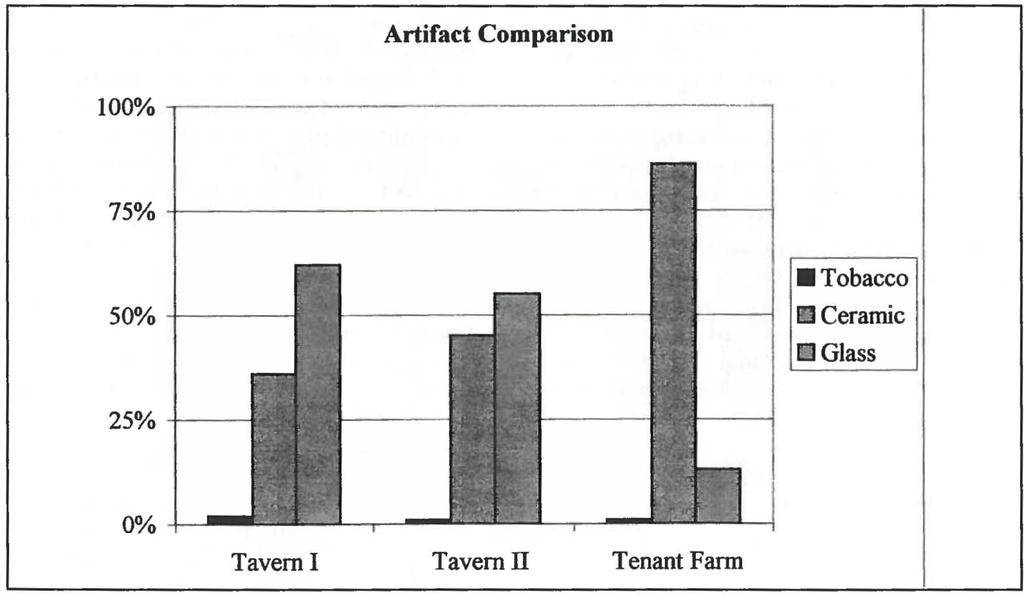

Figure 8. General Artifact Categories from the Tavern and Tenant Farm.

Glass vessel remains manufactured between approximately 1840 and 1890 consisted of spirits, ale, cider, mineral water, medicine, and perfume bottles, demijohns, decanters, flasks, snuff jars, tumblers, and goblets. Other artifacts include ceramic marbles, a key, a thimble, slate pencils, a porcelain doll head, a porcelain figurine, mirror fragments, metal cutlery, a brass escutcheon, eyelets, leather, an agate doorknob, jewelry fragments, lamp chimney fragments, and several buttons, including mid nineteenth century U. S. Infantry General Services Eagle buttons. Several white clay ("kaolin") and earthenware pipe fragments were recovered, two manufactured between 1861 and 1900.

A high proportion of architectural remains, included a variety of window glass types and nails, and low proportion of faunal material, suggests that the midden was not formed solely from daily domestic activity but represents, in part, debris from structural renovation or demolition and the discard of accumulated belongings. One such episode is noted pre-dating 1888. A comparative analysis of general artifact categories (Figure 8) for the two tavern and tenant farm phases show the two tavern phases most resembling one another, and a marked skew between glass and ceramic artifacts for the Tenant Farm phase.

The third phase of the site's use is the dairy operation. New Castle County was the largest dairy producer in the state from the 1850's until 1945 (Michael 1985), with peak years from 1914 to 1928 (Hoffecker 1982). In 1914, A.I. duPont had the dairy barn and milk house built, among the first to incorporate concrete and glass blocks into construction (HABS 1993). Many structural elements that could at one time be seen throughout the dairy complex, such as use of stucco, concrete and galvanized iron sinks, iron window and doorframes,

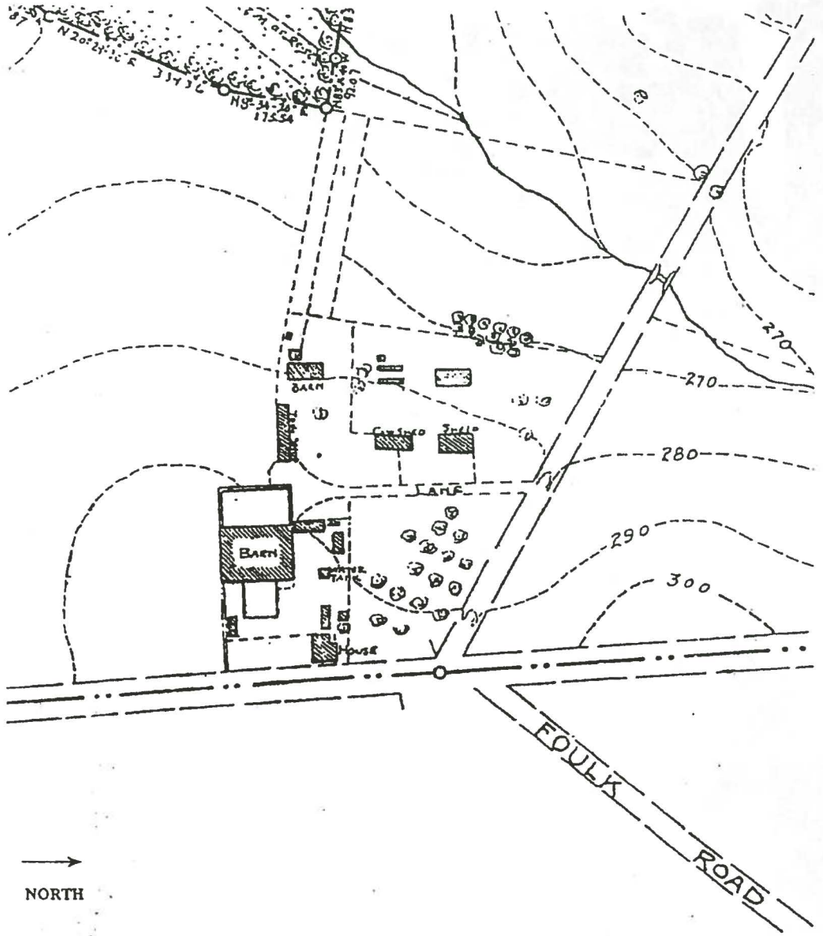

Figure 9. 1917 Price and Price map of the Nemours Estate.

and the elimination of projections and moldings were recommended in Alfred Hopkins' 1913 publication *Modern Farm Building* (Brizzolara 1989).

A.E. Whittington managed the dairy during its first years of operation up until 1920, after which management was transferred to E. M. Davis (HABS 1993). Davis, an ex-railroad brakeman, was active in gaining support for duPont from local labor unions, and eventually gained ownership of duPont's newspaper, the *Newark Ledger* (James 1941), becoming one of duPont's chief political advisors (Wall 1990).

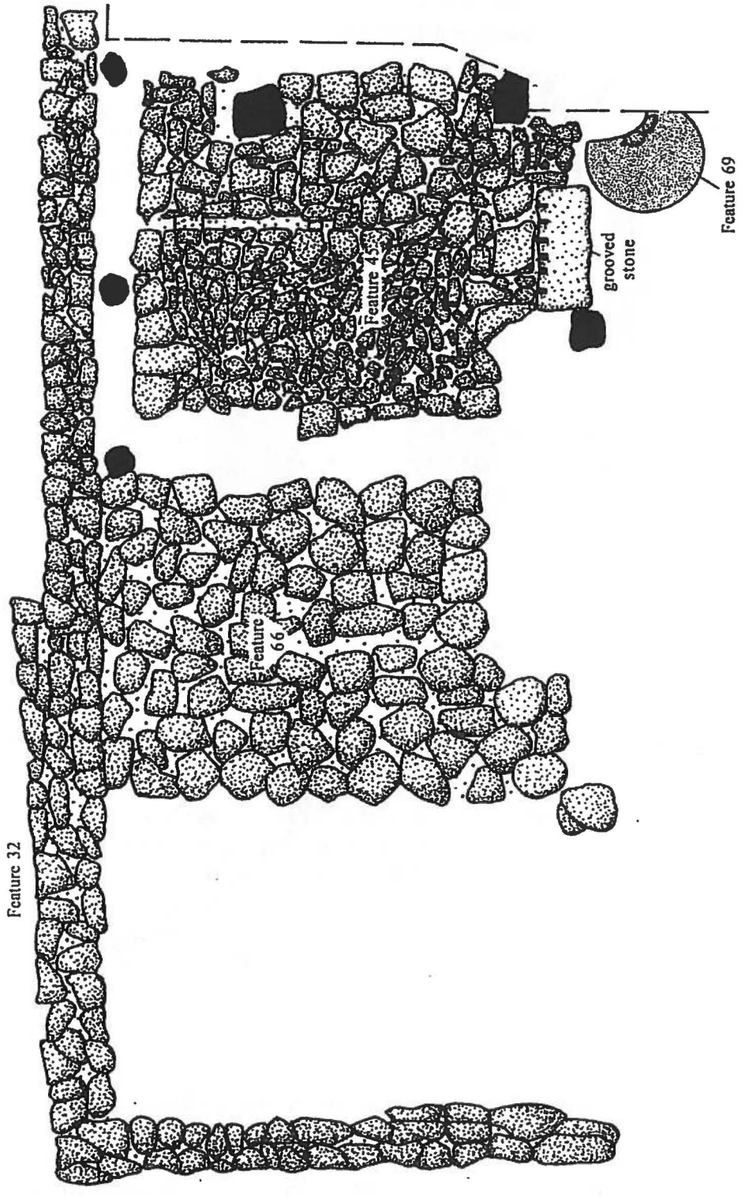

Figure 10. Features 33, 45, and 69

A group of letters between the two indicates that, in addition to owning cows for the dairy operation, the Farm kept a number of horses, sheep, turkey, and chickens. Grain planting, harvesting and processing equipment, pig pens, a poultry house, a horse stable, and a cow stable are all mentioned.

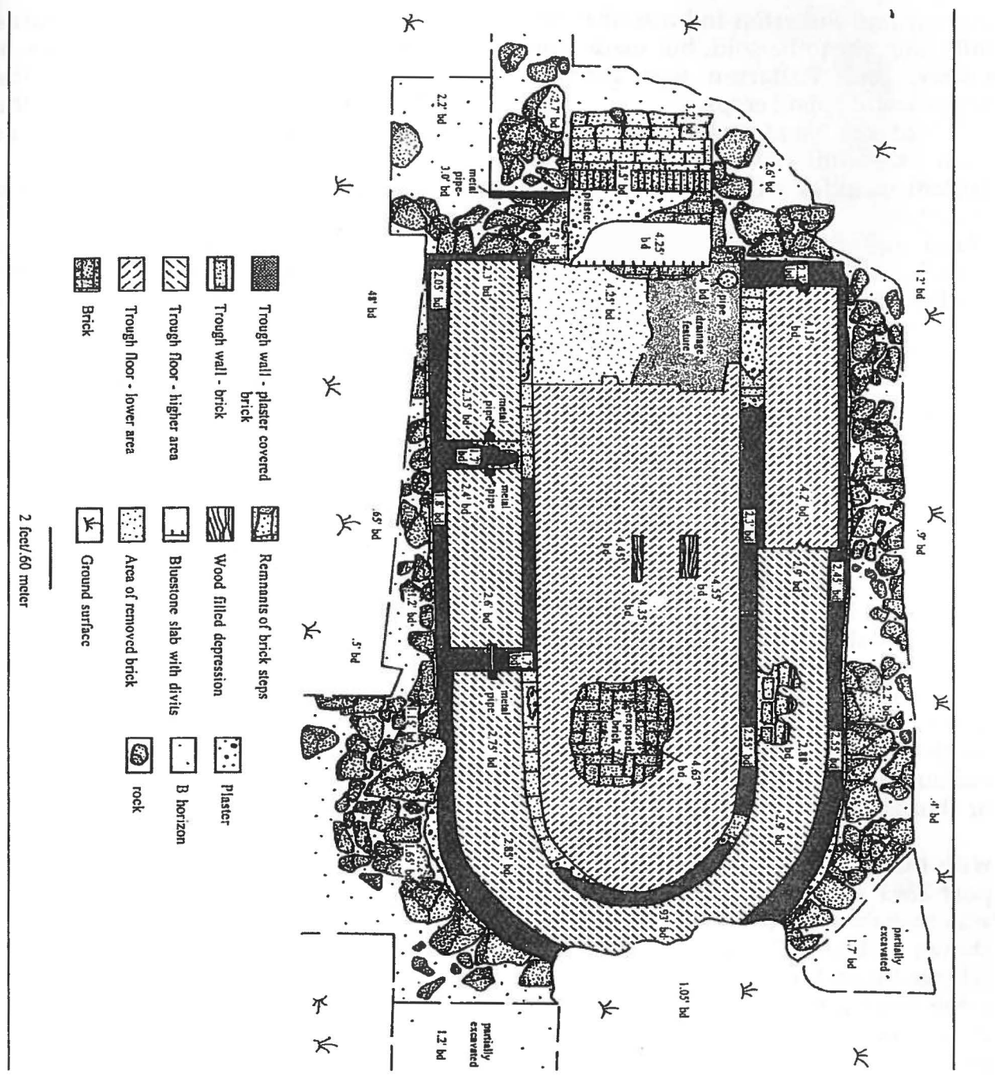

Figure 11. Plan View of Feature 12

They also discuss a request to use the porch of the "Blue Ball boarding house" for registering voters and clerks for the New Castle County Republican Committee. Mr. Bishop supervised the farm under Davis and lived in the farmhouse. In 1921, Bishop was relieved of his responsibility for the dairy and poultry operations, which were turned over to Mr. Thurber. From that point on the poultry and dairy operations were to be "carried on as a separate business from Blue Ball Farm".

Later that year Andrew Fullarton replaced Mr. Bishop as superintendent. A series of correspondences between

duPont and Fullerton indicate that the milk was not to be sold, but made into butter, and Fullarton was granted permission to plant crops.

Maxey Bland was superintendent from 1926 until 1935. A 1927 letter to duPont includes a financial report and inventory for the farm, indicating that Bland and duPont shared the profit equally, and Bland paid $5.00 rent. Similar figures and profit are shown in a 1928 report, however reports from 1931 and 1934 showed a substantial decline in profit. Inventories were made for contents of the dairy, cow stable, horse stable, feed room, granary, barn, poultry house, tractor shed, oil house, hay barracks, corn crib, sheep house, pig pen, house, and "outside". The inventory for the house consisted of four single cots, six single beds, three bureaus and mirrors, five bedroom chairs, four bedroom tables, six dining room chairs and a dining table, a kitchen table with three chairs, a stove, two rockers, an icebox, and a lard press. The number of single beds and cots substantiates the building's function as a workers quarters or "boarding house".

Several features are associated with this phase of the site, including a post-1864 constructed stone wall that was probably the remnants of a building shown on the 1917 Price and Price map (Figure 9); and, the post-1910 mortared stone remains of another small structure. A ten foot square post-1910 dry laid stone floor (Figure 10) included two large square post molds, probably for support beams, along one edge, and a large cut stone slab entryway along another edge. Adjacent to the entry was the metal hoop remains of an above ground wooden barrel. Similar features found at the Thomas Williams Site in New Castle County have been interpreted as rainwater collection devices.

The 24 by 18 foot remains (Figures 11) of a plastered stone, brick and concrete structure indicated on the 1917 Price and Price map of the Nemours estate was presumably built as part of the Dairy

An interior cement floor was removed, revealing an underlying brick floor. One post-1899 manufactured dairy bottle fragment was recovered from between the two floors. A large cut stone threshold beneath the cement floor spanned the width of a staircase entry that was flanked by stone troughs. Several dairy bottle fragments manufactured between 1910 and 1915 and canning jar fragments manufactured between 1910 and 1930 were found within the troughs. A metal pipe that also ran alongside a post-1880 above ground unmortared stone conduit to the west entered this feature into one of these troughs. A series of four plastered brick troughs connected by a metal pipe formed the inner wall of the feature. The depths of the troughs varied from half a foot to two feet, and the grade around their tops was pitched, presumably to circulate water through the pipe. The pipe terminated at a floor grate that was connected to a glazed ceramic pipe beneath the floor that ran back into the west field. A backhoe trench cut across the feature revealed five layers of coarse sand fill extending two feet beneath the brick flooring (Figure 11), from which post-1908 bottle glass fragments were recovered.

Evidence from the Blue Ball site reveals a long occupation and changing economic functions that contributes to an understanding of New Castle County's evolving socio-economic landscape. While the site was always a residence, it primary function evolved from that of a tavern to a general tenant farm to a farm specialized in dairy production. From early European settlement of a frontier in the

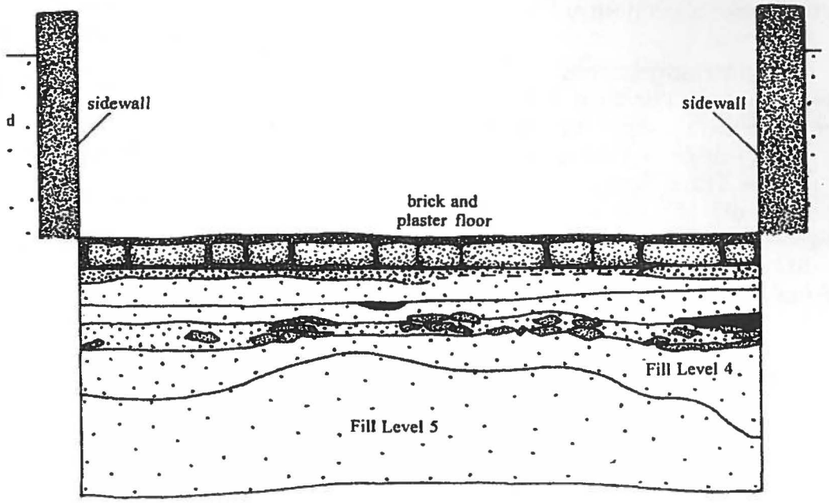

Figure 12. Feature 12, Sub-floor Excavation Profile

seventeenth century to the twentieth century decline of the region's agricultural economy, the owners and tenants of the Blue Ball Tavern and Farm adapted their use of the site to with the evolving economy of the area. The larger size, variety, and increased number of outbuildings is trait of twentieth century dairy farms that has been exhibited as an additive strategy at the Buchanan-Savin farm (7NC-J-175) in Blackbird Hundred (Scholl et al 1994), where eight new outbuildings were constructed in the 1920s, as at the Blue Ball Dairy.

Excavations at the Blue Ball property have revealed evidence of the site's long occupation and changing economic functions. While the site was always a residence, its economic role shifted from that of a tavern to a general tenant farm to a farm specialized in dairy production. This history provides a detailed view of New Castle County's evolving socio-economic landscape as property's owners and tenants adapted

their use of the site along with the developing regional economy.

Acknowledgements

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