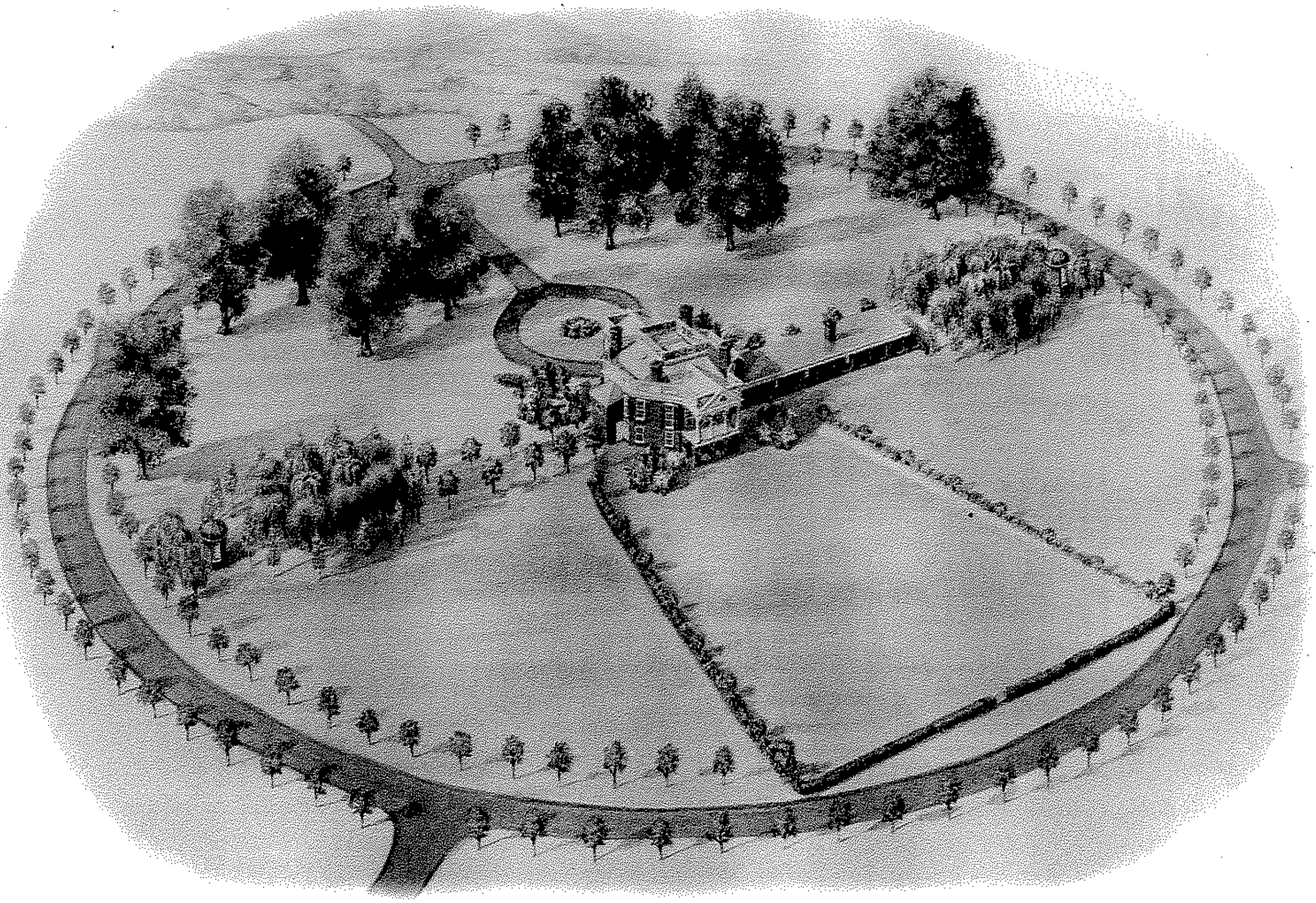

JEFFERSON'S VILLA IN THE GARDEN:

A REPORT ON THE LANDSCAPE ARCHAEOLOGY PROJECT AT THOMAS JEFFERSON'S POPLAR FOREST, 1998-1999.

by Tim Trussell

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CHAPTER 1: INTRODUCTION

THE LANDSCAPE PROJECT

The landscape archaeology project is a multi-year, interdisciplinary study of the ornamental landscape Thomas Jefferson created at his villa retreat Poplar Forest. The project grew from a desire by the staff and Board of Directors at Thomas Jefferson's Poplar Forest to explore issues of landscape reconstruction on the property. The majority of gardens and landscapes at historic home sites today are generic period gardens, created by garden clubs or landscape historians to "look right" for a particular interpretive period. The restoration and preservation philosophy for Poplar Forest calls for a much more exacting standard. However, it was acknowledged from the outset that landscape restoration is not the same as building restoration. An ornamental landscape changes seasonally and yearly in a way that a building does not. In addition, these changes may not always be apparent in the archaeological record, and subsequent grading and other human activities on the site may potentially destroy much of the evidence that did once exist of these changes. A major goal of the landscape project is therefore to gather as much data as possible on Jefferson's ornamental landscape to ascertain whether efforts at landscape reconstruction could be based on enough information to render the eventual result an accurate reflection of Jefferson's design.

The documentary record left by Jefferson is of great assistance in that some aspects of the Poplar Forest landscape design were referenced specifically. However, it is clear that these records provide only a fragmentary outline of the core area design. Excavations have revealed that major alterations to the landscape plan are not listed by Jefferson, and it is evident that much important information simply was never written down. Jefferson probably oversaw many of the plantings and projects personally, leaving no record of his work. Archaeological research is therefore crucial to determining the physical form of the actual design, and in many cases is the only source of information.

The 1998 and 1999 excavation seasons focused primarily on the south lawn and core area at Poplar Forest. These excavations were intended to facilitate multiple types of data recovery and analysis. Given the success achieved in this project, a similar excavation methodology may be applied to other portions of the core area during future research. This report is an initial summary of information obtained from excavation and from associated research conducted during the 1998-99 field seasons, and is intended only to present our work to date. The landscape archaeology project is ongoing, and will involve further excavation within the core area as well as additional analysis of soil chemical, phytolith, and palynological data.

Despite the aforementioned limitations in the documentary record, the research design of the south lawn excavation was heavily influenced by the few surviving documentary references to ornamental plantings. Individual plants and specific locations were referenced in documents, making possible an unusually high degree of detail in the research goals for the project. The sunken lawn is an artificial landscape element, and it was hoped that any intact Jefferson-era stratigraphy, either on the terrace banks or on the south lawn surface, would define the original topography and plan-view shape of this feature. Another important goal was to uncover any landscape features or archaeological evidence of plantings that could provide physical indications of the original ornamental design or planting scheme used. Finally, excavation of soil layers and features was conducted in such a way as to facilitate opal phytolith, palynological, and soil chemical analysis. These types of analysis are discussed in detail in later chapters but were utilized to provide complementary lines of evidence to help determine the function of extant planting or garden features and plant types. As work progressed, research expanded to include a consideration of the growth patterns and characteristics of the species Jefferson directed to be planted to determine if the information was consistent with the physical evidence emerging from the site.

Numerous paid staff, volunteers, students, and professional consultants contributed to this work. Dr. Barbara Heath is Director of Archaeology at Poplar Forest. She convened the landscape panel, oversaw the project, and contributed to nearly every aspect of this report. The author served as Field Supervisor of Archaeology, directing field excavations and coordinating testing and analysis of pollen, phytolith, and soil chemical data. Heather L. Olson, Lab Supervisor, directied the artifact analysis, research, and conservation. Field staff included Rob Feldacker, Jamie Bauguess, Neal Mayberry, Celeste Henrickson, Lori Lee, Keith Adams, Eliot Balazs, Bree Detamore, Ted Fasler, Randy Lichtenberger, and Scott Grammer. Lab staff included Jodi Perin, Sarah Stroud and Liz Paull. Volunteers included Donald Cushman, Ruth Glass, Dot O'Connor, Cynthia Trussell, and Donna Nevers. The students who participated in the University of Virginia Archaeological Field Schools at Poplar Forest in 1998 and 1999 contributed greatly to the project, as did the teachers who excavated during the "Archaeology for Teachers at Poplar Forest" programs in 1998 and 1999. Talmadge Greenway completed an internship project researching the growth properties and physical characteristics of historic plants. David Camden completed an internship researching ornamental gardens Jefferson visited during his lifetime. Fred Duis donated shrubs and labor from Duis Nursery

for the south lawn photo shoot coordinated by Donna Nevers, and American Electric Power donated the use of a gantry crane for photography. Dr. Scott Anderson, Director of the Center for Environmental Sciences, served as the palynology consultant. Dr. Lisa Kealhofer and Kelly Sullivan completed phytolith analysis at the Colonial Williamsburg Foundation phytolith lab. Partial digestion soil chemical analysis was completed at the Viriginia Tech soil testing lab in Blacksburg, while the total digestion testing was completed at A & L Soil Laboratories in Richmond.

HISTORICAL BACKGROUND

The historic origins of Poplar Forest date to 1745, when William Stith patented a four thousand acre tract of land "at the Poplar Forest...passing the Ridge between the Waters of James River and Roanok". The property was inherited by Stith's daughter Mrs. Pasteur, who sold it to Colonel Peter Randolph. Randolph sold the property to John Wayles in 1764. It is unclear exactly when the site was first occupied, but the first known documentary reference to actual cultivation of the land at Poplar Forest comes from an 1766 Bedford court order asking for the "Hands at Wayles quarter" to assist with nearby road work (Marmon 1991:10). It is most likely, however, that the first occupation of the site was some time earlier than this date. Wayles died in 1773, leaving the property to his daughter Martha Wayles Skelton Jefferson and her husband, Thomas Jefferson.

Jefferson is occasionally credited with naming Poplar Forest, but the name clearly originated from the first land patent in 1745, and appears in several other legal documents well before Jefferson took possession in 1773. From the name, one can infer that a large stand of Poplar trees existed on the property in the 1740s, but no descriptions of the landscape exist from this time and it is unknown how much of the original "Poplar Forest" still existed when Jefferson inherited the property. During his fifty-year ownership of the property, Jefferson utilized his plantation at Poplar Forest as an important source of income. Following his retirement from the presidency, he also used Poplar Forest as a regular retreat from the public obligations of life at Monticello. In 1806, while serving his second term as President of the United States, Jefferson's hired workmen and slaves began construction of an octagonal retreat home on the property.

Information about the landscape which existed in the core area at Poplar Forest prior to the construction of the house is known from documentary and archaeological research. A survey map of the property circa 1800 shows a tobacco barn in this location. Since it was standard practice to site tobacco barns in the middle of fields, to reduce the labor required for transport during harvest, this map provides the first clue that this area was likely a tobacco field. In addition, dendrochronological dating

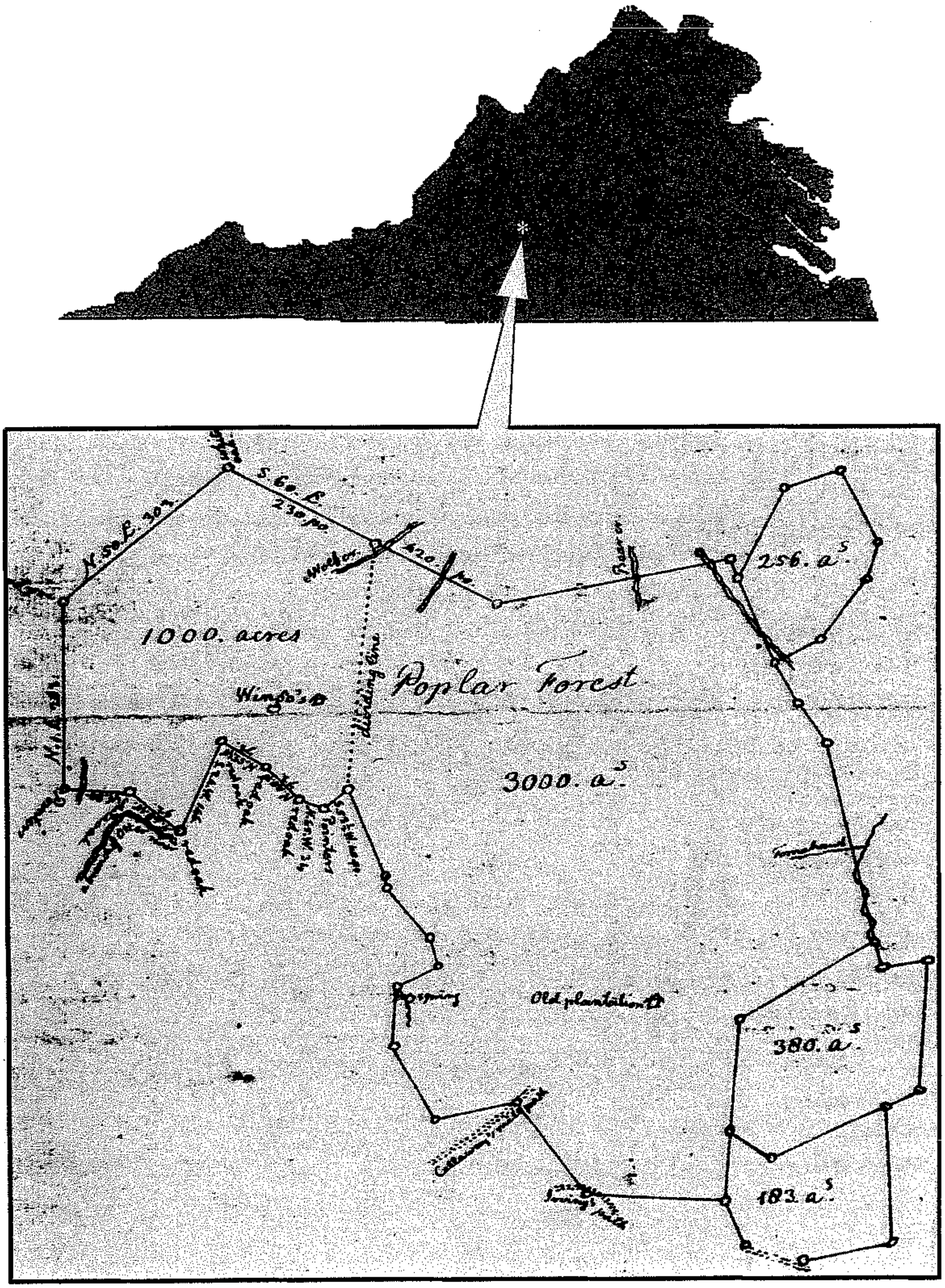


FIGURE 1: Map of Poplar Forest circa 1790, and location in the state of Virginia. The octagonal house was eventually built approximately 600 ft. west of the location titled "Old Plantation".

of extant Tulip Poplar trees north of the house indicates that these specimens were young, second growth trees, approximately 20-30 years old when Jefferson began construction of the house in 1806 (Adams, Internal Memo: Poplar Forest Archaeology Department). Finally, excavations from beneath the west mound, which sealed a small area of soil that had lain undisturbed since construction of the ornamental landscape, clearly showed a stratigraphic profile consistent with an agricultural field. Together, the evidence indicates Jefferson chose a long out-of-use tobacco field, containing medium sized, second-growth Tulip Poplars, for the site of his Palladian villa retreat.

The construction of the house and landscape took many years, and like many of Jefferson's building projects, may never have been fully completed. In 1814, Jefferson directed that a wing of offices be added, extending to the east from the main house. Jefferson visited his retreat at Poplar Forest regularly until turning the management of the property and the living quarters of the house over to his grandson Francis Eppes in 1823. Jefferson died in 1826 and just two years later, Eppes sold the house and 1,074 acres of land surrounding it to William Cobbs for $4,925.

Cobb's daughter Emma married Edward S. Hutter in 1840, and the Cobbs-Hutter family descendants owned Poplar Forest for more than one hundred years before finally selling the property in 1946 to the James O. Watts family. The Watts family lived at Poplar Forest until 1980, when they sold it to Dr. James Johnson of North Carolina, who never lived in the house. In December of 1983, the house and 50 acres of property were bought by the Corporation for Jefferson's Poplar Forest, a private organization whose goals are to restore the property and open it to the public. Today, the Corporation for Jefferson's Poplar Forest owns over 500 acres and Poplar Forest receives over 20,000 visitors per year.

JEFFERSON'S ORNAMENTAL LANDSCAPE

Poplar Forest was important to Jefferson economically for over 50 years, but for the first 30 years of his ownership of the property, he stayed in the overseer's house during visits (Marmon, Vol. 1:19-23). As early as 1781 Jefferson also began to envision the property as a potential country retreat and tentatively sketched plans for a suitable home at his Bedford county plantation (Wenger 1997:238-241). It is important to note that this early house was to be sited on the western edge of the property, along a main road which still exists today as route 811. These early plans were shelved, but more than twenty years later during his second term as president, Jefferson directed the construction of a retreat home in Bedford. Unlike the 1781 design, this house was sited centrally on the property, well away

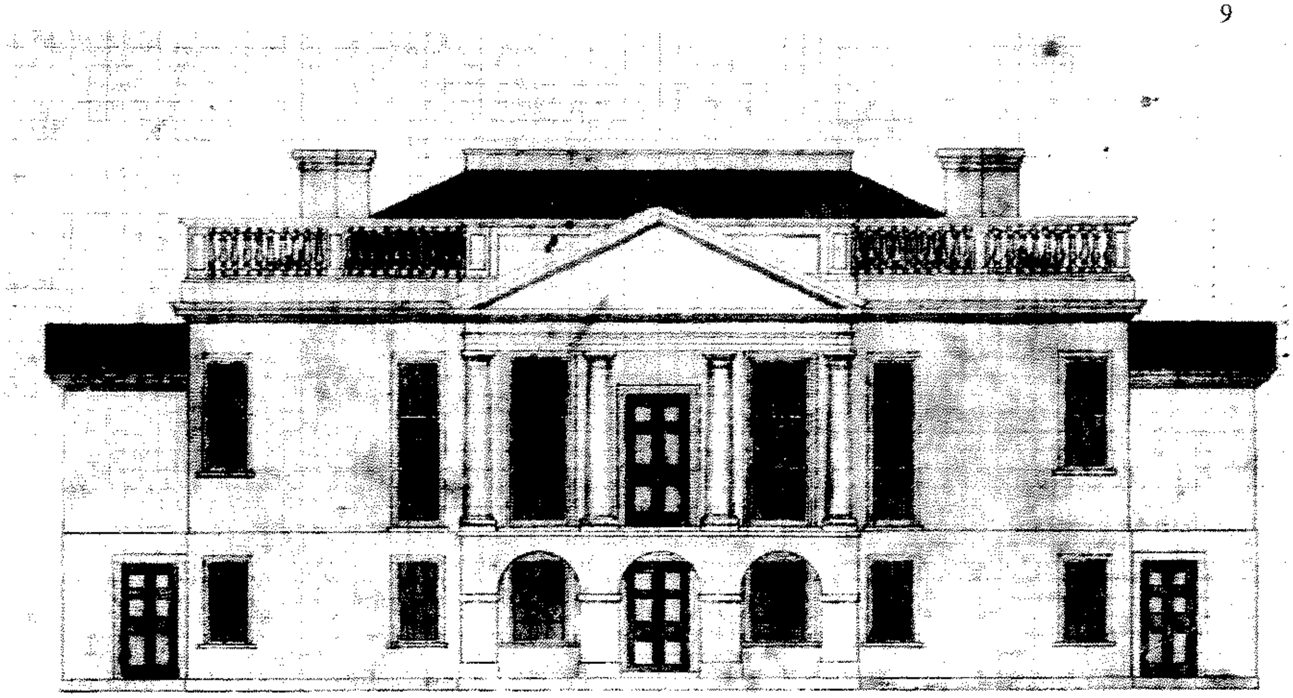


FIGURE 2: Undated drawing of the south elevation of the house by John Neilson. A note from Joseph Cabell in 1819 thanks Jefferson for allowing him to borrow a plan of Poplar Forest by Mr. Neilson, possibly including this same elevation drawing (Chambers 1993: 131, drawing housed in UVi collection).

FIGURE 3: 1999 aerial photograph of the core area of Poplar Forest, looking northwest. Note mounds east and west of house, excavations on east and west banks of the sunken lawn south of the house, and the standing tulip poplars in the north core area.

from public roads, perhaps reflecting an increasing desire for privacy as Jefferson approached retirement. Construction of the octagonal retreat home at Poplar Forest began in 1806, but Jefferson envisioned this house within the context of an idealized landscape and went to great lengths to create this context for his new home in a five-acre enclosure surrounding the house known today as the core area.

Jefferson's records contained references to numerous landscape features at Poplar Forest. He noted the presence of a "circular road", which he calculated as "540 yds round" in 1812. (Betts, 1944:494). Jefferson also calculated how many trees it would take to plant paper mulberry trees on either side of this road at 20 ft intervals, but as he crossed out this notation in his garden book, it is unclear whether it was actually completed (Jefferson Garden Book, MHi). Jefferson made numerous references to the construction of the sunken lawn south of the house, and his planting memorandum indicated that he directs planting the banks of the lawn with shrubs (Betts, 1844:494). Earthen mounds east and west of the house are noted, and twin rows of paper mulberry trees connected the mounds to the house east and west (Betts, 1944:494). Jefferson designed oval beds of flower,s constructed north of the house, and clumps of trees and shrubs at the angled walls of his octagonal house (Betts, 1944:494, 563)

The landscape as it exists today at Poplar Forest contains partially intact portions of the original ornamental landscape. The octagonal privies Jefferson designed are present, and are almost completely original. The mounds to the east and west of the main house, as well as the sunken lawn and terraces to the south, are also still extant. A portion of the circular road is intact on the northwest side of the core area, as is the southwest axial road. The carriage turnaround to the north of the house is possibly an original part of Jefferson's design, though dating this feature has raised preservation issues that have precluded further excavation in the area for the time being. Intact portions of an old fence line surrounding the core area of the property may be a much-replaced remnant of the Jefferson period 10 acre interior curtilage fence that appears on an 1813 map of the property. The area within this 10 acre enclosure is known as the "core area".

In 1807, Jefferson instructed that a sunken lawn 90 feet wide be excavated south of the house (Jefferson to Chisholm, June 5,1807, MHi). The house was sited at the top of a gentle hill, and was built into the top of the hillside in such a way that from the front, or northern aspect, the building appeared to be only one story. On the south side, however, the building had two levels, with the sunken lawn extending away from the basement story at a regular slope until it reached grade. Jefferson

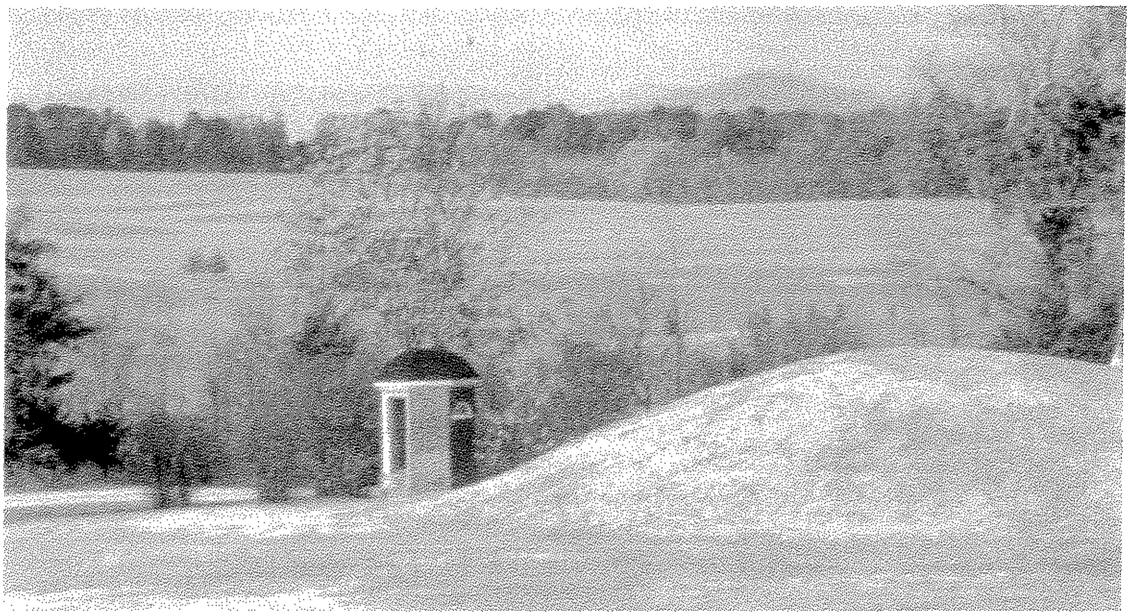


FIGURE 4: Close-up of west mound and octagonal privy, both original landscape elements.

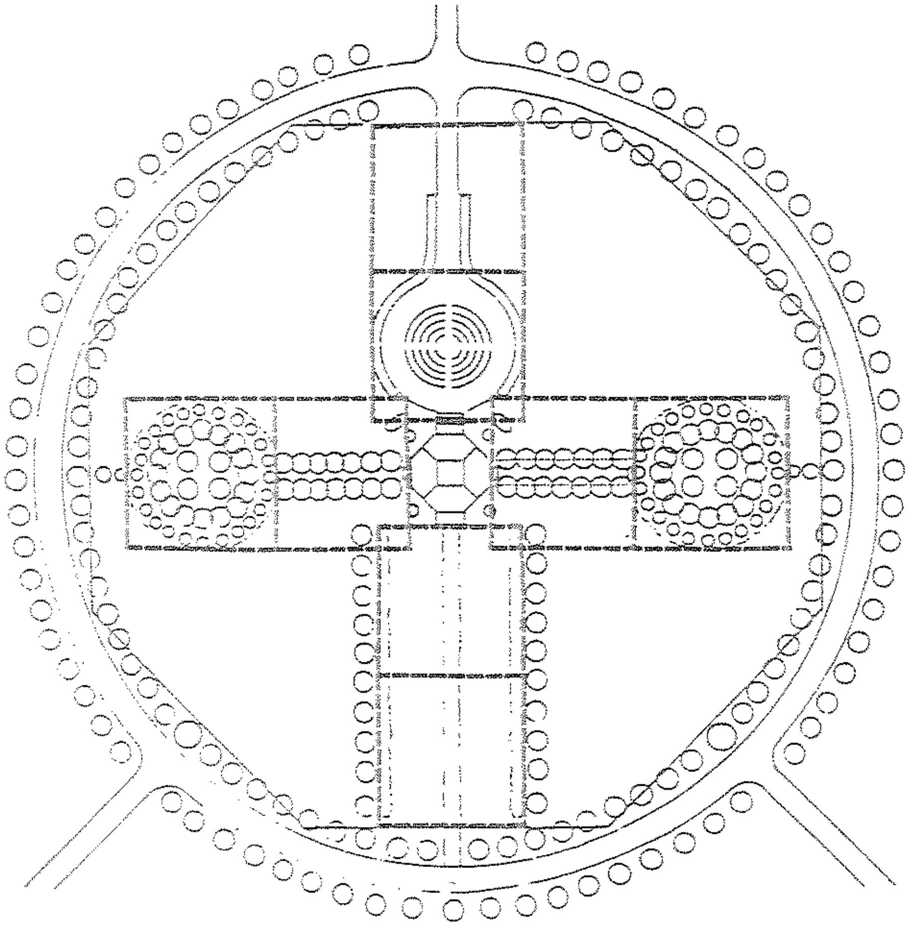


FIGURE 5: Hypothetical drawing of core area by C. Allan Brown, illustrating the 100 ft. by 200 ft. block system of rectangles Brown believed Jefferson based the Poplar Forest landscape design around. Subsequent research has brought into question many details of this "ideal" reconstruction (Brown 1990:132).

offered to pay the enslaved African-Americans who excavated the lawn 1 bit per cubic yard of earth moved, apparently feeling that this work was beyond their regular duties. Phil Hubbard is mentioned specifically in documents, but the volume of earth removed to create the lawn, approximately 36,000 square feet of soil, makes it unlikely, though not impossible, that he performed the work alone. The most likely scenario is that Phil was in charge of a group of workers, who were still "at the digging" in August of 1808 (Chisholm to Jefferson, August 8, 1808, MHi).

In addition to the ornamental shrubs on the bank of the south lawn discussed later in this report, Jefferson also instructed his overseer to plant Kentucky coffee trees but gives no clues as to location. Historic photographs from 1910 through 1940 show Kentucky coffee trees planted along the tops of each terrace bank. Though no evidence has yet been found to date them, it has been hypothesized that these trees may have been original Jefferson plantings (Brown 1990:126). Nearly all of the Kentucky Coffee on the south lawn terraces appear to have died in the 1940s and early 1950s, though a few on the southeast corner of the lawn survived into the 1980s. On the terraces the stumps appear to have been ripped from the ground, effectively destroying any chance to date them archaeologically due to the severe disturbance to the surrounding stratigraphy. Dating the trees through dendrochronology is not an option since no intact original tree or stump exists to be cored. The present landscape contains topographical hints of the original Jefferson-design, but most of the surviving topographic features have been significantly altered.

Currently, the only original living floral remains of the Jefferson period landscape are the large Tulip Poplars on the north side of the house. Dendrochronological dating suggests that these trees were present before the construction of the house in 1806 and probably began growing between 1770 and 1780 (K. Adams, internal memo: 1999). There are several living plant species on the property that may potentially be descendant specimens from plants originally established in Jefferson's ornamental landscape. A small weeping willow grows in front of the wing of offices, and a small paper mulberry exist near it, growing from the northern side of the east mound. One large European Mulberry grows near the Tulip Poplars next to the circular road in the northern portion of the core area, as does one large Kentucky Coffee tree, and several small European Mulberries grow on the edge of the circular road near the museum shop . A small Kentucky coffee grows as a sucker from a large stump southeast of the sunken lawn. An antique rose grows in the center of the carriage turnaround, the location of an oval bed in Jefferson's ornamental landscape design. Isolated iris, hyacinth, tulips, lilac, privet, locust, redbuds, dogwoods, and daffodils grow sporadically in various areas of the property, but it is unknown if these are antique varieties.

In 1990, landscape historian C. Allen Brown published an article titled "Thomas Jefferson's Poplar Forest: the mathematics of an ideal villa" in the Journal of Garden History (Brown 1990: 117-139). As the title implies, Brown felt that Jefferson utilized a strict mathematical basis for designing the major elements of the landscape. He derived his mathematical theory from, and based his plan of the Poplar Forest landscape on, the measures of existing landscape features and references to landscape features in Poplar Forest documents. The "ideal" model of the landscape created by Brown used a dynamic symmetry based on the measure of the house as the basis for all major landscape elements. Brown believed that Jefferson designed the sunken lawn, the east and west mounds, and the carriage turnaround and boxwood planting using 100 x 200 ft modules as the basis for the design (Figure 5). Brown's plan also shows Kentucky Coffee trees lining the sunken lawn, an octagonal fence inside the core area, and symmetrically oriented entrance roads. Though this landscape plan will be discussed in light of archaeological discoveries later in this report, it is important to note that this plan has been the centerpiece of Poplar Forest's public interpretation of the ornamental landscape during the 1990s.

A TEMPORAL LANDSCAPE: CHANGES THROUGH TIME

To study a relic landscape is to work with a subject that has been in a state of constant change from the moment of its creation (Gleason 1990:6). The ornamental species within the historic core of the property would have been continually maturing and eventually dying out through time. From the first planting, a visual landscape is ever shifting and changing, even in the rare case that the organizational layout remains subsequently unaltered. Changes in the functions or uses of a property typically result in permanent changes to a landscape. At Poplar Forest, many of the alterations that have taken place to the ornamental design of the core area are, in general, attributable both to the changing nature of land use historically on the property and to changes in ownership.

Archaeologist Heather Olson has noted that while historic house museum sites are usually linked to a particular famous person or family, the period of occupation of those famous people is often relatively short. The greatest impact on the landscape, and on the archaeological assemblage, is typically made by the generations of families who occupied the site after the "historic" period (Olson 2000:1-2). Jefferson generally visited Poplar Forest several times a year from the construction of the house in 1806 until his last visit in 1823. The Hutter family alone, by comparison, owned the property for more than 100 years. Only a small number of the alterations to the Poplar Forest landscape made by those who came after Jefferson are now known, and the following discussion is only intended to illustrate the vast changes to the landscape over time that archaeologists must deal with when researching a particular period.

The Eppes family occupied Poplar Forest for only five years, 1823-1828, and though Francis inherited the property from Jefferson in 1826, he sold it just two years later. Eppes noted constructing an icehouse in 1826, and it is possible that the remains of this structure still exist archaeologically on the west bank of the south lawn (Olson 2000:10). This period of transition is generally too brief to separate from Jefferson's occupation of the site from artifacts alone, and the extent to which Francis Eppes kept up or modified the landscape is presently unknown. In 1828, Eppes left for Florida and the Cobbs family moved into Poplar Forest. Though no farm records survive to indicate the construction of outbuildings, significant changes were likely taking place in the core area.

An important research question for archaeologists studying the ornamental landscape at Poplar Forest is the degree to which Jefferson's original plantings were maintained by subsequent families. As will be discussed later, Jefferson's ornamental landscape design at Poplar Forest was, in part, the result of his desire to create a country villa inspired by the classical retreats described by Andrea Palladio in "The Four Books of Architecture." The ornamental landscape was therefore a function of Jefferson's desire to create both an intended classical atmosphere, and a context that provided the proper setting for his octagonal home. At Jefferson's death, however, Poplar Forest ceased to function as a gentleman's villa, resulting in changes to the organization and layout of the core area that in some ways reflected a more utilitarian role for the property.

Significantly, several extant or known landscape features suggest that attention was still being paid to the ornamental form of the landscape during the Cobbs-Hutter ownership of Poplar Forest during the 19thcentury. The boxwood and carriage turnaround on the north side of the house may have been an ornamental feature created during this time. Archaeological investigations by William Kelso revealed that the roots of these boxwood are growing over the top of a thick cobbled layer, whose stones are typical of mid to late 19th century paving (Kelso, 1991:17). In addition, the close proximity of these plantings to the archaeologically documented northwest oval bed (a Jefferson-era feature) may also indicate that the boxwood were not a Jefferson planting. Definitive proof, however, is still lacking on both sides of this question and will require further research. The Kentucky Coffee trees lining the terraces of the south lawn may also have been planted by the Hutter family (see pollen section of this report), though further research is also required to settle this question, as well. A subterranean hothouse, termed the "Pit for Flowers" was constructed in 1848, indicating that attention was being paid to the propagation of ornamental plants (Kelso, 1991;Fasler, 1999).

The Cobbs and Hutter families were clearly interested in the ornamental appearance of the landscape to some degree, but it is plain that nearly all of the Jefferson-era ornamental trees and shrubs died out at some point after Jefferson's death. Excavation of the northwest planting clump provided evidence that planting holes associated with this feature were sealed by a layer of soil with a TPQ (terminus post quem; the date after which) of 1830, suggesting that at least some of the clump was no longer extant by that date (Heath 1994: 57-59). A mid 19th century brick path over the clump indicated that none of the original plantings in this area were living 30 years after the initial planting episode. None of the ornamental plantings mentioned in documents anywhere on the property appear in early 20th century photographs. Future palynological research may shed light on this process, but the Jefferson plantings excavated thus far on the property were not replaced by subsequent owners as no evidence of re-digging of these holes has been found archaeologically. Sometime in the second quarter of the nineteenth century, the Cobbs or Hutter families built a large garden south of the house (see chapter 3, south garden testing section).

The Cobbs and Hutter families also oversaw the construction of many new outbuildings, necessary for a working plantation or farm, in the core area and across the property. A smokehouse and kitchen constructed during the 1840s upon the site of the demolished wing of offices on the east side of the main house still exist today. North and south tenant houses were built east of the main house and near the hypothesized location of the circular road in the 1840s or early 1850s (Strutt, 1998). The aforementioned Pit for Flowers was constructed in 1848 on the west terrace bank of the south lawn (Kelso et al, 1991). A large barn, on the western side of the circular road, was constructed in the 1850s reusing lumber from a dismantled Jefferson-era barn (Heikkenen 1997:4-5; Strutt, 1992). Interestingly, references also indicate that a serious attempt to propagate silk worms was being made during this time, as well. An 1842 letter from Marian Cobbs states that a cocoonery was present on the property, though whether this was a new building or a re-used structure is unclear (Olson 2000:11).

Over time road tracks shifted, such as the visible flattening of the northern portion of the circular road. Other historic roads were evidently plowed under or simply allowed to return to nature through lack of use, such as the southeast axial road and the eastern and southern portions of the circular road. The main entrance road was likely relocated to the west, where the present entrance road is sited. Jefferson era documents indicate that the northern entrance road ran north from the house at a 23 degree angle to the east. However, since the northern portion of this road was cut off by construction of a railroad line around 1850, it was likely re-sited to the north-centered entrance road present today (Adams, unpublished draft *Roads at Poplar Forest*, 2000).

Olson notes that the history of rural technological advances, from the introduction of indoor plumbing, running water, electricity, and telephone service is all present in the archaeological record at Poplar Forest and has contributed to disturbances in the core area (Olson 2000:15-18). In addition to these alterations, many other important additions, subtractions, or modifications to the property occurred in the 170+ years since Jefferson's death. The few discussed here merely indicate the massive changes to the core area of the property since Jefferson created the ornamental landscape.

It is important to note that many of these alterations to the Poplar Forest landscape reflect wider historical shifts in agriculture and settlement within the state of Virginia. In discussing changes to the spatial organization of Poplar Forest plantation through time, Heath notes:

> While many of these changes were specific to Poplar Forest, they were symptomatic of larger social processes underway as 18th century plantations gave way to antebellum farms throughout Virginia. Initially, development clustered tightly around cleared agricultural fields centered on a large tract of unexploited land. Over time, as the labor force grew and the land became less productive, settlement expanded over the landscape; first through the establishment of new quarters elsewhere on the property, and later, through a widening band of fields, support buildings and roads radiating out from the "old plantation." This solution was ultimately limited by property boundaries and plantation resources. Unable to sustain consistently high crop yields, the land was broken up for sale to other, less ambitious farmers. (Heath 1999)

Understanding organizational changes to the macro-plantation, whether driven by changing agricultural practices, shifting demographics, changes in the market economy, historical political events such as the end of slavery, or simply because of changing ownership, constitutes an important research goal being pursued at Poplar Forest. In addition to the clear contribution to the history of Poplar Forest and other Piedmont plantations, a more complete understanding of Poplar Forest in the post-Jefferson period will be useful in sorting through the changes to the core area of the property through time.

CHAPTER 2: THE SUNKEN LAWN EXCAVATIONS

PREVIOUS LANDSCAPE ARCHAEOLOGY

Excavations to investigate historic landscape questions have been conducted at Poplar Forest since 1989, and much of this research has been focused on areas specifically mentioned in documentary references. The results of many of these excavations are detailed in *A Report on the Garden Excavations of 1993, 1994, 1995 at Poplar Forest,* and *in Retreating into the Landscape,* Notes on the State of Poplar Forest, 2:19-24, both by Michael Strutt, and in *A Report on the 1992-1993 Excavations: The Perimeter of the House and Excavations Related to Restoration at Poplar Forest, Virginia* by Barbara J. Heath. A map of all excavations to date is contained on the back page of this report, and can be used to reference all unit locations mentioned in the text.

To briefly summarize previous work, the landscape archaeology projects have been successful in locating important elements of the core area design. Evidence of a gate was uncovered, approximately 200 feet due south of the house, but did not contain any artifacts to date its construction. This feature was found with a series of extended plantings that appear to have formed a loose hedge fence. One of two gardens mentioned at Poplar Forest may have been located just south of this gate but a mid-nineteenth century garden obscured or destroyed most of the landscape evidence in this area. A corresponding "north gate" 200 feet north of the house may have been located as well, though its date is also unclear (Strutt 1995).

Jefferson's use of planting "clumps" at the angles of the house has been confirmed archaeologically. The oval beds Jefferson describes to the north of the house also left a clear archaeological signature and the northwest bed was excavated in 1993, shown in Figures 6 and 7 (Heath, 1994:74-77). Excavations on the west mound revealed several planting stains, as did excavations to the west of the west privy. Unfortunately, none of these projects was able to shed much light on the exact species once living in a given area, though Calycanthus taxa were identified in the northwest clump (Kealhofer 1997).

The 1998 excavations on the south lawn were the start of a multi-year landscape archaeology project at Poplar Forest. Previous projects located individual Jeffersonian landscape elements and plantings, but focused mainly on assessment level archaeology conducted in discrete areas. These projects were less successful in identifying the presence of specific plants in the microfossil record,

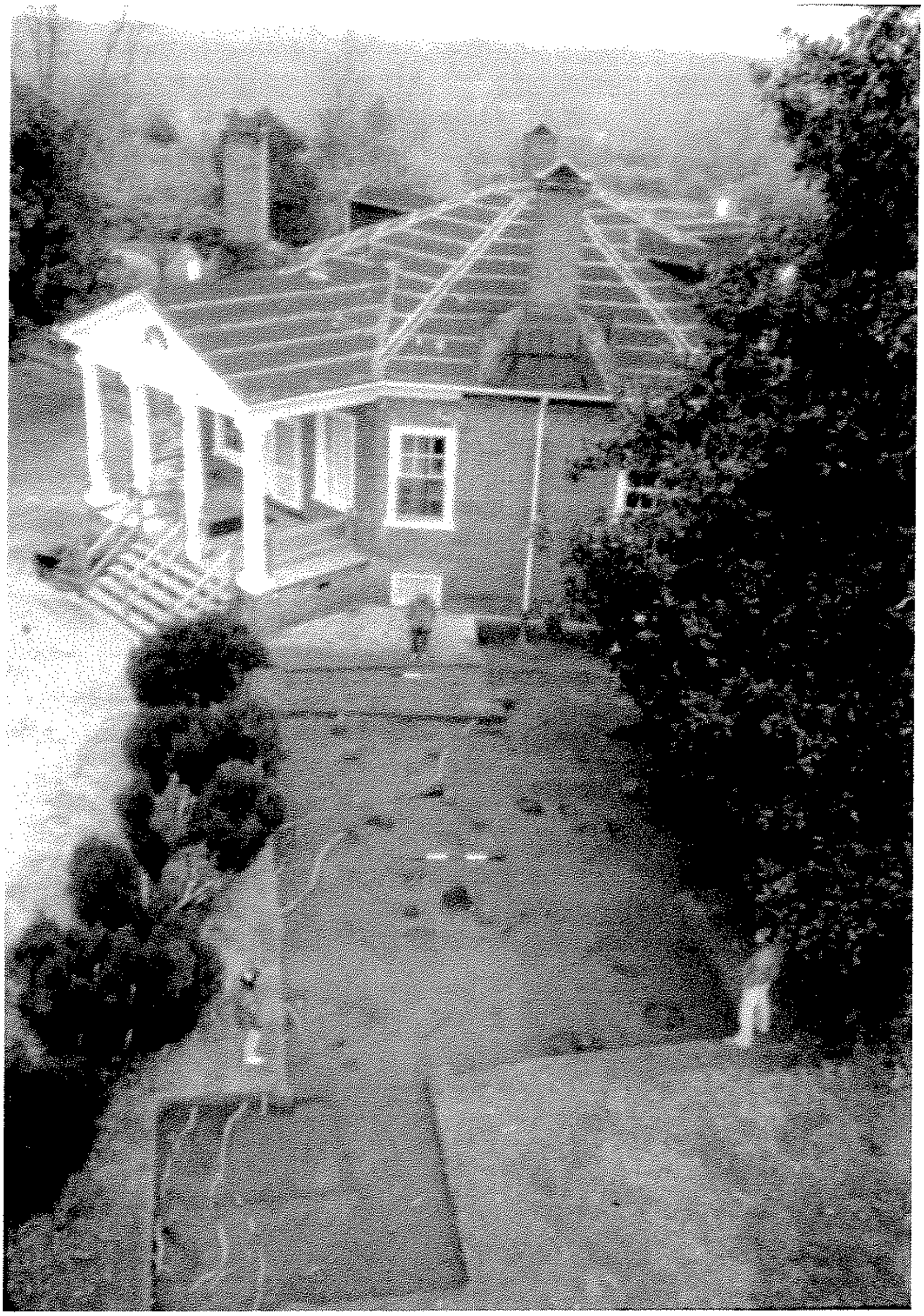


FIGURE 6: 1993 photograph of the Northwest oval bed and planting clump excavations, Southeast aspect. The remains of the clump were primarily planting holes, while the oval bed was delineated by an oval-shaped depression filled with charcoal and Jefferson-period artifacts. Approximately 1/3rd of the oval bed was left intact for future research.

FIGURE 7: Excavation map of Northwest oval bed and clump excavations (see Figure 6).

and, with the exception of the clump and oval bed excavations, were not been able to provide the large-scale plan view information necessary for an exacting reconstruction of the design. The 1998-1999 south lawn landscape project was designed as a test of the level of detail we could ascertain about the landscape design through a multidisciplinary approach to landscape data recovery.

A theme expressed repeatedly in methodological discussions of landscape archaeology is the necessity to use large-scale excavations to discern large scale landscape features (Gleason 1994; Kelso 1990; Miller Yentch, Piperno, and Paca 1990; Yentch and Kratzer 1994). To this end, the equivalent of 75 10 x 10 ft units were hand excavated in the core area during the 1998-1999 field seasons (Figure 8). Landscape features are often visible only as very subtle changes in soil color or texture. Root stains or large planting holes may not be recognized through the relatively small window of a 3 ft or 5 ft square test unit. In addition, larger features such as terraces, garden beds, or buried walking paths may only become apparent when viewed across a broad area. For these reasons, the field strategy chosen for the south lawn excavations concentrated initially on a single large block excavation, and extended to the opening of large blocks in other areas as research questions arose. The shape of the initial excavation was also determined based in part on sampling recommendations made by Dr. Lisa Kealhofer, who has served as a phytolith consultant on this project.

Previous efforts to analyze phytoliths from Poplar Forest archaeological contexts were inconclusive, hindered by the field strategy for collection of samples recommended by former consultant Dr. Irwin Rovner. Individual samples were taken from locations where plantings referenced in surviving documents had been confirmed archaeologically, but this method did not provide the analyst with a means of comparing phytolith concentrations spatially to surrounding areas. Thus, the raw counts of phytoliths from each isolated location were not meaningful since the individual numbers of particular phytoliths per sample could not be compared to other samples from that same area. Kealhofer recommended that for phytolith analysis to have the greatest chance for success, the preferred methodology would be to obtain numerous samples from the same area, collected at regular intervals to facilitate distributional analysis.

DESCRIPTION OF EXCAVATION

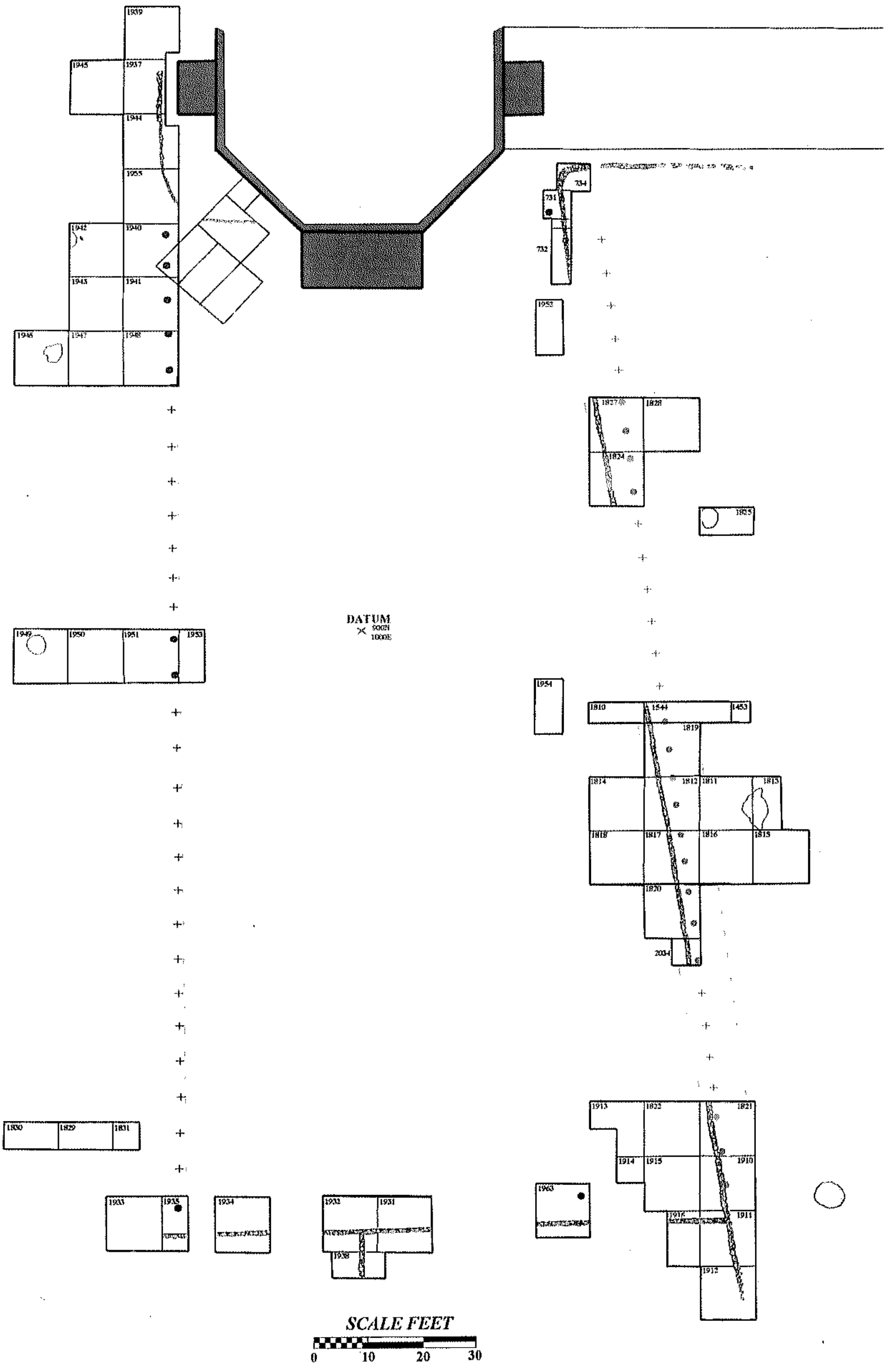
East Terrace Bank

Excavations on the east terrace bank were conducted during the 1998 and early 1999 field seasons. Initially, a 40 ft. x 40 ft. cross shape was chosen for our main block excavation in the center of the bank. Archaeologists collected phytolith, pollen and soil chemical samples from every 5 ft. x 5 ft. quadrant during excavation. After this block excavation was complete, staff explored two other areas to confirm that the northern and southern ends of the bank were comparable to the central excavation area. The location of the east terrace bank units are shown in Figure 8, with photographs of excavation in Figures 10 and 11. Three 10 ft. x 10 ft. units were excavated along the bank at the northern end of the terrace, and eight 10 ft. x 10 ft. units on the southern end. All units were divided into 5ft. x 5ft. quadrants. All units were excavated stratigraphically. Three 150 cu. centimeter soil samples (for pollen, phytolith, and soil chemical analysis) were collected from each stratigraphic layer within each quad. These three soil samples were also taken from each sealed and dated Jefferson era feature excavated. In addition, several one liter soil samples for flotation were taken from selected planting holes, as well as from the soil matrix of the French drains.

Intact stratigraphy was discovered on the east terrace bank. The survival of this original Jefferson-era soil was unusual for the core area, as massive grading and possibly some plowing have destroyed most of the original stratigraphy in the core area. The intact east bank resulted from the protection provided by several modern filling episodes, and possibly by Kentucky Coffee trees forming a barrier to grading. The fill soil altered the topography of the bank from the canted underlying Jefferson era shape, to the more north-south oriented bank that appears today. The intact soil from the ornamental landscape period on the bank facilitated microbotanical analysis of sealed contexts, allowed depositional events and destruction episodes to be accurately dated, and revealed how the south lawn topography has been altered through time.

Modern topsoil sealed a 1940-1950 era fill layer of re-deposited red clay subsoil containing pockets of mottled brown loam. A 1989 interview with James O. Watts may explain this fill layer, as he describes excavating the sunken lawn after he bought the property in 1946 approximately 1 foot in depth to improve the drainage of the house (Chambers 1993:206). It is likely that the uppermost fill layer on the terrace represents soil originating from the sunken lawn and re-deposited on the terrace during this episode. A broad range of materials dating from Jefferson's ownership of the property up through the mid 20^{th} -century were present. The fill contained a significant number of Jefferson-period artifacts, including hand-painted overglaze Chinese export porcelain teawares, as well as pearlware, buttons, hand-blown and hand-finished green bottle glass, and wrought nails. The destruction hole from one of the Kentucky Coffee trees, that appear along the top of the terraces in historic photographs of

FIGURE 8: Map of South lawn excavation units.



KEY

- South Lawn Excavation Units
- French Drain
- 1812 Plan Planting Holes
- Estimated 1812 Planting Locations
- 1814-1815 Planting Holes
- Estimated 1814-1815 Planting Locations
- Jefferson era Terrace Banks
- Kentucky Coffee Locations

FIGURE 9:
Aerial photograph of Poplar Forest with excavation units superimposed. A total of 32,500 square feet of the central 3 acres surrounding the house have been excavated, equalling 26 % of the total area, a level of coverage rarely achieved in landscape studies.

Poplar Forest was also found in unit ER 1811. The materials in this root hole dated the removal of the stump to around 1950, but the destruction caused by its removal was so complete that no intact stratigraphy was left to help date the age of the tree.

Beneath the 1940s layer was another fill layer, dating to the 1910s. The matrix consisted of re-deposited red clay subsoil with pockets of reddish brown clayey-loam and a higher percentage of weathered greenstone (a native schist) than in the 1940s fill layer above. The greenstone fragments were ochre-yellow in color, while the pockets of brown loam were so distinct that they were often mistaken for features. These pockets probably represent re-deposited topsoil, or even torn-up sod that rotted in place. An intact Coca-Cola bottle was found in this fill, manufactured in Roanoke, VA between 1911 and 1916 (Heather Olson, Internet Research). Due to its brief manufacturing run and the fact that it was intact, indicating use and disposal at the time of the filling episode, this item probably dates the placement of this fill layer as well as any artifact found. Along with a wide mix of early 20th to mid 19th- century artifacts, some Jefferson-era artifacts were also present in this soil.

Below the 1910s fill layer was a layer of primary deposition dating from approximately 1830 to 1900. The brown color and loamy texture of this layer was strikingly different from all the other predominantly red clay soil layers in this column. This soil was described in the field as "1850s garden loam" to denote the fact that the artifact types within it seemed to cluster around the mid-19th century and to reflect the distinctive texture and color of the soil. The artifact assemblage contained typical domestic household and architectural refuse. The majority of artifacts are from the second and third quarters of the 19th century, though a small number are from the late 19th century. The artifact dates appear to indicate that the soil surface was open during this period of time, and that the layer is the result of primary deposition starting in the 1830s or 1840s, and continuing through most of the 19th century. Undecorated, transfer-printed, and flow-blue whitewares predominated, along with gray salt-glazed stoneware and porcelain. Machine-cut nails and hand-blown to early mold-blown green bottle glass were also present, along with fragments of medicine bottle glass and window glass.

The mid- to late 19th-century layer sealed the Jefferson-era soil layer across the terrace. This layer was very thin, and was generally only 0.1 to 0.15 ft in depth before turning into sterile subsoil. In fact, the Jefferson layer appeared to be nearly identical to the red clay subsoil, except that it contained Jefferson period artifacts and a slight but regular charcoal flecking similar to that found in the 19th century primary deposition layer above. The Jefferson-period soil layer sealed a precisely aligned row of planting holes filled with charcoal and a French drain, both of which will be discussed in detail in the excavation results section of this chapter. It is believed that the east terrace bank was reworked, and the planting holes and French drain were all constructed sometime around 1814-1815, roughly contemporary with work on the wing of offices (see Sunken Lawn Designs section, this chapter). The Jefferson period soil layer, sealed by the 1830-1900 layer of primary deposition, appears to have been formed almost exclusively from churned subsoil that comprised the ground surface following the 1807-1808 excavation of the South Lawn.

West Terrace Bank

The west terrace bank was examined archaeologically during the 1999 field season. A total of twelve 10 ft. x 10 ft. units were hand excavated along the west bank in a 70 ft. x 30 ft. L-shaped block excavation on the northern portion of the bank adjacent to the main house. A second 10 ft. x 35 ft, block was opened on thee central bank to confirm findings from the northern block and to reveal the stratigraphy north to south along the bank. These excavations are shown in Figures 12 and 13.

The excavation showed two general stratigraphic sequences. The area adjacent to the house contained the first sequence, and was heavily disturbed by grading and utility lines which cut through the soil in this area in large numbers. Several thin, modern layers of construction debris were scattered throughout this area, dating to the renovation of the house in the 1980s and 1990s. These overlaid fill soil, likely related to the grading activities which took place in the late 1940s during the Watts ownership. Below this layer was fill soil dating to the turn of the 20th-century, though in some places the 1940s era grading cut away this layer. Below the 1890-1910 era fill was undisturbed subsoil. It should be noted that each of these temporal layers contained micro-layers of fill of different colors and textures in several places. In the field, these were excavated as separate layers but subsequent artifact analysis showed them to be temporally congruent, and they are thus grouped together in the stratigraphic sequence. The color and texture differences in the soil may have been the result of different loads of fill soil from different areas being dumped during the same time period.

Further south, a second stratigraphic sequence became apparent. Beginning in Unit 1940 and running south, the utility lines were less frequent, though grading destroyed the original stratigraphy for the length of the bank. On the tops of the terraces, a grading or plowing episode in the mid to late 19th century overlaid subsoil for the entire length of the terrace, and this soil layer appears to continue into the northwest and southwest quarters of the core area within the present circular road. The terrace bank and lawn contained a thin layer of fill soil with 1950 era artifacts. This layer overlaid subsoil. The entire area showed evidence of the massive grading in and around the south lawn, and no intact Jefferson era soil layer was present. Only four extant Jefferson-era features were found to

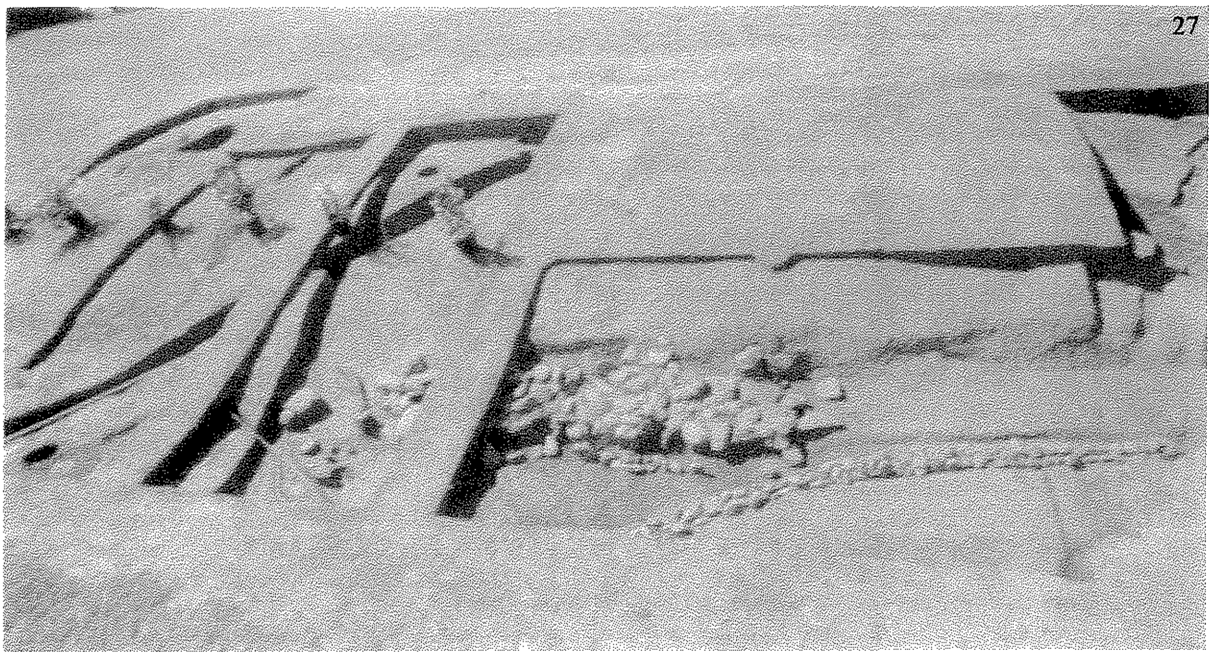


FIGURE 12: Photograph of West bank showing curved French drain, and unidentified rock feature resting against bank. The shrubs on the left of the photo were placed to indicate where a planting row symmetrical with the one identified on the east bank would have been located. Because this platning was never executed, the location of these shrubs is conjectural.

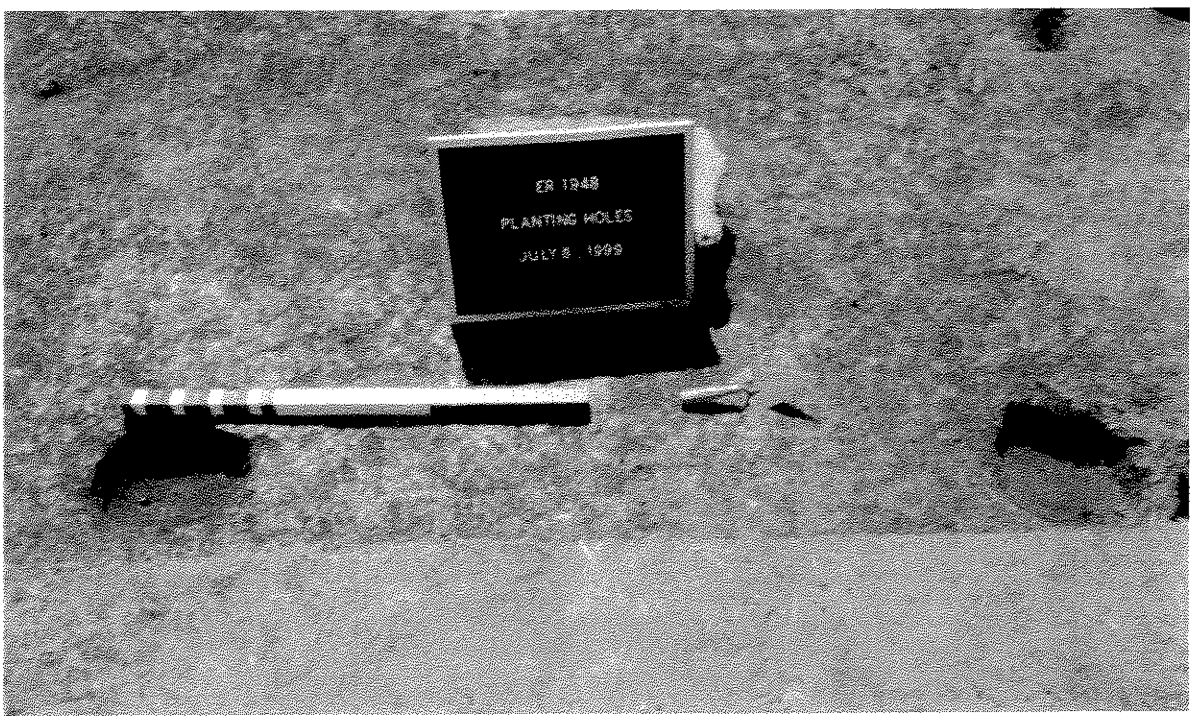


Figure 13: Close-up of planting holes located at the base of the west bank. These features were nearly destroyed by subsequent grading of the lawn and bank, and only the lower 20-30 percent of the original holes were intact. The planting holes contained dense charcoal flecking and Jefferson-era artifacts.

have escaped these earth moving activities; a curved French drain, an amorphous rock feature lying against the subsoil of the back, several planting holes nearly cut to the base, and a portion of the original foundation cut bank.

The curved drain is shown in Figure 12, and appears to have been modified from an earlier straight drain. From directly west of the west stair pavilion, the drain ran south for approximately 9 feet before curving to the east. A ghost trench running due south into unit 1940 from the start of the curving section appears to have been an earlier robbed drain path. Because no evidence of a ghost trench or drain exists beyond unit 1940, it is probable that the southern section was never finished beyond this point. Instead, it is likely that the path of the drain was changed to direct water to the planting clump located at the angle of the house. Only the sides and base of the drain were in primary context, and the soil directly overlaying the top of the drain was a modern deposit, attesting to the grading which took place in this area. The soil from the sides and fill of the drain yielded artifacts with a mean ceramic date of 1811 (Olson, Artifact section of this report). An interesting detail of this drain was the use of curved column bricks for a small section due west of the west stair tower. Four pairs of column bricks were lain side by side to form a channel between the bricks (Figure 14). This section was capped with flat fieldstones formed of sedimentary greenstone schist. Due to the proximity of this drain to the outlet for an indoor privy, it is possible that the drain was directing not only water, but nutrients in the form of human excretion into the planting clump.

An irregular rock feature was uncovered in units 1944, 1945, and 1940 (Figure 12). Comprised mainly of medium sized fieldstones of greenstone schist, the mostly flat stones were roughly stacked on one another against the side of the undisturbed subsoil bank. The soil between the stones contained Jefferson era artifacts including several large chunks of hand-blown green wine bottle glass, pearlware, and creamware. The top of the feature was covered with modern disturbance fill soil, and several of the stones had been pulled out of place into the overlaying fill soil by grading activity. No specific purpose for this feature could be determined. It was considered that this feature may have once formed stairs, but this possibility was rejected based on the irregularity of the feature and the random placement of rocks. Due to the fact that the stones appear to match the fieldstones in the cellar of the house in color, texture, and material, it was hypothesized that the rocks may be construction debris. It is possible that this feature is related to an order by Jefferson to collect construction debris lying around the house (TJ to Chisolm, September 8, 1808; MHS6)

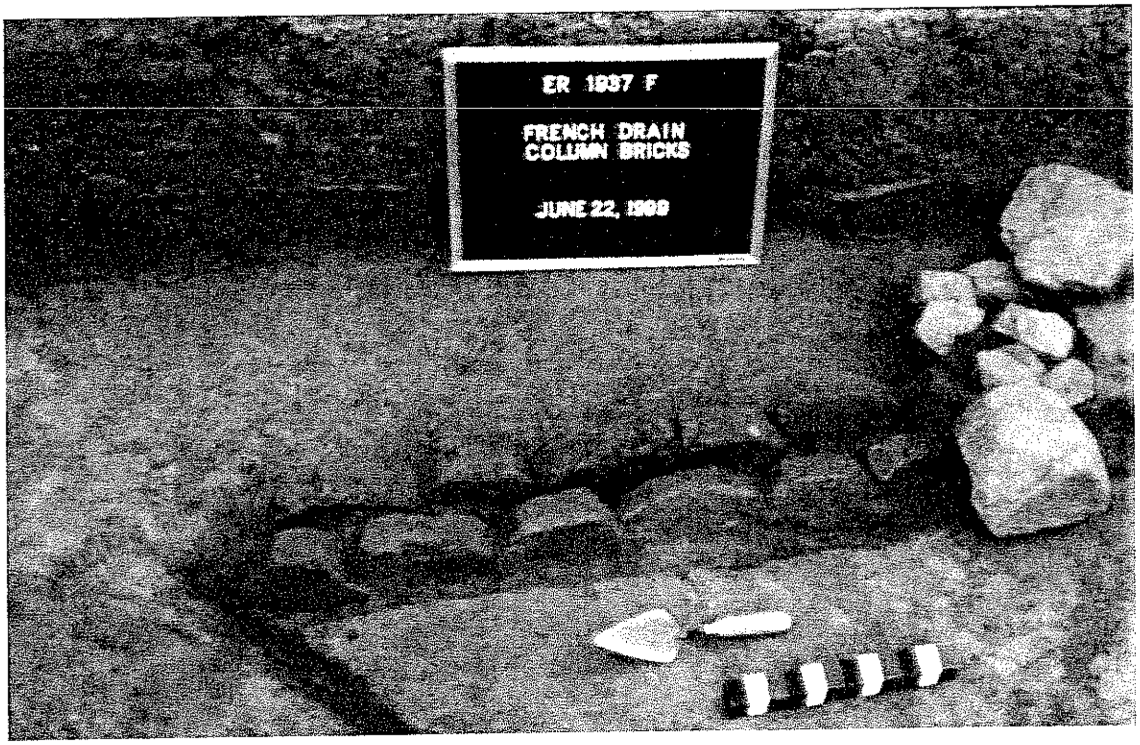


FIGURE 14: Close-up of brick drain on West terrace bank, with cap-stones removed. Note the original foundation cut bank into subsoil, behind drain..

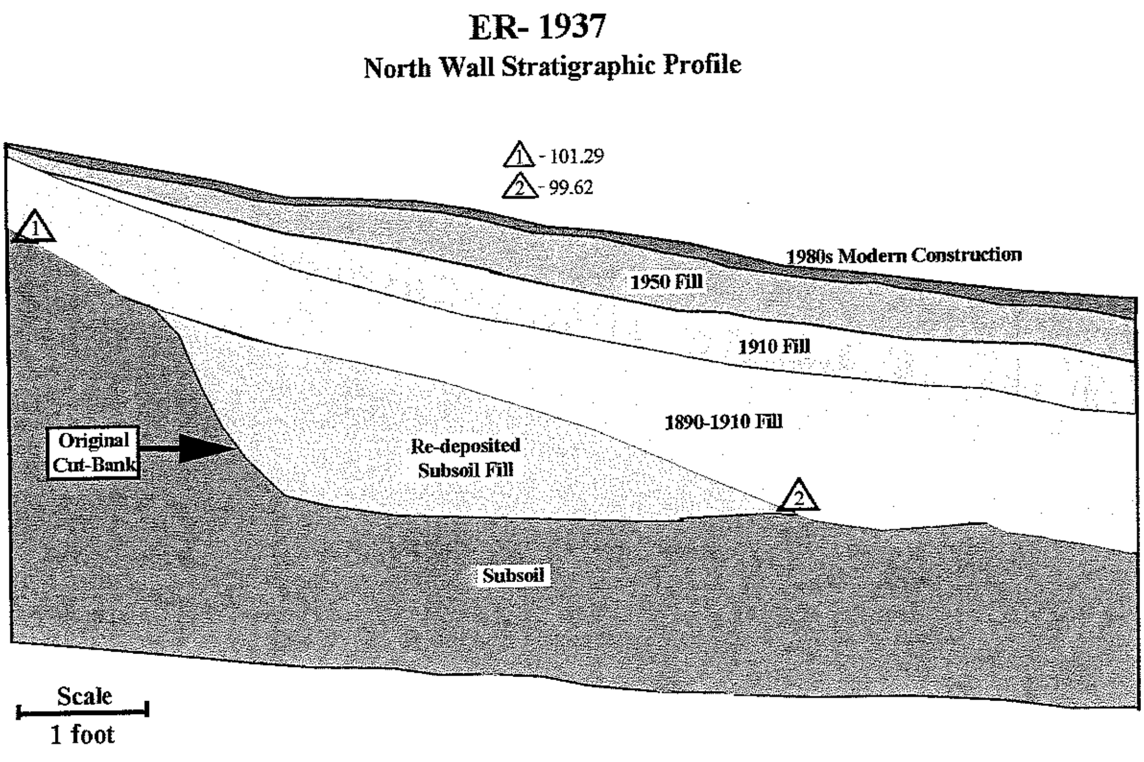


FIGURE 15: West bank stratigraphic profile looking north,directly adjacent to west stair pavilion. Sterile, re-deposited subsoil fill overlayed original foundation cut. Triangle markers indicate relative elevation in feet.

Though the utility lines and modern construction and grading destroyed much in this area, an interesting stratigraphic feature revealed during excavation may be related to the construction of the foundation of the house. A layer of sterile subsoil fill was uncovered in units 1939, 1937, and 1944 overlaying undisturbed subsoil. Though no artifacts were found in the fill to date the time of deposition, the shape of the cut into the underlying subsoil suggests that this is the original foundation cut bank, illustrated in Figure 15. A nearly identical cut into subsoil, also interpreted as an original foundation cut, was located in unit 953 during the 1993 field season on the northeast side of the house. The re-deposited subsoil fill overlaying the cut in units 1939, 1937 and 1944 may have been placed there immediately after construction to stabilize the bank, since this cut would have formed a rather sharp slope that would have been subject to erosion.

Finally, the bases of four charcoal-filled planting holes were found in units 1940, 1941, and 1948. These features were only0.2 to 0.3 ft in depth with the tops completely graded away, and were spaced 5.5 to 5.8 feet apart on center (Figure 12). Artifacts within the matrix were all Jefferson-era, with pearlware, bone china, wrought nails, and green wine bottle glass. The width of these planting holes, and the charcoal/clay matrix, were nearly identical to those located on the east bank. If they were also once the same depth as those on the east bank, then 70 to 80 percent of the original planting hole has been graded away, which explains why no intact Jefferson-period soil layer has been found in this area. Unlike the planting holes on the east bank, which canted outwards from the north-south orientation of the house at a 9 degree angle, the west bank planting holes were aligned north-south with the house. The features were all 35 feet from the centerline of the lawn and were aligned with the west wall of the west stair tower. The bases of two other planting holes in this row were located in units 1951 and 1953, confirming that this was once a contiguous planting row stretching the length of the lawn. Documentary evidence and archaeological data indicates that this planting row bounded the first sunken lawn design, circa 1812 (see Sunken Lawn Designs section, this chapter). A potential final planting hole in this row was located in unit 1934. This feature was the same size and was aligned perfectly with the other features in the planting row, but no charcoal or dateable artifacts were found in the soil matrix. Two possible matching planting hole features on the other side of the lawn were found during exavation in units 732 and 1984, also exactly 35 ft. from the centerline of the lawn. Unfortunately, there was so little remaining of each of these features due to the grading of the lawn that no artifacts were found, and they can not be positively dated. If these features were indeed part of a matching planting row which once existed on the east side of the lawn, the two rows would have

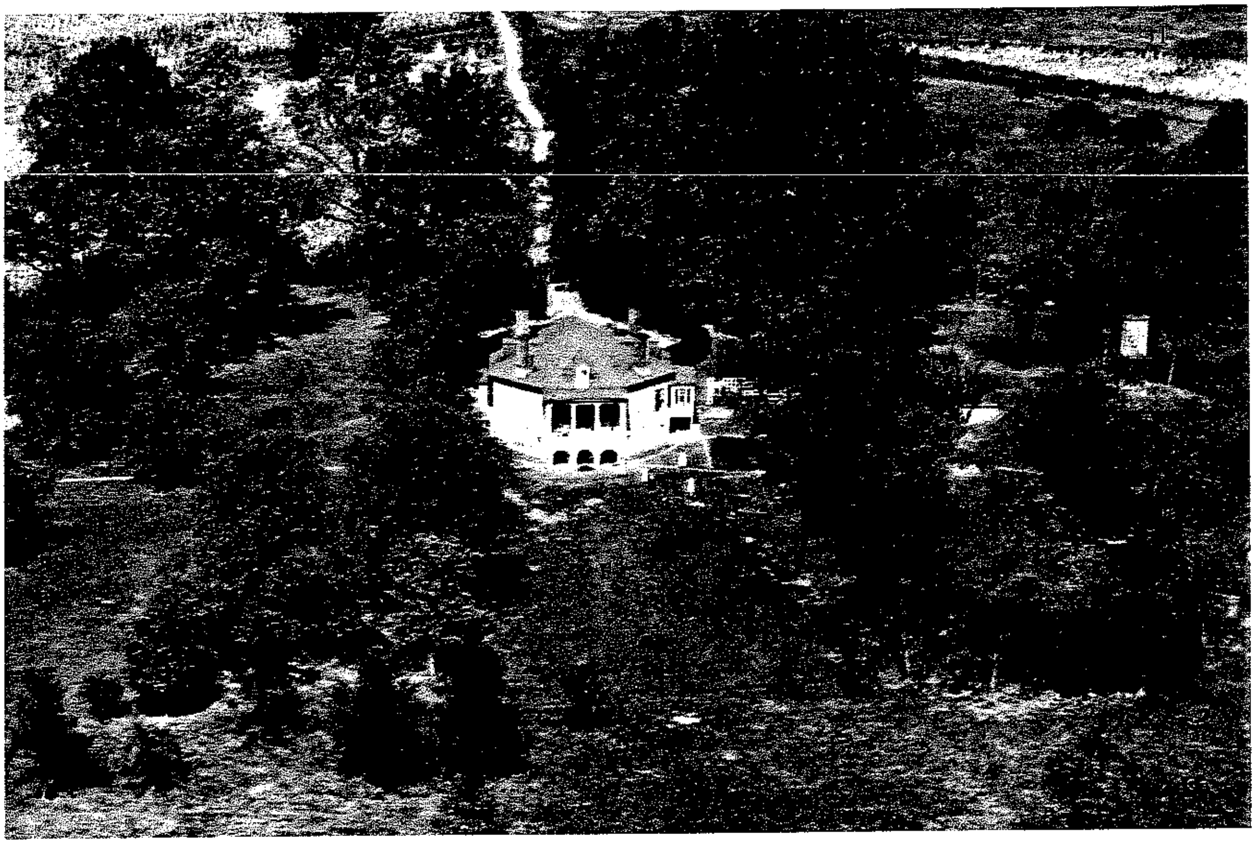


FIGURE 16: 1927 aerial photograph of Poplar Forest looking North. Note the size of the Kentucky coffee trees lining the banks of the south lawn relative to the Jefferson-era trees present in the North core area (Poplar Forest archives).

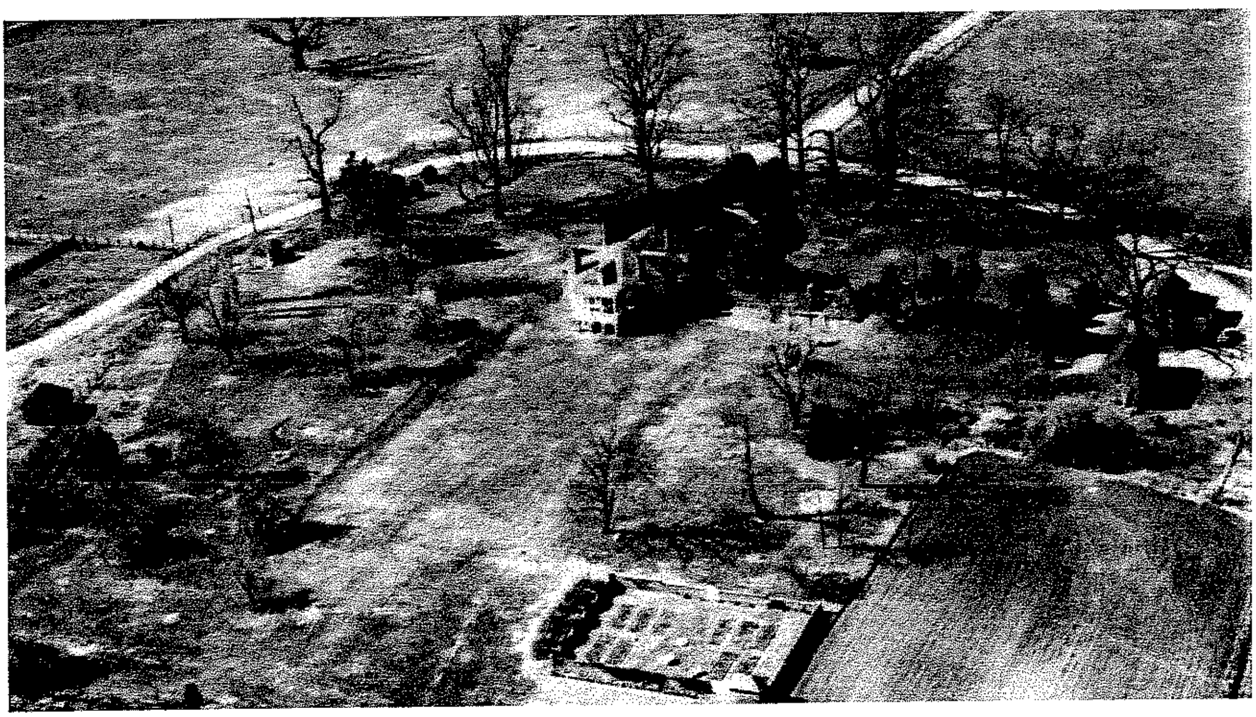


FIGURE 17: 1955 aerial photograph of Poplar Forest looking Northwest. The Kentucky coffee trees lining the lawn are absent by this time. The thin ridge of soil atop the West bank may be a product of the grading of this area evident during excavation (Poplar Forest archives).

bounded the sunken lawn 70 feet apart. Figures 16 and 17 are historic aerial photographs of the core area. Note the presence of the Kentucky coffee trees lining the lawn in the earlier photo, and the apparent line of grading on the west back in the later photo.

Central Drain Re-excavation

The French drain at the base of the east terrace bank was first discovered along the south side of the wing of offices during the 1990-1991 excavations (Strutt, 1993); Heath, 1994). The drain runs along the south side of the wing, turns south approximately 15 feet south of the east stair pavilion, then runs south at a 9 degree angle from the house along the base of the east terrace. In the southern excavation area of the east terrace bank, it was discovered that the drain forms a T, and a portion runs west across the center of the lawn. This portion of drain was partially exposed during excavations of the garden area in 1993, 1994, and 1995, and at that time was thought to date to the mid-19th century due to the presence of 2 fragments of whiteware resting on the top of the drain (Strutt, 1997).

Several facts indicated that it might be a good idea to re-excavate the southern portion of this drain and examine the artifact dates more closely. First, the north-south drain at the base of the east terrace bank yielded artifact types that placed it very solidly in the Jefferson era. Since this drain connects with the east-west central lawn drain, it appeared incongruous to have two connecting drains separated temporally by 30 years. Second, the east-west drain was located in a garden area that was heavily disturbed during the mid 19th-century. Because this disturbance extended down to the top of the drain, it seemed reasonable to consider that the whiteware found on the tops of the drains might date the disturbance episode, not the drain construction. Finally, the previous excavations were ceased at the top of the drain when the tops of the rocks started to show through. A more complete excavation of the soil surrounding the east-west drain seemed to offer a better chance of yielding artifacts dating to the construction or use period of the drain, and would be less likely to be affected by the Hutter garden disturbance.

Seven excavation units were placed across the east-west drain, and the overlying fill soil was removed (Figure 18). Below the previously excavated soil, the stratigraphy consisted only of mid 19th-century garden disturbance overlaying subsoil. Excavation of the drain yielded Jefferson-era artifacts within the soil matrix surrounding and underlying the drain. While several fragments of whiteware were recovered from the top of the drain in disturbed context, no mid 19th-century artifacts were recovered in drain fill. These data suggest the entire drain system was constructed during Jefferson's ownership of the property, including the wing drain, the east bank drain, and the central lawn

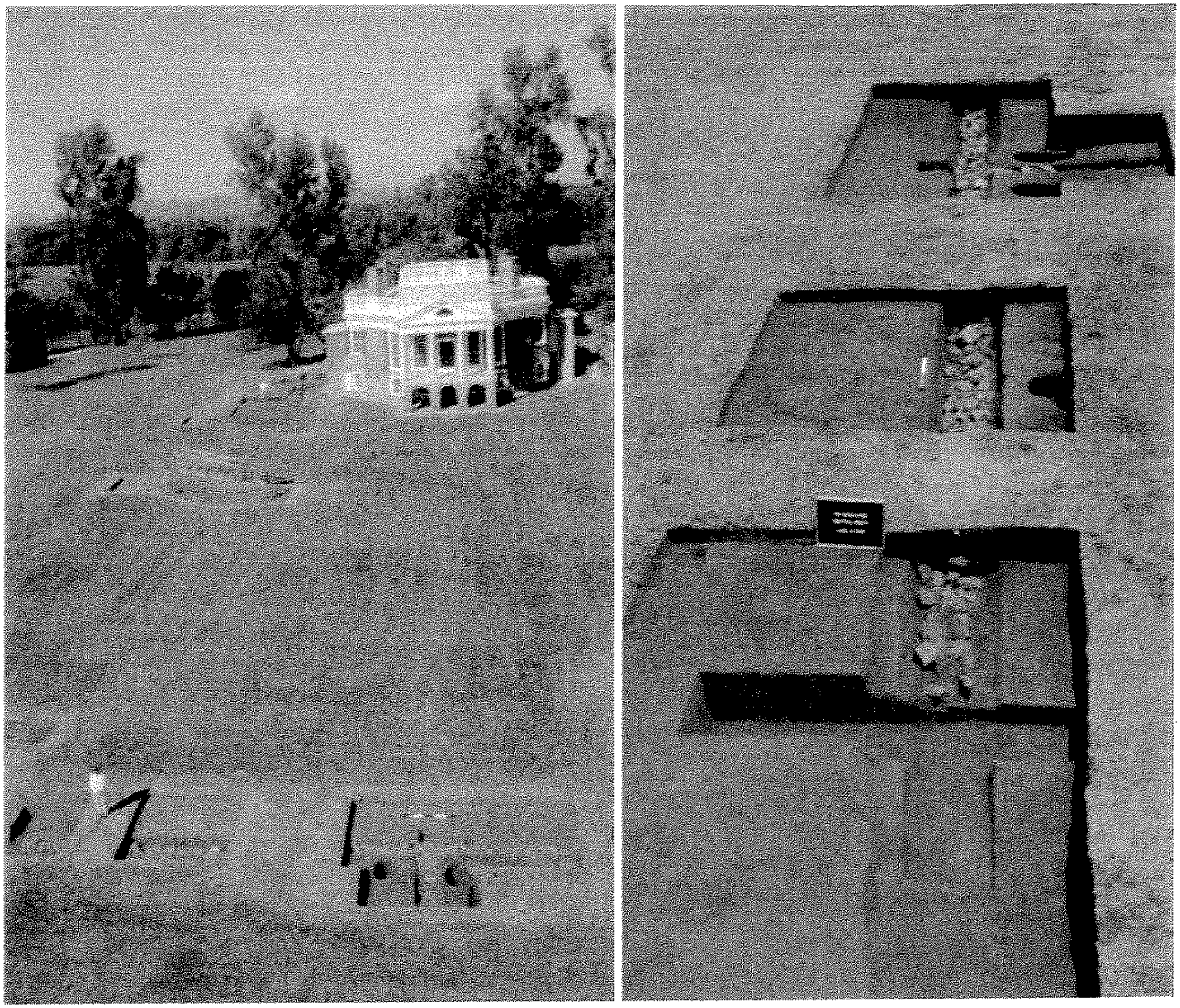


FIGURE 18: Two views of the central lawn drain. The left image shows the relation of the drain to the house, looking North. The right image shows the central drain T, looking east. The squared- off excavations at the end of the drain in the foreground of the right-hand image were sections dug into subsoil to ensure that the drain actually ended in this location, since this drain ends abruptly near the west bank in a position where it would not drain any appreciable area. The existance of this apparently non-functional drain appears to anticipate future construction, and indicates that Jefferson eventually intended to cut back the West terrace bank to match the East terrace shape created circa 1814. If the West bank was cut back, the central drain would have already been in place to connect with the requisite drain at the base of the West terrace. This work was never completed, leaving the south lawn asymmetrical for the duration of Jefferson's ownership.

Drain running east-west. The central lawn drain ended near the west bank, at 35 feet from the center of the lawn. The fact that the west bank planting holes are aligned north-south with this spot is intriguing, and is discussed in the topography and design section of this report. An important final detail of the east-west drain is that it is not aligned perfectly with the orientation of the house. The drain runs east to west at a 268.5 degree angle, and is consequently 1.5 degrees off from a perpendicular alignment with the orientation of the house.

DISCUSSION OF FEATURES

French Drains

A book Jefferson owned, *New Principles of Gardening* by Batty Langley, described the function and construction of a drain:

> When cold or clay lands are troubled with Water, dig drains to convey it away, with a descent, that the water may pass; and instead of Arches &ct. of Brick Work, fill them up six or eight inches with large stones, and over them lay small brush green-wood, and thereon the Mold. Those drains so made will convey away the Water, and drain the lands as desired. (Langley, 1927:33)

As discussed in the previous section, an extensive system of drains was uncovered during excavation. The system started on the south side of the wing of offices, with a drain running west to a point 15 feet south of the east stair pavillion. At this point the drain curved south and ran along the base of the east terrace bank, canted outwards from the orientation of the house at 9 degrees. The wing and east terrace bank drains were roughly the same size, and typically measured 1 ft wide by 0.8 ft deep. A small ditch was initially dug, then filled with rounded cobbles to channel the drainage of excess water, much in the manner Langley describes. Drainage was achieved by laying two parallelrows of cobbles with a channel between them and was capped with a third row of cobbles. At a point 185 feet from the south wall of the house, a T was constructed. The southward running section of the T continued along the same line as the rest of the east bank drain, ending 200 feet from the south wall. However, this is the area of the Hutter garden disturbance, and it is likely this garden, and possibly a water line running east to west in this spot, may have truncated the final few feet of the drain. The westward running section from the T ran across the lawn at 268.5 degrees from the north orientation of the house. This portion of drain is slightly larger than the east bank and wing drains. It typically measures 1.2 to 1.4 feet in width, and was 1.1 to 1.4 feet deep. This section appears to have been built differently than the "cobble channel" east bank drain, with larger and smaller rocks mounded together. This drain may also have once been capped with clay, though evidence of this was mostly destroyed by the Hutter garden disturbance. As noted earlier, this drain section is 1.5 degrees off of a perfect perpendicular alignment with the house. At the center of the lawn, the east-west drain forms another T. The southward leg of the T runs due south 185 feet from this point. The westward leg of the T runs another 35 feet to the west, ending in alignment with the west bank planting row.

Several design aspects are of interest. The entire system was designed to channel water to the south, away from the wing, house, and sunken lawn, and laser transit measurements of the absolute elevation of the drain confirm the direction of drainage. Along the slope of the terrace bank, the planting row was created before the French drain system was put in place since the last two planting holes in the row were actually cut by the drain trench. When comparing the east bank drain with the central lawn drain, the different sizes of the drains, and the seemingly mismatched rock sizes, suggest the possibility that the drain sections represent two different, but temporally close building episodes.

It is possible that along with controlling drainage close to the house, the drain system could have channeled water to the Jefferson-era garden hypothesized to be south of the sunken lawn. While the drain was operating, it clearly would have directed water to this area. However, given the thickness of the clay soils surrounding the southern drain, water would probably not have traveled more than a few feet east or west of the drain in this area. Unless deliberate drain channels were built from the central drain east and west into the garden, only the planting rows directly adjacent to the drain would have received any benefit from the water. Because no such channels were found during excavation, it appears likely that the drain was not deliberately designed to "water the garden", but instead functioned to carry water through, and away from the core area. Future excavations in the garden area may reveal the need to modify this interpretation.

Some of the ceramics found in the east bank French drain cross-mended to pieces from the terrace slope above, indicating that while in use, the top of the drain was left open to better conduct water. It unknown how long the drains would have continued in use after their construction. The possibility that they continued to function for some time after Jefferson's death should not be discounted. Phytolith analysis suggests that the terrace banks were covered with grasses as well as (presumably) the ornamental shrubs asked for by Jefferson, and it is possible that the grassy ground cover would have slowed the silting-in process. In addition, it is not known whether the drains would have been cleaned of accumulated silt periodically. The useful life-span of a French drain, given the particular ground cover, topography, and clay soil texture present on the south lawn at Poplar Forest, is another subject that will require further research, as will the subject of how these drains were maintained historically.

Planting Holes

The east and west terrace banks each contained a row of regularly spaced planting holes. The west bank planting holes typically measured 1 foot in diameter, but the original depth was impossible to determine as they were nearly cut to base by modern grading. Only 0.2 to 0.3 feet of the original planting holes remained, though it is likely that they were about 1 foot deep, given their similarity to the intact east bank planting holes. Filled with charcoal, each planting hole contained artifacts dateable to Jefferson's ownership of the property. The west bank planting row was aligned with the west wall of the west stair pavilion and ran north to south, beginning . The planting holes were spaced between 5.5 to 5.8 feet apart, and the planting row formed by these features was 35 feet from the lawn center. The planting row is visible in the excavation area adjacent to the house, and in the excavation area in the central portion of the west bank. On the southern end, Unit 1834 produced a ghost outline of the base of a round feature in the exact spot where the planting row should have been. Unfortunately not enough of this feature was left to unquestionably identify it as the last planting hole in the row. It appears that the grading of the south lawn was deep enough in this area to have destroyed nearly all of the southern end of the planting row.

The east bank planting holes sealed beneath the Jefferson-era soil layer on the terrace bank were completely intact features. They were filled with large amounts of charcoal, starting about 1 to 2 tenths below subsoil. The charcoal indicated the depth, breadth, and base of each hole very clearly during excavation. Excavation revealed that the planting holes were uniform in size, about 1 ft wide x 1 ft deep. On the east bank, the planting holes were precisely aligned with each other along the east terrace bank, forming a line that canted outward at approximately 8.5 to 9 degrees from the orientation of the house. These features were not exactly aligned with the base of the sunken lawn, which cants outwards at 9.5 degrees. The planting holes were about three feet above the French drain (and hence the base level of the sunken lawn) in Units 1824 and 1827, near the house. However, in ER-1910, approximately 170 feet from the South Portico, the french drain actually cuts the last two planting holes uncovered. Given the consistent artifact dates and the careful, measured way these plantings were executed, these features were clearly part of Jefferson's implemented design despite the fact that they do not align with the west bank plantings.

The soil within each planting hole contained important archaeological data. Like the west bank, the planting holes each contained several artifacts, including green bottle glass, nails, and many dateble ceramic types and patterns. The presence of these artifacts may be explained by period gardening practices, as Langley recommended "Rubbish of Buildings is very good for the Roots of Trees in cold (clay) land" (Langley, 1727:32). Soil chemical analysis indicated that kitchen compost was being added to the planting holes and Jefferson soil layer. In addition, the charcoal within the planting holes that was evident during excavation also indicated an attempt at fertilizaion, a fact also indicated by the soil chemical analysis (see Chapter 6). Finally, soil samples from each planting hole were taken for microbotanical analysis of pollen and opal phytoliths (see Chapter 5)

Topography

Topographical data and site stratigraphy showed that primary deposition and modern grading and filling episodes have changed both the topographical form and the plan-view shape of the sunken lawn significantly since Jefferson's time. Stratigraphic data indicate that the lawn would have been a much more subtle landscape feature than it appears today. The fill layers have added up to 1.3 ft in height to the original terrace near the top of the east bank, and the Jefferson lawn surface has been cut away to the extent that, near the house, modern grade is .5 ft below the original lawn level. As today, the original terraces were the highest near the house, and gradually decreased in height to the south. In 1807 instructions, Jefferson gave explicit orders to his mason and craftsman, Hugh Chisolm, for the construction of the sunken lawn. Jefferson writes:

> If you would engage the negroes to dig and remove the earth South of the house, 90 feet wide, down to a foot below the lower floor, and descending from thence due south 1 inch in every 10 ft. till it gets clear of the ground, I would gladly pay them for it (Jefferson to Chisolm, 5 June 1807, Mhi).

The grade Jefferson asked for, 1 vertical inch per 10 horizontal feet, was 0.8333 percent, or 1/12th of a foot per 10 ft. Laser transit measurements of the slope of the french drain, built at the same level as the lawn base, indicated that the original grade of the south lawn was actually nearer to 1 percent, or 1/10th of a foot per 10 ft.. The original slope of the lawn therefore differed less than 1/5^{ths} of 1 percent from Jefferson's orders. This level of exactness in following Jefferson's instructions is an important clue, because the archaeological evidence for the size and shape of the lawn initially appeared to be greatly at odds with Jefferson's instructions for constructing the lawn.

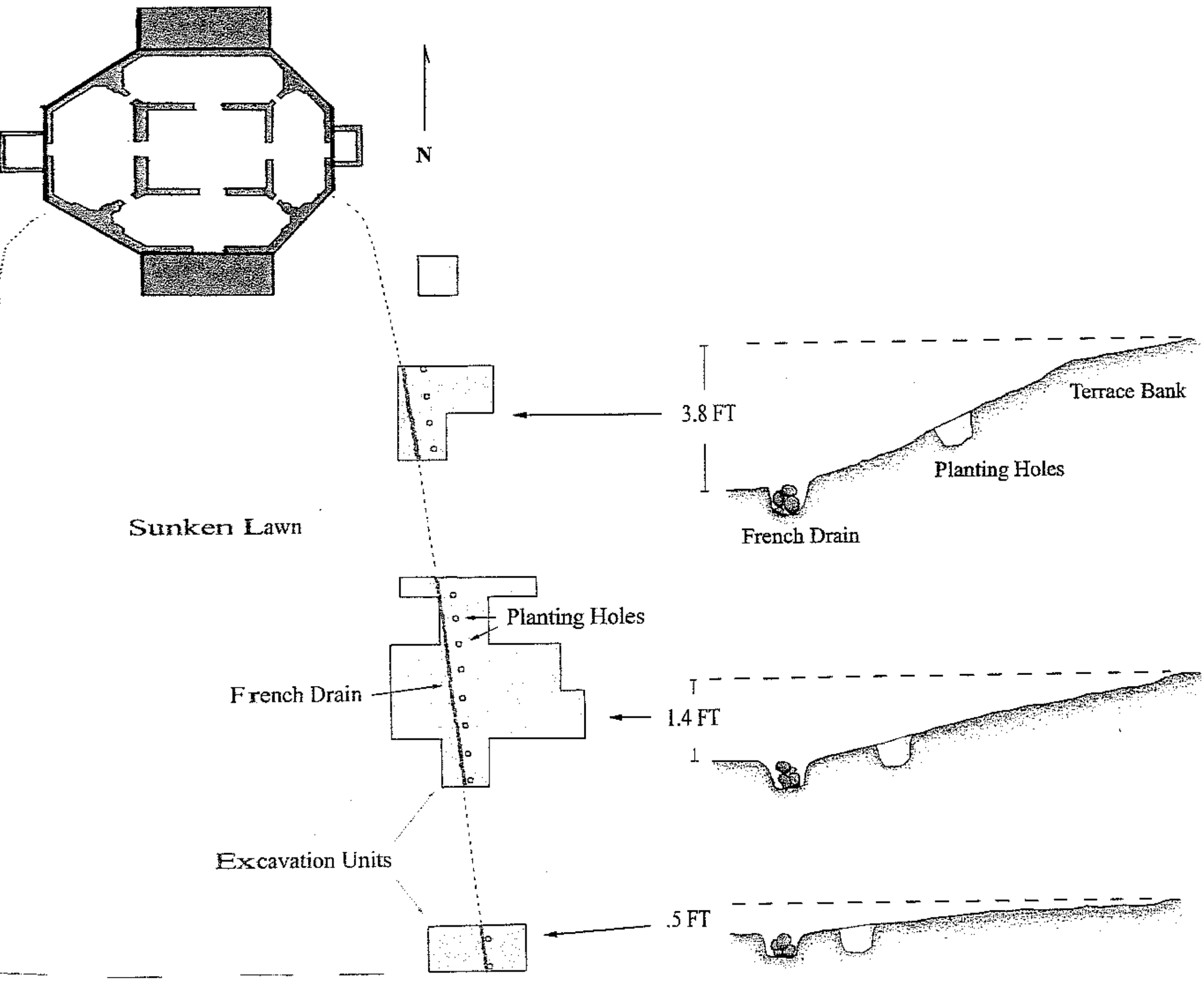


FIGURE 19: Illustration showing original terrace topography of the East bank. The terrace was highest near the house, growing more gradual to the South until it met with natural grade. Basic geometry dictates that a sloped bank with a straight-line base excavated into a naturally declining grade will create a triangluar-shaped plane, known as a *glacis* landscape feature. The position of the planting holes on the terrace bank became closer to the lawn base as the plantings progressed southward, until the last two planting holes were cut by the construction of the French drain. This entire bank was covered with fill soil by subsequent owners, perfectly preserving the original topography and shape.

SUNKEN LAWN DESIGNS

The order to dig the lawn "90 feet wide... and descending from thence due south" appears to dictate a rectangular lawn shape. As noted earlier, however, the east bank terrace was found to have canted outwards from the orientation of the house at a 9 degree angle, plainly not proceeding "due south" and not forming one side of a rectangle. The evidence for this canted shape of the east terrace bank is conclusive, borne out by the artifact dates, planting holes, french drain, and intact Jefferson soil layer, all located along the terrace where modern fill soil has protected the original Jefferson-era features and stratigraphy from disturbance. Discerning the plan of the west bank is slightly more problematic due to the high level of modern disturbance in this area. Nearly half (90 ft) of the 200 foot length of the west bank was excavated to subsoil during this project, and the underlying undisturbed strata of natural soil clearly showed that the terrace bank was never cut back to an angled shape matching the east side. The undisturbed subsoil under the west bank was aligned fairly closely north-south with the house. The remnant Jefferson era planting holes on the west bank comprise a row that is also clearly aligned north-south with the house, thus forming one side of a rectangle. Unfortunately, at just 35 feet from the lawn center, the rectangle formed by two such planting rows would only have been 70 feet wide. Clearly, it is important to establish why such an apparent disparity exists between Jefferson's instruction and the excavation findings.

Three other documentary references are important to this question. Jefferson's June 1807 instructions for the excavation of the lawn are followed by a report from Chisolm more than one year later, in September of 1808. He reports "I still keep fill (Phil Hubbard) at the digging, and give him all the assistance that I possible can, it seem to go on tolerable smooth but slaugh" (Chisolm to TJ, September 4, 1808,Mhi). Three months later in reference to phil Hubbard's work on the sunken lawn, Jefferson's overseer Edmund Bacon writes Jefferson "Chisolm tell me he will (letter torn) digging about the house at bedford" (Bacon to TJ, December 29, 1808, Monticello, UVA6). Though incomplete, this reference makes clear that the excavation of the lawn was not yet complete, and the missing word is likely either "continue" or finish". Either way, one year and six months after Jefferson's 1807 instructions for excavating the sunken lawn, the work was still being done. The final documentary reference to the south lawn is Jefferson's planting memorandum of December 1812, where he writes "plant on each bank, right and left, South of the house, a row of Lilacs, Altheas, Guelder roses, Roses, Calycanthus (Betts 1944:494). The initial excavation of the sunken lawn was clearly finished by this date, and was likely completed several years earlier though no references have survived.

Landscape historian C. Allan Brown interpreted Jefferson's "90 feet wide" order from 1807 as pertaining to the base of the lawn. Brown hypothesized that with five foot banks on either side, the lawn would have formed a 100 foot wide parterre. This hypothesis reflected his belief that Jefferson's landscape design at Poplar Forest required that the measures of all major landscape elements be based on a regular multiple of the 50 ft. x 50 ft. measure of the house (dynamic symmetry). The hypothesis was also influenced by the surface appearance of the extant topography of Poplar Forest, including the south lawn (Brown 1990:126). As discussed earlier, excavation revealed that the surface topography of the sunken lawn has been considerably altered since Jefferson's ownership of the property, with some areas cut away by grading (lawn surface, west terrace) and other areas covered and raised with fill soil (east bank).

The west bank excavations provide the key to understanding Jefferson's 1807 instructions. The row of planting holes uncovered was located 35 feet from the lawn center, and if paired with a corresponding planting row of the east bank, would have formed the boundaries of a parterre roughly 70 ft. wide, depending on how near the base of the slope the shrubs were planted. The undisturbed subsoil underlying the west bank forms a gentle slope roughly ten feet wide, and is a good approximation of the original size of the Jefferson-era slope. It is possible that the grading which took place from the top to the bottom of the slope since Jefferson's time was uneven, altering the shape of the slope. However, the fact that 20-30% of the original 1 foot deep planting holes still exists indicates that differential grading couldn't have changed the measure of the slope more than 1 foot in either direction. If it had, there would be nothing of the original 1 ft deep planting holes left and yet 0.2 to 0.3 ft were found during excavation. Therefore, the original sunken lawn was in fact 90 feet wide- if measured from the <u>tops</u> of the terraces; 70 feet between the planting rows, and 10 feet more for each terrace bank. Jefferson's 1812 planting instructions for "each bank, right and left" refer to the planting holes located archaeologically on the west bank, which are the only remnants of the original south lawn planting scheme, circa 1812, located archaeologically to date.

The east bank plantings, soil layer, and french drain, all clearly indicate that a second design for the sunken lawn had begun to be implemented. In order to construct the wing of offices, considerable excavation into the top of the terrace between the house and the east mound was required. The fact that the base of the wing would have been sitting 2 to 3 feet below grade would have immediately caused drainage problems, necessitating the construction of the wing french drain discussed earlier. The most plausible timetable would date the construction of the wing drain to 1814 or 1815, since it could only have been built during or after the construction of the wing of offices. However, the wing drain runs east to west and directs water towards the basement of the house if it is not connected with the east bank drain, which channels the water away from the house and wing. It is likely that the original east bank shape, a mirror of the west bank and plantings forming a 90 foot wide parterre, was cut back to the canted design found during excavation at the same time that the terrace was being excavated for the foundation for the wing of offices. This would make sense from an organizational standpoint, since the crews, wheelbarrows, tools, etc., would already be on site for the wing excavations. It is also possible that the east terrace was cut back just after the wing was constructed. In either case, the wing would clearly have drainage problems without a drain along its length, and the wing drain couldn't function without connecting to the east terrace bank drain. The construction of the east terrace bank and French drain therefore likely dates to during or immediately after 1814.

It is important to note that the east bank drain trench cuts the final two planting holes on the bank, indicating that this new terrace bank design was replanted prior to the construction of the drain. This means that the east bank planting row was created at least one year after the December of 1812 reference that lists the south lawn shrub types. No documents record what was planted there, but microbotanical evidence suggests that Jefferson utilized the same planting scheme on the new east bank as the one he used on the original banks of the lawn in 1812. Pollen and phytolith analysis of undisturbed east bank soils has shown clear evidence for two of the five shrubs mentioned in the 1812 memorandum (Althea, Rose) and had indicated probable evidence for two others (Guelder Rose, Lilacs). It is therefore likely that the planting scheme utilized on the newly created east terrace bank was the same as that on the older west side planting row (see microbotanical section of this report).

A final clue regarding Jefferson's eventual plans for the design of the sunken lawn is the east to west portion of the French drain that crossed the lawn center. The central lawn drain may have been constructed separately due to the slightly different sizes of the drain and the rocks, and logically would have been the last section to be constructed. However, it is also possible that the entire drain system was built at the same time in a single episode, either during or after the construction of the wing of offices, and that the mismatched rocks in the two drains merely represent loads from different rock sources abutting each other. The drain was constructed as far as the west bank, but terminated in a place that rendered this section essentially useless. The drain appears to anticipate future construction, and indicates Jefferson intended to have the west bank cut back to match the shape of the east bank.

This work was never completed during his lifetime, but it seems highly probable that Jefferson would have desired a symmetrical frame for the view from the south portico.

In sum, archaeology has discovered three different designs for the sunken lawn (Figure 20). The original lawn excavated in 1807 and 1808 was a rectangular design approximately 70 ft wide at the base of the terraces, and roughly 200 to 210 feet long. This design was likely planted in 1812 with a row of shrubs on each bank, and would have formed triple squares of 70 ft. x 70 ft. . A second design was created around 1814, when the east bank was cut back to the angled shape found during excavation and described above. The cut-back bank was replanted with shrubs, also found during excavation. The third, final design can be hypothesized from physical evidence and an understanding of what the physical space of the sunken lawn would have looked like. Jefferson likely would have wanted a symmetrical lawn to provide a balanced frame of the view from the south portico and study. The final semi-useless drain section noted above indicates that preparatory work for cutting back the west bank to match the shape of the east bank was completed during Jefferson's ownership of the property. Therefore, the third design is a theoretical one, representing a final symmetrically shaped design Jefferson intended to complete but never finished. This design would have measured 100 ft at the tops of the terraces on the north end, 150 feet at the southern end, and would have been approximately 200 feet long. It is interesting to note that each of these measures conforms to a dynamic symmetry based on the 50 ft measure of the house.

It is informative to examine the possible reasons for altering the shape of the sunken lawn. One important consideration may be the relative growth rates of the shrubs Jefferson planted on the banks of the lawn in 1812. The growth rate of the south lawn shrub types, 1 to 2 vertical and horizontal feet per year, would have caused the farthest shrubs 200 feet from the house start obscuring the view of the landscape from the south portico considerably (see Horticultural Research section). Moving the planting rows outwards 30 feet on either side would open the direct line view from the south portico considerably. This fact may provide insight on the overall landscape design, as it would suggest that the southern portion of the landscape was being designed and organized around Jefferson's view from the house. The view beyond the circular road would have likely included a garden, the interior curtilage fenceline, and 1,200 feet of cleared agricultural fields descending a gentle slope to the wooded Tomahawk creek.

It is significant that several casual notations in the Garden Book support the hypothesis that Jefferson utilized the house at Poplar Forest as a viewing platform. A visit in December of 1815 saw

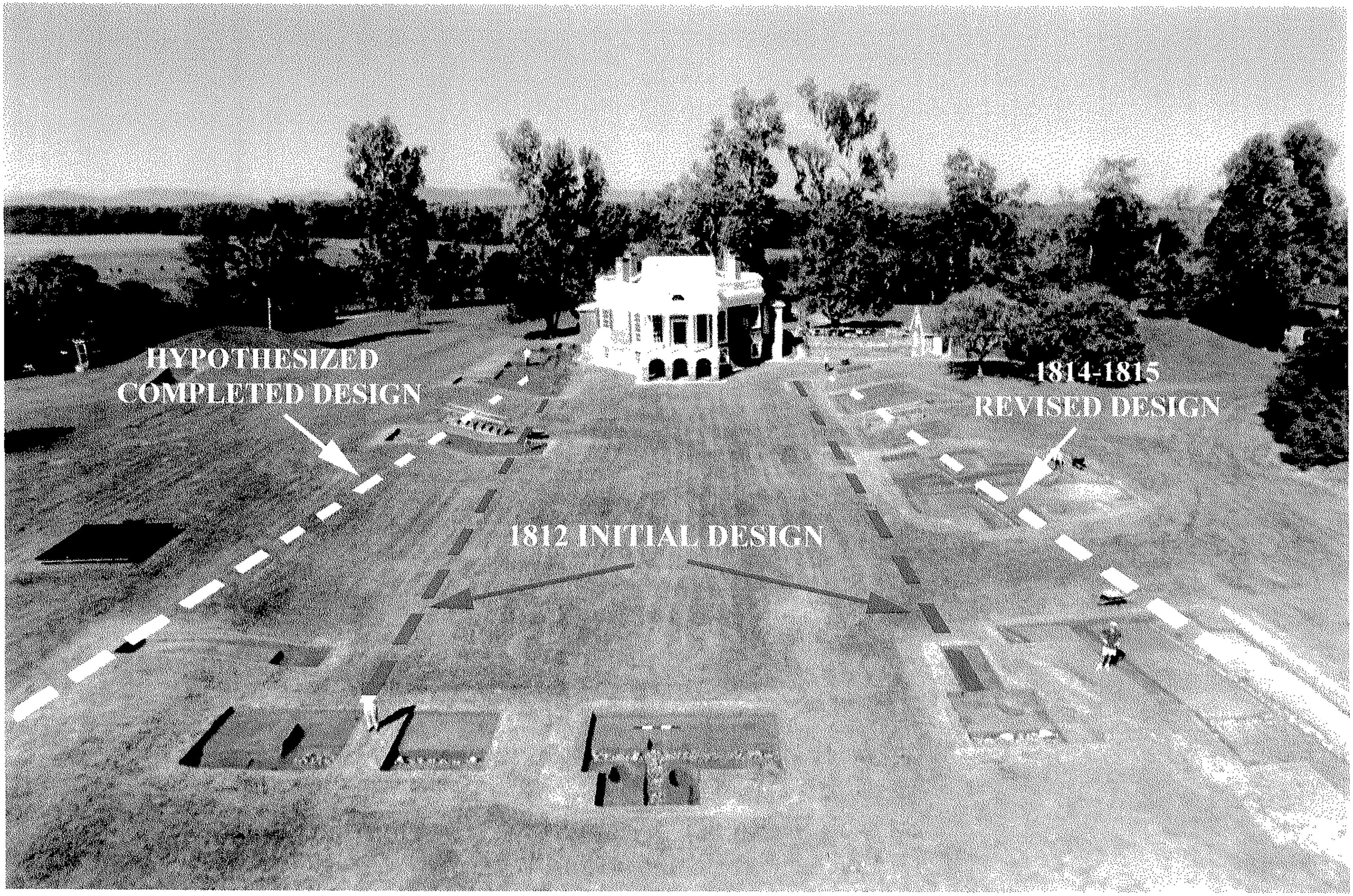


FIGURE 20: Illustration of three designs for the sunken lawn showing landscapes are never static, but change through time. The initial rectangular design of the sunken lawn ca. 1812 is shown in red, measuring 90 ft. wide at the tops fo the terraces, and 200-210 ft. long. Later, the East bank was cut back to an angled shape shown in yellow, probably in conjunction with work on the wing of offices in 1814. The final design is a hypothetical lawn shape, shown in white. If a symmetrical shape is assumed, this final design would have measured 75 ft. wide at the top of the terrace near the house, 150 ft. wide at the southern end, and 200-210 ft. long.

Jefferson carefully setting up his theotolite on both the north and south porticos. He proceeded to meticulously record "the high grounds around the house at Pop. For… sensible horizon, taken in different directions by the spirit level of the theotolite placed 3 ft. 6 In. above the floor of the porticos Dec.2" (December 2, 1815, ViU). The notation then records estimated elevations of the visual horizon for different views from the house. On the same page, but noted five years later, Jefferson records in order the different views of mountains in the distance, as seen from the house at Poplar Forest (Figure 21). These two casual notations indicate that Jefferson, at least in these instances, thought of the house at Poplar Forest in terms of a place *from which* to view.

It is also interesting to consider that the architectural addition of the wing might have necessitated, in Jefferson's mind, an alteration to the landscape. It is clear that architecture and landscape were viewed as part of the same whole by Jefferson, but the nature of the interplay between these two areas is not always evident. If a change in architecture necessitated a change in the landscape design, it remains to be studied what direct link connected the two. One possible connection could be dynamic symmetry, though future research may reveal other explanations.

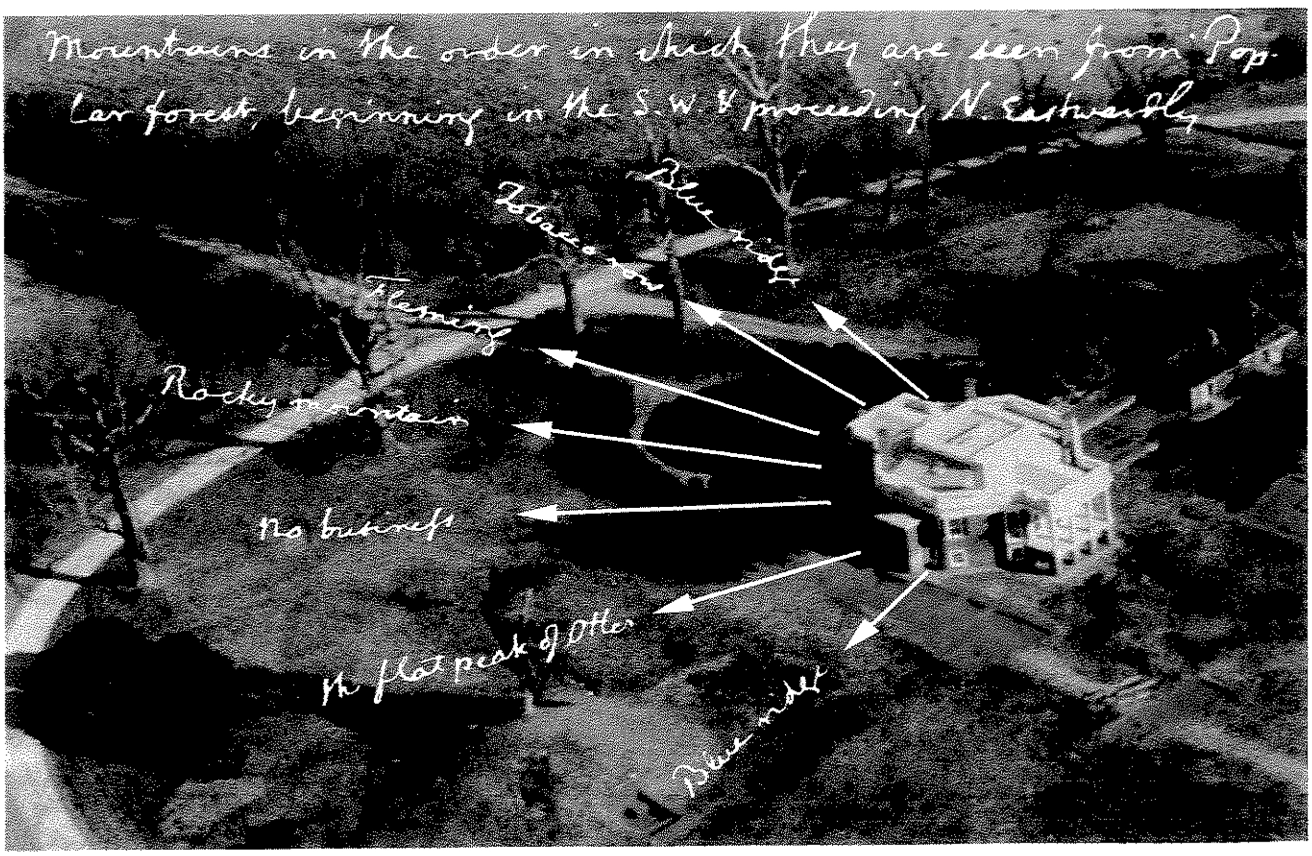


FIGURE 21

CHAPTER 3: CORE AREA EXCAVATIONS AND TESTING

WEST MOUND EXCAVATION

The Jefferson-era mounds, east and west of the house, are visually striking landscape features in the core area at Poplar Forest today. No documentary reference exists recording the date of the construction of the mounds. In the past, it has been assumed that that the mounds were built using the fill soil from the excavation of the sunken lawn, which took place in 1807 and 1808 (Brown 1990:126), though S. Allen Chambers noted that soil from the cellar excavation may have been used to construct the mounds, as well (Chambers, 1993:41).

Utilizing a Totalstation laser transit in conjunction with 3-dimensional computer mapping software, the total volume of the mounds as they stand today was determined to be 54,473 cubic feet. When the volume of earth removed from the sunken lawn was calculated, the total was about 33.1% less, at just 36,100 cu. ft. Clearly, more soil had been used to construct the mounds than was previously thought. The volume of the house foundation cut was calculated, and added to the volume of the wine cellar (18,042 cu. ft total). The combined volume of the excavations needed to create the sunken lawn AND the house foundation and wine cellar was approximately 54,142 cubic feet in total. This matches very well with the 54,473 cu. ft. volume of the mounds. The data therefore suggest that initial construction of the mounds began with fill soil from excavations of the house foundation, during 1805 and 1806. This information is important in that it implies that Jefferson was envisioning the mounds as ornamental landscape features from the very beginning of the construction of the house. It may also be significant that the east mound is roughly 2,200 cu. ft larger than the west mound, and the east mound also has a slightly larger diameter. It is unlikely that these differences are because the east mound contains fill soil from the east bank and wing excavations, though further study is needed to clarify this issue. The estimated volume of earth removed prior to construction of the wing of offices is 7,875 cu. ft, and placing fill soil on the mound would have killed extant plantings there. It seems probable that this soil was removed, and dumped at an unknown location on site.

Several references to planting on the mounds in Jefferson documents strongly suggest that he had a difficult time getting anything to grow on them. In the February 27, 1811 planting memorandum, Jefferson notes :

> Memom. Plant on each mound- 4. Weeping willows on the top in a square 20.ft apart. Golden willows in a circle round the middle. 15 ft. apart. Aspens in a circle round the foot. 15 ft. apart. (Betts 1944:465)

In May of the following year, Jefferson wrote to his overseer Goodman: "as soon as the green swerd is ripe, have some gathered by the negro children and sowed on all the naked parts [of the] mound" (Betts, 1944:487-488). In December of 1812, Jefferson notes: "Planted Mont. Aspens from mr. Clay's. viz. 12. Round the Eastern mound & 4. Round the West. 6. still wanting." (Betts 1944:494). In 1815 he again notes planting Aspens at the foot of the mounds, and adds Calycanthuses on the mounds, as well (Betts 1944:594). Finally, apparently giving up on the willow and aspens entirely, he notes in 1816, "(planted) Altheas, Gelder roses, lilacs, calycanthus, in both mounds" (Betts, 1944: 563). It is unclear whether all of the earlier plantings had died, or whether Jefferson was simply filling in the open spaces between some sparse, but still living earlier specimens.

Previous excavations in 1991 on the west mound, in ER 571, revealed several nebulous root stains and shallow features, as well as rock-lined terraces within the mound (Strutt 1992:8-13). Unfortunately, none of the features discovered were datable to the Jefferson era landscape, as no artifacts or evidence of a deliberate planting hole were located and units were excavated to sterile subsoil. In 1999, two excavation units were placed on the southern side of the west mound, ER 1962 and 1964, and these were excavated stratigraphically through the modern topsoil and fill into the underlying subsoil beneath the mound. Several research questions dictated this style of excavation. First, it was hoped that a dateable planting hole could be located near the present surface of the mound to begin the process of keying-in Jefferson's planting plan for the mound. The interior of the mound was also explored to determine the original shape of the mound and how it was constructed, because a Ground Penetrating Radar (GPR) survey in 1991 noted five layers of rock within the mound fill. The report hypothesized that the original shape of the mound might have been "wedding cake" style terraces, rather than the present rounded, smooth-surfaced mound (Graf 1991:2-9). A third goal of this excavation was to determine where the original extent of the mound edges once lay, and how much erosion has changed the shape of the mound since it was constructed. Finally, because the mound was built on top of the pre-ornamental landscape soil, it was thought that excavation or pollen and phytolith analysis might reveal something of the nature of the landscape prior to construction of the house.

Excavations revealed a single planting hole on the side of the mound in unit 1962. Discovery of this planting hole was especially significant, since it was the same size (about 1 ft. wide by 1 ft.

FIGURE 22: View of excavation of West mound, looking East. The stratigraphy clearly indicated that erosion and structural slumpage was minimal, increasing the plan-view measure of the mound only two feet at the mound edge. The overall exterior shape of the mounds has remained consistant since they were constructed.

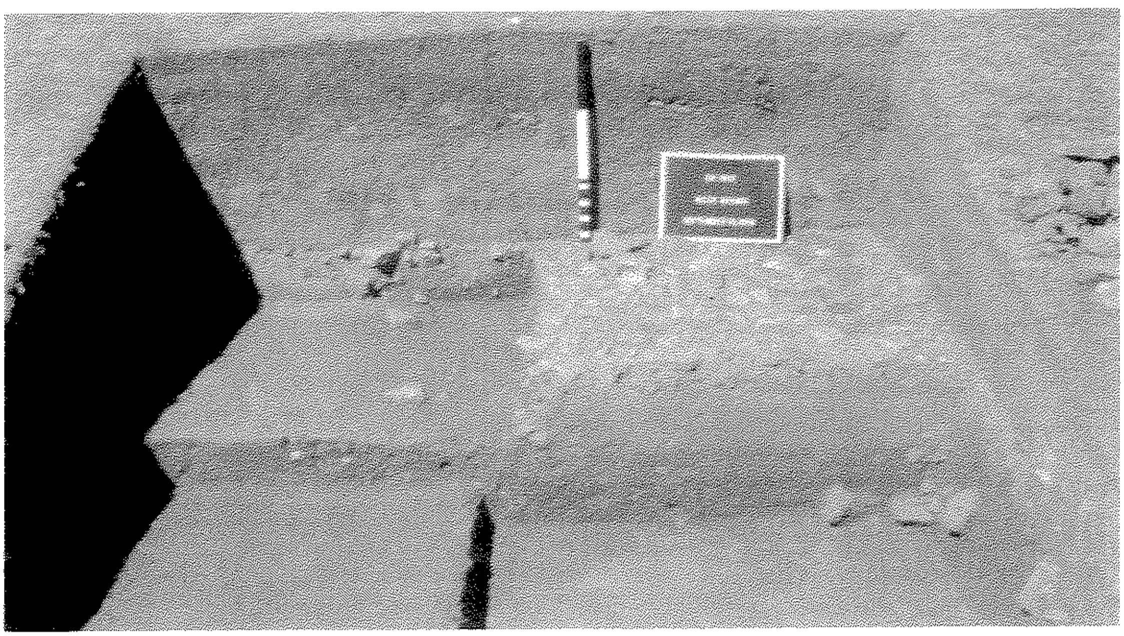


FIGURE 23: View of West mound excavation, looking North. The interior stratigraphy of the mound is illustrated by the pedestalled layers. The highest layer, far right, was a rock-lined platform to stabilize the structure during construction. Beneath the rock layer was a layer of fill soil from the initial construction of the mound. This fill sealed the original plowzone dating to the use of this area as an agricultural field prior to the construction of the ornamental landscape. The lowest level is undisturbed subsoil.

deep) and composition as the Jefferson-era planting holes located on the east bank. Like the east bank plantings, ER 1962E was filled with charcoal, and contained Jefferson era artifacts including Chinese porcelain, industrial slipware, and an even-scalloped blue shell edge pearlware fragment that set the TPQ for the planting hole at 1810. This is the first dated planting feature located on the West mound, as the previous excavations did not locate any charcoal-filled planting holes, and no artifacts to date features. The strong similarities between the west mound planting hole and the east bank planting holes appear to indicate that similar gardening practices were being used in these locations to establish plants (see horticultural research and soil chemical sections).

The fill of the mound was broken by a flat layer of cobbles, carefully placed in a coherent layer about 0.4 to 06 ft deep, depending on the size of the rocks. The location of the planting hole and the strong artifact date of this feature disproves the "wedding cake" theory of construction. The planting hole was located on the slope of the mound above the rock layers, in a place that would have been nothing but post-Jefferson era erosional fill if the "wedding cake" theory was correct. The presence of the planting hole in this location clearly negates this theory. The rock layers identified in the GPR survey, and uncovered during excavation, appear to have been stabilizing layers. The fill soil was apparently piled up for several feet, then a layer of rocks was placed on top to anchor and stabilize the next layer of construction.

Excavations also revealed that some erosion and slump has occurred on the edges of the mounds, but has not changed the shape of the mound significantly. Though partially obscured by a trench feature running east-west at the base of the mound, excavation revealed that only gentle erosional deposition was found to have taken place at the edge of the mound. This erosional/slump layer was only 0.3 to 0.5 ft in depth, and likely increased the modern measure of the mound no more than 2 ft from its original measure. This fact is significant in that the modern diameter of the west mound averages approximately 79 ft, though the mound is not a perfect circle and the mound outline varies slightly in different places. If one subtracts the estimated 2 ft of erosion/slump from the modern measure of the base of the mound, the original diameter can be estimated as being approximately 75 ft. This figure is significant in discussions of the dynamic symmetry Jefferson may have used to design Poplar Forest landscape elements.

Underneath the fill soil of the mound, excavation revealed a layer of plowzone. The presence of this early 19th-century plowzone, or more accurately "hoe-zone" from tobacco cultivation, is an important clue about the nature of the landscape prior to construction of the house. Perhaps because of the large Tulip Poplars standing in the north core today, it has been speculated that the house might have been built in an old-growth forest of Poplars. However, dendrochrolological dating of two of these trees suggests that they were only 20-30 years old in 1806, and thus were merely meduim sized second-growth trees. Documentary evidence also indicates that this area was comprised of cleared fields, as a tobacco barn is shown in this area on a map from circa 1800 (. Because tobacco barns were typically placed in the middle of tobacco fields, the map indicates that this area was most likely a tobacco field at some time prior to construction of the house in 1806. Thus, excavation and documentary research confirm that Jefferson's house and ornamental landscape were built in a cleared tobacco field allowed to go fallow. In addition, the discovery of this soil layer has proven especially valuable for palynological study. A sample of the pollen signature at this location, in intact soil dating prior to the construction of Jefferson's ornamental landscape, has provided an excellent means for identifying ornamental changes to the landscape. Pollen types present in the pre-1806 plowzone are most likely natural or large-scale agricultural in nature (see pollen section).

SOUTH GARDEN TESTING

The curtilage fences shown surrounding the house and grounds on the 1813 Slaughter map are an important topic of research. The exact location and form of these fences remains unknown at the time of this writing. In December of 1812, Jefferson wrote his overseer "The winter's work is to be 1. Moving fences. to wit, the fences for the curtilage of the house as laid off by Capt. Slaughter" (Betts 1944; 492). It was the search for evidence of this landscape feature that spurred the decision to re-excavate a small portion of the central drain south of the house. The excavation of the central drain discussed above indicated that in several places, the previous backhoe trenching did not extend entirely to subsoil. The interior 10 acre curtilage fence is shown as a square centered on the house, with 660 ft to each side. Therefore, six excavaation units were placed at 330 ft south of the center of the house, in hopes of locating a posthole from the fence near the central drain.

Although this east-west fenceline was not found, evidence of a north-south fence running parallel to the central lawn drain was discovered to the west of the drain. Evidence of two postholes with distinct postmolds was found in Units ER 2009 and ER 2000. A third posthole in this line was excavated previously in the backhoe trenching along the drain. Excavation revealed that a hard-packed clay cap sealed the drain and created what appeared to be a central pathway over the drain. The path was not tightly dated, since the soil matrix of this clay cap contained both tiny fragments of industrial slipware, and fragments of whiteware. The stratigraphic location of this feature below the Hutter garden makes it very difficult to date it from these artifacts, since the churning of the soil in this area could have introduced the whiteware after the path was created. Nevertheless, the apparent configuration revealed here, of a clay-cap path overlaying the central lawn drain and bounded to the west by a fenceline, is intriguing, and will require more extensive excavation than the small test completed here.

One other important discovery was made in this location. As mentioned earlier, in many places the previous backhoe trenching was not deep enough to totally destroy the deepest stratigraphy of the garden. Excavation revealed that several intact Jefferson era planting beds appear to have survived below the backhoe disturbance, and below the Hutter garden disturbance. Two parallel beds, each three feet wide, were uncovered to the west of the drain and western fenceline. Artifact dates identify these features as Jefferson era planting beds, and soil samples were taken for pollen and phytolith analysis. The evidence uncovered during this small testing project indicated that intact remains of a Jefferson era garden exists in this area below the Hutter garden disturbance layer. It should be noted that this was only a small scale testing project, and that a much larger excavation is needed to fully confirm this hypothesis. Intensive palynological analysis of these soils could reveal if this garden was for propagation of ornamental species, or was a utilitarian garden for food. If the latter proves to be true, then palynological analysis might reveal details of Jefferson's gardening and diet at Poplar Forest.

CENTRAL LAWN TESTING

Three 10 x 10ft units were excavated in the center of the south lawn to test this area for landscape features. The excavation units uncovered a series of round features which appeared to be either planting holes or post holes, apparently aligned north-south with the house and centered on the doorway to the basement story. No artifacts were found in the matrix of any of the round features, and they are undated at this time. However, contextual information suggests they likely date to the late 19th or early 20th century as the tops of these features appeared to cut through the lowest part of an early 20th-century grading layer. No heavy charcoal flecking was evident in the soil matrix, unlike Jefferson era planting holes. Though several other shallow features were evident in these units, excavation suggests that all features found are the remains of a Hutter period occupation, probably planting features or a fenced walkway. It should be noted that an early 20-th century documentary source writes of Jefferson's "cedar-lined white path" south of the house (Wilstach 1928; 41-43)) This source may be referring to this late 19th-century walk/planting feature, mistakenly identified as a Jefferson period feature.

CORE AREA TESTING

In 1998 and 1999, testing projects were carried out in the southwest and northwest portions of the core area. These areas are "blank spaces" in Poplar Forest documents, and no references are made to landscape features in these areas by Jefferson. The major research question driving these small testing projects was to determine whether intact stratigraphy dating to the Jefferson era still existed in these areas, and whether heretofore unknown planting or garden features, buildings, paths, roads, etc. could be located. Participants in the "Archaeology for Teachers" continuing education program excavated many of the test units in these areas, with the balance excavated by Poplar Forest field staff.

The testing methodology for the 1998 field season was to excavate 4 x 4ft units on 25ft centers in an off-set diagonal grid pattern (see Figure 24). A total of 16 units were excavated in the southwest quarter of the core area west of the west terrace bank. The units were placed to sample the area between several previous excavations, including the hothouse and garden excavations to the south, excavations of the west bank of the sunken lawn, and the mound and west mulberry excavations. Because much less excavation has been done in the north core area, the test units excavated during the 1999 field season were sited to cover more space within the northwest core area. Instead of a diagonal grid testing pattern, the units in the northwest core were placed on 25ft centers in a regular square testing pattern. Excavations the previous year indicated that the more intensive pattern used during 1998 was unnecessary due to a very low density of artifacts and features.

The test units revealed that severe disturbance had taken place in this area during the mid to late 19th century. The stratigraphic sequence found throughout the western core area was topsoil, underlain by a mixed layer of brown silty loam dating to the early 20th century. Below this layer was a thin layer of small cobbles dating to the mid to late 19th century, overlaying a sterile red-brown silty loam. This lowest layer may be a remnant plowzone, and transitions gradually to red clay subsoil. The only significant spatial difference was that the cobbles grew larger and more frequent in the northwest core. No intact Jefferson-era stratigraphy or features were revealed, and the entire area appears to have been plowed or otherwise heavily disturbed during the middle or late 19th century. The presence of so many cobbles is puzzling, and suggested the possibility of a work yard in the late 19th century, created by covering the ground with wagon loads of small rocks. However, the density of the

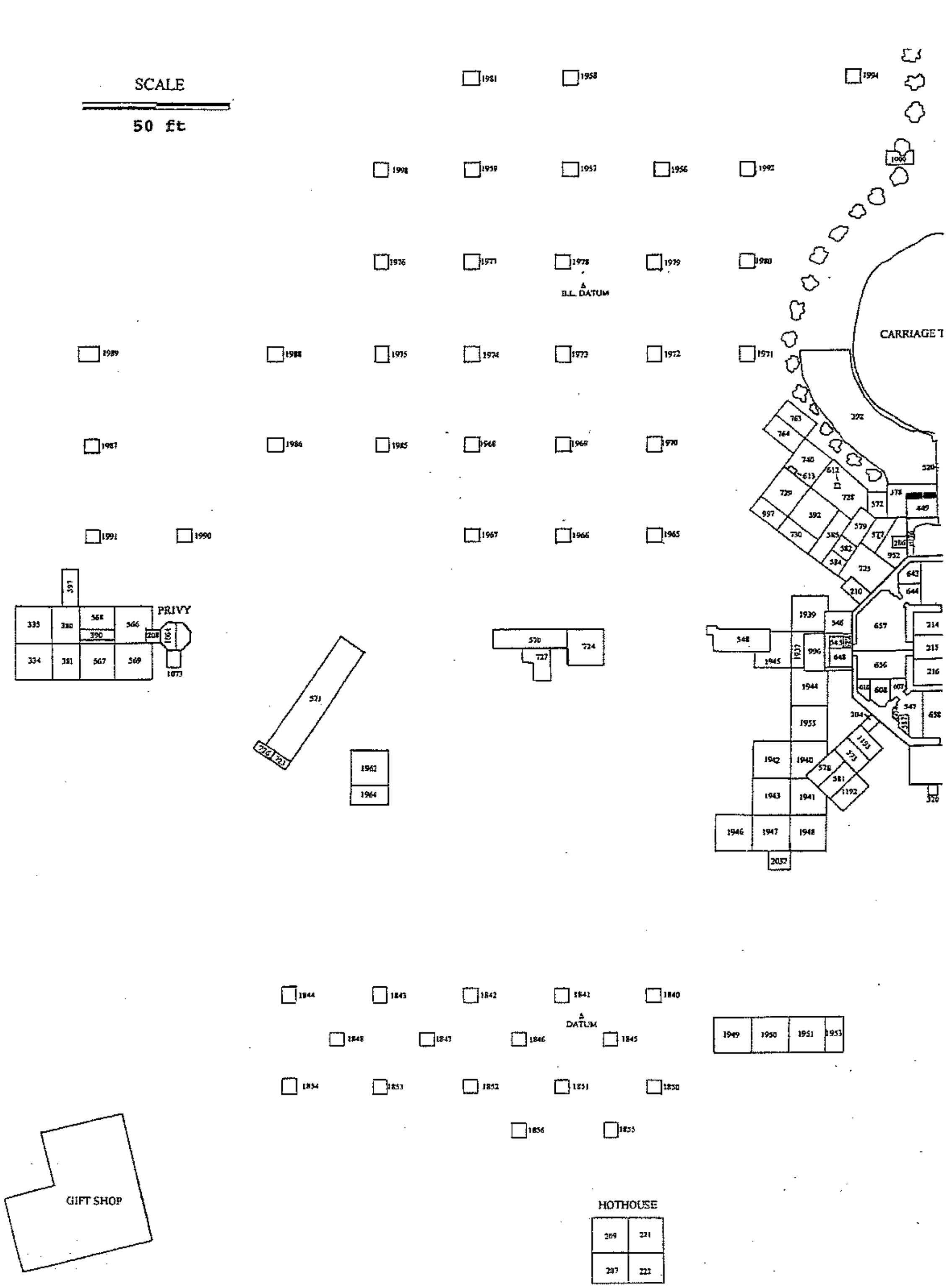


FIGURE 24: Test pits (4 x 4) in Northwest and Southwest core area.The 1998 testing project in the Southwest was a more intensive sample within a smaller area, utilizing an off-set diagonal grid pattern of units on 25 ft. centers. The amount of data recovered in 1998 was insufficient to justify using such a tight interval again, and the 1999 testing project in the Northwest core eliminated the diagonal units from the pattern.

rocks does not seem to be nearly enough to have helped control drainage or to have firmed-up the ground during the wet winter months. Soil chemical tests of the northwest core were inconclusive, but did not suggest a strong presence of animal waste. Phosphate levels were comparatively low, averaging between 5 to 15 lb/acre free phosphate in the center of the area, but trending much higher to the east and west, likely the result of fertilization of ornamental plantings (Figure 25). At present, the historic uses of the northwest and southwest core areas are still unknown, but no physical evidence of the Jefferson era ornamental landscape was located in these areas.

In conclusion, although more than fifty 4 X 4 ft test units were excavated in the southwest and northwest core areas, no intact stratigraphy or features dating to the Jefferson era were located. This research is ongoing, but the initial conclusion is that the southwest core area was likely plowed or otherwise disturbed sometime during the mid-19th century. Though the artifact data and the excavation findings support the same conclusion for the northwest core area, it is unknown how plowing could have taken place here given the extant Tulip Poplar trees likely dotting the landscape in this area. It is possible that the original pre-1806 plowzone is present in some places here, but that it contained no artifacts and was unrecognizable in the stratigraphic record, where it appear as a sterile disturbed soil overlaying subsoil. Indeed, the most common stratigraphic sequence in the northwest core area was a mid-19th century layer of gravel overlaying a sterile soil layer which seals subsoil. However, until a Jefferson era feature is discovered and its stratigraphic relationship to this sterile soil layer can be determined, this question will likely remain unresolved. The only hint of any Jefferson era features in this area during the testing project came from unit ER-1981, where several small fragments of daub were recovered. No post holes or evidence of a cabin structure or foundation were revealed, and these artifacts came from a mid-19th century context of disturbed soil. This area should be re-examined at a later date. In addition, several Jefferson era ceramic types were found in a disturbed area beneath one of the Tulip Poplars that was removed in the northeast core area directly adjacent to the east of the carriage turnaround. This location should also be examined closely during future testing.

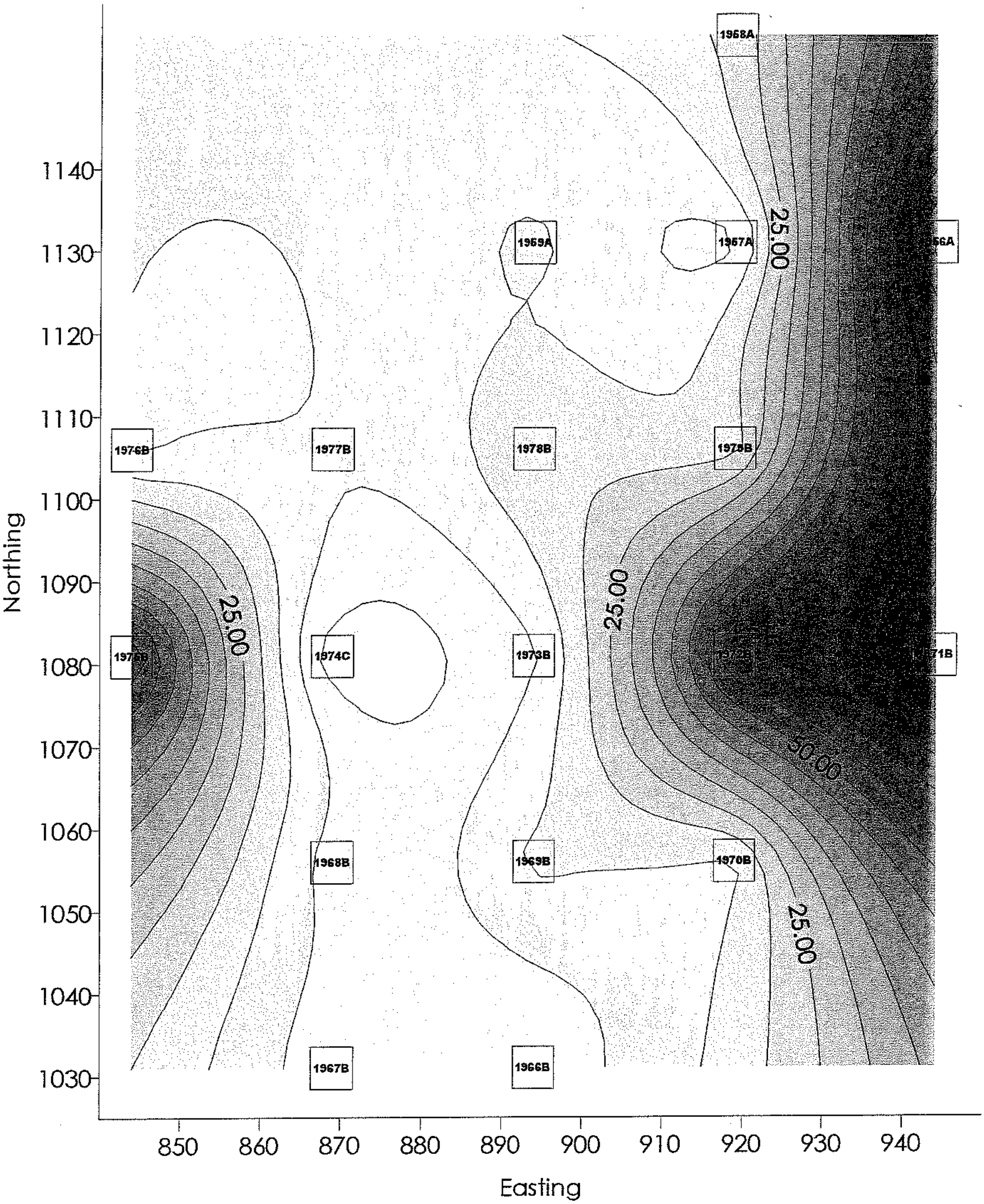


FIGURE 25: Distribution of phosphate in Northwest core area.

CHAPTER 4: ARTIFACT ASSEMBLAGE

Artifacts dating to Jefferson's ownership of the property are found in nearly every known context at Poplar Forest. The earth moving and ground disturbing activity which has churned so much of the soil in the core area at Poplar Forest has destroyed many original Jefferson period surfaces and features. The result of this destruction is that Jefferson period artifacts become mixed in with the artifacts dating to the time of the destruction. However, the many artifacts recovered from tightly dated Jefferson period contexts excavated from the south lawn formed a generally uniform assemblage, with a few notable exceptions. The artifact types include ceramics, wine bottle glass, brick, mortar, nails, window glass, buttons, and an ox shoe. Almost all of the artifacts fall within either the kitchen or architecture functional category, except for two buttons, an earthenware pipe bowl fragment and an iron ox shoe. For a complete discussion of the artifact assemblage from the landscape excavations at Poplar Forest, see Appendix IV report by Heather Olson, Lab Supervisor. Information here is condensed from her report.

A total of 383 ceramic sherds were recovered from Jefferson-era excavation contexts during excavation. Undecorated or blue transfer-printed pearlware was the predominant ceramic type, but the assemblage also included green and blue shell edge plates, green and blue embossed plates, a hand painted bowl, blue transfer printed plates and teacups, and overglazed, hand painted decorations on Chinese porcelain and bone china teawares.

FIGURE 26

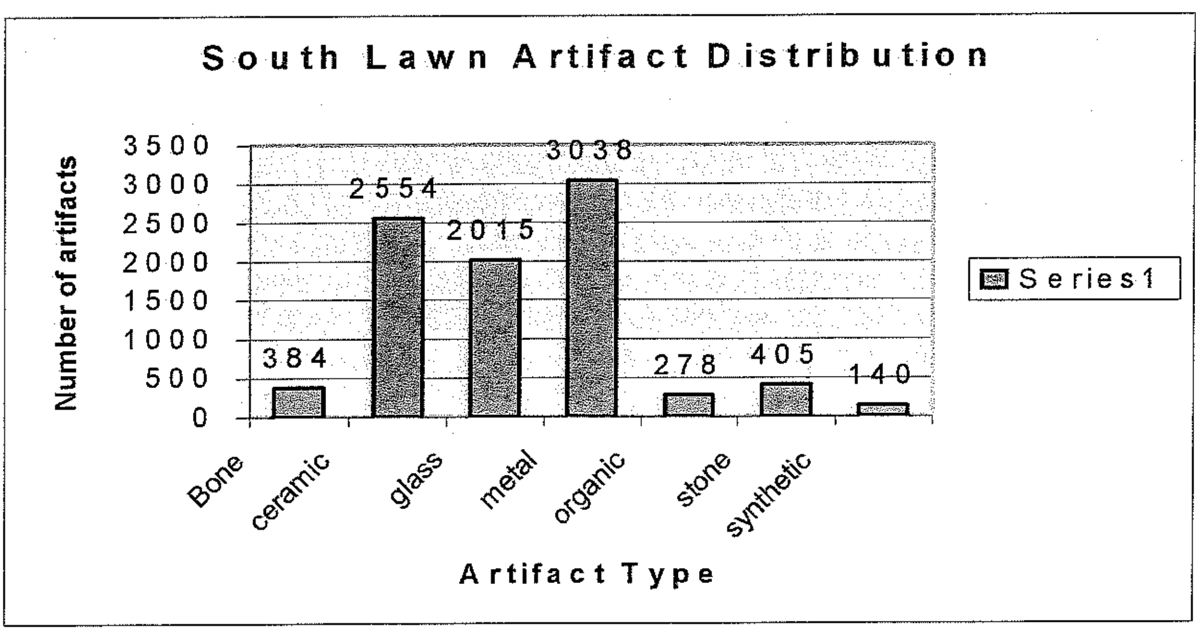
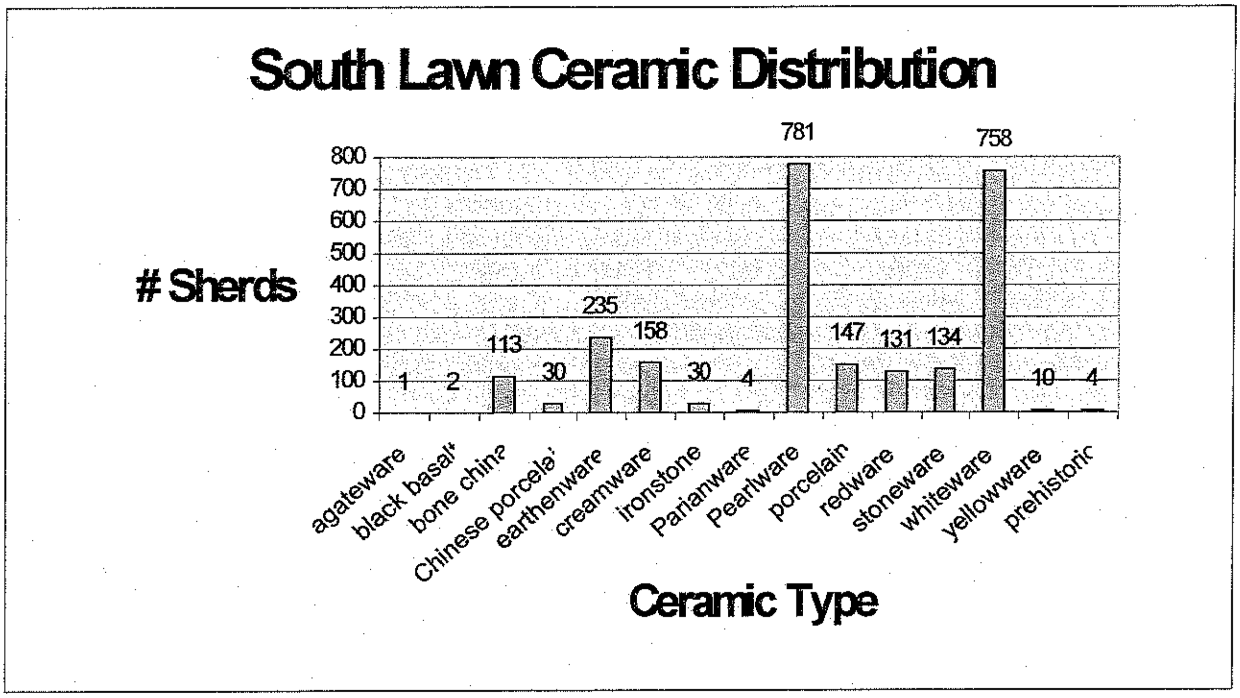


FIGURE 27



Blue transfer-printed patterns recovered include the "*Foliage Border Series*," the "*Foliage and Scroll Border Series*," the "*Bluebell Border Series*," the "*Oxford College Series*," and "*Willow*" pattern. In the "*Foliage Border Series*" patterns, the specific scene "*Wistow Hall, Leicestershire*,"was identified from the name transfer-printed in blue on the reverse side of the plate rim, and one plate fragment has been tentatively identified as the "*Foliage and Scroll*" scene "*Fonthill Abbey, Wiltshire*." All of these patterns have been found in other excavation contexts at Poplar Forest, and in primary context in the wing of offices exavations.

Several other ceramic types were found in Jefferson-era contexts during excavation. Creamware fragments were recovered, and a single fragment of gray stoneware was found. Bone china was found in several contexts, including portions of a hand painted overglazed bone china teacup and fragments of an undecorated bone china saucer. One fragment of English yellow-glazed earthenware was recovered in a planting hole. Because this ceramic type has never been found in any other excavation context at Poplar Forest, and because this ceramic type is present at Monticello, lab supervisor Heather Olson has speculated that this single fragment of yellow-glazed earthenware may have come from Monticello in the root-ball of a transplanted shrub (Olson, personal communication). Many overglazed, hand painted Chinese porcelain teacup fragments were recovered, decorated with a dot and swag border in overglazed red and blue.

Architectural artifacts were found in every Jefferson-era excavation context. This category included wrought and cut nails, brick fragments, and window glass. The brick fragments and window glass were ubiquitous, found in nearly every excavation unit and every context within the unit. The construction of the house and wing clearly resulted in a large-scale deposition of these artifacts across the site, and the soil matrix of many Jefferson-era contexts contained brick flecking as well as charcoal. A significant difference was found to exist when the ratio of wrought to cut nails was compared between contexts, and the implications of this will be discussed below. Very few personal items were found, with only a single pipe bowl fragment and two buttons identified within this category. While this may be a reflection of the "occasional retreat" usage of the site during Jefferson's ownership of the property, further research is needed to clarify this issue.

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MEAN CERAMIC DATING

A technique archaeologists often use for defining occupation sequences through the excavation of layers or features is to calculate the mean ceramic date. A mean ceramic date for a particular excavation context is calculated by taking the median date of manufacture for a ceramic type or pattern, then multiply it by the number of sherds of that type or pattern found to get the product. Calculate the product in the same way for each ceramic type found in the excavation context. By adding all of the products and then dividing by the total number of sherds, the mean ceramic date

(MCD) for that particular excavation context is obtained. MDC calculations were useful for comparing different south lawn excavation contexts in relative terms. However, it should be noted that due to the low total numbers of ceramic fragments found in different contexts in the sunken lawn excavations, the dates are not statistically valid and should be viewed only as indicators of the relative age of different contexts, not as exact dates for construction or use. In addition, the known manufacturing date range for many commonly found ceramic types at Poplar Forest can be as long as twenty or thirty years. This type of analysis is typically used to separate occupations of sites based on decades, and is usually not associated with such tight chronological sequences as are known for Poplar Forest through the documentary record. Nonetheless, this analysis proved useful as a relative dating technique for landscape features at this site.

As discussed in Chapter 2, a rough chronology for major construction and modification of the sunken lawn area was determined through documentary evidence and excavation findings. To reiterate, the sunken lawn was initially excavated during 1807-1808, then the banks were planted with shrubs in December of 1812. The east bank of the sunken lawn was cut back to the angled shape found during excavation at a later point, work most likely associated with the construction of the wing of offices sometime around 1814. After construction, the east bank was replanted with shrubs, and finally, the french drain was constructed at the base of the east terrace bank, cutting the last two planting holes on the bank. Thus, the sequence of construction would have been 1. Original rectangular sunken lawn, 2. Initial shrub plantings at bases of banks (west bank planting holes located archaeologically), 3. Re-excavation of the east bank to the second, canted shape, 4. Replanting of east bank with shrubs, and 5. Construction of east bank french drain.

This chronology is strengthened by results of mean ceramic date analysis. The west bank layer of soil was revealed as the earliest context with a mean ceramic date of 1791. As mentioned previously, this number is clearly not the date of construction of the first lawn, as this date is based on only 2 datable ceramic sherds. It does show, however, that this context, hypothesized to be the earliest based on evidence from documents and excavation, contained the earliest artifacts from the sunken lawn area. The planting holes located on the west bank represent the initial shrub planting on the sunken lawn, and these features had a mean ceramic date of 1804.2, based on 12 ceramic sherds in the soil matrix of the planting holes. The next major landscape change was the excavation of the east bank of the sunken lawn to the canted shape found during excavation. The mean ceramic date of the soil layer on the east bank was 1807.1, based on 193 sherds. After it was constructed, the east bank was replanted with shrubs. The planting holes on the east bank had a mean ceramic date of 1810.98, based on 27 sherds. Finally, the french drain constructed at the base of the east bank had a mean ceramic date of 1807.7, beased on 82 sherds.

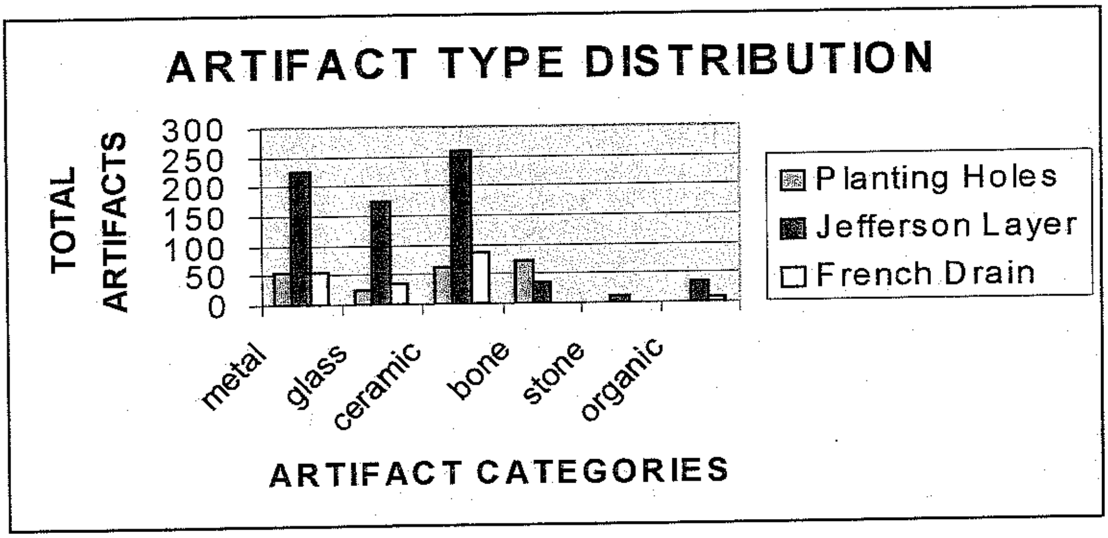
The progression of dates matches almost perfectly with the construction sequence hypothesized from excavation and documentary evidence. The only MCD that was out of sequence was the east bank french drain. This feature cut the last two planting holes and thus had to have been constructed after the plantings, but falls second to last in a relative sequence. Nevertheless, the analysis shows that despite the limitations inherent in conducting this type of analysis based on comparatively low numbers of ceramic sherds, the relative sequence of construction is still apparent. This is especially remarkable given that all of the sunken lawn landscape features were likely constructed within a period lasting 8 years or less, an extremely tight date range for this type of analysis.

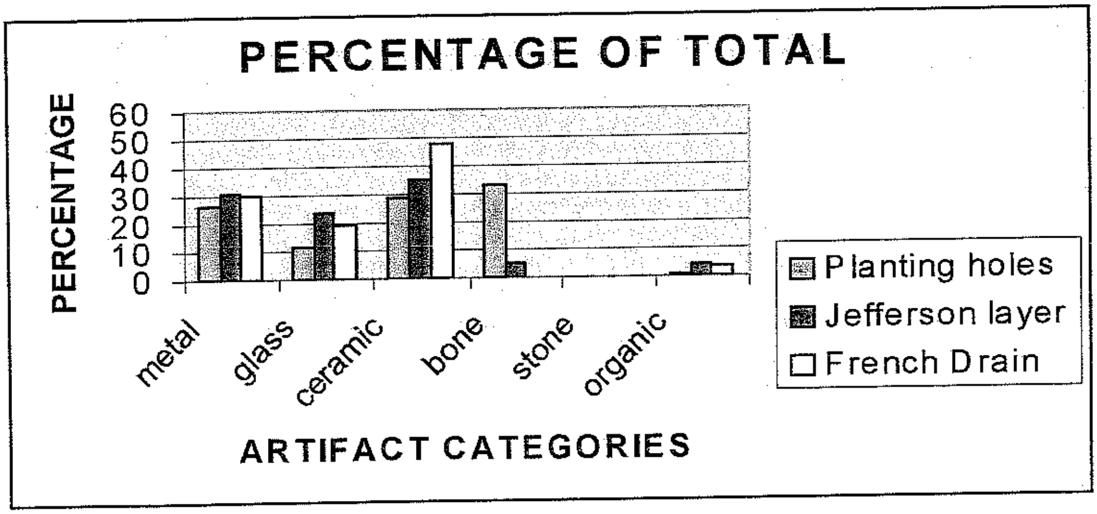
A comparison of the distribution of artifact types between contexts may shed some light on the depositional processes that resulted in the artifact assemblage recovered during excavation. Figure 27 shows a comparison between the planting hole, Jefferson-era soil layer, and the French drain soil. Though the assemblage was generally uniform between contexts, several trends are apparent.

The percentage of metal artifacts, mostly wrought and cut nails, was very similar in all three contexts, representing 26 to 30 percent of the total. These artifacts served an architectural function, and are probably the result of trash disposal or building maintenance through time. However curved glass, representing , was only 11 percent of the total in the planting holes, was 19 percent in the French Drain and 23.7 percent in the Jefferson-era soil layer. This difference may be due in part to the fact that the planting holes were a sealed context, while the French Drain and the Jefferson-era soil layer were open, and the higher amount may indicate trash disposal across the landscape over time.

Perhaps the most striking difference between the artifact assemblage from these contexts was the distribution of bone fragments. A total of 71 bone fragments were recovered from the planting hole soils, representing 33 percent of the total number of artifacts from this context. Bone only represented 4.7 percent of the total artifacts found in the Jefferson-era soil layer, and no bone fragments were recovered in the French Drain. Soil chemical analysis appears to indicate that kitchen trash was being added soil layer and planting holes as a fertilizer (see Chapter 3), and the presence of bone fragments, a common kitchen waste material, appears to bear this out. However, the uneven distribution suggests several explanations. It is possible that the bone fragments simply survived better sealed in the planting holes than on the surface of the soil layer. If this were the case, then the decomposed bone should still have been evident as higher calcium levels in the Jefferson-era soil samples. Soil chemical data, however, indicated that the amount of calcium was actually higher in the planting hole soils than in the Jefferson-era soil layer. The other most plausible explanation is that the planting hole soil received a higher amount of kitchen trash as fertilizer than the soil layer, resulting in a higher percentage of bone fragments. Soil chemical data appears to support this conclusion. The planting hole soils did, in fact, contain higher amounts of total phosphate, potassium, and calcium, the levels were between 3 percent (potassium) to 11 percent (calcium) higher than the Jefferson-era soil layer. The data appear to indicate that while the same fertilization techniques were being used for the planting holes and the Jefferson-era soil layer, fertilization through kitchen trash may have been slightly more concentrated in the planting holes.

FIGURE 27





CHAPTER 5: MICROBOTANICAL ANALYSIS

Surviving Jefferson documents provide limited glimpses into the ornamental landscape at Poplar Forest. However, when one attempts to produce an even cursory reconstruction of this relic landscape design on paper, the important gaps in our current knowledge of the landscape become evident. In the case of the south lawn designs, while the planting holes discovered archaeologically can be used to determine the exact location of Jefferson's south lawn plantings, the question remains what plant to place in each particular hole. One important goal was potentially to link high concentrations of ornamental pollen or phytolith types to the planting features located on the terrace banks. In this way, we hoped to obtain specific planting information, and potentially to link a single plant species to a specific planting stain. In addition, historic photographs show Kentucky Coffee trees along the tops of the terrace banks, but the question remains whether these are the same trees mentioned by Jefferson. Finally it is possible, and perhaps even probable, that Jefferson directed many landscaping activities personally during his visits to Poplar Forest. If the work was directed verbally, no documentary record would exist and other ornamental species not mentioned specifically in documents may have been planted on the terrace banks. These major questions needed to be addressed if an accurate picture of the ornamental landscape was to be achieved. It was therefore decided that the use of palynological and phytolith analysis to augment standard archaeological techniques would best serve these goals. The use of both palynology and phytolith analysis was intended to minimize the limitations of both types of data.

Our field methodology and sampling strategy was chosen to attempt to maximize the effectiveness of both types of data. During excavation three separate soil samples, one each for pollen, phytolith, and soil chemical analysis, were taken from every stratigraphic layer within every 5' by 5' square in the excavation area. The samples were taken from the middle of each stratigraphic layer by hand excavating roughly the top 1/3rd of the soil layer before collection took place. Then, the sample was obtained by taking several thin scrapings from across the layer in the center area of the 5 x 5, to roughly randomize the soil from the quadrant. A quantity of soil sufficient to fill a single cardboard sample box, approximately 150 cu. centimeters of soil, was taken from each layer context. Features, such as the planting holes or the fill soil surrounding the French drain, were also sampled this way but, larger quantities, up to 800 cu. centimeters, were occasionally obtained, in case more soil was needed to facilitate different types of analysis in the future. Large excavation areas were also utilized to facilitate distributional analysis. In the central south lawn excavations a single large cross-shaped excavation area 40 ft. x 40 ft. across was opened to provide comparative samples from the terrace bank running north-south, and from the lawn surface through the terrace top, running east to west.

PHYTOLITH ANALYSIS

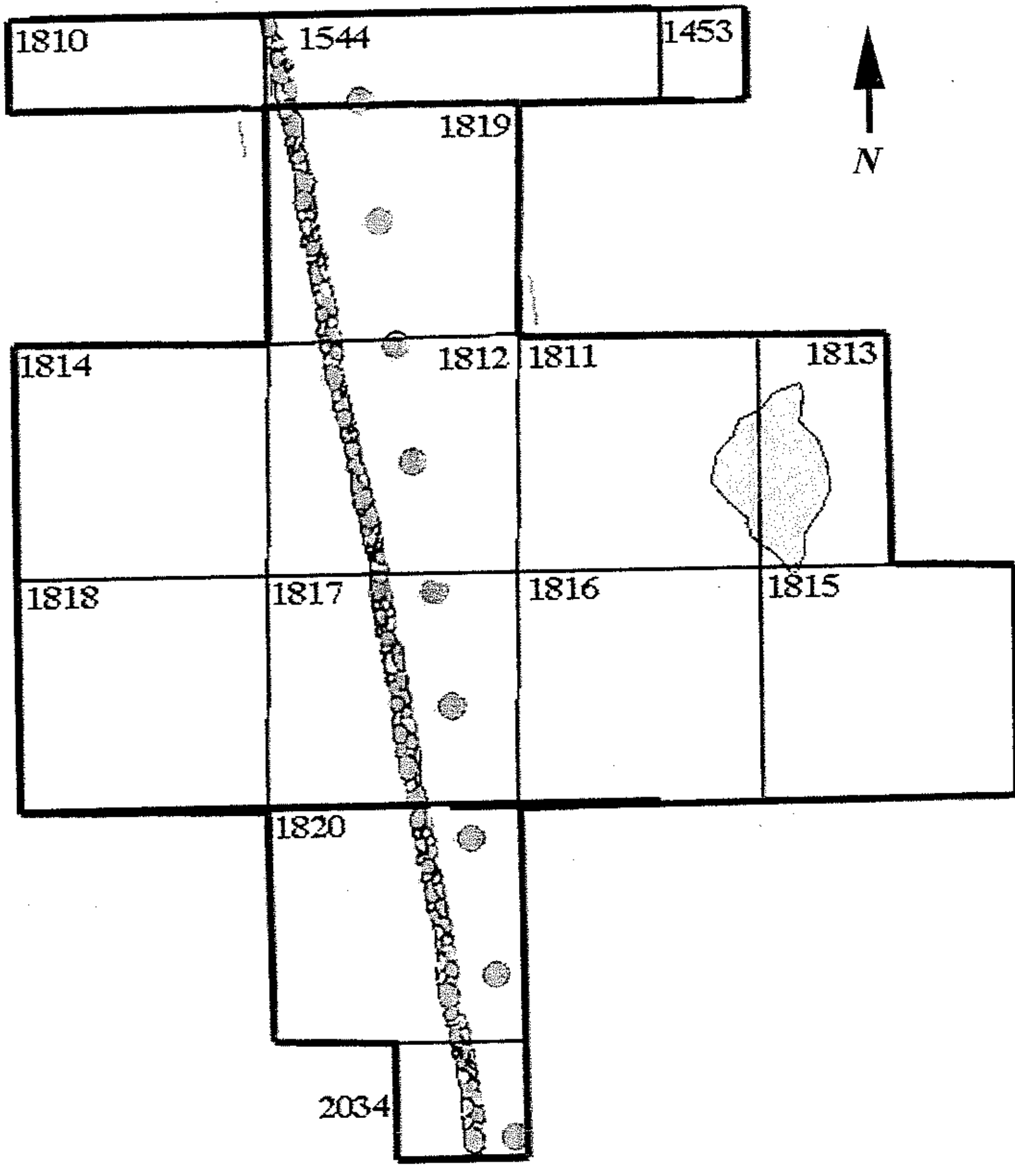
Phytoliths are microscopic opal silicates, and their name literally means *plant stone*. All groundwater contains dissolved silica and as water is carried through the roots and into the circulatory system of plants, many build up silica in different places as the water is used by the plant and evaporates. Different plants with differing cell structures, leaves, or circulatory systems will produce different shaped phytoliths (Piperno 1988:11-13). When the plant dies, these microscopic opals drop to the ground where they are generally location specific, a trait that is useful for area or distributional analysis. Unfortunately, not all plants produce diagnostic phytoliths, and those that are diagnostic are usually only family, and occasionally genus, specific.

In the fall of 1998, 25 soil samples from known Jefferson era contexts from the south lawn excavations were sent to Dr. Lisa Kealhofer and Kelly Sullivan, at the Department of Archaeological Research at The Colonial Williamsburg Foundation. Kealhofer's full report, includijng the raw data from phytolith counts, is included as Appendix 1 of this report. The results suggest that phytolith analysis is probably not going to be broadly useful for identifying specific ornamental plant species in the core area. However, the data indicated that important differences between areas on the south lawn could be discerned, and may be a valuable tool for discovering what the lawn, terrace banks, and planting areas looked like during Jefferson's ownership of the property.

The phytolith counts on the lawn surface, terrace bank and terrace top were dominated by grasses and weeds. The Pooideae types are generally representative of festucoid grasses, types that are usually introduced species utilized for forage. The Panicoideae phytoliths are indicative of tall, native grasses that are found naturally occurring in the region. The Chlorideae types are also native grasses, but are typically short grasses and weeds, often found to appear in areas of disturbed soil (Kealhofer, personal communication).

The data indicates that the lawn surface and the tops of the terraces were covered by Pooideae types, the Festuca or festucoid grasses which are typically introduced and intentionally planted species. The terrace bank samples indicated slightly different zones existed along the slope of the bank from north to south. Kealhofer notes "[The data] suggests some patchy differences in grass taxa on the up side of the terrace slope. This patterning (areas of chloridoid and panicoid, respectively) is suggestive

FIGURE 29: Phytolith sample location key



LAYER SAMPLES
1812 K/1
1812 K/2
1812 K/3
1812 K/4
1814 G/2
1814 G/4
1815 G/1
1816 F/3
1816 F/4
1817 F/1
1817 F/2
1817 F/3
1817 F/4
1818 F/4
1819 F/1
1819 F/2
1819 F/3
1819 F/4
1820 E/1
1820 E/2
1820 E/3
1820 E/4

FRENCH DRAIN SAMPLES
1812 P/3
1812Q/3

PLANTING HOLE SAMPLE
1817J

of weeds, or lawn edge, where variability in moisture and/or light would cause differences in species present. (Kealhofer 1998)." This distribution might be explained by a combination of an open soil planting area in conjunction with areas of shade and sun created by the growth of the south lawn ornamental shrub types as they matured. It may also indicate areas of shade created by Kentucky Coffee trees along the terrace banks, though this is doubtful since the pollen data did not suggest a strong presence of these locust trees nearby. What is clear from the analysis is that the terrace bank contained different grass types, native weeds, than the surface of the sunken lawn, containing intruduced festucoid grasses. The data clearly showed that these two areas were planted or managed differently in Jefferson's time.

Arborial/dicot phytoliths were high in the planting hole samples, and these samples were different enough from the lawn layer samples to indicate clearly that this soil originally came from somewhere other than the south lawn. This appears to confirm an initial hypothesis regarding the gardening practices used by Jefferson in planting the south lawn shrubs. Documentary references to a nursery, garden, truck patch, etc. suggested that Jefferson first placed seedlings or cultivated plants from seeds in these areas to get them established and healthy. It would logically follow that he would then have them replanted them in their final positions in the ornamental landscape when the plants reached a certain maturity. This hypothesis appears to be confirmed by the unique phytolith signature of the planting hole soil, which clearly appears to have been brought to the south lawn from another location.

The phytolith assemblage from the planting hole soil contains 20% arboreal/dicot types compared to an average of only 3% in the lawn and terrace soil layer samples. Phytoliths attributable to Oak species were high in planting hole soil. This information was also confirmed by the pollen analysis, which indicated that Quercus (Oak) pollen was significantly higher in planting hole samples (Anderson 2000:13). It is especially interesting that phytoliths attributable to the Oleaceae family were identified in the planting hole and terrace bank soils, since Lilacs are in this family and are one of the five species documented by Jefferson in this area. This data may indicate that the planting hole soil came from an area of the garden/nursery where young lilac shrubs were being propagated. However, Kealhofer indicated that this phytolith type might also be from Lingustrum, or privet, an ornamental Jefferson also planted at Poplar Forest and may have been cultivating in the nursery as well.

In addition, Kealhofer also identified Liliaceae phytoliths in two terrace samples, as well as in one planting hole. Jefferson planted several ornamentals belonging to the lileaceae family at Poplar

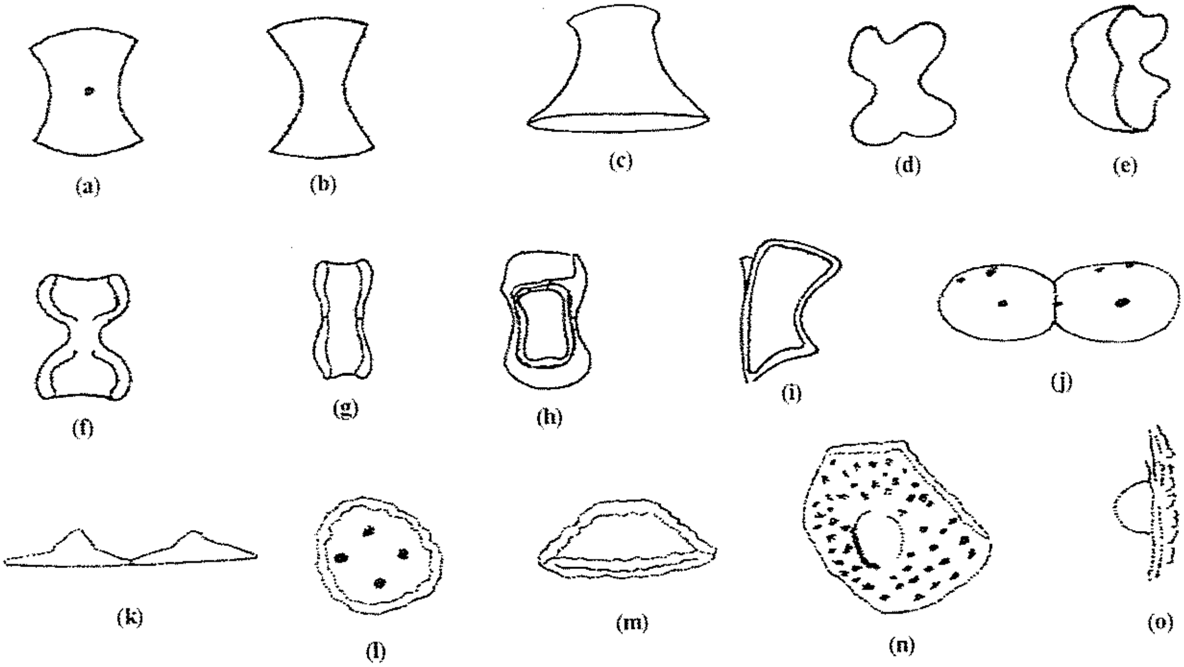


FIGURE 30: Examples of phytolith shapes viewed from different orientations: (a)-(c) saddle shaped; (d) and (e) cross shaped; (f) and (g) dumbell shaped; (h) and (i) bamboo short cell; (j) and (k) Cyperaceae shapes; (l) and (m) Palmae conical to hat shaped; (n) and (o) dicotyledon seed phytoliths (from Piperno 1988;57).

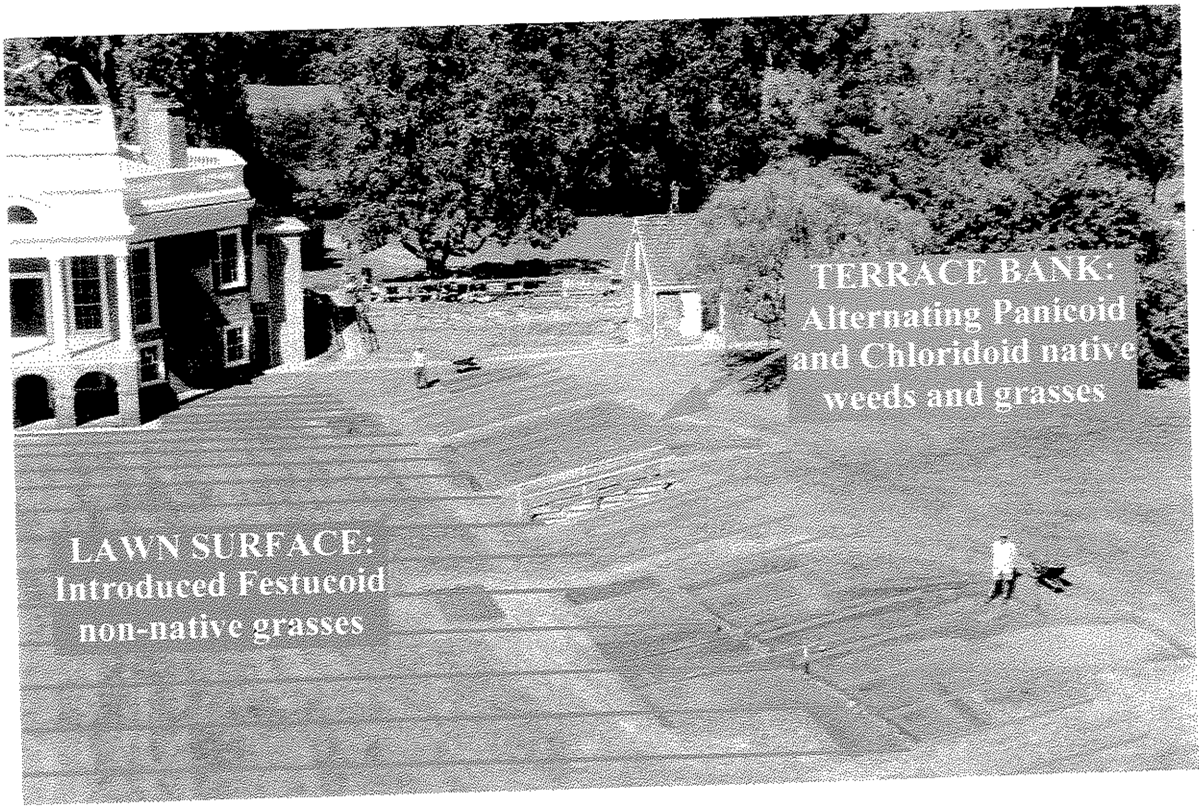


FIGURE 31: Area distinctions based on phytolith analysis. The lawn surface was composed primarily of introduced Festucoid grasses, while the terrace bank was distingushed by Panicoid and Chloridoid types. The alternating sequence of Panicoid and Chloridoid native weeds and tall grasses may represent micro-area of sun and shade, underneath and around the south lawn shrubs.

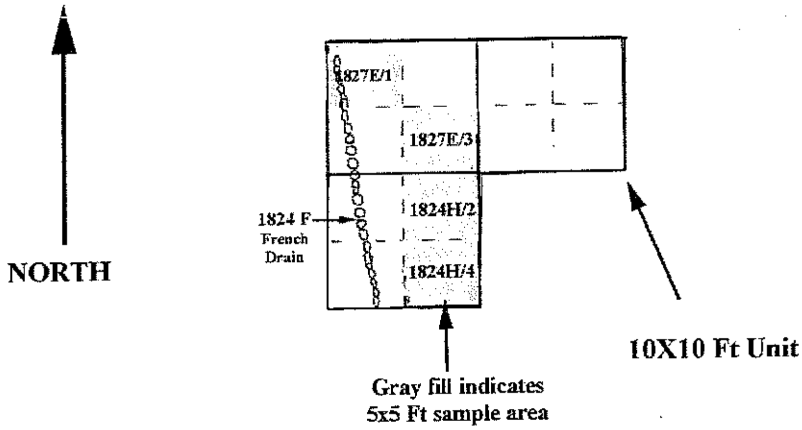
Forest, including daffodils, jonquils, narcissus, hyacinths and tulips, and pollen analysis also identified pollen from an as yet unidentified Liliaceae species. No other phytoliths from ornamental plants could be identified with any certainty, although Kealhofer has noted that pollen types found in these same soils may be used to narrow the range of possibilities for specific phytolith types within the family level of the taxonomic hierarchy. Future comparison of the phytolith data to the pollen data may bring a greater level of specificity to the phytolith analysis than was achieved in this initial analysis.

PALYNOLOGICAL ANALYSIS

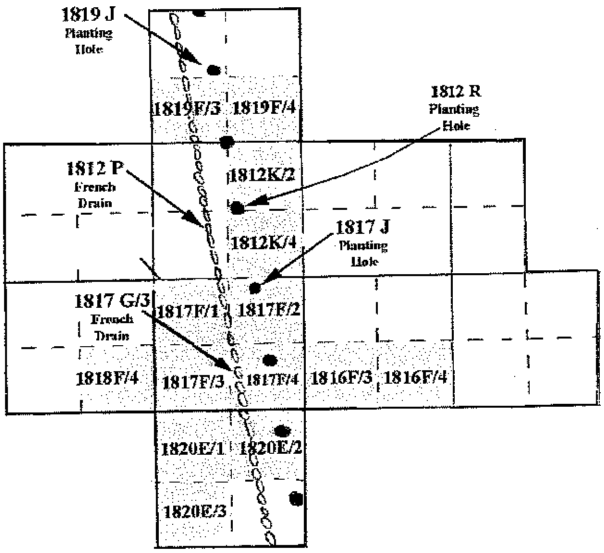
Palynology offers a better chance of obtaining information on specific species based on diagnostic pollen shapes for ornamental plants in the core area. Pollen distribution is dependant on the size, shape, and weight of the particular pollen grain type. Anemophilous plants, like Pine or Oak, rely on wind scatter for pollen dispersion, and typically produce pollen in large quantities (Anderson 2000:3). Pollen from these plants can travel great distances, and is not useful for the location specific information sought by this study. However, because most of the ornamentals on the south lawn were entomophilous (insect pollinated), the pollen dispersion could be limited spatially so that some locational information may be gained through charting their spatial distribution. Unfortunately, these plants also produce far fewer grains than anemophilous plants, making their identification in anthrosols more difficult. In addition to information about the ornamental landscape, palynoligical analysis can also shed light on the macro-environment surrounding Poplar Forest during Jefferson's ownership of the property.

Between the fall of 1998 and the fall of 1999, a total of 37 soil samples from core area excavations were sent to Dr. Scott Anderson, director of the Northern Arizona University Center for Environmental Sciences and Education. As discussed in the introduction, each sample was obtained utilizing a standardized collection methodology, and samples chosen for analysis were from known Jefferson-era contexts which offered the best opportunities to answer our research questions relating to the ornamental landscape. Samples from five different contexts were analyzed. The majority of sample chosen for analysis came from the Jefferson-era soil layer from the sunken lawn surface and east terrace bank, and the planting holes from the west and east banks. Fill soil surrounding the east bank and west bank French drains, soils from Jefferson era planting features from the garden south of the sunken lawn, and a sample of the the pre-1806 plowzone soil sealed beneath the west mound were also analyzed, though in comparatively smaller numbers.

FIGURE 32: Pollen sample locations



SAMPLE KEY:



Jefferson Soil Layers:

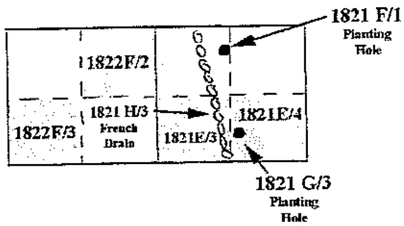
1827E/1
1827E/3
1824H/2
1824H/4
1819F/3
1819F/4
1812K/2
1812K/4
1817F/1
1817F/2
1817F/3
1817F/4
1816F/3
1816F/4
1818F/4
1820E/1
1820E/2
1820E/3
1820E/4
1822F/3
1822F/4
1821E/3
1821E/4

Planting Holes:

1819J
1812R
1817J
1821F
1821G

French Drain:

1824F
1812P
1817G
1821H



The initial analysis of these samples was done by Dr. Anderson utilizing a standard count procedure of 300 grains per sample. However these counts were dominated by the top five pollen types, Picea, Ambrosia, Quercus, Chenopodiaceae, and Poaceae. These accounted for more than 92% of the total pollen in the counts, and none of these species were the ornamentals we were trying to isolate. To test the effectiveness of higher pollen counts for revealing less numerous pollen types, four samples previously counted at 300 grains were recounted at 600 grains per sample, and four new samples were processed and counted at 600 grains per sample. These counts did reveal ornamental pollen types that did not appear in the smaller counts. Thirteen new samples were then processed and counted at 1000 grains per sample, and five 2000 grain counts were attempted, as well. By experimenting with pollen counts of different sizes, this process indicated that higher counts can be effective in identifying rare pollen in samples The table below shows the increasing pollen richness of the higher counts, and indicates that on average, the 2000 grain pollen count revealed eight pollen types that were not found in the standard count.

POLLEN RICHNESS IN SAMPLES

Count	Average# of pollen types	# of samples
200 gr.	14	28
600 gr.	19	8
1000 gr.	21	13
2000 gr.	22	5

Several broad trends are apparent from analysis of the pollen data. All pollen counts and pollen percentages for each sample and context are included in Dr. Anderson's report, Appendix 2. As in the phytolith study, the planting hole soils clearly appear to have been brought to the south lawn from another location. The pollen signature of the planting holes contained an average of nearly 34 grains per sample of oak (Quercus) pollen compared to the Jefferson layer mean of 18 grains per sample. The planting hole samples also included fir, spruce, hemlock, alder, birch, hickory, hazelnut, walnut, and aspen pollen, though in numbers roughly comparable to the south lawn layer samples. The planting hole soil contained comparatively high numbers of Ambrosia, or Ragweed pollen, with an average of 60 grains per sample compared to 39.4 grains per sample in the Jefferson-layer soil. This plant is considered to be a "disturbance indicator", meaning that it grows very quickly in freshly disturbed soils (Anderson Personal Communication, 1999). This also seems to indicate that the planting hole soil was brought to the south lawn from a garden/nursery area at Poplar Forest, where ragweed was beginning to grow in the freshly tilled soil. It is also possible, however, that the garden/nursery was located adjacent to an agricultural field that was allowed to go fallow, producing the high ragweed counts in the planting holes. Although many arboreal pollen types were higher in the planting hole soil than in the south lawn layer soil, one interesting exception is pine. The counts of pine pollen were more than twice as high per sample in the Jefferson layer contexts as they were in the planting hole contexts. Pine pollen is large and light, becomes wind-borne easily, and the plume from a single tree travels great distances. The pine pollen should therefore have been less location specific than nearly every other pollen type. Further testing is needed to understand why the pine pollen distribution was so heavily skewed toward the south lawn area.

The phytolith analysis indicated that the lawn surface and terrace bank were planted differently during Jefferson's ownership of the property. Kealhofer found that while the lawn surface was composed primarily of introduced Festucoid grasses, the terrace bank was a mixture of tall native grasses and weeds. Pollen analysis revealed significantly higher amounts of Ambrosia pollen (ragweed) and Chenopodiaceae pollen, probably indicative of native weeds on the terraces. The pollen analysis confirms that grasses were abundant in the localized area around the sample areas on the south lawn. Poaceae pollen was found in amounts exceeding 10% of total pollen in most Jefferson layer samples, but trended lower in planting hole and French drain samples. Anderson notes that values as high as 10% grass pollen are rare in areas surrounded by forest, and believes it likely that the poaceae pollen from the Jefferson layer samples on the bank can be attributed to a small amount of dispersion occurring from the lawn surface (Anderson Personal Communication, 1999).

A comparison between the north, central, and southern excavation units showed significant differences. Chenopodiaceae pollen counts tended to be higher on the southern end of the lawn, as did ambrosia pollen counts. This may indicate proximity to disturbed soil, which would invite fast growing weeds in the garden area south of the sunken lawn. It is also interesting to note that the concentration of Poaceae pollen tended to be higher the further south the samples were taken. This is puzzling given the fact that the entire lawn surface should have been planted with grasses, and one would expect a relatively uniform distribution north to south along the lawn. However, the Poaceae family includes many native grasses as well as introduced species, and this distribution may be the result of native grasses from nearby areas of soil disturbance to the south showing up in the pollen

FIGURE 33: Pollen counts, sorted by excavation context

POLLEN TYPE	COMMON NAME/ possible species	Grain Count	% of total pollen	French dr. mean/sample (n=5)	Plant Holes mean/sample (n=14)	TJ Layer mean/sample (n=30)
Total		24821				
Abies	Fir	4	0.01%	0.25	0	0.08
Cupressaceae (Famn)	Pine,cedar, Juniper,cypress	70	0.28%	0.25	2.4	1.6
Picea	Spruce	34	0.13%	0	0.44	0.44
Pinus	Pine	11988	48.29%	216	182.3	278.4
Tsuga	Hemlock	196	0.70%	3	2.5	4.8
Alnus	Alder	83	0.33%	1.2	1.5	1.8
Betula	Birch	74	0.26%	0.6	1.7	1.56
Carya	Hickory	250	1.00%	6	3.4	5.7
Juglans	Walnut (black?)	149	0.60%	1.8	2.4	3.5
Populus	Lombardy Poplar, Euro.Aspen	3	0.01%	0	0.2	0
Quercus	Oak species	2401	9.67%	52	60.3	43.2
Tilia	Chicory	4	0.01%	0	0.07	0.1
Ericaceae (Fam)	heather,azalea, laural, Rhododendron	2	0.01%	0.8	0.07	0
Euphorbia	Dixie sandmat	3	0.01%	0	0.2	0
Lonicera	honeysuckle(caprifol.-Guelder)	2	0.01%	0.2	0	0.03
Plantago	English Plantain	1343	5.41%	26.8	45.5	19
Rhamnaceae (Fam)	buckbrush, pinemat, jujube, ceanthus	2	0.01%	0	0.14	0
Ribes	Gooseberry	2	0.01%	0	0	0.06
Ambrosia	Ragweed	6015	24.30%	81.4	165	109.6
Asteraceae (Fam)	Ragweed, lettuce, chickory,thistles, sunf	308	1.24%	13.8	5.6	5.3
Lactuceae	Lettuce	101	0.40%	1.2	1.57	2.5
Brassicaceae (Fam)	Radish, cabbage, kale, luneria	2	0.04%	0	0.07	0.03
Caryophyllaceae (fam)		14	0.05%	0.4	0.3	0.3
Chenopodiaceae (Fam)	Goosefoot, Mexican Tea	716	2.88%	12.8	12.2	16.3
Eriogonum		91	0.30%	3.4	2.5	16.3
Fabaceae		60	0.20%	0.2	3.8	0.23
Lamiaceae		1	0.01%	0	0	0.03
Liliaceae (Fam)	Daffodils, narcissus, jonquil,tulip, lily, hy	1	0.01%	0	0	0.03
Onagraceae (Fam)	Primrose, suncup, nightshade, carolina	1	0.01%	0	0	0.03
Polemoniaceae (Fam)	Gillyflower,colomia, gilia, phlox, linanthus	2	0.01%	0	0	0.06
Polygonaceae		2	0.01%	0	0	0.06
Poaceae (Fam)	Grasses	2137	8.60%	47	42.3	43.7
Large Poaceae		527	2.12%	7.6	9.4	11.9
Zea	corn	121	0.40%	3.4	1.57	2.73
Hibiscus	Althea(Hibiscus syriacus)	14	0.05%	0	0.2	0.36
Rosa	rose	4	0.01%	0.6	0.07	0.06
Apiaceae (Fam)	Carrot, parsley, dill, celery, coriander	83	0.33%	0.33	4.2	0.83
Cyperaceae (Fam)	sedge, tule, bullrush, fimbry	8	0.03%	0.2	0.14	0.13
Utricularia	Bladderwort	3	0.01%	0	0	0.1

counts. Because most grass pollen is not species specific, it is likely that study of the grasses present in these areas may be better informed by the phytolith distribution within different south lawn contexts.

Many pollen families identified in this analysis include vegetables known to have been cultivated by Jefferson at Poplar Forest. Unfortunately, no specific species were identified within these families during the analysis. It may be significant that pollen from several of these families trended higher to the south of the excavation area, where evidence of a Jefferson-era garden has been found archaeologically. While not proof, the different spatial distribution may suggest that at least some of these pollen grains can be attributed to cultivated fruits and vegetables within that garden.

Ribes pollen was found in Jefferson era layer samples from the lawn surface, in the central and south excavation areas. Jefferson notes the presence of Ribes, or Gooseberry, several times at Poplar Forest in documents, though the specific area/garden he is referring to is not clear. On February 11, 1811 he wrote that he was having difficulty preparing planting beds for asparagus, raspberry, and gooseberry bushes due to frozen ground. By February 24, the ground had apparently thawed enough that he notes: "planted 30. Gooseberries. W. end of patch"(Betts 1944:646). In May of 1812, Jefferson wrote "...weed the gooseberries, raspberries, and strawberries" (Betts 1944:488) It should be noted that gooseberries are a native plant, and this pollen may not be the result of Jefferson's gardening efforts. However, the relatively low concentration of Ribes pollen might be expected to be higher if large numbers of them were growing naturally in the area.

Lactuca pollen also trended higher to the south, and could be attributable to lettuce. Apiaceae pollen, a family which includes carrot, celery, parsley, and coriander, also trended higher to the South. Brassicaceae pollen was found in the Jefferson layer in the south lawn, as well. This family includes luneria, radish, cabbage, kale, sweet allysum, and lilacbush. Radish, cabbage, and kale were known to have been cultivated at Poplar Forest by Jefferson. It is therefore possible that the Brassicaceae pollen might be attributable to grains being blown from a nearby garden. It could also have been the result of ornamental plantings of species not noted by Jefferson in documents. However, this pollen may also be attributable to native weeds. Zea, corn pollen, also trended higher to the south. Fabaceae pollen was also found. This family includes the Kentucky Coffee tree (discussed later), as well as robinia hispida and Redbuds mentioned by Jefferson in documents. The Fabaceae pollen may also be evidence of cultivated species in the legume family.

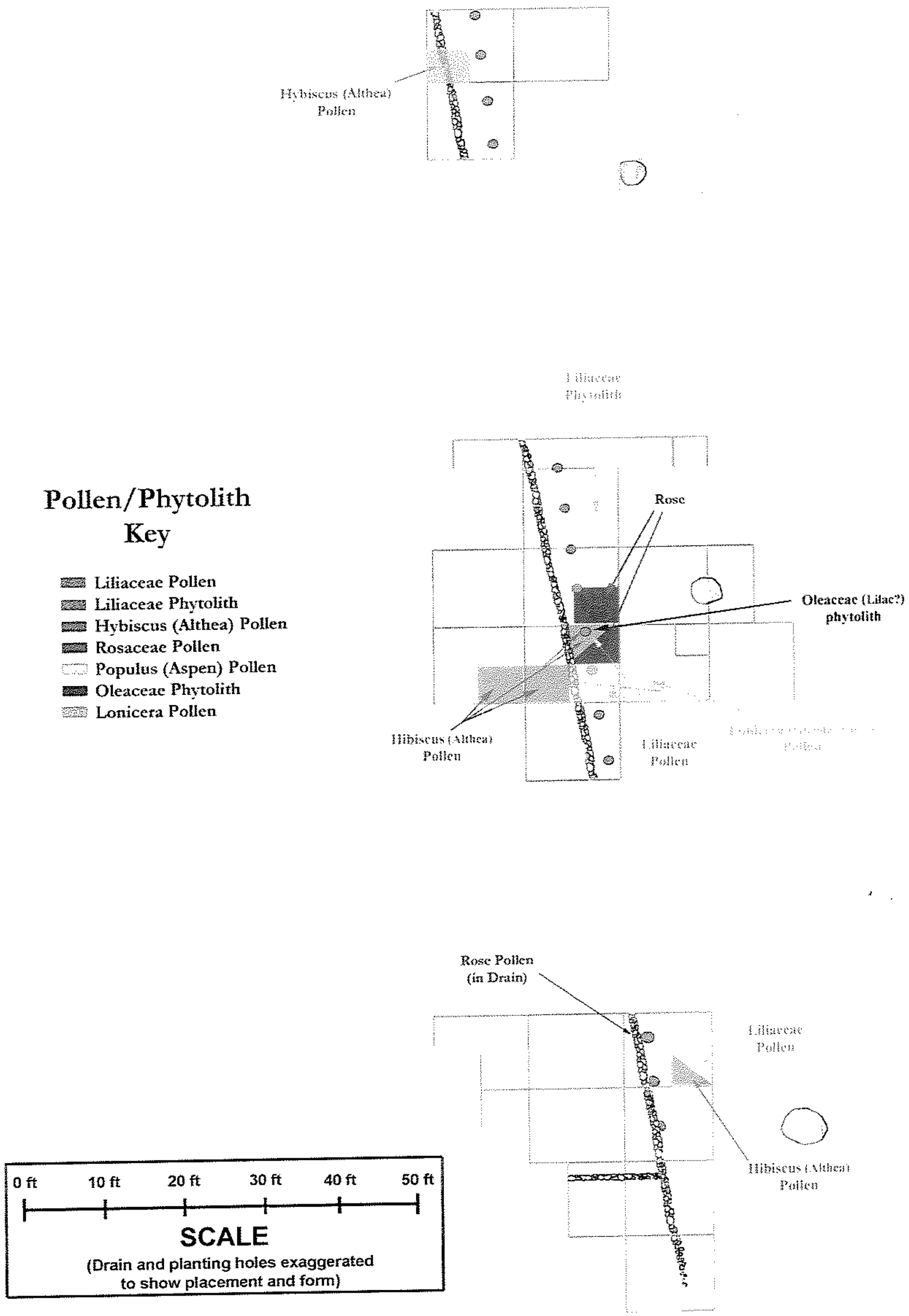
The analysis of two soil samples from features believed to be Jefferson-era planting beds within the garden is pertinent to this question. The samples contained Fabaceae, Lactuceae, Brassicaceae, Zea, Apiaceae, and large poaceae pollen, all of which are, or potentially are, from cultivated plants. However, the counts of these types were not high enough to definitively prove that this garden was the source of the pollen. In addition, no Ribes pollen was present.

A single soil sample was examined from an agricultural plowzone dating to the period before the ornamental landscape was constructed may be important to this question. This sample came from under the west mound, which sealed the pre-1806 plowzone and protected it from the subsequent ground disturbing activities which destroyed much of the intact soil within the core area. The pollen signature from this context offers a window on the micro-environment around Poplar Forest prior to the ornamental landscape. The large Poaceae pollen could be attributable to cultivated wheat in this location or in nearby fields. The much lower percentage of hardwood pollens in these samples indicates native forests in the area. The much lower percentages of these types in the later dating samples shows that significant clearing of these forests had proceeded in the intervening years. In addition, the absence of Ribes, Apiaceae, Lactuceae, and Fabaceae pollen in these samples may indirectly indicate that the presence of those pollen types in the contexts discussed previously may well be attributable to intentionally cultivated plants introduced later to Poplar Forest. If they were simply the result of weeds or native species in the area, then they likely would have appeared in the pre-ornamental landscape samples. Further research and pollen testing of garden contexts is needed to clarify this debate, but at present, the data tend to indicate that this area could have been a garden.

EVIDENCE OF ORNAMENTAL PLANTINGS

Six pollen types were identified which may have come from ornamental plants. Although in several cases the pollen was only diagnostic to the family level of the taxinomic hierarchy, this may still be enough to at least confirm the presence of ornamental species listed in surviving Jefferson documents. It should be noted, however, that the 300 grain counts did not produce enough diagnostic pollen grains from ornamental species to facilitate distributional analysis. Most of the ornamentals were represented by only 1 or 2 grains and were found in the 600, 1000, and 2000 grain counts only. The majority of these pollen types were found in Jefferson layer samples. Therefore, locational information will be limited until other contexts have been analyzed using higher pollen counts per sample. Because the planting hole soil was in essence a sealed context after the initial planting episode, pollen types found within this soil represent pollen from the area of the nursery/garden where the young plants were propagated, rather than pollen from the ornamental landscape. Three grains of Populus, or aspen pollen, were found in planting holes; one from the east bank (ER-1819J) and two from the west bank (ER-1941G and ER-1940H). This pollen may be from Monticello aspen, European aspen and

FIGURE 34: Ornamental pollen/phytoliths



Lombardy poplars that Jefferson was planting at Poplar Forest as ornamental species. Aspen is not native to this area, the Populus pollen in three planting holes strongly indicates that Aspen saplings were being grown in a nursery area, adjacent to the immature shrubs also being propagated in the nursery, prior to being planted in the grounds.

Liliaceae pollen was found in the Jefferson layer, and one lileaceae phytolith was also found in this context. The lileaceae family is quite large, but it includes a number of plants noted as being planted at Poplar Forest by Jefferson. Jefferson wrote from Poplar Forest to Monticello in 1816 and asked daughter Martha:

> Would it be possible for you to make up some of the hardy bulbous roots of flowers as to come safely on the mile. Daffodils, jonquils, Narcissuses, flags & lillies of different kinds, refuse hyacinths, &c. (Betts 1944: 562)

Martha replied that most of the types listed could not be moved at that time without damage, but sent along tulips and hyacinths (Betts 1944: 562). Unfortunately, there is no information regarding the locations of their planting in the landscape. The pollen and phytolith evidence suggests that Jefferson may have planted bulbs from the Liliaceae family in the margins between shrubs on the terrace bank.

Onagraceae pollen was found in the Jefferson layer on the terrace bank. The onagraceae family includes primrose, nightshade, suncup and Carolina primrose (willow). Jefferson planted the common primrose, Primula vulgaris, at Monticello and may have brought it to Poplar Forest, though it is not noted in Jefferson's planting memorandum. Jefferson also planted willows of different kinds at Poplar Forest and may have included the Carolina primrose as well, though only weeping and golden willows are named specifically (Betts, 1944:494).

Pollen from two of the five south lawn ornamental shrub species were positively identified, and it is possible that evidence for a third type was found, as well. The December 1812 planting memorandum notes "Plant on each bank, right & left, on the S. side of the house, a row of lilac, Altheas, Guelder roses, Roses, Calycanthus" (Betts 1944:494). Althea, Rose of Sharon (Hibiscus Syriacus) was identified in samples from the north and central excavation areas. The pollen from the central excavation area samples appears to be spatially coherent, centering around planting hole 1817J which contained three grains of Hibiscus pollen. The Jefferson-era soil layer in 1817 contained three more grains, and four grains were found scattered in adjacent units 1812 and 1818. The evidence suggests that planting hole 1817J once contained the Althea shrub. In addition, one grain was discovered in the southern excavation area in ER 1821 E/4, and six grains were identified in ER 1827 E/3, in the northern excavation area.

Rose pollen (Rosa) was identified in three contexts; a planting hole, French drain, and the Jefferson-era soil layer. One grain was identified in planting hole 1941G on the west terrace bank. One grain was identified in a French drain sample in ER-1821 H/3. Two grains were identified in samples from the east terrace bank, in ER- 1817 F/2, and ER 1812 K/4. These quadrants are not adjacent to each other, but may suggest close proximity to one of the rose bushes. Jefferson grew at least 16 varieties of roses at Monticello and does not specify what type of roses he was planting on the south lawn. Research has indicated that Musk Rose or Sweet Briar Rose are the most likely varieties (Greenway 1999: 12-14), but it is not possible to identify these specific rose types from the pollen alone.

Two grains of lonicera pollen were found, one in the French drain in ER-1817, and the other in the soil layer in ER-1816. Although lonicera, commonly known as honeysuckle, is a plant which is native to Virginia, it is from the Caprifoliaceae family which includes the Guelder Rose, a type of viburnum that was also one of the five shrubs planted on the south lawn by Jefferson. Anderson suggests that pollen grains from Honeysuckle and Guelder Rose could be very similar, and said that it is possible that these grains, though identified by the technician as honeysuckle, could actually be Guelder Rose pollen. Further analysis may reveal the true derivation of these pollen grains.

It is important to note that seven Oleaceae phytoliths were found in east terrace bank contexts, including two in ER-1819F/4, two in 1817 F/4, and three in the planting hole 1817J. The Oleaceae family includes Lilacs, and because they are noted in documents for this location, it is quite possible that these phytoliths are attributable Lilac shrubs. When added to the possible Guelder Rose pollen (tentatively identified as lonicera but possibly Guelder Rose), and to the positive identifications of Rose and Althea pollen, four of the five shrub types listed by Jefferson are accounted for. Distributions of these pollen types overlap, and hence do not strongly indicate an exact planting plan. However, only selected samples were chosen for the ultra-high 1000 and 2000 grain counts due to the expense of this method. It is quite possible that with enough research and very high pollen counts, the spatial distribution of these shrubs could be revealed. This study suggests that a very high degree of detail can be revealed through this type of analysis.

As noted earlier, Fabaceae pollen is notable for its low numbers in any of the samples tested. Large Kentucky Coffee trees appear in historic photographs as early as the 1910's on the tops of the terraces of the sunken lawn. These trees have been hypothesized to have been Jefferson era plantings

(Brown 1990: 126). At the time of this writing it is considered doubtful that the Kentucky Coffee trees were a Jefferson period planting due to the very low amounts of Fabaceae pollen in all of the samples analyzed to date. The location of these trees, directly overhanging many of the sample location areas, would have almost certainly resulted in at least a strong signature if these trees were living during Jefferson's ownership of the property. Instead, this pollen may be attributable to Redbuds or robinia hispida, both mentioned in Jefferson's planting memorandums for the core area at Poplar Forest. Robinia Hispida was planted in the oval bed north of the house, and redbuds were part of the planting clumps at the angles of the house (Betts 1944:494,563). Pollen from these types could also result from their propagation in a garden or nursery near to the excavation area.

No magnoliaceae pollen was identified, although dendrochronology indicates that a small grove of Tulip Poplars (Liriodendron tulipfera) stood just 200-300 feet away in the north core area. However, this may be explained by differential pollen preservation. Anderson notes that fossil pollen preservation is mainly due to the sporopollenin composition of the "shell" of the pollen grain, and that since Poplar pollen has a very low sporopollenin content, this pollen would not survive the acidic clay soil in these contexts (Anderson 2000:3).

CONCLUSIONS

It is clear from this study that palynology and phytolith analysis can be useful in the study of a relic ornamental landscape. A number of firm conclusions can be drawn from this study regarding the physical form of Jefferson's ornamental landscape at Poplar Forest, and several other conclusions are hinted at by the data and will require further study. The nature of the lawn surface and the terrace bank is best revealed through the phytolith study. The lawn surface appears to have been planted with an introduced festucoid grass, while the terrace banks contained tall natural grasses and shorter weeds. Variability within the terrace bank samples suggests areas of sun and shade, and may be the result of the south lawn ornamental shrubs growing and changing the growing conditions beneath them through time.

Both pollen and phytolith analysis confirmed the working hypothesis that Jefferson first cultivated his ornamental plantings in a garden/nursery, then replanted them in the ornamental landscape once they were established. The pollen and phytolith signatures from the planting hole soil were markedly different from the samples taken from south lawn layer contexts. It is clear that this soil originally was located in the garden/nursery and was moved in the balled roots of the plants and placed in the planting holes on the south lawn.

The planting hole soil also offers a glimpse into the garden/nursery area where these plants were propagated. It contains significantly higher amounts of Ambrosia and Chenopodiaceae pollen, both indicative of disturbed soil, and hints that the garden/nursery may have been located adjacent to cleared agricultural fields. The Arboreal/Dicot assemblage in the planting holes also suggests that the trees surrounding the garden/nursery were different than those in the immediate vicinity of the south lawn. The presence of several types that do not appear in the south lawn soils bear this out, and the level of Oak pollen and Oak phytoliths is especially high in the planting hole soils.

Several broad trends in the pollen distribution reveal information about the ornamental landscape. The presence of a garden area south of the south lawn is suggested by several lines of evidence. First, the Lactuceae Brassicaceae, Fabaceae, pollen trended higher in the southern excavation area. These pollen types may be the result of cultivated vegetables Jefferson notes as growing at Poplar Forest. In addition, the ambrosia, Chenopodiaceae, and poaceae pollen all trended higher to the south, suggesting that an area of disturbed soil was nearby, resulting in pollen from fast growing weeds concentrating on the southern end of the lawn. Finally, with the exception of pine pollen, the arboreal pollen assemblage was generally very uniform throughout the lawn, indicating that the sampling strategy used was successful in retrieving samples that were from comparable contexts.

The south lawn plantings noted by Jefferson have been partially confirmed by this analysis, and strongly hint that with higher pollen counts, distributional analysis may be possible. The phytolith study identified Onagraceae pollen in several contexts. This may represent the Lilacs noted by Jefferson on the south lawn, but may also represent another species since this phytolith is not species specific. No lilac pollen was identified in the initial round of testing, but may come to the fore through the greater use of higher pollen counts per sample. Lonicera pollen was identified in several contexts, and may be attributable to the Guelder Rose, since both Lonicera and Guelder Rose are in the Caprifoliaceae family. Further study may confirm presence of Guelder rose pollen, but current findings can only list this shrub as a potential identification. Rose pollen was definitively identified, as was Hibiscus pollen from Althea, Rose of Sharon. Two of the five south lawn shrubs have therefore been positively identified, and two more are listed as possible. Further research may provide enough data to begin to place these plants in their respective planting holes, though at present this is not possible.

This initial study has indicated that while ornamental plant pollen is identifiable the standard 200-300 grain pollen count used in most archaeological projects, the number of ornamental pollen grains produced by these counts is too small to provide meaningful distributional data that might be used to match a planting hole with a specific plant type. This study has shown the effectiveness of higher pollen counts at bringing rare pollen types to the fore, and it is clear that palynology has much to offer the study of ornamental landscapes. Future work at Poplar Forest will undoubtedly expand on the initial study discussed here.

CHAPTER 6: SOIL CHEMICAL ANALYSIS

It is well established that changes to soil chemistry are caused by a variety of past human activities, and archaeologists have made use of soil chemical analysis to answer a multitude of questions at many different site types. Perhaps the most common archaeological utilization of soil chemical analysis has been to determine past use areas and human activities at domestic sites, where fires or hearths, trash disposal, animal butchering, and human or animal excretion may significantly alter soil chemistry in discrete areas (Keeler 1978; Pogue, 1988; Heath 1999). While this focus on loci of habitation is understandable given that most archaeological research is conducted in these places, the usefulness of soil chemical analysis to studies in landscape archaeology has yet to be fully explored.

Excavations on the east terrace bank of the sunken lawn at Poplar Forest revealed intact stratigraphy dating to the ornamental landscape created by Jefferson from 1806-1823. Beneath the original Jefferson-era soil layer across the terrace bank, planting holes dating to the ornamental landscape were found to be completely intact. It was noted during excavation that significant differences between these contexts might exist chemically.

In anthrosols, high levels of potassium have been linked to wood ashes, and potassium has used to indicate places where fireplace remains were disposed of, where hearths were once located, or even to pinpoint burned structures (Keeler 1978; Pogue 1988). The presence of charcoal flecking in the Jefferson-era soil layer, and heavy concentrations of charcoal in the planting holes, suggested that fertilization with fire ashes might have been taking place. Excavations also revealed several pockets of what appeared to be decomposed mortar or plaster, suggesting that calcium might have been intentionally added to the soil as fertilizer, as well. Finally, a slight but regular artifact scatter was recovered throughout the Jefferson era soil layer and the planting hole soils. The specific artifact types suggested that they were the products of kitchen trash, and it was hypothesized that a kitchen compost pile might have been used to fertilize the soil layer and planting holes. If kitchen trash were being composted, the remains should be high in phosphate, present in human and animal tissue and waste (Keeler 1978; Pogue 1988; Heath 1999).

RESEARCH QUESTIONS

Although many specific plantings at Poplar Forest are noted in surviving documents, Jefferson's records have little to say regarding the particular gardening practices he used to create the landscape and to maintain plantings at Poplar Forest. For example on February 24, 1811, Jefferson notes "I had begun to prepare an asparagus bed..." (TJ to Martha Jefferson Randolph, Mhi) but fails to mention whether these "preparations" included the use of fertilizer. Jefferson does not specifically record using specific materials as fertilizers on the ornamental landscape at Poplar Forest, but he was clearly familiar with fertilization of gardening areas. A letter from his granddaughter Ellen Wayles Randolph notes that so much charcoal had been placed in the garden at Monticello in 1808 that:

> It looks rather dismal where ever the grass has not grown. It is quite black and excessively dirty to walk on. It is not near as bad as it was but it is disagreable and ugly (Betts and Bear 1966:340-341).

Jefferson later instructed his overseer to rake the charcoal into piles and remove it after the grass has gone to seed (Betts 1944:371). Excavation findings discussed later in this chapter confirm the use of charcoal in ornamental planting at Poplar Forest.

Jefferson also noted using manure as a fertilizing agent for his gardens. For instance, In 1808 he instructed his overseer:

> Begin at the S.W. end of the garden, and drop a good wagon load of dung every five yards along a strait line through the middle of the garden from the S.W. to the N.E. end. This will take between 60 & 70 loads in the whole, which will do for the first year (Betts 1944:383)

Jefferson was also a long-time advocate for the use of plaster or mortar as a fertilizing agent. Jefferson believed that the clay soils and climate of the Piedmont region of Virginia responded especially well to 'plaistering', and he called its use "the principle article for our improvements (of the soil in this area)" (Betts, 1944: 195-200).

Period gardening books, including several in Jefferson's personal library, describe the use of many different types of fertilizers. Though the specific chemical properties of these agents were unknown in Jefferson's day, the results of the use of different fertilizing agents in different soils and growing conditions was studied avidly, and a rich body of period literature exists on fertilization practices in the late 18th and early 19th centuries. Soils were described using the same textural descriptions based on particle size, from sand to clay, familiar to archaeologists today. However, soils were also classified by their observed fertility, and by the resultant plant growth in them. For instance, the clay subsoil comprising the terrace bank at Poplar Forest would have been considered a "cold" soil, needing to be "heated up" by the use of special fertilization techniques.

Jefferson owned the 1727 edition of *New Principles of Gardening* by Batty Langley, which stated "...stiff and cold clay lands are help'd by divers composts" and advocated the use of many different fertilizers, including rotten dung, sand, meadow topsoil, "sea-coal" ashes, and even pigeon dung (Langley 1727:31-33). Langley also mentions the use of chalk and/or lime for "stiff clays". A more modern text, the 1793 edition of *The Practical Farmer*, was actually dedicated to Jefferson by the author John Spurrier. He noted:

> Clay does not admit free access of heat and air... such manures as will open its pores, destroy its adhesion and correct its bad qualities, should be applied. Lime and coal or wood ashes.. are best adapted for clayey and stiff soil under the plow. (Spurrier 1793: 30)

Drawing on period gardening sources, Jefferson documents, and excavation findings, we hoped to address multiple research questions by utilizing soil chemical analysis of the sealed Jefferson-era contexts on the south lawn. In broad terms, the goal was to determine if human alterations to the soil chemistry of an ornamental landscape could be discerned through chemical analysis. Many specific questions grew out of this broad inquiry. Was Jefferson using fertilization to improve the growing conditions of the infertile clay subsoil on the south lawn? Could soil chemical data reveal multiple types of fertilizer being used in the same context? What were the specific conditions affecting the soil in different archaeological contexts that could be affecting the soil chemical data?

METHODOLOGY

The soil chemical analysis and data presented here are the results of a two-year process of excavation and research. Soil samples were obtained during excavation, and were chosen for analysis based on specific research questions. As the project progressed, the results were studied and new samples were then sent for analysis, either to address a question regarding the contexts of the previous samples or to provide a basis for comparison. One important area that was not given enough attention initially was subsoil samples. For the initial round of testing, samples were included from the entire stratigraphic sequence above subsoil, but it became apparent that without a baseline to compare this data to, there was no way to discern whether the chemical signature was caused by human alterations or the natural soil chemistry. This problem was addressed in subsequent testing.

A standardized technique for collecting the samples was used throughout. Soil samples were taken from every stratigraphic layer. The overlying fill soil was sampled from the center of each 10 x 10 ft. excavation unit. From the layer of 1830-1900 primary deposition and below, the sample

FIGURE 35: Soil layer being hand-excavated prior to sampling. Collection methodology was standardized throughout the project, with layer samples being taken from the plan-view center of each excavation quadrant, within the stratigraphic center of the layer. Planting holes and other features were sampled in the same way, except when the depth of features allowed for samples to be obtained from the upper and lower portions of the matrix.

interval was tightened, and samples were taken from every 5 x 5 ft. quadrant, within each stratigraphic layer of the 10 x 10 ft. excavation unit and from every identified archaeological feature. The soil layer was hand-excavated using a trowel, and the sample was taken from the plan-view center of the 5 x 5ft. quadrant within the middle of the stratigraphic layer. A quantity of soil sufficient to fill a single cardboard sample box, approximately 150 cu. centimeters of soil, was taken from each layer context. The amount provided a sufficient quantity of soil to yield two 75 cu. centimeter samples, 1 each for partial and total extraction testing. Features, such as the planting holes or the fill soil surrounding the French drain, were occasionally sampled in larger quantities up to 500 cu. centimeters, in case more soil was needed to facilitate different types of analysis.

A total of 54 soil samples were sent to the Virginia Tech Soil Testing Lab in Blacksburg, Virginia for chemical analysis using a partial extraction method. Three samples were tested from the 1950s fill soil, four samples were tested from the 1910s fill soil, and twelve samples were tested from the 1830-1910 primary deposition layer. Sixteen samples were tested from the Jefferson-era soil layer, eight planting hole samples were tested, and three French drain samples were tested. In addition, five subsoil samples, one mound construction layer, and two cultivation-zone samples from below the mound were also tested.

Archeologists often use agricultural soil testing labs because they are relatively inexpensive, charging around $7.00 per sample for partial digestion analysis of soils for pH, calcium, magnesium, phosphate and potassium. The vast majority of archaeological sites where soil chemical analysis has been conducted have been sites of permanent habitation. The standard agricultural lab soil tests are usually sufficient to roughly indicate human habitation or activity because the massive changes in soil chemistry wrought by long periods of human habitation leave large amounts of given elements available in the soil, even after an extended period of time. However, in a landscape archaeology project, the changes to soil chemistry are likely to be much more subtle, dependant on what in some cases could be a single episode of fertilization. The partial digestion method utilized by most agricultural soils labs is used to determine how many pounds per acre of a given element in the soil are available for a plant's use. A limitation of this type of analysis, especially for phosphate and potassium, is that a number of factors can act to bind available elements in the soil, meaning that the results are not necessarily an accurate reflection of the human alterations to soil chemistry. For instance, calcium can bind free phosphate, and the clays at Poplar Forest are naturally calcium rich. Aluminum and magnesium can also bind free phosphate, as can acidic clay soil.

To provide a basis for comparison to the partial digestion results, twenty-nine of the samples were re-tested using a total digestion solution by A&L laboratories in Richmond, Virginia. Unlike the partial extraction method, which reveals the amount of a given element which is *available* for a plant's use, the total digestions method reveals the *total* amount of a given element in the soil, regardless of whether it is available to a plant or not. Due to the greater expense of this method, the samples were only tested for total potassium, total phosphate, and organic content.

RESULTS OF ANALYSIS

The soil chemical analysis concentrated on three archaeological contexts from the sunken lawn area; the planting holes on the bank, the Jefferson-era soil layer lying across the terrace bank and over the planting holes, and the underlying subsoil. Subsoil was an appropriate "control" for testing changes to soil chemistry due to specific conditions on the site, and the history of the development of the stratigraphic sequence extant on the east terrace bank . The sunken lawn and terrace banks were excavated deep into subsoil when these landscape features were first constructed in 1807-1808, and the soil in the Jefferson-era soil layer and the planting holes was almost exclusively composed of this re-deposited red clay subsoil. All three of these contexts are the same age, from the same location and are of the same parent material and soil type (clay subsoil). Therefore, samples from undisturbed subsoil provided an excellent basis for chemical comparison to the anthrosols, since the planting hole soil and the Jefferson-era layer of soil are composed of re-deposited subsoil, altered by human activity.

It was clear that plaster, mortar, or lime was added as a fertilizing agent. The amount of available calcium in the planting hole soil averaged 2,209 PPM , or 44.2 percent higher than subsoil. The available calcium in the Jefferson-era soil layer averaged 1,970 PPM, or 37.5 percent higher than subsoil. Calcium would have the effect of lowering the pH of the acidic clay soil, freeing phosphate and potassium for a plants use, and this would likely have been an effective fertilization method. The data appears to confirm that Jefferson was using "plaistering" for his ornamental plantings similar to the way he wrote of using it for Piedmont agricultural fields. The chemical indications of calcium fertilization were confirmed archaeologically by several small pockets of Jefferson era mortar resting within the matrix of the Jefferson soil layer. Because calcium is a relatively stable element, no total digestion testing was done.

As noted earlier, both the Jefferson soil layer and the planting hole soil contained visible charcoal flecking. This finding led us to believe that fire ashes were being added to the soil, and we expected to find a very high amount of potassium in these soils. It was therefore surprising to find that

FIGURE 36: Soil chemistry sample locations

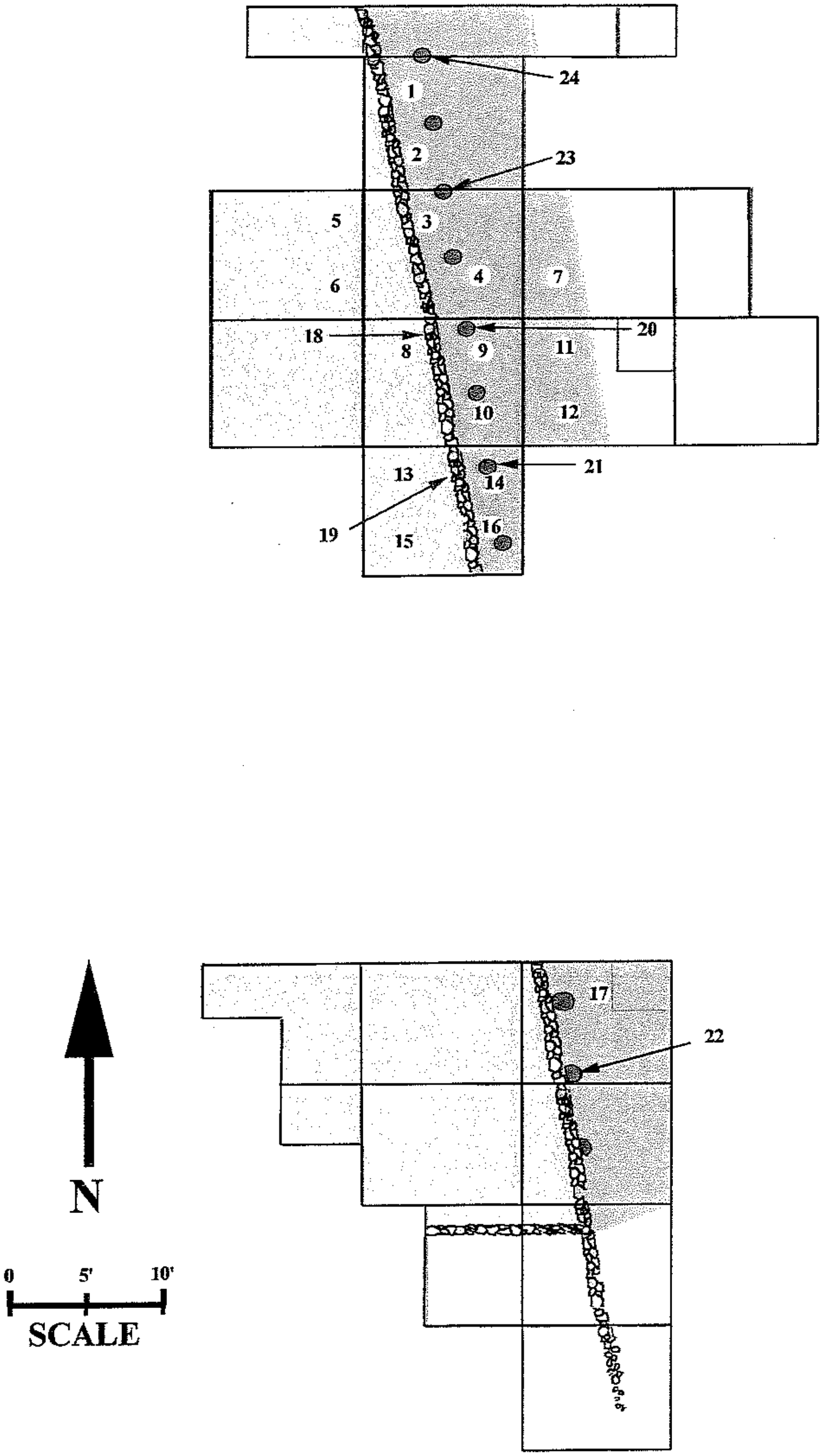
JEFFERSON LAYER ABOVE PLANTING HOLE
1. 1819 F/1
2. 1819 F/3
4. 1812 K/4
9. 1817 F/2
10. 1817 F/4
14. 1820 E/2
16. 1820 E/4
17. 1821 E/2

JEFFERSON LAYER NO PLANTING HOLE
5. 1814 G/2
6. 1814 G/4
7. 1811 F/3
8. 1817 F/1
11. 1816 F/1
12. 1816 F/3
13. 1820 E/1
15. 1820 E/3

PLANTING HOLE
20. 1817 J
21. 1820 G/2
22. 1821 G/3
23. 1812 M/4
24. 1819 H/1

FRENCH DRAIN
18. 1817 G/1
19. 1820 F/1

SUBSOIL
3. 1812 S
5. 1814 S
9. 1817 H/2



the amount of available potassium were in these charcoal-filled planting holes was actually lower than subsoil. The five east bank planting holes averaged 141.8 PPM available potassium, compared to 179 PPM for sterile subsoil. Total digestion testing indicated that the planting holes did, in fact, contain significantly higher amounts of potassium than subsoil. Total potassium in the five planting holes averaged 620 PPM, compared to 540 PPM for subsoil.

The fact that the planting holes contained 15.6 percent more total potassium than subsoil indicated that potassium had been added to the planting holes as fertilizer, a finding which made sense in light of the heavy amounts of charcoal found during excavation. However, under natural conditions, subsoil samples indicated that available potassium should exist in a ratio of roughly 1 to 3 to total potassium in these soils, as the average of available potassium in subsoil was 179.2 PPM, or 33.2 percent of the average total potassium in subsoil, 540 PPM. However, in the planting hole soil, average available potassium was 141.8 PPM, or only 22.1 percent of the average total potassium, 640 PPM. This finding indicated that an unknown factor was at work in the planting hole contexts, causing a drop in the ratio of available to total potassium. The question to be addressed was why the available potassium in the charcoal-filled planting holes was 20 percent lower than sterile subsoil, while the total amount of potassium in these same planting holes was nearly 16 percent higher than subsoil.

The results of phosphate testing indicated that a very similar relationship existed between available and total phosphate as was found in available and total potassium. The presence of small, broken domestic artifacts in the planting hole soil appeared to indicate that kitchen trash was being added to the soil. If a trash/compost pile of kitchen refuse, where broken plates, cups, etc. were thrown away along with the remains of cooking, was then used for fertilizer, the planting hole soil could be expected to contain considerably higher levels of phosphate than sterile subsoil. Initial testing indicated that subsoil contained an average of 6 PPM available phosphate, while samples from five east bank planting holes averaged 5.6 PPM, or 6 percent lower. However total digestion testing indicated that the planting holes contained much higher amounts of total phosphate than subsoil. Average total phosphate in the five planting holes was 1200 PPM, nearly 43 percent higher than the 840 PPM average for subsoil. This again provided chemical evidence that phosphate was being added to the soil, and confirmed the excavation findings suggesting kitchen trash disposal, and subsequent re-deposition through fertilization of the ornamental landscape.

The ratio of available phosphate to total phosphate in subsoil was shown to be 1 to 140, or 0.71 percent. However in the planting hole soil, the ratio of available phosphate to total phosphate was 1 to 214, or 0.5 percent. As a comparison, available phosphate was 6 percent lower in the planting

Context / unit #	*Avail P*	*Total P*	*%Avail P*	*Avail K*	*Total K*	*% Avail K*	*Calcium*	*pH*
Jefferson A (PH Absent) means	**8**	**1160**	**0.69**	**214.2**	**620**	**34.5**	**1968**	**6**
1814G/2	6	1000	0.60	177	500	35.4	1656	6.3
1816F/1	10	1200	0.83	232	600	38.6	1656	5.8
1816F/3	8	1200	0.66	228	700	32.5	1728	5.7
1817F/1	8	1300	0.61	196	500	39.3	2400	6.1
1820E/3	8	1100	0.72	238	800	29.7	2400	6.7
Jefferson P (PH Present) means	**6**	**1180**	**0.51**	**143.4**	**620**	**23.1**	**2032.4**	**6.27**
1812K/2	8	1500	0.53	131	500	26.2	2064	6.5
1817F/2	4	800	0.50	141	600	23.5	2136	6.2
1820E/2	6	1400	0.43	170	900	18.8	1872	6.5
1819F/3	8	1400	0.57	162	600	27	2160	6.2
1821E/4	4	800	0.50	113	500	22.6	1930	6.1
Planting Hole sample means	**5.6**	**1200**	**0.50**	**141.8**	**640**	**22.1**	**2209**	**6.58**
1817J	6	1100	0.54	133	500	26.6	2400	6.5
1820G/2	4	800	0.50	170	900	18.8	1896	6.6
1821G	4	800	0.50	146	700	20.8	2140	6.5
1812M/4	6	1300	0.46	138	600	22.6	2400	6.5
1819 H/3	8	2000	0.40	122	500	24.4	2208	6.8
Subsoil (control) sample means	**6**	**840**	**0.71**	**179.2**	**540**	**33.2**	**1233.6**	**6.5**
1812L/1	6	800	0/75	170	500	34	1536	6.4
1817H/2	6	900	0.66	180	500	36	1392	6.2
1814S	6	900	0.66	151	500	30.2	1080	6.9
1940S	8	900	0.88	202	600	33.6	1176	7
1962S/1	4	700	0.57	193	600	32.1	984	6

Figure 37: Results of soil chemical analysis from excavation of the East bank. Means for separate excavation contexts are shown in bold. Jefferson A represents samples taken from the Jefferson era soil layer from 5 ft. X 5 ft. excavation quadrants **not** containing a planting hole. Jefferson P represents samples taken from the Jefferson era soil layer from 5 ft. X 5 ft. excavation quadrants **containing** a planting hole. Planting hole samples were taken from the center of these features, while subsoil samples were taken from the underlying sub. Calcium was found to be higher than subsoil in all three excavation contexts, suggesting fertilization. Total potassium and phosphate was also higher than subsoil in all three excavation contexts, indicating addition of these elements through fertilization. However, note that the percentage of available phosphate and potassium within the Jefferson era soil layer (A and P) differed significantly.The mean percentages of available phosphate and potassium in Jefferson A samples very closely resemble the mean percentages for subsoil. Mean percentages of available phosphate and potassium in Jefferson P very closely resemble the mean percentages from the planting hole soil samples.

holes than subsoil, but total phosphate was nearly 43 percent higher than subsoil. The data again indicated that an unknown factor was causing a large drop in the ratio of available to total phosphate in the planting holes, very similar to the potassium data.

The key to understanding this discrepancy was a careful examination of the Jefferson-era soil layer samples from across the terrace bank, and some practical landscape gardening knowledge of plant growth. It should be noted that there are no known significant contextual or post-depositional differences between the Jefferson-era soil layer samples. All of the samples taken from the Jefferson-era soil layer come from the same tightly dated archaeological context within the site. The soil layer was overlain by a distinctly different colored layer of 1830-1900 primary deposition soil, which was in turn sealed by two filling episodes.

Nothing found during excavation indicated that the soil chemical readings for this soil layer would be different spatially, as the charcoal flecking and the artifact scatter was regularly found throughout. However, it was found that if a sample came from a 5 x 5 ft. excavation quadrant that sealed a planting hole, the ratios of available to total phosphate and potassium were very similar to those same ratios in the planting hole soil. Conversely, if a sample from this same soil layer came from a 5 x 5 ft excavation quadrant not sealing a planting hole, it was found that those ratios were very similar to subsoil. Soil samples taken from a 5 x 5 ft excavation quadrant not sealing a planting hole will henceforth be termed Jefferson A (planting hole **Absent**). Samples taken from the Jefferson-era soil layer from 5 x 5's sealing a planting hole will henceforth be termed Jefferson P (planting hole **Present**).

The mean available potassium for the entire Jefferson-era soil layer was 142.6, lower than the 179.2 PPM average for subsoil. Available phosphate was slightly higher, at 7 PPM, than the 6 PPM mean for subsoil. However, an important realization was made when the locations of the individual samples were plotted on a map of the excavation. Samples with the lowest amounts of available Phosphate and Potassium in the Jefferson era soil layer corresponded with the locations of planting holes underneath the 5 x 5 ft. sample area. The highest levels of available Phosphate and Potassium in the Jefferson-era soil layer were found in samples from 5 x 5's not containing a planting hole. This contextual distinction, separating soil samples from within the same stratigraphic layer based on their proximity to planting holes, provided an important clue in the analysis of this data.

As noted earlier, the underlying parent subsoil contains an average of 179.2 PPM available potassium, and an average of 540 PPM total potassium, indicating for this soil at this site, available potassium will exist in a ratio of 1 to 3 to total potassium under natural conditions. These readings are nearly identical to Jefferson A samples (no planting hole). Samples from this context also had an available to total potassium ratio of nearly 1 to 3, and averaged 214 PPM available potassium, and 620 PPM total potassium. Mean available potassium was 34.5 percent of mean total potassium. In other words, samples from subsoil and Jefferson A indicate that even when potassium is added to the soil through deliberate fertilization, the ratio of available to total potassium will remain basically constant (1 to 3) in soils of the same type and of the same age unless influenced by an outside factor. That this factor is proximity to a planting hole is indicated by Jefferson P (platning hole) layer sample means.

The average <u>total</u> potassium in samples from Jefferson P was identical to the average total potassium in Jefferson A, both 620 PPM. This indicates that the same fertilization technique was being used uniformly throughout this soil layer, and that roughly the same amount of total potassium was added to this soil through fertilization. However, the average <u>available</u> potassium Jefferson P was only 143.4 PPM, or 33 percent lower than Jefferson A, which contained an average of 214.2PPM. Expressed another way, available to total potassium in Jefferson P was only 23.1 percent, a ratio of 1 to 4.3. This is especially striking when one remembers that the percentage of available to total potassium in the planting hole soil was almost exactly the same, at 22.1 percent, or a ratio of 1 to 4.5. Note that Jefferson A averages and the subsoil control samples both contained about 33 percent available potassium, a ratio of 1 to 3 available to total. The only variable identified between Jefferson A samples and Jefferson P samples was the presence of the planting hole within the excavation quadrant's 5 x 5 ft sample area for Jefferson P samples.

Phosphate data for the Jefferson era soil layer samples showed exactly the same trend. In Jefferson A samples (planting hole absent) the amount of total phosphate averaged 1160 PPM, about 38 percent higher than the 840 PPM found in subsoil. This indicated that phosphate was being added through fertilization. In addition, available phosphate averaged 8 PPM, representing 0.69 percent of the total phosphate in this soil. For Jefferson A, the available to total phosphate ratio was 1 to 145, which matches very closely with the 1 to 140 ratio found in subsoil. The data demonstrated that without the presence of a planting hole under the sample area, the ratio of available to total phosphate in same soils of the same age would remain constant under natural conditions.

However, the data indicated that the Jefferson soil layer in units underlain by a planting hole, Jefferson P, was very similar to the planting hole soil. The amount of total phosphate in Jefferson P was 1180 PPM, or 40.4 percent higher than subsoil, again indicating fertilization was uniform throughout the layer, as total phosphate for Jefferson A was 1160 PPM. The average available phosphate in Jefferson P was 6 PPM, or 0.51 percent of total phosphate. Again, the average available phosphate to average total phosphate ratio of 1 to 197 for Jefferson P matches very closely with the ratio of 1 to 214 found in the planting hole soil. Thus, while the total phosphate was 40.4 percent higher in Jefferson P than subsoil, indicating fertilization, available phosphate in jefferson P was 25 percent lower than Jefferson A. The ratio of available to total phosphate in Jefferson P, 1 to 143.4, was very similar to the planting hole samples at 1 to 141.8, and was much different than the roughly 1 to 200 ratio found in subsoil and Jefferson A samples.

DISCUSSION OF FINDINGS

Research into the growth properties of the south lawn ornamental shrubs which once grew within the planting holes provided an important clue to understanding the soil chemical data. Horticultural research indicated that while these species were hardy and could survive in the south lawn plantings, these shrub types were also considered very likely to become root bound within their respective planting holes due to the thick and infertile clay soils surrounding them (Greenway 1999). This is a key point, because a root-bound shrub would therefore need to utilize every available nutrient within the planting hole soil to survive, even if just for a few years. The data discussed above appears to indicate that the growth of the shrubs within the planting holes can be shown by the corresponding drop in available phosphate and potassium in the planting holes and the surrounding soil layer (Jefferson P) that was revealed during analysis.

The hypothesis that the growth of shrubs within the root-bound planting holes caused the drop in available phosphate and potassium in the planting holes and in the surrounding Jefferson P soil layer samples is borne out by several findings. First, the ratios of available to total phosphate and potassium established by the subsoil control samples were shown to remain constant despite the addition of extra phosphate and potassium to soil. This was demonstrated by the fact that the Jefferson A layer samples contained almost exactly the same ratios of available to total phosphate and potassium as the subsoil control samples- 1 to 3. Thus the initial fertilization episode did not change the ratios of available to total potassium and phosphate, and another factor had to be at work.

Second, the total potassium average within both Jefferson A and Jefferson P was exactly the same at 620 PPM, indicating that the same amount of fertilizer was applied to the soil layer historically. However, while the total potassium was the same throughout the soil layer, the available potassium in Jefferson P was 33 percent lower than Jefferson A. The only contextual difference between these two sets of samples was the presence of the planting hole within the 5 x 5 ft. sample area for Jefferson P samples. In addition, the ratio of available to total potassium in the planting hole soil

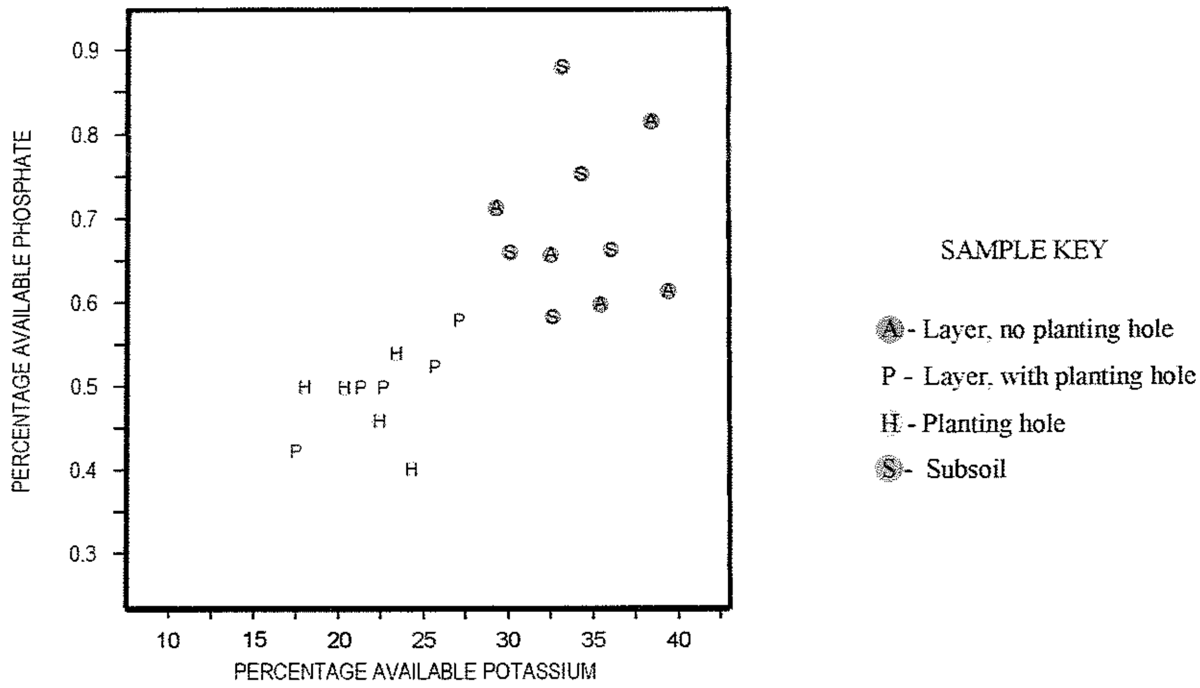


Figure 38: Relationship of soil samples from different excavation contexts based on available phosphate and potassium. Data clearly indicates a strong correlation between A (layer sample not containing a planting hole) and S (subsoil), and between P (layer sample containing a planting hole) and H (planting hole soil samples). Plant growth, lowering the amount of available phosphate and potassium in the planting holes and surrounding soil, may explain this relationship.

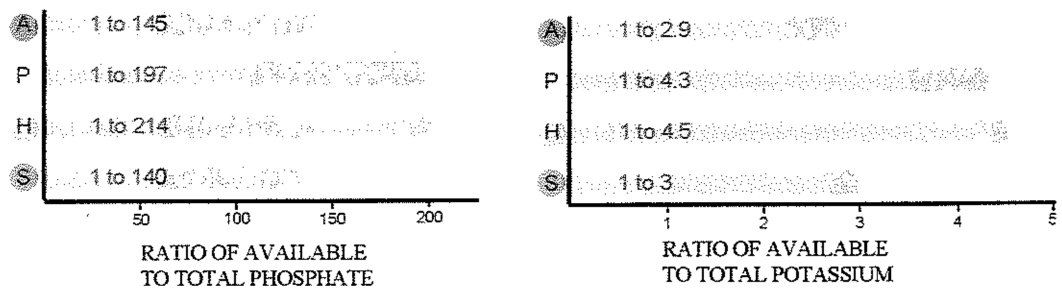


FIGURE 39: Bar graphs showing mean ratio of available to total phosphate and potassium for same excavation contexts. Again, the strong correlation between A and S, and between P and H is clear. The data suggests that under natural conditions, the ratio of available to total phosphate will reach an equilibrium nearing 1 to 140, while the ratio of available to total potassium will reach an equilibrium nearing 1 to 3. The presence of a plant in the immediate area of the sample changes those ratios to approximately 1 to 200, and 1 to 4.5 respectively. (A= layer sample, no planting hole; P=layer sample, with planting hole; H= planting hole sample; S= subsoil sample)

was nearly identical to Jefferson P, at just 1 to 4.3. This appears to confirm the hypothesis that the root-bound plants were utilizing available potassium in the planting hole soil, and from the overlaying soil layer Jefferson P.

Phosphate data shows exactly the same trends. Total phosphate for Jefferson A was 1160 PPM, while Jefferson P was 1180, again indicating that the historic fertilization episode distributed phosphate spatially in approximately equal amounts across the layer. The entire layer contained nearly 40 percent more total phosphate than subsoil. However, the percentage of available to total phosphate in Jefferson P was 1 to 197, very similar to the 1 to 214 ratio found in planting hole samples. Conversely, the ratio of available to total phosphate in Jefferson A, 1 to 145, was very similar to the ratio found in subsoil, 1 to 140. This again indicated that under natural conditions, these soils, of the same type, location and age, would attain a standard ratio of available to total phosphate unless influenced by an outside factor. The data appears to indicate that the outside factor was the growth of the ornamental shrubs within the planting holes.

In conclusion, the soil chemical and archaeological data have indicated the historic use of several types of fertilizers on the ornamental landscape. Analysis indicated that lime, mortar, or plaster was being used as a fertilizer in the ornamental landscape, as elevated levels of calcium were found in the planting holes and the Jefferson-era soil layer. Total potassium data also indicated that fire ashes were being added to the planting hole and Jefferson layer soils as fertilizers, a finding that was confirmed by the heavy charcoal flecking found in the soil during excavation. The "domestic trash" artifacts in these different contexts led to the hypothesis that kitchen compost was being added to the planting holes and the Jefferson-era soil layer. This hypothesis was also confirmed by the total phosphate data. Finally, the differences in available and total phosphate and potassium between the planting holes, the Jefferson layer samples, and subsoil, appears to confirm the survival of the south lawn plantings and indicates that the shrubs were utilizing every available nutrient in the surrounding soil to survive. This conclusion is also important to archaeologists as it suggests that under certain conditions, the results of partial digestion soil chemical analysis can be heavily influenced by site-specific conditions. The data indicate that plant growth within anthrosols can significantly deplete the amount of available phosphate and potassium in the soil. If partial digestion testing alone was used for this study, the conclusion would be that Jefferson did not use fertilizers in ornamental planting contexts, since the amounts of available phosphate and potassium were actually lower in these contexts than in the underlying subsoil. Comparison to total digestion, however, not only revealed the fertilization practices being utilized, but provided evidence for the success of these plantings.

The methods described in this report are widely available to archaeologists, and are not prohibitively expensive. This project indicated that a careful sampling strategy and testing methodology can reveal subtle variations in soil chemistry indicative of past human activities and changes to the landscape that took place outside the domestic unit. Soil chemical analysis has proven a useful tool for revealing land use practices, landscape construction and maintenance techniques, and has even provided evidence for the success of ornamental plantings on the property.

Several questions need to be addressed in future studies. One possible variable which requires further attention is whether the calcium added to the soil during fertilization acted to bind available phosphate, thus influencing the available to total phosphate ratio. Initial statistical analysis has shown that the link between calcium level and available phosphate level is not statistically significant. However, it is reasonable to assume that some available phosphate is being bound by the added calcium in the soil. Quantifying this phenomenon would add greatly to the certainty of the conclusions presented here, though at present, no process has been found to accomplish this.

The results of all other chemical testing accomplished during the 1998-1999 field seasons are shown in Appendix III. In addition to the data presented previously in this report, soil chemical data were obtained from numerous contexts during excavation. Unfortunately, while this data will undoubtedly prove useful for future studies, few conclusions can be drawn from the results at this time. For example, the primary deposition layer of 1830-1900 was tested extensively. However, the living grass, weeds, and other plants would have likely had an important effect on the chemical signature of this soil, but a means to determine that effect is at present unknown. This precludes making any statements regarding phosphate or potassium fertilization of this layer, but there is some indication that calcium was being added. This may be the result of the 1845 fire that destroyed the interior of the house.

The overlaying fill layers of soil were also tested, and it was initially hoped that a "rate of binding" for available phosphate and potassium could be ascertained by comparing different soils of different ages. However, the ratio of available to total phosphate and potassium was found to not be dependant on the age of the soil, and evidence for contamination by modern fertilization was irregular, and inconclusive. No other research questions for the chemical signature of fill soil could be ascertained.

Data from the west bank was not included in the above study for several reasons. Primarily, there was no intact Jefferson era soil layer, and thus no area specific readings to compare with the data from the east bank. The only contexts which could be directly attributed to the Jefferson era landscape were the planting holes and the french drain. In addition, the data obtained from samples from the west bank planting holes showed that the chemical signature of these features differed wildly from those on the east bank, with phosphate levels 20 to 80 times higher than the east bank planting holes. The most likely explanation for this is that the indoor privy in the west stair tower was dumping effluent into the area, which would have been channeled to the planting holes through the robbed drain trench while it was still in operation. This hypothesis would explain the extremely high phosphate readings found in the planting holes, and would obviously mask any subtle chemical changes caused through planting hole fertilization. At the time of this writing, however, not enough is known to definitively state that the west stair privy is the source of the high phosphate of this area.

Finally, soil chemical data from the west mound excavation was also obtained. The planting hole located archaeologically on the south bank of the west mound contains much higher available phosphate and potassium than any of the east bank planting holes. Available phosphate was 36 PPM, while the total Phosphate was 1000 PPM. The available potassium was 628 PPM, more than twice that of the east bank planting hole average, while total potassium was 1000 PPM, also much higher than the east bank average of 640 PPM.. It should be noted that the east bank was protected from modern fertilization episodes by the two thick layers of clay fill soil overlaying this section of the site. However, the mound planting hole had no such fill layer above it, and these elevated readings may well be the result of modern contamination filtering through the mound from the surface. Further testing is needed during future excavation of the mounds. This testing should include not only chemical analysis of the planting hole soil, but considerable analysis of the mound fill matrix as well, at different distances from the surface. This methodology could potentially identify modern fertilization contamination and seepage through the mound since the mound fill is essentially sterile, re-deposited subsoil.

CHAPTER 7: GARDEN HISTORY AND HORTICULTURE

THE CONTEXT OF TIME AND PLACE

Much of Jefferson's life was spent interacting with the economic and political elite of Europe and America. His extensive travels abroad in the 1780s, combined with his political status, brought him into contact with a social class that was in the midst of an explosion of interest in gardening and ornamental landscapes. Jefferson was immersed in a culture that saw a revolution in the style and fame of large-scale gardening and landscape design. Across Europe, immense tracts were laid off on the estates of the powerful and wealthy, and enormous sums of money were spent to create elaborate visual landscapes. The cultural impact of this movement, present in France but especially intense in England, is difficult to quantify but was certainly exceedingly important to the social circles in which Jefferson was travelling.

Constructing a large ornamental landscape made a powerful and very explicit statement. The observation that the "size and pretensions of (estate) houses were an accurate index of the ambitions of their owners" (Girouard 1978;:13) applied to the ornamental gardens as well. However, simply constructing a big garden or wilderness walk was not enough. The creator of a garden landscape was judged not simply by the fact that he was wealthy enough to afford building it but perhaps more importantly on the taste he showed through his creation. Receiving approval or prestige of this kind was so valued that it gave rise to a professional class of landscape architects whose job it was to create ornamental landscapes that would reflect gloriously on the refinement of their benefactors. Lancelot "Capability" Brown is perhaps the most famous of these today, but many other notable designers competed in this game.

Touring the gardens of famous estates became an important means of social interaction. To be considered educated and of good taste, it was necessary to become fully versed in ornamental plant species, current gardening theories, and even classical literature which was used as a common theme of individual or sequenced scenes in the designed landscapes. Tourists routinely traveled the country with special "landscape mirrors", which they could hold up to view the landscape as a framed picture, and carried sketch pads to record the prospects they found most pleasing (MacCubbin and Martin 1984: 44-46). In their paintings or drawings, they were "encouraged to frame views, to graduate prospects from foreground to background, and above all to ensure variety of painted, drawn or engraved texture, which mimicked similar qualities in the natural world" (Hunt 1990A:234) The gardening/landscapes movement was so pervasive that it resulted in the development of both an overt and a hidden gardening vocabulary, as landscapes became a means for the elite of society to communicate complex messages to their peers and public. Aside from a clear declaration of power and wealth, the "created" landscape was occasionally intended to be read like text, telling a story or communicating a series of emotions which the viewer would come to understand while passing through it. Sometimes single scenes were meant to stand alone and spark the interest of the viewer. Spaces were created to depict well-known classical or biblical scenes and were often augmented with statuary to guide the viewer towards the intended allusion. Some were even constructed as pointed political commentary, such as the "Temple of Modern Virtue" at Stowe, contrasting a headless statue of Sir Robert Walpole with other, perfectly complete examples of leaders from antiquity (Jackson-Stops 1991:18).

It is also likely that unwritten rules of etiquette and social interaction played an important role in the landscapes/gardening phenomenon, with tacit forms of behavior or social interaction linked to different areas within the garden. For instance, literary references suggest that specific areas within gardens were considered more proper for personal or private topics of conversation than others. Laird notes examples in the works of Jane Austin, where special news was often kept to be shared until an intimate and private walk in the garden, possibly in close proximity to a screening shrubbery (Laird 1999:18-19). Reflecting the social aspect of garden design, the width of paths through the landscape, dictating the number of people who could walk together at one time, were carefully adjusted to the level of intimacy intended for different spaces.

Understanding how Jefferson viewed this movement, and how he was influenced by it, is clearly an important element in discerning his intentions and actions in the ornamental landscape at Poplar Forest. Yet this task is rendered difficult by the complex array of experiences of this well-traveled man, and the varied social, political, and economic contexts which shaped, and sometimes changed, his opinion through time. In addition, Jefferson occasionally writes negatively of the use of a particular practice or landscape form, only to utilize that same form later in life. Several important contexts of gardening and landscape influence may provide a starting point for understanding the mature Jefferson's work at Poplar Forest.

Jefferson's long stay in France brought him into contact with European high-style architecture, fashion, music, theater, and painting. While Jefferson witnessed first-hand many of the baroque style geometric garden designs still maintained in France in the last quarter of the 18th century, gardens of this type were not as current or stylish as the *Jardin Anglaise,* and were considered moderately old-fashioned during Jefferson's time in France. Many of Jefferson's later writings, and his actions in landscape design at Monticello, indicate a strong affinity for the irregular English style. However, the influence of French garden designs on Jefferson's thought should not be discounted, as Jefferson's experiences in France were clearly a strong influence on his ideas and taste.

The important question for this study is the degree to which Jefferson might have been influenced in his work at Poplar Forest by French gardens, both formal and landscape, which he visited in the 1780s. Though in architecture Latrobe wrote of Jefferson's design "prejudices in favor of the old French books, out of which he fished everything" (Brown, 1990:125), the American Sphinx himself does little to resolve the issue regarding landscape. For example, it is often supposed that the Republican Jefferson disliked the gardens at Versailles for their monarchical overtones, but Jefferson himself recorded little on this subject and historians have been forced to speculate on what Jefferson might have thought. Adams writes that though Jefferson observed numerous gardens around Paris and made many visits to Versailles, "He left no recorded comments on the baroque geometry of the layout, a symbol of royal autocracy" and speculates that "The Virginian could hardly have seen any redeeming elements in the now exhausted formula (Adams1996:118-120). Shackelford notes "It is Jefferson's silences, rather than his words, that reveal his distaste for Versailles" (Shackelford 1995: 178). Landscape historian C. Allen Brown believed that the influence of the geometric French formal gardens could be seen in some landscape elements at Poplar Forest, as well as in what Brown perceived to be the overall design of the landscape. In support of this theme, Brown credits Jefferson with praising the comtesse de Tessa's formal geometric gardens as "charming" (Brown 1990:121). However, this compliment may only have been a polite acknowledgement of Jefferson's well-documented fondness for the comtesse, since the quote comes as Jefferson was reminiscing of his time in France to a mutual friend. Jefferson remembered "the charming gardens of Chaville without, and the charming society within" (Adams 1981:325). It should also be noted that in addition to geometric gardens, Chaville also contained several sections laid out in the modern, *Jardin Anglaise* style (Rice 1976:97).

It would be misleading to conclude that if his experiences in France influenced Jefferson's ideas about gardening, then those influences would necessarily be primarily of a symmetrical, baroque, or geometric nature. While many French gardens of this style survived into the 1780s, there were also numerous examples of the irregular, natural style in existence or being constructed. Indeed, French architectural and landscape thought was undergoing a transformation heavily influenced by the picturesque style during Jefferson's time in France. Thomas Whatley's 1770 *Observations on Modern Gardening*, delineating the latest theory of the picturesque style, was translated into French almost immediately upon publication and was widely read. *Observations* in some ways seems to have sparked a round of intense publishing on beauty and landscape in France, as it was followed by the publication of Watlet's *Essay on Gardens* in 1774, Duchesne's *Treatise on the Making of Gardens* in 1775, Morel's *Theory of Gardens* in 1776, and Girardin's *An Essay on Landscape* in 1777 (Middleton 1992:48-51). These works all deal in one form or another with interpretations of the picturesque theory, and while there is no evidence that Jefferson owned any of these books, they most certainly would have been well known to his aristocratic acquaintances. The La Rochefoucauld family estate of La Roche-Guyon, for example, contained modern, irregular gardens, as well as a working Ferme-Ornee based directly on Morel's prescriptions in *Theory of Gardens* (Adams 1997:121). In fact, Jefferson's friend the Duchess D'Enville implored Jefferson to send her selected American species to plant in the grounds there. The seeds arrived in time to be planted in the Spring of 1792, and the list included *Liriodendron Tulipfera*, which Jefferson described as "the Juno of our groves" (Rice 1976:113). Upon the reception of Jefferson's Tulip Poplars, she wrote

> They are more precious to us, coming as they do from a man we revere, from a true philosopher in the full meaning of the term. Those who live to see the trees they produce will bless you as long as the mountain of La Rocheguyon stands (Rice, 1976:113).

A strong argument can be made that Jefferson's exposure to aristocratic French landscape taste circa 1786 would have informed him that the most stylish "modern" garden designs were grounded in the rococco irregularity of the Jardin Anglaise. Unfortunately, Jeffersons lack of comment on the subject makes it difficult to speculate on the degree to which his time in France shaped Jeffersons thinking on landscape.

As an aside, one particular detail of Jefferson's time in France may relate directly to the grounds at Poplar Forest. While spending the bulk of his time in Paris, Jefferson occasionally went "into retreat" in the country at a peaceful mountaintop monastery run by a religious community of lay brothers known as the "Hermites". Jefferson's daughter Martha later wrote

> Whenever he had a press of business, was in the habit of taking his papers and going to the hermitage, where he spent sometimes a week or more till he had finished his work. The hermits visited him regularly in Paris, and the Superior made him a present of an ivory broom that was turned by one of the brothers (Randolph 1947:48).

This community was part of the Pilgrimage Church, and produced honey, wood, and wine from large terraced vineyards surrounding the mountaintop retreat. Jefferson would stay in a

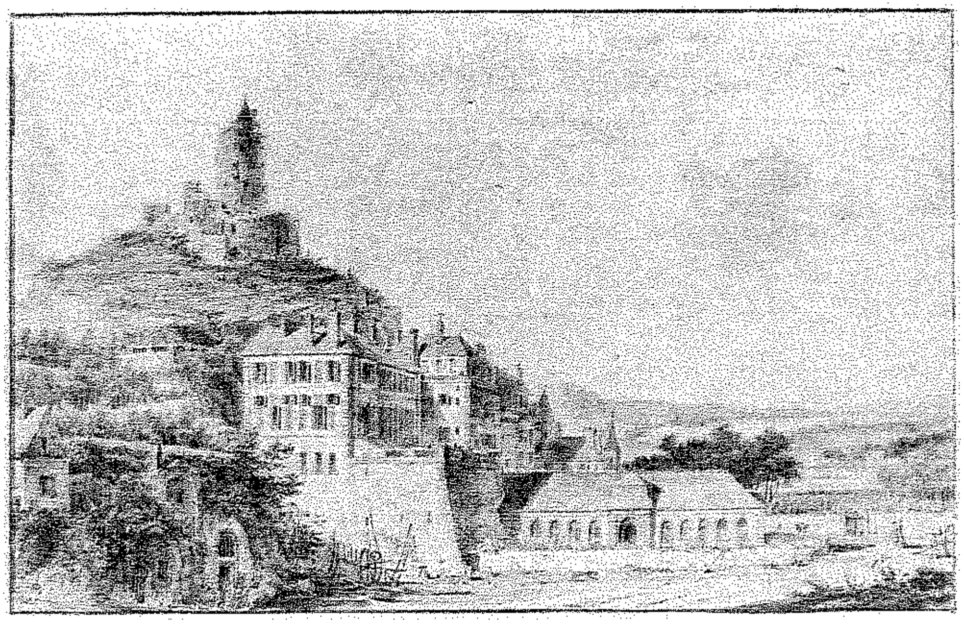


FIGURE 40: Chateau de La Roche-Guyon.

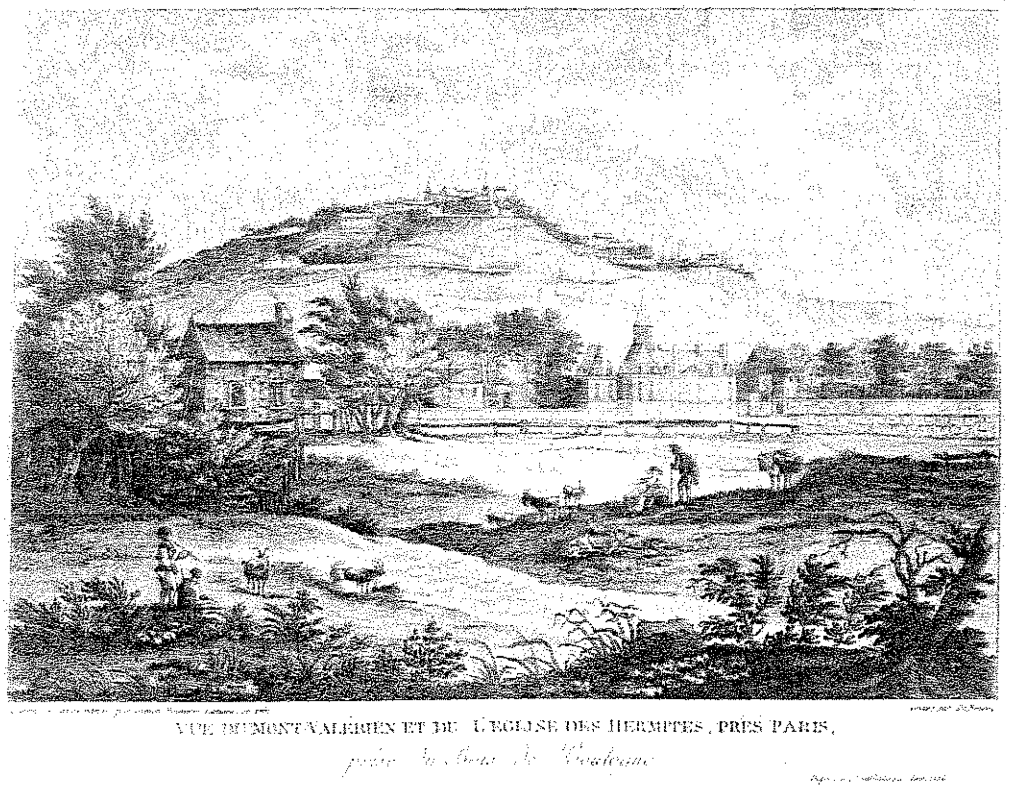


FIGURE 41: Jefferson's hilltop retreat at Mont Valerien.

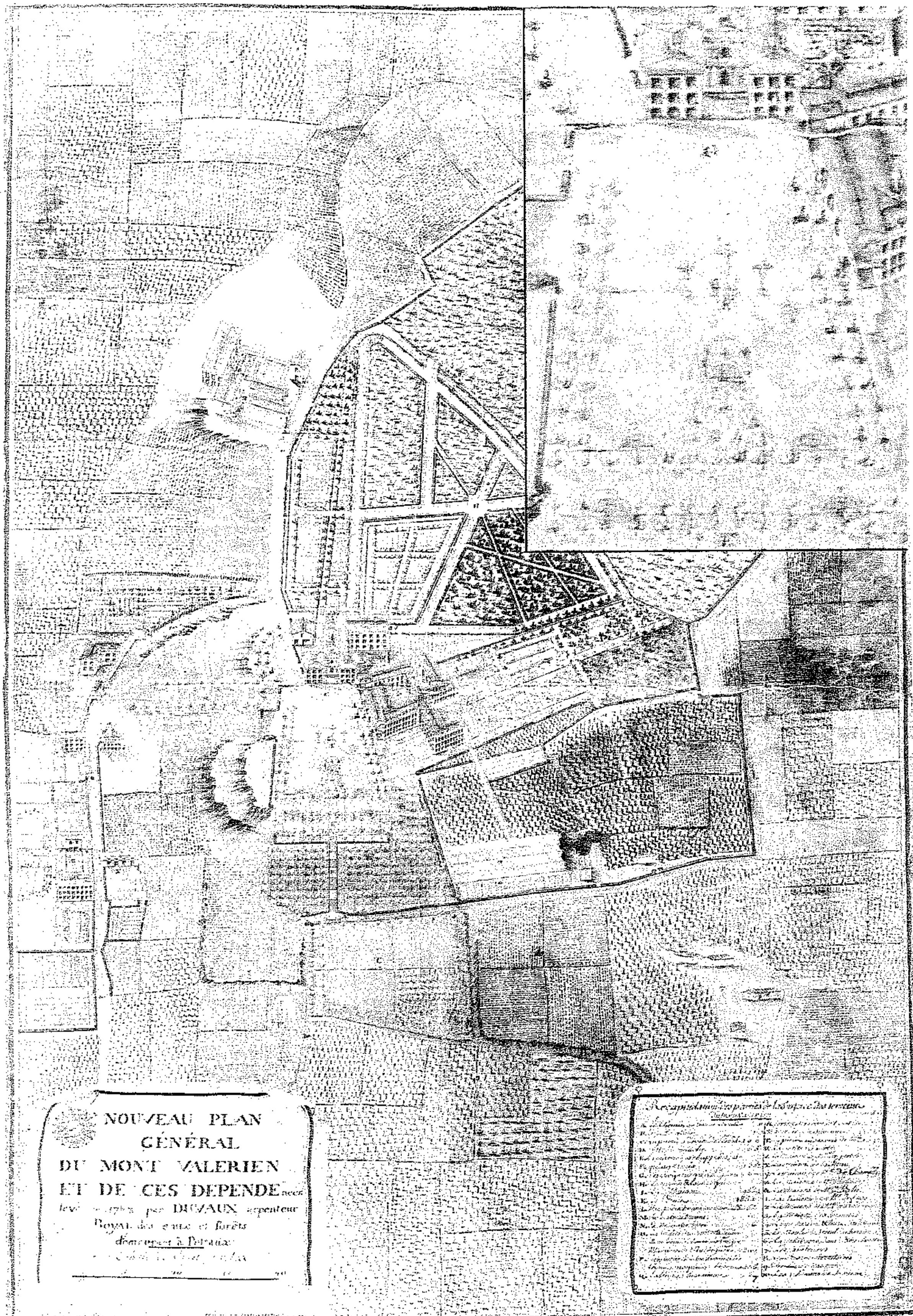


FIGURE 42: Map of Mont Valerien drawn in 1783, just three years before Jefferson's first visit. The inset at top right is an exploded close-up of the central building. Note the angled plantings bordering the parterre. This landscape feature framed the view from the central building, looking out from the mountaintop over vinyards to the valley below.

boardinghouse kept by the brothers, where he "enjoyed good air, a magnificent view, and found comfort for body as well as for soul" (Rice 1976:106-107). Jefferson's pleasure at the prospect of a visit to this idyllic retreat is plain from his note of October 18, 1787: "The sky is clearing and I shall away to my Hermitage!" (Jefferson Papers Vol 12:246-247). If there are strong similarities between Jefferson's visits to this hermitage and the experience of being 'in retreat' which Jefferson wished to create at Poplar Forest, then the plan of the grounds at Mont Valerien is enough to give one pause. While the monastery is perched on the top of a hill, surrounded by agrarian fields and vineyards, the central house looks out over a parterre flanked by rows of trees canted slightly outwards (Figure 42). That Jefferson chose to modify the sunken lawn parterre at Poplar Forest to cant outwards from the house in the exact same manner may well be coincidental. However, the similarity of the "retreat experience" between Mont Valerien and Poplar Forest is nonetheless striking.

If the effect of his experience in France is difficult to precisely identify, there is no such ambiguity regarding the influence of English garden design on Jefferson's tastes. He wrote "The gardening in that country is the article in which it excels all the earth. I mean their pleasure gardening. This, indeed, went far beyond my ideas" (Jefferson Papers Vol 9:445). Like many cultural phenomena, the English style changed through time. John Dixon Hunt notes that originally, the term 'picturesque' was used to denote <u>any</u> subject worthy of inclusion in a painting, and only towards the end of the 18^{th} century would the term come to denote "an experience of landscape" based on the irregular or natural (Hunt 1990A: 231). It was considered the most aesthetically advanced landscape style during Jefferson's time in Europe, and the English aristocracy was in the midst of a fervent love affair with grand scale landscape gardening. A member of the English nobility, Lady Mary Gregory, noted: "Mr. Potter had laid out 1200 pounds for a shrubbery... it is become a national disease" (Laird 1999: 16)..

Jefferson's six-week tour of famous gardens and grounds in England with John Adams provides an intimate glimpse into Jefferson's tastes in landscape design, as Jefferson looked with a highly critical eye on the various ornamental grounds he surveyed. It is revealing that Jefferson stated the purpose of his trip was to ascertain the expense and practicality of creating an ornamental landscape, as this indicates that his evaluations were intended to be put to future use. The fact that Jefferson traveled through the interior of England specifically to examine famous garden landscapes may hint at the significance of the English gardening style both in popular opinion and in Jefferson's mind.

Jefferson recorded a rather high volume of critical or negative observations, and a reading of his notes today leaves one with the impression that he disliked the majority of what he saw. Perhaps his snubbing at the hands of the King George III, who Jefferson felt had rudely treated him in an "ungracious" fashion a month before, darkened his temperament towards these very English creations during his subsequent journey (Shackelford 1995:45-46). It is interesting to note, for instance, that his journal recorded a generally poor impression of the gardens at Blenhiem. Though he admired the water features, Jefferson noted the grounds as having "no great beauties. It is not laid out in fine lawns and woods, but the trees are thinly scattered over the ground, and every where and there are small thickets of shrubs, in oval raised beds... Art appears too much" (Betts, 1944:113). Yet Jefferson later constructed oval beds of shrubs and flowers at both Monticello and Poplar Forest, of the same basic form as those he recorded at Blenhiem. Jefferson used the tour as an opportunity to observe the "state of the art" of the landscape garden at the time, coalescing his thoughts on the subject and showing a keen appreciation for the beauty of well-executed natural landscapes and landscape features. Martin notes: "What Jefferson liked very much in a few English landscapes, and what he later would try to create at Monticello... was the soft and pastoral" (Martin, 1991:146). Jefferson's critical eye noted and discarded the contrived or artificial elements of these landscapes, distilling a personal vision of landscape based loosely on the best of what he observed in English landscape designs.

Jefferson's populist republican ideals also appear to have influenced his views of such creations. He remarked that the gardens in Schwetzingen "shew how much money may be laid out to make an ugly thing" (The Papers of Thomas Jefferson, 13:24), and he may have taken a dim view of the Versailles gardens, noted earlier. His travelling companion during the tour of English gardens in 1786 was much more vociferous in his feeling that these expensive landscapes were quite at odds with democratic ideals. John Adams noted: "A national debt of two hundred and seventy four million pounds sterling accumulated by jobs, contracts, salaries, and pensions, in the course of a century might easily produce all this magnificence of architecture and landscaping". Adams also stated "It will be long, I hope, before riding parks, pleasure grounds, gardens, and ornamented farms, grow so much in fashion in America" (Dumbauld 1946:81). Jefferson, however, was a lifelong enthusiast of landscape gardening, including it prominently in his "Objects of Attention for an American", stating that gardens are "Particularly worth the attention of an American, because it is the country of all others where noblest gardens may be made without expense. We have only to cut out the superabundant plants" (Jefferson Papers,13:269). This quote also shows his preference for naturalistic garden design, as one could hardly create a baroque or neoclassical geometric garden by merely cutting out selected abundant plants. Later in his life, Jefferson notes that "to England, we are surely to go for models of this art" (TJ to William Hamilton, 1808 MHi). Both Monticello and Poplar Forest represent Jefferson's personal forays into the world of the late 18th and early 19th century garden landscape design.

A final note regarding Jefferson's design influences for Poplar Forest concerns an early plan for the White House grounds. Brown has posited that Jefferson's involvement with this design may have influenced his design at Poplar Forest (Brown 1990:121-123). Brown saw many similarities between the Latrobe and King White House landscape plan and what he perceived to be the design of Poplar Forest. Brown notes that the similarities include a surrounding road (originally circular in the White house plan), a bi-axial design centered on the house with wing dependencies, a circular carriage drive on axis to the north, and a tree-lined sunken lawn to the south (Brown 1990:123). As discussed on the design section of this report, significant differences exist between Brown's theoretical design of the Poplar Forest landscape plan, and actual excavation findings. Several of these differences suggest that the specific elements of these plans may not be as similar as was initially thought.

Brown believed that "the correspondence between the two plans is so close that they share identical dimensions for the carriage drive and the same double-square proportions for the south lawn (Brown 1990:123). However, unlike the 100 ft. by 200 ft. rectangle hypothesized by Brown, excavation of the sunken lawn at Poplar Forest showed conclusively that the original measure was 90 ft. wide by 200 to 210 ft. long (depending on whether one measures from the south portico or the south wall of the house). Hence, the lawn at Poplar Forest did not form a double-square like the White House lawn, nor was it the same measure as the lawn in the White House plan. The second lawn design for Poplar Forest, with angled banks, has no corollary in the White House plan. In addition, although research is still ongoing, initial evidence also suggests that the present carriage turnaround is a post-Jefferson landscape feature. Brown also noted that the White House plan showed the sunken lawn to be tree lined, and identifies this as another similarity. However, pollen analysis suggests that Jefferson's sunken lawn was not tree lined, as the Kentucky Coffee trees shown in historic photographs were actually planted after Jefferson's ownership of the property. However, pollen evidence does suggest that shrubs and flowers formed part of the border plantings on the sunken lawn at Poplar Forest. In addition, Brown identified a "ronde-point" system of roads at Poplar Forest based on the same bi-axial symmetry that he felt governed the interior design of the landscape. However, documents clearly indicate that the three roads existing in Jefferson's time were not symmetrically aligned, and instead entered the property from irregular angles (Adams 2000).

Brown's interpretation of the design at Poplar Forest was based around a formal, perfectly symmetrical geometry. Perhaps for this reason, one aspect of the White House plan which Brown did

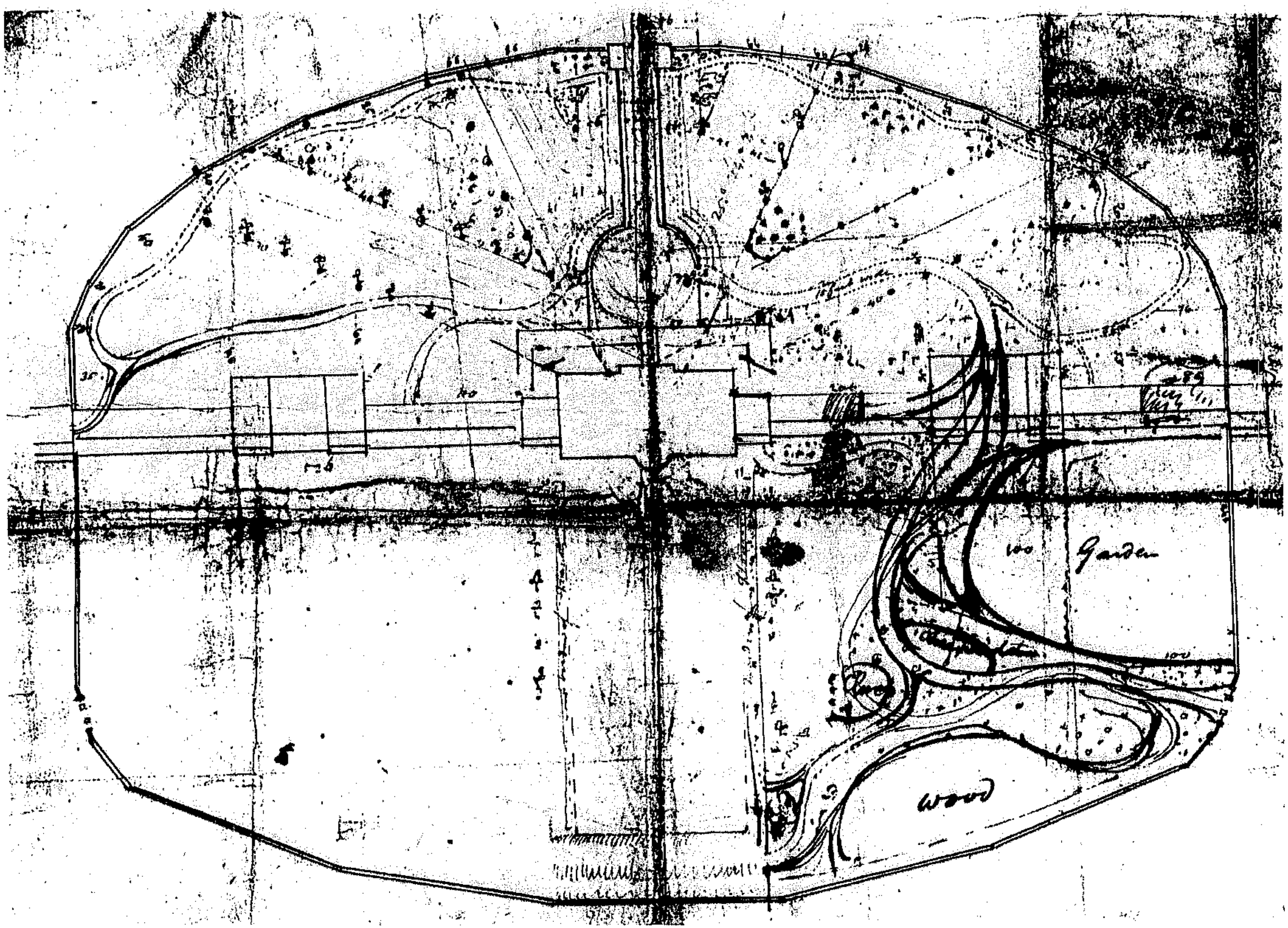


FIGURE 43: Early plan for White House grounds by Latrobe and King (Library of Congress, G.3852 w46 1802)

not include in his hypothetical plan of Poplar Forest was the irregularly winding system of roads and paths through the landscape shown on the White house plan. Ironically, this may eventually be revealed to be an aspect of the White House design that is in reality similar to Poplar Forest. Excavations have thus far not located any evidence of a Jefferson-era circular road, despite the fact that more than 20 separate units have been excavated in locations where they should have intersected a 540 yard-round perfect circle as shown in Brown's plan. Though something as ephemeral as a road trace is very difficult to locate archaeologically, the planting holes for the paper mulberry trees Jefferson notes planting around the road at twenty foot intervals would be relatively easy to distinguish, yet none have been found to date. In addition, an eight or ten foot wide road forming a perfect circle of these dimensions would severely cut into the roots of several trees in the north core of the property which are almost certainly original Jeffersonian landscape elements. The lack of direct evidence from archaeology, as well the indirect evidence of the location of original trees, may be indicating that the "circular road" may not have been a perfect circle at all. One likely possibility is that the road could have wound around freely and irregularly, following the topography of the Poplar Forest hilltop much in the same manner as the encircling road in the White House plan.

An additional clue may have been found in the alignment of the northwest oval bed. Located archaeologically in 1993, excavations have shown that unlike the location posited by Brown, the northwest oval bed was not aligned geometrically with the house (Heath 1994: 68-75). It is possible that these beds were irregularly placed in association with a free-flowing pathway or north entrance much in the manner of the paths shown in the White House plan. The way in which Jefferson blended the serpentine path and oval beds on the lawn at Monticello may indicate the general pattern the features took in the landscape at Poplar Forest (Figure 44). Hence, the White House plan may not be as similar to Poplar Forest for its geometric regularity, but instead for its irregular, curvilinear elements.

JEFFERSON AS GARDENER

As documentary and archaeological research into the ornamental landscape at Poplar Forest progressed, many research questions were generated that were not readily apparent at the beginning of the project. A common feature of many archaeological excavations is that some of the questions one *should* be asking of a site are often revealed during the project itself, opening new avenues of inquiry as part of the research process. It became evident that hints of "Jefferson the gardener" could be not include in his hypothetical plan of Poplar Forest was the irregularly winding system of roads and paths through the landscape shown on the White house plan. Ironically, this may eventually be revealed to be an aspect of the White House design that is in reality similar to Poplar Forest. Excavations have thus far not located any evidence of a Jefferson-era circular road, despite the fact that more than 20 separate units have been excavated in locations where they should have intersected a 540 yard-round perfect circle as shown in Brown's plan. Though something as ephemeral as a road trace is very difficult to locate archaeologically, the planting holes for the paper mulberry trees Jefferson notes planting around the road at twenty foot intervals would be relatively easy to distinguish, yet none have been found to date. In addition, an eight or ten foot wide road forming a perfect circle of these dimensions would severely cut into the roots of several trees in the north core of the property which are almost certainly original Jeffersonian landscape elements. The lack of direct evidence from archaeology, as well the indirect evidence of the location of original trees, may be indicating that the "circular road" may not have been a perfect circle at all. One likely possibility is that the road could have wound around freely and irregularly, following the topography of the Poplar Forest hilltop much in the same manner as the encircling road in the White House plan.

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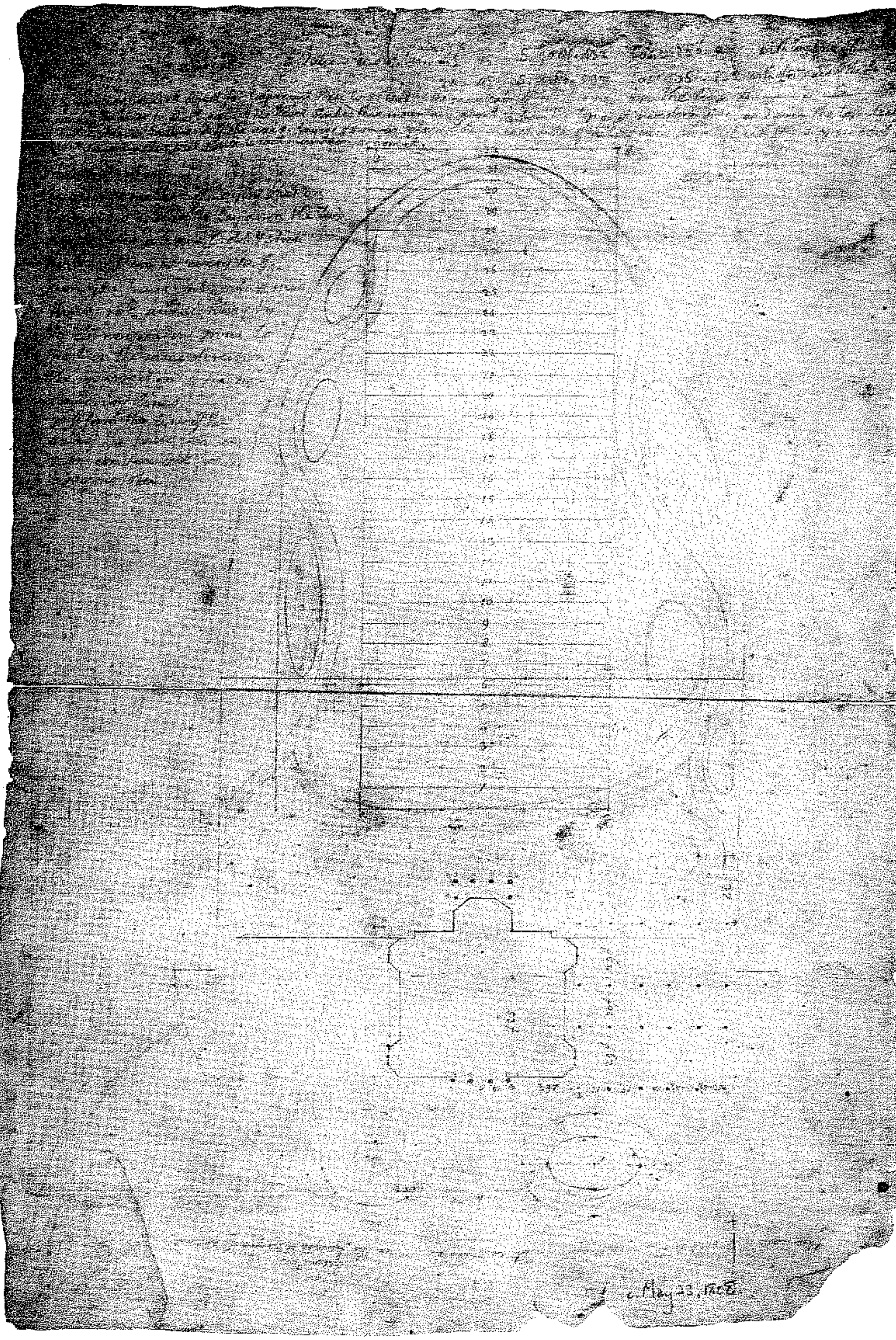

FIGURE 44: Study for remodeling grounds at Monticello. The hand-drawn map features a serpentine walk winding through oval beds of differing sizes. The date of this map is unknown, though the horizontal lined across the lawn were added in 1808 (Adams 1976:331)

discerned to a greater degree than was previously realized, and this theme was examined using multiple sources of data.

Jefferson's deep interest in the practical and ornamental cultivation of plants is well documented: Jefferson owned nearly 200 published books or pamphlets on agriculture, gardening, and botany (Betts1944:655-663). He studied and experimented with innovations in agriculture his entire life and was a strong advocate of scientific farming practices such as contour plowing, standardized field sizes, and crop rotation. He became a member of the American Philosophical Society in 1780, and was elected President in 1797 (Betts 1987: 510-511). He received a gold medal, and a nomination as an associate member, from the Agricultural Society of Paris in 1807 for his mould-board plow design(Malone 1974: 19). During his presidency, he directed that foreign consuls of the United States collect examples of useful and ornamental plants from the places they visited, and send them to him in Washington. He would then distribute these specimens to professional gardeners in the city and would follow their attempts to propagate these species closely, even ordering his steward to pay the highest prices for the earliest and best new specimens (Smith 1906: 394). It is not surprising that Jefferson has been referred to as serving as a one-man Department of Agriculture, long before that department ever existed. Jefferson once noted:

> Botany I rank with the most valuable sciences, whether we consider its subjects as furnishing the principle subsistence of life to man and beast, delicious varieties for our tables, refreshments from our groves, materials for our buildings, or medicaments for our bodies (Lipscombe and Bergs 1903: 375).

His enthusiasm for gardening and ornamental landscaping was equally strong and he wrote often about the enjoyment he derived from these activities, though usually with a self-deprecating air which belied his extensive knowledge. He cultivated numerous acquaintances throughout his life with whom he would share and exchange seeds, bulbs, roots, cuttings, etc. Rare specimens, such as the western pea brought to him by Merriwether Lewis, were quickly shared with others. Jefferson exchanged both letters and plants with many leading gardening experts of his time, maintaining an especially active relationship with Bernard McMahon, influential author of *The American Gardener's Calendar* (Nichols and Griswold 1978; McEwan 1991; Betts 1944) A letter by his Granddaughter Ellen Randolph Coolidge illuminates the pleasure Jefferson derived from his gardening.

> I remember well when he first returned to Monticello, how immediately he began to prepare new beds for his flowers. He had these beds laid off on the lawn,

> under the windows, and many a time I have run after him when he went out to direct the work, accompanied by one of his gardeners, generally Wormley, armed with spade and hoe, whilst he himself carried the measuring line. ...The roots arrived each one with a fancy name. There was Marcus Aurelius, and the King of the Gold Mine, the Roman Empress, and the Queen of the Amazons, Psyche, the God of Love, etc. etc. etc. ...Each root was marked with its own name written on a bit of stick by its side, and what joy it was for one of us to discover the tender green breaking through the mould, and run to grandpapa to announce that we really believed Marcus Aurelius was coming up, or the Queen of the Amazons was above ground! With how much pleasure compounded of our pleasure and his own, on the new birth, he would immediately go out to verify the fact... how he would sympathize in our admiration, or discuss with my mother and elder sister new groupings and combinations and contrasts. Oh, these were happy moments for us and him (Betts, Perkins, and Hatch 1986:29)

Archaeological, microbotanical, and documentary research into the landscape at Poplar Forest has revealed several gardening practices used by Jefferson. For instance, the use of multiple types of fertilizers to establish new plantings, consistent with practices outlined in period gardening literature, has already been discussed (see soil chemistry section). Jefferson's technique of initially propagating young plants in a nursery area, and later replanting the best established specimens in the ornamental landscape, has also been revealed through archaeological research (see palynological analysis).

Another topic of research pursued during this project was to examine the ornamental shrubs Jefferson chose for the south lawn from a horticultural/gardening perspective. In the Spring and Summer of 1999, Mr. Talmage Greenway of Lynchburg, VA completed an internship research project for the Poplar Forest archaeology department as part of his course of study for a master's degree in historic horticulture from Roanoke College. His full report, *A Search for Jefferson's Landscape Design for Poplar Forest*, is on file in the Poplar Forest archaeology department.

Excavation revealed two different designs for the sunken lawn (see excavation section). The December 1812 planting memorandum indicated the types of shrubs Jefferson wished to have planted on the south lawn: "Plant on each bank, right & left, on the S. side of the house, a row of lilacs, Althaeas, Gelder roses, Roses, Calycanthus (Betts 1944:494). By combining these two lines of evidence, it became possible not only to rough in the plan-view design(s) of Jefferson's lawn, but to begin to visualize the three-dimensional nature of the landscape.

The growth and survival of the south lawn ornamentals is of primary consideration. There is indirect evidence that other Jefferson plantings at Poplar Forest did not survive long, the most notable being the 8 weeping and 20 golden willows Jefferson wished to have planted on the east and west mounds in November of 1812 (Betts 1944:494). Willows are especially sensitive to a lack of water, and since the mounds were artificially steep slopes composed of re-deposited subsoil fill, they would have drained water away from the willows to such a degree that their long-term survival is unlikely. This is especially true given that the years 1813 and 1816 were ones of recorded drought in this region (Betts 1944::513,552). The fact that Jefferson replanted the mounds, or open areas on them, in 1815 with Calycanthus and again in 1816 with Altheas, Guelder Roses, Lilacs, and Calycanthus seems to indicate that at least some, if not all, of the willows did not survive (Betts, 1944: 594,562) It was therefore considered important to assess the probability of the survival of the south lawn shrubs.

Research indicates that Jefferson chose the Lilac, Althea Guelder Rose, Rose, and Calycanthus shrubs for the south lawn in part due to their hardiness. All of the plant types are very compatible with the climate and temperature range of the Piedmont region of Virginia, and all have a proven ability to survive in relatively infertile clay soils (Greenway 1999: 11) Jefferson would certainly have been very familiar with these qualities, having grown these shrubs at Monticello before he considered planting them at Poplar Forest. The extremely dense nature of the clay at Poplar Forest made it likely that the plants would have become at least partially root-bound within their respective planting holes, and this would in turn have likely slowed their growth to some degree. However, their chances for survival were nonetheless considered to be high in the context of the south lawn plantings. Their survival may be hinted at by the fact that Jefferson replanted both mounds, which he originally preferred to cover with willow surrounded by aspens, with althea, guelder rose, lilacs and calycanthus in 1816. It is possible that he chose to use these plants on the mounds based on the success of the plantings on the south lawn, then four years old, since it is unlikely he would have used them in 1816 had they not proven successful elsewhere at Poplar Forest.

All of the shrubs had very similar vertical growth rates, between 1 to 2 feet per year, and all would reach a maximun height of between 8 to 15 feet excepting the Calycanthus which typically reaches 6 to 12 feet in height. This important similarity in growth rates meant that as the landscape matured, the visual balance of the planting row would not be upset by one or two species "outcompeting" adjacent shrubs and possibly killing what would have otherwise been successful plantings. A similar vertical growth rate would also have contributed to a visually even planting row as the plants matured.

When discussing the placement of shrubs or trees in the landscape, period gardening books often mention the color of the leaves as being an important consideration for the choice of specific plantings and placements. In his 1823 edition of "*Sylva Florifera: The Shrubbery, Historically and Botanically Treated*", Henry Phillips notes:

> One of the most important things in planting is to attend particularly to the shades of green, especially where the view from the house or lawn catches the trees... Even the effect of perspective may be considerably increased by the proper arrangement of hues. Trees whose leaves are of a grey or bluish tint, when seen over or between shrubs of a yellow or bright green seem thrown into the distance. Trees with small and tremulous leaves should wave over or before those of broad or fixed foliage (Phillips 1823: 22-24).

Though writing after Jefferson had already completed his landscaping at Poplar Forest, Phillips was describing a landscaping effect that had clearly been understood for a long time and was used extensively. Batty Langley describes the same effect nearly 100 years earlier, and also mentions the use of perspective. In discussing how to construct a walk that lends an impression of distance, Langley states that if the farthest portion is: "...enclosed on the sides with a hedge whose leaves are of a light green, 'twill seemingly add a great addition to the length of the walk (Langley 1727:196)".

In addition to Langley's book, Jefferson owned the 1770 edition of Thomas Whatley's "*Observations on Modern Gardening.*" Jefferson clearly admired Whatley's work, and referred to it constantly during his 1786 tour of famous ornamental landscapes in England. Jefferson wrote:

> While his descriptions, in point of style, are models of perfect elegance and classical correctness, they are as remarkable for their exactness. I always walked over the gardens with his book in my hand, examined with attention the particular spots he described, found them so justly characterized by him as to be easily recognized, and saw with wonder, that his fine imagination had never been able to seduce him from the truth. My inquiries were directed chiefly to such practical things as might enable me to estimate the expense of making and maintaining a garden in that style (Betts 1944:113)

Whatley also made note of the importance of the choice of plant color for fostering an illusion of distance. He wrote:

> Clumps at a distance may be rendered more or less distinct by their greens; and the fine effect of a dark tree, or group of trees, with nothing behind it but the splendor of a morning, or the glow of an evening sky, cannot be unknown to any who was ever delighted with a picture of Claude, or with the more beautiful originals in nature. Another effect attainable by the aid of the different tints is founded on the first principles of perspective. Objects grow faint as they retire from the eye; a detached clump or a single tree of the lighter greens, will, therefore, seem farther off than one

> equidistant of a darker hue; and a regular gradation from one tint to another will alter the apparent length of a continued plantation (Whatley 1770: 35)

Palynological data has not yet been detailed enough to ascertain the specific plants placed in the planting holes along the south lawn. Because Jefferson was often quite specific in his writings, it has been considered likely that the planting scheme on the south lawn followed the sequential order of his written directions (Lilac, Althea, Guelder Rose, Rose, Calycanthus), and that the shrubs were planted in a regularly alternating sequence of five. However, while the above quotes demonstrate that it is possible Jefferson planted the five shrubs in five separated sections, based on leaf color, palynological data suggest this is unlikely. Pollen or phytoliths from four of the five shrubs were either confirmed or suggested, and all were found within a 25 foot section of the east terrace bank. The data strongly suggests that Jefferson was mixing these plants, probably in an alternating sequence of five, in this area (see microbotanical section).

The row of ornamental shrubs Jefferson desired would have had several significant visual qualities. The south lawn shrubs were spaced relatively close to one another, at approximately 5.5 to 6 feet apart (Greenway 1999:8). Given that these ornamentals would typically reach 6 to 12 feet in diameter at maturity, it is clear that if spaced only 6 feet apart, they would have started growing together and overlapping very quickly. The rate at which this happened would obviously depend on specific growing conditions and on the level of care they received such as pruning or watering. Documentary references suggest that the ornamental landscape at Poplar Forest received either minimal care or none at all when Jefferson was away. A surviving letter from Ellen Wayles Randolph to Martha Randolph describes Poplar Forest as a place of "wildness and desolation" after a long family absence, with weeds growing "as high as your head". (Ellen Wayles Randolph to Martha Randolph, July 18, 1819: UVi). Even with regular pruning or general care, it is probable that the south lawn shrubs would have become a thick, and essentially singular hedge in a relatively short period of time, even if they were somewhat root-bound.

Another important visual quality of these shrubs is their time of bloom. Phillips states:

> A well planted shrubbery depends not so much for its beauty on the expense or rarity of the plants it contains, as on the selection of trees and shrubs which succeed each other in blossoming throughout the year, or whose various colored fruits grace them for the longest duration of time (Phillips 1823:27).

In Jefferson's south lawn planting row, the Lilac would bloom first, in early spring to mid May. The Guelder rose would bloom in May while the Calycanthus would bloom in late May to early

June. The specific Rose species was not listed by Jefferson in his planting memorandum. After evaluating all of the roses known to have been grown at Monticello, the most likely candidates would have been the Musk rose and the Sweet Briar rose, based on hardiness, growth rates, and a mature size that would be compatible with the other south lawn plantings (Greenway 1999:13). The Musk Rose would have bloomed from June through September, while the Sweet Briar Rose would have bloomed in spring. Finally, the Althea would have bloomed from July to September. Evaluated as a group, an alternating but contiguous planting row of these shrubs would have had at least one species in bloom from early spring through September, providing both color and scent for up to seven months or longer during the year.

In conclusion, it appears that Jefferson gave careful consideration to the ornamental plantings on the south lawn, based on his years of horticultural study and his experience with ornamental landscape design and implementation at Monticello. Research suggests that Jefferson had a very specific visual effect he wished to achieve through the design of the lawn, and that he chose the south lawn shrubs carefully in order to achieve this desired effect. In addition, the fact that he chose these species for replanting efforts in other areas during 1816 may indirectly suggest that the south lawn plantings from 1812 survived the subsequent drought years. The choice of such hardy shrubs indicates that this was a planting Jefferson desired to have a high expectation of success. The criteria of hardiness, suitability to the climate and clay soils of Piedmont Virginia, compatible growth rates, and differential bloom times of the south lawn shrubs, may all have been factors Jefferson took into account in choosing these species. When one envisions the thoughtful way in which the plants were chosen, the careful propagation of the seedlings in the nursery, and the painstaking process of transplanting the best specimens into the landscape with three types of fertilizer in each planting hole, one starts to get a sense of Jefferson the gardener.

CHAPTER 7: JEFFERSON'S LANDSCAPE

Gathering and synthesizing the data from archaeological investigation and documentary evidence is an essential first step towards understanding the intended and actual spatial volumes and visual relationships of the 3-dimensional landscape. However, once the "what" and "how" of the landscape have been established, the next step is to address the question "why"? Discoveries made during this investigation have provided the opportunity to reassess specific aspects of Jefferson's ornamental landscape, and to offer insights into its creation from several different vantage points.

The physical component of an ornamental landscape has an ideal form imagined by its designer, an actual form altered by realistic constraints, and a temporal form reflecting changes to the physical form through time. The functional component of the landscape reflects the roles, intended and unintended, that a landscape plays for those who inhabit or observe it. For instance, landscape features can serve as physical reflections of social barriers, or may structure or control social interaction by channeling that interaction into intended spaces. A landscape can serve an ornamental function to create an intended public statement for outsiders to see, or a decorative function to create an intended atmosphere or setting for its occupants. It is therefore important to remember a landscape still has significance and meaning on a multitude of levels. Even if the plan can be reconstructed perfectly (an impossible task), this is only a first step towards addressing broader inquiries.

FORCED PERSPECTIVE: INTERPRETING A VIEW

As discussed earlier, evidence indicates that Jefferson planned to cut back the west bank to match the shape of the east bank (see central lawn drain discussion, excavation section of this report). If Jefferson did intend the final lawn shape to be symmetrical, with both banks canting outwards, then it is possible that he was envisioning using the principle of forced perspective. If one were to view the house from the south, the narrowing distances between the terraces, plantings, and trees on either side of the sunken lawn would produce the illusion that the house was farther away through forced perspective. This would also make the house appear larger, and the slowly increasing size of the terrace slopes nearer the house would add the impression of greater height. The illusion would have operated in the opposite direction, as well. Jefferson clearly designed the south portico, with the only triple sash windows in the building, as the featured viewing area in the house and he wrote that he believed the southern aspect to be the most important consideration in planning the design of a building

FIGURE 45: A comparison of the two different shapes of the sunken lawn, as viewed from the South portico. The yellow arrows on the top image show the placement of the furthest shrubs in the original 1812 planting plan. Note how the growth of large shrubs would quickly begin to boscure the view from this location. The yellow arrows on the lower image show the re-designed lawn, based on the east bank plantings of 1814. Unlike the original design, the planting rows canting outwards open up the view from the South portico, and bring the distant prospect closer to the viewer. Although obscured by undergrowth today, this view would originally have looked out past a garden area over sloping agricultural fields to the wooded Tomahawk creek.

(Jefferson to Latrobe 1817: DLC). From the south portico, the outward-sloping terraces, and the widening lines of shrubs and flowers,would appear to bring the broad landscape south of Poplar Forest closer to the viewer. In Jefferson's time this view would have been primarily of the sunken lawn parterre in the foreground. Behind this was likely a garden, a curtilage fenceline, then a wide vista of cleared fields descending a moderate slope to the wooded Tomahawk creek, about 1,300 feet from the house. Determining in which direction the illusion was intended to operate, whether to make the house appear larger or to bring the landscape closer to his study, is clearly significant and may have something to tell us about Jefferson's ideal of the Poplar Forest landscape and vision of his place within it.

The technique of utilizing perspective was well established at the time of the creation of Poplar Forest, and is mentioned in numerous 18th and 19th century garden books, including Batty Langley's 1727 *New Principles of Gardening*, Whatley's 1770 *Observations on Modern Gardening,* and Phillips 1823 *The Shrubbery*. The closing section of Langley's book, entitled "General Directions &c." details aspects of particularly excellent designs. As noted earlier, Langley describes how to design walks to create an illusion using the manipulation of visual perspective, and it is important to note that not only the color of the plants, but also the plan-view design of the walk is used to create the forced perspective illusion:

> (It is suggested) ...That the grand Front of a Building lie open upon an elegant Lawn or Plain of Grass... That the walks leading up the Slope of a Mount, have their breadth contracted at the Top, full one half part; and if that contracted Part be enclosed on the Sides with a Hedge whose leaves are of a light Green, 'twill seemingly add a great Addition to the Length of the Walk, when viewed from the other end. (Langley 1727:196)

The manipulation of line-of-sight perspective has been documented at other 18th and 19th century ornamental landscapes in America. At Gunston Hall in Fairfax County, Virginia, for example, George Mason deliberately used line of sight perspective in planting four 1,200 foot long rows of cherry trees in the front of his house. These rows were canted slightly outwards and were precisely sighted from a "common center" where the lines of sight for the four rows converged at the front of his house. His son, John Mason, describes the illusion:

> ...so carefully and accurately had they been planted, and trained and dressed in accordance each with the others, as they progressed in their growth, that from the point...as taken from the common center, and when they had got to a great size, only the first four trees were visible. (Martin 1991:126)

When one took only a few steps to either side of this center sighting point, what initially appeared to be only four cherry trees was then revealed to be four immense lines of trees, in rows over twelve hundred feet in length (Martin 1990:126).

In addition to planting designs, 18th century gardeners also used terraces to create optical illusions with forced perspective. At the William Paca garden in Annapolis, Maryland, the dimensions of falling terraces were deliberately sized to make the house appear larger and more imposing to outside viewers. This design has been interpreted by archaeologist Mark Leone as being evidence of an attempt by the Paca family to "naturalize" their lofty, but arbitrary (according to Leone) position in society through the control and manipulation of nature (Leone in Miller and Tilley 1984:25-34). This theme of interpretation, that ornamental landscapes of 18th century Annapolis were created to function as ideological tools to publicly demonstrate that the status and wealth of the elite was deserved and natural, has had a strong influence on landscape archaeology. The vast majority of published material on the archaeology of ornamental landscapes and urban gardens has been written from an interpretive standpoint similar to that taken by Leone and Paul Shackel in their work with historic gardens in Annapolis. In fact, the practice of analyzing ornamental landscapes within the context of power relations and capitalist ideology, and concluding that their primary function was as an outward display of wealth and an affirmation of social position, has seemingly become the de-facto method of interpretation of most ornamental landscape archaeology research today. The ornamental landscape at Poplar Forest, however, is intriguing in that it was created for what was intended to be a very private space. The context of its creation suggests an interpretation differing from the standard Leone pioneered.

Jefferson designed and built his retreat at Poplar Forest while serving his second term as President. It is interesting that he chose to build it at all, for during this time he was heavily in debt and the project was essentially an indulgence that would not provide a measurable fiscal return on his expenditures. In spite of his decaying finances, he chose to build it anyway, indicating the importance the idea of this retreat held for him. The concept he envisioned was grounded in the 16th century architect Andrea Palladio's idealized description of the classical villa. Palladio described the villa as a house on a country estate where a statesman of Roman society would retire from the administration of the republic. Here, the gentleman could put his private affairs in order, oversee his lands and restore his energies through the study of letters, and contemplation.

> "Hence it was that the ancient sages used to retire to such places, where being oftentimes visited by their virtuous friends and relations, having houses, gardens, fountains, and such pleasant places, and above all, their virtue, they could easily attain to as much happiness as can be attained here below (Placzec 1965:46)."

It is not hard to imagine the appeal such a description would have had to Jefferson at that point in his life. Suffering from migraines, burdened by the responsibilities of his office, his years of public service had undoubtedly cost him much financially and personally. Apparently, the reality of his debt was not enough to outweigh the power of this peaceful, idealized vision of a classical retreat. It is this context that gives us the greatest insight into the motives compelling Jefferson to construct the ornamental landscape at Poplar Forest.

Poplar Forest was situated in what, at that time, was a rural area with a low population density. However, to serve as an effective outward display of wealth or social position, such display would require a suitable audience. Unlike Monticello, where the Jeffersonian celebrity ensured a constant stream of callers, the only people who would have seen Poplar Forest would have been either Jefferson's slaves and overseers. The small number of locals who might have visited did not require an elaborate ornamental landscape to respect a former Governor of Virginia and President of the United States. The prospect of Jefferson devoting all of the time and effort necessary to create the ornamental landscape at Poplar Forest merely in order to "naturalize" his social position in the Virginia hinterlands seems rather unlikely. More significantly, several accounts exist of Jefferson politely declining to invite visitors to Poplar Forest due to a lack of adequate guest accommodations. In fact, the interior of the house was intentionally designed to exclude any guest accommodations. Far from seeking some form of public recognition through his creation, Jefferson clearly valued his solitude and shunned intruders, casting serious doubt on any interpretation of this ornamental landscape as an intended public statement.

It seems much more likely that the vision of the villa retreat was the primary force shaping Jefferson's design of the landscape, including the south lawn. This is not to suggest that different meanings were not implicitly or explicitly expressed through its creation. Nonetheless, the ornamental landscape appears to have been created by Jefferson primarily for himself and his family, to provide an intended setting and to evoke an atmosphere reminiscent of the ideal of the villa that Jefferson so cherished. This example may suggest that other ornamental landscapes may also have been created primarily for reasons other than capitalist ideology. Individuality and variation are hallmarks of the human experience, and archaeologists should be wary of interpreting the remains of the past within preconceived categories of meaning or significance without accounting for the distinctive individual context of the creation of those remains.

JEFFERSONIAN LANDSCAPES: THE MODERN AND ANCIENT

The redesign of the sunken lawn suggests one intended place for Jefferson within this landscape; the lawn appears to have been created by Jefferson to be viewed from his south portico study. The forced perspective illusion Jefferson envisioned "'framed' a picture of the outside world, and would have appeared to bring that picture closer to his study. In discussing the potential for conducting research on relic landscapes, archaeologist Kathryn Gleason has observed: "Knowing what once could be seen from, of, or within a planned landscape suggests planned physical and human relationships that can be interpreted, as well as just the concept of design." (Miller and Gleason 1994:7) If the sunken lawn redesign implies that Jefferson envisioned himself viewing the southern portion of the landscape from a fixed point within the house, what does that say about the overall context of his landscape design?

The ornamental landscape at Poplar Forest appears to have contained an interesting juxtaposition of rococo, natural-style landscape elements and geometric, neoclassical symmetry. Thomas Whately's *Observations on Modern Gardening* was particularly respected by Jefferson, and the manner in which Whately characterized the English "picturesque" style of landscape gardening may shed light on some of Jefferson's own preferences in landscape design. Considering it to be one of the fine arts, Whately believed that the art of the landscape gardener went far beyond that of the mere painter. The canvas is only two-dimensional, but fine landscape gardening, due to the grand scale of the creation and the inexhaustible palette of nature, surpassed even sculpting as fine art (Middleton 1992:48). While "composing" scenes of great natural beauty, the landscape gardener is implored to eschew the use of crude, overtly man-made landscape elements in favor of harmonious, natural scenes rooted in the native character of the place. Whately notes: "Regularity can never attain to a great share of beauty, and to none of the species called picturesque; a denomination in general expressive of excellence" (Whately 1770: 146). As noted earlier, Jefferson shared this view, discarding the most artificial or contrived elements of ornamental landscape design in favor of tastefully executed natural looking features, a philosophy described as based on the "soft and pastoral" (Martin 1991:147)

At Poplar Forest, the influence of Jefferson's knowledge of English landscape gardening is expressed through his use of several types of landscape elements. The north core area in particular appears to have been designed almost exclusively around features emblematic of English picturesque

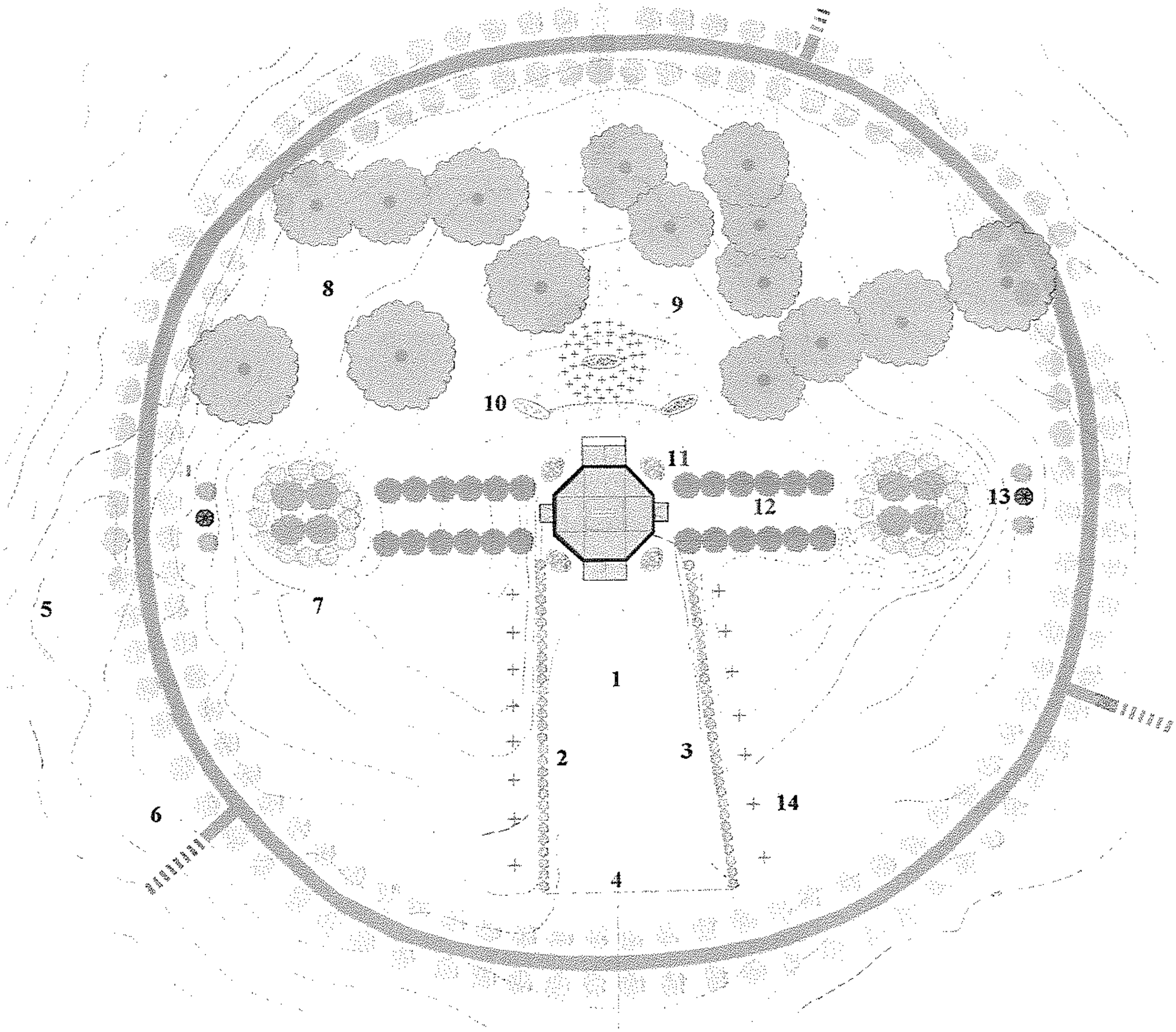

FIGURE 46: Plan of Jefferson's ornamental landscape.
Based on current archaeological and documentary research.

1. SUNKEN LAWN: Called a "parterre" or "bowling green", this area was excavated by Phil Hubbard, and likely other workmen, in 1807 and 1808.

2. 1812 PLANTING PLAN: Jefferson notes: "Plant on each bank ...Lilac, Althea, Guelder Roses, Roses, Calycanthus". Archaeological evidence suggests this first lawn shape was rectangular.

3. SECOND PLAN, ca 1814: Archaeologists discovered Jefferson modified his original plan by canting the east bank outwards- does this mean Jefferson planned the same treatment for the west bank?

4. FRENCH DRAIN: Channeled water south, away from house and wing.

5. MODERN ROAD SYSTEM: Current entrance and drive shown in gray.

6. JEFFERSON ERA ROAD SYSTEM: Documents record surveys of three entrance roads, but the present central road is never mentioned. Jefferson wanted rows of Paper Mulberry trees around the encircling road.

7. EARTHEN MOUNDS: Constructed of fill from the house foundation and sunken lawn excavations, the mounds are shown planted with willows and aspen as noted by Jefferson in 1811. Subsequent replanting may indicate that some or all of these plants did not survive long.

8. POPLAR GROVE: Native trees were intentionally left in place for shade.

9. BOXWOOD AND ENTRANCE: Though archaeology suggests these features are post-Jefferson, no conclusive evidence has yet dated them. American boxwood shown as light crosses, English boxwood as dark crosses.

10. OVAL BEDS: Planted in 1816 with "large Roses...Dwarf Roses... Robinia Hispida", the west bed was discovered archaeologically intact.

11. PLANTING CLUMPS: Planted tightly together in 1812 to produce a dense thicket of foliage at each angle of the house, they held "Athenian and Balsam Poplars... intermix with locusts, common and Kentucky, redbuds, dogwoods, calycanthus, liriodendron". NW clump located archaeologically.

12. PAPER MULBERRIES: Jefferson planted "double rows" of these trees east and west of house in 1812. Did the 1814 construction of the wing of offices destroy the eastern mulberry plantings?

13. CLOACINALS: Jefferson built unusual octagonal privies east and west of the house. He notes planting willows around each privy in 1811, later adding paper mulberries and privet.

14. KENTUCKY COFFEE TREES: Early photographs of Poplar Forest show these trees along the sunken lawn banks. When they were planted is presently unknown.

garden design of the late 18th and early 19th centuries. The planting clumps at the diagonal angles of the house contained trees and shrubs densely packed together to produce a wild thicket of foliage. The form of the planting clump had been developed over the course of the 18thcentury in England, evolving from broad wildernesses and thickets into the "shrubbery" of the mid to late 19thcentury (Laird 1999:101-130). Though composition, and size varied with individual plantings and sites, the style of planting clump Jefferson used had taken shape in the mid 18thcentury. Whately describes the ideal form of such clumps:

> (Clumps) are either independent or relative: when independent, their beauty, as single objects, is solely to be attended to; when relative, the beauty of individuals must be sacrificed to the effect of the whole. ...Another peculiarity of clumps, is the facility with which they admit a mixture of trees and shrubs, or wood and grove; in short, of every species of plantation. None are more beautiful than those which are so composed. Such compositions are, however, more proper in compact than straggling clumps (Whately 1770: 53-55)

Jefferson began planting clumps at Monticello in 1807, perhaps inspired by the clumps he remembered from his 1786 visit to Esher Place, Surrey, which he described as "a lovely mixture of concave and convex" (Betts 1944:112). Paper mulberries, robinia hispida, mountain ash, poplars, prickley ash, choke cherries, and purple beeches were purchased in the Spring of 1807 from Thomas Main's nursery in Georgetown, forming the core plantings around the house and augmented with horse chesnut and redbud from his own stock (Heath 1994: 52). By November, eight of the original 36 trees in the clumps had died, and replacements were purchased. How long a clump of trees was intended to persist as a landscape element is unknown, but Heath notes that by 1825, paintings of Monticello do not show clumps matching those documented in 1807 (Heath 1994: 54).

Jefferson's 1812 planting Memorandum for Poplar Forest notes the mix of trees and shrubs he used in the clumps at the angles of the house: "Athenian and Balsam Poplars at each corner of house. Intermix locusts, common and kentucky, redbuds, dogwoods, calycanthus, liriodendron"(Betts 1944:494). If Jefferson followed Bernard MacMahon's *American Gardener's Calendar* instructions for organizing these species within the clump, the tallest specimens would have been placed in either the background or center of the clump, with the whole arranged "according to their gradation in height" (MacMahon 1806: 62-63). This was not a new idea, as gradation of plantings based on height had been argued over by Batty Langley and Richard Bradley as early as the 1720's. Bradley presented the idea as a "new improvement" in his *New Improvements of Planting and Gardening* in 1719, only to be taken to task by Langley who noted: "Every gardener is perfectly acquainted therewith; and 'tis what they have practiced many years before Mr. B--d--y"(Laird 1999:27-30). Laird notes: "One central idea seems to run through the composition of all 18th-century shrubberies and flower gardens: plants should be arranged in a graduated array" (Laird 1999: 16).

The oval bed grew out of the same evolution in landscape gardening that produced the shrubbery clump. Composed primarily of low-lying flowers, oval beds also occasionally contained a flowering shrub in the center, and were typically composed with the same gradation in height that governed the construction of clumps. Jefferson noted an unfavorable impression of the gardens at Blenheim during his 1786 tour, when he wrote: "...the garden has no great beauties. It is not laid out in fine lawns and woods, but the trees are scattered thinly over the ground" (Betts 1944:114). He also notes the flowering shrubs in raised oval beds scatted across the landscape, but apparently did not dislike these particular landscape features in the same way he disliked the layout of the grounds. He began to plant oval beds at Monticello in 1807, occasionally including fraxinella and guelder rose in the centers of some beds. Other oval beds were composed entirely of flowers (Betts 1944:334). He was evidently pleased enough with the results to continue the practice at Poplar Forest. In a November 1, 1816 planting memorandum for Poplar Forest, Jefferson notes: "Planted large roses of different kinds in the oval bed in the N.front. Dwarf roses in the N. E. oval. Robinia hispida in the N. W. do." (Betts 1944:563). Archaeological investigations have located the northwest oval bed, and indicate that it was not aligned geometrically with the house (Heath 1994: 68-75). The angled placement of this feature recalls the naturalist style oval beds and serpentine path shown in Jefferson's plan for the west lawn at Monticello.

Another important aspect of the north core design is brought to light by the five tulip poplars still standing along the circular road. Numerous circular depressions eight to ten feet in diameter from large removed stumps were recorded across the north core during modern surveys of the property (Reilly 1992: Site Survey map), hinting that the 5 remaining specimens are the last remnants of a larger grove of that likely once covered the north core area. Jefferson argued that the execution of the naturalist style of landscape gardening should be, of necessity, different in America than in England. In writing to William Hamilton in 1806, the same year he began construction of the house at Poplar Forest, Jefferson states:

> Their sunless climate has permitted them to adopt what is certainly beauty of the first order in landscape. Their canvas is of open ground... But under the beaming, constant and almost vertical sun of Virginia, shade is our Elysium. In the absence of this no beauty of the eye can be enjoyed... The only substitute I have been able to find is this. Let your ground be covered with trees of the loftiest stature. Trim up their bodies as

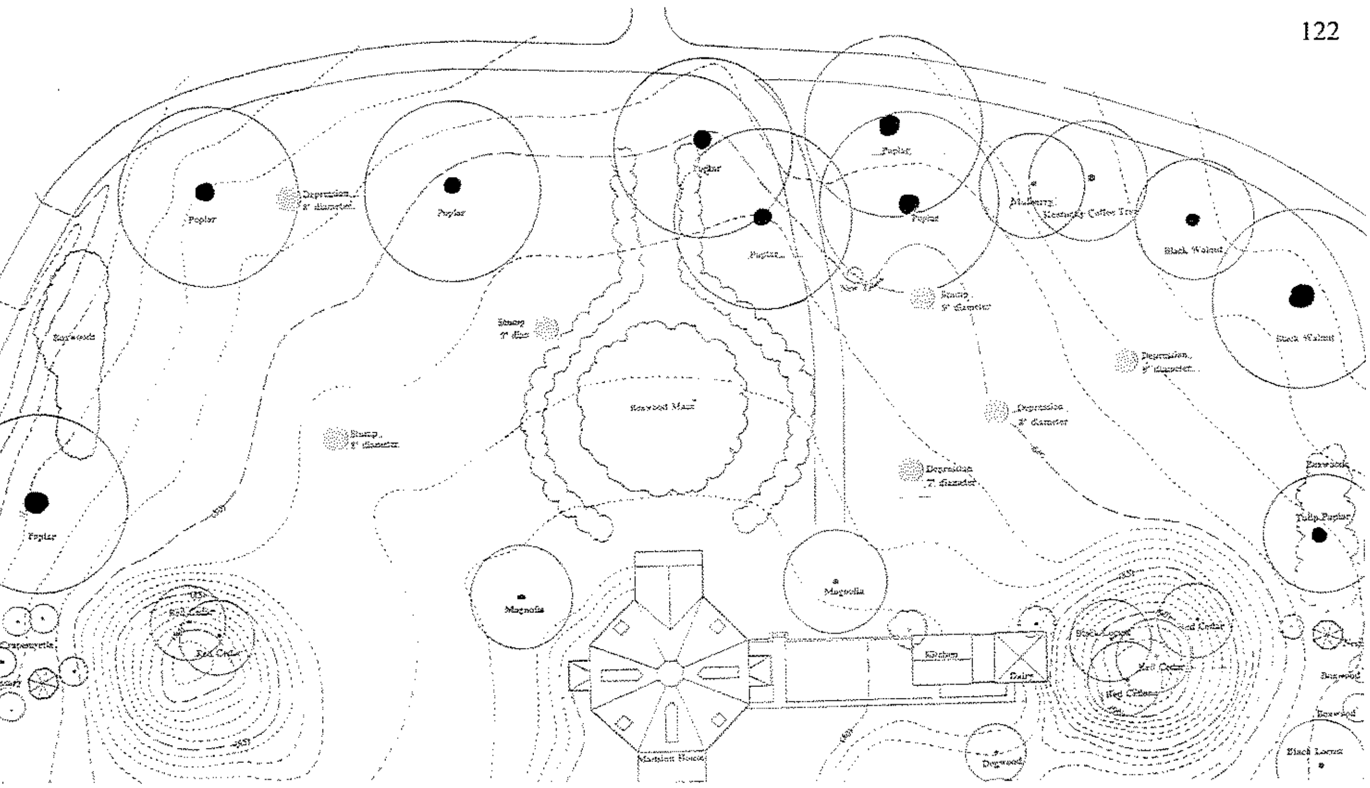

Figure 47: This survey of the North core area made in 1990 showed seven large tulip poplars of roughly the same size, and one large black walnut tree, still standing in the North core. Two of these trees have since been lost, but tree-ring dating (dendrochronology) indicated they were 20-30 years old in 1806 when Jefferson started developing the house and grounds. In addition, seven large circular depressions and stumps (shown in gray) indicate that other trees also once stood here. Archaeological testing may eventually reveal more tree placements (Map created by Will Rieley).

FIGURE 48: View of tulip poplars in North core,1999. Jefferson envisioned "English style open grounds" beneath a canopy of shade, and left these specimens in place when designing his ornamental landscape.

> high as the form of the tree will bear, but so that their tops shall still unite and yield dense shade. A wood so open will have nearly the appearance of open grounds.(TJ to William Hamilton 1806, in MacCubbin and Martin 1984:182)

This quote surely illustrates the effect Jefferson wished to achieve in the north core area at Poplar Forest. Initial dendrochronological analysis of two specimens suggests these trees were 20 to 30 years old when Jefferson built the house and designed the landscape. That these Poplars were intentionally left in place surely points to the intended setting Jefferson wished to achieve in the north core area at Poplar Forest. The planting clumps, angled oval beds, and a cover of native trees to provide English style open grounds in a Virginia climate, all illustrate a coherent landscape composition strongly influenced by Jefferson's knowledge of, and exposure to, the finest English landscape gardens of his time.

These natural-style landscape features suggest that the north half of the core area at Poplar Forest was envisioned by Jefferson as a coherent whole. However, this is not to suggest that the entire ornamental landscape at Poplar Forest was simply a compilation of English-style rococo features in the late 18th and early 19th century tradition. The southern half of the core area would have presented a very different aspect than the north core. The geometric south lawn parterre, bounded by long, straight lines of flowering shrubs, would have been the visually dominant feature of the southern half of the core area. Laird notes:

> While ornament was the overriding purpose of the flower garden, both utilitarian and decorative concerns helped define the shrubbery. Providing a backdrop to an architectural or sculptural feature, *framing a view*,(italics added) or leading the eye to the next section of a circuit were other functions that a plantation of shrubs could fulfill (Laird 1999:15)

This linear landscape feature is not immediately congruous with a soft, pastoral landscape atmosphere. However, it likely did overlook a utilitarian garden of some type at the end of the sunken lawn, beyond which was a very pastoral view of gently undulating agricultural fields descending to a wooded creek. In addition, the allees of paper mulberries and the earthen mounds east and west of the house were symmetrical landscape features that appear to have been built to sculpt Palladian architecture from nature. Jefferson's use of these landscape features as architectural forms is shown by comparing the elevation of Poplar Forest with Palladio's own design for the Villa Barbaro, constructed between 1549 and 1558 (Figure 13). The double rows of paper mulberry trees east and west of the house formed the barchessas, or wings. The earthen mounds at each end, initially planted with willows,

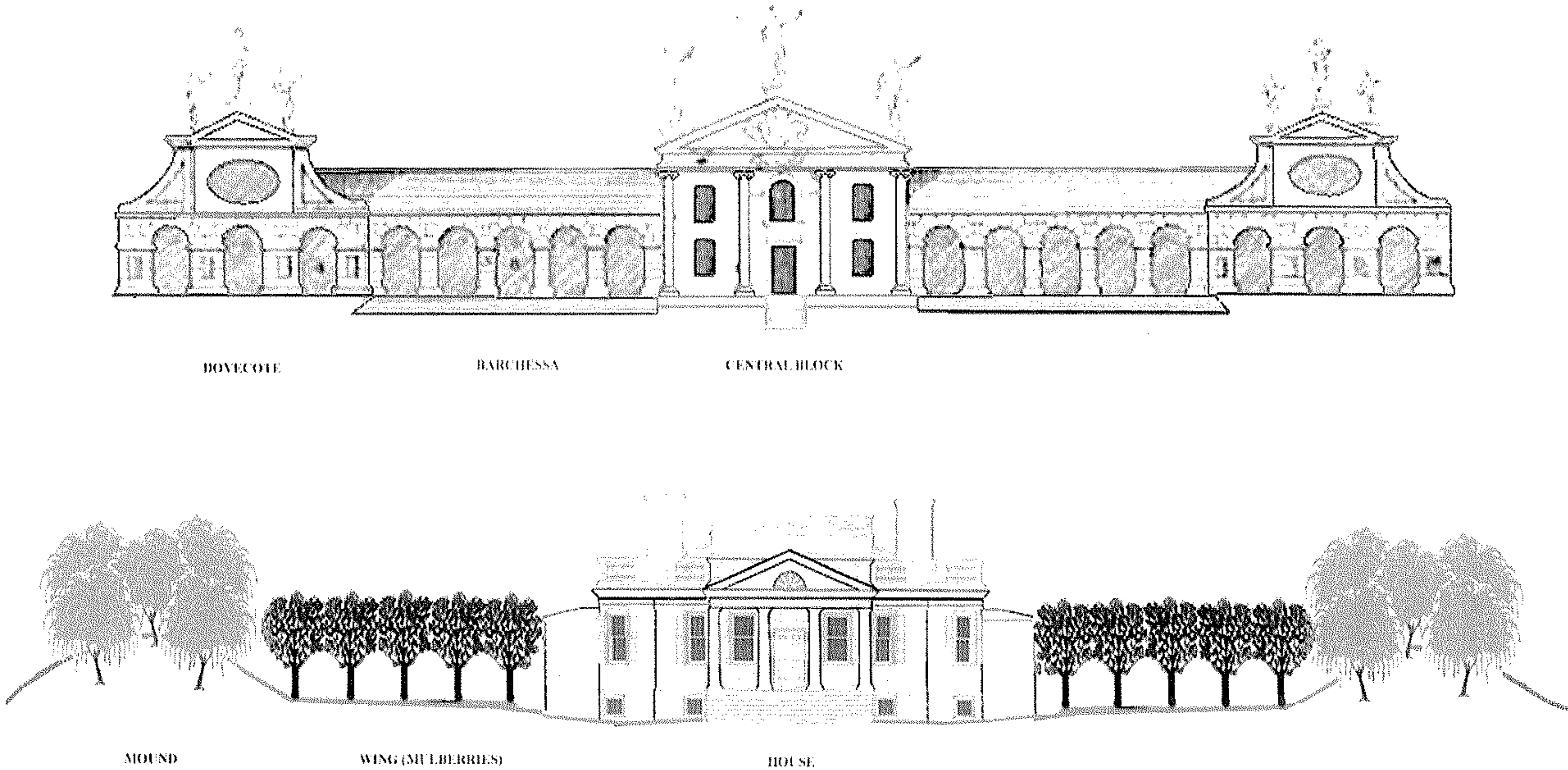

FIGURE 49: Comparison of elevation drawings of Andrea Palladio's Villa Barbaro (1549) andThomas Jefferson's Poplar Forest (1806). The tripartite Palladian scheme is created by Jefferson through the use of landscape elements as visual representations of architecture. The wings of paper mulberry trees formed the barchessas, while the earthen mounds formed the dovecotes. The replacement of the east wing of mulberries with a physical wing of offices in 1814 indicates the faux-architectural function of these landscape elements. Another important aspect of this composition is that it would have stretched for 400 ft. East to West through the core area, visually separating the ornamental landscape into two halves.

functioned as the dovecotes, forming the familiar tripartite Palladian scheme. The visual architectural function of these landscape features is demonstrated by the fact that in 1814, Jefferson replaced the paper mulberries on the east side with an actual brick and mortar wing of offices, a building that was later destroyed in the 1840s (Kelso et al 1990: 46). The comparison illustrates the intimate blend of nature and architecture Jefferson sought to create at Poplar Forest. It is also important to note that these features visually split the core area into two separate parts, a design aspect discussed later.

That portions of the overall design of the landscape appear to have been based on dynamic symmetry is also surely significant. Landscape features based on this dynamic symmetry included the mounds (75 ft), wings (100ft), and the hypothesized re-design of the sunken lawn (100 x 150 x 200ft). Thus, while the overall design of the landscape reflects a Palladian physical harmony between the measures of various elements, the form and organization of those elements shows Jefferson's personal affinity for the English "natural" style landscape. The combination of these two design influences is not necessarily contradictory. Whately notes that a physical harmony between the measures of constituent parts is not only amenable to the picturesque style, but should actually be sought as a design element in some instances. He writes:

> The style of every part must be accommodated to the nature of the whole... On the same principle, the proportion of the parts may often be adjusted; for though their size must be very much governed by the extent of the place; ...a character of greatness belongs to some scenes, which is not measured by their extent but raised by other properties, sometimes only by the proportional largeness of its parts. (Whately, 1770: 13-14)

The organization of landscape features within the core area may shed light on Jefferson's vision of his own interaction with, and presumed activity within, the Poplar Forest house and grounds. In addition to functioning as corollaries to Palladian architectural elements, the paper mulberries and earthen mounds would have visually split the core into two halves. Stretching for 350 feet from east to west, these features would have confined one's view to whichever half of the core area the viewer was standing in. It appears likely that this was an intentional design goal, to avoid presenting the viewer with a discordant scene of natural irregularity on the north side, and linear, geometric landscape features on the south side. The seemingly contradictory division between the natural style north core area and the geometric, linear south core area, may become more harmonious when one envisions entering the house through the first landscape, and viewing the second landscape from a fixed position within the house. The natural-style north core would have set the scene as Jefferson passed through the landscape and entered his villa through the north portico. When he retired to the south room, the sunken lawn bounded by shrubs would have provided an exterior frame to Jefferson's view of the garden and distant rural landscape from his study, through the triple sash windows or the sash doors on the south wall of the house (note Laird's observation, previously quoted, that a common use for a shrubbery was to frame a view).

Clearly, Jefferson the gardener would never have been content simply to view the landscape from his study. He would have enjoyed being "in" these landscapes he created too much to merely observe them from the platform of the house. Jefferson surely strolled from the house, over the sunken lawn and between the rows of shrubs, to his garden south of the house to observe the progress of his latest plantings. Nonetheless, a strong case can be made that the *primary* view informing the design of the south core area was the view from the south portico study (see sunken lawn redesign discussion).

The interpretation of a divided landscape north and south in the core area at Poplar Forest may be strengthened by the fact that Jefferson had previously used this same concept architecturally. At Monticello, the east elevation (the building front and main entrance) was designed in the fashion of the French Hotels or town houses Jefferson admired so much (Beiswanger 2000:595-596). An important innovation of this "modern" architecture, and a departure from traditional classical models, was the use of a single-story front with a low, horizontal look containing hidden volumes of space. Jefferson designed the second story windows on the east elevation at Monticello to be just 4 ft square, and placed them at floor level. The base of these second story windows met the top of the first story windows, appearing from the outside to be a single, large window in a high-ceilinged room (Figure 50). When one approached the entrance, these features were deliberately designed to give the illusion that Monticello was just one story high (McGlaughlan 1988:7-8). Bill Beiswanger, Director of Restoration at Monticello, noted that this design was Jefferson's " effort to suggest a one story house by the use of a mezzanine level, just what was being perfected in cities such as Paris" (Bieswanger 2000:596).

Conversely, the rear of Monticello is the "ancient" architectural elevation, dominated by the octagonal dome. Though sometimes erroneously linked to the dome of the Hotel-de-Salme, most architectural historians agree that the rear octagonal dome is most directly inspired by the Roman Temple of Vesta, illustrated in Palladio's Four Books of Architecture (Beiswanger 1993:51). That Jefferson would deliberately create his architectural masterpiece with "two faces", the modern to the front and the ancient to the rear, may go far towards explaining his landscape design for Poplar Forest.

Unlike the "temple-room" dome in the rear of Monticello, at Poplar Forest the house IS the temple. However, significant architectural distinctions can still be made between the front and rear elevations. Travis McDonald, Director of Architectural Restoration at Poplar Forest, believes that the

FIGURE 50: Front elevation of Monticello. Note the second story windows joining the tops of the first story windows, lending the appearance of a single story elevation. This "modern" innovation Jefferson brought back from France.

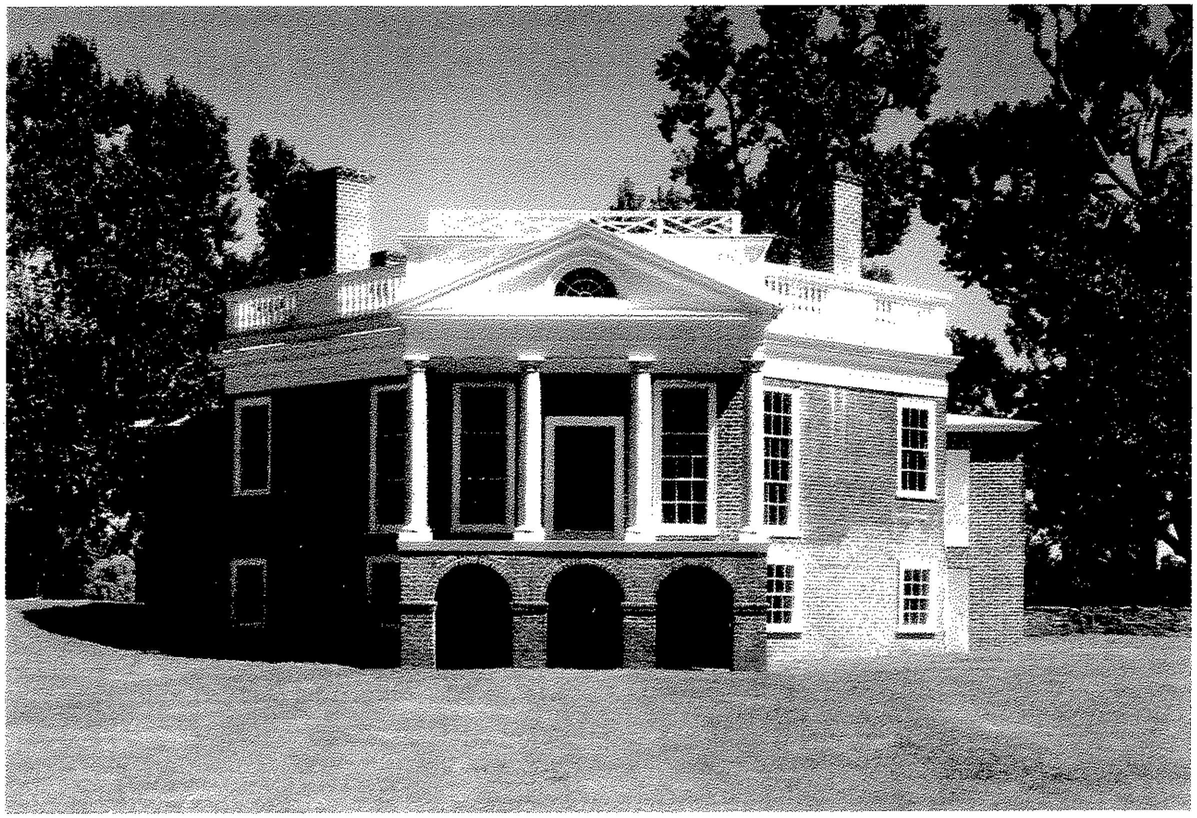

FIGURE 51: Rear elevation of Poplar Forest. The basement forms a second story not visible from the front. Note the Roman-style arches beneath the columns of the South Portico.

north and south elevations of Poplar Forest also subtly represent "two faces" of architecture in the same manner as those at Monticello. He notes the "modern" element of a single-story front elevation, and the two-story rear elevation with "ancient" Roman style arches on the basement story (McDonald, Personal Communication). It is only natural that this subtle architectural dichotomy would be carried into the landscape, given that Jefferson clearly viewed architecture and landscape as intimately related parts of the same whole.

In discussing the synergy between the decorative and horticultural arts, "one of the unappreciated glories of picturesque garden design", Mark Laird described how the shift towards the picturesque in the landscape affected the decoration of interior spaces, and vice versa (Laird 2000: 936-939). Laird makes a strong case that an overlooked element of the picturesque esthetic was the interplay between interior and exterior spaces, asserting that the eventual effect of this interplay was "The outside had simulated the inside, and the inside had become the outside" (Laird 2000: 938). Jefferson deliberately chose to intermix different classical orders on the interior entablature of the central room, explaining:

> In my middle room at Poplar Forest I mean to mix the faces and ox skulls, a fancy which I can indulge in my own case, altho in a public work I feel bound to follow authority strictly. (Jefferson to William Coffee, 1822, MHS11)

At his private retreat, Jefferson's freedom to "indulge his fancy" by mixing traditionally separated decorative elements according to his own taste appears to have been carried into the landscape just as Laird describes. The architectural precedent of the modern/ancient elevations of Monticello and Poplar Forest provides the perfect corollary to the natural/ geometric split of the design of the ornamental landscape at Poplar Forest. Indeed, it may be more accurate to term the north core area the "modern" garden, reflecting Jefferson's interpretation of the English picturesque style, and the southern core area as the "ancient" garden, framing Jefferson's view from the south portico and grounded in neoclassical Palladian geometry.

Describing a late 18^{th} century decorative vessel that blended straight line supports and curvaceous flowers, Laird observes: "It seems a perfect image of the moment- poised between the rococo and the neoclassical- a balance of naturalness and artifice. (Laird 2000:937). The landscape at Poplar Forest appears to have been a similar mixture of naturalness and artifice. The "modern/ancient" or the "rococo/neoclassical" blend within the landscape would be an appropriately sophisticated creation for Jefferson; a landscape design that reflected his complex tastes, his enjoyment of the landscape, and his time and place in the history of garden design.

CHAPTER 9: DISCUSSION OF FUTURE RESEARCH

Thomas Jefferson's Poplar Forest is a permanently preserved historic site, with a full time professional archaeological staff. The house, grounds, and surrounding plantation landscape will continue to function as a permanent site for archaeological research for many years to come. In this spirit, an effort has been made during the 1998-1999 landscape archaeology project to set aside large portions of the intact stratigraphy on the east bank, preserving these soils for future research and, hopefully, for more advanced methods of microbotanical analysis than are available today. Though the landscape archaeology project to date has broadened our understanding of many topics relating to Jefferson's ornamental landscape, many topics require further research. The following discussion suggests several avenues of inquiry pertinent to the work discussed in this report. Undoubtedly, other topics and research questions unknown at this time will also be discovered and researched in the near future.

One of the major landscape features which most strongly shapes a first impression of the house and grounds for visitors is the current front entrance drive. This road is aligned north-south with the axis of the house, and one approaches head-on from directly in front of the house. C. Allan Brown believed this road to be an example of a French-inspired "ronde-pointe" system of roads at Poplar Forest. However, the only map of a north entrance road in Jefferson's time clearly shows that it was not aligned north-south with the house, but was instead canted northeast from the house at a 23.5 degree angle (Jefferson's hand drawn "Map of Fields", circa 1809-1812, Poplar Forest Library). This road followed topography, crossed several streams, and eventually joined the "Forest Road", currently Rt 221. Archaeologist Keith Adams, who has surveyed the topography and studied the Poplar Forest road system in depth, believes that the northern portion of the older road shown on Jefferson's "Map of Fields" would have been cut-off by construction of the Lynchburg and Tennessee Railroad, sometime between 1852 and 1854. To use this original road after the railroad was built, the Hutter family would have been forced to construct a bridge at their own expence. However, a bridge was built at public expense to cross the railroad, but was located to the west of the old road. Clearly, it would have been cheaper to simply re-route the dirt road than to construct an entire Bridge. Adams believes that the current entrance drive is therefore the result of the Hutter family re-routing the north entrance road to take advantage of this public bridge (Adams, unpublished draft *Roads at Poplar Forest*, 2000).

Determining the date of construction for the current entrance drive is clearly important, and has many implications for the ornamental landscape plan. The current entrance drive is aligned perfectly with the present carriage turnaround in front of the house. As noted previously, archaeologist Bill Kelso tentatively dated the cobbles and boxwood of the present carriage turnaround to the mid to late 19th-century (Kelso, 1991:17). However, neither the boxwood or carriage turnaround could be dated beyond question, so if the front entrance road with which this feature is aligned was constructed in the mid-19th century, it would add further evidence that the boxwood and carriage turnaround are not Jefferson-era features. Furthermore, the interpretation of the landscape design discussed in chapter 8 is predicated on a natural-style north core area. A common feature of English picturesque landscape designs was an asymmetrically aligned entrance road. It would therefore be important to determine if the asymmetrical road shown on Jefferson's 1809-1812 "Map of Fields" was carried into the core of the property within the encrcling road to the front of the house.

It is recommended that future archaeological research be conducted to ascertain the location of all three of the axial roads, including the north entrance discussed here, as well as the southwest and southeast axial roads. One way to accomplish this would be to open large block excavations in the locations where these roads intersect the 10 acre curtilage fence and the 61 acre curtilage fence. The fencelines, according to the 1813 Slaughter Map, are located at 330ft and 660 ft from the center of the house (excavations should therefore bracket a Northing of 1,330 ft for the north entrance drive and interior curtilage fence intersection). It should be noted that three excavation units were placed bracketing 330 ft Northing along the current front entrance drive to search for these gateposts during the 1999 field season. Excavation revealed that modern grading in and around this road cut has been extensive. No evidence of gateposts was found, but this is not surprising given the level of disturbance in the area. Excavations at the intersections of the fences and the three axial roads may prove more rewarding.

Another major question about the landscape is the nature of a circular road Jefferson notes as being "540 yds round" (Betts 1944:494). This road may have formed a perfect (or near perfect) circle as C.Allan Brown contends in his ideal diagram of the property. A likely alternative would be an "encircling" road, meandering slightly around the hilltop and following the contours of the land in the same manner as the roundabouts at Monticello. Though Jefferson calculates the number of paper mulberry trees it would require to plant on either side of the road at 20 ft intervals (Betts 1944:494), he crosses out this notation in the Garden Book. This could possibly indicate that he changed his mind, or never completed the work, so searching archaeologically for planting holes 20 ft apart might not successfully locate this road. In addition, it is possible that what passed for a "road" at Poplar Forest may not leave enough of an archaeological trace to be distinguishable during excavation. A man traveling near Poplar Forest visited Jefferson and complained of the state of the roads, noting "We had to travel along a road through the brush somewhat like the road from Huntersville to your (David Campbell's) house, scarcely passable for any sort of carriage" (UVA, MSS 10508). In sum, the road circling around the core area at Poplar Forest may prove difficult to locate archeaologically, but is well worth searching for as it was clearly an important feature of the core area landscape.

Within the core area, details of Jefferson's plan need still need to be fleshed out. The single, well-dated planting hole located in ER 1962 on the west mound should provide the starting point for larger excavations to determine the planting plan and sequence of planting for the west and east mounds. Because the mounds were replanted multiple times, it may prove difficult to discern initial planting from subsequent re-planting, though mean ceramic dates of artifacts from the planting holes may prove helpful.

The "wings" of paper mulberries connecting the mounds to the house east and west also need to be located archaeologically. Related to this research is determining the extent to which the construction of the wing of offices in 1814 destroyed the eastern plantings. While it is conceivable that the northern planting row could have survived, the southern planting row was clearly destroyed by digging the cut for the wing, and archaeological excavation of this entire area clearly showed no evidence of replanting after the wing construction in this area.

Discovering the locations and orientation of the central and eastern oval beds north of the house is also highly relevant to further understanding the core area design. The plan of irregular shapes, sizes, and orientations of the oval beds adjacent to the winding path on the lawn at Monticello suggest that something similar might also have been constructed at Poplar Forest. Excavations intended to locate these elements should not assume they are symmetrically balanced with, or are of a similar size as, the western oval bed. If these features can be located, and compared to the location and size of the western oval bed, they may indirectly hint at the location of an asymmetrical entrance road or walkway to the north portico.

Determining the extent and form of the Jefferson-era garden south of the sunken lawn is also clearly an important research question. This feature would obviously have been an important visual component of the landscape. The location of this feature, directly in the viewing path of Jefferson's south portico and study, may hint at an element of the *ferme ornee* within the core area.

Microbotanical research utilizing undisturbed Jefferson era soils from this context may shed light on the specific types of plants Jefferson chose to grow at his retreat.

A historically accurate reconstruction of the core area will obviously need to include period vernacular outbuildings and fencelines. That stables, barns, slave quarters, etc. were located within the 61 acre curtilage fence is certain. It is also highly likely that some of these buildings were located within the 10 acre curtilage, well within the view of the house. Documents plainly suggest the location of at least one such building (Hannah's house along the southwest axial road), and hint at many others. At Monticello, very explicit messages are communicated to the visitor through the decision to reconstruct the ornamental landscape without reconstructing the buildings along Mulberry Row. During garden tours, great emphasis is placed on the historical accuracy of each planting or landscape feature, and the visitor is given the impression that to gaze around the grounds is to see what Jefferson saw. However, choosing to present the visitor with a sanitized version of history, devoid of Mulberry row buildings, effectively erases the presence of Jefferson's slaves from the "visual" history conveyed by the landscape (Heath 1997:188-190). It is revealing that an institution which prides itself on historical authenticity would deliberately choose inaccuracy in their reconstruction of the landscape by removing the visual reminders of slavery, a much more permanent part of the period landscape than the transitory flower beds so carefully cultivated about the grounds today. At Poplar Forest, the emphasis on historical authenticity should preclude a similar treatment. Archaeological research will ultimately be the only means through which these important elements can be discovered, and added to the interpretation of the site and to the plan of the landscape.

Conclusion

The restoration philosophy at Poplar Forest emphasizes the goal of a world-class standard of historical accuracy. One of the implications of that philosophy is discussed above: the necessity to restore or interpret all known period landscape features, including vernacular outbuildings. However, the discussion of restoration philosophy supposes that landscape restoration will eventually take place, a fact that is far from a fore-gone conclusion at the time of this writing. A panel of experts, scholars, and professionals in fields related to landscapes, has been assembled and will meet several times per year to advise the staff at Poplar Forest. Only if it is determined that enough evidence has been gathered to produce an acceptably accurate interpretation of the original landscape, through documentary, archaeological, and microbotanical research, will the decision to move ahead with a reconstruction be made.

One of the major themes discussed in early meetings of this panel is a two-pronged argument against ever reconstructing the landscape. First, it has been noted that no landscape can ever be perfectly reconstructed, or even totally understood. There will always be "gray areas" in the knowledge of the landscape, no matter how diligent the research. Therefore, any reconstruction is bound to be inaccurate to some degree, giving the visitor a false sense of "history".. In addition, landscapes change through time, but a reconstructed landscape is static, and can not give the visitor a visual sense of different time periods or plans, an especially relevant point at Poplar Forest given the three sunken lawn designs and plantings discovered archaeologically (see chapter 2).

A second, highly important consideration is that the process of discovery is an ongoing one, and new discoveries will likely be forever modifying and altering our interpretation of the landscape, or even the physical details of the landscape design itself. This problem is compounded by the nature of archaeological data in landscape studies. One must have intact, original soil to study in order to discover something new, a fact which will become even more pertinent as advances in technology make the microbotanical studies presented in this report appear crude and ineffective. Yet any conventional landscape reconstruction would necessitate large-scale digging and planting, a process that would disturb the soil in the most vital places, effectively destroying the very information that could eventually prove most valuable. This would be greatly at odds with the preservation/stewardship ethos at Poplar Forest.

For these reasons, a conventional landscape restoration is not generally considered a possibility in the near term. Yet the impetus to interpret the landscape physically on the ground in some fashion is compelling. The story of the ornamental landscape is interesting and complex, and it certainly ought to be as integral a part of Poplar Forest's interpretive efforts as the architectural minutia of the house is today. In addition, our current knowledge of the Poplar Forest landscape, as imperfect as it is, is more detailed and well documented than nearly any other ornamental landscape in America from this time period. Clearly, no computer hologram or interpretive panel can communicate the sight, smell, movement, etc. of a living landscape, or for that matter the visual effects Jefferson wished to achieve through the creation of that landscape, as well as the genuine article.

One possible solution for this dilemma may be for restoration/interpretation efforts to concentrate on creative means for interpreting the living landscape in ways that are unusual or precedent setting. A "moveable" living landscape is one of the more innovative means discussed to date. Using this model, historically accurate live shrub or tree types would be placed in their exact locations (as found archaeologically) in unobtrusive containers sitting on the ground. To interpret a planting scheme dating to a different time period, the containers could simply be moved to the new location. This method could be particularly useful for interpreting the south lawn, where three different plans could be interpreted over the course of a single month; the 1812 plan, the 1814 plan, and the hypothesized final plan which Jefferson never completed. An added benefit of this type of "restoration" is the potential to interpret historical ambiguity to the visitor, presenting the landscape not as a *fait accompli*, but as a working model based on our best evidence to date, emphasizing the role research and discovery plays in landscape studies. Such a project would visually interpret a vibrant, living landscape to visitors without disturbing the underlying soil and destroying the potential for future research. Further exploration of this, and other innovative models, will be needed if the physical landscape is to be interpreted to the public without loosing the archaeological evidence of the landscape.

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APPENDIX I:

PHYTOLITH REPORT, Dr. Lisa Kealhofer

The South Lawn at Poplar Forest

Phytolith Analysis

10 February, 1999

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Introduction

The first phytolith analysis report for Poplar Forest contains a summary of general goals, background on phytoliths, methodology, approaches, and problems that will not be repeated here. Please refer to that report for a detailed discussion of these issues. The presence of phytoliths in those first samples, and the meaningful patterning in the phytolith assemblages suggested that further, more systematic analyses might be informative. The specific goal of this analysis was to document the distribution of plants along the east side of South Lawn and its terrace at Poplar Forest. Where possible, specific plant associations would be identified.

Twenty-five soil samples from features were analyzed for phytoliths. All of these samples contained phytoliths, although in several they were rare. Interestingly, where phytoliths were rare, starch grains were often found to be abundant, suggesting distinctive planting patterns.

Methodology

The analysis of the sediment samples has proceeded as a "two-pronged" effort. A list of 18th century garden plants focusing on Williamsburg and Jefferson gardens was created with the generous assistance of the staff and volunteers at Colonial Williamsburg and Donna Ware at the Herbarium of the College of William and Mary. Based on these lists, plant collecting trips were made to the Herbarium at the College of William and Mary, nurseries, the gardens at Monticello and Poplar Forest and of course, the nursery and gardens at Colonial Williamsburg. Nearly 1000 samples have presently been collected. About 500 of these have been analyzed. While this may seem like a large number, it is important to remember that the potential number of species in local environments and gardens runs to the thousands. Creating a reference collection is an ongoing process that can take years to complete. Initially plants were collected strategically, focusing on those known to have been purchased by local 18th c. gardeners, those most common in 18th century Williamsburg gardens, and most importantly, those known to produce phytoliths. We are continuing to build our type collection to improve the identification of phytoliths from soil samples.

The second part of the analysis centered on the sediment samples from Poplar Forest feature contexts. T. Trussell collected 25 samples using two different strategies. In one strategy, within 5'x5' units, pinch samples from the same stratigraphic unit were combined into a single unit sample. In the second strategy, samples were taken from cultural features. The samples include 22 unit and 3 feature samples. The 25 samples taken included:

	1812 K/1	Planting Hole	1817 J
	1812 K/2		1818 F/4
	1812 K/3		1819 F/1
	1812 K/4		1819 F/2
French Drain matrix	1812 P/3		1819 F/3
French Drain Fill	1812 Q/3		1819 F/4
	1814 G/2		1820 E/1
	1814 G/4		1820 E/2
	1815 G		1820 E/3
	1816 F/3		1820 E/4
	1816 F/4		
	1817 F/1		
	1817 F/2		
	1817 F/3		
	1817 F/4		

If we focus on the arboreal/Dicot component of the sample assemblages, several patterns are visible (Figure 3). One pattern, just identified, is the unique status of the planting hole. The phytolith types associated with the planting hole include a type found in Oleaceae taxa (FMFP), as well as some types also found in oak species (SmMFP and SphMFP). Oleaceae includes a variety of ash trees, *Ligustrum,* and lilacs. The form found is most similar to *Ligustrum*. Another pattern is the "cyclical" distribution of arboreal/Dicot types, revealing (smaller) concentrations of types in some places (e.g., 1820E/2, 1819F/3, 1817F/2, etc.). In these cases, the samples were in units adjacent to both the water table and planting holes, and it may be that the systematic unit samples included soils associated with planting features. A third pattern can be seen in the difference in the assemblages from adjacent blocks, 1819 to 1812 in particular, although also clear in 1817. It is likely that these differences do relate to planting, given the spatially distinctive patterning. In the 1819 and 1812 units, sclereids dominate. Unfortunately these arboreal phytoliths are not diagnostic, however they do suggest trees rather than shrubs. In addition, they are not found in any of the taxa on the list of plants that Thomas Jefferson had for the South Lawn beds. Only two phytolith types in these samples are comparable to diagnostic forms in the reference collection: EMPF (Liliaceae) and LVRS (Moraceae). 1812K/2 and K/4 both have a very small percentage of LVRS phytoliths, which may be related to some kind of mulberry tree. Three samples also have EMFP types, 1819F/4, 1817F/4 and 1817J, possibly related to Liliaceae taxa such as Hyacinth or *Lilium*.

If we look at these subtle patternings across the map, in general, the "downslope" samples show the greatest abundance of grasses, and the upslope samples show the greatest abundance of Dicot/arboreal taxa. This holds for units immediately adjacent to planting holes, as well as for other upslope units (e.g., 1812K/2). Within this upslope group, several clusters occur, suggesting different planting areas, each measuring a ca. 5-10 foot circumference (i.e. correlating to some extent with unit boundaries). It is unclear if this is a sampling issue, or represents true planting organization.

In the previous, more widely dispersed phytolith sample (1997), the two lawn samples analyzed showed a significantly higher Pooid content than other samples from around the property. This concentration is born out in these samples. The majority of the area sampled appears to have been covered in lawn. The distinctiveness of the planting hole sample bears this out as well.

Statistical analyses

In order to reveal the patterning among samples, phytolith sample percentages were subjected to correspondence analysis. The results are graphically demonstrated in Figures 4-7. These graphs are scattergrams of the values of the 1st and 2nd eigenvectors, which account for about 30% of the variability, and 3rd and 4th vectors [4 vectors account for 50%], in these samples. These low percentages suggest the samples are highly variable across several specific variables [e.g., starch grains]. Figures 5 and 7 show the phytolith types that account for the sample relationships shown in Figures 4 and 6. Perusal of the sample distribution (Figure 4), immediately identifies the two anomalous samples: the planting hole (1817J) and the French drain (1812P/3). The correspondence analysis, however does little to differentiate the internal patterning discussed above based on arboreal/Dicot taxa. This is undoubtedly because of the very low frequencies of arboreal/Dicot taxa relative to grasses, except in the 2 samples noted.

Conclusion

The 25 soil samples analyzed from the South Lawn units at Poplar Forest revealed the presence of phytoliths in all of the samples tested. The abundance of grasses in the samples indicates that the majority of the area was covered by lawn for most of the duration of soil formation, particularly the area below the French Drain, and on much of the upper Terrace. Several examples stand out: the planting hole sample and the French Drain sample, which are highly distinctive and relatively low in grass phytoliths. Another subtle, but distinctive pattern is the relative concentration of Dicot/arboreal forms in the samples immediately upslope from the French Drain, even away from the Planting Holes. This suggests more planting was located in this zone. There is also variability within this zone, indicating slight differences in light, water, and soil amendment. The patterning seems to concentrate in 5-10 foot areas, but not enough area has been tested to confirm this. A few Dicot/arboreal types define these areas: types related to Liliaceae and possibly Moraceae. The diversity of the Dicot/arboreal taxa present in the planting hole sample suggests the soil came from a nursery, or was considerably amended. Given this diversity it is impossible to pinpoint what was planted in the hole, but types consistent with oaks and *Ligustrum* were identified.

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APPENDIX II:

PALYNOLOGY REPORT, Dr Scott Anderson

POLLEN ANALYSIS OF HISTORIC FEATURES AT THOMAS JEFFERSON'S POPLAR FOREST ESTATE, BEDFORD COUNTY, VIRGINIA

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INTRODUCTION

Data documented in this report comes from the analysis of 38 pollen samples submitted by Timothy Trussell, Field Supervisor Archaeologist for the Corporation for Jefferson's Poplar Forest, located in Bedford County, Virginia. The pollen samples analyzed in this study come from four contexts. Four pollen samples were collected from historic French drain contexts, both near the house (on the west bank) and from a drain running parallel to the east bank, trending southeast. Eight pollen samples came from planting hole soils; these samples were from locations near the French drains. Twenty-two samples were collected from Jefferson-age terrace turf soils, primarily on the east bank of the sunken lawn. An additional four pollen samples came from garden or agricultural field contexts.

As outlined in documents provided by Mr. Trussell, the goals of these pollen analyses were many-fold. Our analyses attempted to provide relevant data on the following questions:

1. Determine if all of the plants on Thomas Jefferson's planting list were present on the Poplar Forest terraces, and determine whether any other ornamental plants were present that are not on the list mentioned in historic documents;

2. Determine the planting scheme on the terraces to see if we could match a specific plant to a specific planting stain;

3. Determine whether soils from the terraces have the same origin as soils from other contexts, such as from a nursery location;

4. Determine whether the soil surrounding these plantings was lawn or bare earth, and whether or not there were intrusive weeds growing around the plantings;

5. Determine if the Kentucky coffee trees, which were known to exist on the terraces in 1910, existed during the time of Thomas Jefferson; and

6. Determine the macroenvironment of the local area surrounding the Poplar Forest – whether significant amounts of land was cleared for farming of such crops as tobacco, wheat and corn, or if the surrounding land was forested.

In addition to the research questions outlined above, our study was able to address several other questions important to the field of archaeological palynology. This was due largely to the high number of pollen samples in this analysis, as well as the comprehensive spatial distribution of those samples. These secondary issues include (1) an appropriate pollen sum necessary to recover rare, agricultural and ethnobotanic pollen types; (2) the relationship between pollen richness in a sample and the pollen sum, and (3) the general pollen concentration values of historic archaeological pollen samples in Virginia.

The Limits of Pollen Analysis

Though pollen analysis has had a long association with archaeological investigations, its original use was in determining stratigraphic correlations between deposits and in reconstructing paleoenvironments (Faegri and Iversen 1989). Therefore, it is important to understand the limits of palynology, and in particular, archaeological palynology, so that the results of this type of analysis can be fully understood. One of the limits of the technique is that of differential pollen production. In a sense, the pollen that we find on the landscape represents the failure of individual pollen grains to reach their intended target, which is the flower of another individual plant of the same species. Many plants, such as pines (*Pinus*) and oaks (Quercus), produce large amounts of pollen that is dispersed across the landscape by winds. Such plants are call anemophilous ('wind-loving") because of their reliance on physical phenomena for pollen dispersion. These plants often produce far greater quantities of pollen than other plants that rely on insects for pollination. Plants that rely on insects or other animal vectors are referred to as "entomophilous" ("insect-loving") or zoophilous ("animal-loving") plants, respectively. Plants that follow the evolutionary strategy of entomophily are thriftier in their pollen production, and less pollen is dispersed across the landscape. For archaeological palynology, this is both fortunate and unfortunate. It means that pollen will not be dispersed far from the source, but it also means that little pollen is lost in pollen transfer. Unfortunately, many of the most interesting plants in the Jefferson list are insect-pollinated, and their recovery in soil pollen samples necessitates large pollen counts.

A second limitation of pollen analysis in soils refers to differential pollen preservation. Fossil pollen is preserved in deposits largely due to the sporopollenin composition of the exine, the outer "shell" of the grain (Faegri and Iversen 1989). Pollen types that contain greater amounts of sporopollenin are more often preserved than those that contain lesser amounts. For instance, pine (*Pinus*) pollen is often well-preserved in soils due to its high sporopollenin content, whereas aspen or poplar (*Populus*) is more rarely preserved due to its very low sporopollenin content.

A third limitation of pollen analysis is in pollen identification. From an evolutionary standpoint, morphologic changes in pollen have been very conservative. Although literally hundreds of species of the sunflower family, Asteraceae, have been identified, the pollen of this group in North America can be differentiated into less than two dozen groupings. Therefore, most pollen of the family Asteraceae can be differentiated only to genus, or sometimes only to family. This is not true for all pollen types, but it makes it difficult under most circumstances to differentiate between, for instance, weeds such as dandilion (*Taraxacum*) and cultigens such as lettuce (*Lactuca*).

Even though pollen analysis has its limitations – like any other technique – it is an extremely useful technique for reconstruction of former plant communities, cultigens, and for ethnobotanical investigations in general. One reason for this is that pollen it is preserved in situations where other remains are decomposed. The relatively low pH's found in soils of eastern North America are ideal for the preservation of pollen. In addition, because of the large numbers of fossil grains in a typical pollen assemblage, statistical relationships between different assemblages can be determined.

The balance of this report describes the methodology of soil pollen analysis used at the Laboratory of Paleoecology (LOP) at Northern Arizona University, the results of our investigations, and implications of our work. Among the more important findings are that the pollen assemblages from each context has a unique signature, and the implications are explored in following sections.

METHODS

Samples were collected by Mr. Tim Trussell and field crews at Thomas Jefferson's Poplar Forest. Once the Jefferson period, or pre-Jefferson period, soil was isolated, soil samples were extracted from every five foot grid square across the site (T. Trussell, pers. comm., 1998). Workers would excavate about 1/3 of the soil layer, then collect the sample from across the broad surface of the 5'X5' grid. Pollen samples were also taken from each planting stain (i.e., planting hole), from the French drain soil matrices, and in the case of a couple of soil samples, from the soil layer above, and a "sterile" subsoil underlying the Jefferson layer. Several samples were also taken from a garden context in a similar manner. Samples were stored in cardboard boxes for drying, and shipped to Northern Arizona University for processing and analysis.

Pollen subsamples were processed at the Laboratory of Paleoecology using a heavy liquid flotation technique to separate pollen from sample sediments. Sample bag contents were thoroughly mixed and 20-cm^3 subsamples were extracted. A known concentration (25,084 grains) of exotic spores (*Lycopodium*) was added to the subsamples to estimate pollen concentration and monitor any degradation resulting from chemical processing. Subsamples were treated with 10% hydrochloric acid to remove carbonates, concentrated hydrofloric acid to remove silicates, washed through 0.18 mm mesh screen, then floated twice in zinc bromide (specific gravity 1.9). Following flotation, samples were treated with an acetolysis solution that reduces organic matter. Samples were then rinsed, stained with safranin, washed with alcohol and mixed with glycerol. This is the standard process followed at the LOP.

Pollen assemblages were identified using a Leitz microscope. Slides were examined by counting pollen on transects at 400x magnification. Several pollen sums were used to investigate the maximum recovery of rare pollen types. Seventeen pollen samples were counted to a pollen sum of 200 to 350 grains – most of these samples came from Jefferson soil samples on the east bank of the excavation area. Ten additional samples from the east bank were counted to a sum of ca. 1000 grains, including four soil, four planting hole and two French drain samples. The pollen sums of an additional five samples (four soil and one planting hole) from the east bank were increased to 2000-grain counts. Nine samples from the west bank and south garden sites were subjected to two counts. Seven of the nine received 600-, then 1000-grain counts, while two of the samples were sterile (see below).

Pollen aggregates were often encountered in these preparations. Aggregates are clumps of a single pollen taxon that did not separate at anthesis (the time of pollen liberation). Pollen aggregates of individual taxa were included in the sum as one grain per occurrence and a separate tally was made of the number of grains within individual aggregates. In general, pollen aggregates are indicative of the local presence of the plant, since aggregates are relatively "heavy", are not very aerodynamic, and do not travel far from the plant. Identifications were made to the lowest taxonomic level possible aided by comparison with the Laboratory of Paleoecology pollen reference collection and to published references (Kapp 1969; McAndrews et al. 1973; Moore et al. 1991).

The conventions used in identifying pollen types were as follows. All pine (*Pinus*) pollen grains were lumped together as preservation did not allow separation. All members of the oak genus *Quercus* were lumped together as pollen species within this genus are generally inseparable from each other. Pollen of hemlock is assigned to eastern hemlock (*Tsuga canadensis*), while pollen of the Cupressaceae is probably referable to eastern red cedar

(*Juniperus virginiana*). Members of the Chenopodiaceae and Amaranthaceae were lumped together in a pollen type called "Cheno-Ams". Pollen from the rose family (Rosaceae) was separated into *Rosa* and other Rosaceae. Pollen species of the grass family (Poaceae) were generally not distinguishable from each other, but we separated out a larger grass type ("Large Poaceae"), which probably represents cultivated grasses, such as wheat (i.e., *Triticum*). The widely cultivated maize (*Zea mays*) is also distinguishable. Members of the sunflower family (Asteraceae) were subdivided into the ragweeds (*Ambrosia*), the Lactuceae (dandilions and the like), and other Asteraceae. All other pollen types refer to specific genera (i.e., *Plantago, Carya, Juglans*, etc.) or were not identified below level of plant family (i.e., Brassicaceae, Caryophyllaceae, Fabaceae, etc.).

RESULTS

At least 44 pollen types (excluding unknowns and degraded grains) were identified in this analysis. The dominant pollen type in virtually all samples is pine (*Pinus*) (Appendix Tables 1 & 2). Other major pollen types include oak (*Quercus*), ragweed (*Ambrosia*), grasses (Poaceae), large grass pollen type, sunflower family (Asteraceae) and plantain (*Plantago*). Lesser amounts of hickory (*Carya*), walnut (*Juglans*) and members of the goosefoot family (the Cheno-Am group) occur. Certain of these pollen types are important anthropogenically (i.e., *Plantago*, large Poaceae, *Ambrosia*). Other pollen types were identified that could be important anthropogenically. These occurred in much lesser quantities, and include honeysuckle (*Lonicera*), members of the rose family (Rosaceae), the dandilion and lettuce group (Lactuceae), mustards (Brassicaceae), members of the legume family (Fabaceae), corn (*Zea mays*), rose of Sharon (*Hibiscus*), true roses (*Rosa*), members of the lily family (Liliaceae), and many others. A complete list of pollen types identified in these analyses are found in Appendix Tables 1, 2, and 3.

Pollen Concentration

The addition of exotic tracer grains during processing allowed for an estimate of each sample's pollen concentration (number of pollen grains per cm^3 of sample) calculated as a ratio of the pollen sum to the number of tracers encountered multiplied by the tracer concentration and divided by the sample volume. The pollen sum consists of all terrestrial and semi-aquatic pollen types, including the unknowns and degraded grains.

In general, sample pollen concentrations were low to moderate for soil samples (Table 1). Pollen concentrations for 200-grain counts were not significantly different from either 600- or 1000-grain counts. With the exception of a single pollen sample (1821 E/4), which had a relatively high pollen concentration (11,079 grains/cc), pollen concentrations for the 2000-grain counts were not significantly different from the lower counts as well.

Figure 1 shows pollen concentration values (grains/cc) for all samples that were not sterile. The top four samples come from French drains, the middle eight come from planting holes, the middle 22 come from terrace soil samples, and the bottom three come from garden and agricultural field samples.

Table 1. Pollen Concentration, all samples

	Average	# of Samples
200-grain counts	5,050	n = 28
600-grain counts	4,177	n = 8
1000-grain counts	4,188	n = 13
2000-grain counts	6,353	n = 5

Pollen Richness

Table 2 and Figures 2a and 2b display the number (richness) of pollen taxa for counts of various sizes. In each case, the average pollen richness increases for each increment of increase in the size of the pollen sum. An average of 14 pollen taxa was encountered for the 200 to 350-grain counts (termed the "200-grain counts"). Richness increased to ca. 19 grains per sample for 600-grain counts. On average, two additional pollen grains were encountered for the 1000-grain counts, with an additional grain (to 22) for the 2000-grain counts. These data clearly show that as the pollen sum increases, more pollen types will be identified. However, the biggest increase occurred between the 200-grain and the 600-grain counts, with much smaller increases in richness with even higher pollen counts.

Table 2. Pollen Richness, all samples

	Average	# of Samples
200-grain counts	14	n = 28
600-grain counts	19	n = 8
1000-grain counts	21	n = 13
2000-grain counts	22	n = 5

Distribution of Individual Pollen Types

In the following sections we discuss the proportion of individual pollen types as they occur in all of the sediment samples. Our aim here is to examine spatial patterns in the pollen data, as well as differences in the pollen assemblages between the four sediment contexts. For each of the more important pollen types (in certain cases we group several pollen types together, or calculate ratios between pollen types) we graphed the pollen data by sediment type and location. The French drain samples (four) are located at the top of the diagram; the planting hole soils (eight) are in the next lowest group; the terrace soils themselves (22 samples) are below this, and the three garden/field samples are in the lowest portion of the diagram. Samples within each group are arranged from the southern-most excavations to the northern-most, and from east bank excavations to west bank samples. For instance, for the French drain samples, samples 1821H/3, 1817G/3 and 1812P are arranged from south to north, and all samples are from the east bank terraces. The last sample in the group, 1937F, is from the west bank excavation. A similar strategy is employed in graphing the planting hole soil and other soil samples.

Pine (*Pinus*). *Pinus* pollen dominates the pollen percentages of most of the samples, with few examples (Figure 3). For the east bank sites, pine pollen percentages are considerably higher for the Jefferson soils than for either the planting soils or the French drains. This is one indication that the soils from the planting holes and the French drains probably have a different origin than the terrace deposits. The terrace soils average over 40% of the sum, while pine percentages for the other two contexts are generally around 20%.

However, pine percentages for the garden and agricultural soils are considerably lower than the east bank samples, suggesting a very different context. As discussed in greater detail below, sample 1962M was extracted from a plow zone in an agricultural field, farmed before the house and ornamental gardens were built. Samples 2003D and 2000F came from a location south of the south lawn, and are definitely dated as Jefferson-era soils (T. Trussell, pers. comm., 2000). Samples came from the bases of planting rows within a garden. Undoubtedly this garden lay fallow for some time, because the dominant pollen type in these three samples is ragweed (*Ambrosia*) (see further discussion below).

Oak (*Quercus*). *Quercus* pollen is more abundant than any other deciduous tree species. Unfortunately, we cannot identify the species of oak that produced the pollen, as oak pollen is not diagnostic from one species to another. However, the pattern for oak pollen is, in general, the reverse of that for pine. Oak pollen percentages are higher in the French drain and planting soil samples than they are on average for the soil samples (Figure 4). This includes the garden samples as well. Similar to the pattern for pine, considerable difference exists between the east bank and west bank sites for two contexts; oak percentages are higher on the west than the east for the French drain context, but the reverse is true for the planting hole soil.

Mesic Hardwoods plus Hemlock (MHH). Here we include as "mesic hardwoods" birch (*Betula*), hickory (*Carya*) and walnut (*Juglans*); hemlock (*Tsuga canadensis*) is included in this group as well, since hemlock often occurs with mesic hardwoods at locations in the eastern deciduous forest. None of these pollen types occur in high percentage individually, but when grouped together a specific pattern emerges. In general, the MHH consist of higher percentages in the terrace soil samples, and in lower percentages in both the planting soils and French drain deposits (Figure 5). The single pre-Jefferson sample, 1962M, differs from the other garden samples in a relatively high MHH percentage. Little difference exists between east-bank and west-bank locales. This is probably due to the relatively low numbers of pollen grains recovered for these types.

Plantain (*Plantago*). Among the probable species represented by this pollen type is the English plantain (*Plantago lanceolata*), introduced from Europe and a prolific pollen producer. This species was probably introduced early into the New World, although the timing is not known. It is most often associated with disturbed areas, and especially with pastures and grasslands. For the Thomas Jefferson samples, *Plantago* is a consistent pollen type in the planting hole samples (Figure 6), but also occurs in all other contexts. Its occurrence in the terrace turf samples is variable but consistent, however we expected it to be consistently more abundant there than it is. It is found in the two garden samples in roughly the same percentage as the French drain samples, but is nearly absent in the pre-Jefferson agricultural field sample. This latter fact is intriguing, and may suggest that the plant species had [redacted] been rare at the time of large-scale cultivation in the field, only becoming established near the time of the Jefferson construction and plantings.

Ragweed (*Ambrosia*). The percentages of *Ambrosia* pollen once again highlight the difference between the sedimentary contexts. Ragweed pollen percentages are considerably higher for the agricultural soils (2003D, 2000F, 1962M) than for any of the other samples. For each agricultural sample, ragweed pollen approaches or exceeds 50% of the pollen sum (Figure 7). Ragweed pollen percentages are also higher for the French drain and planting hole sediments than they are for the terrace soils. This spatial pattern is not surprising since ragweed is an opportunistic plant, and aggressively colonizes disturbed soils. The extreme percentages in the garden soils may reflect a period in which the gardens were fallow, and not weeded on a regular basis.

Ratio of Disturbance Pollen Types to Pine. The ratio of pollen of plants generally considered to be disturbance indicators (ragweed [*Ambrosia*], goosefoot family [Cheno-Ams], plantain [*Plantago*]) to pine (*Pinus*) essentially summarizes the relationships among the major pollen types in this study. Figure 8 shows the ratio of the disturbance pollen types to the dominant pollen type. As would be expected from the discussions above, the ratio is highest for the garden sites, moderately high for the French drain and planting soils, and lowest for the terrace soils. This undoubtedly reflects the proximity of plants indicative of disturbance to the source of the soil from which the soil was extracted. We can conclude that ragweed plants were probably rare on the lawn, but periodically grew on the soil piles of the nursery, and most certainly on or adjacent to the garden.

Grass (Poaceae). Many grasses are anemophilous, or wind-pollinated. Grasses are a large group of plants that include, in this case, species native to the surrounding area, species planted for turf on the lawn, and species introduced from outside the area. In the latter case, we can include agricultural species (such as wheat, *Triticum*) and invasive types. Pollen percentages of grasses (Figure 9) shows patterns similar to other pollen types, with significant variations. For example, pollen percentages for the French drain and planting hole samples show little variance, only between ca. 5 and 10%. Considerable variability occurs in the terrace soil samples, however. Many samples have grass pollen percentages exceeding 10%, and at least two samples are greater than 15% of the sum. For many of these sites, the data are suggestive of the occurrence of local grass plants, as would be found in a turf or lawn.

Corn, Maize (*Zea mays*). Maize was widely cultivated within the region during the time of Thomas Jefferson (T. Trussell, pers. comm., 2000). Although occurring in very small percentages in the pollen samples (generally under 1%), virtually each of the pollen samples contained some maize pollen (Figure 10). Except for two samples that exceeded 1%, and one samples that exceeded 2%, the average corn pollen percentage was ca. 0.5%. In addition, corn pollen was found in all four contexts – French drain, planting hole, terrace turf samples and in the garden. Interestingly, it was not found in greater concentrations in the garden that it was in the other contexts. This indicates that corn probably was not grown in the garden, but that the corn pollen probably comes from a more widespread source.

One indicator of the potential location of the dominant corn fields comes from the corn aggregate pollen data. Only a single pollen sample had corn aggregates – 1821E/4 (Appendix

Table 3). The location of this pollen sample, the furthest sample to the southeast in the east-bank terrace samples, suggests major corn fields may have been growing in that direction, or that the wind during the summer pollination season was from that direction. As mentioned earlier, corn pollen generally does not travel far from the corn plant, due to the size of the grain. Corn aggregates travel even shorter distances due to the diminished buoyant characteristics of aggregates.

Lactuceae pollen. Members of the Lactuceae include a variety of plants in the sunflower family Asteraceae. Many of these plants are agricultural, including lettuce (*Lactuca*), while some are invasive weeds (i.e., dandilion [*Taraxacum*]) and others are native plants. Pollen of Lactuceae were found in most of the pollen samples, including all four contexts (Appendix Tables 2 & 3). Most plants producing this pollen type are insect-pollinated, and their pollen does not travel far from the source. The lack of specific spatial or contextual patterns does not allow us to conclude whether the origin of these grains was from cultigens or otherwise.

Apiaceae pollen. Members of the carrot family Apiaceae include agricultural plants (i.e., carrots, dill, etc.) as well as naturally-occurring species and introduced weeds. The spatial distribution of Apiaceae pollen was much more limited than that for the Lactuceae. Most of the terrace soils did not include any Apiaceae pollen (only three samples did included this pollen type); neither was the pollen type found in 1962M – the pre-1806 plow zone sample. However, Apiaceae pollen was found in 2 of the 4 French drain samples, and all 7 of the planting hole samples. It was also recovered from the garden samples. These data suggest that at least one primary source for this pollen type was from the nursery, where it is assumed the planting soils were obtained. This lends support for the origin as being from a weedy species of the family. Since it is difficult to distinguish one genus from another in this family, we cannot determine whether the Apiaceae pollen represented in the garden samples comes from cultivated or weedy sources.

Hibiscus pollen. Pollen of *Hibiscus*, a cultivated shrub, exhibits yet a different type of spatial distribution. It was recovered only from seven of the terrace soils samples, primarily in the central portion of the eastside excavation (1812K/2, 1812K/4, 1817F/2, 1818F/4 and 1817F/3) along with one sample in the north (1827E/3) and in the south (1821E/4) (Appendix Tables 2 & 3). It was only recovered from a single planting hole sample (1817J), and was not recovered at all from any of the contexts on the west bank, nor in either garden or agricultural samples. Its preponderance in the samples in the core of the central excavation unit may suggest a concentration of the plant on that part of the terrace.

Fabaceae pollen. Pollen of the legume family (Fabaceae) was rarely found in these samples. Five pollen samples from the east bank (three planting holes and two terrace samples) had Fabaceae pollen; it was also found in two planting holes on the west side, as well as in the garden samples. Species occurring within the Fabaceae of interest to this study include Kentucky coffee tree (*Gymnocladus dioicus*), as well as common locusts (*Robinia* sp.) which were planted adjacent to Jefferson's house, and on the terraces of the sunken lawn. The Jefferson plan also specified redbud (*Cercis* sp.) shrubs. We also assume that several cultivated species of legumes were grown in the garden. A potentially large number of members of this family are also weedy, but we did not differentiate them from the others listed above.

DISCUSSION

The data described above can be used to investigate and answer several of the questions first posed in the introduction. Pollen analysis is a tool for paleoecological and ethnobotanical research, and, when used as such, can enhance and expand the excavations and analyses of archaeological research. Analyses initiated by the Corporation for Jefferson's Poplar Forest has sought to identify specific locations for plants mentioned in Thomas Jefferson's plan for Poplar Forest. In achieving this goal, pollen analysis has been moderately successful, and in addition, has been able to elucidate several other aspects of the plan for which historical records do not exist. In the following passages we explore the answers to the most pressing questions regarding Thomas Jefferson's plan.

Presence of Plants on the List

Information provided by Mr. Tim Trussell allowed us to look for the presence of pollen of specific plants on the Jefferson list. We looked specifically for pollen of the following plants: redbud (*Cercis*), dogwoods (*Cornus*), *Calycanthus*, tulip poplar (*Liriodendron tulipifera*), balsam and athenia poplar (*Populus balsamifera, P. atheniensis* [=*tremuloides*]), Kentucky coffee tree (*Gymnocladus dioicus*), common locust *(Robinia pseudoacacia*), paper mulberry (*Broussonetia papyrifera*), lilac (*Syringa vulgaris*), althea (rose of sharon; *Hibiscus*), privet (*Ligustrum vulgare*), willows (including weeping willow, *Salix babylonica*), and many ornamental plants in the lily (Liliaceae) and iris (Iridaceae) families.

Our pollen work was able to specifically identify only a handful of these. For instance, we found several examples of *Populus* pollen, but could not differentiate the various species involved. We found several grains of the legume family, but could not say specifically whether they belonged to *Gymnocladus*, *Robinia*, or *Cercis*. We did, however, find pollen of *Lonicera*, *Ribes*, Liliaceae, and *Rosa* – all believed to have been grown here by Thomas Jefferson. Perhaps our most interesting find of this group was the occurrence of *Hibiscus* pollen on the east-bank terrace. We identified many other pollen types from plants that we assume did not grow at Poplar Forest as ornamentals. These include pine (*Pinus*), spruce (*Picea*), eastern hemlock (*Tsuga canadensis*), and many others.

Matching Specific Plants to Specific Planting Stains

Here our success was less apparent. Although pollen assemblages from planting holes were mostly distinct from the surrounding terraces (see Results above, and Discussion below), we could not definitively suggest that a specific plant was located in a specific location. The reasons for this are two-fold. First, we were unable to determine except in very specific cases which species within a genus, or which genus within a family, was represented by an individual pollen grain. Second, many of the ornamentals that were planted on the Poplar Forest were species that do not produce much pollen. Even with the large pollen sums employed in this study (in some cases over 2,000 grains) we were unable to recover sufficient amounts of pollen to provide definitive information on exact location. For instance, a single grain of gooseberry (*Ribes*) out of a 2,120-grain count was found in the 1821E/4 sample – an east-bank terrace sample. It is possible that *Ribes* was planted at that location, but the occurrence of only a single grain does not provide the sufficient proof. We can only say that it is possible that *Ribes* grew at that location, or nearby. A similar argument can be made for pollen of the lily family (Liliaceae; 1 grain of 2,120 at 1821E/4) and pollen of the mint family (Lamiaceae; 1 grain of 2,129 at

1812K/2). On the other hand, pollen of the carnation family (Caryophyllaceae) was found in four of the five 2,000-grain counts. At least one species from this family, *Dianathus*, is listed as occurring at the Poplar Forest during Thomas Jefferson's time.

Origin of Soils

We were able to conclusively determine from the pollen evidence that the planting hole soils, and perhaps the soils associated with the French drains, were from a different origin than the samples from the lawn terraces. Terrace soils have higher pine, mesic hardwood and hemlock, and grass pollen percentages, while exhibiting lower oak, ragweed, and disturbance pollen to pine ratios than either planting hole or French drain samples. Terrace soils tend to have somewhat greater pollen concentrations as well. Interestingly, planting hole and French drain samples are not very different from one another either in specific pollen content or pollen concentration. One difference between these two contexts is the proportion of samples that contain Apiaceae pollen. Apiaceae pollen is found in all eight of the planting hole samples, but only in two of four French drain samples. On these bases, we suggest that at least the planting hole soils, and probably the French drain soils, come from a location different from the terrace soils. It has been suggested that planting soils came from a hypothesized "nursery" area, away from the lawn complex (T. Trussell, pers. comm. 1998). Our data support this interpretation.

Lawn versus Bare Earth

Although we do not stand on statistically significant ground, the pollen evidence supports the hypothesis that much of the area encompassed by the pollen samples sent to us was covered by grasses. We base this conclusion on the variable but relatively high grass pollen percentages of the terrace samples, compared to the less variable but somewhat lower grass pollen percentages of the French drain and planting hole samples. Grass pollen percentages of six of the terrace samples are over 10% grass pollen, while only two other samples have as high a percentage. In our experience, values as high as 10% grass pollen are rare in areas surrounded by forest. Thus, it appears that much of the local area surrounding the terraces was covered by grasses. This fits with the historical evidence as we understand it.

Occurrence of Intrusive Weeds

Many of the pollen types found in these analyses come from species known to be intrusive weeds. Perhaps the most abundant weed associated with the land clearance activities of the early Euro-Americans is ragweed (*Ambrosia*). Although we cannot determine the exact species involved, an abrupt increase in Ambrosia pollen clearly marks major land clearance episodes in the 17^{th} through 19^{th} centuries on the east coast of North America (Russell et al. 1993). Such high percentages of *Ambrosia*, generally over 10%, can be attributed to the widespread occurrence of this invasive weed in the general vicinity. Similarly, the occurrence of plantain (*Plantago*) is a direct indicator of land clearance, planting of grasslands, or of the occurrence of pasturage. It is unlikely that *Ambrosia* grew on established lawns at the Poplar Forest, but is more likely that *Plantago* grew as a weed within the lawn itself. Our data demonstrate that *Plantago* was also consistently abundant in planting hole soils, in French drain samples, and within the Jefferson-age garden. It was not common at all in the pre-Jefferson agricultural soil. Most probably, *Ambrosia* grew along roadsides, and in fallow fields and other wasted places on and near the plantation. Many of the other familial pollen types found in this study include weedy species, although it is impossible, because of the lack of taxonomic resolution, to determine if the pollen came from weedy species or otherwise.

Occurrence of Kentucky Coffee Trees

One of the great unknowns is whether Jefferson had Kentucky coffee trees planted on the terrace banks, as specified in a letter from Thomas Jefferson in 1812 AD (T. Trussell, pers. comm. 1998). Old photographs from ca. 1910 AD show Kentucky coffee trees planted on the terraces, but their removal in the 1940's destroyed any evidence as to whether they were planted during Jefferson's time. Although several grains of legume (Fabaceae) pollen were found in terrace soil samples (see above), we did not find pollen of this type in enough abundance to conclude that the trees had been at those locations at the time of the "Jefferson soils". We have assumed that if such large trees (with large canopies) had been planted in the early 1800's, surviving until the 1940's, that larger quantities of legume pollen would be recovered. Therefore, based upon the small amount of legume pollen, we conclude the evidence suggests that the Kentucky coffee trees were not planted until some time after the deposition of the Jefferson terrace soils.

Macroenvironment of the Region

We assume that many if not all of the coniferous pollen types were from woodlands surrounding the plantation, and were not cultivated as ornamentals. Such pollen types as spruce (*Picea*), fir (*Abies*), juniper (Cupressaceae) and eastern hemlock (*Tsuga canadensis*) were deposited from extra-local or regional pollen rains from surrounding uplands. The situation is less clear regarding the sporadic occurrence of birch (*Betula*) and hazelnut (*Corylus*), which could have come from local or non-local sources. Clearly, pollen from other hardwoods, such as hickory (*Carya*), walnut (*Juglans*), and linden (*Tilia*) probably were trees that grew naturally in the surround forests, but at least in the case of hickory and walnut, could have been planted as ornamentals or for food crops for nuts.

Two other tree pollen types merit further discussion. The most abundant pollen type is pine (*Pinus*), found in virtually all samples. Pine trees are notorious as over-producers of pollen, and palynologists often consider percentages lower than 15-20% as signifying that pine trees were absent locally. Percentages in excess of that usually signify local occurrence of the plant. Though many of the French drain and planting hole samples are near this threshold, most of the terrace soil samples exceed the threshold. This suggests that pine trees were common in the surrounding forests of the plantation, although it is not clear if individual trees were growing directly adjacent to the cleared grounds. This observation is particularly interesting, since an inventory of plants on the grounds by Peggy Newcomb in 1993 did not mention the occurrence of pine trees. Ms. Newcomb's assessment did, however, mention a number of dead Virginia pines (*Pinus virginiana*) within the vicinity, apparently killed by pine beetles. It is possible, therefore, to conclude that pines were more numerous in the past before insect infestation, and undoubtedly lumbering operations, cause their decline.

A second major pollen type is that of oak (*Quercus*). A copy of a memo provided to me (Peggy Cornett to Barbara Heath, 10 March 1999) described several species of oaks occurring on the property, including northern red oak (*Quercus rubra*), white oak (*Q. alba*), black oak (*Q. velutina*), pin oak (*Q. palustris*) and southern red oak (*Q. falcata*). Clearly oaks have remained a significant part of the local flora for a considerable time period.

Though we did not find a significant numbers of cultigens in our samples, such as tabacco, we can confidently say that maize (*Zea mays*) was widely grown within the general vicinity of the Poplar Forest. Maize, or corn, pollen is found in virtually all of our samples, and there must have been a significant acreage of cultivated maize nearby. Similarly, most samples contained abundant "Large Poaceae" pollen. We distinguished a third category of grass grains – ones that are intermediate in size between the smaller native grasses and the larger grains of corn (Appendix Tables 2 & 3). In other studies, particularly in Europe, these "Large grass" types are often associated with the cultivation of cereal crops, including wheat (*Triticum*). While we do not have direct evidence of this specifically for the Poplar Forest plantation, we highly suspect that other cereal crops were grown here as well as corn.

Characteristics of the Garden and Agricultural Samples

Two pollen samples (2000F, 2003D) were obtained from the bases of planting rows in a Jefferson era garden soil, while two others (1962M, 1962N) came from plow zones in soils believed to be from the original tobacco farm agricultural field, which existed prior to the development of Poplar Forest. It is thought that samples 1962M and 1962N represent soils prior to 1806 AD (T. Trussell, pers. comm. 2000). While sample 1962N was sterile, the remaining three pollen samples were demonstrably different from the other soil samples. The remaining three samples had the highest ragweed (*Ambrosia*) pollen percentages of any of the samples (Fig. 7), as well as the highest ratio of disturbance pollen types to pine (Fig. 8). This is not an unexpected finding, since invasive weeds often thrived in agricultural fields and gardens. Each of the samples had moderate oak (*Quercus*) percentages (Fig. 4), with the lowest pine (*Pinus*) percentages of any sample. The generally low pine pollen percentages are undoubtedly a reflection of the very high ragweed pollen.

As mentioned above, *Plantago* was extremely uncommon in the agricultural field sample, 1962M. We suggest that this may indicate that *Plantago* plants were not fully established in the vicinity of pre-Poplar Forest plantation, and only became fully established locally subsequent to the creation of the large grassy area of the south lawn.

Sample 1962M was further differentiated from the other two garden samples by higher percentages of Mesic Hardwoods plus Hemlock pollen (Fig. 6). We had hoped to find pollen of tobacco in this sample, and we suspect that higher pollen sums would increase our chance of recovering this important pollen type. However, we did find grains of Brassicaceae, *Zea mays* and large Poaceae, all of which are or could be cultivated plants there. In the Jefferson garden samples (2000F and 2003D), we recovered several grains of Lactuceae, Fabaceae, Apiaceae, *Zea mays* and large Poaceae. Again, each of these are, or could have been, produced by cultivated crops.

West Bank Planting Holes

Samples 1940H and 1941G on the west bank have been aged to somewhat earlier than sediments from planting holes on the east bank, perhaps as early as late 1812 or early 1813 (T. Trussell, pers. comm. 2000). One hypothesis suggested that the pollen assemblage from these two samples would be different than from later samples, which date from 1814 and 1815. Examination of the dominant pollen types (Figs. 3-10) shows few differences in these major pollen types between the earlier and later samples. Only the curve for oak pollen (Fig. 4) shows an apparently significant difference between samples 1940H and 1941G, when compared to the other planting hole samples. Why this is the case is unclear. One explanation is that the original sediments from which 1940H and 1941G were obtained were not in close proximity to oak trees, a situation perhaps different for the pile of soil that ultimately was used to plant other trees and shrubs at a later date.

The Earliest Planting Hole

Sample 1962E came from a planting hole on the west mound that has generated some controversy. In 1811 Thomas Jefferson asked for willows and aspen to be planted at this location, but in 1816 he requested that the site be replanted with roses and calycanthus. Unfortunately, even though we performed a 1,031-grain count on this sample, we did not recover pollen of any of the above-listed plants. Thus, we cannot resolve this question with the presently-available data.

CONCLUSIONS

The pollen results from this study have illuminated the importance of using this technique for investigation of former vegetation and environments on Thomas Jefferson's Poplar Forest estate. The data have (1) successfully differentiated the origin of soils of different contexts; (2) suggested that the south lawn region was covered by grasses; (3) demonstrated the ubiquity of invasive weeds such as *Ambrosia*; (4) indicated a potential scenario for the local spread of plantain (*Plantago*); (5) suggested that Kentucky coffee trees were not planted as Jefferson had instructed; and (6) shed light on the characteristics of the macroenvironment surrounding the estate. Pollen data have also highlighted the differences between the garden samples and other contexts, and showed some similarities between the garden samples and the pre-Jefferson agricultural samples. In addition, we have demonstrated that higher pollen counts will identify a greater richness of pollen types – a fact important to archaeological pollen analysis in general.

The pollen results were less successful generally in recovering evidence for all of the plants on Thomas Jefferson's list, or a matching specific plants to specific planting hole stains. We suspect that even higher pollen counts may be necessary to recover very rare pollen types. It is possible that Jefferson's gardeners planted some species which are sterile, and do not produce pollen. It is also possible that pollen of many of the cultivated plants does not preserve as well as other plants. Certainly the ability of palynologists to provide the taxonomic resolution necessary to distinguish cultivated from weedy or natural plants within a single family is a limitation. However, our ability to contribute information to the reconstruction of the Poplar Forest's original plan, as well as provide interpretative information, we hope has been sufficient to justify continued use of pollen analysis on historical archaeological projects such as this.

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APPENDIX III

Thomas Jefferson's Garden Visits, 1766-1791
A selected list including potential internet sources.

> "I have often thought that if heaven had given me choice of my position and calling, it should have been on a rich spot of earth, well watered, and near a good market for the productions of the garden. No occupation is so delightful to me as the culture of the earth, and no culture comparable to that of the garden. Such a variety of subjects, some one always coming to perfection, the failure of one thing repaired by the success of another, and instead of one harvest a continued one through the year. Under a total want of demand except for our family table, I am still devoted to the garden. But though an old man, I am but a young gardener."
>
> Jefferson to Charles Willson Peale
> Poplar Forest, August 20, 1811

1766

May 25 — Letter (**1766052**) to John Page on a visit to Annapolis: "the houses are in general better than those in Williamsburgh, but the gardens more indifferent"
Williamsburg - <http://www.history.org/>
< http://www.gardenvisit.com/ge/colon.htm>

1775

<u>Attending Continental Congress</u>

June 11	"Set out from Wms.burgh for Philadelphia." At Ruffin's Ferry
June 12	At King William Court House and "Aylett's"
June 13	At Fredericksburg
June 14	At Howe's Ferry
June 16	At Port Tobacco (Mrs. Halkinson's)
June 17	At Upper Marlborough (Mrs. Gibson's), London Town, Annapolis
June 18	At Rockhall (Greentree's)
June 19	At "Downs's"
June 20	At Middleton (Witherspoon's), Wilmington, Chester (Mrs. Withey's), "arrived in Philadelphia"
August 1	Left Philadelphia. At Chester (Mrs. Withey's), Christiana Ferry
August 2	At Newcastle (Mrs. Clay's), Warwick (McCollough's), "Downs's"
August 3	At "Worrall's, in Newton upon Chester," Rockhall (Hodges's), Annapolis (Middleton's)
August 4	At London Town, Marlborough (Mrs. Gibson's), Piscataway
August 5	At Young's Ferry, Howe's

August 6	At Portroyal (Buckner's), Bowling Green
August 9	At Richmond, attending Virginia Convention
August 11	Re-elected member of Continental Congress
September 25	"Set out from Monticello for Philadelphia." At Orange Court House (Bell's)
September 26	At "Porter's on the Rappidan," "Bradley's in Culpepper," "Elk-run church"
October 1	Arrives at Philadelphia
December 28	Left Philadelphia
December 29	At Wilmington, "Marshall's," Head of Elk
December 31	At "Stephenson's on Susquehanna"
1776	
January 1	At "Ewens's"
January 2	At Bushtown
January 3	At Baltimore
January 4	At "Rawlings's," Upper Marlborough, Piscataway
January 5	At Port Tobacco
January 6	At Young's Ferry
January 7	At Fredericksburg
January 9	At Monticello
May 7	Leaves Monticello
May 8	At Orange Court House and Culpepper Court House
May 9	At Fauquier Court House and Red House
May 10	At "Lacy's," Leesburg (McIntyre's), "Knowlands on Patowmack"
May 11	At Frederickstown and Tawneytown (Caleb's)
May 12	At McAlister's Town (Rheneghcr's), York (White's), Wright's Ferry
May 13	At "Ryckhart's in Lancaster," "at the bull," at "Blackhorse"
May 14	At Chester (Mrs. Withey's). Arrives at Philadelphia
September 3	"Left Philadelphia"
September 4	At "the White horse," "the Three crowns," Lancaster (Ryckhart's)
September 5	At Wright's Ferry, York (White's)
September 6	At "Rheneghcr's in McAlister's town," Tawneytown (Caleb's), Frederick (Crush's)
September 7	At "Knowland's on Patowmack," Leesburg (McEntire's)
September 8	At Tyler's at the Red House
September 9	At "Porter's" and Monticello
1779	
March 27	Letter (**1779032**) to Patrick Henry: "the environs of the barracks are delightful, the ground cleared, laid off in hundreds of gardens, each enclosed in its separate paling; these well prepared, and exhibiting a fine appearance. General Riedezel alone laid out upwards of two hundred pounds in garden seeds for the German troops only. Judge what an extent of ground these seeds would cover. There is little doubt that their own gardens will furnish them a great abundance of vegetables through the year." (UVA library online, TJ documents)
1783	
October 16	"Left Monticello for Congress"

October 17	At "Hayes's"
October 20	At Savage's in Woodstock
October 24	At Winchester (McGuire's)
October 25	At Harper's Ferry
October 26	At Fredericktown (Morris's [Catauba King]) and Tawneytown
October 27	At McAlister's Town
October 28	At Susquehanna (Jeffrey's) and Lancaster (Ryckhart's [Bear])
October 29	At Philadelphia (Thompson's Indian Queen)
November 3	At Trenton
November 4	At Princeton, takes seat in Congress
November 5	Leaves Princeton. At Trenton
November 6	At "McElroy's," Cross Keys, Bristol, and the "Red Lion"
November 7	At Philadelphia
November 22	Leaves Philadelphia. At Chester
November 23	At Newport
November 25	At Baltimore and Annapolis

1784

<u>Tour Through New England in 1784</u>

May 7	Appointed on mission to negotiate treaties of commerce
May 11	Leaves Annapolis
May 12	At Rockhall (Spencer's)
May 13	At "Worral's," Chester
May 14	At Newcastle ("Bail's"), Chester (Mrs. Withey's). Arrives at Philadelphia
May 28	Leaves Philadelphia. At Bristol (Cross Keys), Trenton
May 29	At Princeton and Brunswick
May 30	At Woodbridge, Elizabethtown. Arrives at New York (Mrs. Elsworth's)
June 1	To Long Island and back
June 5	Leaves New York
June 6	At Fort Washington (Wilson's) and Rye (Mrs. Haviland's)
June 7	At Stamford (Mrs. Well's), Fairfield (Buckley's), and Stratford
June 8	At New Haven (the coffee house)
June 9	At Middletown
June 10	At Hartford (Bull's)
June 11	At Bolton, Lebanon, Norwich
June 12	At New London
June 13	At Pokatuck bridge and South Kingston
June 14	At Newport (Almy's)
June 16	Left Newport. At Burr's, Warren
June 17	At Providence (Chace's)
June 18	At "Mann's," Dedham ("Ames's"), Boston
June 21	At Charlestown and Winnisimet
June 22	At Salem, ferriage Parker River, Ipswich, Newberry
June 25	At Beverly, Salem, and Marblehead
June 26	At Boston (Colonel Ingersol's)

<u>Travels in Europe</u>

July 5	Sails from Boston on the *Ceres*

July 26 Landed at West Cowes. To Portsmouth
July 29 At Farnham, Titchfield, Gosport, Portsmouth

July 31 Crossed to Havre de Grace (Mahon's l'aigle d'or)
August 1 At LaBotte, Bolbe, Aliquerville, Yvetot, Barentin, Rouen (Harp's Pomme de Pin)
August 5 Leaves Rouen. At Pont Saint-Ouen Vaudreuil, Gaillon, Vernon, Bonnieres, Martes, Meulan, Triel (Chateau de Bizy)
<http://www.jardins-et-fleurs.com/cgi-local/jardin/jardin_bd_fiche.pl?fiche=47>
August 6 At St. Germain, Marly (Chateau de Marly), Nanterre, Paris
<http://www.tulane.edu/lester/text/Baroque/French.Baroque/French.Baroque39.html>
August 10 At Passy to see Franklin
September 15 At Versailles with Franklin and Adams to see Vergennes
<http://www.chateauversailles.fr/>
<http://www.greatbuildings.com/buildings/Chateau_de_Versailles.html>
<http://www.gardenvisit.com/ge/vers.htm>
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Rice, Howard C. *L'Hotel de Langeac, Jefferson's Paris Residence*. Monticello: Thomas Jefferson Memorial Foundation, 1947. LC Call Number: NA7348 .P2 R5 1948

At Paris:
Bois de Boulogne
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc368.htm>
Chateau de Madrid (now Bagatelle)
<http://www.sissons.demon.co.uk/bagtelle.htm>
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc370.htm>
Champs Elysee (designed by Le Notre)
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc355.htm>
Hotel La Fayette on the Left Bank
Hotel de La Rochefoucauld
Hotel de Bruney (on Champs Elysees)
Jardin du Roi
Louvre Palace
<http://www.louvre.fr> (official website)
<http://www.paris.org./Musees/Louvre/buildhistory.html>

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Luxembourg Palace

<http://www.paris.org/Monuments/Luxembourg/>
<http://www.infoplease.lycos.com/ce5/CE031660.html>
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc353.htm>
<http://www.gardenvisit.com/ge/luxe.htm>

Observatory Gardens

<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc354.htm>

Tuileries Gardens

<http://www.pariserve.tm.fr/quartier/00tuilerie.htm>
<http://www.worldbook.com/fun/atw/html/tuil.htm>
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc350.htm>
<http://www.gardenvisit.com/ge/tuil.htm>

Viewed construction of Hotel de Salm

Chateau de La Roche-Guyon in Normandy

<http://www.echo-du-net.com/anglais/rguyona.html>
<http://www.chateaux-france.com/domain/ChaView.cgi?l=en&num=1039>

1785

June 20 At St. Denis

July 7 At Vincennes
<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc357.htm>

October 23 At Sanois

1786

March 6 "Set out for London." At Chantilly and Breteuil

Chantilly - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20 slides/Nord.Picardy/Chantilly/Chantilly.html>
<http://www.ville-chantilly.fr/>
<http://www.jardins-et-fleurs.com/cgi-local/jardin/ jardin_bd_fiche.pl?fiche=420>
<http://www.gardenvisit.com/ge/chant.htm>

Chateau de Breteuil - <http://www.chateaux-france.com/domain/ ChaView.cgi?l=en&num=1052>
<http://www.chateaux-france.com/cha/pages/bretb.htm>

March 7 At Abbeville

March 8 At Montreuil and Calais

March 11 Arrived at London

<u>At London</u>

Alexander Pope's estate on the Thames

Chelsea Physick Garden

Enfield Chase on the northern periphery of London (April 9-14?)

"*Enfield Chase*. -- One of the four lodges. Garden about sixty acres. Originally by Lord Chatham, now in the tenure of Dr. Beaver, who married the daughter of Mr. Sharpe. The lease lately renewed -- not in good repair. The water very fine; would admit of great improvement by extending walks, &c., to the principal water at the bottom of the lawn." (Jefferson, *Notes on the Gardens of England*)

Moor Park in Hertfordshire (April 9-14?)

Moor Park. -- The lawn about thirty acres. A piece of ground up the hill of six acres. A small lake. Clumps of spruce firs. Surrounded by walk -- separately inclosed -- destroys unity. The property of Mr. Rous, who bought of Sir Thomas Dundas. The building superb; the principal front a Corinthian portico of four columns; in front of the wings a colonnade, Ionic, subordinate. Back front a terrace, four Corinthian pilasters. Pulling down wings of building; removing deer; wants water.

<http://www.gardenvisit.com/g/moor1.htm>

Greenwich Park

<http://www.gardenvisit.com/g/green2.htm>

Ranelagh

<http://www.pagesjaunes.fr/pt/villes/paris/ang/savoirp/voir/r_acc371.htm>

Vauxhall

<http://members.aol.com/LONDON20/full/belle/gardens.html>

The Pantheon

"*Claremont.* -- Lord Clive's. Nothing remarkable." (Jefferson, *Notes on the Gardens of England*)

<http://www.gardenvisit.com/g/clare.htm>

March 22 Seeing castle at Windsor

April 2 At Chiswick (Richard Boyle's villa, gardens by William Kent), Richmond, Twickenham, Hampton Court, Esherplace, Cobham (Painshill), Weybridge

"*Chiswick.* -- Belongs to Duke of Devonshire. A garden about six acres; -- the octagonal dome has an ill effect, both within and without: the garden shows still too much of art. An obelisk of very ill effect; another in the middle of a pond useless." (Jefferson, *Notes on the Gardens of England*)

<http://www.gardenvisit.com/g/chis.htm>

<http://www.tulane.edu/lester/text/18thCentury/English.Style/English.Style11.html>

Harris, John. *The Palladian Revival: Lord Burlington, His Villa and Garden at Chiswick.* Yale University Press, 1994.

"*Twickenham.* -- Pope's original garden, three and a half acres. Sir Wm. Stanhope added one and a half acre. This is a long narrow slip, grass and trees in the middle, walk all round. Now Sir Wellbore Ellis's. Obelisk at bottom of Pope's garden, as monument to his mother. Inscription, "Ah! Editha, matrum optima, mulierum amantissima, Vale." The house about thirty yards from the Thames: the ground shelves gently to the water side; on the back of the house passes the street, and beyond that the garden. The grotto is under the street, and goes out level to the water. In the centre of the garden a mound with a spiral walk round it. A rookery." (Jefferson, *Notes on the Gardens of England*)

"*Hampton-Court.* -- Old fashioned. Clipt yews grown wild." (Jefferson, *Notes on the Gardens of England*)

<http://www.hrp.org.uk/hcp/indexhcp.htm>

<http://www.gardenvisit.com/g/hamp3.htm>
<http://tudor.simplenet.com/castles/hcp/>
<http://www.english.upenn.edu/~rstack/hampton.html>
Chettle, G.H. *Hampton Court Palace.*
Green, David Brontèe. *The Gardens and Parks at Hampton Court and Bushy.*
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"*Esher-Place.* -- The house in a bottom near the river; on the other side the ground rises pretty much. The road by which we come to the house forms a dividing line in the middle of the front; on the right are heights, rising one beyond and above another, with clumps of trees; on the farthest a temple. A hollow filled up with a clump of trees, the tallest in the bottom, so that the top is quite flat. On the left the ground descends. Clumps of trees, the clumps on each hand balance finely -- most lovely mixture of concave and convex. The garden is of about forty-five acres, besides the park which joins. Belongs to Lady Frances Pelham." (Jefferson, *Notes on the Gardens of England*)

"*Paynshill.* -- Mr. Hopkins. Three hundred and twenty-three acres, garden and park all in one. Well described by Whateley. Grotto said to have cost $7,000. Whateley says one of the bridges is of stone, but both now are of wood, the lower sixty feet high: there is too much evergreen. The dwelling-house built by Hopkins, ill-situated: he has not been there in five years. He lived there four years while building the present house. It is not finished; its architecture is incorrect. A Doric temple, beautiful." (Jefferson, *Notes on the Gardens of England*)

<http://www.brainsys.com/cobham/painshill/>
<http://www.gardenvisit.com/g/pain2.htm>
Kitz, Norman. *Painshill Park: Hamilton and His Picturesque Landscape.*

April 3 At Weybridge, Woburn, Twickenham, London

"*Woburn.* -- Belongs to Lord Peters. Lord Loughborough is the present tenant for two lives. Four people to the farm, four to the pleasure garden, four to the kitchen garden. All are intermixed, the pleasure garden being merely a highly-ornamented walk through and round the divisions of the farm and kitchen garden." (Jefferson, *Notes on the Gardens of England*)

<http://www.cwrl.utexas.edu/~garden/History.html>
<http://www.gardenvisit.com/g/woburn.htm>

April 4 At Twickenham, Woburn, Sunning Hill, Caversham, Reading

"*Caversham.* -- Sold by Lord Cadogan to Major Marsac. Twenty-five acres of garden, four hundred acres of park, six acres of kitchen garden. A large lawn, separated by a sunk fence from the garden, appears to be part of it. A straight, broad gravel walk passes before the front and parallel to it, terminated on the right by a Doric temple, and opening at the other end on a fine prospect. This straight walk has an ill effect. The lawn in front, which is pasture, well disposed with clumps of trees." (Jefferson, *Notes on the Gardens of England*)

April 5 At Wallingford, Thame, Wotton, Buckingham

"*Wotton.* -- Now belongs to the Marquis of Buckingham, son of George Grenville. The lake covers fifty acres, the river five acres, the basin fifteen acres, the little river two acres – equal to seventy-two acres of water. The lake and great river are on a level, they fall into the basin five feet below, and that again into the little river five feet lower. These waters lie in form of an (illustration omitted): the house is in middle of open side, fronting the angle. A walk goes round the whole, three miles in circumference, and containing within it about three hundred acres: sometimes it passes close to the water, sometimes so far off as to leave large pasture grounds between it and the water. But two hands to keep the pleasure grounds in order; much neglected. The water affords two thousand brace of carp a year. There is a Palladian bridge, of which, I think, Whateley does not speak." (Jefferson, *Notes on the Gardens of England*)

April 6 At Banbury, Bicester, Stowe, Buckingham, Banbury, Kineton, Stratford-on-Avon

"*Stowe.* -- Belongs to the Marquis of Buckingham, son of George Grenville, and who takes it from Lord Temple. Fifteen men and eighteen boys employed in keeping pleasure grounds. Within the walk are considerable portions separated by inclosures and used for pasture. The Egyptian pyramid is almost entirely taken down by the late Lord Temple, to erect a building there, in commemoration of Mr. Pitt, but he died before beginning it, and nothing is done to it yet. The grotto and two rotundas are taken away. There are four levels of water, receiving it one from the other. The basin contains seven acres, the lake below that ten acres. Kent's building is called the temple of Venus. The inclosure is entirely by ha-ha. At each end of the front line there is a recess like the bastion of a fort. In one of these is the temple of Friendship, in the other the temple of Venus. They are seen the one from the other, the line of sight passing, not through the garden, but through the country parallel to the line of the garden. This has a good effect. In the approach to Stowe, you are brought a mile through a straight avenue, pointing to the Corinthian arch and to the house, till you get to the arch, then you turn short to the right. The straight approach is very ill. The Corinthian arch has a very useless appearance, inasmuch as it has no pretension to any destination. Instead of being an object from the house, it is an obstacle to a very pleasing distant prospect. The Grecian valley being clear of trees, while the hill on each side is covered with them, is much deepened to appearance." (Jefferson, *Notes on the Gardens of England*)

<http://panther.bsc.edu/~jtatter/stowe.html>
<http://www.stowe.co.uk/>
<http://www.gardenvisit.com/g/stowe1.htm>

Gilpin, William. *A Dialogue upon the Gardens of the Right Honourable the Lord Viscount Cobham at Stow in Buckinghamshire (1748)*. 1993.

Robinson, John Martin. *Temples of Delight: Stowe Landscape Gardens.*

April 7 At Hockley, Birmingham, Leasowes, Stourbridge

"*Leasowes, in Shropshire.* -- Now the property of Mr. Horne by purchase. One hundred and fifty acres within the walk. The waters small. This is not even an ornamented farm -- it is only a grazing farm with a path round it, here and there a seat of board, rarely anything better. Architecture has contributed nothing. The obelisk is of brick. Shenstone had but three hundred pounds a year, and ruined himself by what he did to this farm. It is said that he died of the heart-aches which his debts occasioned him. The part next the road is of red earth, that on the further part gray. The first and second cascades are beautiful. The landscape at number eighteen, and prospect at thirty-two, are fine. The walk through the wood is umbrageous and pleasing. The whole arch of prospect may be of ninety degrees. Many of the inscriptions are lost." (Jefferson, *Notes on the Gardens of England*)

<http://www.gardenvisit.com/g/leas.htm>

Heely, Joseph. *Letters on the Beauties of Hagley, Envil, and the Leasowes.*

April 8 At Bromsgrove, Hagley, Bromsgrove, Worcester, Winch castle, Moreton, Lynston, Woodstock

"*Hagley, now Lord Wescot's.* -- One thousand acres: no distinction between park and garden -- both blended, but more of the character of garden. Eight or nine laborers keep it in order. Between two and three hundred deer in it, some few of them red deer. They breed sometimes with the fallow. This garden occupying a descending hollow between the Clent and Witchbury hills, with the spurs from those hills, there is no level in it for a spacious water. There are, therefore, only some small ponds. From one of these there is a fine cascade; but it can only be occasionally, by opening the sluice. This is in a small, dark, deep hollow, with recesses of stone in the banks on every side. In one of these is a Venus predique, turned half round as if inviting you with her into the recess. There is another cascade seen from the portico on the bridge. The castle is triangular, with a round tower at each angle, one only entire; it seems to be between forty and fifty feet high. The ponds yield a great deal of trout. The walks are scarcely gravelled." (Jefferson, *Notes on the Gardens of England*)

<http://www.gardenvisit.com/g/hag.htm>

Heely, Joseph. *Letters on the Beauties of Hagley, Envil, and the Leasowes.*

April 9 At Blenheim, Woodstock, Oxford, Tatsworth, High Wycombe, Uxbridge

"*Blenheim.* -- Twenty-five hundred acres, of which two hundred is garden, one hundred and fifty water, twelve kitchen garden, and the rest park. Two hundred people employed to keep it in order, and to make alterations and additions. About fifty of these employed in pleasure grounds. The turf is mowed once in ten days. In summer, about two thousand fallow deer in the park, and two or three thousand sheep. The palace of Henry II. was remaining till taken down by Sarah, widow of the first Duke of Marlborough. It was on a round spot levelled by art, near what is now water, and but a little above it. The island was a part of the high road leading to the palace. Rosamond's bower was near where is now a little grove, about two hundred yards from the palace. The well is near where the bower was. The water here is very beautiful, and very grand. The cascade from the lake, a fine one; except this the garden has no great beauties. It is not laid out in fine lawns and woods, but the trees are scattered thinly over the ground, and every here and there small thickets of shrubs, in oval raised beds, cultivated, and flowers among the shrubs. The gravelled walks are broad -- art appears too much. There are but a few seats in it, and nothing of architecture more dignified. There is no one striking position in it. There has been a great addition to the length of the river since Whateley wrote." (Jefferson, *Notes on the Gardens of England*)

<http://www.blenheimpalace.com/>

<http://www.gardenvisit.com/g/blen2.htm>

Bond, James, and Kate Tiller. *Blenheim: Landscape for a Palace*. Sutton Publishing, 1997.

April 14 — At Kew

"*Kew*. -- Archimedes' screw for raising water. A horizontal shaft made to turn the oblique one of the screw by a patent machinery of this form: (Illustrations omitted)" (Jefferson, *Notes on the Gardens of England*)

<http://www.hrp.org.uk/kew/indexkew.htm>

Desmond, Ray. *Kew: The History of the Royal Botanical Gardens*. Harvill Press, 1998.

April 17 — At Ranelagh

April 18 — At Buckingham House

April 20 — Through Hyde Park and Kensington to Brentford to see Osterly and Sion House

Osterly - < http://www.gardenvisit.com/g/ost.htm>

April 26 — "Set out from London for Paris." At Greenwich, Dartford, Rochester, Sittingbourne, Canterbury, Dover

April 27 — Seeing castle at Dover

April 28 — At Calais

April 29 — At St. Omer, Royes

April 30 — At Le Bourget. Arrived at Paris

May 4 — Letter (**1786050**) to John Page from Paris: "The gardening in that country is the article in which it surpasses all the earth. I mean their pleasure gardening. This indeed went far beyond my ideas."

August 10 — At Suresne

Visits Desert de Retz, belonging to Francois Racine de Monville

<http://www.geocities.com/Paris/6093/>

Jardin des Plantes in Paris (Andre Thouin - head gardener)

1787

February 7	Letter (**1787020**) to Anne Willing Bingham on Paris: "His [Monsieur de Saint James's] garden, at the Pont de Neuilly, where, on seventeen acres of ground he had laid out fifty thousand louis, will probably sell for somewhat less money."
February 28	"Set out from Paris." At Villeneuve, St. Lieu, Melun, Fontainebleau *Fontainebleau* - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/IledeFrance/Fontainebleau/Fontainebleau.html> <http://www.bc.edu/bc_org/avp/cas/fnart/arch/fontainebleau.html> <http://www.souppes-fontainebleau.com/fontainebleau/bleau.htm> <http://www.fontainebleau.org/> <http://www.gardenvisit.com/ge/fontain.htm>
March 2	At Moret, Faussard, Villeneuve, Pont sur Yonne, Sens
March 3	At Villevallar, Joigny, Basson, Auxerre, St. Bris, Vermenton, Lucy le Bois
March 4	At Cussy les Forges (Chateau de Sevigny), Rouvray, Maison-neuve, Vitteaux, la Chaleure, Pont de Pany, la Cude, Dijon (Hotel de Conde)
March 7	At Dijon, la Baraque, Nuits, Beaune, Pommard, Volnay, Meursault
March 8	At Aussy, Chagny, Chalon-sur-Saone, Sennecey, Tournus
March 9	At St. Albin, Macon, Maison Blanche, St. George de Renan, Chateau de Laye-Epinaye
March 11	At Ville franche, Les Echelles, Puits d'or, Lyons (Hotel du Palais royal)
March 15	At St. Ford, St. Sympherin, Vienne
March 16	At Auberive, le Peage, St. Rambert, St. Vallier, Tain
March 17	Ferry over Isere. At Valence, La Paillasse, L'Oriol, Laine, Montelimar
March 18	At Donserre, Pierrelatte, la Palus, Mornas, Orange, Pont St. Esprit
March 19	At Bagnols, Connault, Valliguiere, Remoulins, St. Gervasy, Nismes
March 24	At Arles, Tarascon, St. Remy (Cheval blanc)
March 25	At Orgon, Pontroyal, St. Cannat, Aix (Hotel St. Jaques)
March 29	At Aix, Le Pin, Marseilles (Hotel des Princes)
April 2	At Chateau d'If
April 5	At Chateau de Borelli
April 6	At Aubagne, Cuges, le Beausset, Toulon
April 7	At Toulon
April 8	At Toulon, Hyeres, Cuers, Pignans, le Luc (Hotel St. Anne)
April 9	At Vidauban, le Muy, Frejus, Lestrelles, Napoule, Antibes
April 10	At Nice (Hotel de York)
April 13	At Scarena
April 14	At Sospello, Breglia, Saorsio, Fontan, Ciandola
April 15	At Tende, Limone, Coni (a la Croix blanche)
April 16	At Centallo, Savigliano, Racconigi, Poirino, Turin
April 17	At Turin (Hotel d'Angleterre)
April 18	At Moncaglieri, Stupinigi, Superga
April 19	At Settimo, Chivasso, Ciliano, St. Germano, Vercelli
April 20	At Vercelli, Novara, Buffalora, Sedriano, Milan (Albergo reale)
April 23	Leaves Milan. At Casino, Rozzano, Binasco, Pavia (al Croce bianco)

April 24	At Voghere, Tortona
April 25	At Novi (a la Poste), Voltaggio, Campomarone (a la rosa rossa), Genoa (St. Marthe, Cerf)
April 27	At Sestri, Pegli, Nervi
April 28	At Noli
April 29	At Albenga
April 30	At Oneglia, St. Remo (Auberge de la poste)
May 1	At Ventimiglia, Menton, Monaco, Nice (Hotel de York)
May 2	At Antibes, Naupoules, Lestrelle
May 3	At Frejus, Muy, Vidauban, Luc, Brignoles, Tourves, Porcieux, La Galiniere, Aix (Hotel St. Jaques)
May 4	At Le Grand Pin, Marseilles (Hotel des Princes)
May 7	At Aix, St. Cannat, Pontroyal, Orgon
May 8	At St. Andiol, Avignon (Hotel St. Omer), Vacluse *Avignon* - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/Provence/Avignon/Avignon.html> <http://www.avignon.com/>
May 9	At Ville Neuve d'Avignon, Remoulins, St. Gervasy, Nismes (Hotel de Luxemburg)
May 10	At Nismes, Uchaud, Colombieres, Lunel, Montpellier
May 11	At Montpellier
May 12	At Frontignan and Cette (Au grand Gaillon)
May 13	At Agde
May 15	At Beziers, Argilies, Saumal
May 16	At Marseillette
May 17	At Carcassonne (Hotel de St. Jean baptiste)
May 18	At Castelnaudary (Hotel de Notredame)
May 19	At St. Feriol, Escarmare, Lampy
May 20	At Narouze, Ville franche, Baziege
May 21	At Toulouse (Hotel du Griffon d'or)
May 22	At St. Gerry, Grisolles, Montauban, Moissac, Malause, Magistere, Croquelaudy
May 23	At Agen (Hotel petit St. Jean), St. Hilaire, Port Ste. Marie, Aiguillon, Tonneins, Maramaude, Montelandron, La Preole, Cauderat, Langdon, Barlade, Casters
May 24	At Prade, Bouscaut, Bordeaux (Hotel de Richelieu)
May 28	At Blaye
May 29	At Etauliers, St. Aubin, Mirambleau, St. Genis, Pons Lajart, Saintes, St. Porchaire, St. Hyppolite, Rochefort
May 30	At Bacha, Le Rocher, Rochelle, Usseau, Marans, Moreilles, Ste. Hermine *Chateau d'Usse* - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/Loire/Usse/Usse.html> <http://www.angelfire.com/mo/FrenchConnection/usse.html>
May 31	At Chantenay, St. Fulgent, Montaigu, Aigrefeuille, Nantes (A la Croix verte)
June 1	At Le Temple, Moere, Pontchateau, Rochebernard, Massillac

June 2 At Thex, Vanues, Auray, Landevant, Hennebont, L'Orient (Hotel de l'Epee royale)

June 3 At Hennbont, Baud, Locmine, Josselin

June 4 At Ploermel, Campeneac, Plelan, Mardelles, Rennes

June 5 At Bout des Landes, Roudun, Brecharaye, Derval, Nozay, Bout de Bois, Gesvres, Nantes (St. Julien)

June 6 Manves, le Plessis, Ancenis (Hotel de Bretagne)

June 7 At Verades, Loriottiere, St. George, Angers, Daguiniere, La Menitre, Roziers, La Croix Verte, La Riviere, Les Trois Volees

Angers - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/Loire/Angers/Angers.html>
<http://www.ville-angers.fr/index.html>
<http://www.gardenvisit.com/ge/angers.htm>

June 8 At Langeais, Tours (Place Royale), La Frilliere, Amboise, Chanteloupe, Veuve

Chateau de Langeais - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/Loire/Langeais/Langeais.html>
<http://loirevalley-tours.com/Anglais/Chateaux/langeais.htm>

Chateau d'Amboise - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/Loire/Amboise/Amboise.html>
<http://www.chateaux-france.com/~amboise.en>
<http://www.gardenvisit.com/ge/amb.htm>

June 9 At Chavilly (gardens of Comtesse de Tesse), Artenoy, Toury, Angerville, Montdesin, Etampes, Estrechy, Arpajon, Longjumeau, Croix de Bernis, Paris

Duc de Choiseul's estate

Chateau of Mdme. de Pompadour's brother, the Marquis de Menars

Gardens at Ermenoville

1788

March 4 "Set out for Amsterdam." At le Bourget, Louvres, Chapelle, Senlis, Le Pont St. Maxence, Bois le Duc, Gournay, Le Cuvilley, Couchy, Roye, Fenches, Peronne (Grand cerf)

March 5 At Fins, Bonnir, Cambray, Bouchain, Valenciennes, Quievran, Quaregnon, Mons, Casteau, Bralne le Compte

March 6 At Hal, Bruxelles, *Malines*, Antwerp

March 7 At Agtenbroek, Uruystraet, Moerdyk

March 8 At Rotterdam

March 9 At the Hague

March 10 At Amsterdam (Waping van Amsterdam)

March 20 Excursion to Haarlem (Henry Hope's country house Wegelegen)

March 22 At Saerdam

March 30 Leaves Amsterdam

March 31 At Utrecht (Aublette's), Nimuegen

April 1 At Cranenbury, Cleves, Santen, Reynberg, Hoogstraat

April 2 At Essenberg, Duysberg, Dusseldorf (Zimmerman's)

April 3 At Langveld, Cologne (Holy Ghost, Ingels), Bonn, Remagen, Andernach,

	Coblentz (The Wild Man)
April 5	At Nassau
April 6	At Nasteden, Schwalbach, Wiesbaden, Hadersheim, Frankfort (Rothen House)
April 8	At Hanau
April 10	At Hadersheim, Mayence, Hocheim
April 11	At Rudesheim, Johandberg, Markebronn, Mayence (Hotel de Mayence)
April 12	At Oppenhein, Worms, Manuheim (Cour du Palatin)
April 14	At Dossenheim, Heidelberg (Heidelberger Schloss), Schwetzingen (summer retreat of the Princes of the Palatinate), Kaeferthall
April 15	At Spire, Graben, Karlsruh (Au Prince hereditaire)
April 16	At Rastadt, Scholhofen, Bischofheim, Kehl, Strasbourg (A l'Esprit)
April 18	At Stutzheim, Wiltenheim, Saverne, Phalsbourg
April 19	At Fenestrange, Dicuze, Moyenvic, Champenous, Nancy
April 20	At Velaine, Toul, Laye, Void, St. Aubin, Ligny en Barrois, Bar le Duc, St. Dizier
April 21	At Longchamp, Vitry, La Chaussee, Chalons sur Marne, Epernay
April 22	At Aij, Auvillaij, Cumieres, Pierny, Epernay
April 23	At Port a Bainson, Dormans, Parois, Chateau Thierry, la Ferme de Paris, La Ferte, Meaux, Claye, Bordy, Vergalant, Paris *Chateau Thierry* - http://www.lafontaine.net/chat_th.htm
June 3	Travelling Notes for Mr. Rutedge and Mr. Shippen: "Gardens peculiarity worth the attention of an American, because it is the country of all others where the noblest gardens may be made without expense. We have only to cut out the superabundant plants."

1789

September 26	"Left Paris." At Vernon (Chateau de Bizy) <http://www.jardins-et-fleurs.com/cgi-local/jardin/jardin_bd_fiche.pl?fiche=47>
September 27	At Bolbe
September 28	At Havre (Aigle d'or)
October 8	Left Havre
October 9	Arrived at Cowes (Fountain Inn)
October 11	At Newport, Carybrook Castle
October 22	Embarked on the *Clermont*
October 23	Weighed anchor off Yarmouth
November 23	Landed at Norfolk

1791

<u>Tour through New England in 1791</u>

May 17	Leaves Philadelphia
May 18	At Bristol, Trenton, Princeton
May 19	At Brunswick, Elizabethtown Point. Reaches New York (Elsworth's)
May 21	Leaves New York
May 22	At "Conklin's"
May 23	At Poughkeepsie (Hendrickson's)
May 24	At Lasher's, Swartz's, Katchum's
May 25	At Pulvar's, Claverack, Hudson, Kinderhook

May 26	At Albany
May 27	At Troy, Lansingburg, Waterford. "Visited the falls at Cohoes." Lodged at Benjamin's
May 28	At Stillwater (Ensign's), Saratoga, McNeel's Ferry, Fort Edwards (Baldwin's)
May 29	At Sandy Hill Falls, Wing's Falls, Fort George, Fort William Henry
May 30	On Lake George. At Ticonderoga (Hay's), Crown Point
May 31	On Lake Champlain. "Sailed half way to Split Rock." Returned to Ticonderoga
June 1	"Repassed Lake George." "Back to Fort George"
June 2	"Visited Wing's Falls and Sandy Hill Falls"
June 3	"Crossed the Hudson at Saratoga." At Cambridge (Colvin's)
June 4	Visited the battle field at Bennington
June 5	At Bennington (Dewy's), detained by Blue Laws
June 6	At Williamstown (Killock's), New Ashfield, Lanesboro (Wheeler's), Pittsfield, Dalton (Mrs. Marsh's)
June 7	At Worthington (Smith's), Northampton (Pomeroy's)
June 8	At West Springfield (Stebbin's), East Springfield, Suffield (Hitchcock's), Windsor, Hartford (Frederick Bull's)
June 10	At Weathersfield, Sidon Hill, Middletown (Mrs. Bigelow's), "Strandford's"
June 11	At Guilford (Medab Stone's). "Sailed for Long Island and was on the Sound all night"
June 12	At Oysterpond Point (Tupple's), Southhold (Mrs. Peck's)
June 13	At Riverhead (Griffin's), Morichies (Downs's)
June 14	At "Genl. Floyd's," "Hart's," "Terry's." "Visited the Unquachas Indians"
June 15	At Homstead, Flushing (Prince's), Jamaica
June 16	At Brooklyn and New York
June 17	At Pauler's Hook, Bergen Point, Staten Island, Richmond, Billing's Point, Perth Amboy
June 18	At South Amboy, Spotswood, "Williamson's," Cranberry, Allentown (Francis's)
June 19	At Bordentown, Burlington, Dun's Ferry. Arrives at Philadelphia

At Philadelphia:
Bartram Gardens - <http://www.ushistory.org/tour/_bartram.html>
Woodlands, the estate of William Hamilton
<http://www.libertynet.org/uchs/Woodlands/woodlandshome.html>

General Resources

Betts, Edwin M., ed. *Thomas Jefferson's Garden Book, 1766-1824. With Relevant Extracts from His Other Writings.* Philadelphia: American Philosophical Society, 1944. LC Call Number: SB479 .J4

Fletcher, Sir Banister. *Sir Banister Fletcher's A History of Architecture*. 18th ed., revised by J.C. Palmes. New York: Charles Scribner's Sons, 1975. ISBN 684-14207-4 NA200.F63.

Randall J. Van Vunckt, ed. *International Dictionary of Architects and Architecture: Volume 2, Architecture*. Detroit: St. James Press, 1993. ISBN 1-55862-087-7. LC 93-13431.

Jardins et Fleurs- <http://www.jardins-et-fleurs.com/>
(searchable database of French gardens)

Chateaux and Castles in France - <http://www.centralia.ctc.edu/~vfreund/French.Resources/French%20slides/french.chateaux.html>

Chateaux France - <http://www.chateaux-france.com/>

Garden Visit & Travel Guide - <http://www.gardenvisit.com/>