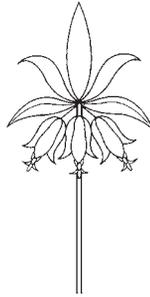


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Naturalized alien plant species at Mount Vernon, Virginia

Elizabeth Fortson Wells and Rebecca Louise Brown

Abstract

A recent study of terrestrial vascular vegetation of the forest at historic Mount Vernon, Virginia, home of George Washington, provided a count of 53 naturalized alien species out of a total of about 250 species, or roughly 20 percent of the vascular flora collected. This report discusses the geographic origins, uses, and dates of introduction into North America of the naturalized alien species found at historic Mount Vernon at the end of the twentieth century.

Introduction

The forest at historic Mount Vernon, home of George Washington, has been preserved and protected from exploitation since the last quarter of the eighteenth century, beginning with Washington's own efforts. Documented floristic change in the last two centuries at Mount Vernon has occurred predominantly by the deliberate or accidental introduction of species from other parts of the world and their subsequent escape into the wild. A recent study of terrestrial vascular plants of the forest at Mount Vernon yielded 53 naturalized species out of about 250 species, or roughly 20 percent of the flora collected (Wells et al. 1996; Wells and Brown, in press). By the end of the eighteenth century 36 of these alien species were probably naturalized to some extent in northern Virginia

or in eastern North America. The remaining 17 species were introduced to North America during the nineteenth or twentieth century.

Mount Vernon is located on a gently rolling plateau in Fairfax County, Virginia, in the inner Coastal Plain below the Fall Line, 29 km (18 miles) south of Washington, D.C. The forest consists of about 80 hectares (200 acres) of mature climax oak-hickory with an ericaceous-dominated shrub layer. The plateau is occasionally dissected by deep beech-dominated ravines. The soil is well to excessively well drained and is somewhat infertile on the higher reaches of the rolling plateau. The bank of the Potomac River in front of the mansion is a very high, east-facing, sloping wooded bluff, 36.5 m (120 ft) above the tidal river, protected from major floods and continuous wave action by a stone seawall for a large portion of the estate's river boundary.

George Washington sought to maintain his forest around Mount Vernon, using fallen trees for rails and firewood wherever possible and forbidding the unnecessary cutting of trees even when they competed with his crops (Fitzpatrick 1931; Wells and Brown, in press). At the same time, he was passionately concerned with aesthetic effects in his gardens and wilderness areas around the mansion (Fig. 1). He transplanted decorative shrubs and trees he had found in his travels, and he imported exotic species from Europe and the western frontier (Flexner 1969). He exchanged plants with friends and admirers, including the noted botanist William Bartram (1739–1823) (1792;

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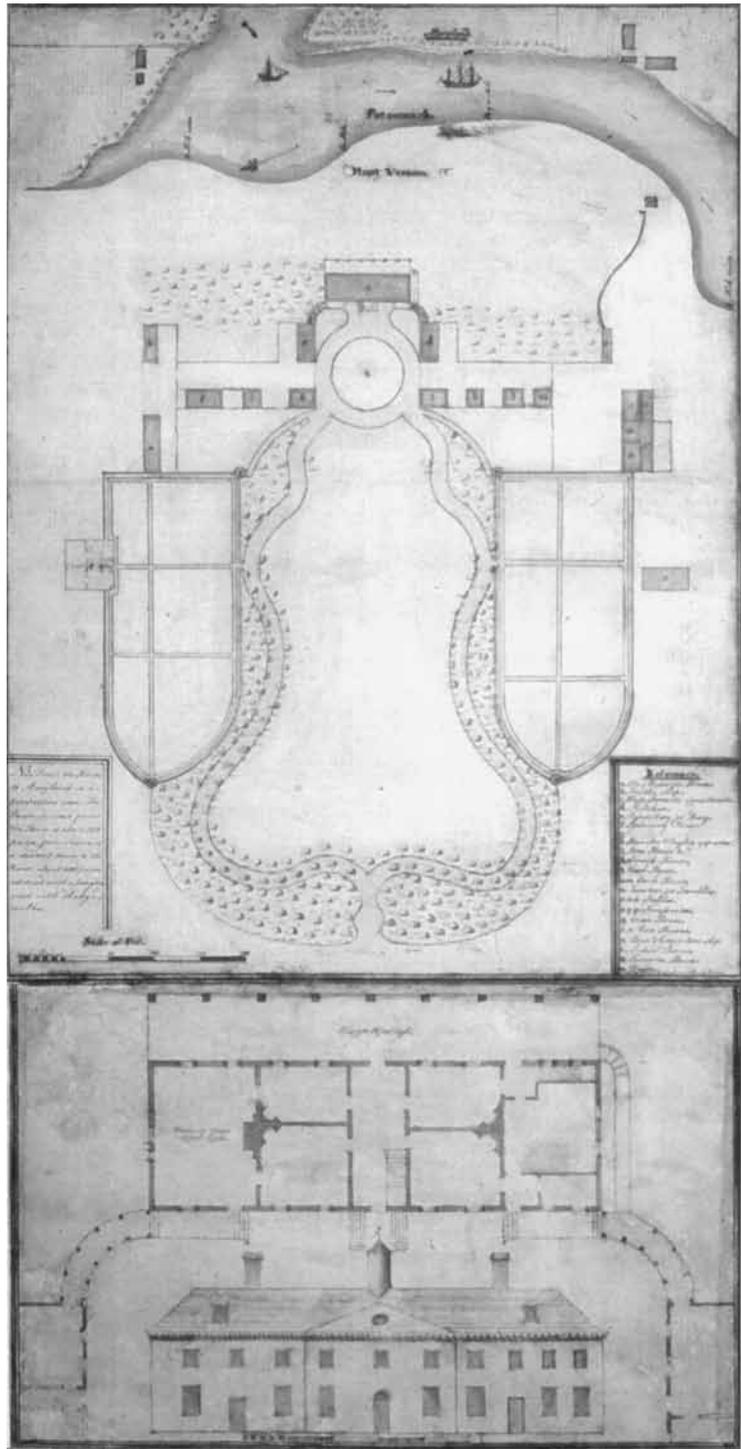


Figure 1. The Vaughan plan of Mount Vernon, presented to George Washington by Samuel Vaughan in November 1787. The plan is based on notes made by Vaughan in June 1787, and its accuracy is attested by Washington's letter of acknowledgment. Courtesy of The Mount Vernon Ladies' Association.

Harper 1958). These horticultural introductions possibly brought some exotics into the forest during Washington's lifetime.

American settlers began importing seeds and plants very early in colonial history. During 1607 and 1608 the first Virginia settlers at Jamestown planted peas, potatoes, melons, and what was most likely barley or wheat. Several years later they successfully planted hemp, flax, apples, peaches, and cotton, and unsuccessfully attempted rice, indigo, pineapples, and oranges (Sanford 1916). Tobacco seed was brought to Virginia from the West Indies and South America by 1612 and soon became the most important cash crop. A list of supplies sent to the Pilgrims in Massachusetts in 1628 included wheat, rye, barley, beans, peas, apples, pears, cherries, peaches, plums, filberts, quinces, pomegranates, "woad" (*Isatis tinctoria*, whose leaves produced a blue dye), saffron, licorice, hemp, flax, and currants (Carrier 1923). Settlers, no doubt, brought seeds of favorite medicinal herbs and various edible herbs for private cultivation. They found that native hay and pasture grasses were not nutritive, resulting in near starvation for their livestock in winter, and as early as 1665 began bringing in "English grass," which included several important plants such as timothy and white clover (Bidwell 1925). Mixed hay was brought on board ships to feed the cattle, sheep, goats, and hogs. Eventually a lively exchange of ornamental plants took place (Betts 1944; Harper 1958). This carried the possibility of introducing countless weeds.

The early flora of North America has been documented by early naturalists such as Josselyn (1672) in New England and Gronovius (1739, 1743, 1762) writing about Virginia. Gronovius based his writings on collections sent to him by John Clayton of Gloucester County, Virginia. Gronovius received his first shipment of Clayton specimens while Linnaeus was living in the Netherlands, and Linnaeus's influence is evident in Gronovius's adoption of his sexual system

and acceptance of Linnaean generic and specific nomenclature from *Hortus Cliffortianus* and *Flora Lapponica* (Stafleu 1971).

This report presents information on the geographic origins, uses, and approximate dates of introduction into North America of naturalized alien species growing in the forest at Mount Vernon at the end of the twentieth century.

Materials and methods

Alien angiosperms from the forested areas of Mount Vernon were collected as part of a vegetation study from 1995 through 1999 (Wells et al. 1996; Wells and Brown, in press). Ornamental and kitchen gardens, lawns, hay meadows, the tomb area, and other landscaped sites were not surveyed in this study because they are under continual horticultural care. The geographic origin of each alien species was determined by consulting the relevant literature, cited within this text. Comparing pre-Linnaean polynomials used by Gronovius (1739, 1743, and 1762) with synonyms cited by Linnaeus (1753, 1762) under his species made it possible to identify many of the species collected for this study with Gronovius's taxa, and thereby to establish their presence in Virginia by Gronovius's publication dates. Reveal's (1983) review of North American plant species known to Linnaeus, which contains an invaluable list of Clayton's collection numbers and their Linnaean binomials, was consulted. Additionally, the entire herbarium of Clayton specimens at the Natural History Museum (BM), London, and the Benjamin Smith Barton and Frederick Pursh herbaria at the Academy of Natural Sciences of Philadelphia (PH) were examined. Nomenclature follows Gleason and Cronquist (1991). Vouchers are deposited in the United States National Herbarium at the Smithsonian Institution (US).

Results and discussion

The naturalized plant species occurring in the forest and its edges at Mount Vernon at the end of the twentieth century include 36 species introduced before the end of the eighteenth century and 17 species introduced during the nineteenth and twentieth centuries. The forest at Mount Vernon currently contains among its naturalized flora eight species originally introduced for fodder or hay for animals or food for silk worms (*Morus alba*), 18 species introduced for their medicinal, nutritive, or flavoring value to humans, and 10 species brought in as ornamentals or for hedging during the early settlement of this country (Table 1). The primary purpose for the introduction of the species of this study in the nineteenth and

twentieth centuries was for landscaping, with 13 species used as ornamentals or for hedging, three for human consumption, and one accidentally (Table 2). These numbers probably reflect changing needs and practices and satisfaction with earlier introductions. People of the nineteenth and twentieth centuries have had greater opportunities to acquire and cultivate alien ornamental species, especially with the opening of Japan in the nineteenth century. Very early settlers no doubt were influenced in their choice of medicinal herbs by Gerard's *Herball* of 1633 or its earlier, smaller edition of 1597. Gerard illustrated and discussed medicinal uses for 17 of the naturalized species in this study, using pre-1753 polynomials.

Josselyn (1672) and Gronovius (1739, 1743, 1762) have documented the early influx of alien

Table 1. Number of species introduced during the seventeenth and eighteenth centuries, now naturalized in the forest at Mount Vernon, grouped by primary purpose for introduction

Forage for animals ¹	Consumption for humans ²	Ornamental ³	Total
8	18	10	36

¹Forage for animals: *Dactylis glomerata*, *Holcus lanatus*, *Morus alba*, *Phleum pratense*, *Poa annua*, *Setaria faberi*, *Setaria viridis*, *Trifolium repens*.

²Consumption for Humans: *Achillea millefolium*, *Allium vineale*, *Anthemis arvensis*, *Arctium minus*, *Artemisia vulgaris*, *Chenopodium album*, *Cichorium intybus*, *Glechoma hederacea*, *Melissa officinalis*, *Polygonum cespitosum* var. *longisetum*, *Polygonum persicaria*, *Prunella vulgaris*, *Rumex crispus*, *Satureja calamintha*, *Taraxacum officinale*, *Verbascum thapsus*, *Veronica officinalis*, *Urtica dioica*.

³Ornamental: *Calycanthus floridus*, *Chrysanthemum leucanthemum*, *Gleditsia triacanthos*, *Gymnocladus dioica*, *Hedera helix*, *Hibiscus syriacus*, *Lysimachia nummularia*, *Robinia pseudoacacia*, *Verbascum blattaria*, *Vinca minor*.

Table 2. Number of species introduced during the nineteenth and twentieth centuries, now naturalized in the forest at Mount Vernon, grouped by primary purpose for introduction

Consumption for humans ¹	Ornamental ²	Accidental ³	Total
3	13	1	17

¹Consumption for humans: *Alliaria petiolata*, *Prunus mahaleb*, *Rubus phoenicolasius*.

²Ornamental: *Ailanthus altissima*, *Arthraxon hispidus*, *Berberis thunbergii*, *Celastrus orbiculatus*, *Duchesnea indica*, *Hesperis matronalis*, *Koeleruteria paniculata*, *Lonicera japonica*, *Perilla frutescens*, *Poncirus trifoliata*, *Rosa multiflora*, *Vinca major*, *Wisteria sinensis*.

³Accidental: *Microstegium vimineum*.

plant species into North America. Gronovius's use of pre-Linnaean polynomial names rendered his work relatively inaccessible to the modern reader, but comparing his polynomials and synonyms with Linnaean synonyms has made it possible to infer the modern taxa to which most of his species belong. An examination of Clayton's specimens at the Natural History Museum in London confirmed the identity of many of Clayton's specimens, but some are missing from the collection and a number of Gronovius's species were apparently based on Clayton's notes rather than specimens. Many of Clayton's specimens have been annotated as Linnaean types through the activities of the Linnaean Plant Name Typification Project of the Natural History Museum in London. Clayton apparently avoided collecting alien species unless they had been thoroughly naturalized. There are few aliens in Gronovius's first edition (1739) and its supplement (1743). The second edition, which contained no trivial names in spite of being published nine years after 1753, was published by Gronovius's son in the year of his father's death (1762) and was based on new material received from Clayton. The 1762 edition contained more alien species, possibly reflecting more naturalization of aliens in the intervening years or a desire to be more inclusive.

Washington himself was very active in cultivating non-native woody ornamentals to beautify the grounds of Mount Vernon. His writings mentioned receiving *Calycanthus floridus*, *Gleditsia triacanthos*, and *Gymnocladus dioica*, as well as a large number of woody species which did not naturalize in his forest. His letters gave instructions for planting forage species such as *Cichorium intybus*, *Dactylis glomerata*, *Phleum pratense*, and *Trifolium repens* (Fitzpatrick 1931). His formal gardens contained boxwoods and herbaceous plants, but the herbaceous plants grown in his formal gardens were not recorded in his writings or in those of his gardener, who submitted a weekly report in

writing, accounting for his activities and those of his assistants (Fisher 1954).

Only a few of the naturalized species collected in this study are believed to have been introduced into North America by accident. All the introductions of plants or their perennating structures for crops, forage, kitchen gardens, medicinals, and ornamentals carried enormous possibilities for the unintentional introduction of non-native weeds adapted to coexist with the desired plants. However, many such weeds are adapted to fields with low competition and high insolation and unlikely to thrive in forests or forest edges, the focus of this study. By constructing a seawall along the river and a high brick wall along the north and west boundaries and by controlling tourist access to the forest, the management at Mount Vernon through the years may have succeeded in limiting the influx of propagules and disturbance of habitats in the forest and its edges, preventing the invasion, for instance, of kudzu (*Pueraria lobata* (Willd.) Ohwi), mile-a-minute (*Polygonum perfoliatum* L.), alien bush honeysuckles (*Lonicera maackii* (Rupr.) Maxim., *L. morrowii* A. Gray, and *L. tatarica* L.), and porcelain berry (*Ampelopsis brevipedunculata* (Maxim.) Trautv.), which are abundant nearby.

Naturalized plant species at Mount Vernon

The naturalized plant species found in the forest or forest edges during this study are arranged alphabetically by family, with monocotyledons before dicotyledons. No naturalized vascular cryptogams or gymnosperms were found in the forest of Mount Vernon. Nomenclature follows Gleason and Cronquist (1991). Specimen citation appears at the end of each treatment and includes collector, accession numbers, locality within Mount Vernon, date, and notes of the reproductive state of the plant. Vouchers are deposited in the United States National Herbarium at the Smithsonian Institution (US).

Monocotyledons

Liliaceae

Allium vineale Linnaeus, field garlic, native to Europe, was introduced very early as a flavoring or medicinal herb. Gerard (1633) illustrated “crow garlicke,” which may have been this species, and discussed its medicinal values. Josselyn (1672) listed a species of *Allium* in New England, which may have been this species. Gronovius (1739, p. 37) listed one species in the genus, *Allium arvense*, *odore gravi, capitulis bulbosis rubentibus*, citing Clayt. s.n. This characterization “of fields, with a strong odor and a reddish bulbous capitulum” could point to either of two species common in Virginia, alien *A. vineale* or native *A. canadense* L., but *A. vineale* is the more likely in fields. In his second edition Gronovius (1762, p. 50) named this taxon *Allium radice laterali cordata solida, capite bulbifero*, and cited Clayt. n. 246. The Clayton Herbarium at the Natural History Museum (BM) in London contains one specimen of *Allium vineale*, Clayt. n. 746, determined by Marion Ownbey in 1954, confirming that the species was known in Virginia during Clayton’s lifetime. The discrepancy between Clayton’s published number 246 and the specimen’s actual number 746 can be attributed to misreading by Gronovius or his typesetter. Linnaeus based *A. canadense* on a Kalm specimen (Linnaeus 1753, p. 1195). Darlington (1865) reported that *A. vineale* “was introduced by the first Welsh immigrants to Pennsylvania [in the eighteenth century] for the purpose of supplying an early pasture.” Walter’s *Flora Caroliniana* (1788), based on his collections primarily of South Carolina, did not include *A. vineale*. Michaux’s *Flora Boreali-Americana* (1803), based on his collections of the Carolinas and western states, did not include this species. In 1814 it was common in old fields of Virginia, Pennsylvania, and New

York (Pursh 1814), and Eaton (1818) found it common in Pennsylvania and several areas of New England.

Our collection is *Wells and Brown* 4996, collected in forest edge at base of river bluff below mansion, 3 June 1999, plant bearing an umbel of dry mature bulbils.

Poaceae

Arthraxon hispidus (Thunberg) Makino, native to eastern Asia, is invasive in low roadside ditches as far north as Missouri and New York (Gleason and Cronquist 1991). Its first occurrence in the United States appears to have been in Philadelphia in the 1870s. The oldest American specimen of the species in the Academy of Natural Sciences of Philadelphia (PH) was collected in 1877 by I. Burk near the Japanese Bazaar, Fairmont Park, Philadelphia. According to Earl Spamer (pers. comm.), collection manager of the Academy of Natural Sciences of Philadelphia, the Japanese Bazaar, now known as the Japanese House, had been built in Fairmont Park in 1876 as part of the nation’s Centennial Celebration and landscaped with Japanese species that probably included *Arthraxon hispidus*. The oldest American specimen in the United States National Herbarium at the Smithsonian Institution (US) was also collected by I. Burk in 1877 near the Japanese Bazaar, Fairmont Park, Philadelphia. The second oldest American specimen at US was collected on ship’s ballast in Philadelphia by F. L. Scribner in 1878. The species was not mentioned in the seventh edition of *Gray’s New Manual of Botany* (Robinson and Fernald 1908) but was in the eighth edition (Fernald 1950).

Our collection is *Wells and Brown* 4149, collected from shaded roadside ditch between service entrance and reconstructed threshing barn near Pioneer Farm south of mansion, 29 October 1995, plant in fruit.

Dactylis glomerata Linnaeus, orchard grass, native of Eurasia, was introduced into Virginia before 1760 for cultivation in meadows and pastures, although it did not attract much attention in the other colonies until after the Revolution. Washington preferred it, growing mixed with clover, above all other grasses for pasture grass and hay (Carrier 1923). Jefferson listed orchard grass as one of the cultivated grasses in Virginia in his *Notes on the State of Virginia* (1787). Gronovius (1739, 1743, 1762) did not list it, and it is not in the Clayton Herbarium.

Our collection is *Wells* 4048, collected in forest edge along top of river bluff east of mansion, 3 June 1997, plant in fruit.

Holcus lanatus Linnaeus, velvet grass, native to Eurasia, is now widely naturalized in North America. Gronovius (1739, 1743, 1762) did not list this species. In 1755 a farmer, William Logan of Philadelphia, recorded Salem grass or white head, believed to be this species, in his diary (Carrier 1923). It has been used for hay and in pastures (Hitchcock 1935).

Our collection is *Wells* 4047, collected in forest edge along top of river bluff east of mansion, 3 June 1997, plant in fruit.

Microstegium vimineum (Trinius) A. Camus, Japanese stilt grass, native to the Far East, is an invasive alien species currently established in at least 16 eastern states, from New York to Florida. It was introduced into Tennessee about 1919 (Fairbrothers and Gray 1972). It was listed in *Gray's Manual of Botany* (Fernald 1950) as *Eulalia viminea* (Trin.) Kuntze and was reported in the mountains and piedmont of the Carolinas and throughout much of the Southeast by 1968 (Radford et al. 1968).

Our collection is *Wells and Brown* 4127, collected in low woods near reconstructed threshing barn in Pioneer Farm south of mansion, 29 October 1995, plant in fruit.

Phleum pratense Linnaeus, timothy, native to Eurasia, is now commonly naturalized throughout the

United States (Hitchcock 1935). It was first widely grown for pasture and hay on the eastern seaboard of North America (Mabberley 1987). Gronovius (1739, 1743, 1762) did not list it, and it is not in the Clayton Herbarium. Jefferson (1787) reported timothy as one of the cultivated grasses in Virginia. On 6 January 1793 Washington wrote to Anthony Whiting, his manager, "The point between the road leading to the Wharf, and Hell-hole, ought to be well grubbed, cleaned, smoothed, and well sprinkled with Timothy" (Fitzpatrick 1931, 32:295).

Our collection is *Wells* 4643, collected in forest edge along gravel road near Pioneer Farm south of mansion, 28 June 1998, plant in fruit.

Poa annua Linnaeus, speargrass, is native to Eurasia and widely distributed as a lawn weed throughout the U.S. and Canada (Gleason and Cronquist 1991). Gronovius listed this species only in his second edition (1762, p. 13) as *Poa panicula diffusa angulis rectis, spiculis obtusis, culmo obliquo compresso*, using language identical to Linnaeus's description for *P. annua* (1753, p. 68). Clayton specimen 936 in the Clayton herbarium is *Poa annua*. Walter (1788, p. 79) listed *Poa annua*, using language identical to Linnaeus's description. It was probably included in "English grass" seed or hay, and may have been valued in spite of its small size because it flourishes throughout the winter.

Our collection is *Wells* 4964, collected in forest edge along gravel road near Pioneer Farm, 28 May 1999, plant in fruit.

Setaria faberi R. Herrmann, giant foxtail, is native to east Asia (Gleason and Cronquist 1991), now widespread throughout the United States as a weed. It resembles *Setaria viridis* (L.) P. Beauv., from which it was separated when described in 1910 (Herrmann 1910). It was probably in North America very early, mixed with *Setaria viridis* for pasture grass and hay.

Our collection is *Wells and Brown* 4131,

collected in forest edge along gravel road near Pioneer Farm, 29 October 1995, plant in fruit.

Setaria viridis (Linnaeus) P. Beauvois, green foxtail or green bristlegrass, native of Europe (Hitchcock 1935), was probably introduced by the late seventeenth century either for pasture and hay, mixed with *S. italica* (L.) P. Beauv. seed, or in hay to feed animals on shipboard. Gronovius (1762, p. 12) listed it only in his second edition as *Panicum spica simplici, aristis aggregatis flosculo subjectis*. As a synonym Gronovius cited the same polynomial, *Panicum spici tereti, involucri bifloris fasciculato pilosis*, based on Clayt. n. 579, which Linnaeus (1762, p. 83) cited under *Panicum viride*, supporting its identity as present-day *Setaria viridis*. However, Clayton specimen number 579 is informally annotated as *Echinochloa crusgalli*, but resembles *Echinochloa walteri* (Pursh) Heller even more. It is definitely not a species of *Setaria*. The discrepancy between Gronovius's descriptive language and Clayton's specimen is unfortunate. *Setaria viridis* is believed to be the wild species from which the cultivated grain *Setaria italica*, Italian millet, was derived. Italian millet was grown in Massachusetts before 1637 but was not generally preferred (Carrier 1923). It was used for fodder and cereal (Darlington 1865; Hitchcock 1935).

Our collection is *Wells* 4640, collected in forest edge along river bluff east of mansion, 28 September 1997, plant in fruit.

Dicotyledons

Apocynaceae

Vinca major Linnaeus, big periwinkle, was introduced to North America as an ornamental from southern Europe in 1789 (Wyman 1969). No references to this species have been found in Gronovius (1739, 1743, 1762) or in Jefferson's Pocket Account Book for 1771 (Betts and Perkins 1971) or in his 1766–1824 garden book (Betts 1944; Baron 1987).

Our collection is *Wells* 4046, on river bluff near wharf southeast of mansion, 3 June 1997, plant sterile.

Vinca minor Linnaeus, periwinkle, native to Europe, was brought to America as an ornamental plant very early (Dutton 1979). Gronovius (1739, 1743, 1762) did not list it. Thomas Jefferson included periwinkle in his plans for landscaping the grounds at Monticello, written in his Pocket Account Book for 1771 (Betts and Perkins 1971) and in his 1766–1824 garden book (Betts 1944; Baron 1987). It was almost certainly cultivated during Washington's lifetime at Mount Vernon. Eaton (1818), Ward (1881), and Hitchcock and Standley (1919) listed *V. minor* as naturalized in the eastern United States.

Our collection is *Wells and Brown* 4074, collected near drain pipe in deep ravine near reconstructed barn in Pioneer Farm, 3 June 1995, plant sterile.

Araliaceae

Hedera helix Linnaeus, English ivy, native to Europe, was introduced in early colonial times as an ornamental and has escaped in many places in the United States (Wyman 1969), especially in the mid-Atlantic states. Gronovius listed this species only in his second edition (1762, p. 34), as *Hedera foliis integris, ovato-cordatis, alternis, petiolatis, glabris splendentibus, saturate viridibus, superne nonnihil concavis*, citing Clayt. s.n., giving no literature references, and not using Linnaeus's (1753, p. 202) polynomial *Hedera foliis ovatis lobatisque*. No specimen of *Hedera helix* has been found in the Clayton herbarium in London or in the Barton herbarium in Philadelphia. Gronovius's (1739, p. 24, Clayt. s.n.) *Hedera fraxini foliis in altitudinem magnam ascendens* is most likely to be *Campsis radicans*, although no specimen of *Campsis radicans* can be found in the Clayton herbarium. Jefferson included ivy in his plans for landscaping the grounds

at Monticello, written in his Pocket Account Book for 1771 (Betts and Perkins 1971). However, he used “ivy” for two different species, neither of which was *Hedera helix*. In his *Notes on the State of Virginia* (1787), Jefferson recorded that “ivy” was *Hedera quinquefolia* Linnaeus (now *Parthenocissus quinquefolia* (L.) Planchon) and that *Kalmia latifolia* Linnaeus was “called ivy with us.” Washington mentioned ivy in his diary in 1785 (Taylor 1952), and on 14 October 1792 in a letter to Anthony Whiting, his manager, he referred to a shrub, not a vine, “The flowering evergreen Ivy, I want them to plant thick around the Ice house upper side, not of the tallest kind, but of an even height” (Fitzpatrick 1931, 32:178). Eaton (1818) considered English ivy a European garden plant. In addition to the ornamental uses of *Hedera helix*, the young twigs were once used as a source of dyes, to treat corns, and to counteract the effects of alcohol. For this reason it was depicted on signs of taverns (Mabberley 1987).

Our collection is *Wells and Brown* 4182, collected on forested river bluff near wharf southeast of mansion, 26 August 1997, plant sterile.

Asteraceae

Achillea millefolium Linnaeus, common yarrow, is considered European by Mabberley (1987), alien by Harvill et al. (1992), and circumboreal with endemic and alien taxa in North America (Gleason and Cronquist 1991). Gerard (1633) illustrated yarrow and discussed its medicinal properties. In both editions, Gronovius (1739, p. 101; 1762, p. 127) listed it as *Achillea foliis duplicato-pinnatis glabris, laciniis linearibus acutis laciniatis* and cited a synonym *Millefolium vulgare album*, based not on a Clayton specimen but on his notes. Linnaeus (1753, p. 899) used a polynomial for *Achillea millefolium* with slightly different wording, but cited Gronovius and used the same synonym *Millefolium vulgare album*.

There is no *Achillea millefolium* in the Clayton Herbarium.

Our collection is *Wells* 4954, collected in forest edge near bottom of river bank east of mansion, 28 May 1999, plant in flower.

Anthemis arvensis L., dog fennel or corn chamomile, native to Eurasia (Mabberley 1987), was one of Gerard’s (1633) three wild chamomiles, “which are generally called in Latin *Cotula*; one stinking and two not stinking.” Josselyn (1672) reported a may weed, which may have been this species or *A. cotula* L. This species was probably the species listed by Gronovius (1739, p. 101) in his first edition as *Buphthalmum florum discis ovatis, caule ramoso, foliis duplicato-pinnatis linearibus*. In his second edition (1762, p. 127, based on Clayton n. 436) it is *Anthemis receptaculis conicis, paleis setaceis, seminibus nudis*, which was Linnaeus’s polynomial for *A. cotula* (1753, p. 894). Two of the synonyms he included (1739, 1762) were *Chamaemelum foetidum* and *Cotula foetida vulgaris*, which fit better under *A. cotula* L. Gronovius, who listed only one species, may have regarded the two species of *Anthemis* now naturalized in Virginia (*A. arvensis* and *A. cotula*) as conspecific. *Anthemis arvensis* is the more widespread one in Virginia now. Clayton specimen 436 is missing from the Clayton Herbarium. No specimens of *Anthemis arvensis* or *A. cotula* can be found in the Clayton or Barton herbaria. Pursh (1814) reported that *A. arvensis* was “in waste grounds and fields: common everywhere, and probably introduced from Europe.” Eaton (1818) indicated that *A. arvensis* was found around Columbia College in New York City by the early nineteenth century. Ward (1881) listed it in the vicinity of Washington, D.C.

Our collection is *Wells* 4045, collected in forest edge near bottom of river bank east of mansion, 3 June 1997, plant in flower.

Arctium minus (Hill) Bernhardt, common burdock, native to Europe, is a common weed of roadsides and waste places in North

America. Gerard (1633) illustrated “clote burre or burre docke” and listed its medicinal uses in England. Josselyn (1672) reported a “clot bur,” which very likely was this species in New England. Gronovius (1739, p. 91) included a species of *Arctium* with no polynomial but cited as a synonym *Bardana* s. *Lappa major*, which Linnaeus (1753, p. 816) also cited under the edible European *Arctium lappa* Linnaeus. In the second edition Gronovius (1762, p. 116) listed *Arctium foliis cordatis inermibus petiolatis* (based on Clayt. n. 929), used the same language as Linnaeus for *A. lappa* and cited Linnaeus (1753). Clayton specimen 929 is missing from the Clayton Herbarium, but specimen 44 consists of two basal leaves of this species. *Arctium minus* was not recognized as a species until 1800. Today it is much more common than *A. lappa* in Virginia and much of the eastern United States (Medsker 1972; Harvill et al. 1992). It very likely was present in Virginia in the eighteenth century. Pursh (1814) considered *Arctium lappa* as “frequent, ... probably introduced,” and Eaton (1818) reported it as common in several localities in Pennsylvania and New England, but neither mentioned *A. minus*. As a medicinal plant, *A. minus* has been used to “purify the blood” (a term often used to refer to the treatment of syphilis and related venereal diseases) and treat various skin conditions, including psoriasis and acne. The fresh root contains compounds with antibacterial and antifungal properties (Tyler 1993).

Our collection is *Wells* 4164, collected in forest edge near top of river bank southeast of mansion, 26 August 1997, plant in fruit.

Artemisia vulgaris Linnaeus, mugwort, native to Eurasia, was probably in the American colonies very early but may not have been in Virginia during the eighteenth century. Gerard (1633) illustrated and discussed the medicinal uses of this species under the

name of common mugwort. Josselyn (1672) reported a wormwood, which may have been this species. Gronovius (1739, p. 95; 1762, p. 120) listed *Artemisia foliis ramosis linearibus, caule procumbente*, based on Clayt. n. 167, using language that Linnaeus did not cite. The species described by Gronovius can be tenuously identified as *A. campestris* Linnaeus on the basis of Gronovius’s synonym *Abrotanum campestre*, cited by Linnaeus (1753, p. 846), but *A. campestris* is ruled out based on distribution data. Radford et al. (1968) reported that *A. campestris* has been attributed to the Carolinas, but no specimens have been seen there. Gleason and Cronquist (1991) stated that the range of *A. campestris* extends south to Florida, yet Harvill et al. (1992) did not include it in their *Atlas of the Virginia Flora*. Clayton specimen n. 167 in the Clayton Herbarium is *Artemisia annua* Linnaeus. The presence of *A. vulgaris* during the eighteenth century is certain farther north. Michaux (1803) reported that *A. vulgaris* was found “in northern Canada,” and Pursh (1814) reported that it was found “on the banks of rivers etc, Canada to New England.” Eaton (1818) noted that it was found around Columbia College in New York City. *Artemisia vulgaris* has been used in many parts of the world as a uterine stimulant and abortifacient (Mills 1991) and was used in magic and superstition in Great Britain until the nineteenth century (Mabberley 1987). Its leaves are sometimes used as aromatic, bitter condiments (Fernald and Kinsey 1958). A related species *A. absinthium* Linnaeus, absinthe, was formerly used as a treatment for intestinal worms and as the principal flavoring ingredient in a toxic alcoholic beverage called absinthe, which was very popular across Europe, especially in France, until finally banned in 1915 (Tyler 1993). It is not reported in Virginia (Harvill et al. 1992).

Our collection is *Wells* 4044, collected in

forest edge near top of river bank southeast of mansion, 3 June 1997, plant sterile.

Chrysanthemum leucanthemum Linnaeus [*Leucanthemum vulgare* Lamarck], ox-eye daisy, was indisputably in Virginia by the 1730s. The species is listed in Gronovius's *Flora Virginica* (1739, pp.100–101; 1762, pp. 126–127, based on Clayt. n. 68) under the polynomial *Chrysanthemum foliis amplexicaulibus oblongis superne serratis, inferne dentatis*, identical to the description of *C. leucanthemum* in *Species Plantarum* (Linnaeus 1753, p. 888) except for punctuation. Clayton specimen 68 in the Clayton Herbarium is *Chrysanthemum leucanthemum*. Gronovius (1739; 1762) cited *Leucanthemum vulgare* as a synonym, which further confirms the identity of this species. Linnaeus (1753) did not cite Gronovius. Pursh (1814) reported that *Chrysanthemum leucanthemum* was “in meadows and fields: common everywhere, and probably introduced from Europe.” Jefferson's plans for his flower beds included “daisy” among other perennials such as snapdragon, larkspur, sunflower, and poppy (Betts 1944). Many species in this family have been called “daisy,” but *Chrysanthemum leucanthemum* is the most likely species to have been cultivated in Jefferson's garden and others of the eighteenth century. It is a large, attractive plant, roughly the same size as the others reported in Jefferson's beds. It is thoroughly naturalized throughout Virginia and much of the mid-Atlantic region.

Our collection is *Wells* 4043, collected in forest edge near bottom of river bank east of mansion, 3 June 1997, plant in flower.

Cichorium intybus Linnaeus, chicory, succory, or witloof, is native to the Mediterranean area (Mabberley 1987). Gronovius (1739, 1743, 1762) did not list it. The earliest written reference of chicory in Virginia I have found is in the writings of George Washington. On 18 January 1795 Washington wrote to

William Pearce, manager at Mount Vernon, “There is a grass, or rather a substitute, which was sown opposite to Stuarts house at River farm, called chicorium or chicory, which from Mr. Whiting's dislike to it, was neglected. If any of it remains, I desire you will save all the seed you can from it [for] the coming season. There is or was some of it also in the little garden by the Salt house. I have lately had a character of it from some English gardeners who are well acquainted with it, which has convinced me that to cut and feed it green in the manner of Lucern or clover, that it is a valuable thing for soiling [purging] either horses or cattle, especially the former” (Fitzpatrick 1931, 34:96–97). Chicory leaves are blanched and eaten, and the ground roots are roasted and used as a substitute or an adulterant of coffee (Medsker 1972).

Our specimen is *Wells* 4032, collected in forest edge near bottom of river bank east of mansion, 5 September 1997, plant in flower. *Taraxacum officinale* Wiggers, dandelion, was probably introduced very early. It was listed as a medicinal herb, called dandelion by Gerard (1633), and reported as a naturalized introduction in New England by Josselyn (1672). Gronovius (1743, p. 176) listed it as *Leontodon calyce inferne reflexo*, based on Clayt. n. 694, and Linnaeus cited the same polynomial (1753, p. 798) under his *Leontodon Taraxacum*. Gronovius (1739, p. 90) listed it as *Dens Leonis vernus vulgaris*, without citing a specimen and later (1743, p. 176) listed it as *Leontodon calyce inferne reflexo*, citing Clayt. n. 694. Clayton specimen 694 in the Clayton Herbarium is *Taraxacum officinale*. The dried roots of dandelion are a very old home remedy, but the plant lacks any significant pharmacological activity (Tyler 1994).

Our specimen is *Wells* 4639, collected in forest edge at top of river bank southeast of mansion, 28 September 1997, plant in flower.

Berberidaceae

Berberis thunbergii De Candolle, barberry, native to China and Japan, was imported in 1875 from Japan by the Arnold Arboretum (Wyman 1969) and has escaped throughout the mid-Atlantic states. It is effective as hedges and borders for walks and drives because it is too spiny to be browsed by cattle (Bailey 1906). It was not included by Wood (1880) or Ward (1881).

Our collection is *Wells and Brown* 4102, collected on wooded plateau above ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant sterile.

Brassicaceae

Alliaria petiolata (Bieberstein) Cavara & Grande, garlic mustard, native to northern Europe, was first recorded in North America in 1868 on Long Island, New York (Nuzzo 1993). It was reported in Hitchcock and Standley (1919) as occasional in "waste ground or low woods along the Potomac." The leaves produce a strong garlic odor when crushed. It was formerly used as a flavoring (Mabberley 1987) and has become a noxious invasive exotic species in low woods and moist soils.

Our collection is *Wells* 4042, collected in woods near top of river bank southeast of mansion, 3 June 1997, plant in fruit.

Hesperis matronalis Linnaeus, dame's rocket, is native to central and southern Europe (Mabberley 1987). Gerard (1633) illustrated and discussed the medicinal properties of this species under the name dames violets. No reference to this species has been found in Jefferson's Pocket Account Book for 1771 (Betts and Perkins 1971) or in his garden book (Betts 1944, Baron 1987). Gronovius (1739, 1743, 1762) did not list it. It was recorded by Eaton (1818) as a cultivated plant from Europe. Wood (1880) wrote that the species was "a fine garden perennial, said to be found native around Lake Huron." Ward (1881) reported

it in the Washington, D. C., area, but "rare in the Rock Creek region." The species was not treated in Gray's *Manual of Botany* until the sixth edition (1889), when it was reported to be "sparingly naturalized," although he listed it in his fourth edition at the end of his treatment of the family as sometimes escaping cultivation (Gray 1862). No records support its presence as a naturalized species in North America before the middle of the nineteenth century. The showy, large, self-seeding annual makes an attractive garden flower.

Our collection is *Wells* 4041, collected in open area near bottom of river bank east of mansion, 3 June 1997, plant in fruit.

Caesalpiniaceae

Gleditsia triacanthos Linnaeus, honey locust, was originally found in rich low woods west of the Appalachian Mountains from Ontario to Texas. It is regarded as escaped from cultivation east of the mountains (Gleason 1952). Gronovius (1739, p. 59) listed it as *Acacia triacanthos*, *siliquis latis fuscis*, *pulpa virescente subdulci* and gave the English name honey-locust, one of his few uses of English, but cited Clayton's name without designating a specimen. In his supplement (1743, p. 193), he listed it as *Gleditsia* without a polynomial then gave as a synonym *Caesalpinoides foliis pinnatis ac duplicato-pinnatis*. Linnaeus used the same synonym for *G. triacanthos* (1753, p. 1056), but he incorrectly cited the page number of Gronovius's first use of *Gleditsia* as p. 183, not 193. There is no specimen of *Gleditsia triacanthos* in the Clayton Herbarium. Washington recognized its value as a hedge plant early (Fisher 1954). On 20 February 1787 he wrote to Richard Henry Lee from Mount Vernon, "Your favour of the 15th, with the seed of the honey locust came safe to hand, and claims my particular thanks. I have but one doubt of its forming the best hedge in the world; and that is, whether it

can be sufficiently dwarfed” (Fitzpatrick 1931, 29:166).

Our collection is *Wells* 4180, collected in woods near top of river bank southeast of mansion, 3 June 1997, plant in fruit.

Gymnocladus dioica (Linnaeus) K. Koch, Kentucky coffee tree, was originally found in low woods and ravines in West Virginia, Kentucky, and several mid-Western states (Fernald 1950). It was introduced into Virginia during George Washington’s time for use as an ornamental and for making fence posts and cabinets. Seeds of this species were collected by Washington on his trip to the Kanawha lands and planted at Mount Vernon in April 1785 (Fisher 1954). Some of George Washington’s original Kentucky coffee trees and his written instructions regarding their care in his hothouse at Mount Vernon have survived. Linnaeus (1753, p. 381) originally called it *Guilandina dioica*. Gronovius (1739, 1743, 1762) did not list it.

Our collection is *Wells and Brown* 4172, collected on wooded plateau above ravine near nature trail and reconstructed threshing barn south of mansion, 26 August 1997, plant sterile.

Calycanthaceae

Calycanthus floridus Linnaeus, sweet shrub or Carolina allspice, is native to rich woods of the Southern Appalachians and upper Piedmont, from southern Virginia to Florida and Mississippi (Fernald 1950). Washington received gifts of this shrub and planted them in his shrubbery in 1786 and 1791 and purchased plants from Bartram in 1792 (Fisher 1954). Jefferson also grew it in his garden (Taylor 1952). Gronovius (1739, 1743, 1762) did not list it. It was introduced into European cultivation in 1726 (Bush-Brown and Bush-Brown 1996).

Our collection is *Wells* 4040, collected in

woods near top of river bank east of mansion, 3 June 1997, plant sterile.

Caprifoliaceae

Lonicera japonica Thunberg, Japanese honeysuckle, was first brought to the United States in 1862 by George Rogers Hall, as an ornamental plant from his Yokohama garden in Japan to a garden on Long Island, New York (Spongberg 1990). Washington grew the native honeysuckle *Lonicera sempervirens* Linnaeus along the walls leading to the “necessaries” and for splaying against the colonnades at Mount Vernon (Fisher 1954). Jefferson included “honeysuckle” in his plans for landscaping the grounds at Monticello, written in his Pocket Account Book for 1771 (Betts and Perkins 1971) and in his garden book (Betts 1944, Baron 1987), but he undoubtedly meant *Rhododendron perichlymenoides* (Michaux) Shinners (*R. nudiflorum* (L.) Torrey) or *R. viscosum* (L.) Torrey, both of which he called wild honeysuckle (Jefferson 1787). Despite its sweet fragrance, *L. japonica* has come to be a pernicious invasive exotic that has invaded thousands of acres of woodland along the eastern seaboard of the United States (Spongberg 1990). Nevertheless, it is sometimes planted today as a groundcover.

Our collection is *Wells* 4173, collected in forest edge on wooded plateau above ravine near nature trail and reconstructed threshing barn, 26 August 1997, plant in flower.

Celastraceae

Celastrus orbiculatus Thunberg, oriental bittersweet, native to Japan and China, was introduced into the United States in 1860 (Wyman 1969) and into Great Britain in 1870 (Chittenden 1956). It was not reported as naturalized in the last quarter of the nineteenth century (Potomac-side Naturalists’ Club 1876; Wood 1880; Ward 1881) or in the first quarter of the

twentieth century (Hitchcock and Standley 1919), but it is now considered a nuisance in many areas of the Mid-Atlantic states, where it overgrows native vegetation. It is a hardy ornamental vine used for trellis work (Bailey 1906), and branches bearing its dried fruits are used in flower arrangements.

Our collection is *Wells and Brown* 4076, collected in forest edge on wooded plateau above ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant sterile.

Chenopodiaceae

Chenopodium album Linnaeus, lamb's quarter or pigweed, native of Eurasia, was introduced early in the colonial period and is now widespread throughout North America (Medsger 1972). Gerard (1633) illustrated and discussed the medicinal properties of this species under the common name white garden orach. Gronovius (1743, p. 145; Clayt. s.n.) listed *Chenopodium foliis inferioribus ovatis acutis antrorsum dentatis, summis linearilanceolatis*, which Linnaeus (1753, p. 219) cited as a synonym for *Chenopodium album*. In his second edition, Gronovius (1762, p. 39) used language very similar to Linnaeus's description, *Chenopodium foliis rhomboideo-triangularis (sic) erosis postice integris summis oblongis, racemis erectis* (based on Clayt. s.n.), but did not cite Linnaeus (1753). There is no specimen of *Chenopodium album* in the Clayton Herbarium. Walter (1788, p. 111) listed *Chenopodium album*, using Linnaeus's exact description. Though rarely cultivated, its leaves have long been highly prized in Europe and in some parts of the United States as a potherb in late spring or early summer where it is cooked and eaten like spinach, and its seeds have been ground and baked into bread. In other parts of the United States it is depised as a common weed (Fernald and Kinsey 1958; Medsger 1972). It was

widespread by 1818 (Eaton 1818) but was not reported in New England by Josselyn (1672).

Our collection is *Wells and Brown* 4039, collected in woods near top of river bank southeast of mansion, 6 October 1996, plant sterile.

Fabaceae

Robinia pseudoacacia Linnaeus, black locust, is native to the Appalachian region from the Blue Ridge westward, from Alabama and Georgia to Pennsylvania, to southern Indiana and Illinois. Indians introduced it east of the Blue Ridge before the seventeenth century because its wood makes the finest bows (Spongberg 1990). Gronovius (1739, p. 82, based on Clayt. n. 50) listed this species as *Robinia aculeis geminatus* (with the English name sweet-smelling locust), which Linnaeus cited as a synonym (1753, p. 722). In his second edition Gronovius (1762, p. 105) listed this species as *Robinia pedunculis racemosis, foliis pinnatis*, using language very similar to Linnaeus's description except for *foliis impari-pinnatis* (Linnaeus 1753, p. 722). Clayton specimen 50 is *Robinia pseudoacacia* in the Clayton Herbarium. Virginia colonists prized the very durable wood for ground sills, fence posts, and split rails (Taylor 1952). Washington valued this tree as an ornamental and as a source of lumber and fencing. He planted a grove north of the mansion at Mount Vernon almost entirely with black locust (Fisher 1954).

Our collection is *Wells and Brown* 4072, collected in forest edge on wooded plateau above ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant sterile.

Trifolium repens Linnaeus, white clover, native to Europe (Mabberley 1987) and a very important fodder and rotational species, was naturalized in Virginia by the first third of the eighteenth century. Gronovius (1739, p.

85; 1762, p. 110) listed it as *Trifolium capitulis subtrotundis, flosculis pedunculatis, leguminibus tetraspermis, caule procumbente*, based on Clayton n. 390. Linnaeus (1753, p. 767) cited this polynomial as a synonym for *T. repens*. Clayton specimen 390 is missing from the Clayton Herbarium. Washington preferred clover, growing mixed with orchard grass, for pasture and hay (Carrier 1923). He wrote to James Anderson, his manager, from Philadelphia on 8 January 1797, "I have provided five bushels of clover seed for the use of the Estate, which I shall send to Mount Vernon" (Fitzpatrick 1931, 35:356). Jefferson (1787) reported three clovers in Virginia: "red, white, and yellow." Red clover was probably *T. pratense* L.; yellow clover was most likely *T. aureum* Pollich. Both of these species are common in present-day Virginia but were not seen in the forest or forest edges during this plant survey at Mount Vernon.

Our collection is *Wells and Brown* 4093, collected in forest edge on wooded plateau near nature trail and reconstructed threshing barn, 3 June 1995, plant in flower.

Wisteria sinensis (Sims) Sweet, Chinese wisteria, was introduced from China in 1816 (Wyman 1969). It was unknown in the colonial period (Taylor 1952).

Our collection is *Wells and Brown* 4027, collected in forest edge along trail north of rest rooms near Pioneer Farm and reconstructed threshing barn, 5 September 1997, plant sterile.

Lamiaceae

Glechoma hederacea Linnaeus, ground ivy or gill-over-the-ground, native to Europe (Mabberley 1987), was naturalized in the northern American colonies before 1672 and was used to flavor beer and as a ground cover (Josselyn 1672). Gerard (1633) illustrated and discussed the medicinal properties of this species as "ale-hoofe." Gronovius (1739,

1743, 1762) did not include it. The common name "gill" comes from the French *guiller* ("to ferment") because the leaves were once used to help ferment and flavor beer. The leaves have been used in England to make tea as a beverage (Medsger 1972) and for lung ailments, asthma, jaundice, and kidney ailments (Foster and Duke 1990).

Our collection is *Wells* 4160, collected in woods near top of river bank southeast of mansion, 26 August 1997, plant sterile.

Melissa officinalis Linnaeus, lemon balm or common balm, native to southern Europe (Medsger 1972), was listed and its medicinal value discussed by Gerard (1633) as "bawme." The species was cultivated in Williamsburg gardens during the colonial period (Dutton 1979) and in New England (Eaton 1818). Jefferson grew "balm" in his garden (Baron 1987). Gronovius (1739, 1743, 1762) did not list this species, although he reported two other species of *Melissa* in Virginia. *Melissa officinalis* has been used for more than 2000 years as a seasoning to flavor teas and liqueurs, for its antibacterial and sedative properties, and in potpourris for its fragrance (Foster and Duke 1990; Tyler 1994; Bush-Brown and Bush-Brown 1996).

Our collection is *Wells and Brown* 4158, collected in forest edge along road at mouth of ravine near nature trail and reconstructed threshing barn, 15 May 1997, plant in fruit.

Perilla frutescens (Linnaeus) Britton, beefsteak plant or yegoma, is cultivated from India to Japan and in southeastern Europe for oil and as an ornamental. Linnaeus (1753) named it *Ocimum frutescens* and reported that its habitat was India. It was not listed in Walter (1788), Michaux (1803), Pursh (1814), Eaton (1818), or Darlington (1865). The oldest American specimen in the United States National Herbarium at the Smithsonian Institution (US) was collected in the vicinity of Washington, D.C., in 1879 by Lester F.

Ward. Yegoma oil is used to waterproof paper and in paints and printing inks (Mabberley 1987). In the United States these plants are cultivated for their ornamental and often aromatic foliage.

Our collection is *Wells and Brown* 4137, collected in forest edge along road at mouth of ravine near nature trail and reconstructed threshing barn, 29 October 1995, plant in fruit.

Prunella vulgaris Linnaeus, selfheal, was probably introduced very early in the colonial period. Gerard (1633) listed it and described its medicinal value under the common name "selfe-heale." Gronovius listed two species of *Brunella* or *Prunella* in both editions. In his first edition (1739, p. 67) he included *Brunella bracteis cordatis*, citing Linnaeus's *Hortus Cliffortianus* (1737, p. 316) but with no Clayton specimen, and *Brunella sylvestris autumnalis, floribus dilute purpureis, capitulis dense stipatis* based on Clayton n. 170. In his second edition (1762, p. 91) he included *Prunella foliis ovato-oblongis petiolatis*, citing Linnaeus (1753, p. 600) and using the exact polynomial that Linnaeus used for *Prunella vulgaris* but with no Clayton specimen, and *Prunella sylvestris autumnalis, floribus dilute-purpureis, capitulis dense stipatis*, based on Clayton n. 170. In both editions, Gronovius cited under his first species the synonym *Brunella major, folio non dissecto* that Linnaeus also cited under *Prunella vulgaris* (Linnaeus, 1753, p. 600), but Gronovius's second species *Prunella sylvestris autumnalis, floribus dilute-purpureis, capitulis dense stipatis* is based on Clayton n. 170, which is *Prunella vulgaris* at the Clayton Herbarium in London. Clearly, both of Gronovius's taxa are conspecific with *Prunella vulgaris*. Traditionally, a tea of its leaves was used as a gargle for sore throats and mouth sores, and for fevers and diarrhea (Foster and Duke 1990).

Our collection is *Wells* 4183, collected

in forest edge along road between service entrance and reconstructed threshing barn near Pioneer Farm south of mansion, 26 August 1997, plant in flower.

Satureja calamintha (Linnaeus) Scheele, basil-thyme, is native to Europe (Gleason and Cronquist 1991). Gerard (1633) may have discussed this species under garden time, wild time, or savory, although positive identification is difficult. Gronovius (1739, p. 65, based on Clayton n. 198) listed it as *Melissa floribus ex alis superioribus, pedunculo dichotomo, caule procumbente*, which Linnaeus (1753, p. 593) cited under *Melissa nepeta*. In his second edition Gronovius (1762, p. 90) listed it as *Melissa pedunculis axillaribus dichotomis folio longioribus, caule decumbente*, using Linnaeus's (1753, p. 593) description for *Melissa nepeta*. *Melissa nepeta* was moved into *Calamintha* as *C. nepeta* Savi and is now considered conspecific with *Satureja calamintha* (Gleason and Cronquist 1991). Clayton specimen 198 is missing from the Clayton Herbarium. Walter (1788) did not list it. *Satureja calamintha* has been used as a flavoring and may have been introduced as a substitute for *Satureja hortensis* Linnaeus, summer savory, or *Satureja montana* Linnaeus, winter savory, both long used as spices and in folk medicine, especially as sex drugs (Tyler 1993).

Our collection is *Wells* 4196, collected in open areas at bottom of river bank east of mansion, 5 September 1997, plant in flower.

Malvaceae

Hibiscus syriacus Linnaeus, rose of Sharon or althaea, is native to China and India. It was introduced as an ornamental to Europe before 1600 and then to the colonies, where it was valued because it flowers in late summer when few other woody plants are in bloom (Bush-Brown and Bush-Brown 1996). It has become naturalized throughout much of the

eastern United States. Gronovius (1739, 1743, 1762) did not list this species.

Our collection is *Wells* 4181, collected in woods near top of river bank southeast of mansion, 26 August 1997, plant in flower.

Moraceae

Morus alba Linnaeus, white mulberry, and silkworms, both native to China, were introduced from London very soon after the founding of Jamestown (Barck and Lefler 1958) in the first of repeated attempts to establish silk cultivation in the American colonies. Gronovius (1739, p. 122) cited three species of mulberry, but only one with white fruit, *Morus foliis minoribus, fructu parvo albo* (based on Clayt. s.n.). This species appears to be *Morus alba* based on the brief description, as *M. alba* but not *M. rubra* has white fruit (Gleason and Cronquist 1991; Brown and Brown 1972). However, in his second edition, Gronovius (1762, p. 146) changed the description slightly to *Morus foliis minoribus, fructu parvo albicante* and cited Clayt. n. 694. The Clayton number 694 in the Clayton Herbarium is *Broussonetia papyrifera* (L.) Vent. In his second edition, Gronovius (1762, p. 146) added a useful Latin note under the name of his second species, *Morus foliis latioribus, fructu rubro* (based on Clayt. n. 781), which reads in translation: "it is absolutely a variety of *Morus alba*, which produces abundant pistillate flowers." Clayton specimen 781 in the Clayton Herbarium is *Morus alba*.

In 1619 the first elected Assembly of Virginia passed legislation in Jamestown encouraging production of silk as one of several diverse commodities to prevent overproduction of tobacco in the colony (Doyle 1889). The earliest efforts attempted to use the native red mulberry (*M. rubra* L.) as food, but when the silkworms refused to eat red mulberry, white mulberry was imported in 1621 (Taylor 1952). Throughout

the colonial period, various incentives were offered in the colonies to encourage the production of silk (Doyle 1889; Wright 1947), but none succeeded. The care of silk cocoons and the winding of raw silk required knowledge and skill, and the rewards were never as high as for other crops (Sanford 1916). The silk industry ultimately failed in America, but white mulberries have become common in the southeastern United States.

Our collection is *Wells* 4170, collected in woods near top of river bank southeast of mansion, 26 August 1997, plant sterile.

Polygonaceae

Polygonum cespitosum var. *longisetum* (DeBruyn) Stewart, knotweed, native of eastern Asia, is now a common weed throughout eastern North America where it often occurs with the following species, *Polygonum persicaria* Linnaeus (Gleason and Cronquist 1991). The species *P. cespitosum* Blume was described in 1825, and the variety was described in 1930 (Steward 1930). Until 1825, it was considered conspecific with the following species, which it resembles very closely in appearance and ecology. It was very likely introduced with *Polygonum persicaria*.

Our collection is *Wells* 4037, collected in low woods near reconstructed threshing barn in Pioneer Farm south of mansion, 6 October 1996, plant in fruit.

Polygonum persicaria Linnaeus, knotweed, lady's thumb, native of Europe, now a common weed throughout eastern North America (Gleason 1952; Gleason and Cronquist 1991), was illustrated and recommended by Gerard in his *Herball* (1633) under the common name dead or spotted arsmart. It was so well established in New England by 1672 that Josselyn considered it native (Josselyn 1672). Gronovius (1739, p. 44) reported the species in Virginia as *Persicaria non maculosa, floribus albis* and *Eadem flore carneo*, and (1743, p. 157)

as *Persicaria florum staminibus senis, stylos duplici*, based on Clayt. n. 670 and 672. Linnaeus (1753, p. 361) cited him under *Polygonum persicaria*. In Gronovius's second edition (1762, p. 61) he used the polynomial *Polygonum floribus hexandris digynis, spicis ovatis oblongis, foliis lanceolatis stipulis ciliatis*, citing Linnaeus and using Linnaeus's polynomial. Clayton specimen 670 in the Clayton Herbarium is *Polygonum persicaria*, but specimen 672 is missing. The earliest settlers to Virginia and New England undoubtedly introduced this species into the New World as a medicinal plant. The leaves are very pungent and peppery and have been used raw as a salad plant, as a condiment, and cooked as a potherb (Fernald and Kinsey 1958; Medsger 1972; Peterson 1977).

Our collection is *Wells* 4030, collected in low woods near reconstructed threshing barn in Pioneer Farm south of mansion, 6 October 1996, plant in fruit.

Rumex crispus Linnaeus, yellow or curly dock, a native of Eurasia (Mabberley 1987), was discussed as a medicinal under the common name "small water docke or patience" by Gerard (1633). Josselyn (1672) reported it as patience and elaborated, "the variety of sharpe-pointed dock with crisped or curled leaves of Johnson's Gerard." Kalm in 1749 reported observing its preparation and consumption as a dish (Erichsen-Brown 1979). Gronovius (1743, p. 153) listed *Lapathum folio acuto crispo undulato: valvulis integris, granulo incumbente auctis*, based on Clayt. s.n., in his first edition, which is very likely to be this species, but no reference to it appeared in his second edition. Linnaeus (1753, p. 335) cited *Lapathum folio acuto crispo* as a synonym under *Rumex crispus* but did not cite Gronovius. There are no specimens of *Rumex crispus* in the Clayton Herbarium. Jefferson in 1777 mentioned "dock" as an edible plant, favored for its "first young spring growth" (Betts 1944). In 1785

Cutler included it as a medicinal: "the roots are cathartic, the seeds ... are given with great advantage in the dysentery, and the fresh root bruised and made into an ointment or decoction to cure the itch" (Erichsen-Brown 1979). The roots of various species of this genus are a very old home remedy as a laxative and for diseases of the blood and liver. American Indians used it as a fungicide to treat skin conditions (Tyler 1993).

Our collection is *Wells* 4183, collected in forest edge along road between service entrance and reconstructed threshing barn in Pioneer Farm south of mansion, 26 August 1997, plant in fruit.

Primulaceae

Lysimachia nummularia Linnaeus, creeping charlie, moneywort, or herb twopence, native to Europe (Mabberley 1987), was introduced from England to Williamsburg as an ornamental groundcover at an early date (Taylor 1952). Gronovius (1739, p. 20; 1762, p. 26; Clayt. s.n.) listed what was probably this species as *Nummularia aquatica Becabungae foliis, ad genicula florens, flore albicante tubulato, caule rubente succulento, radice repente*, although Linnaeus (1753, p. 148) did not cite this polynomial. There is no *Lysimachia nummularia* specimen in the Clayton Herbarium. The accidental reintroduction of this species to England is documented in correspondence. Peter Collinson (1694–1768) wrote John Bartram (1699–1777) of Philadelphia on 2 May 1738 of its inclusion in the soil with another plant sent from the American colonies, "It is a great advantage to send plants with a sod of earth around them; for many times there comes up odd plants ... as it happened this year ... in the rods of Herb Twopence" (Taylor 1952, p.60).

Our collection is *Wells and Brown* 4135, collected near drain pipe in deep ravine near

nature trail and reconstructed threshing barn in Pioneer Farm, 29 October 1995, plant sterile.

Rosaceae

Duchesnea indica (Andrzejowski) Focke, Indian strawberry or mock strawberry, was introduced from India in the nineteenth century. It was originally cultivated in this country as basket trailers and has since become naturalized, often as an aggressive garden weed (Bailey 1906).

Our collection is *Wells and Brown* 4055, collected in forest edge on dry wooded plateau near nature trail and reconstructed threshing barn south of mansion, 3 June 1995, plant in fruit.

Prunus mahaleb Linnaeus, mahaleb, perfumed cherry, or St. Lucie cherry, was extensively imported to the United States from middle and southern Europe in the late nineteenth century for cherry tree stocks in grafting (Bailey 1906).

Our collection is *Wells and Brown* 4060, collected on dry wooded plateau on east side of ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant sterile.

Rosa multiflora Thunberg, many-flowered rose, native to eastern Asia, was introduced to the eastern United States from Japan in 1886 as rootstock for ornamental roses. In the 1930s to 1960s its use was promoted for erosion control, wildlife food, and cover. It is extremely prolific, forms impenetrable thickets that exclude native plant species, readily invades open woodlands and forest edges, and is considered an undesirable invasive alien species (Wyman 1969).

Our collection is *Wells* 4159, collected in forest along top of wooded river bank southeast of mansion, 26 August 1997, plant in immature fruit.

Rubus phoenicolasius Maximowicz, wineberry, was introduced into the United States in 1876 from East Asia, as an edible ornamental (Wyman 1969). It was unknown in the eighteenth century.

Our collection is *Wells and Brown* 4109, collected in forest edge along road at mouth of ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant in fruit.

Rutaceae

Poncirus trifoliata (Linnaeus) Rafinesque, hardy orange or trifoliolate orange, was introduced to Great Britain from China by Robert Fortune between 1840 and 1860 for his garden of Chinese plants. From Great Britain it was introduced to the United States as an ornamental and has since escaped to the wild (Spongberg 1990). It was brought to Mount Vernon in the 1940s to line paths in the hope that the thorns would prevent children from wandering into the woods.

Our collection is *Wells and Brown* 4061, collected in forest edge on dry wooded plateau at head of ravine near nature trail and reconstructed threshing barn, 3 June 1995, plant sterile.

Sapindaceae

Koelreuteria paniculata Laxmann, golden rain tree, is native to China, Korea, and Japan. It was introduced to the American colonies in 1763 (Wyman 1965). Jefferson received seeds of this species from the Comtesse de Noailles de Tesse, aunt of Lafayette, in the spring of 1806 and was the first to plant it in Albemarle County, Virginia (Betts 1944). This was probably the first introduction into Virginia of this species.

Our collection is *Wells* 4038, collected in clearing at base of river bank east of mansion, 6 October 1996, young sterile tree.

Scrophulariaceae

Verbascum blattaria Linnaeus, moth mullein, native to Eurasia (Mabberley 1987), was naturalized in Virginia by the eighteenth century. Gerard (1633) illustrated and discussed the medicinal properties of this species. Gronovius listed it in both editions, in his first edition as (1739, p. 23) *Verbascum maximum floribus speciosis flavis, filamentis tenuibus purpureis, intus dense congestis, folio glabro viridi fusco, acuminato crenato*, based on Clayt. s.n. In his second edition (Gronovius 1762, p. 31) it is *Verbascum annuum foliis oblongis sinuatis obtusis glabris*, also based on Clayt. s.n., with the 1739 polynomial as a synonym. Linnaeus (1753, p. 178) used a similar polynomial as a synonym for *Verbascum blattaria* but did not cite Gronovius. Clayton specimen 264 in the Clayton Herbarium consists of two inflorescences and a corolla of *V. blattaria*, annotated by J. L. Reveal in 1990. It has been valued as an ornamental (Mabberley 1987).

Our collection is *Wells* 4036, collected in clearing near bottom of river bank east of mansion, 5 September 1997, plant in flower.

Verbascum thapsus Linnaeus, woolly mullein, native to Eurasia (Mabberley 1987), was common in the American colonies before 1672 (Josselyn 1672). Gerard (1633) illustrated and discussed the medicinal properties of this species as mullein or higtaper. Gronovius (1762, p. 31) listed it only in his second edition, *Verbascum foliis utrinque tomentosis decurrentibus*, based on Clayt. n. 791. He used the same language as Linnaeus but did not cite *Species Plantarum* (Linnaeus, 1753, p. 177). Clayton specimen 791 is missing from the Clayton Herbarium. Woolly mullein plants were no doubt brought by early settlers because of their wide usage as medicinal plants. The dried flowers, leaves, and roots were formerly smoked for the relief of asthma and other pulmonary diseases (Lewis and Elvin-Lewis 1977). Flowers have been used to make a tea to relieve coughs and sooth the throat (Tyler 1993).

Our collection is *Wells and Brown* 4178, collected on well-drained open slope in forest edge along trail near nature trail and reconstructed threshing barn, 26 August 1997, plant in flower.

Veronica officinalis Linnaeus, common speedwell, native to Eurasia (Gleason and Cronquist 1991), was probably introduced to North America early in the colonial period. Gerard (1633) illustrated and discussed the medicinal properties of this species under the common name speedwell. Josselyn (1672) listed this species as occurring in the New England colonies in the seventeenth century. Gronovius (1739, p. 4; 1672, p. 2) listed five species of *Veronica*, but not *V. officinalis*. There is no specimen of *V. officinalis* in the Clayton Herbarium. Michaux (1803) reported the habitat of *Veronica officinalis* as Virginia and Maryland. Pursh (1814) reported that it was very common from Canada to Carolina in barren, dry woods. A medicinal tea was formerly prepared from the leaves or roots to treat a number of internal and external ailments (Lewis and Elvin-Lewis 1977; Mabberley 1987).

Our collection is *Wells and Brown* 4023, collected in forest edge on dry wooded plateau near nature trail and reconstructed threshing barn, 3 June 1995, plant in flower.

Simaroubaceae

Ailanthus altissima (Miller) Swingle, tree-of-heaven, is traced to seeds sent by a Jesuit missionary from Nanking, China, to Peter Collinson in Great Britain in 1751 (Taylor 1952). The first specimen of this dioecious species was introduced into North America in 1784 by William Hamilton to his estate near Philadelphia and was greatly admired. In 1820 William Price began importing young trees-of-heaven for sale and recommended them for landscaping in parks and estates. The

introduction of this species as a reproducing invasive alien thus began in 1820. By the mid-1800s they were planted along streets in New York, Philadelphia, Baltimore, and Washington (Haughton 1978; Quinn 1994). Now the species is considered a severe nuisance, invading gardens, woodlands, and roadsides.

Our collection is *Wells and Brown* 4184, collected along top of wooded river bank between old tomb and wharf, 26 August 1997, colonial with several tall sterile trees in canopy.

Urticaceae

Urtica dioica Linnaeus, stinging nettle, native to Eurasia (Mabberley 1987), was introduced very early in the colonial period. Gerard (1633) illustrated and discussed the medicinal properties of this species. In 1672 it was common in New England (Josselyn 1672) and by 1818 was common in New York and Pennsylvania as well (Eaton 1818). Gronovius (1739, p. 187; 1762, p. 146) listed *Urtica minor urens, foliis profundius serratis*, based on Clayt. s.n., which might be *Urtica urens* L. or *U. dioica* (Linnaeus 1753, p. 984). The distribution range of *U. urens* does not include Virginia (Radford et al. 1968; Harvill et al. 1992). Thus, Gronovius's specimen was most probably *U. dioica*. Linnaeus (1753, p. 984) did not cite Gronovius but reported both species as European. The Clayton Herbarium does not have any specimens of either *Urtica dioica* or *U. urens*. According to Lehner and Lehner (1962), stinging nettle was spread all over northern Europe and England by Roman soldiers, who could not stand the cold, wet climate of those countries and rubbed the formic acid-rich nettles over their bare limbs for warmth. The plant has been used medicinally to relieve asthma and rheumatism, as a diuretic, to relieve toothache, and as a remedy for tuberculosis

and dysentery (Lehner and Lehner 1962; Foster and Duke 1990; Tyler 1993). The leaves are eaten as a substitute for spinach in Europe (Medsger 1972).

Our collection is *Wells* 4198, collected in low woods along creek west of reconstructed threshing barn in Pioneer Farm, 5 September 1997, plant in fruit.

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