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# Growing Things "Rare, Foreign, and Tender": The Early Nineteenth-Century Greenhouse at Gore Place, Waltham Massachusetts

## **Cover Page Footnote**

The authors would like to thank the Gore Place Society for their support of several seasons of archaeological research, particularly Susan Robertson, the Executive Director, and Lana Lewis and Tamar Agulian who facilitated access to Gore Place's documentary collections. We also would like to thank the numerous UMass Boston students who participated in the field and laboratory research. We particularly acknowledge Rita De Forest for her analysis of the planting pots and Heidi Krofft for her study of the architectural hardware. Melody Henkel of UMass Boston took the artifact photographs. Two anonymous reviewers also made useful suggestions on strengthening the data presented in this article.

*Growing Things "Rare, Foreign, and Tender": The Early Nineteenth-Century Greenhouse at Gore Place, Waltham, Massachusetts*

Christa M. Beranek, J. N. Leith Smith, John M. Steinberg, and Michelle G. S. Garman

## Abstract

*Excavations and ground penetrating radar at Gore Place in Waltham, Massachusetts, uncovered part of an early 19<sup>th</sup>-century greenhouse (ca. 1806 to the early 1840s) constructed by Christopher and Rebecca Gore. Documentary, archaeological, and geophysical data suggest that the greenhouse was a formal space intended to display exotic plants and that it was built in the relatively new lean-to style, with a tall back wall and a short front wall. The artifact assemblage included tools and small finds related to the greenhouse operation, as well as the remains of at least 149 planting pots. The greenhouse was constructed during a period of intense interest in agricultural experimentation by members of the Massachusetts commercial and political elite, including Gore. Scholars have argued that these men used the positive associations of agriculture to offset some of the contemporary negative connotations of commerce. This article examines the greenhouse in the light of this scientific agricultural movement but also argues that the greenhouse was an extension of the social space of the house and posits that Rebecca Gore may have played a significant role in managing it.*

*Grâce à des fouilles et à l'utilisation de géoradar au site de Gore Place à Waltham dans l'état du Massachusetts, une partie de la serre construite par Christopher et Rebecca Gore au début du 19<sup>ème</sup> siècle (de ca. 1806 au début des années 1840) a été mise au jour. Les données documentaires, archéologiques et géophysiques suggèrent que la serre était un espace formel prévu pour exhiber des plantes exotiques et qu'elle avait été construite selon un type de construction relativement nouveau à l'époque qu'est la serre à un versant, i.e. une serre dont le mur de l'arrière est plus haut que celui de l'avant. L'assemblage des artefacts comprend des outils et des menus objets liés aux opérations d'une serre, de même que des vestiges d'au moins 149 pots à plante. La serre fut construite à une époque pendant laquelle les membres de l'élite commerciale et politique du Massachusetts, incluant Gore, étaient grandement intéressés à faire des expériences de nature agricole. Des érudits ont avancé que ces hommes utilisaient les associations positives liées à l'agriculture afin de contrer les connotations négatives liées au commerce à l'époque. Cet article examine la serre dans le cadre de ce mouvement agricole scientifique, mais propose aussi que la serre fût en quelque sorte une extension de l'espace social de la maison et que Rebecca Gore a probablement joué un rôle important dans sa gestion.*

## Introduction

J. C. Loudon, author of a number of early 19<sup>th</sup>-century English gardening and greenhouse manuals, describes the advantage of potted plants, which could be moved indoors or to a greenhouse, as part of a progression from raising plants that were "choice" to those that were "rare, foreign, and tender" (Loudon 1825: 1-2), emphasizing the exotic nature of the plants that could be grown under glass. Specialized structures for sheltering plants spread from Italy through the villas, estates, and palaces of Europe in the 15<sup>th</sup> century and following (Woods and Warren 1988: 4-17), with increasing emphasis on providing light through glass in the 17<sup>th</sup> century and later (Woods and Warren 1988: 17; Pogue 2009). Wealthy Americans followed suit by the mid 1700s, especially in the Chesapeake and the

Philadelphia area, though the structures were still "unusual" in the 1780s (Pogue 2009: 38).

A number of Massachusetts greenhouses are documented in the late 18<sup>th</sup> century (Wilder 1881; Moore 1988: 129, 135-136), and the ability to grow exotic plants in Massachusetts became one of the hallmarks of the mercantile and political elite. Such structures became more widespread with the founding of the Massachusetts Society for Promoting Agriculture (MSPA) in 1792, an elite organization whose members pursued agricultural experiments such as seeking to improve crop yields through selective propagation or soil enrichment or importing new livestock and plant breeds (Thornton 1989). This article presents the results of the excavations at the early 19<sup>th</sup>-century greenhouse of Christopher and Rebecca Gore in Waltham, Massachusetts, nine miles from Boston.



Figure 1. Gore Place during the 1920s while the property was used as a golf course. The house was built by the Gores in 1805-1806. View looking north. (Courtesy of Gore Place Society, Waltham, MA.)

Christopher Gore was a lawyer and politician by profession (Pinkney 1969), yet he invested a great amount of energy in his farm, as he called it, as did many of his peers. Gore was a founding member of the MSPA, and his greenhouse, probably built in 1805-1806, was constructed in the context of this rising social interest in agriculture and horticulture. The greenhouse studied here was the second of three on the property. It fell out of use in the early 1840s and was probably demolished by 1856.

The existence of the greenhouse is known from historic maps; however, there are few other references to it in primary documents. For this reason, and because the few discussions of other New England greenhouse excavations are limited to the gray literature (Pinello 1999), the Gore Place archaeological data are valuable. Although only a small part of the building was uncovered, the excavations and associated ground penetrating radar (GPR) survey yielded information about the greenhouse's structure and environs and a large assemblage of artifacts including

planting pots, gardening tools, and animal bones that may have been stockpiled for soil enrichment. This artifact assemblage will be analyzed within a contextual framework of other period sources on greenhouses to reconstruct this specialized building form and to interpret the activities that took place in and around it. Sources include standing buildings, 19<sup>th</sup>-century gardening manuals (Cobbett 2003 [1821]; Hibbert and Buist 1834; Loudon 1805, 1817, 1825; M'Mahon 1857), excavations at other greenhouses in eastern North America (Beudet 1990; Bescherer, Kratzer, and Goodwin 1990; Pinello 1999; Pogue 2009), and primary documents.

In addition to presenting information on this specialized building type and assemblage, the article also analyzes the ways that the Gores' greenhouse functioned within Boston-area elite life. Other scholars have analyzed the meanings of gardens and landscape features at elite homes and found that these need to be understood in their specific cultural contexts (Ernstein 2004; Leone 1984; Yamin 1996; Yentsch 1990). With its controlled environments

and exotic plants, Gore's greenhouse was certainly a part of the scientific or experimental agriculture movement promoted by the MSPA. Scientific agriculture is a movement associated primarily with the male members of the MSPA; however, circumstantial evidence from Gore Place and data from other properties indicate that women often were involved in greenhouse management. Further, this article argues that the greenhouse at Gore Place was part of broader elite sociability in ways employed by both men and women; gardens and greenhouses were settings that highlighted the novel and the exotic; the time and capital required to raise these rare plants to maturity required access to long-established wealth.

### A Short History of Gore Place

Christopher Gore (1758-1827) was a Boston-born lawyer, politician, and statesman (see Pinkney 1969 for an account of his professional life). He served on the Jay Treaty commission and spent the period between 1796 and 1804 in England. After returning from England, he served terms in the Massachusetts Senate, in the U.S. Senate, and as governor of Massachusetts (a one-year term in 1809). He and his wife Rebecca (d. 1834) purchased several lots totaling 50 acres in Waltham in 1786, eventually expanding to 197 acres of farmland and additional wood lots. The Gores were mostly absent from the property until they returned from England in 1804. Their first house in Waltham burned in 1799 while they were still abroad. After their return, they built a new house, which still stands. Situated on a terrace overlooking the Charles River, this grand brick mansion has a central block with fashionable oval rooms and east and west wings. Completed in 1806, the house included state-of-the-art domestic technologies for heat, hot water, laundry, and cooking. The Gores maintained a home in Boston and used the Waltham property as a summer home until 1816 at which point it became their primary residence.

The property, now known as Gore Place (FIG. 1), was one of a number of Federal period country estates in the greater Boston area. The Gores' interest in the latest domestic technology was mirrored by an interest in agricultural improvements. As part of their program of

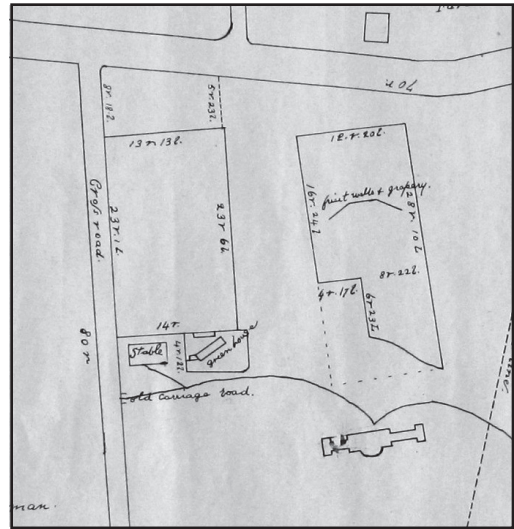


Figure 2. Detail of Plan of Theodore Lyman Estate ca. 1834-1838. This plan shows the property at the time that Lyman purchased it from the Gore estate and depicts the stable and greenhouse along the entrance drive, the fruit wall, and the house. (Courtesy of Gore Place Society, Waltham, MA.)

landscape manipulation, agriculture, and horticulture, the Gores built a fruit wall and graperies (probably in the 1790s), laid out a vegetable garden, a formal flower garden, and agricultural fields, and constructed a series of greenhouses (Brockway 2001; Smith and Dubell 2006; Smith, Beranek, and Steinberg 2010). Based on documentary sources (Lyman 1834-1838) (FIG. 2), the fruit wall consisted of a central span and two flanking wings, probably of brick, north of the house. The warm, south-facing side of such walls was used to shelter fruit trees; a graperies could be much more elaborate, with heating systems, large drainage fields, and structural elements (Kratzer 1995). We do not know the level of elaboration of Gore's fruit wall and graperies. The area between the house and fruit wall was the site of a formal garden.

The earliest greenhouse on the property was attached to one of the wings of the main house and was reportedly the source of the 1799 fire that destroyed the house. The second greenhouse was built along the entrance drive, probably at the same time that the new house was built in 1805-1806 and is the one discussed in this article (FIG. 2). It consists of a single building with a small extension, surrounded by an enclosure. The third greenhouse complex

was constructed against the fruit wall. An 1841 map shows structures built along the central and western spans (Greene 1853). Some version of these greenhouses, which eventually ran the whole length of the fruit wall, survived into the early 20<sup>th</sup> century.

The level of Gore's personal involvement in this scientific and agrarian lifestyle is demonstrated in letters to his friend Rufus King (Gore 1766-1899), and the scope of his farm activities is documented in the daily journal of one of his farm managers during the 1820s, Jacob Farwell (Farwell 1822-1826). In her recent analysis of these documents, Viens (2010) argues that Gore's principal agricultural activities were organized to produce items for sale in the Boston market. To support his agricultural enterprise, Gore adopted new practices (producing compost manure, rotating crops) and tools (the horse-drawn hay rake, iron plows, and a straw cutter for producing animal feed) before they were in common use by other Massachusetts farmers (Viens 2010). The production and application of manure (a mixture of animal dung, plant materials, and mineral additives) were of particular interest to scientific farmers of the period (Wulf 2011: 119-121). Gore's manuring practices are fairly well known from the documentary and archaeological records (Beranek et al. 2011: 11-14). Farwell brought multiple loads of manure, probably vegetable matter, from Boston every week. It was stored in the carriage house cellar, tended over the course of the winter and spring, and then applied to the fields in the late summer and fall. The discovery of small ceramic sherds and fragments of calcined bone in test pits across Gore's fields suggests that other materials (household trash, bone, probably animal dung) were added to the manure before it was spread (Beranek et al. 2011: 11-12).

Gore's interest in agriculture was evident while he was in England, where he viewed different breeds of cattle and sheep (Viens 2010: 23). On his Waltham farm, he grew grasses and grains, planted more than 20 types of fruits and vegetables, and raised cows, sheep, and many pigs. While most of the vegetables were common for Massachusetts farmers and intended for market, Gore's letters mention small quantities of novel or experimental vegetables such as rhubarb, salsify, and sea kale

(Viens 2010: 41). Gore's letters also record crop yields, experiences with new varieties, and his experiments with animal feeding techniques. Gore's agricultural experimentation resulted in a new breed of cattle (the Gore breed) and a new species of pear (the Heathcot pear, after Gore's gardener).

In one of his letters to King, Gore mentions 1600 bunches of grapes from his grapery (C. Gore to R. King, August 1, 1816). Grapes were one of the most challenging fruits of the early 19<sup>th</sup> century. Gentlemen interested in scientific agriculture, including Thomas Jefferson, attempted to grow imported European wine grapes but usually failed. In the early 19<sup>th</sup> century, the focus shifted from the use of European plants to the improvement of native varieties. Initially, these grapes were not suitable as table grapes and grew well only in a limited range of climates (Ohio, but not Massachusetts). Cultivation efforts in Massachusetts culminated with the development of the sweet Concord grape in the late 1840s (Pauly 2007: 73-74). While we do not know the type of grape that Gore produced, his success at this early date indicates that he was more than a casual participant in scientific fruit culture.

Gore's involvement with agriculture and animal husbandry may have exceeded what was typical for his contemporaries in the MSPA. Pauly characterizes the owners of northern estates as interested in "immediate gratification during summers" rather than in year-round improvement. They tended to focus on fruit culture, rather than vegetables, which were considered common, not to breed livestock, and not to concern themselves with profit (Pauly 2007: 53). Gore, on the other hand, seems to have had a market orientation, grown a wide range of vegetables, raised livestock, and manured his fields for long-term soil improvement.

Christopher died in 1827, and it is not clear whether Rebecca Gore continued to live in the house, though in 1834, the year of her death, it was rented to Judge Charles Jackson. Between 1834 and 1838, Theodore Lyman, Jr. owned the property. Lyman was also a member of the MSPA and was the son of Theodore Lyman who laid out the early greenhouses at The Vale, just a few miles from Gore Place in Waltham. Lyman (senior's) multiple greenhouses and a

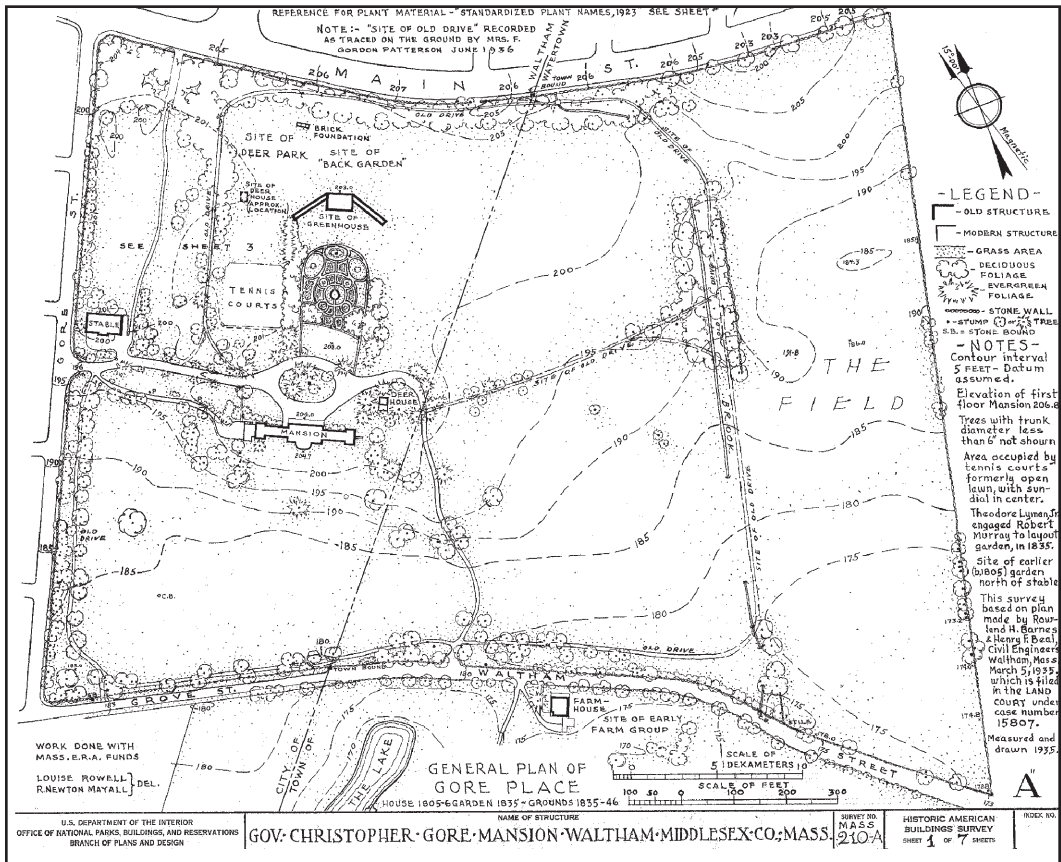


Figure 3. Detail of the Historic American Buildings Survey plan of Gore Place (1937). (Library of Congress, Prints & Photographs Division, HABS MASS 9-WALTH, 2-A.)

fruit wall built between 1797 and 1810 still stand (Thornton 1989: 22-24; Historic New England 2010). Although these structures have been altered several times, they are an important source of comparative material for the greenhouses at Gore Place. During their short ownership of Gore Place, Theodore and Mary Lyman redesigned the formal gardens and may have improved the graperies and its associated greenhouses. John Singleton Copley Greene owned the property from 1838 to 1856, and this is the last period when the second greenhouse was in use. Greene also had a family tradition of horticulture. His father, Gardiner Greene, owned a property in Boston with a terraced garden, numerous fruit trees, and another early greenhouse (Wilder 1881: 12).

The Gore Place property continued to be used primarily as a residence until 1921 when it became the Waltham Country Club. The

conversion of the property to a golf course significantly altered the landscape around the house. In 1935, the Country Club went bankrupt, and the property was purchased by the newly-formed Gore Place Society which still maintains the house and grounds. The 1937 Historic American Buildings Survey (HABS 1937) plan shows the house, the location of the fruit wall greenhouses to the north, and the stable or carriage house along the entrance drive to the west (HABS 1937) (FIG. 3). At the current time, the grape wall and its greenhouses are no longer standing, and the carriage house was moved north and east when Gore Street was widened in 1967. The Gore Place Society is interested in restoring the landscape, to the extent possible, to its Gore-period appearance. This research initiative has resulted in several seasons of archaeology on the property (Smith and Dubell 2006; Smith,

Beranek, and Steinberg 2010; Smith 2011; Beranek et al. 2011).

### Documentary Evidence for the Greenhouse

Documentary evidence for the Gore-period greenhouse and the plants grown within it is limited to a few textual references and two maps (Lyman 1834-1838; Greene 1853). While Gore discussed his field crops with King and once described his yield of grapes, Gore Place researchers have not yet found any mention of his greenhouse in these letters, and Farwell only mentions it in passing in his journal with entries for "helping Heathcoat about the hot-house" (Farwell January 23 and 24, 1822) and "making hotbeds for Heathcoat" (Farwell March 11, 1822). [Heathcoat, or Heathcot, was Gore's gardener.] At Rebecca Gore's death in 1834, a notice of the estate sale lists roses and geraniums in the vinery, probably meaning in a structure against the grape wall and notes the purchase of her orange, variegated orange, and lime trees (Brockway 2001: 26, 28). Both the 1834 map (FIG. 2) created when Lyman purchased the property and an 1841 map created for Greene depict the greenhouse.

Based on the maps, the greenhouse sat along the main entrance drive and consisted of a south-facing main body, to maximize sun exposure, measuring 60 by 15 ft. (18.3 by 4.6 m) with a small extension at an irregular angle to the rest of the greenhouse. The extension is aligned with the other buildings on the property, and the front of it is flush with the front of the carriage house. The greenhouse area was enclosed, and there was a narrow feature, possibly a hot bed or a cold frame, along the rear wall. The 2008 excavations covered the area of the extension, and GPR was conducted over part of the main body of the greenhouse.

### The Culture of Horticulture

The founding of the MSPA and the interest in experimentation in Massachusetts took place in the context of a growing American interest in scientific agriculture and horticulture. The early 19<sup>th</sup> century saw the rise of American botanists and plant collectors, centered on Philadelphia (Leighton 1987: 18-24), and the proliferation of gardening manuals, both English and American (e.g. Hibbert and

Buist 1834; M'Mahon 1857). Botanical gardens such as the Cambridge Botanic Garden in Massachusetts (MSPA Records, Massachusetts Historical Society) and the Elgin Botanical Garden in New York (Hix 1996: 25) were also established at this time. In addition to the examples at these institutions, a growing number of private individuals also constructed greenhouses. These individuals could purchase plants from botanical gardens or from the new, and growing, ranks of professional nurseryman such as George Heusler in Salem or John Bartram outside of Philadelphia. A significant number of botanical specimens also were exchanged between friends and correspondents. The Massachusetts Horticultural Society (MHS) was founded in 1829. Its membership consisted of wealthy and middle-class amateurs, professional nurserymen, and academics (Pauly 2007: 23). The MHS, founded at the end of Gore's life, had a more diverse membership than the MSPA and was indicative of the diversification and professionalization of botanical studies.

J. C. Loudon, in *The Green-House Companion*, described greenhouses as "an appendage to every villa, and to many town residences;—not indeed one of the first necessity, but one which is felt to be appropriate and highly desirable, and which mankind recognizes as a mark of elegant and refined enjoyment" (Loudon 1825: v). To facilitate this refined enjoyment, greenhouse and gardening manuals like Loudon's expounded on the ideal construction methods and settings, provided lists and descriptions of plants, and cataloged the tasks to be performed during each month of the year (Loudon 1805, 1817, 1825; see M'Mahon 1857; Hibbert and Buist 1834; Cobbett 2003 [1821] for American examples). These manuals provide detailed instructions and specifications that may represent ideals rather than reflect the actual practices of greenhouse owners, but they do give a sense of the range of possibilities in greenhouse construction and care. Published sources were probably important references for people seeking to build greenhouses in New England. For example, the Cambridge Botanic Garden noted in 1810 that they could not find a builder who would agree to construct the greenhouse for a fixed sum, suggesting that the form was relatively novel and construction



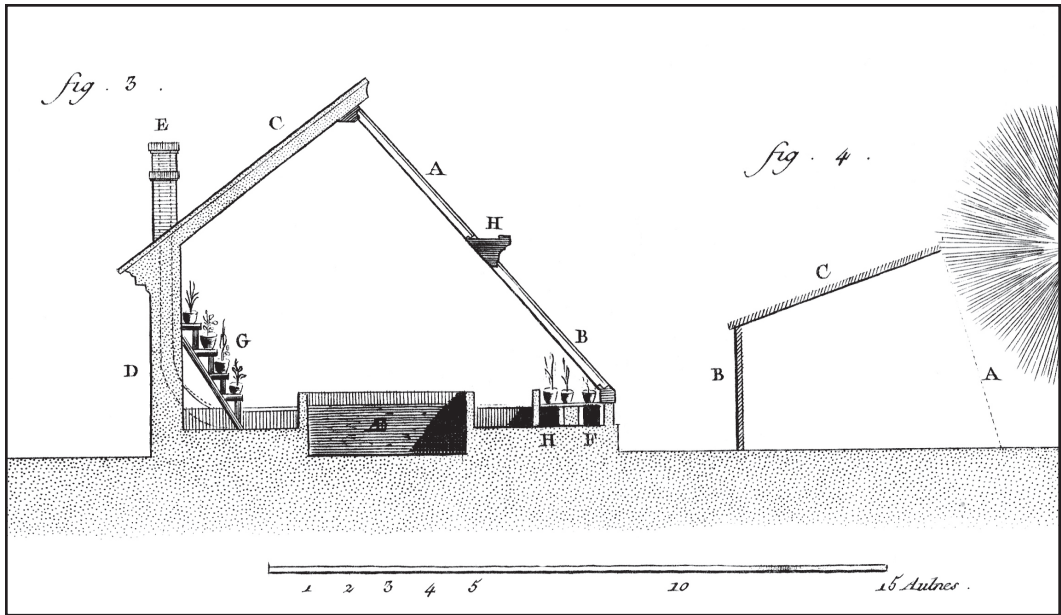


Figure 4. Profile of a greenhouse with a substantial back wall and short front knee wall from Diderot's late 18th-century *Encyclopædia*.

costs quite varied (MSPA Records, John Lowell to Cambridge Botanic Garden 1810).

American greenhouses of the 18<sup>th</sup> and early 19<sup>th</sup> centuries were narrow rectangular buildings, 10 to 20 ft. deep and up to 100 ft. long. Authors of 19<sup>th</sup>-century gardening manuals agreed that the greenhouse should be oriented with its long axis facing south for maximum sun exposure (Hix 1996: 22-23; Woods and Warren 1988: 31). The north wall should have few or no windows. The authors usually recommended that there be an attached shed for holding tools and to provide a place to repot plants. The shed, located behind the greenhouse or at one of its ends, might also hold the furnace. M'Mahon (1857: 518) illustrates a greenhouse with a full cellar to house the furnace, cisterns, and tools, so that no unsightly sheds would be visible.

Loudon's list of necessary supplies makes clear that anyone with a greenhouse would need to maintain both indoor and outdoor storage space: outdoor space for piles of soil components such as loam, peat, leaf mould, different sorts of dung, and sand; indoor space for pots, saucers, thread and wire for tying up plants, rods for plant props, brushes and sponges for cleaning leaves, mats, watering cans, a syringe, a thermometer, bell-glasses,

naming sticks, and a range of small gardening tools (Loudon 1825: 151-152). For killing insects, various ingredients and apparatus were needed, including tobacco and fumi-gating bellows, soap, and sulfur.

Rectangular greenhouses of the mid- to late 18<sup>th</sup> and early 19<sup>th</sup> centuries had two basic profiles, though with any number of variations. One, the earlier form, was an ornamental structure of brick or stone with a rectangular profile. It had tall front sash windows (almost the height of the building) between wood, brick, or stone piers. Notable examples of this type include the greenhouses at Mt. Clare in Baltimore, Maryland, Mt. Vernon in Virginia, the Wye Plantation in Maryland, and the Derby House in Salem, Massachusetts. The second type, introduced near the end of the 18<sup>th</sup> century (Pogue 2009), was designed to take advantage of the sun's energy; it had a substantial back wall, a sloped roof, and a front wall constructed mostly of glass, resting on a shorter and less substantial knee-wall. This form was sometimes called a lean-to style greenhouse because of its irregular profile (FIG. 4). Examples of this type can be seen at the Lyman Estate in Waltham, Massachusetts, and Oatlands Plantation in Virginia. On the interior, plants could either be set in built-in beds or

placed in pots on tiered shelves (Loudon 1825: 12). In a third option, a section of the floor was sunk to form a pit. Known as a bark pit, the pit was filled with bark, and plant pots were set into the bark medium so that the decaying bark could provide a moist heat (M'Mahon 1857: 104-109).

### Terminology

Nineteenth-century authors sometimes, although not consistently, distinguish between greenhouses, as structures that contain plants in pots and have a fixed roof, and conservatories, with sloping glass roofs and fronts which contain plants in beds and have removable roof panels or skylights (Loudon 1825: 130; M'Mahon 1857: 98). M'Mahon states, "A Green-house, is a garden-building fronted with glass, serving as a winter residence, for tender plants from the warmer parts of the world, which require no more artificial heat, than what is barely sufficient to keep off frost, and dispel such damps as may arise in the house" (1857: 78). Trees and plants were planted in large potting tubs for easy mobility. In the spring, the plants were brought outside for the summer. Conservatories, on the other hand, housed plants in their beds year round and, so, needed to have movable windows or skylights to let in fresh air when the weather was warm. During the 18<sup>th</sup> century, the term "orangerie" also was used because the buildings commonly housed citrus trees. Some authors used different terms for buildings with different degrees of heat; in M'Mahon's scheme, greenhouses were for plants that needed only a little heat in the evenings or mornings, while hot houses or stoves were for more exotic plants that required more constant heat (M'Mahon 1857: 103-104). These terms are not always used consistently, however, even within a single publication.

Jacob Farwell's accounts refer to helping Heathcot at the "hot house" at Gore Place, establishing that somewhere on the property there was a heated structure for exotic plants. Whether that corresponds to the excavated building, labeled as a greenhouse on the 1834 map, or refers to an element of the fruit wall and grapery complex is unclear. Due to this uncertainty and to the fact that 19<sup>th</sup>-century authors, while sometimes making distinctions between types, seem to have used "greenhouse"

as a generic term, greenhouse is the term used throughout this paper.

### Heat and Light: Furnaces, Flues, and Windows

The methods of heating greenhouses were some of the most actively discussed topics in 19<sup>th</sup>-century manuals. The size of the furnace varied depending on the type of fuel, the size of the building, and the arrangement of the flues, which could run under the floors or through the walls. Exact dimensions for the furnace varied between 2 to 5 ft. deep, 18 to 20 in. wide, and 18 to 22 in. high (Loudon 1805: 22; M'Mahon 1857: 86). Regardless of the size, the furnace consisted of a main fuel chamber with an arched ceiling, an iron grate at the floor or bottom of the chamber, and an ash pit below. Furnaces could be fired by wood or coal and could send either hot air, steam, or smoke through the flues to heat the space. M'Mahon advocated heating by running pipes of hot water under the floors and through the walls, rather than using flues (1857: 20), whereas Loudon advised against steam and hot air systems in favor of "smoke flues" (1825: 25).

Solar exposure also was important for warmth and light. Earlier in the history of greenhouses, the importance of sunlight was not always clearly understood, and some authors stressed the quality of the air more than the quantity of the light (Yentsch 1990: 177). By the early 19<sup>th</sup> century, however, the importance of sunlight was known. Greenhouse manuals advised prospective builders to position their greenhouses with a long face to the south (Loudon 1825: 11; M'Mahon 1857: 99-100), offered designs with more glazed surface area, and debated the best angle for sloped glass surfaces to receive the most direct light (Hix 1996: 22-23). In either type of greenhouse, most of the southern wall and sometimes a portion of the roof were constructed of glass. Loudon stressed the importance of choosing glass "which is clearest and has fewest inequalities of surface, in order that the light may pass through it as little changed as possible" (Loudon 1825: 158). The adoption of metallic bars, or astragals, in window sashes was also seen as an improvement in the construction of greenhouses because these could be narrower than the earlier wooden ones and



Figure 5. Location of the greenhouse, the carriage house, and the excavation area at the entrance to the Gore Place property. (Figure by authors.)

therefore blocked less light (Loudon 1817: 78). It was necessary to cover the windows to retain heat during the nights and during inclement weather (Loudon 1805). Interior shutters were used in greenhouses where only the southern wall was constructed of glass. In greenhouses where the roof was also constructed of glass, an inner roofing system could be created. Loudon describes the inner roof as "simply a collection of curtains of coarse woolen cloth, which are made so as to slide down upon wires, six or eight inches within the glass. These curtains can be drawn up, and let down at pleasure, by means of

ords and pulleys" (Loudon 1805: 63-64).

Other construction details helped to make the most of light and heat from the sun. Gardening manuals instructed that the interior of the greenhouse be finished with plaster and whitewash to maximize the power of the sun (Hibbert and Buist 1834: 300; M'Mahon 1857: 81). These authors also suggest that the floor of the greenhouse be paved with large tiles or flagstone and raised above ground level to help maintain heat and reduce dampness within the greenhouse (M'Mahon 1857: 81; Loudon 1817: 73).

### Maintaining a Greenhouse

Not only were the plants, tools, and the greenhouse itself an expensive addition to a home but the labor involved in maintaining a greenhouse would have been constant and time consuming. Advice manuals insist that each plant should be inspected daily to have dead leaves removed and to ensure that it received the appropriate amount of water. When plants became infested with insects, the greenhouse had to be fumigated with tobacco smoke for several hours every few days over a period of several weeks. For other kinds of pests, each individual leaf of every plant needed to be sponged with a chemical mixture or have a mixture applied to the stems with a syringe (M'Mahon 1857: 179-184; Hibbert and Buist 1834: 14). Plants had to be repotted during the course of the year. To admit fresh air, greenhouse windows should be opened daily; in

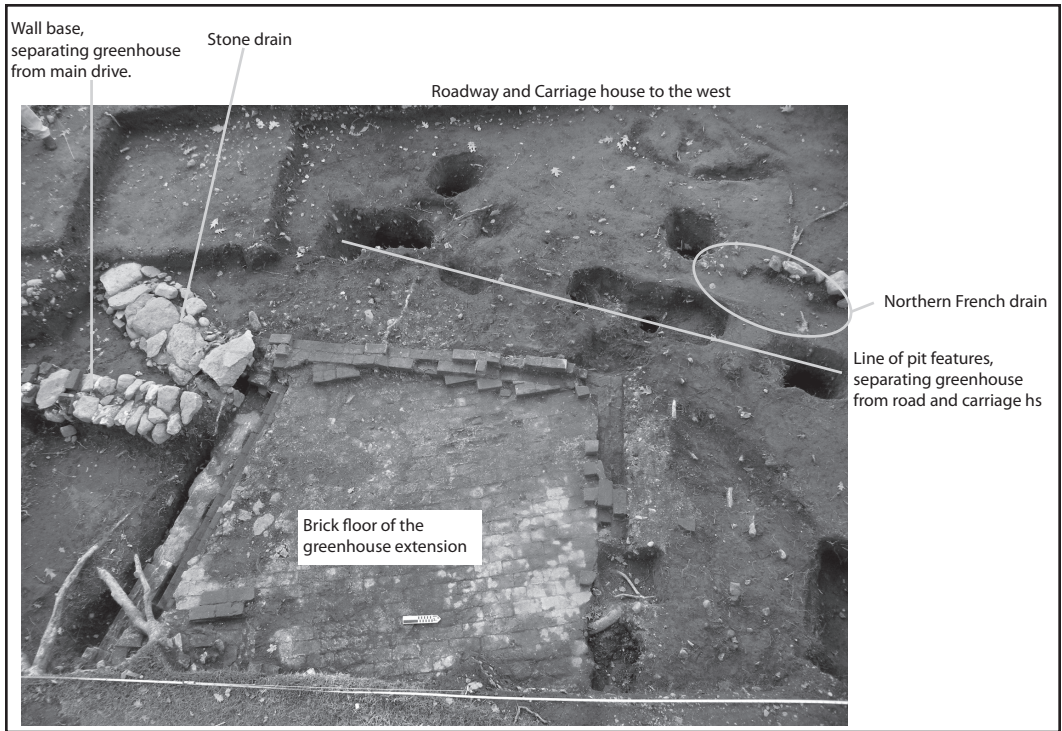


Figure 6. The greenhouse area at the end of the 2008 excavation, facing west. (Photograph by authors.)

winter, the windows should be opened only when the weather was fine and only between the hours of 10 a.m. and 2 p.m. In cold or stormy weather, the greenhouse windows needed to be covered. Each day, except in the summer, fires were lit in the morning and evening to heat the greenhouse and to drive off the chill; in the winter, fires were kept burning overnight and needed to be tended several times, since it was important that they never be too hot (M'Mahon 1857: 103).

Hibbert and Buist (1834: 284) recommend repainting, repairing broken glass, inspecting the flues, and whitewashing annually. The records of the Cambridge Botanic Garden greenhouse provide evidence for the types of regular specialized labor required for the physical upkeep of the greenhouse. While the botanical garden employed a full time gardener and seasonal labor for the horticultural work, specialists performed other regular tasks. Receipts show substantial episodes of masonry repair in 1815, 1823, and 1830 (MSPA Records, Massachusetts Historical Society) including repairing the fireplaces, repairing and repointing the masonry, plastering, and

whitewashing. Wooden elements such as window frames and water conductors were repaired more frequently, and there are several receipts for repainting. The accounts of the glazier who replaced broken panes of glass show that he visited several times a year, and there also are running accounts with a person who made and repaired metal tools, hinges, and locks. Even if the cycle of tasks outlined in the greenhouse manuals represents an ideal rather than a reality, greenhouses were certainly costly, requiring money, labor, and specialized knowledge to build and maintain.

### Excavation Data from the Gore Place Greenhouse

The 2008 excavations, conducted by the Fiske Center for Archaeological Research at the University of Massachusetts Boston, consisted of 52 contiguous square meters over the extension at the west end of the greenhouse (FIGS. 5 & 6). The location and extent of the excavation area were determined in part by proposed construction impacts and in part by current landscape features. Two previous

excavation seasons tested other areas across the property with shovel test pits and isolated excavation units. Areas both east and west of the excavation units were covered by GPR. We used the Malå X3M GPR system with the 500 MHz antenna over the greenhouse (to the east) and the 250 MHz antenna over the parking lot (to the west). The transect spacing was variable, but generally about 50 cm apart. The radargrams were sliced at 10 cm depths (for example, Fig. 8b) to create images such as Figure 8a.

The excavation uncovered a roughly 3 x 3 m trapezoidal brick floor which has been interpreted as the greenhouse extension depicted on the 1834 Lyman map (FIG. 2). The northern and southern walls had been removed to just below the level of the floor, while one or two courses of brick remained of the western wall. Along the south edge of the brick floor is a small (one brick wide and one brick deep) channel that may have carried water to a stone drain that began at the southwest corner of the floor. The drain consists of a cap made of large fieldstones resting on sidewalls constructed of stones of mixed sizes, all unmortared. The drain was constructed sometime during the life of the greenhouse, either as part of the initial construction or as a later addition. Areas outside the extension showed evidence that the whole ground surface had been scraped and prepared prior to construction, as Gore had done at other locations around the mansion. Thus, from available evidence, construction of this end of the greenhouse entailed removal of the A-horizon plowzone and a portion of the B-horizon subsoil. Then a layer of stone rubble and mortar was laid down for bedding. The north and west brick foundation walls were constructed on the bedding, followed by installation of two courses of mortared brick pavement. The south foundation wall was constructed separately of fieldstones topped with brick.

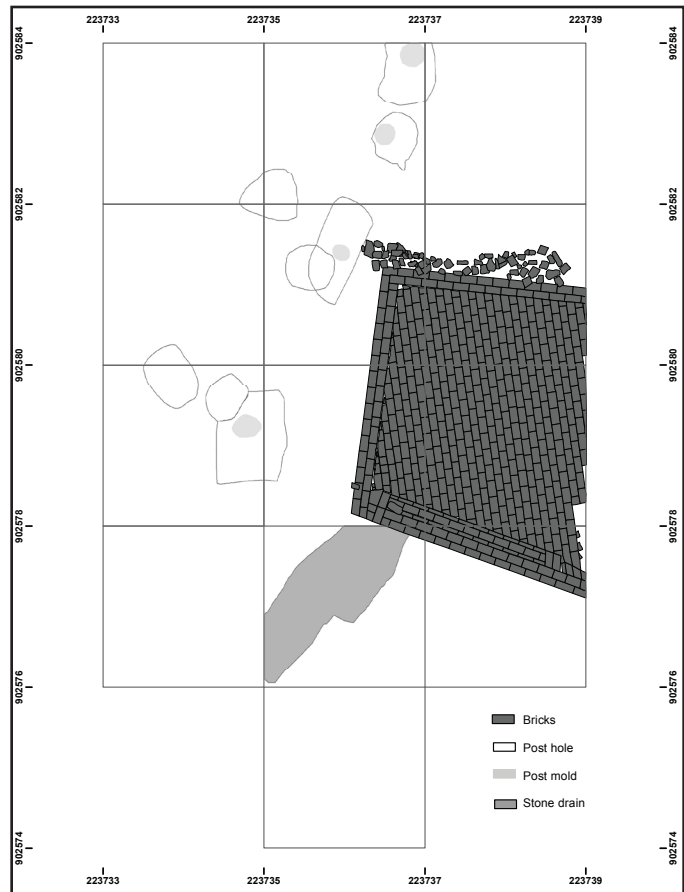


Figure 7. Features contemporary with the greenhouse: the brick floor of the extension, the stone drain, and the post holes and post molds. (Figure by authors.)

The extension was surrounded by a number of features that were contemporary with the operation of the greenhouse. At the far west edge of the excavation area was a roadway that ran between the greenhouse and the carriage house, visible in both the excavation and the GPR survey. The road deposits consisted of an olive-gray clay over a medium brown sand and gravel road bed covered by a thin, dark, organic layer. All of these levels sloped down from the west to the east. The deposit that covered these roadway layers is full of architectural hardware, suggesting that this area was filled in and re-landscaped when the greenhouse was taken down.

A row of large post holes separated the greenhouse from the road (FIGS. 6, 7), suggesting that the greenhouse area had been defined by

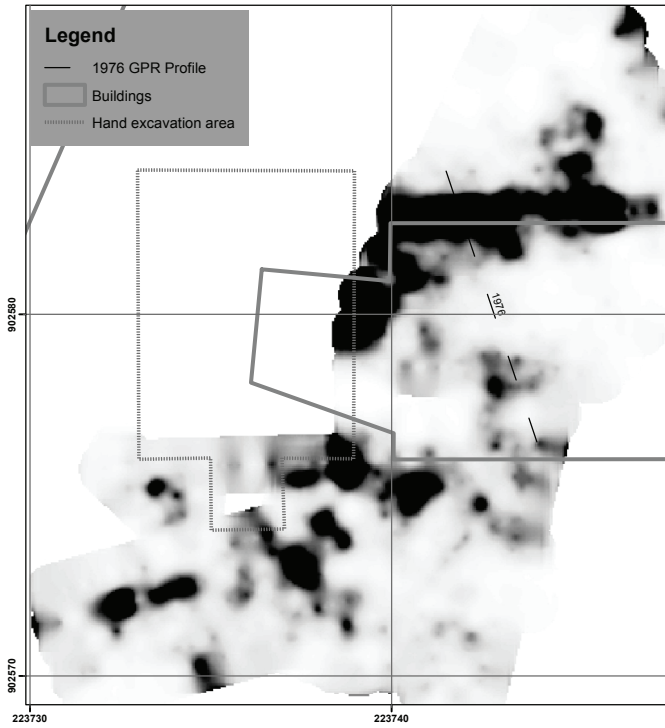


Figure 8. A) GPR slice at 44-50 cm below the ground surface showing the rear wall of the main body of the greenhouse (strong reflector running east-west). The excavation area and the greenhouse structure are outlined. The microwave amplitudes in this slice have been squared so that white represents small amplitudes and black represents large amplitudes (regardless of the sign of the wave). (Figure by John Steinberg.)

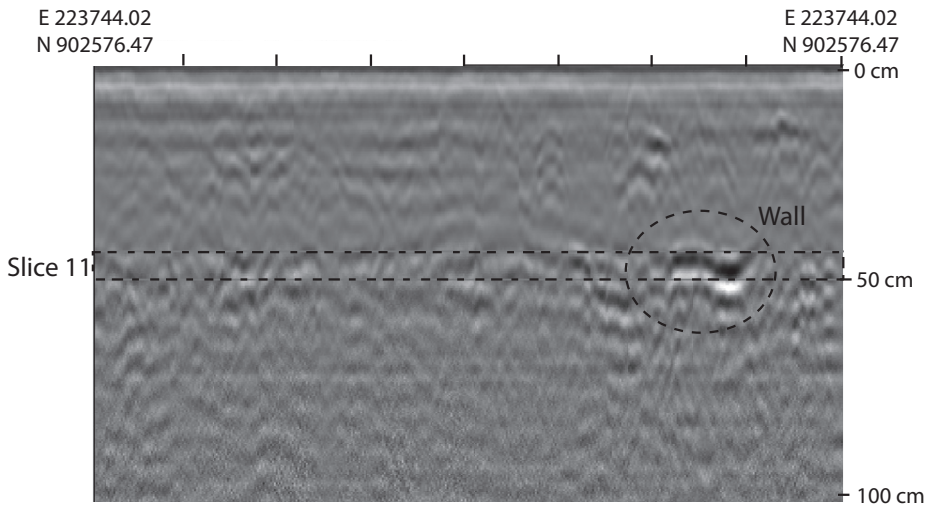


Figure 8. B) Filtered radargram along transect 1976. The transect distance is 7.8 m and the meter tick marks along the top start from the south, where the transect began. Note that the white and black that represent the relative microwave amplitude (positive and negative) do not correspond to the white and black in Figure 8a. (Figure by John Steinberg.)

a substantial fence. Four of these appear to run in a single line with two in a second line to the west, possibly representing a fence and a gate. The rounded rectangular post holes are roughly the same size (60 by 80 cm, 60 by 90 cm, and 80 by 110 cm) with posts of 20 to 30 cm in diameter. The continuation of this fence south of the greenhouse may be exhibited in the GPR slices. A cross-mend between a planting pot fragment in one of the post holes with a piece from the destruction layers above the greenhouse floor suggests that the fence was torn up at the same time as the greenhouse structure was dismantled.

Late in the life of the greenhouse or after it was demolished, two covered channel drains, trenches cut into the surrounding ground surface and filled with large debris to allow water to percolate through them (Baugher 2001-2002), were installed north and south of the greenhouse extension. When the greenhouse was torn down, architectural rubble, building hardware, planting pots, bone, and other artifacts were deposited across the northern three-quarters of the excavation area, both outside the greenhouse and over the brick floor. These areas contained multiple, distinct fill episodes which are related to each other by cross-mending ceramics and were created over a relatively short period of time. Immediately on top of the brick floor of the extension were dense deposits of coal. Several layers of later landscaping fill then covered the whole area.

### Dating the Construction and Demolition of the Greenhouse Extension

In the destruction rubble, we found white marble tile fragments that seem to have been part of the floor of the main greenhouse. This tile is similar to the marble tiles used inside the mansion. The similarity of the tiles and the dates of the ceramics in the earliest ground surfaces around the greenhouse suggest that the greenhouse was constructed by the Gores, probably in 1805-1806 while they were overseeing the construction of the main house.

The greenhouse and its extension appear clearly on a map drawn in 1834. The greenhouse, but not the extension, appears again on a plan drawn in 1841 and used in an 1853 estate sale. If the map was accurate and drawn based on the existing conditions in 1841, it indicates that the greenhouse stood until at

least that time, although not necessarily until 1853. It is not clear whether the extension is not shown on the 1841 map because it was removed before that time or because the scale was too small to show it. The rubble over the extension floor contains marble floor tiles, which we believe came from the main body of the greenhouse, suggesting that both the greenhouse and the extension were demolished at the same time.

The ceramics in the destruction layers include some whiteware and yellowware but lack decorative types such as flow blue or painting in chrome colors. Tablewares of the late 18<sup>th</sup> and early 19<sup>th</sup> centuries such as creamware, blue transfer-printed pearlware, and blue painted pearlware eventually made their way to the greenhouse, but except for the utilitarian yellowware, tablewares of the 1830s and later are not found in the greenhouse area. All of these earlier plates and bowls in refined ware types may have been used in place of saucers, to set plant pots on, or they may have been incorporated into potting soils for drainage (more likely, given the small size of most of the fragments). In either case, refined wares were being repurposed and incorporated into the greenhouse area during the Gores' lifetime. This pattern seems to have changed after Mrs. Gore's death in 1834.

The types and relative amounts of ceramics in the collection suggest that the greenhouse certainly had been demolished by the time that Theophilus Walker bought the property in 1856. The presence of yellowware indicates that the greenhouse was not demolished until after 1830, in keeping with the documentary evidence. The relative scarcity of yellowware (only 9 fragments from the destruction layers) and the lack of other ware types from the 1830s and later suggest one of two scenarios. The first is that the greenhouse was falling out of use in the 1830s or early 1840s and was demolished sometime shortly after it was drawn on the 1841 map. The second possibility is that the greenhouse stood longer, but that the owners in the 1830s and 1840s (the Lyman family from 1834-1838 and J. S. C. Greene from 1838 to 1856) were not re-using current tablewares in the greenhouse, either as plant saucers or for drainage in potting soils.

In sum, the greenhouse extension was demolished between 1841 and 1856 and may



Figure 9A



Figure 9B

Figure 9. Architectural hardware. A) Iron rim and stock lock fragments. B) Copper alloy latch and escutcheon. (Photographs by Melody Henkel.)

have had a period during the 1840s when it was not as heavily used as it had been earlier. When it was demolished, the area underwent a significant landscape change. In addition to removing the greenhouse extension (and probably the greenhouse itself), Lyman or Green also took down the fence separating the greenhouse from the carriage house and deposited fill over part of the road between the greenhouse and carriage house, possibly to level the area. Between the 1850s and the present, the whole area of the greenhouse extension was covered with two additional layers of landscaping fill.

### The Architecture and Finish of the Gore Place Greenhouse

When the Massachusetts Society for Promoting Agriculture formed a committee to secure plans for their greenhouse buildings in 1810, they were unable to set a fixed budget because there were no builders who would undertake the project for a set fee (MSPA Records, John Lowell to Cambridge Botanic Garden 1810). This uncertainty indicates the degree to which greenhouses were still a novel and individually-designed building type at this time. Yet Christopher Gore in commissioning his new greenhouse likely had knowledge of local and international examples; his time in England and visits to the estates of prominent agricultural improvers in the 1790s may have made him aware of the latest greenhouse designs there (Thornton 1989: 29). He also

may have been familiar with local examples constructed by fellow members of the MSPA, such as Theodore Lyman's greenhouses at the Vale a few miles from Gore Place which would have been just a few years old.

Although only the extension at its west end has been excavated, we can reconstruct or postulate a good deal about the appearance of the greenhouse using information from the 1834 Lyman map, GPR results, archaeological information, and comparative sources. The main body of the greenhouse, which has not been excavated, was a rectangular structure measuring 60 by 15 ft. (18.3 by 4.6 m) oriented to face south and, therefore, not aligned with the other buildings on the property. It had a small (roughly 3 by 3 m or almost 10 by 10 ft.) trapezoidal extension on the west end, most of which has been excavated. The extension was aligned so that it was oriented with the carriage house and the entrance drive, and the south face of the extension may have been flush with the south face of the carriage house. Anyone entering the property would first pass the carriage house and then the greenhouse before reaching the mansion.

The extension had a brick floor, while white marble tiles recovered from the destruction debris suggest that the floor of the main greenhouse was marble or white marble and black slate. These different floorings underscore the functional differences between the two spaces: the main body of the greenhouse was a place not only for raising but also for



displaying exotic plants, while the addition was probably the functional appendage recommended by gardening manuals for storing tools and repotting plants. At other sites, small extensions also functioned as specialized growing spaces where the heat could be controlled more closely; Dennis Pogue (personal communication 2008) has suggested that a brick-floored addition to the Mt. Clare greenhouse in Maryland functioned as a pinery (for growing pineapples). We do not interpret the Gore Place extension in this way, based on the hypothesis that an additional growing space also would have been oriented to the south similar to the main body of the greenhouse.

The details of the greenhouse's heating system are still not known, although the amount of coal in the deposits immediately on top of the floor of the extension strongly suggests that the last furnace, at least, was coal fired. It may have been located in the extension or behind the north wall, both common locations for greenhouse furnaces. We recovered what may be a part of the furnace door in the destruction debris. A small area at the far eastern edge of the excavation that was void of bricks may be related to the furnace's ash pit or have served as a connection to a sub-floor flue system. Since only the edge of this feature was uncovered, its function is not known. We also do not know if the greenhouse had sub-floor flues or flues in the walls, but it likely had a chimney to carry away the smoke from the furnace.

Ground penetrating radar (GPR) slices show a strong, long and narrow reflector that we interpret as the rear wall of the greenhouse continuing away from the extension (FIG. 8). Black indicates strongly reflective targets while white indicates no reflector. This linear, strong reflector is present in multiple transects of the GPR data. The 7.8 m-long radargram (GPR profile along a transect) in Figure 8b is a very good example. All of the radargrams that cross this feature show the strong alternating reflections from the top of this wall, which is about a meter wide. None of these radargrams have hyperbolas that would suggest a feature such as a pipe. Instead, the anomaly is a flat, hard reflective surface with defined edges,

suggesting that portions are still intact. The GPR suggests that the greenhouse had a substantial back wall, probably with sloping glass front, and a less substantial front knee wall, similar to the contemporary greenhouses at the near-by Lyman estate. This form, sometimes referred to as the lean-to style, was introduced near the end of the 18<sup>th</sup> century (Pogue 2009) and was designed to take advantage of the sun's energy. In using this form, Gore would have been choosing the most recent greenhouse plan. The back, north wall of the greenhouse may also be more substantial because it was where the flues for the heating system were located since, facing north, that wall frequently did not contain windows or doors.

Architectural hardware and debris recovered from the excavation indicates that some part of the structure had a slate roof, sash windows, and locked doors and compartments. Slate with nail holes, a padlock, latches, and fragments of stock and rim locks were recovered (FIG. 9A). Greenhouse plants could be expensive and rare, so access to the greenhouse would have been more limited than access to other agricultural spaces. While most of the hardware was iron, two decorative copper alloy items (a latch and an escutcheon) were also recovered (FIG. 9B). The number of planting pots recovered suggests that plants were placed in pots on stages, though without excavating the main body of the greenhouse, the presence of beds for vines or a central bark bed for heat cannot be eliminated.

The greenhouse area was set off from its surroundings by a wooden fence, possibly with a gate on the west side. The area inside the greenhouse enclosure also may have been a location for stockpiling soil preparation ingredients such as bone, shell, sand, and compost. These activities probably took place north of the greenhouse, out of public view. A shallow pit feature just north of the greenhouse extension may have been a soil preparation bed. The large numbers of animal bones in the destruction debris may have been stored here in anticipation of preparing bone manure (see below).

One of the most intriguing architectural details is the presence of three different types



Figure 10. Reconstructed redware planting pots. (Photograph by Melody Henkel.)

of window glass, suggesting that Gore was experimenting with sources, trying to find the clearest glass. Most of the window glass from the greenhouse area (80% of the fragments) was tinted aqua or pale greenish-yellow, the common color for glass made from sand with iron impurities. There were also pieces of colorless glass with a white surface film (16% of the fragments), possibly from lead, and a smaller collection of pieces that were solarized due to the presence of manganese in the glass (4% of

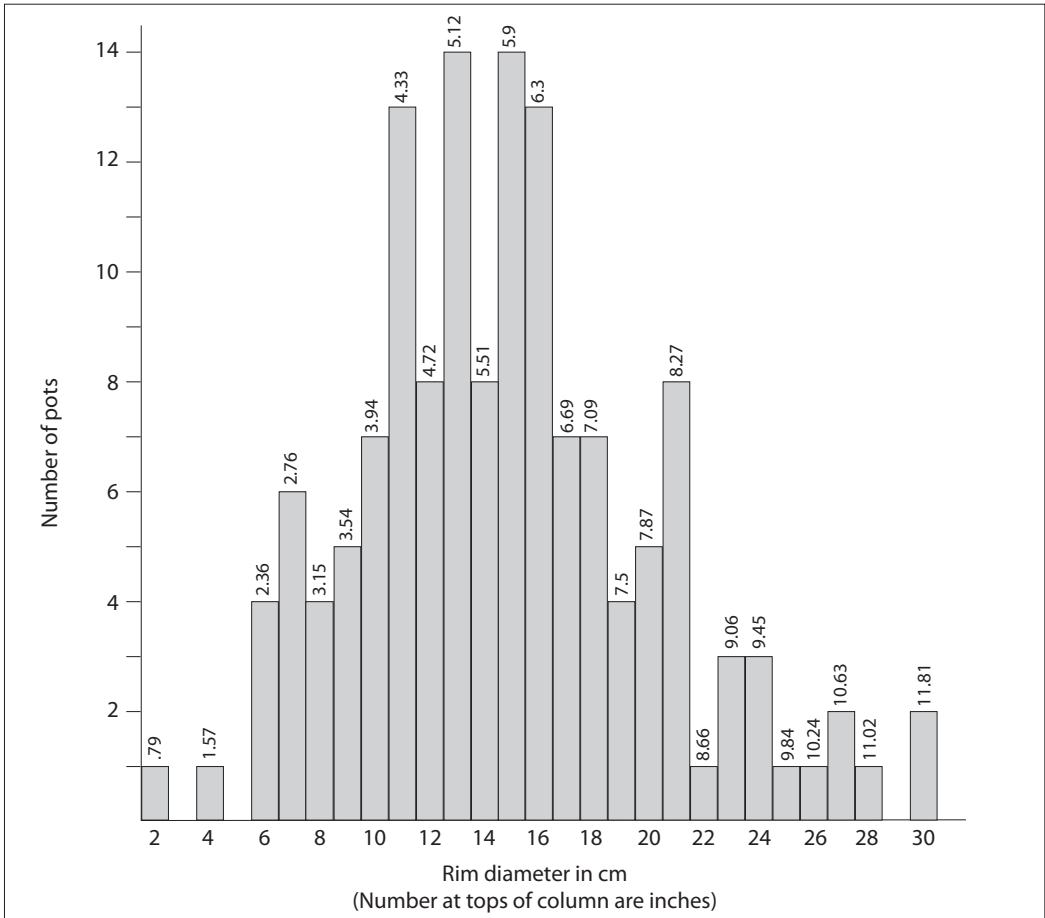


Figure 11. Rim diameters of the 149 identified planting pots. (Vessel analysis by Rita A. DeForest (DeForest 2010)).



Figure 12A

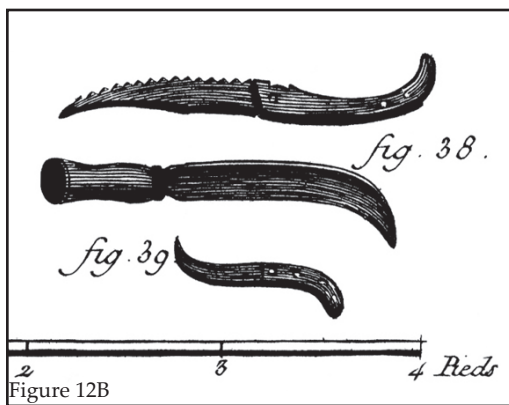


Figure 12B

Figure 12. A) The three more complete knife blades. (Photograph by Melody Henkel.); B) Pruning knives illustrated in Diderot's *Encyclopædia*.

the fragments).<sup>1</sup> This glass was colorless when originally produced. Of the thousands of sherds of glass from hundreds of test pits across the entire property, solarized flat glass occurs only in association with this greenhouse and the later greenhouse in the center of the property [with the exception of one fragment from the south lawn and one from the flower garden], suggesting that it was a specialized material that Gore acquired specifically for the greenhouses, not for the main house or other support buildings. Solarized glass is present in the earliest ground surface levels around the greenhouse extension, suggesting that it dates to the period of Gore's ownership. Since the purple tint is a gradual and unintentional development, Gore might have acquired the initially colorless panes as an alternative to the common aqua tinted glass. Gore's source for manganese-treated flat glass (or for any of his greenhouse glass) is not known.

<sup>1</sup> The addition of manganese to glass is most commonly associated with glass containers between the late 19<sup>th</sup> century and World War I (Jones and Sullivan 1989: 13); hence, the discovery of a small collection of solarized window glass sherds from the early 19<sup>th</sup> century is interesting and unusual. Bill Lockhart's study of manganese as an additive identified 19<sup>th</sup>-century scientists who observed and tested the color change due to solarization (2006: 47). He found that solarized English window glass, in particular, had been documented by 1823 and that one later 19<sup>th</sup>-century commentator noted that this change in flat glass had been observed at the beginning of the century (Lockhart 2006: 49-50). Early 19<sup>th</sup>-century American glassmakers also were aware of the use of manganese as an additive to produce colorless glass (Jessen and Palmer 2005: 145-146).

### Greenhouse Artifacts

While Gore was responsible for constructing the greenhouse, the artifacts from the destruction layers probably come from the Lyman or Greene occupations (Lyman and Greene employed the same farm and garden manager). Among the specialized materials recovered from the destruction layers are the remains of at least 149 redware planting pots (DeForest 2010, Beranek and DeForest 2011) in a range of sizes. (FIGS. 10 & 11) Eleven of the identified vessels and other unassociated fragments are decorated with bands of tooled wavy lines; all are thrown on a wheel. Most of the pots were between 10 and 21 cm (roughly 4 to 8 in.) in diameter at the rim. Having a range of mid-size pots was important for proper re-potting; 19<sup>th</sup>-century gardening manuals recommended constant repotting into incrementally larger pots as a process integral to plant health (Henderson 1884: 61). The range of pot sizes on hand in the greenhouse, therefore, speaks to not the initial investment in the plants, but to the continued investment in their care and display. The largest and smallest of the pots indicate the level of intensity and specialization of the horticultural enterprise at Gore Place. The smallest pots were called thumb or thimble pots and include two pots with rim diameters of 2 or 4 cm and seven bases of 5 cm in diameter. These small pots were used for propagating plants from seeds or clippings and indicate that the Gores, Lymans, or Greenes were not only purchasing mature plants but raising new ones, a more intensive activity. C. M. Hovey, who tried to



Figure 13. One of three spade blades. The rounded blade is 26 cm long and 19 cm wide at the top. The square blades (not pictured) are 27 cm long, 21 cm wide at the top, and about 18 cm wide at the bottom. (Photograph by Melody Henkel.)

institute a standard, numerical system for pot sizes, did not include thumb pots since “little use is made of [them], except by propagators” (1839: 48). Likewise, Hovey did not include pots of larger than 9 in. (23 cm) in diameter in his scheme, instead calling them “Extras,” as “[t]hey are scarcely ever made by the manufacturers, unless expressly ordered by persons who desire such for particular purposes” (1839: 49). The Gore Place collection includes six pots with rim diameters of 10 in. or larger (26-30 cm), again suggesting that the Gores or Lymans were ordering specialty pots to meet their particular needs. These 30 cm pots are the smallest size useful for potted fruit trees and could also be used for shrubs.

A number of other finds may have had specialized functions in the greenhouse. Other

than window glass, almost all of the glass from the greenhouse area is bottle glass. The absence of table glassware such as tumblers or stemware and the large size of the bottle glass fragments suggest that the bottles were part of the greenhouse assemblage (rather than part of household trash where a more diverse assemblage might be expected) and that they are in their primary depositional context. Among the bottles are at least two small vials (base diameter=2.5 cm) with flanged lips of the type that commonly held liquid medicines. Here, they might have been used to hold chemicals for pesticides. There were also a number of large dark green beverage bottles that may have been reused in the greenhouse to hold chemical solutions. In the 2005 test excavations, a fragmentary bell jar was also recovered.

Many pieces of wire were found, some ferrous and some copper, and some twisted into loops. These may have been used to hold plant stalks to wooden supports. Numerous pieces of iron wire were found during the excavation of the mid-19<sup>th</sup>-century Highlands greenhouse, and the excavators there also suggested that the wire served to support plants or vines (Bescherer, Kratzer, and Goodwin 1990: 89). There were also two pierced, rectangular lead tags, one with a number “3” impressed on it. These may have been used to identify specific



Figure 14. Artifacts and faunal remains in situ in one of the greenhouse destruction deposits. The excavator is uncovering some articulated vertebrae; fragments of marble tile appear at the right edge of the photograph. (Photograph by authors.)

plants or bottles of chemicals. Period gardening manuals advised people to label their plants, especially if they were conducting propagation experiments. One of the suggested labeling methods was to paint the names of plants on small wooden sticks that could be stuck in each pot. One fragment of a colorless glass rod which may have been part of a piece of scientific glassware was also recovered. Some 19<sup>th</sup>-century syringes, for example, were made with glass rods as plungers (Kaiser 2009: figs. 195-196).

Gardening manuals recommended the use of syringes to apply pesticides.

Four partial knife blades (FIG. 12) were also recovered from the greenhouse area. One is represented only by a blade tip (and may in fact come from a pair of scissors or shears); three are partial blades and tangs. All of these would have had wooden or bone handles. Table knives of the early 19<sup>th</sup> century typically had broad, slightly curved blades with rounded ends. Unfortunately, these artifacts are not complete enough to determine their shape; the three most complete examples lack

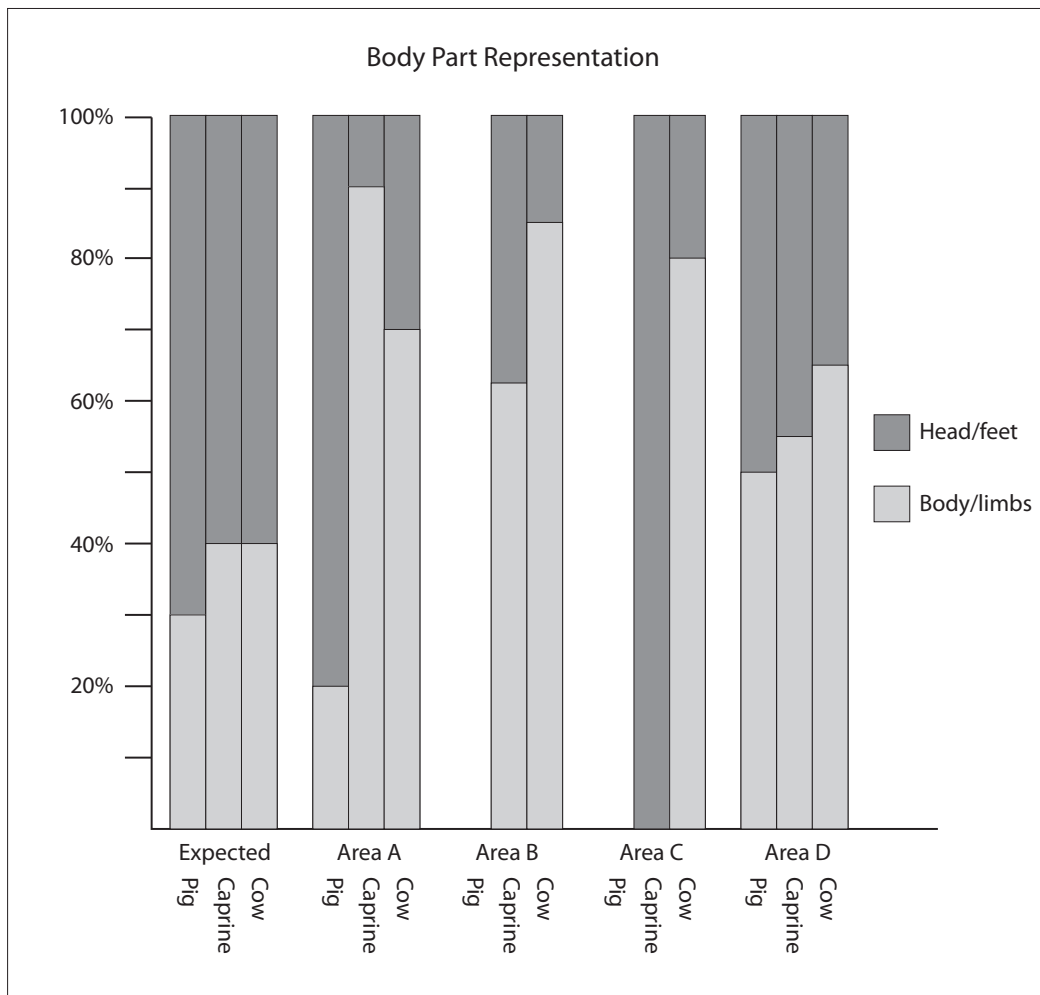


Figure 15. Body part representation. Expected anatomical proportions for complete skeletons of cows, caprines, and pigs, and body part distribution in the different deposits. Area A) Destruction deposits over the greenhouse floor; Area B) roadway; Area C) northern French drain; Area D) destruction deposits outside the greenhouse. (Analysis conducted by Michelle Garman. Figure by authors.)

their tips, and the single tip fragment is pointed rather than rounded. They may have served as pruning knives, though they lack the distinctive backwards curve of the pruning knife (French: *serpette*) blade shown in Diderot's encyclopedia and other period publications. No forks or spoons were recovered which lends some support to the idea that the knives had a function in the greenhouse and were not simply domestic utensils redeposited here.

The fill of the northern covered channel drain contained a number of large items, presumably placed there to promote drainage. In addition to several almost intact planting pots, there were three iron spades and a colander in the fill. These spades may not have been used in the greenhouse itself, but may have been used to turn soil or composting piles nearby. Two of the spades were rectangular; one was rounded (FIG. 13). The rounded example is the most complete and consists of two iron plates that are worked together for the blade of the spade but which separate as they move towards the handle. The triangular iron plates that formed the top edge of the shovel are intact, as is the beginning of the iron fitting that would have surrounded the wooden handle. Only the blades of the square spades survive. They are also both formed from two plates that separate near the handle. The top components are partially present on one example and missing on the other. Neither has a preserved handle attachment.

### Faunal Material

The greenhouse demolition deposits and the northern drainage channel all contained a significant number of large faunal remains (FIG. 14). Since these deposits otherwise almost exclusively contained material that could be related to the operation of the greenhouse, Garman (nee Styger) conducted an analysis of the faunal material from these contexts to determine if it could have been used in the production of bone manure (Beranek et al. 2011: 75-83). Exploring the advantages of using bone manure to fertilize crops was a major component of the agricultural revolutions that occurred in Europe and the United States in the early to mid-19<sup>th</sup> century (Thompson 1968: 66, 68).

Standard zooarchaeological methods were used to analyze the faunal assemblages (Reitz

and Wing 1999). Number of individual specimens (NISP) provided a raw count of all bones in the collection organized by taxon. These calculations were used to compare the relative frequency of cow, caprine, and pig bones. Two chicken bones were the only bird bones identified in the assemblage. The analyzed contexts yielded a total of 614 bones identified as the remains of mammals (and the additional two chicken bones). The combined assemblages accounted for approximately 68% of all faunal material recovered during the 2008 excavations. The emphasis on domestic mammal bones in the 19<sup>th</sup>-century layers, particularly the remains of caprines and cows, suggests that the Gores, Lymans, or Greenes selectively deposited the bones of medium and large mammals within the vicinity of the greenhouse. The bones of cows, caprines, and pigs would have been the ideal choices for manure production due to their larger sizes and densities when compared with the remains of birds, fish, and smaller mammals.

### Skeletal Part Representation

The faunal data were grouped into two categories: head/feet and body/limbs. Results were compared to the proportions of body parts expected in the skeletons of complete animals (FIG. 15). The percentages of body parts in the four Gore Place assemblages show a preference for body and limb bones, particularly those of cows and caprines. Since the percentages are so different from the expected ratios for complete animals, these assemblages probably do not represent the complete carcasses of animals from the Gore Place farm. Farmers were known to use the carcasses of dead animals from their properties to produce manure, and the 1861 edition of the *American Agriculturist* suggested cutting up dead animals into small pieces and "stack[ing them] in the corner of some field or backyard" (Judd 1861: 168). The high instance of axis and atlas vertebrae and of pelvic bones, not traditional cuts for food, and the absence of wild or domesticated bird bones and fish or shellfish remains support the conclusion that the faunal assemblage represents a specialized deposit rather than a deposit comprising the diversity of taxa expected in the diet of a 19<sup>th</sup>-century household. The bones appear to have been selected for their size and density. Body and

limb bones of domestic mammals are the largest bones in the skeleton (when compared to head and feet bones) and would have yielded the largest quantities of bone dust or manure. In sum, Garman's analyses show that only selected bones were deposited around the greenhouse representing neither complete animals nor un-sorted food refuse.

By the 1860s, most American farmers agreed that, "bones [made] one of the best fertilizers accessible to farmers and fruit-growers [but that] the great objection to their use [was] the cost of reducing them" (*American Agriculturist* 1861: 168). To be useful, bones needed to be broken up by steaming them, fermenting or dissolving them in acid or urine, letting them decompose in covered piles, or grinding them in a mill. (Garman's thorough discussion of each of these methods with citations to period agricultural literature and newspaper articles can be found in Beranek et al. 2011: 75-83.)

Although the advantages of using bone manure were realized in Great Britain in the first decades of the 19<sup>th</sup> century, as late as 1843 newspaper accounts reported that "crushed bones as a manure are but little known by the farmers of the United States" (Thompson 1968: 66; *Pittsfield Sun* 5 January 1843). Articles from local Massachusetts newspapers show that people began to discuss the advantages of bone manure in New York and Maryland in the early 1830s, but the first references to New England farmers using bone manure date to the late 1830s (*Gloucester Telegraph* 11 June 1834; *Norfolk Advertiser* 16 August 1834; *New Bedford Mercury* 9 February 1838; *Norfolk Advertiser* 16 June 1838). By 1839, Nahum Ward was selling barrels of bone dust from his manufactory in Roxbury, MA (*Boston Daily Courier* 5 August 1839).

Of the three residents of Gore Place during the period that the greenhouse was in use (Gore, Lyman, and Greene), Gore and Lyman were experimental agriculturalists and part of the MSPA, whose members prided themselves of keeping abreast of the latest developments in England. Christopher Gore, for example, stated in a February 1820 letter to Rufus King that he did not own a bone mill but was interested in seeing such an implement (Waltham February 29, 1820). At this time, Gore was unaware if a bone mill even existed in the

United States. It is not known if he ever acquired one. Small pieces of calcined and unburned bone occur in the plowzone across Gore's agricultural fields, suggesting that he added it to the soil in this fashion. While less is known of Greene's involvement with the scientific agriculture movement, he did keep a professional gardener and his occupation of Gore Place corresponds to the period when bone manure was initially discussed in area newspapers. Stockpiling bones at the greenhouse, therefore, could be a practice that dated back to Gore's period or an innovation by Lyman or Greene. It is even possible that the furnace of the 1805-1806 greenhouse was used for steaming bones as this greenhouse fell out of use in favor of the newer complex against the grape wall.

### Greenhouses and Scientific Agriculture

It is a curious fact of history that the same men directly responsible for changing the Massachusetts economy from a farming to a commercial and industrial one—merchants, financiers, manufacturers, and their legal and political advocates—should have endeavored so assiduously to identify themselves with things rural and agrarian. Between the Revolution and the Civil War, many of Boston's elite settled on country estates, took up gentleman farming, and made a stab at horticultural experimentation. *Cultivating Gentlemen*, Thornton 1989: 1

While the artifacts in the destruction layers probably relate to the later households, the greenhouse was constructed by the Gores, and so the focus of this later interpretive section is on putting the greenhouse in a social and political context for the Gore period (1806-1834).

The Gore Place greenhouse was undoubtedly luxurious, expensive to build and to maintain, and intended to be seen. The building is situated on the entrance drive, so that visitors would have to pass it on the way to the house. The expanse of colorless glass in the sun alone would have been an eye-catching sight. The white marble floor tiles and copper alloy window and door hardware indicate that the building was embellished beyond what was necessary for mere functionality. The plants themselves, especially in the winter, would have been colorful displays of

exotic specimens. In addition to the cost of the plants and the materials, Gore would have had to employ specialists to construct the greenhouse, knowledgeable staff to tend to the plants and to the daily routines of heating, cooling, airing, and covering the greenhouse, and specialized labor to repair elements of this unusual structure. To give a sense of the expense of the plants themselves, Gore hired seasonal male agricultural workers at \$10 per month and women at \$2 per week in the early 1820s (Farwell, *Farm Journal*). In 1822, Gore paid \$3.62 for two plants from the Cambridge Botanic Garden (MSPA Records, Mr. Carter's accounts 1822), indicating that the cost of a single plant was roughly 9/10<sup>ths</sup> the cost of a week of a woman's work.

A number of scholars have argued for the different ways in which gardens, greenhouses, or other landscape features have been used by elite households to convey messages about family status (Ernstein 2004; Leone 1984; Yamin and Metheny 1996; Yentsch 1990). Common to these scholars is the idea that these landscape features were much more than simple accessories to the grand homes. Greenhouses and gardens help to create a certain type of context for houses, making "mansions much more effective status symbols" by allowing them "to incorporate other messages about social position within their fabric" (Yentsch 1996: xxviii). At Gore Place, the house, greenhouse, carriage house, flower garden, and some of the cultivated fields were located in a relatively small core area and would have all been visible from the north entrance to the house. This close placement suggests that these agricultural, horticultural, and domestic features need to be considered together.

The landscape manipulation and control over nature involved in constructing and maintaining these features were part of elite self presentation, display, and social cohesion in ways that were specific to the time, place, and social context. The agricultural experiments, gardens, and greenhouses of the Gores and their peers functioned in specific ways in early 19<sup>th</sup>-century Massachusetts society. The message conveyed was not of wealth generally, but of wealth employed systematically and, according to contemporary rhetoric, for the public good.

Gore's agricultural and horticultural activities took place in the broader American context of an increasing scientific interest in plants (Leighton 1987: 18-24). While there were a growing number of professional nurserymen and middle-class amateur horticulturalists in the early 19<sup>th</sup> century, the movement still had an elite cast to it, particularly in the first two decades. For example, the members of the MSPA were generally wealthy men with large country properties.<sup>2</sup> Even the gardening manuals assumed a certain level of wealth. J. C. Loudon, for example, is explicit that his manual gives a lady or gentleman the specialized knowledge so that she or he can dispense with a "regularly bred and skillful gardener," but the work will still require the "assistance of a footman or common labourer" (Loudon 1825: 5). The ladies and gentlemen that Loudon refers to oversaw the work but probably did not carry out many of the day-to-day tasks.

Christopher Gore's fields, gardens, and greenhouse were part of a social package; "for elite Bostonians, gentleman farming was simply part of an entire complex of activities--building an elegant house in a fashionable landscape, studying the classics, belonging to learned societies---that constituted a style of living rich with cultural associations and therefore with possibilities for self-characterization" (Thornton 1989: 56). This complex of activities was full of contradictions, however. During his professional career, Gore aggressively defended Massachusetts and American commercial interests (Pinkney 1969); in his private life and retirement years, he deeply committed himself to agriculture.

Plants and politics were closely entwined in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. Wulf's *Founding Gardeners* (2011) demonstrates that not only were many of the period's most prominent politicians (Washington, Jefferson, Hamilton, Adams, and Monroe) personally committed to agricultural pursuits but that the political rhetoric of the period linked domestic agricultural production to independence from England and the prosperity of the United

<sup>2</sup> Note that these properties were large compared to average Massachusetts farms of the period, consisting of several hundred acres. They are dwarfed by the sizes of large properties in the Chesapeake, where the best known greenhouses (at Mt. Vernon, the Wye House, or Oatlands) are on properties of several thousand acres.



States. Productive professions, of which farming was at the apex, carried connotations of independence and good character, while commerce was seen as dependant (on foreign producers) and prone to weaken character by encouraging people to buy things that they did not need (Thornton 1989: 2-3). Politicians, Thomas Jefferson in particular, also attempted to use agriculture to argue against some European claims that the American climate was inferior to that of Europe and was causing the degeneration of people, plants, and animals (Pauly 2007: 9-23).

At this time, the link between politics and agriculture in Massachusetts was set within more specific arguments tying the health of the country to individual moral character. Farmers were thought to be hard working, temperate, and uncorrupted and, as such, to exemplify necessary moral virtues (Wulf 2011: 115-118). Jefferson's Republicans were the political party most overtly sympathetic to agriculture and farmers, while Federalists favored commercial interests. Interestingly, it was Massachusetts Federalists, merchants, lawyers, politicians, and statesmen (including Gore and Lyman), who comprised most of the membership of the MSPA. Thornton (1989) argues that country seats and agricultural experimentation were important for the Federalist political and mercantile elite because the virtuous, productive associations of agriculture and rural life offset some of the criticisms of commercial wealth, setting suggestions of self sufficiency and wholesome domestic production against imported luxury, wastefulness, and corruption. Through experimental agriculture, they could attach themselves to farming and its positive associations despite their political support of commercial interests. The MSPA's rhetoric presented their activities, all of which required significant financial resources, as a public benefit to the ordinary farmers of Massachusetts despite the fact that many results were only disseminated in private letters (Thornton 1989: 26-30, 61-63).

Thornton argues that the virtues associated with agriculture and the rhetoric of public benefit were elements that MSPA members used to implicitly argue for their fitness to hold positions of political and economic power. One of the political pamphlets distributed during Gore's campaign for governor of

Massachusetts makes this connection explicit, stating that "Mr. Gore is a practical farmer" (Anon. 1809) as a characteristic in his favor. Gore seems to have drawn on his agricultural experience to support his political career, but he continued farming after he retired from politics. In part, this was because he used his farm to generate income; for example, he earned \$1700 from the produce that he sent to market in 1817 (Viens 2010: 40). Gentlemanly farming, or agriculture paired with experimental fruit culture and the cultivation of greenhouse plants, was also an appropriate way to retire for a member of the Massachusetts elite.

The cultivation of exotic greenhouse plants could not be included as part of the schemes to benefit Massachusetts farmers, but it may have been seen as an appropriate or defensible use of wealth. Imported consumer goods had been central in critiques on luxury and consumerism since the mid-18<sup>th</sup> century (Breen 1993); over-indulgence in imported goods could weaken personal virtue and thus weaken the health of the nation (Hunter 2001: 159; Thornton 1989: 1-12; Wethje 1989). Wethje's analysis of Bostonian's attitudes towards virtue in the 1780s found that "Bostonians perceived that the greatest danger to virtue, and consequently to republicanism, was luxury" (1989: 67). As agricultural production provided a symbolic counter-balance for men who derived their wealth from commerce (Thornton 1989), plants may have been seen as an acceptable outlet for luxury spending. At least one horticulturalist, William Cobbett, set up plants and consumer goods in opposition to each other, writing, "as a thing to keep and not to sell; as a thing, the possession of which is to give me pleasure, I hesitate not a moment to prefer the plant of a fine carnation to a gold watch set with diamonds" (Cobbett 2003 [1821]: xxvi). Although plants could be quite valuable and expensive, their natural origin and the fact that much of their exchange took place through personal channels in the early 19<sup>th</sup> century set them apart from other types of expenditures.

As discussed above, documentary evidence and excavations across the property have provided a wealth of evidence about Gore's scientific approach and the degree to which he manipulated and transformed his

landscape. He experimented with composting and soil improvement (Beranek et al. 2011: 11-15), measured the relative yields of different varieties of crops, and filled and leveled the ground to shape the topography around his home (Smith and Dubell 2006). Greenhouses, with their specialized materials and construction requirements and ability to grow exotic plants in a carefully controlled setting, were embedded in this regulated, scientific environment. The range of pot sizes, indicating a desire to control all phases of the growing process, the collection of bone for bone manure, the experiments with different types of window glass, and the lead labeling tags are all evidence of the application of scientific principles to horticulture. When applied to field crops, scientific agriculture attempted to make Massachusetts soil more productive and to discover breeds of plants and animals that would thrive in the Massachusetts climate. Experimentation in greenhouses, on the other hand, sought to create an artificial climate so that foreign and exotic plants could be grown locally.

Scientific or experimental agriculture has been discussed exclusively as a male phenomenon (Thornton 1989; Wulf 2011). The members of the MSPA were all men. Greenhouse advice manuals, however, were directed to both men and women (see especially Loudon 1857). Loudon, writing in England in 1825, stated that "a green-house is in a peculiar degree the care of the female part of a family" (1825: 2). Weber's (1996) research on 18<sup>th</sup>-century Maryland greenhouses argues that many of them were overseen by women. Christopher Gore's correspondence with Rufus King never mentions the greenhouse, although he does discuss his fruit trees, vegetables, grapes, and field crops regularly. This absence raises questions of his involvement though does not demonstrate that Rebecca Gore was the primary person overseeing the greenhouse.

Rebecca Gore seems to have taken an active role in planning the construction of the Gores' new house, built in 1805-06. According to Pinkney (1969: 85-86), it was Rebecca who drew up preliminary plans for the house and sent them on to a French architect to be elaborated. There is also some evidence that Rebecca Gore was very knowledgeable about horticultural matters. She was one of only

three women elected as honorary members of the Massachusetts Horticultural Society in 1830, one year after it was founded, because of her "zeal in forwarding the objects of the society" (Wilder 1879: 9). (Women were not, at the time, permitted to be regular members.) This election indicates that Rebecca was at least interested in horticulture and possibly one of the more influential women in the horticultural sphere in the Boston area, given the small number of women elected.

Rebecca Gore also appears on lists of people who purchased plants from the Cambridge Botanic Garden. Either Rebecca or her tenants maintained the greenhouse after Christopher's death in 1827 because sales records at Rebecca's death in 1834 list orange, variegated orange, and lime trees (specifically identified as belonging to Mrs. Gore) and roses, geraniums, and other plants (Brockway 2001: 26, 28). The evidence connecting Rebecca Gore to the management of the greenhouse is fragmentary and circumstantial, so we will probably never be sure of the degree of her involvement. Nonetheless, her potential association with this aspect of scientific agriculture suggests the need to broaden our idea of the group that has been, to date, referred to as "Cultivating Gentlemen" (Thornton 1989).

### An Extension of the Parlor

A greenhouse was not wholly scientific; it also had a social function for both men and women. Greenhouses were expensive to build and even more so to maintain. Unlike field crops, which provided food for the family and money through sale, a private greenhouse of this size would probably not provide a significant amount of food or produce for the home or market. It might produce some citrus or other tropical fruits, but not dietary staples. Greenhouses were elements of display, to a great extent.

Since the middle of the 18<sup>th</sup> century, the gardens attached to grand houses served as extensions of their refined interiors; in *The Refinement of America*, Bushman states that a garden "was an extension of the parlor, a place where polite people walked and conversed" (1992: 130). At Gore Place, the connection between the greenhouse and the house's interior spaces was more than symbolic since both were

floored with white marble tiles. The use of the same expensive material in the house's entrance lobby and the greenhouse suggests a level of social equivalence between the spaces. The presence of several surface-mounted locks in the greenhouse rubble also indicates that access to the greenhouse was restricted. Visitors to the property might have viewed it from the entrance drive, from within its fenced enclosure, or from within the greenhouse itself, depending on their relationship to the family. Even if the greenhouse was opened for public viewing (as described below), access to it, like access to the interior of the house, was limited and controlled.

Accounts from late 18<sup>th</sup>- and early 19<sup>th</sup>-century Massachusetts suggest that greenhouses and orchards of exotic fruit trees played an important role in the social round of the period. Visitors to the homes of Essex County merchants wrote of being shown the gardens and fruit trees, sometimes by the gardener himself (see descriptions quoted in Moore 1988). They marveled at the quality, size, and variety of fruits and at exotic specimens. Well-stocked greenhouses and orchards were destinations in themselves for both male and female visitors. A young woman from New York, for example, wrote this description in 1802:

In the afternoon rode out to Hasket Derby's farm, about 3 miles from Salem, a most delightful place,—the gardens superior to any I have ever seen of the kind; cherries in perfection! We really feasted!...We visited the greenhouse, where we saw oranges and lemons in perfection; in one orange tree there were green ones, ripe ones, and blossoms; every plant and shrub which was beautiful and rare was collected here. Quoted in Moore 1988: 136.

When President Monroe visited Boston in July of 1817, he stopped at Gore Place briefly. Gore described the visit in a letter: "he stopped at my house, ate a strawberry, bowed and shook hands cordially, [and] returned to Boston" (quoted in Pinkney 1969: 141). The larger context of Gore's quote shows that he was critical of Monroe and the whirlwind nature of his visits, but the mention of stopping to eat a strawberry indicates that displaying the results of one's gardens and greenhouses could be part of the hospitality for the most distinguished visitors. (Given the time of year, the strawberries were probably being

grown outside.) Even in the 1830s, strawberries around Boston were very expensive with an exceedingly short season (Pauly 2007: 70); so offering someone a scarce fruit was a generous gesture that not everyone could reciprocate.

Gardens and greenhouses provided important spaces for socializing: to walk, to admire the view of a well laid-out estate, and to see (and sometimes taste) exotic and unusual plants. The views from someone's gardens, the abundance of their fruit trees, and the taste and skills of their gardener were measures on which people were compared among the social elite. Possessing these things allowed the Gores to offer hospitality that was difficult to duplicate. While clothing, dishware, and foodstuffs could be easily purchased, if one had the necessary funds, a greenhouse full of mature, healthy plants could not be acquired quickly. Some plants took years to reach maturity and would only flower or bear fruit if they had been properly tended during that time.

A fine collection of plants and well-landscaped grounds required not only money, but also time and specialized knowledge to develop. As such, they could serve as marks of social distinction. Gardens and greenhouses became one of the solutions to a long-standing problem for social elites of how to set themselves apart in a world of widely available consumer goods. Goodwin discusses how, in the 18<sup>th</sup> century, individuals wishing to distinguish themselves could continue to purchase novel items, or they could rely of the display of conspicuously old items to evoke the idea of patina to display the longevity of their status (Goodwin 1999: 118-155). Greenhouses and the plants within could be used in the service of both of these ideals. There were trends in plant popularity, so they had an element of novelty and many plants were prized for their exotic origins. Although commercial nurseries were coming into existence at the end of the 18<sup>th</sup> century, many seedlings were still exchanged through personal connections, sent by friends in Europe or elsewhere in the United States, limiting their availability. Additionally, many plants took time to reach maturity, so a well-furnished greenhouse was not immediately available for purchase. The necessary time involved in the development of fine botanical specimens gave them a patina that increased their value.

Later 19<sup>th</sup>-century commentators recognized the time it took for horticultural investments to develop and recorded the pedigree of important landscapes. In describing notable estates around Boston, Marshall Wilder, president of the Massachusetts Horticultural Society, usually listed not only the property's current owner, but also its previous owners, to give them credit for establishing the landscape design (Wilder 1881). Wilder (1881) also occasionally noted the disposition of particular plants from a previous collection; important specimens were passed down from one owner to the next, giving them a lineage, which added to their value.

## Conclusion

The early 19<sup>th</sup>-century greenhouse at Gore Place was an unusual but not unique structure that can be understood in the general context of a growing English and American interest in horticulture in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. This interest led to the publication of greenhouse manuals, the creation of botanical gardens, and, in the specific context of the Massachusetts Society for Promoting Agriculture, the development of scientific or experimental agriculture in Massachusetts. Although few Massachusetts greenhouses of this date are known either from standing structures or extensive excavations (for localized excavations at the Lyman greenhouses, see Pinello 1999), documentary sources indicate that they were not uncommon among Gore's peers in the MSPA and other elite families. As Ernstein (2004) found among the landed elite of Maryland, shared landscape features contribute to group self-fashioning and cohesion. Elements that could be used in these landscapes (plants, deer, and information about construction techniques) circulated among members, serving to strengthen social ties and solidify a family's position (Ernstein 2004: 251-254). The members of the MSPA were a similarly linked community, sharing plant clippings, seeds, and information about growing techniques.

The MSPA's membership was exclusively male, yet this article argues that it seems inappropriate to think of the greenhouse as a space associated solely with Christopher Gore, given the evidence for Rebecca Gore's involvement in the design of other aspects of their property

and her election to the Massachusetts Horticultural Society. The greenhouse, in both its scientific and social functions, is probably best interpreted as an important element in both Christopher and Rebecca's realms.

The Gores' commitment to agriculture and horticulture was probably based on a degree of personal interest (given the extent to which they committed time and financial resources to it) as well as on contemporary expectations of appropriate elite pastimes. Following Thornton's (1989) argument, the Gores' involvement in these agricultural pursuits also may have been a response to a larger cultural critique of people whose professions were based on commerce and importation rather than on domestic production. Further, the Gores' participation in scientific agriculture and greenhouse cultivation was something that they shared with other Massachusetts merchants and statesmen, many with political affiliations similar to Gore. The agricultural and horticultural activities and the exchange of seedlings and specialized information were another way that the Gores could fashion themselves as members of that group. The gardens, grapery, and greenhouse also served as an extension of their home. They were spaces that the Gores could use to offer hospitality to visitors in settings that had taken years to develop, which offered them a measure of social distinction.

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