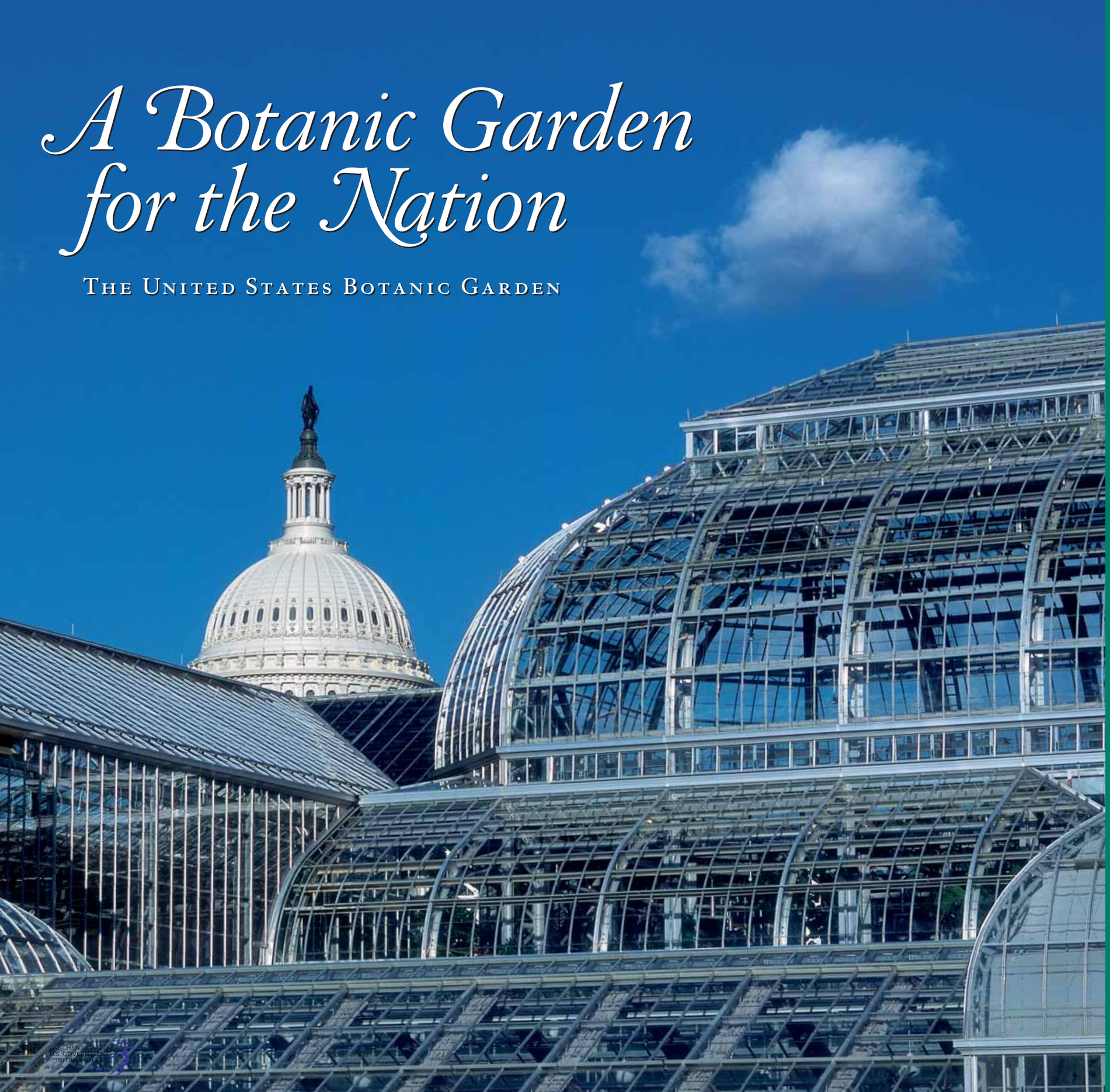
A Botanic Garden for the Nation

THE UNITED STATES BOTANIC GARDEN



A Botanic Garden for the Nation: The United States Botanic Garden

THIS beautifully illustrated book presents the first comprehensive look at the U.S. Botanic Garden in Washington, D.C. Conceived by the nation's founders as a resource for collecting and studying plants, the U.S. Botanic Garden is closely linked to the history and development of the capital city. Through historical documents and colorful photos, *A Botanic Garden for the Nation* tells an important story about this special place.

The story begins in 1796 with the support of George Washington, who believed a Botanic Garden would be a significant addition to the capital. Along with other early leaders, including Thomas Jefferson and James Monroe, Washington understood the value of plants for the health and economic well-being of the nation, a message that still resonates today. Though it took time to achieve Washington's vision, the U.S. Botanic Garden now occupies a prominent location in the heart of the city, where it continues to highlight the critical role of plants in human survival.

Located on the Capitol grounds at the east end of the National Mall, the Botanic Garden Conservatory is perfectly situated to reach out to the public. More than 750,000 visitors a year experience its exciting plant displays, innovative exhibits, and special programs. Through sumptuous photographs, *A Botanic Garden for the Nation* offers a tour of the Conservatory, starting with the formal Garden Court, with its fountains and special flower collections, and continuing through every plant environment, including the lush Jungle, colorful Orchid House, and spare World Deserts. The engaging text explores ecosystems and reveals details about interesting plants and plant collections.

"Windows on the Mall," a chapter written by William C. Allen, architectural historian for the Architect of the Capitol, focuses on the history and design of the Conservatory building, whose

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(CONTINUED FROM FRONT FLAP)

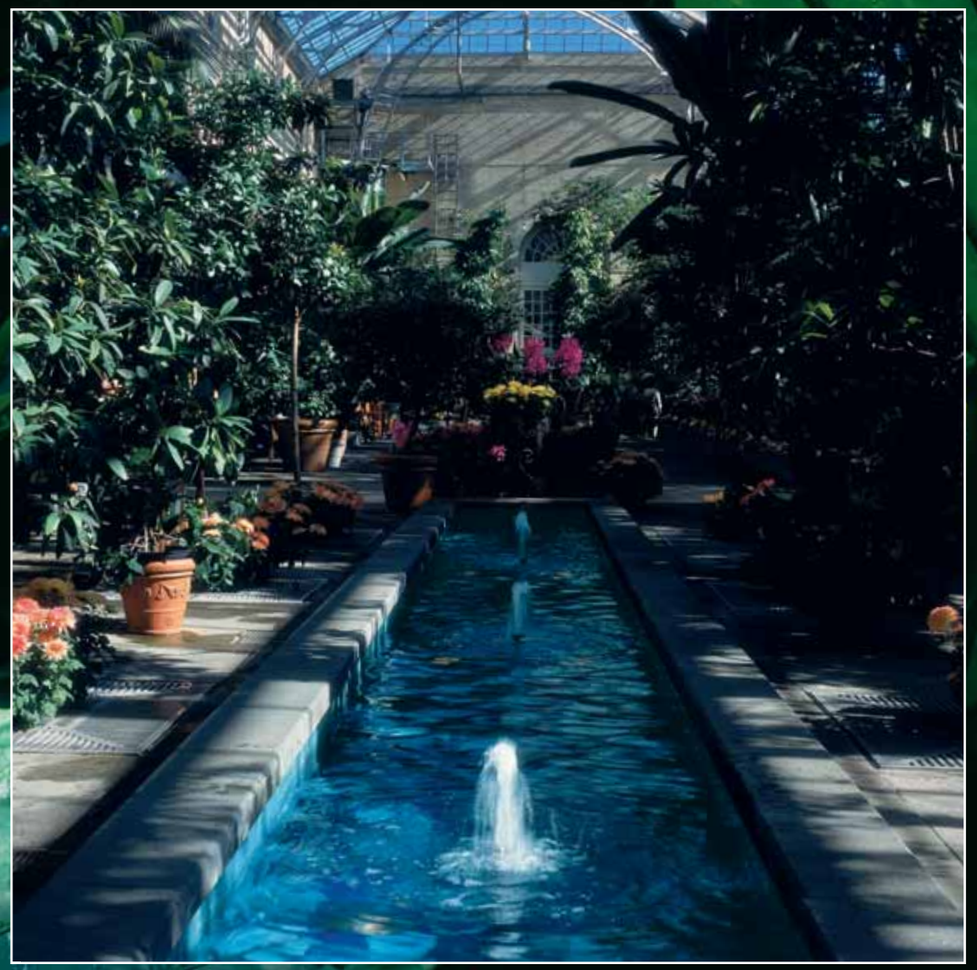
distinctive glass dome makes it a jewel on the National Mall. Newly discovered period photos show the Conservatory in its various incarnations, from the 1860s greenhouse in the shadow of the new Capitol dome, to the Palm House that drew visitors throughout the late nineteenth and early twentieth centuries. The chapter ends with views of the renovation that resulted in the reopening of the state-of-the-art Conservatory in 2001.

From the Garden Primeval to the new National Garden, the U.S. Botanic Garden is a living museum that showcases the beauty and benefits of plants. *A Botanic Garden for the Nation* celebrates the history and the horticultural heritage of this vital institution.

ANNE-CATHERINE FALLEN is a writer and photographer living in Arlington, Virginia. She has written for books, publications, and museum exhibitions on such diverse topics as Gothic architecture, the Everglades ecosystem, and satellite imagery. Her artist book *The Lively Dance* is in the collections of museums and art libraries throughout the U.S. and Europe. As a landscape photographer and gardener, Ms. Fallen has been inspired for many years by the plant collections of the U.S. Botanic Garden.

WILLIAM C. ALLEN has been the architectural historian in the office of the Architect of the Capitol since 1982. His book *History of the United States Capitol: A chronicle of design, construction, and politics* is the definitive work on this iconic building. In addition to his research and writing, Mr. Allen supports preservation and restoration projects undertaken by the Architect's office.

KAREN D. SOLIT was the botanist for the U.S. Botanic Garden when she undertook research that led to the publication of *History of the Botanic Garden, 1816–1991.* Since then she has been a garden writer and the owner of a landscape contracting company. Ms. Solit is currently writing fiction.



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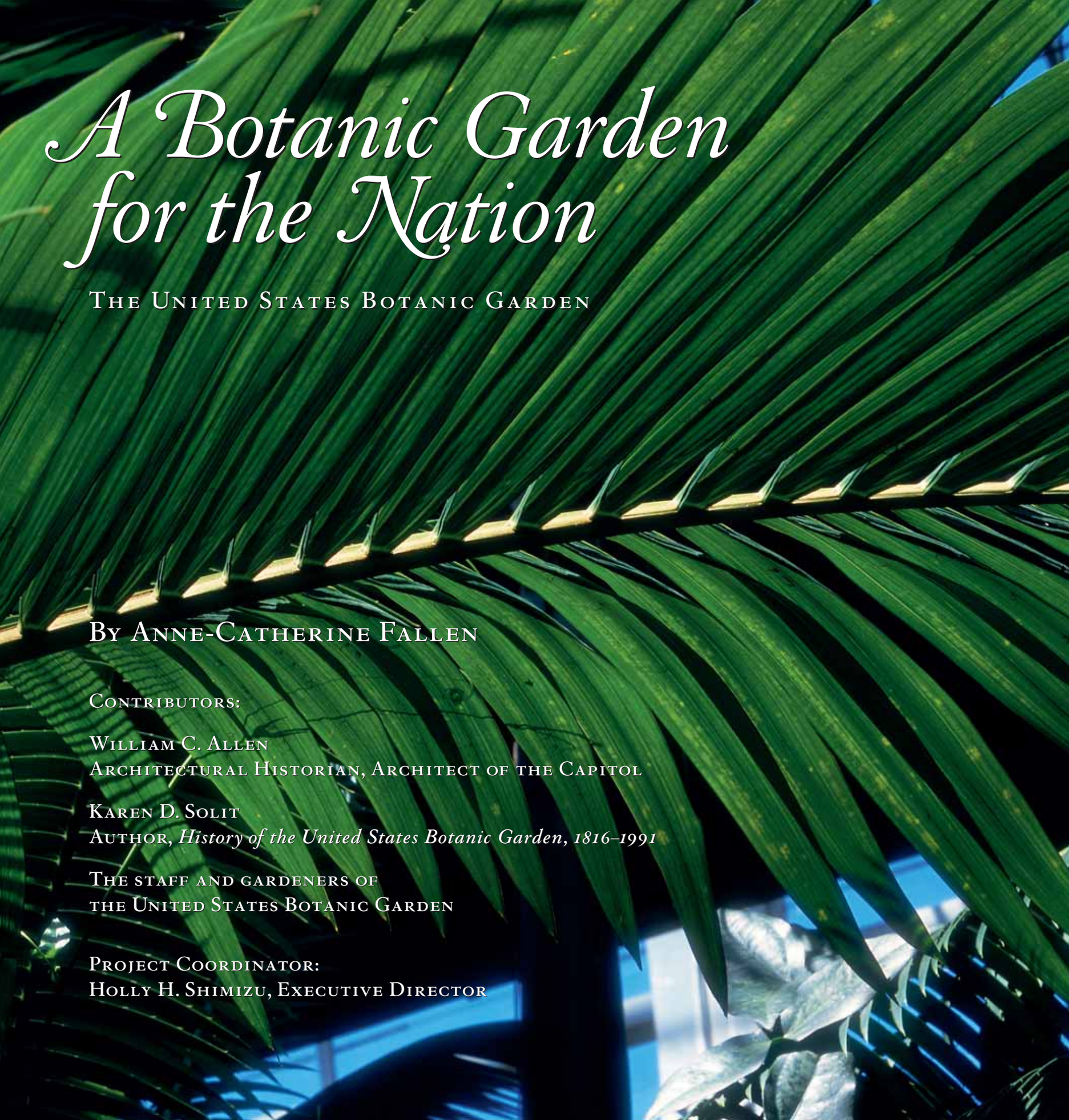
To collect,
cultivate, and
distribute.



A Botanic Garden for the Nation

The United States Botanic Garden

By Anne-Catherine Fallen

Contributors:

William C. Allen
Architectural Historian, Architect of the Capitol

Karen D. Solit
Author, *History of the United States Botanic Garden, 1816–1991*

The staff and gardeners of
the United States Botanic Garden

Project Coordinator:
Holly H. Shimizu, Executive Director

109th Congress, 2nd Session
S. Con Res. 108
A Botanic Garden for the Nation
Senate Document 109-19

(FRONT COVER)
THE CAPITOL DOME ABOVE THE GLASS ROOF OF THE U.S. BOTANIC GARDEN CONSERVATORY.

(BACK COVER)
GARDEN COURT (INSET) AND LEAVES IN THE JUNGLE.

(PAGE 1)
ORCHID (*Vanda* HILO PRINCESS 'ALICE').

(PAGES 2–3)
MT. LEWIS KING PALM (*Archontophoenix purpurea*).

(PAGE 5)
GARDEN COURT.

(PAGE 6)
BANANA LEAVES IN THE GARDEN COURT.

(PAGE 9)
ORCHID (*Anguloa virginalis*).

(PAGE 10)
ORCHID (*Sophrolaeliocattleya* PUMPKIN FESTIVAL 'FONG YUEN').

United States Botanic Garden
100 Maryland Avenue SW, Washington, D.C. 20001 www.usbg.gov

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Contents

A Message from the Joint Committee on the Library

The Joint Committee on the Library is pleased to publish this new history of the U.S. Botanic Garden. This book not only explores the Botanic Garden's historical and architectural roots, it celebrates its vivid exhibits through a variety of colorful photographs.

The origin of the U.S. Botanic Garden dates to May 8, 1820, when President James Monroe signed a bill providing for the use of five acres on the Mall for a national botanic garden. Following the 1842 U.S. Exploring Expedition that brought plants and seeds from far regions of the globe, Congress recognized the need to create a permanent home for the collection. A small greenhouse was constructed in 1843 and placed under the direction of the Joint Committee on the Library. As the plant collection grew, a new conservatory was built in 1850 on the original site near the Capitol. With the redesign of the National Mall, the Botanic Garden was relocated and a new conservatory opened in 1933 at its present site.

For more than 150 years, the U.S. Botanic Garden has been a wonderful oasis on Capitol Hill, a living museum of plants, and a favorite destination for visitors.

The Joint Committee wants to express its appreciation to Architect of the Capitol Alan Hantman and his staff for documenting the rich history of the U.S. Botanic Garden in this book.

Through its educational programs, exhibits, and other services, all Americans can make use of the U.S. Botanic Garden's resources and benefit from its collections. It is a national treasure located only steps away from the United States Capitol.

The Honorable Vernon J. Ehlers
Chairman
Joint Committee on the Library

The Honorable Ted Stevens
Vice Chairman
Joint Committee on the Library

A Message from the Architect of the Capitol

The United States Botanic Garden has had a long history and association with the U.S. Congress. It serves as our living plant museum and its exhibits interpret the role of plants in supporting earth's diverse and fragile ecosystems and in enriching human life. Since 1933, the U.S. Botanic Garden has been housed at First Street and Maryland Avenue, S.W., which includes a conservatory and four acres of outside grounds.

In 1997, the Botanic Garden Conservatory was closed to undergo extensive renovation and reconstruction. Time and the elements had taken their toll on the building and therefore, the renovation was massive and complicated. On December 11, 2001, it was reopened, ready to continue its mission to demonstrate the aesthetic, cultural, economic, therapeutic, and ecological importance of plants.

The publication of this book chronicles the history of the Conservatory and documents the beautiful and ecologically important plants and exhibits housed there. The Garden's living collections are comprised of more than 13,000 plants used for exhibition, conservation, and study.

It is an honor to serve as Acting Director of the U.S. Botanic Garden and to be responsible for the stewardship of this wonderful facility. The Conservatory is a fine asset for the Congress, the Capitol Hill community, and many, many visitors to our nation's capital.

Alan M. Hantman, FAIA

Acting Director of the U.S. Botanic Garden

Architect of the Capitol

The United States Botanic Garden

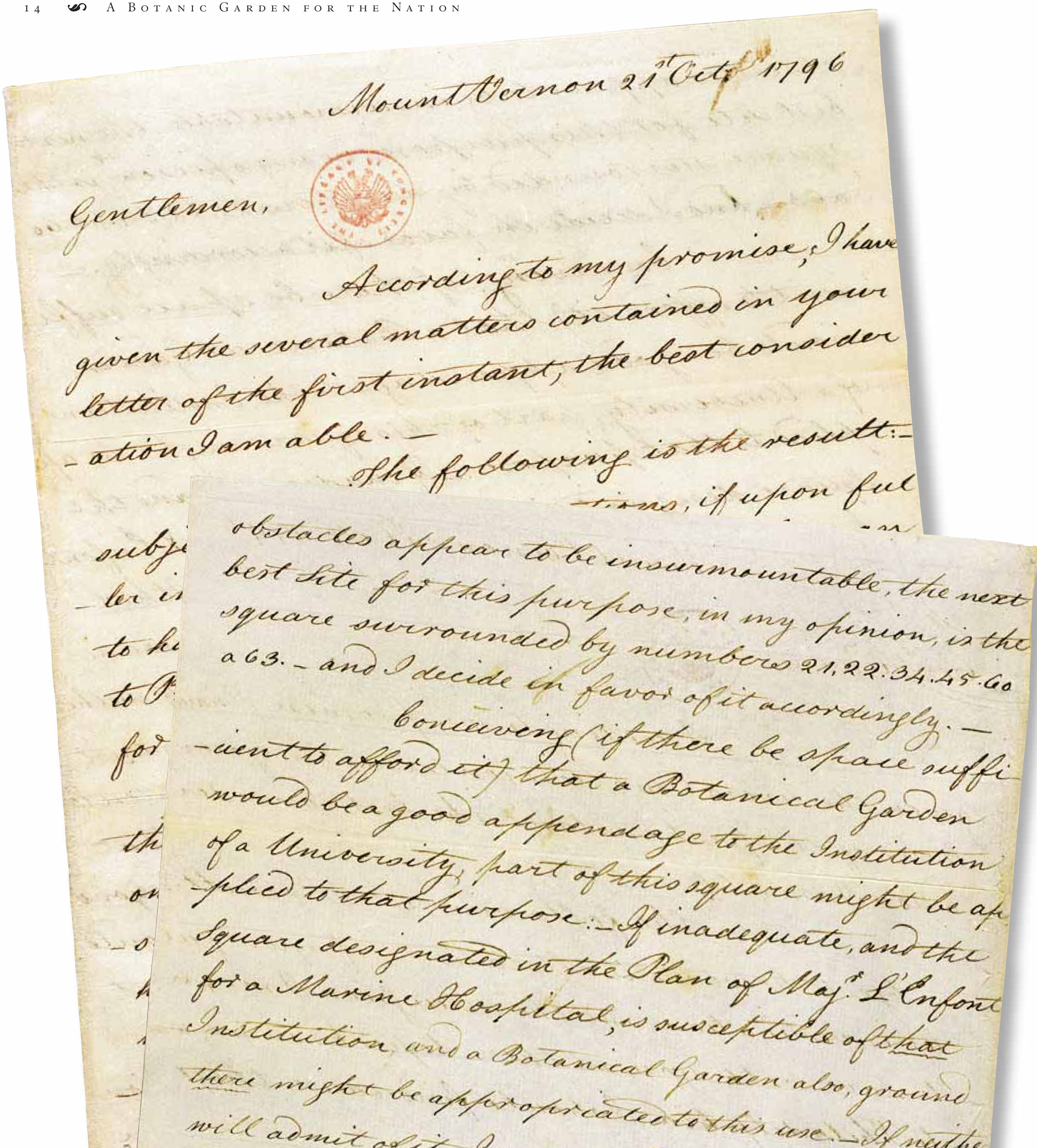
Establishing a Plant Collection

Visitors to Washington, D.C., are often surprised to discover the distinctive glass dome of the U.S. Botanic Garden at the bottom of Capitol Hill, so close to the center of legislative power. Yet a national botanic garden was part of the earliest plans for the nation's capital. It is a measure of the value of plants to the well-being of the nation that the Founding Fathers wanted to include a botanic garden in a prominent place in the new city. Writing in 1796 to the city Commissioners, President George Washington asked that a "Botanical Garden" be incorporated into the plan for Washington, D.C. He suggested several sites, one of them being the square next to the President's House.

The same intellectual fervor that created the new American democracy also fueled curiosity about the natural world. Botanical studies flourished during the nineteenth century, as scholars tried to unlock the secrets of plants. They hoped to discover new sources of food and medicine, as well as improve existing food production. Through great ocean voyages, explorers navigated the globe collecting plant specimens that might prove useful. Governments vied for the prestige and economic benefits that accompanied important plant discoveries, since healthy populations relied on agriculture to produce food, clothing, dyes, and medicines. George Washington, Thomas Jefferson, and other early presidents were owners of farm land. They recognized that a botanic garden was an important resource for a developing nation. It would be a place to collect and study new varieties of plants from around the world in order to improve the quality and production of domestic agriculture.

(above)
The U.S. Botanic Garden, engraving from *Picturesque America: Or, the Land We Live In,* Volume II, New York, 1874.
Architect of the Capitol

(opposite)
The U.S. Botanic Garden.
The soaring glass and aluminum roofline of the Botanic Garden provides contrast to the stately dome of the U.S. Capitol.


Mount Vernon 21st Octr 1796

Gentlemen,

According to my promise, I have given the several matters contained in your letter of the first instant, the best consideration I am able.—

The following is the result:—

...tions, if upon ful...

obstacles appear to be insurmountable, the next best site for this purpose, in my opinion, is the square surrounded by numbers 21, 22. 34. 45. 60 & 63.— and I decide in favor of it accordingly.—

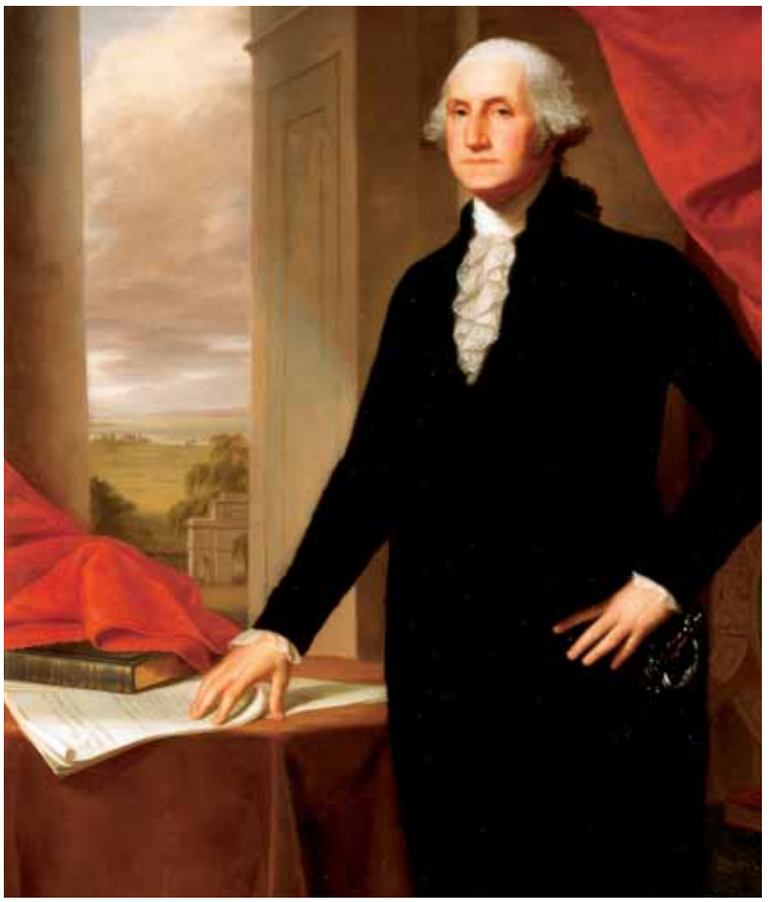
Conceiving (if there be space sufficient to afford it) that a Botanical Garden would be a good appendage to the Institution of a University, part of this square might be applied to that purpose.— If inadequate, and the Square designated in the Plan of Majr L'Enfant for a Marine Hospital, is susceptible of that Institution and a Botanical Garden also, ground there might be appropriated to this use.— If neither will admit of it...

A botanic garden would also become the repository for plants discovered throughout the vast territories of the expanding nation.

The vision of these early statesmen was realized in 1820, when Congress granted land on the Mall for a national botanic garden. Over the years, the United States Botanic Garden, one of the oldest botanic gardens in America, has collected plants from military and exploring expeditions, foreign governments, states and territories, and government agencies, preserving, cultivating, and distributing them as part of the national heritage. Today the Botanic Garden is the steward of rare and interesting plants, and its mission continues to emphasize the value of plants to humanity. The Conservatory is a living museum, displaying the biodiversity of plants from around the world and educating visitors about their aesthetic, cultural, economic, therapeutic, and ecological importance.

A Garden on the Mall

The establishment of a botanic garden in the nation's capital was included among the goals of a group of respected citizens who founded the Columbian Institute for the Promotion of Arts and Sciences in 1816. Hoping to create a center for scientific pursuits, the Institute drafted a constitution that included as its first objective "to collect, cultivate and distribute the various vegetable productions of this and other countries, whether medicinal, esculent, or for the promotion of arts and manufactures." One of its founding members,



(opposite)

Letter from George Washington to the Commissioners of the District of Columbia, 1796 (detail).

Library of Congress, Manuscript Division

In his letter to the Commissioners, Washington made suggestions for the placement of a botanic garden: "Conceiving (if there be space sufficient to afford it) that a Botanical Garden would be a good appendage to the Institution of a University, part of this square might be applied to that purpose. If inadequate, and that Square designated in the Plan of Majr. L'Enfant for a Marine Hospital, is susceptible of that Institution and a Botanical Garden also, ground there might be appropriated to this use. If neither will admit of it, I see no solid objection against commencing this work within the President's square…."

(above)

***George Washington* (1732–1799) by John Vanderlyn, 1834.**

Architect of the Capitol

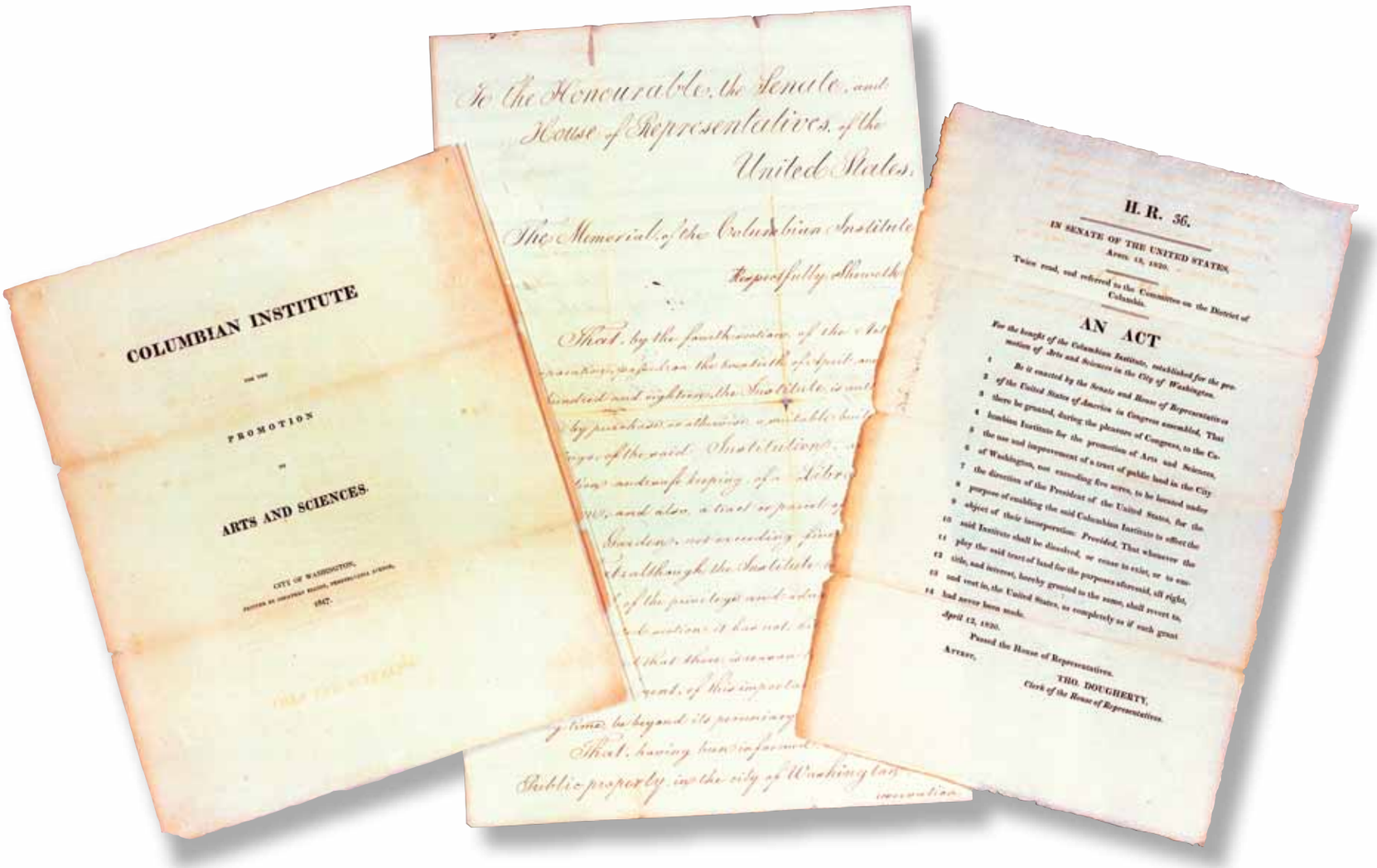
The first president of the United States, George Washington prided himself on his knowledge of horticulture. Between 1748 and his death in 1799, he kept extensive diaries detailing all of his garden operations.

(above)
James Monroe (1758–1831)
by John Vanderlyn, 1816.
National Portrait Gallery
James Monroe, president from 1817 to 1825, was an early supporter of the Columbian Institute. Other distinguished members included John Quincy Adams, John C. Calhoun, and Andrew Jackson.

Dr. Edward Cutbush, was a navy surgeon stationed in Washington. He was confident that, despite "the infantile state" of the city, there were many people who possessed the "industry and an ardent desire to promote the objectives of the Institute." He expressed his enthusiasm for a botanic garden to a large audience at Congress Hall on the evening of January 11, 1817:

> We have been peculiarly fortunate, my friends, that our association has commenced at the seat of government; where, through representatives of the people, coming from the various sections of our country, of different climates and soils, whose minds are illuminated by the rays of science; and through scientific citizens and foreigners who visit the metropolis, we may reasonably expect, not only valuable communications, but various seeds and plants; hence, the necessity for a botanical garden where they may be cultivated, and, as they multiply, distributed to other parts of the Union.… The numerous grasses, grains, medicinal plants, trees, &c., which are not indigenous to our country should be carefully collected, cultivated and distributed to agriculturists.

The Columbian Institute received a congressional charter on April 20, 1818. After considerable lobbying by members, Congress approved a bill, which was signed by President James Monroe on May 8, 1820, granting the Institute "a tract of public land in the City of Washington, not exceeding five acres." The members personally met with President Monroe, who was a member and supporter of



the Institute, and he agreed to let them place the botanic garden on property adjacent to the Capitol on the west. Work was started to clear and drain the soggy land, and trees were planted.

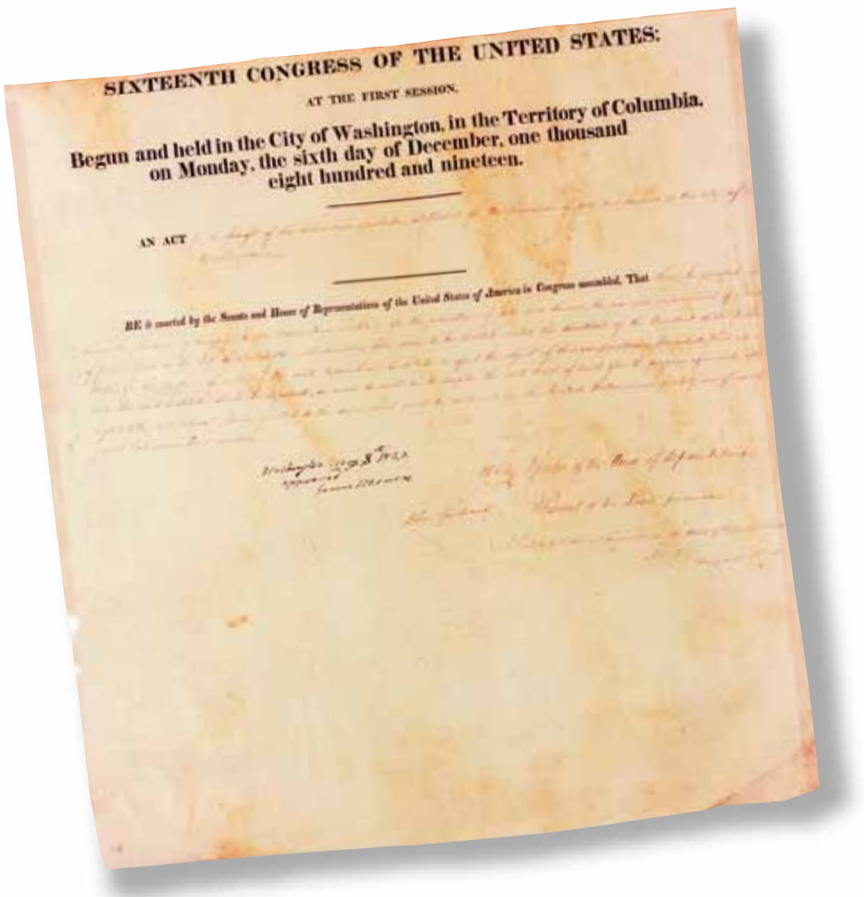
Though the membership roster included many distinguished citizens and several presidents, the Institute was unable to raise money for a greenhouse and lecture hall. Meetings were conducted in a variety of temporary offices, including a room in the Capitol. Nevertheless, the Institute began an enthusiastic effort to collect plants and seeds. In 1826, a committee was appointed to meet with heads of government departments to

(above)

Constitution of the Columbian Institute, 1817; Memorial of the Columbian Institute to Congress, 1819; Bill considered by the Senate of the United States, April 13, 1820.

Records of the U.S. House of Representatives and Records of the U.S. Senate, Center for Legislative Archives, National Archives

When the members of the Columbian Institute petitioned Congress for land, they submitted a copy of their constitution and a formal letter of request, called a memorial. The printed bill, passed by the House, was the version under consideration by the Senate in April 1820.



SIXTEENTH CONGRESS OF THE UNITED STATES:

AT THE FIRST SESSION.

Begun and held in the City of Washington, in the Territory of Columbia, on Monday, the sixth day of December, one thousand eight hundred and nineteen.

AN ACT

BE it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That

(above)

Act of Congress, May 8, 1820.

General Records of the U.S. Government, National Archives

The original Act of Congress, signed on May 8, 1820, by President James Monroe and Speaker of the House Henry Clay, granted "a tract of public land in the City of Washington, not exceeding five acres, to be located under the direction of the President of the United States, for the purpose of enabling said Columbian Institute to effect the object of their incorporating." The act stipulated that the land would revert to the United States "whenever the said Institute shall be dissolved…."

(opposite)

Castor bean (*Ricinus communis*).

A plant from tropical Africa, the castor bean was among the 114 plants appearing on the 1824 "List of Plants in the Botanic Garden of the Columbian Institute" prepared by William Elliot.

help solicit "all subjects of natural history that may be deemed interesting" from foreign representatives. The following year, Secretary of the Treasury Richard Rush circulated a letter to foreign dignitaries. In it he stated that President John Quincy Adams was "desirous of causing to be introduced into the United States all such trees and plants from other countries not heretofore known in the United States, as may give promise, under proper cultivation, of flourishing and becoming useful…." The letter included detailed instructions for preparing seeds and plants for travel. This information was reprinted in Washington's *Daily National Intelligencer* along with an article urging naval officers to "bring home from their long cruises in the Mediterranean, Pacific, &c. the seeds of every plant indigenous in those countries, but strangers to ours, and present them to the Columbian Institute, to be propagated in their Botanic Garden; for which the ground is now properly prepared."

The publicity proved successful, as plants and seeds made their way to the Institute from as far away as Brazil and China, and as near as Montgomery County in Maryland. These plants, however, constituted only a portion of the material cultivated during the Institute's existence. An 1824 "List of Plants in the Botanic Garden of the Columbian Institute," prepared by member William Elliot, mentions more than 100 plants growing at that time.

Despite this success, financial woes continued, and there was never enough money from contributions for proper maintenance of the garden and plant collections. Dwindling interest in the Institute as a whole doomed the garden when, in 1837, Congress

(right)
Charles Wilkes (1798–1877)
by Thomas Sully, 1843.
U.S. Naval Academy Museum
The son of a wealthy New York businessman, Charles Wilkes was well educated in science and mathematics. Determined to pursue a career in the Navy, he was commissioned in 1818 and continued to study navigation, surveying, and hydrography. Though only a junior lieutenant when he was given command of the U.S. Exploring Expedition in 1838, Wilkes was well qualified to take charge of the scientific aspects of the voyage. His stern leadership and strict discipline, though earning him criticism and official rebuke, kept the expedition in order with ships "ill-equipped for making such a voyage and restive crews."

Much has been written about his manner, which was brooding, domineering, and aloof. It is rumored that Herman Melville based the character of Captain Ahab in *Moby Dick* on Wilkes. However, James Dwight Dana, the renowned geologist who sailed on the expedition, wrote that "Wilkes, although overbearing and conceited, exhibited through the whole cruise a wonderful degree of energy.... I much doubt if, with any other commander... we should have fared better or lived together more harmoniously, and I am confident that the Navy does not contain a more daring officer."

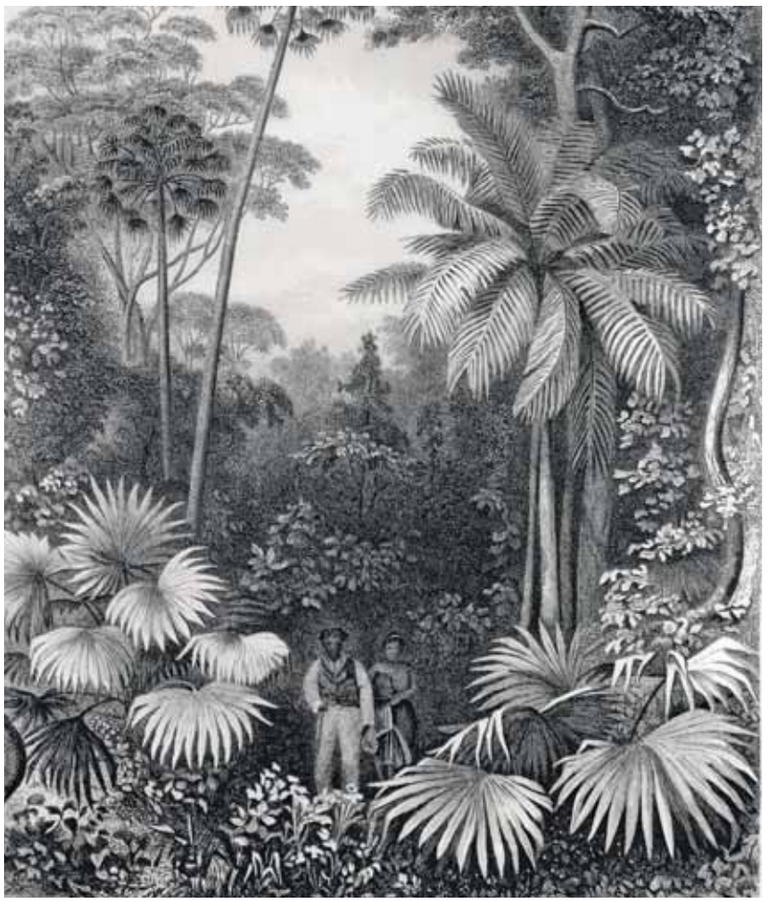
(opposite)
Vincennes in Disappointment Bay,
engraving from *Narrative of the United States Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842,* Philadelphia, 1845.
Smithsonian Institution Libraries
During the winter of 1838–1839, Wilkes traveled through Antarctic regions, reaching latitude 74° 14′ south. His exploration of more than 1,500 miles of Antarctic coastline demonstrated for the first time that Antarctica was a continent. Part of the Antarctic land mass is named Wilkes Land in honor of this discovery.

failed to pass legislation to support it. The site of the Botanic Garden reverted to the federal government and remained untended for several years. Not until 1850, when a location was sought for the botanical collections of the U.S Exploring Expedition, was the site resurrected as a botanic garden.

The U.S. Exploring Expedition (1838–1842)

There were national benefits to be derived from exploration, as Thomas Jefferson argued in his letter to Congress in 1803 asking for support of the Lewis and Clark expedition. In his instructions to Meriwether Lewis, Jefferson included among "objects worthy of notice ... the soil & the face of the country, its growth & vegetable productions, especially those not of the U.S." Twenty-five years later, Congress was again mindful of the political prestige and potential commercial rewards of geographic exploration when it authorized an expedition to examine and chart remote areas of the globe.

It took ten years to organize and fund the project, but on August 18, 1838, the U.S. Exploring Expedition set sail from Hampton Roads, Virginia, headed for the South Seas. Under the command of Lt. Charles Wilkes, an eccentric and ambitious officer, the six naval vessels of the expedition traveled more than 87,000 miles while surveying and charting hundreds of islands and vast stretches of the Pacific Ocean and its coastlines. The expedition's most notable accomplishment was its confirmation that Antarctica was indeed a continent, not a series of islands as had been previously thought.



(above)

***Forest Illiwara*, New South Wales, engraving from *Narrative of the United States Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842*, Philadelphia, 1845.**

Smithsonian Institution Libraries

In order for the expedition to be considered successful, its discoveries and collections had to be organized and published. This daunting task was overseen by Charles Wilkes, whose single-minded determination helped overcome disorganization and lack of funding. His own account, the five-volume *Narrative of the United States Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842*, went through 15 editions before its last publication in 1858. The scientific volumes were published according to subject over a period of 25 years.

(opposite)

Sago palms (*Cycas circinalis*).

Two majestic sago palms stand sentinel in the center of the Conservatory's Garden Court, reminders of the important heritage of the U.S. Botanic Garden. Though it has had to be cut back several times, the tree on the left is the actual plant brought to the United States by the Exploring Expedition of 1838–1842, and has stood at the Garden since its first greenhouse was built in 1850.

Wilkes reported that, in its four years at sea, the expedition took every opportunity when "not incompatible with the great purpose of the undertaking, to extend the bounds of science and to promote the acquisition of knowledge." Nine civilian scientists, dubbed "scientifics," were included in the expedition, and their presence accounted for the collection of cultural artifacts and plant, animal, and mineral specimens never before identified. The two botanists on board were William D. Brackenridge and William Rich, but Charles Pickering, the expedition's naturalist, also had a hand in discovering plants. From the coast of South America to the islands of the South Pacific, from Australia to Oregon, the plantsmen collected specimens at every stop. Forays were made into the landscape where plants and seeds were gathered, pressed and dried, or packed live into special containers. When especially promising specimens were discovered, the expedition's artists, Alfred T. Agate and Joseph Drayton, would draw the plants from life. Though there was work to do in every location, the islands of Fiji and Hawaii proved especially rich in botanical discoveries. Despite the hazards of storms at Cape Horn, highwaymen in the Andes, and hostile natives in the South Seas, the botanists collected and pressed more than 50,000 specimens of plants, gathered propagation material for an unknown number of these, and managed to bring back 250 live plants.

The challenge in Washington was what to do with the thousands of pounds of specimens of all types. Initially the expedition's collections were housed in the Great Hall of the U.S. Patent Office, but the plants were placed outside. In late 1842,

(ABOVE)

Herbarium specimen of the vessel fern *(Angiopteris evecta).*

U.S. National Herbarium, Smithsonian Institution

Plants discovered during the Exploring Expedition were cut and pressed to preserve their essential parts. This herbarium specimen of the vessel fern, discovered in Tahiti, is one of 10,000 species collected and preserved during the voyage.

(CENTER)

Vessel fern *(Angiopteris evecta).*

This progeny of the original vessel fern specimen is located in the Conservatory Jungle.

(ABOVE RIGHT)

Pitcher plant (*Darlingtonia californica*).

One of the great plant discoveries of the expedition was the pitcher plant found by William Brackenridge near Mount Shasta in California. It was named after renowned botanist William Darlington, who had given advice to the expedition's planners. Because of its delicacy, *Darlingtonia* is not often on display, though other pitcher plants can be seen in the Southern Exposure garden in the West Courtyard of the Conservatory.

(FAR RIGHT)

Herbarium specimen of the pitcher plant.

U.S. National Herbarium, Smithsonian Institution


UNITED STATES EXPLORING EXPEDITION
under the command of Charles Wilkes, 1838–1842

(above)

William Brackenridge (1810–1893), drawing, date unknown (before Exploring Expedition).

Smithsonian Institution Archives

Born in Scotland, Brackenridge was 28 when he was hired as a plantsman for the Exploring Expedition. He proved to be energetic and keen-eyed, working his way to assistant botanist by the end of the journey. He went on to catalog the live plants that survived the expedition, and he served as the first horticulturist for the U.S. Botanic Garden when it was established on the Mall in 1850.

(above center)

***List of Plants Producing Edible Fruits*, date unknown.**

Smithsonian Institution Archives

In a neat, legible handwriting, Brackenridge listed by category plants that had economic value. The 19 pages include plants with edible fruits, plants producing dyes or useful for other economic purposes, spice plants, plants known to possess medicinal virtues, and plants with roots adapted for food for man.

(right)

Native yellow hibiscus, also known as ma'o hau hele (*Hibiscus brackenridgei*).

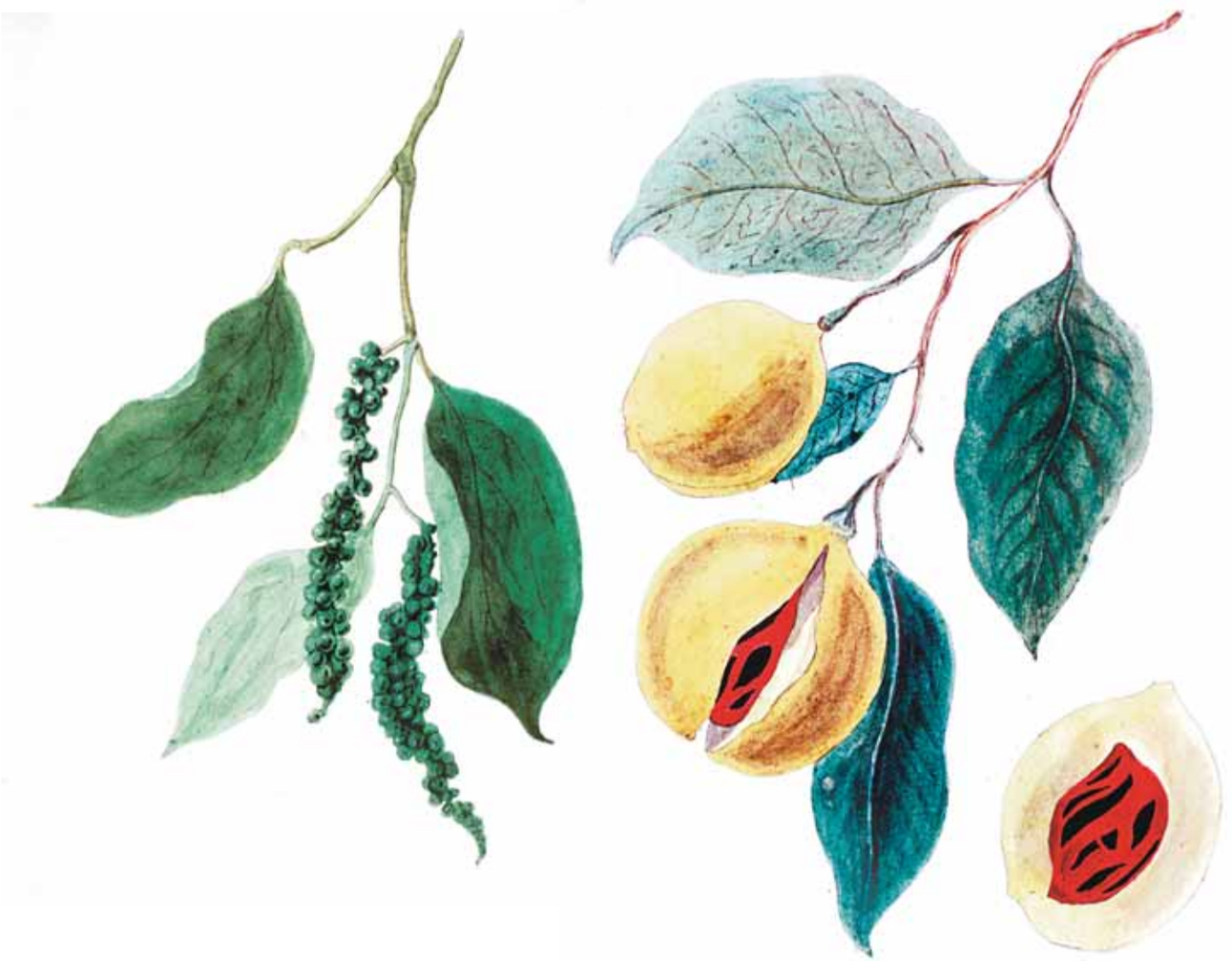
Discovered during the expedition's exploration of the Hawaiian Islands, this bright yellow hibiscus bears Brackenridge's name. Now the state flower of Hawaii, the plant is on the endangered list, with fewer than 60 plants remaining in the dry forests and shrub land that make up its native habitat.

(opposite)

Chinese jujube towering over Bartholdi Park.

The live plants brought back by the U.S. Exploring Expedition formed the core of the original collection of the Botanic Garden. At least four plants (or their progeny) are thought to have survived from the expedition collection: the Chinese jujube (*Zizyphus jujuba*) located in Bartholdi Park; the vessel fern (*Angiopteris evecta*) in the Jungle; the ferocious blue cycad (*Encephalartos horridus*) in the World Deserts; and the female sago palm (*Cycas circinalis*) in the Garden Court.

a greenhouse was added to the back of the building to accommodate the study and propagation of the live plant specimens. William Brackenridge was put in charge of caring for the plants, which he described as one of the "most extensive and varied botanical collections." More than 500 species comprising some 1600 specimens had been placed in pots. These marvelous live plants from around the world, including a vessel fern from New Zealand and a red gloxinia from Brazil, renewed interest in a national botanic garden. In 1850, when the Patent Office was enlarged, Congress appropriated $5,000 to relocate the greenhouse. By the end of that year the Botanic Garden was once again established at the foot of the Capitol.



(above right)

Commodore Matthew Perry (1794–1858).

Smithsonian Institution Archives

A distinguished naval officer, Commodore Perry is best known for his expedition to Japan from 1852 to 1855, which resulted in the 1854 treaty that permitted American ships to use Japanese ports and, therefore, opened the country to Western trade and influence. During the voyage, Perry's ships collected plants from China, Japan, and other stops in Asia.

(above left)

***Two storm-tossed ships of Perry's squadron in Bay of Odawara, Japan, 12 February 1854*, by William Heine.**

Smithsonian Institution Archives

(left)

Four plants collected during the Perry Expedition, drawings by William Heine.

Smithsonian Institution Archives

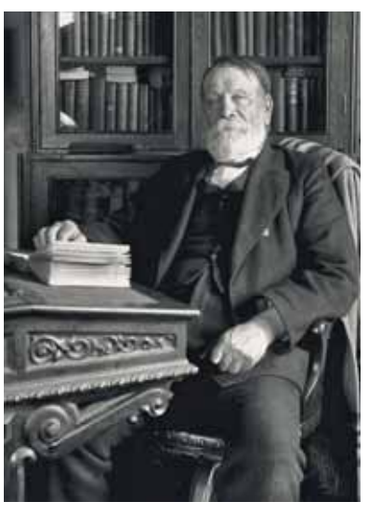
These sketches by the official artist of the Perry Expedition, William Heine, show four of the plants collected during the voyage: mangosteen and areca nut from Singapore (top left); black pepper from Singapore (bottom left); and nutmeg from Ceylon (near left).

The Botanic Garden Flourishes

In the 1850s, Washington was a growing city with 40,000 inhabitants. Construction was under way on the Smithsonian Institution, the Washington Monument, and the new wings of the Capitol. The Botanic Garden, with a new greenhouse built at the site of the previous Columbian Institute garden, occupied ten acres on the Mall near the Capitol. The small Gothic greenhouse with its exotic plants from distant countries was becoming an attraction in the city. In 1856, Congress officially named the United States Botanic Garden and placed it under the specific jurisdiction of its Joint Committee on the Library with regular funding to nurture its growth.

William Brackenridge, whose careful stewardship of the expedition's rare plants enlarged the collection, continued to oversee the Garden as horticulturist. In 1853, he hired a young Scotsman, William R. Smith, to start work as a gardener. Trained at the Royal Botanic Gardens at Kew, England, Smith brought experience and determination to his position. One of his first tasks at the Botanic Garden was to prepare a comprehensive catalog of its plants. In the introduction to the catalog, Smith notes that "the majority of the plants in this list are the results of the United States Exploring Expedition.... Mr. Brackenridge by a judicious system of exchanging has obtained many important additions. Several of the plants first discovered by the expedition are now found wherever an exotic collection exists."

New explorations, including the voyage of Commodore Matthew Perry in 1852, brought more exotic plants to Washington.



(above)

Tropical Garden outside the Conservatory, ca. 1880.

Architect of the Capitol

(left)

William R. Smith (1828–1912) by Frances Benjamin Johnston, photograph, ca. 1900.

Library of Congress, Prints and Photographs Division

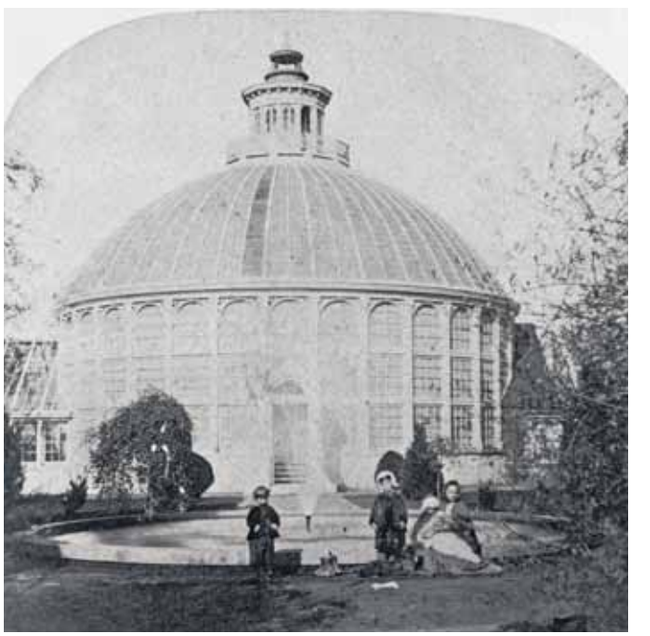
During his nearly sixty-year tenure, William Smith was a remarkable presence on the Mall, where he lived in a small brick cottage near the greenhouses. A Scotsman, Smith amassed the world's foremost collection of the works of poet Robert Burns. He would often entertain members of Congress who strolled down the hill to visit by reading from his beloved books. He died in 1912, weary of fighting a new plan for the Mall that proposed relocating the garden and destroying its memorial trees.

(opposite)

The central pavilion of the Botanic Garden Conservatory, *Harper's Weekly*, June 26, 1869.

Library of Congress, Prints and Photographs Division

Visitors flocked to the glass rotunda on the Mall to view more than 300 palms and other exotic plants. The dramatic circular staircase concealed a brick chimney, part of an innovative heating system to protect the plants.

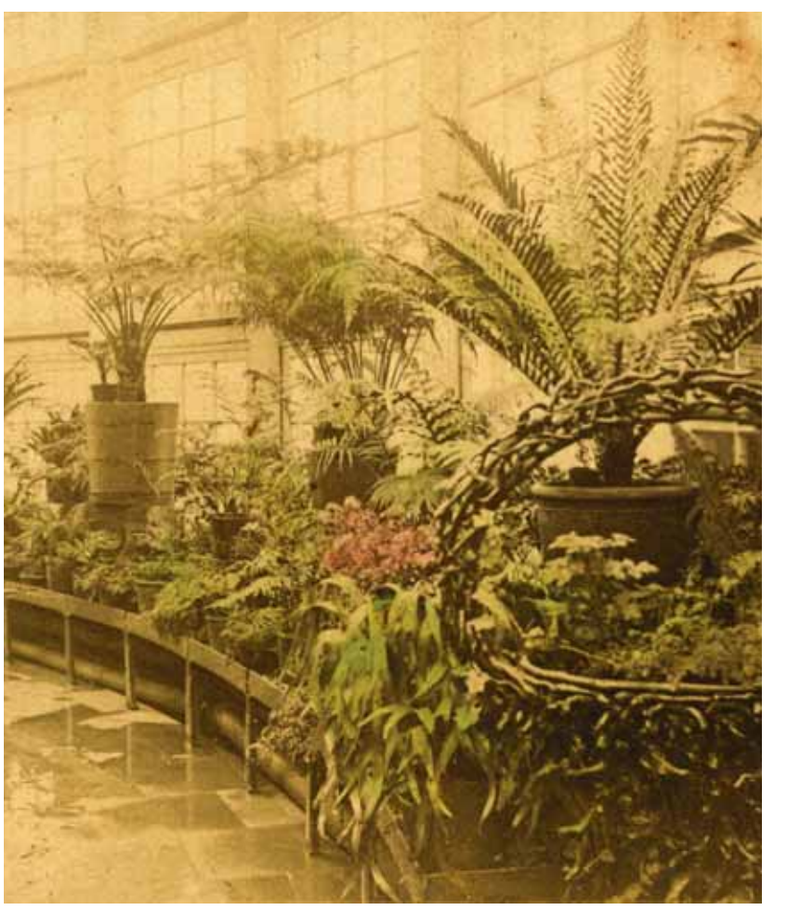


(above right)

Children in front of the Palm House, ca. 1870.

Architect of the Capitol

Children pose reluctantly for their portrait in front of the popular Palm House. Note the doll carefully propped against the fountain.

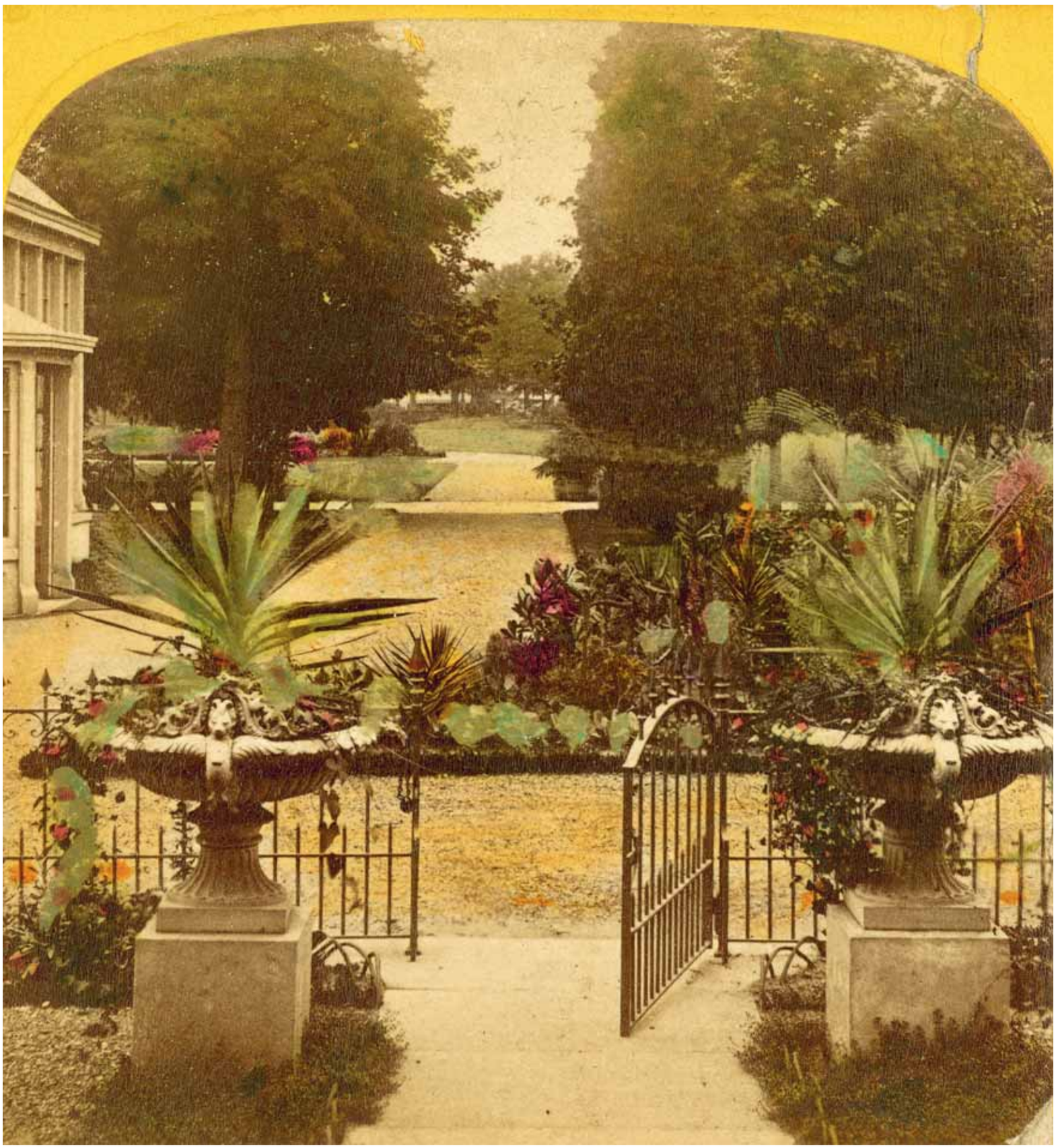


(below right)

Interior of the Palm House, ca. 1870.

Architect of the Capitol

Plants in the Botanic Garden at this time included palms, ferns, and cycads.



In 1855, Congress appropriated $1500 for "the erection of a suitable house for the plants recently brought from Japan for the United States." Larger greenhouses were built to display the expanding collections and to study and propagate new plants. Smith was appointed the first superintendent of the Botanic Garden in 1863 and held the post until his death in 1912.

Smith oversaw an era of tremendous expansion at the Garden. He worked to broaden the collection while distributing the Garden's sought-after seeds across the country. During his tenure, the Botanic Garden began to gain national prominence as residents and visitors alike came to admire its beautiful gardens and unusual plants. The Conservatory's rotunda, built in 1867, contained more than 300 magnificent palms as well as a variety of plants from Asia, Madagascar, New Zealand, Panama, and

(opposite)

Exterior of the Botanic Garden, ca. 1890.

Architect of the Capitol

This rare photograph of outdoor plants reveals the lush grounds of the Botanic Garden during the Victorian era. An 1875 description in *Keim's Illustrated Handbook of Washington and Its Environs* states that there were "two main entrances for pedestrians.... Each entrance consisted of four marble and brick piers, with iron gates." The Garden comprised ten acres "surrounded by a low, brick wall, with coping and iron railing, and [was] laid out in walks, lawns, and flower-beds."

(above)

The U.S. Capitol, 1906.

Library of Congress, Prints and Photographs Division

The Mall in 1906 was crowded with trees, paths, streets, and railroad tracks. The round dome of the Botanic Garden Palm House is just visible among the trees in front of the Capitol.

South America. The east and west wings featured plants from such exotic locations as the South Seas, China, and the East and West Indies. A separate conservatory housed a lecture hall, or botanical classroom, that could accommodate more than 100 students.

Changes throughout the Twentieth Century

As the nineteenth century ended, the U.S. Botanic Garden was serenely ensconced at the east end of the Mall near the Capitol, surrounded by lush gardens and mature memorial trees. But the new century brought a fresh vision for the city of Washington. A movement was begun to transform the capital into a city worthy of its international stature and to restore the grandeur of Pierre L'Enfant's original ideas. In 1901, under the direction of the Senate's McMillan Commission, a new plan was drawn that would create an open Mall between the Capitol and the Washington Monument. The centerpiece of the new design was a memorial to Ulysses Grant to be placed at the foot of Capitol Hill. The Botanic Garden and its greenhouses, however, obstructed the vista and impeded placement of the monument. The Botanic Garden would have to be moved.

Many Washingtonians, among them congressmen and other government officials, openly opposed the move because it meant uprooting the magnificent trees. The public outcry delayed the inevitable for 20 years. When the Botanic Garden was finally relocated in the early 1920s, more than 200 trees on the grounds were destroyed, and the greenhouses were dismantled.

(opposite)

Botanic Garden, ca. 1920.

Library of Congress, Prints and Photographs Division

Mature memorial trees, many of them planted by congressmen and senators, surrounded the Botanic Garden at the turn of the century. Among the more notable specimens were a mossy-cup oak (*Quercus macrocarpa*) planted in 1863 by the Hon. J.J. Crittenden, a Kentucky congressman, and the Garfield Memorial Tree, a mimosa (*Albizia julibrissin*), planted by the Masons after the death of President James Garfield in 1881. Several American elms (*Ulmus americana*) were of special interest since they had been propagated from the roots of the Washington elm, a tree that once grew on the Capitol grounds. Destruction of the trees was at the heart of the controversy over relocating the Botanic Garden to make room for the Grant Memorial.

(above)

Cornerstone laying of the new Botanic Garden, 1931.

Architect of the Capitol

After years of debate, it was decided to move the Botanic Garden to its present site on Maryland Avenue. At the cornerstone laying, Senator Simeon C. Fess, Chairman of the Joint Committee on the Library, holds the trowel. The other gentlemen present are, from left to right: Horace D. Rouzer, Assistant Architect of the Capitol; George W. Hess, Director of the Botanic Garden; Eugene Pugh of the George A. Fuller Co.; and David Lynn, Architect of the Capitol.

(opposite)

Botanic Garden interior, ca. 1940, by Theodor Horydczak.

Library of Congress, Prints and Photographs Division

Plants reach for the light in the Palm House of the new Conservatory after its completion in the late 1930s.

(above)

Botanic Garden, ca. 1970.

Architect of the Capitol

(above)
Workers remove plants from the Garden Court, 1997.
U.S. Botanic Garden

(right)
A crane begins to dismantle the Palm House, 1992.
U.S. Botanic Garden

To the good fortune of Washington's residents and its many visitors, the Garden was moved just a short distance away, to the area bordered by Maryland Avenue, First Street, and Independence Avenue, where it still stands today. A new Botanic Garden Conservatory, with its spectacular glass and aluminum dome, was designed to incorporate the extensive plant collections and accommodate growing public interest. Constructed by the Architect of the Capitol and opened in 1933, it contained eight garden rooms under glass, totaling 28,944 square feet of growing space.

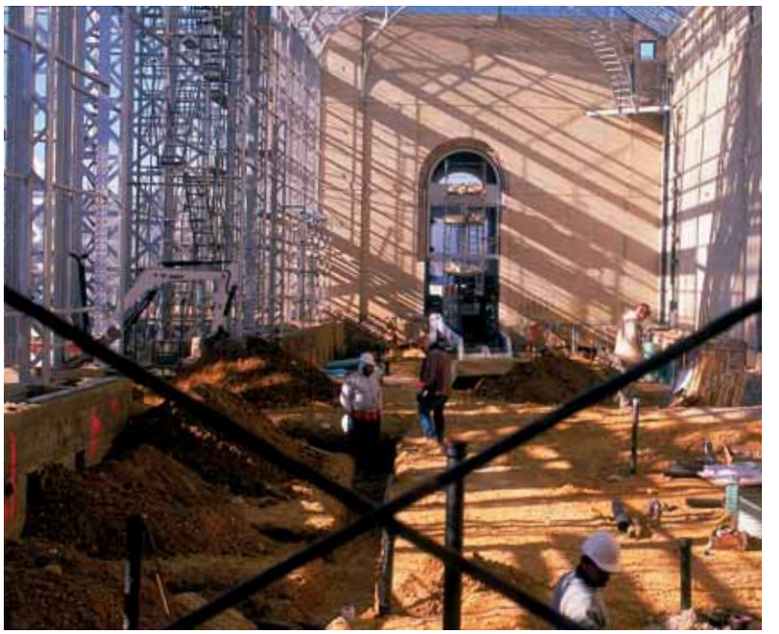
The formidable task of relocating the Garden had fallen on the shoulders of George Wesley Hess, who succeeded William Smith as director in 1913. During his long tenure, Hess expanded the mission of the Botanic Garden to focus on education as a vital component of the exhibits, while continuing plant collection and distribution. Hess was the first director to hold seasonal flower shows. He developed displays of medicinal plants, plants mentioned in the Bible, and plants whose products might be useful in the home. He encouraged teachers and students to visit the Garden, often conducting the tours himself.

After Hess retired in 1934, the Architect of the Capitol took over the administration of the Botanic Garden, establishing it as an important link to the Capitol complex. The day-to-day operations became the responsibility of the Assistant Director (named Executive Director in 1985). Throughout the century, many able assistant directors brought their own refinements to the Botanic Garden, including summer terrace displays, self-guided tours, and horticultural classes for the public. The plant

collections continued to expand, with thousands of plant specimens on display. The elegant Palm House and traditional seasonal shows brought in more visitors seeking the beauty and tranquility of the indoor and outdoor gardens.

Another major change was on the horizon for the Botanic Garden, however. In the 1970s, deterioration was discovered in the aluminum superstructure of the Conservatory. By 1989, it was clear that maintenance and repair would not be enough to restore the aluminum framing—the entire structure would have to be rebuilt. The Palm House, its roof declared unsafe, was dismantled in 1992, and the large historical and irreplaceable plants were shipped by truck to Florida for safe-keeping. In 1997, the entire building was closed to the public. It required approximately four months to remove the plants, some of which were sent for storage in the greenhouses of the U.S. Botanic Garden Production Facility. Others were donated to educational and nonprofit institutions, while cuttings were taken of plants that were too large or too difficult to remove.

The reconstruction lasted several years, and the staff of the U.S. Botanic Garden used that time to reaffirm its mission through development of an interpretive master plan that provided guiding principles for the renovated exhibits. When the Conservatory reopened in 2001, historic elements of the original building had been preserved and its glorious glass roofline had been restored, but the building was made fully accessible and state-of-the-art environmental systems were installed. The Botanic Garden was poised for the new century.



(above)
The rebuilt Conservatory begins to take shape, 2001.
U.S. Botanic Garden

(left)
The framework of the new dome is lowered into place, 2000.
U.S. Botanic Garden

The U.S. Botanic Garden Today

When the Botanic Garden first began to "collect, cultivate and distribute" specimens in the 1820s, the world of plants held tremendous mystery and hope. Though believing in the importance of plant study, the Founding Fathers could not have imagined how plant discoveries and plant science would transform humankind. Today, there is no better place to gain an understanding of the essential relationship of plants to people than the renovated U.S. Botanic Garden. Through living displays that feature the biodiversity of plants from around the world, the Botanic Garden brings to light the many benefits derived from plants, including oxygen, food, medicine, fiber, fragrance, shelter, and inspiration. From lush jungle to dry desert, from primitive ferns to fragrant orchids, the Conservatory's beautiful exhibits delight the senses while informing visitors about the irreplaceable value of plants.

In support of its innovative exhibits, the Botanic Garden provides workshops, lectures, tours, and demonstrations. Educational programs include botany and gardening, as well as hands-on activities that use plant materials. Renowned botanists and other specialists present lectures on conservation and other timely topics.

Partnerships are another important way for the Botanic Garden to share its resources and to extend its mission to a national audience. Present partners include the Smithsonian Institution, the U.S. Department of Agriculture (USDA), the Denver Botanic Gardens, the Chicago Botanic Garden, other domestic and international botanic gardens, the National Wildlife Federation, the National Gardening Association, and the Corcoran College of Art + Design. With each partner, the Botanic Garden plans outreach programs that include exhibits, educational programs, lectures, and conservation activities.

(above)

Docent with discovery cart.

Volunteer docents are indispensable at the Garden. They conduct tours, help with record-keeping and maintenance, and circulate the discovery carts that contain artifacts and activities related to the exhibits.

(opposite)

A nourishing environment.

State-of-the-art environmental systems in the renovated Conservatory enhance plant growth, permitting the inclusion of a wide range of plants in the displays. Each of the 12 rooms now has its own distinct environment with controls augmented by custom shades for light management, mists for cooling and humidity control, and automatic venting.

Plant Collections

(above)

Plants of Hawaii.

An exceptional collection of rare and endangered Hawaiian plants was given to the U.S. Botanic Garden in 2003. Loss of habitat and invasion by exotic species threaten these plants on their native islands. By adding rare plants to the permanent collections, the Botanic Garden can preserve, propagate, and display them, educating visitors about their plight.

(right)

Plant tags.

Keeping track of so many plants is a challenge, but an accurate database is necessary for cultivation, conservation, and research. When acquired, each plant is documented and tagged with its scientific name, common name, description, range, and source. Its physical location in the collection is also noted. The information is used to retrieve plants for display, follow plant propagation history, and maintain documentation on rare and endangered plant populations.

Promoting botanical knowledge is an important part of the Botanic Garden's mission, and maintaining an ordered collection of plants is essential to that end. The Botanic Garden currently cultivates more than 13,000 plants, which are used for exhibition, study, and exchange with other institutions. The Garden's noteworthy collections include economic plants, medicinal plants, orchids, carnivorous plants, cacti and succulents, bromeliads, cycads, and ferns. Strict criteria have been established to build the modern collections, especially the medicinal plants and orchids, so that they represent a broad diversity of species.

Conservation and CITES

When the U.S. Exploring Expedition set off in 1838, plant discovery was part of its mission. The variety of plants seemed limitless, and there was unbridled enthusiasm to collect and put to good use as many plants as possible. Today there are still many undiscovered plants with unresearched potential, but wild habitats all over the globe are disappearing. We may never know what valuable medicine or new source of nutrition has been lost because a plant has become extinct.

The U.S. Botanic Garden is committed to sustaining biodiversity through partnerships, education, preservation, and cultivation. In response to the targeted conservation initiatives developed by Botanic Garden Conservation International in 2000, the U.S. Botanic Garden is developing a conservation program. Exhibits, lectures, and hands-on activities reach out to the public with the essential message that plants and their habitats are critical to human survival. The U.S. Botanic Garden also serves as an important plant rescue center for orchids and succulents through its cooperation with CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The goal of CITES is to prevent species from being driven to extinction by uncontrolled exploitation. When rare or endangered species are confiscated at U.S. borders, they are often sent to the U.S. Botanic Garden for safekeeping. These plants are nurtured in the greenhouses of the U.S. Botanic Garden Production Facility, brought to the Conservatory for exhibition, and sometimes propagated for exchange with other institutions.

(above)

Rare orchids growing at the Production Facility.

(left)

Vietnamese orchid (*Paphiopedilum vietnamense*).

U.S. Botanic Garden

In compliance with CITES, authorities seized this rare Vietnamese orchid that was brought into the U.S. without proper documentation. Turned over to the Botanic Garden by the U.S. Fish and Wildlife Service (FWS), it was added to the endangered plants collection. The Garden is working with FWS and a commercial grower to produce marketable quantities of this orchid for sale and distribution to other public gardens. Cultivating endangered plants and placing them on the market can reduce demand and remove the incentive for collecting them from the wild.

Production Facility

Greenhouses to shelter and propagate plants have been part of the U.S. Botanic Garden since the 1850s, when Congress first appropriated funds for its construction. As the Botanic Garden grew in the shadow of the Capitol, more greenhouses were added to accommodate the expanding collections. When the Botanic Garden was moved the short distance from the center of the Mall to Maryland Avenue in the 1930s, production greenhouses were built adjacent to the Conservatory. By 1956, the greenhouses had deteriorated and Congress authorized their demolition. Plant propagation and storage were relocated to Poplar Point, just two miles away in Anacostia, on land that had been acquired in 1926 for horticultural production purposes. Eventually, 24 greenhouses supported the Botanic Garden and horticultural production for the Capitol complex. In the 1980s, the Poplar Point site was traded to the Washington Metropolitan Area Transit Authority (WMATA) for construction of a subway station. WMATA, in turn, provided the Botanic Garden with a state-of-the-art greenhouse facility on 25 acres just four miles away. The new Production Facility opened in 1994. With 85,000 feet under glass, it is the largest such facility supporting a botanic garden in the United States. Its computerized environmental controls provide the flexibility to grow a wide variety of plants for public display and to landscape Capitol Hill.

(opposite)

Venus' flytrap seedlings (*Dionaea muscipula*).

Venus' flytrap seedlings flourish at the Production Facility in preparation for summer display in the Southern Exposure garden.

(above)

Amorphophallus odoratus.

(right)

The Production Facility in Washington, D.C.

Architect of the Capitol

(above left)

Cameron Elm (*Ulmus americana*).

This tiny tree was propagated from a cutting of the Cameron Elm, located on the House side of the U.S. Capitol. The tree was removed in 2004 when decay in the trunk threatened its structural integrity, presenting a public danger. Estimated to be between 125 and 150 years old, the elm was first slated for removal in 1875 when Frederick Law Olmsted was implementing his plan for the Capitol grounds. At that time, Senator Simon Cameron of Pennsylvania stopped the crew from cutting down the tree, which was later named for him. The progeny from this elm and a number of other historic trees now growing at the Production Facility will be replanted on Capitol Hill.

(above right and opposite)

Rows of plants for the Capitol.

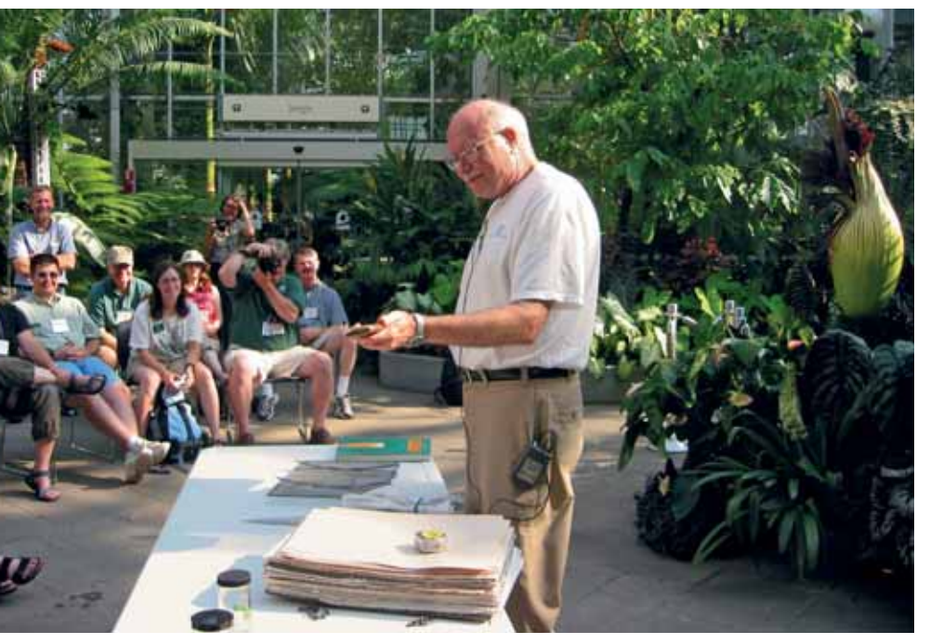
Since the nineteenth century, the Botanic Garden has cultivated and provided plants for the beautification of the Capitol complex.

(left)

Seasonal plants.

Earthstars (*Cryptanthus fosterianus*) at the Production Facility await installation in the annual Christmas extravaganza at the Conservatory. Seasonal exhibits, popular since the early 1900s, require careful planning and extensive cultivation of special plants.

The U.S. Botanic Garden and the Smithsonian



(above)

Dissection of the titan arum (*Amorphophallus titanum*).

Smithsonian botanist Dr. Dan Nicolson prepares to dissect the Botanic Garden's titan arum in front of a group of visiting science teachers. The dissected and pressed plant was preserved at the Smithsonian as a herbarium specimen.

(left)

Ginger (*Smithatris myanmarensis*).

Smithsonian scientists launch expeditions to remote areas of the globe, where they continue to discover new species of plants, such as this ginger identified by Dr. John Kress in Myanmar. These rare plants are cultivated at the Botanic Garden Production Facility and put on display in the Conservatory.

Throughout its travels, the U.S. Exploring Expedition of 1838–1842 sent tons of collected material to Washington whenever its ships met other ships in port. By the end of the voyage, these amazing collections of natural specimens—birds, animals, insects, fossils, minerals, shells, and marine life, along with seeds, nuts, and living and dried plants—were housed at the U.S. Patent Office. The monumental task of preserving the materials required government support, and a good deal of lobbying took place to get the funding for cataloging and publication of the discoveries. Through the hard work of a group of Washington citizens and a generous bequest from James Smithson, a little-known British citizen, the expedition's bounty became the core natural history collection of the Smithsonian Institution, established by Congress in 1846.

The plant materials from the expedition were divided: preserved plant specimens (called herbarium specimens) and botanical art went to the Smithsonian; live plants and propagation specimens went to the Botanic Garden. In the years since, these two independent institutions have benefited and complemented one another. Today a formal relationship recognizes the common origins and unifies the strengths of both entities. The Department of Botany at the National Museum of Natural History, Smithsonian Institution, is an international research and education center in the botanical sciences, specializing in plant taxonomy and classification. It also has become an international center for plant biodiversity studies and conservation. The U.S. Botanic Garden is a major botanical exhibition center that displays the biodiversity of world plants to more than 750,000 visitors each year. It also oversees a twenty-five-acre production nursery facility where live plants can be cultivated and studied. The Botanic Garden is able to educate visitors about the Smithsonian's botanical work and plant collections by highlighting the actual plants that result from the exploration and conservation efforts of Smithsonian scientists. Together these institutions are developing a number of programs for research and exhibitions.

The U.S. National Herbarium

The botanists on the U.S. Exploring Expedition could not bring back live specimens of every new plant they encountered. Only 250 live plants survived the grueling four-year voyage. Instead they preserved plants by cutting, drying, and pressing the essential parts of each one. These plant materials are called herbarium specimens, and they are used by botanists to identify and classify different plant groups. The expedition's botanists pressed approximately 50,000 specimens representing 10,000 species, and those herbarium sheets formed the inaugural collections of the U.S. National Herbarium at the Smithsonian Institution. The Herbarium now contains 4.8 million preserved plant specimens from around the globe. More than 100,000 of these are "types," the original specimens of the plants whose scientific descriptions are the basis for naming new species.

(above)

The U.S. National Herbarium.

U.S. National Herbarium, Smithsonian Institution

(above right)

Herbarium press preserves parts of the titan arum.

(right)

Iliau (*Wilkesia gymnoxiphium*).

U.S. National Herbarium, Smithsonian Institution

The original herbarium specimen of *Wilkesia* was discovered on the Hawaiian island of Kaua'i during the U.S. Exploring Expedition of 1838–1842.

Windows on the Mall

An Architectural History of the U.S. Botanic Garden

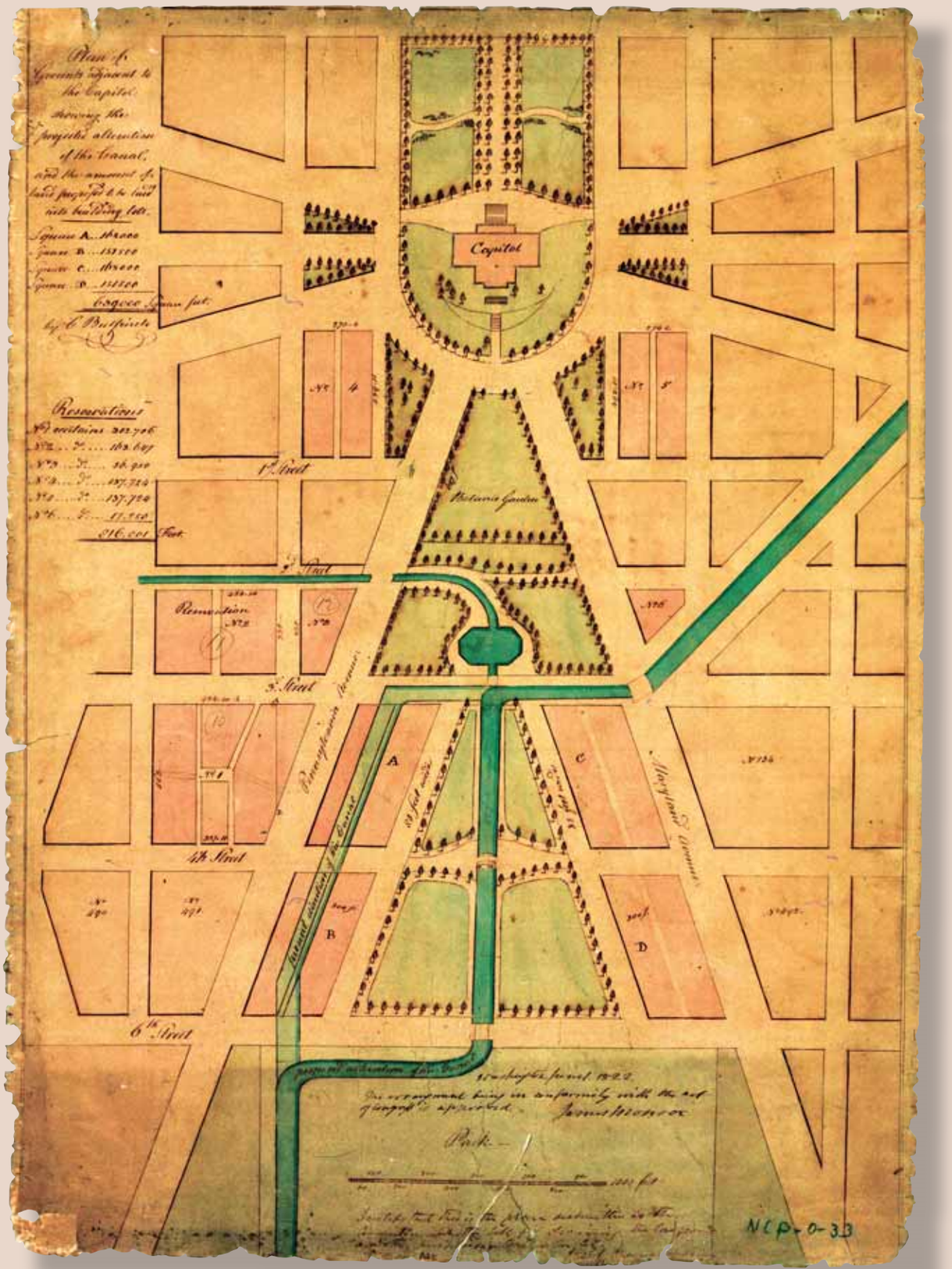
By William C. Allen

The U.S. Botanic Garden stands at the foot of Capitol Hill overlooking the eastern end of the National Mall. Its tall arched windows look out onto the sloping grounds of the Capitol and the great white dome that presides so majestically over the capital city. Straight ahead is the Grant Memorial with its brooding statue of the Civil War general flanked by representations of cavalry and infantry—a superb composition in bronze and marble that shimmers in the waters of the nearby reflecting pool. Farther down the Mall are the remarkable museums that form the Smithsonian Institution. Nearby is the National Gallery of Art, housed in two marble buildings that are themselves admirable works of art. Standing over the western end of the Mall are the Washington Monument and Lincoln Memorial, two strikingly different yet equally powerful tributes to two great leaders. Education, preservation, beauty, and memory are themes that are common to all structures lining the national Mall.

The Mall is Washington's "monumental core." Although its physical appearance has evolved over the years, it was created by the original city plan drawn in 1791 by the French-American artist-engineer Pierre Charles L'Enfant. L'Enfant's plan of America's new capital—to be laid out on what had been Tidewater Maryland farmland—had all the accouterments of a great city: broad avenues, vast public plazas and squares, and prominent sites for national buildings such as the Capitol, the President's House, a national church, a national bank, a market, and a theater. The plan called for an immense city covering eleven square miles at a time when London covered just eight.

(above)
View of the Botanic Garden on the Mall from the Capitol dome, ca. 1900.
Architect of the Capitol

(opposite)
Capitol dome viewed from the canopy walk in the Conservatory Jungle.


Plan of Grounds Adjacent to the Capitol
Capitol
Reservations
1st Street
2d Street
3d Street
4½ Street
6th Street
Botanic Garden
Reservation
Pennsylvania Avenue
Maryland Avenue
A
B
C
D
Park
NCP-0-33

L'Enfant's plan was the fulfillment of his patron's fondest wishes for the city that would bear his name. George Washington had first envisioned a new city to serve as the nation's capital even while the outcome of the war for independence was still uncertain. He wanted it located on the banks of his beloved Potomac River, which he foresaw as the principal route to the bounty that lay west of the Appalachian Mountains: in Washington's view the Potomac was a prime locale for commercial as well as for political activities. In 1790 Congress had granted the president the authority to select the specific site for the seat of government along the Potomac and created a three-man board of commissioners to oversee preparation of the city for the installation of government ten years thereafter. At this time Washington began to focus on three things that would make the city a success: grandeur, permanence, and usefulness. Grandeur in the city's plan and in the public buildings would make the place irresistible to those in Congress who would otherwise be reluctant to forgo the comforts of New York or Philadelphia. It would supersede other commercial centers and state capitals in the affections of the American people and develop into a truly national metropolis that would help bind far-flung states into a stronger, more unified nation. Washington also valued the idea of a permanent capital that would not be relocated on a whim—a stable and secure location from which to govern a stable and secure nation. After the wanderings of Congress during the Revolutionary War period, permanence would be welcomed. As for usefulness, like most Americans, Washington valued practicality above almost any other virtue. Wherever possible, he sought to combine it with grandeur. While considering the ambitious idea of a domed Capitol, for instance, he said that he liked the concept of a dome because it would give the building grandeur and provide a useful place to hang a bell or mount a clock.

The idea of a botanic garden as a useful and ornamental part of the capital

(above)

View of the Capitol at Washington, by William Henry Bartlett, 1837.

Architect of the Capitol

The Botanic Garden was located south of Pennsylvania Avenue (right), yet it appears indistinguishable from the Capitol grounds. Fashionably dressed sightseers stroll past the site of the garden on their way to the Capitol.

(opposite)

Plan of Grounds adjacent to the Capitol, by Charles Bulfinch, 1822.

Cartographic and Architectural Branch, National Archives

Flanked by Pennsylvania and Maryland Avenues, the original site of the United States Botanic Garden was a wedge-shaped plot of ground at the foot of Capitol Hill. Its design can only be surmised from vague depictions on maps such as this one by the architect in charge of completing the Capitol, Charles Bulfinch.

(above)

Wye Plantation Orangery, Talbot County, Maryland.

Library of Congress, Prints and Photographs Division

In the eighteenth century, greenhouses and botanic gardens were rare private luxuries.

(opposite)

The Patent Office, daguerrotype by John Plumbe, 1846.

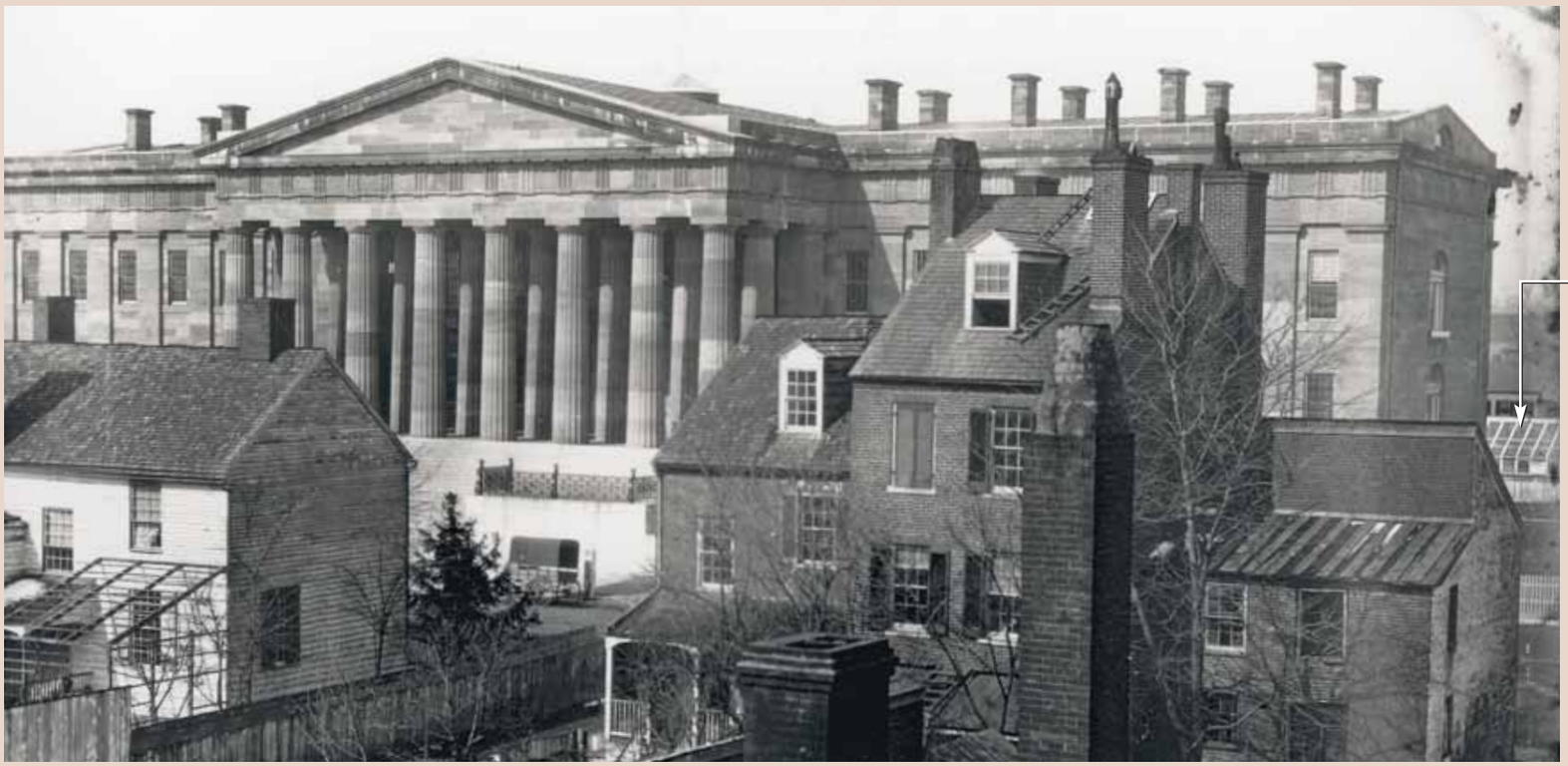
Library of Congress, Prints and Photographs Division

With its monumental Doric portico modeled after the Parthenon in Athens, the Patent Office was one of the great civic improvements made to Washington in the Jacksonian era. In this extremely rare early photograph, a small glass greenhouse, temporary home of the Botanic Garden, is visible to the right (see arrow). Plants from the U.S. Exploring Expedition were housed here until they were moved to the site of the original Garden near the Capitol.

was first articulated in 1796 when one of the city commissioners, Alexander White, wrote the president's strongest ally in the House of Representatives, James Madison, with a proposal to establish such a facility on the city's "pleasure grounds" (i. e., the Mall). The matter was apparently discussed among government leaders in Philadelphia and within a month Washington had written back with his approval. He was especially enthusiastic due to its possible relation with another favorite project—a national university. Washington suggested locating both facilities west of the President's House on a site overlooking the Potomac near the present-day State Department. If that location were inadequate, the president wrote, then perhaps a site overlooking the Anacostia River would be suitable. (L'Enfant had designated that site for a marine hospital.) A third possible location was the President's Square, but that was to be considered temporary unless private interests improved it with pleasure walks.

The potential locations that Washington suggested for a national botanic garden were all prominent, which suggests the significance he attached to it. Of the three locations, two were within walking distance of the President's House, which perhaps indicates that he considered the botanic garden as a potential amenity for the nation's principal residence. At Mt. Vernon, Washington had a substantial brick greenhouse (built in 1787) and a private botanic garden, in which he cultivated useful and rare plants for medicinal, agricultural, and ornamental purposes. Greenhouses were not common in America during the eighteenth century, but for wealthy planters like Washington, they seem to have been highly prized. One of the finest greenhouses to survive from that period is on Wye Plantation in Talbot County, Maryland, seat of the Lloyd family. Thomas Jefferson's greenhouse, still in service at Monticello, was integrated into the main residence just off his library and bedroom. The expense and scarcity of glass, however, put this luxury beyond the reach of most Americans.

The city that Washington had envisioned and that L'Enfant had mapped out on paper took generations to mature. Its development was retarded by the remoteness of the site; a perpetual shortage of workmen, money, and materials; and a reluctance in Congress to support improvements amid constant threats of removing the seat of government to Philadelphia or to the west. After British troops torched the public buildings during the War of 1812, only the irresistible force of Washington's memory could persuade the nation's legislators to keep the capital on the Potomac. The Capitol, the President's House, and the executive offices were



Botanic Garden Greenhouse, 1846.

restored on their original locations and according to the original designs that Washington himself had approved (albeit with inevitable modifications). New, monumental buildings for the Treasury Department, the Patent Office, and the Post Office were constructed in the Jacksonian era, which expanded upon the ideas of grandeur, permanence, and usefulness that were vital to the founder's vision. Improvements to city parks were slowly made, fenced to keep out wandering cattle and hogs, landscaped with flower-beds and meandering walkways, and occasionally ornamented with statuary. Although a rarity, some streets around the public buildings were paved. The city's growing pains had eased by the mid-nineteenth century, but it would still take years before a world-class capital emerged.

Not all of Washington's hopes for the city came to be: a national university, for instance, never materialized. Other things simply took time, and the U. S. Botanic Garden was a case in point. Although the idea for a botanic garden had been around for a quarter century, it did not come into being until 1820 when the Columbian Institute for the Promotion of Arts and Sciences was granted use of five acres for a garden on the Mall at the foot of Capitol Hill. The garden was enclosed with a board fence and contained a pond, paths, and planting beds. Despite membership that included presidents, senators, representatives, cabinet secretaries, and the Marquis de Lafayette, the institute suffered financially and from a lack of leadership: the Columbian Institute and its botanic garden went out of business in 1837. Except for vague and imprecise markings on historic maps, there are no visual records or remains of that garden.

In 1842 the garden was reincarnated in a small, unassuming greenhouse located behind the Patent Office. It was built to house materials collected by the U.S. Exploring Expedition of 1838–1842 but was torn down in just eight years to make way for a substantial enlargement of the building. In a happy coincidence,

(above)

The Crystal Palace, London, illustration, ca. 1851.

Library of Congress, Prints and Photographs Division

Although much smaller and less influential, the Botanic Garden's Gothic greenhouse was nonetheless related to Joseph Paxton's Crystal Palace in London, one of the principal monuments of iron-and-glass architecture.

(opposite)

Botanic Garden greenhouse, ca. 1860.

Smithsonian Institution

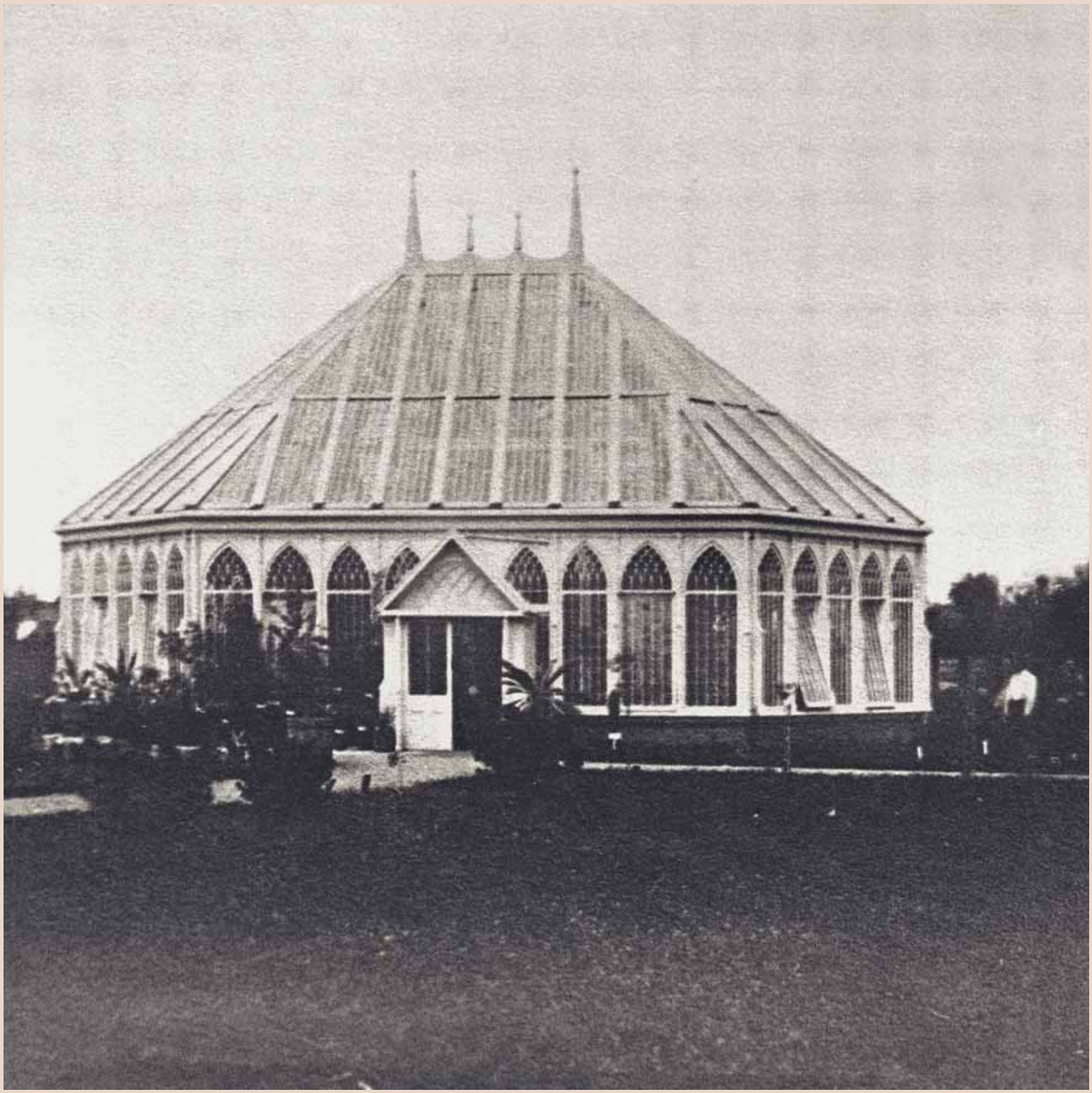
This is the earliest known close-up photograph of the first greenhouse located at the eastern end of the national Mall. The pointed arched windows and roof pinnacles provide the Gothic touches that were considered fashionable in the 1840s and 1850s.

however, the appearance of the greenhouse was documented by John Plumbe, who photographed Washington public buildings in 1846. While his camera was aimed at the Patent Office he also captured a charming array of brick and frame residential buildings in the foreground and a little greenhouse in the background. There appears to be no architectural pretense about the greenhouse, which consisted of a simple painted iron or wood frame holding large panels of sheet glass.

Congress appropriated $5,000 in 1850 to relocate the Botanic Garden. It was returned to the plot of ground on the eastern end of the Mall where the first garden had been located. The commissioner of public buildings had a greenhouse constructed, but little is known of its designer or builder. Credit is sometimes given to Thomas U. Walter, the architect of the Capitol extension, but his papers and other documents do not support the attribution. (In addition, the Botanic Garden greenhouse was most likely built a year before Walter moved to Washington.) From photographs, it is known that the new greenhouse was a more elaborate and a larger building than its predecessor behind the Patent Office: in plan it was an elongated octagon with Gothic sash and tall pinnacles along the ridge line. Although of a much smaller scale, it is nonetheless related to other, more stylish iron and glass conservatories such as the Royal Palm House (1848) at Kew Gardens near London, and is exactly contemporary with one of the great monuments of nineteenth-century glass architecture, the Crystal Palace (1850–1851) in London. All of these buildings depended on advances in structural iron and developments in casting and rolling glass, which made large, open, and naturally lit spaces possible.

During the Civil War era, the little Gothic greenhouse appeared forsaken at the bottom of Capitol Hill, surrounded by ill-kept grounds and the decrepit skeleton of the Washington Canal. Photographs taken of the Capitol from the west during the war years were intended to show the progress of the great iron dome rising above the rotunda, but they sometimes also captured the solitary Botanic Garden in the foreground. Happily, the Garden's prospects began to look up a few years after the Battle of Appomattox when additions transformed the little greenhouse into a Victorian conservatory of ample style and proportion.

In 1867 Congress made the first of a series of appropriations to enlarge the greenhouse at the Botanic Garden. The first appropriation of $35,000 stipulated that the new section would have a central dome and a wing designed by the architect of the Capitol extension, which had been approved by the Joint Committee on the Library. The architect, Edward Clark, was



1858

1860

(this page and opposite)

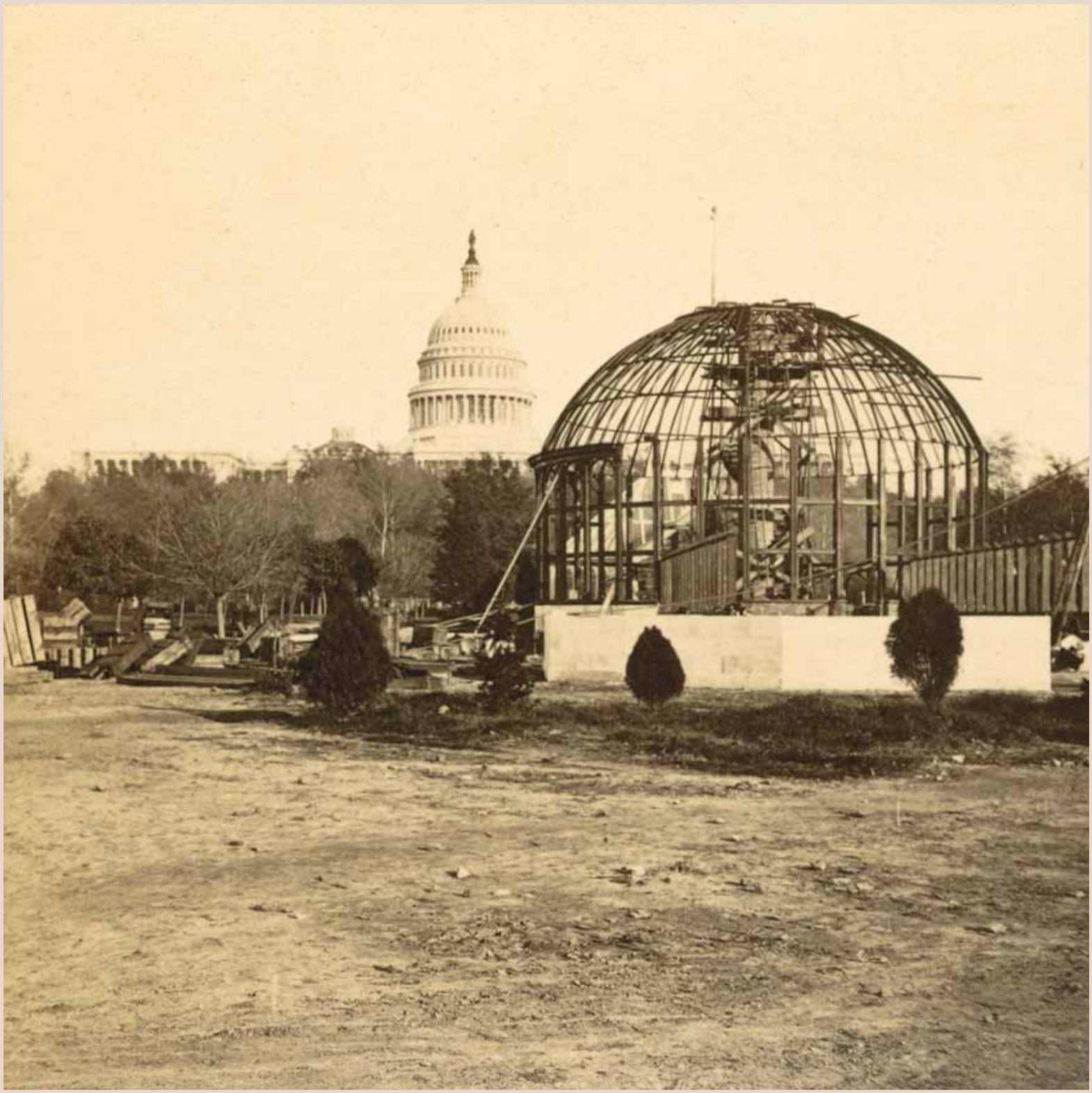
Views of the Capitol from the west, 1858, 1860, 1862, and 1865.

Architect of the Capitol

Although the purpose of these photographs was to show the progress of the iron dome rising above the Capitol's rotunda, the Botanic Garden is also seen flanked by the dilapidated Washington Canal. The garden's Gothic greenhouse and auxiliary structures were protected from wandering wildlife by a plain, sturdy wooden fence.

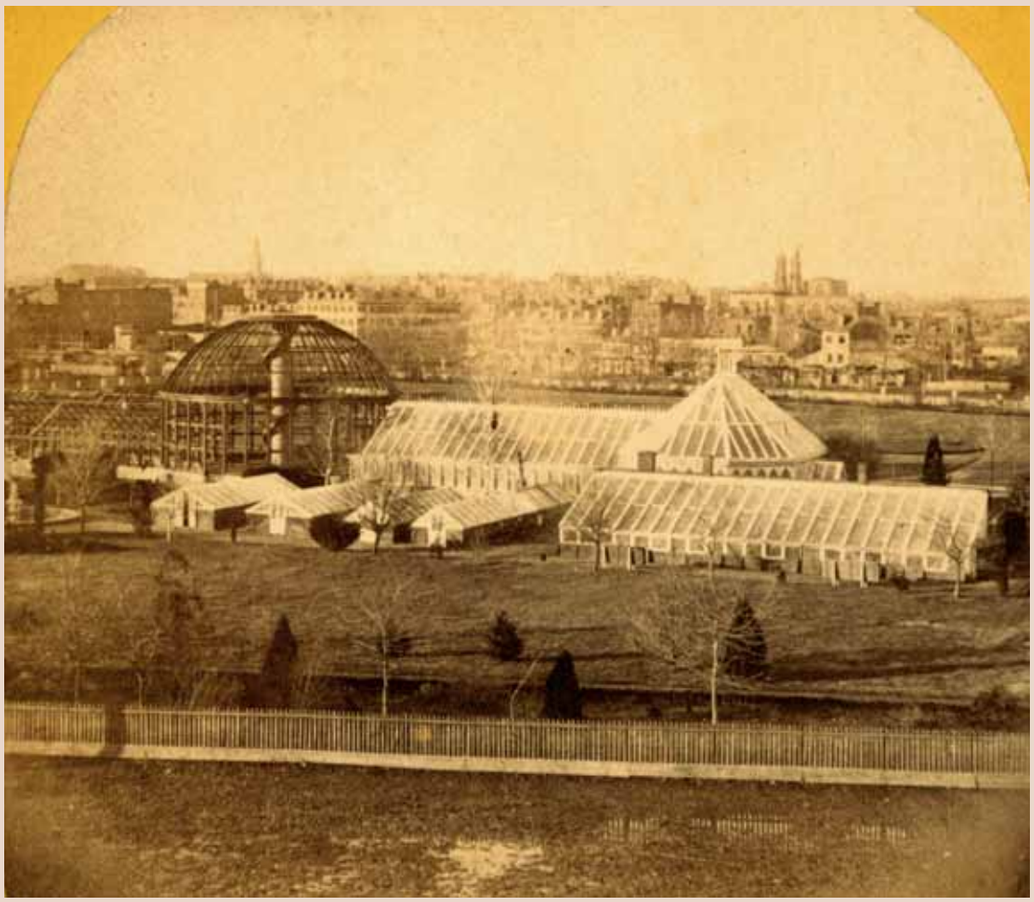
1862

1865



a former pupil and protégé of Thomas U. Walter, and he had taken over the Capitol extension office upon Walter's resignation in 1865. Clark had little of his old boss's genius for design, but he was capable of planning enlargements that were thoroughly respectable. In Clark's scheme the little octagonal greenhouse would form the eastern pavilion of a five-part conservatory. The next section would be a so-called parallelogram, or hyphen connecting the octagon with a new central rotunda. Two more building programs would be necessary to construct a matching parallelogram and a western octagon. Each section was constructed with iron posts, hinged iron sash, ventilators, hoisting gear, and cast plates for floor walks. Heat was provided by hot water pipes and a furnace that was connected to a round brick chimney that rose through the center of the rotunda. An iron stair wrapping the chimney allowed visitors a bird's-eye view of the interior. The rotunda and first parallelogram were built by the Architectural Ironworks of New York City in 1867–1868, while the west parallelogram and west octagon were constructed by Washington iron workers E. N. Grey and G. E. Noyes in 1872 and 1873, respectively.

Once the conservatory was completed, the grounds around the Botanic Garden were enclosed with an iron fence. Impressive brick and marble gates were



(this page and opposite)
Construction of the Botanic Garden rotunda and wings, 1867–1873.
Architect of the Capitol

(above)

The rotunda of the Botanic Garden's Conservatory, ca. 1880.

Architect of the Capitol

The main pavilion of the Victorian Conservatory, built in 1867, was the third of five sections. An observation platform allowed visitors to view the garden while the lantern disguised a large central chimney.

(opposite)

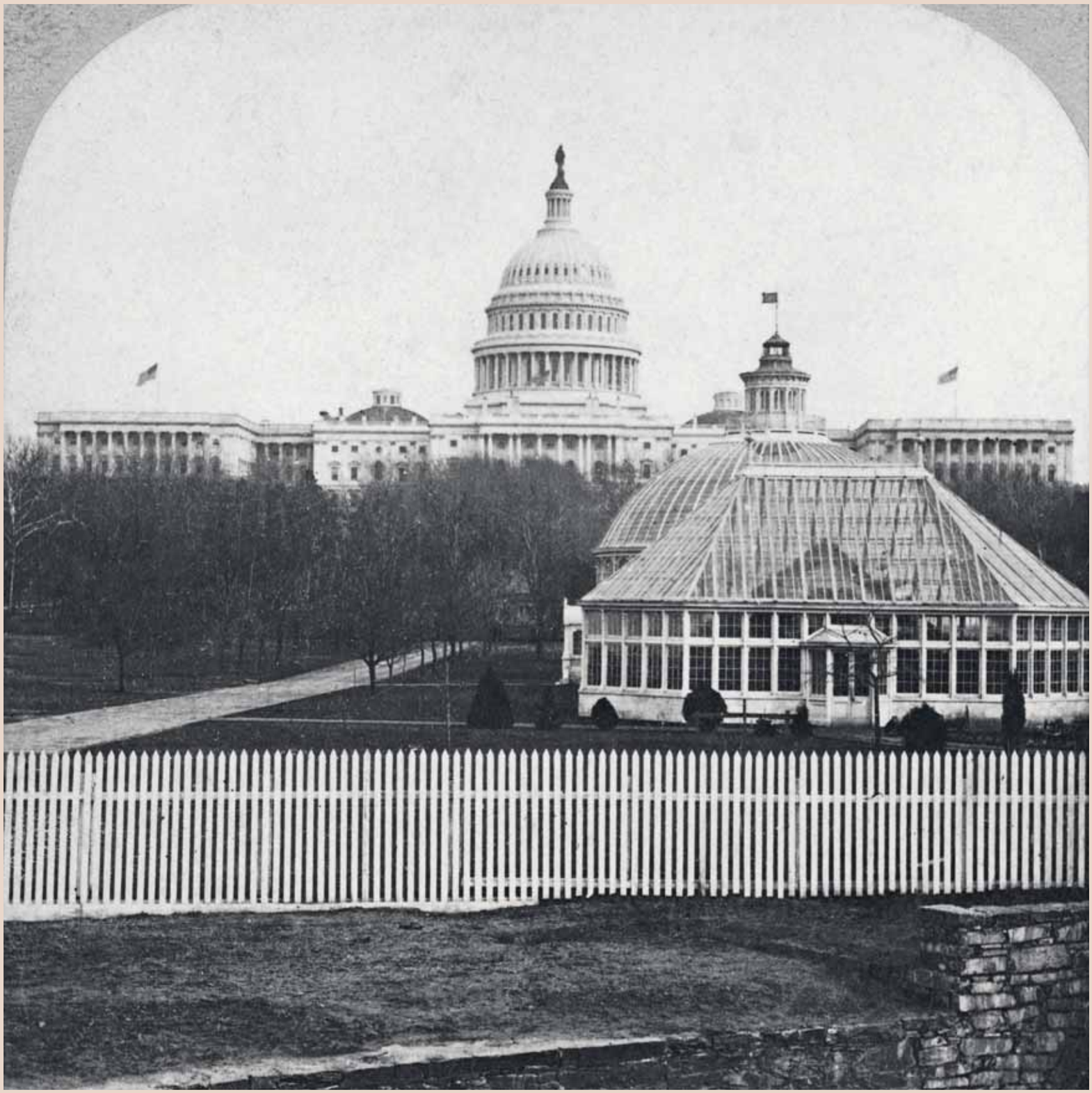
Botanic Garden Conservatory and west front of the United States Capitol, 1887.

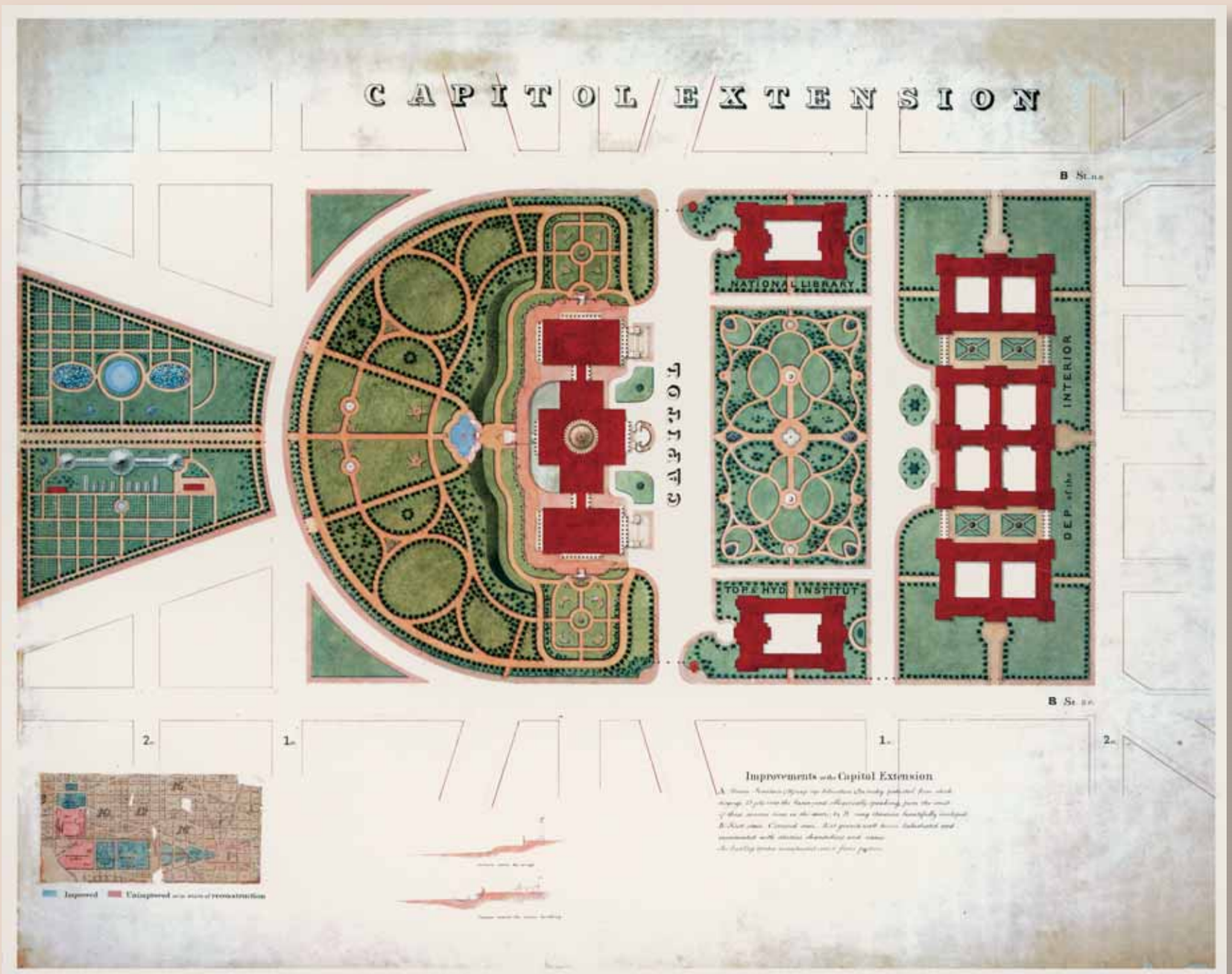
Architect of the Capitol

The close proximity of the garden to the Capitol is illustrated in this view from a stereoscopic image.

positioned along the streets that bordered the ten-acre property (Maryland and Pennsylvania Avenues between First and Third Streets, west). In addition to the conservatory, the Botanic Garden now consisted of two houses used as the superintendent's office and a seed house, two large greenhouses located near the office, eight propagating houses, and two old hot houses. In 1877 the government paid $6,000 for an iron fountain sculpted by Frédéric Auguste Bartholdi (later famous for the Statue of Liberty) that had stood at the Centennial Exhibition in Philadelphia. Landscape architect Frederick Law Olmsted, Sr., who was redesigning the Capitol grounds at the time, had learned that the fountain was available and recommended to the Architect of the Capitol that it be bought and placed in a suitable location. A new water basin was built opposite the conservatory's principal (north) front to receive the fountain. In 1885, it was illuminated by the addition of thirty-six gas lights.

While the Botanic Garden was being finished, the rest of the Mall was filling up with ever more disparate neighbors. After the Civil War, Congress had allowed several railroads to lay tracks across the Mall to let south-bound trains from the north (and vice-versa) speed through the city. Railroad stations were built on or adjacent to the Mall. In 1868 the

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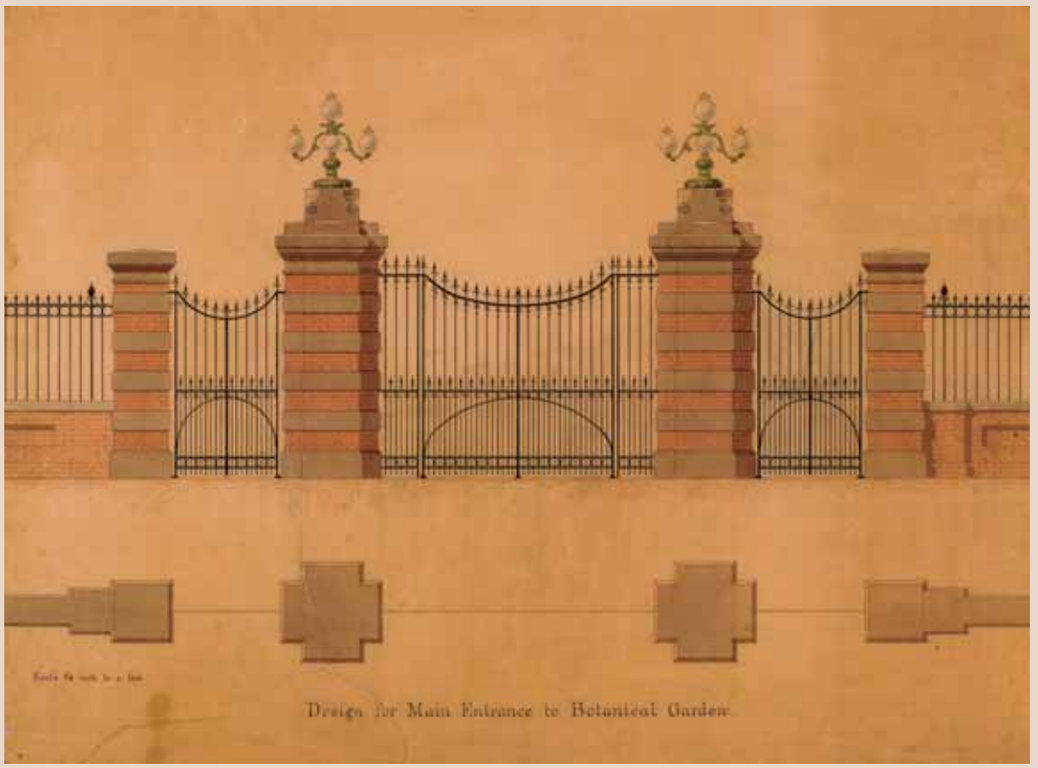
Improvements on the Capitol Extension
Improved
Unimproved

Department of Agriculture built a Second Empire–style headquarters on the Mall at Fourteenth Street. It was fronted by a formal French garden that juxtaposed itself against an existing Romantic (and overgrown) garden fronting its Smithsonian neighbor. Critics deplored the helter-skelter appearance and, as Washington approached its one hundredth anniversary as the nation's capital, professionals in the design field clamored for improvements and restoration. The Senate Committee on the District of Columbia created the McMillan Commission (named for its chairman, James McMillan of Michigan) to address the problems. Members of the commission included the architect Daniel Burnham of Chicago, the landscape architect Frederick L. Olmsted, Jr., and the sculptor August Saint-Gaudens. They became convinced that the national Mall had to be returned to L'Enfant's original vision: an unencumbered open space lined with classical buildings. Among other things, this meant clearing extraneous structures off the Mall, including the U. S. Botanic Garden.

While relocating the Botanic Garden was a major step towards restoring the Mall, the Garden did not move far. It was simply shifted a few hundred feet south to a new site overlooking its former setting, which was slated to become the site of the Grant Memorial, authorized by Congress



(above)

Design for Main Entrance to Botanic Garden, Edward Clark, architect, ca. 1874.

Architect of the Capitol

(left)

View of the West Front of the Capitol from the Botanic Garden gates, ca. 1890.

Architect of the Capitol

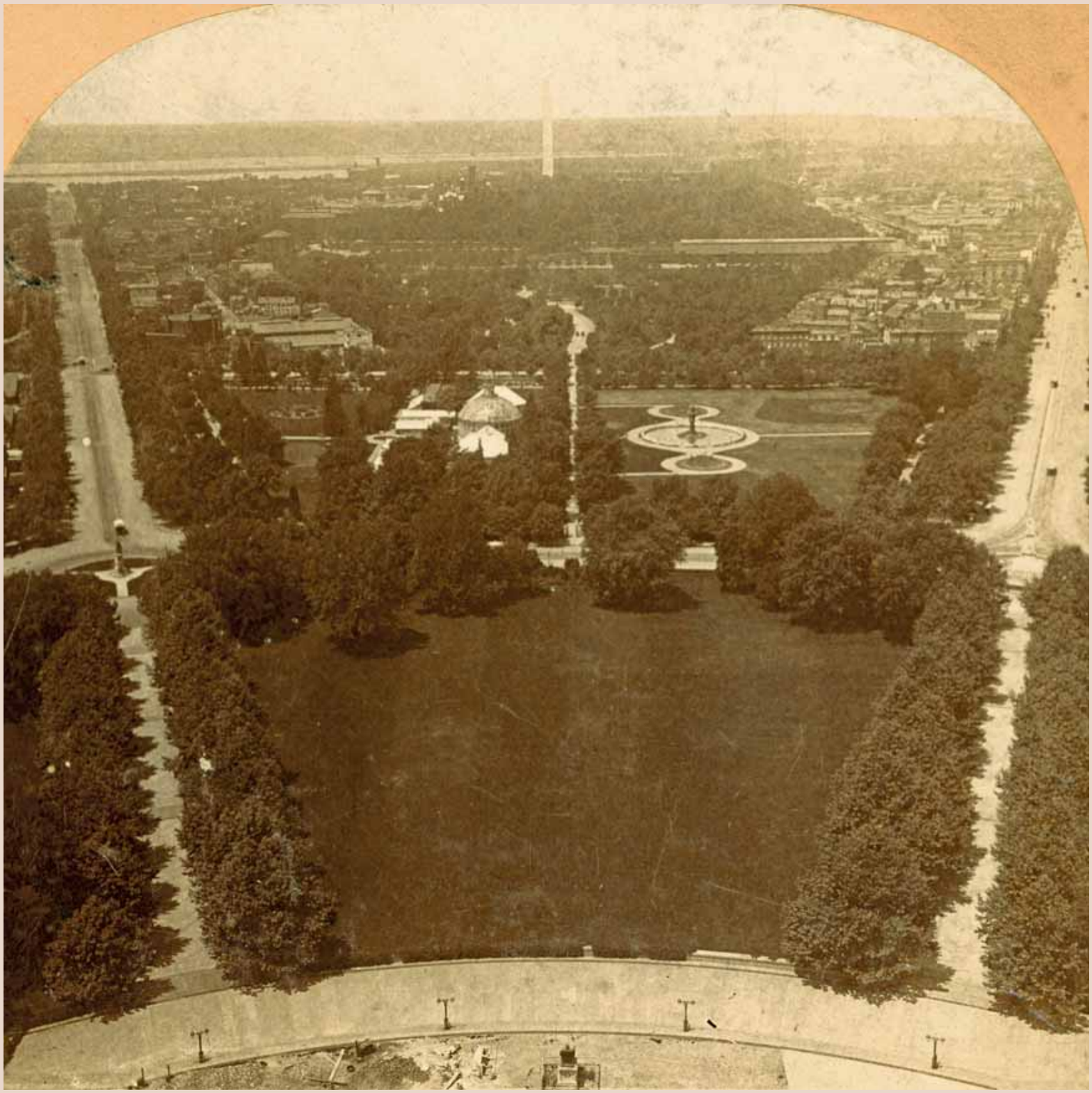
To complement the enlarged and upgraded Conservatory, the Architect of the Capitol designed a handsome iron fence and entrance gates for the Botanic Garden.

(opposite)

Improvements at the Capitol Extension, T. Enthoffer, 1871.

National Archives

While the main purpose of this drawing was to show landscape improvements intended for the Capitol grounds, the artist also illustrated the site plan of the U. S. Botanic Garden at left center.



(opposite)

View of the Mall, Maryland Avenue, and Pennsylvania Avenue from the Capitol, ca. 1890.

Architect of the Capitol

Prominently displayed in the center of the Mall is the Bartholdi Fountain, which the government purchased in 1877 on the recommendation of Frederick Law Olmsted, Sr. To the left (south) of the fountain is the rotunda of the Garden's Conservatory.

(above)

The Botanic Garden, ca. 1910.

Architect of the Capitol

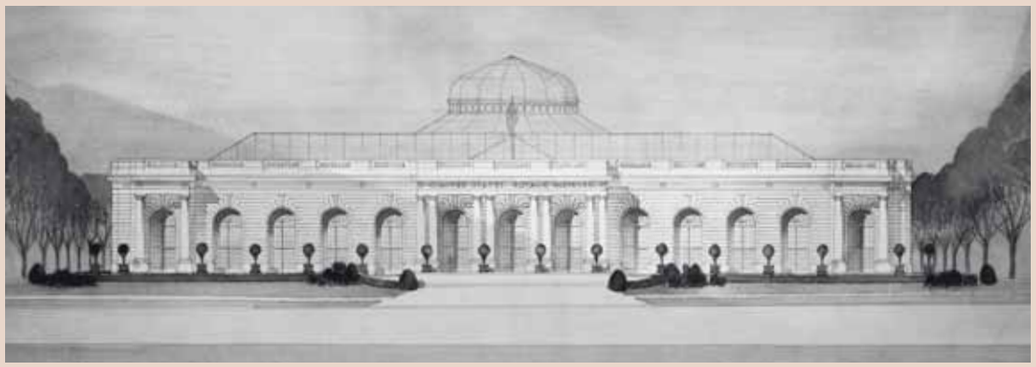
The Botanic Garden's most visible features, the Conservatory and the Bartholdi Fountain, are shown here. Barely visible to the left of the fountain is the base for the unfinished Grant Memorial.

(left)

U.S. Capitol and the Mall from the Washington Monument, ca. 1910.

Library of Congress, Prints and Photographs Division

To restore the Mall, the McMillan Commission proposed removing the extraneous buildings, railroad tracks, and overgrown woods shown here.



(above)

Preliminary rendering of the north elevation of the U. S. Botanic Garden, Bennett, Parsons & Frost, ca. 1930.

Architect of the Capitol

To economize on the final design, the architects reduced the principal elevation by two bays and simplified it by eliminating the Doric order.

(opposite)

Construction of the new Botanic Garden Conservatory, photograph by Underwood & Underwood, 1932.

Architect of the Capitol

The aluminum structure for the great Palm Court is shown here framing a view of the Capitol dome.

in 1902. For years the move was delayed by protests against the inevitable removal of trees from the former Botanic Garden site, but in 1927 the final relocation legislation was enacted. The timing coincided with a long-term project begun in 1910 to clear the residential and commercial neighborhood that once existed between the Capitol and Union Station. (The new station allowed removal of railroad tracks that formerly encumbered the Mall and was one of the first and finest achievements of the McMillan Commission.) This too was a beautification project prompted by the same forces that drove the Botanic Garden off the Mall. The station's architect, Daniel Burnham, declined the commission to create the new park between Union Station and the Capitol, but recommended the architectural firm of Bennett, Parsons & Frost of Chicago, where one of the principals, Edward H. Bennett, was a Burnham protege. It was a natural step for the same firm to be put in charge of designing the new Botanic Garden.

The design that emerged from the drafting boards in Chicago drew upon two distinct greenhouse traditions. The front portion was a simple, well-proportioned limestone building with pronounced rustication, lofty arched openings, and a flat roof with a balustrade. It was a tightly controlled neoclassical revival design that is closely related to the seventeenth-century orangery at Versailles. Its simple, symmetrical masonry block with pronounced windows also relates it to eighteenth-century greenhouses in America—including Washington's at Mount Vernon. Distinctive heads, or mascarons, were carved for alternating keystones on the facade—the sole sculptural decoration found on the building. They were modeled by Leon Hermant, a French-American sculptor whose most famous work was the *Pasteur Memorial* in Chicago's Grant Park. The actual carving was performed by the Shawnee Stone Company in Bloomington, Indiana. The heads that Hermant created represent four figures from ancient mythology: Pan, a male figure with horns, wild flowers, and oak leaves; Pomona, a female figure with wild flowers and a head-band; Triton, a male figure with aquatic flowers and shells; and Flora, a young and smiling female figure with roses.

Behind the formal stone front is the Conservatory, which was derived from the nineteenth-century iron-and-glass




(above)

Keystone carvings on the Botanic Garden's new Conservatory.

Architect of the Capitol

The dramatically carved heads sculpted by Leon Hermant were used as keystone ornaments and help to enliven an otherwise restrained architectural design. They represent (from left to right) Pomona, Pan, Flora, and Triton.

(opposite)

The new Conservatory, 1933.

Architect of the Capitol

(pages 72–73)

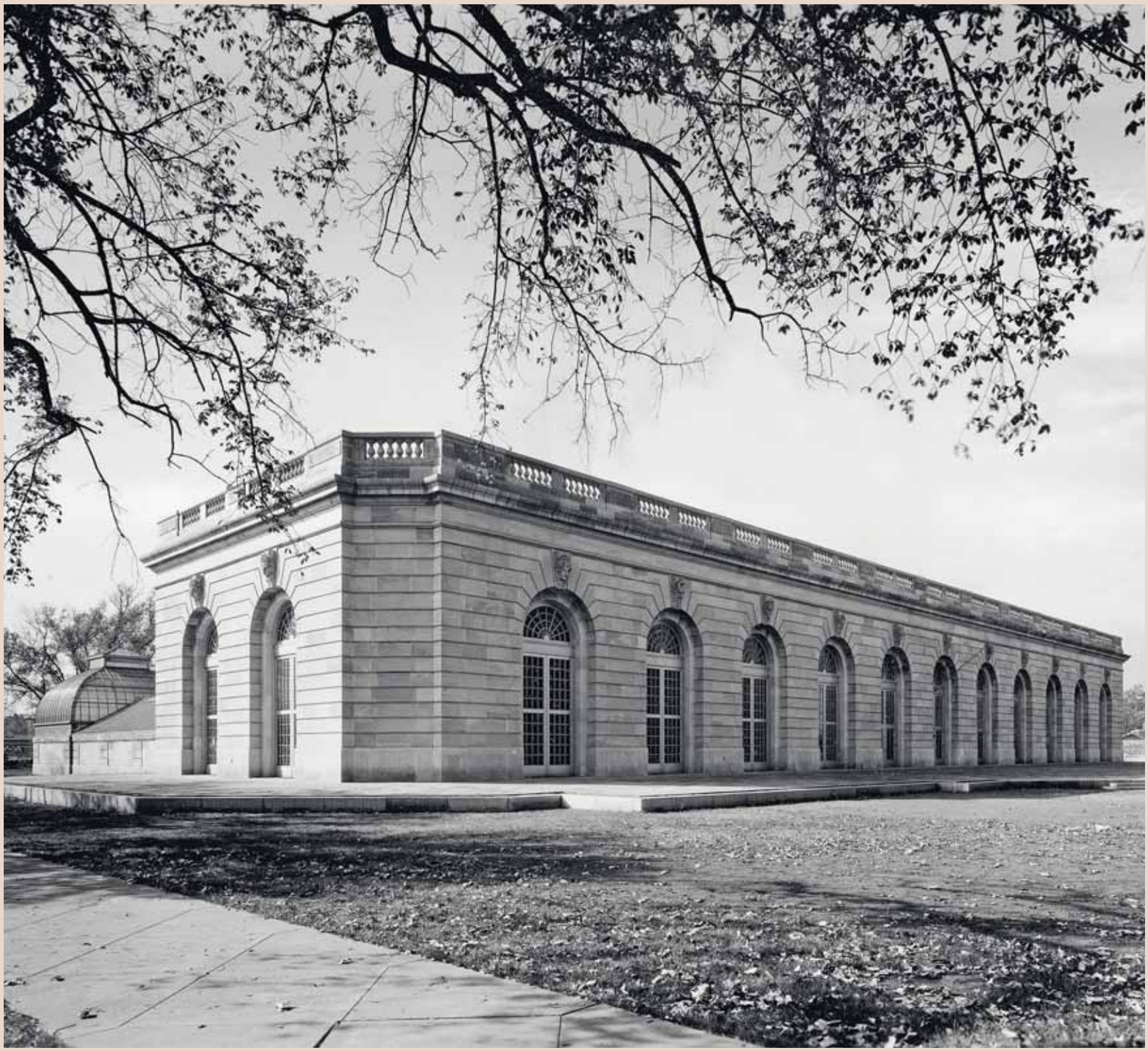
Time-lapse photographs of the Botanic Garden Conservatory reconstruction, 1997–2001.

Architect of the Capitol

greenhouse tradition. This greenhouse, however, made with aluminum, was the first major American building to exploit the structural possibilities of that strong yet lightweight metal. The interior contained a lobby 200 feet long, which provided access to almost 30,000 square feet of growing space. The most memorable interior feature was the great Palm House, which rose 83 feet above the ground and was covered by a dome 67 feet across. The Bohn Aluminum Company of Detroit was the supplier of the metal for the framework, while the fabricator was the venerable Lord & Burnham Company of Irvington, New York. The George A. Fuller Company of New York served as the general contractor for the Botanic Garden project, which by the time it was completed in 1933 had cost $633,585.

By the early 1990s, some of the structural aluminum used to construct the Conservatory had shown signs of weakness, prompting extensive renovation. The Palm House was dismantled in 1992, and in 1997 the Conservatory was closed for four years while the entire structure was reconstructed. The restored building, reopened in 2001, preserves the integrity of the original Bennett, Parsons & Frost design, while providing new environmental systems, modern facilities, and ADA-compliant access.

For more than 175 years the U. S. Botanic Garden has had a graceful and educational presence on the National Mall. Today hundreds of thousands of visitors come to the Garden each year to learn about its plant collections and programs, and to marvel at the beauty, scholarship, and stewardship the Garden represents. As a permanent and useful ornament in our grand capital city, the U. S. Botanic Garden helps fulfill George Washington's highest aspirations for his city on the Potomac.




November 20, 1997


September 21, 1998


December 19, 1998


February 16, 1999


May 10, 1999


July 23, 1999


November 5, 1999


February 21, 2000


April 6, 2000


May 24, 2000


August 4, 2000


November 5, 2000

November 22, 2000

January 5, 2001

May 14, 2001

November 20, 2001

The Conservatory

The U.S. Botanic Garden Conservatory is a museum with a difference—its artifacts are the living treasures of the plant world. The towering leaves, graceful flowers, delicate seeds, and exotic fruits of plants at their peak are displayed artfully throughout the historic Conservatory. From the formal arrangement of the Garden Court, through the luxuriant greenery of the Jungle, to the spare elegance of the World Deserts, visitors are invited to explore this indoor Eden and appreciate the incredible beauty and variety of our planet's flora.

The mission of the U.S. Botanic Garden goes beyond celebrating the allure of plants, however. In order to promote an understanding of botanical knowledge, engaging displays present the facts and the fascinating stories of the plant world. Plants are present everywhere on the planet—from the steamiest lowlands to the coldest mountaintops—yet all too often they are overlooked and misunderstood, despite their importance to human survival. Without plants there would be few sources for food, medicine, clothing, shelter, and, most important, oxygen. People have a tremendous impact on plants, through discovery and cultivation, but also through destruction of plant habitats. Globally, about one out of every eight known plant species is threatened or nearing extinction. In the United States, the figure stands at about one out of every ten plant species. Conservatory exhibits bring these startling numbers to life by featuring endangered plants and demonstrating conservation strategies. A tour through the glorious green surroundings of the Conservatory is delightful to the senses and refreshing to the spirit, but visitors also leave with awareness of the many ways in which the destinies of humans and plants are intertwined.

(ABOVE)
Discovering the Conservatory.
Plants appeal to the senses—visitors of all ages are captivated by the sights, smells, sounds, and textures that surround them in the Conservatory.

(OPPOSITE)
Jungle foliage.

Garden Court

A curious transformation occurs in visitors as they cross the threshold into the welcoming expanse of the Garden Court—their expressions brighten. Encountering this lush interior landscape, a busy worker pauses, a tired tourist sighs, a harried parent smiles. Tall arches frame the glass roof that lights up the lofty space, even on a cloudy day. Softly splashing fountains fill the center of the two rectangular pools brimming with turquoise water. Around the pools, wide avenues provide room for strolling, observing, and photographing, while benches offer a place to rest. The dignified architecture serves as a suitable backdrop for hundreds of plants from around the globe. The spectacular greenery, from roof-tall trees to creeping ground covers, introduces the first of several important themes in the Conservatory—the economic value of plants to humans.

People rely on a wide variety of plants for many basic needs, including food, dyes, medicine, wood, fiber, flavoring, industrial products, fragrances, and cosmetics. The plants on display represent a tiny fraction of the botanical resources that have contributed to the economic well-being of cultures throughout the world. Though the plants themselves may not be familiar, their products certainly will be. Huge, floating leaves of banana trees (*Musa* 'Saba') conceal the familiar bunches of ripening fruit. Though each tall stalk looks like a separate tree, the plant is actually a clump of several stalks. As soon as the fruit has ripened, each stalk will die back, to be replaced by several new stalks as the cycle begins again. Other important food sources on display include chocolate (*Theobroma cacao*) from the Amazon Basin, tea (*Camellia sinensis*) from Southern Asia, and coconut (*Cocos nucifera*). Herbs and spices are represented by the cinnamon tree (*Cinnamomum zeylanicum*), whose bark is used to produce the pungent flavoring, and by vanilla (*Vanilla planifolia*), a climbing orchid from Mexico and Central America that, outside of its

(above)
Amorphophallus bulbifer.

(opposite)
Garden Court fountains.

native range, must be hand-pollinated to increase production of its seeds. A number of the tall trees that line the Garden Court produce materials for building. Spanish mahogany (*Swietenia mahagani*) is renowned for its hard, deep red wood prized by cabinet-makers throughout the world. Native to the New World, the original West Indies mahogany was harvested to near extinction during Colonial days to meet European demands for its wood. Timber bamboo (*Bambusa vulgaris*), though actually a spreading grass, is used throughout Asia to build sturdy homes.

The Garden Court is also a grand venue for temporary exhibits, elegant receptions, and seasonal celebrations. Outstanding flowers and ornamental plants provide accents of dazzling color against the backdrop of flourishing green. Graceful arrangements spotlight the classic beauty of flowers from the Botanic Garden's greenhouses, including orchids, lilies, chrysanthemums, poinsettias, cyclamens, anthuriums, heliconia, and many more.

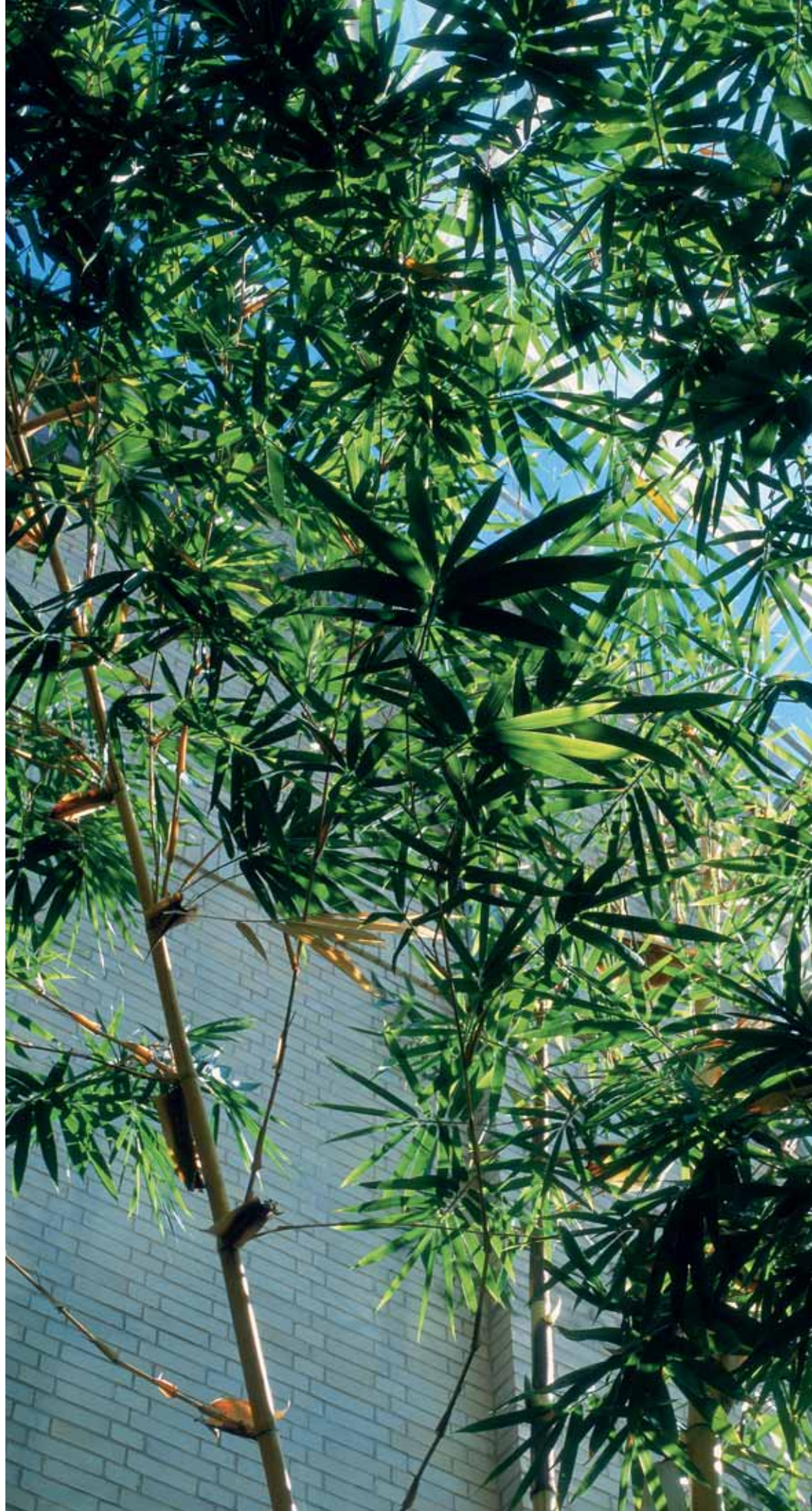
(top)
Orchids displayed among theatrical temple ruins during the annual orchid exhibit.

(right)
Cacao (*Theobroma cacao*).
Blossoms burst from the trunk of a cacao tree.

(right below)
A painter takes inspiration from the Botanic Garden's flower displays.

(far right)
Orchid (*Phaius tankervilliae*).

(opposite)
Light spills across the stone floor of the Garden Court.



(center)

Timber bamboo
(*Bambusa vulgaris* 'Vittata').

Strong, lightweight bamboo poles are used throughout Asia for a number of purposes, including construction of houses and fences. Although technically not a wood but a giant grass, timber bamboo stalks grow as thick as four inches in diameter and are a remarkable resource for sturdy and durable building materials.

(opposite above)

Coffee
(*Coffea arabica*).

Bright red fruits line the branches of this coffee tree, *Coffea arabica*. Of the more than five dozen species in the world, three are commonly grown, of which *C. arabica* produces the most desirable beans. Hot coffee became a popular drink in Europe in the 1600s, though people had been chewing leaves and beans long before then.

(opposite below)

Vanilla orchid
(*Vanilla planifolia*).
U.S. Botanic Garden

(right above)

Sugar cane
(*Saccharum officinarum*).

Arab traders brought this South Pacific grass to India and the Near East in the seventh century. Columbus found it in the eastern Atlantic and brought it to the Caribbean. Forests were stripped to grow sugar cane, and slaves were later imported to cultivate the fields.

(right below)

Banana flower and fruit
(*Musa* 'Ice Cream').

The striking purple cone and red tongue of the banana flower hang beneath the ripening fruit. Once the banana bunch has ripened, the stalk will die back to be replaced in the next growing cycle by several new stalks.

Titan arum
(*Amorphophallus titanum*).

The dramatic blossoming of the titan arum, the world's largest flowering structure, attracted thousands of visitors to the Garden Court of the Botanic Garden in 2003. Also known as the corpse flower for the terrible stench that accompanies blossoming, this native of Sumatra can take eight to ten years to bloom.

Jungle

The rhythmic croaking of tree frogs filters through the steamy stillness. Whistles of exotic birds pierce the air. A formal balustrade and an eroded staircase emerge from the creeping vegetation, suggesting that a great plantation once dominated these lush surroundings. Water courses over a ruined terrace. The stately royal palms (*Roystonea regia*) that once led towards the entrance of the estate are now engulfed by other plants. The jungle is reclaiming its domain.

The Jungle, displaying plants from the world's lowland tropical rain forests, is conceived as a metaphor for the global clash between humans and nature. Left undisturbed, the forest will eventually overtake the abandoned plantation, covering over all traces of human habitation. This is a particularly poignant message today, as the loss of rain forest habitat due to deforestation is dramatic and widespread. Tropical rain forests contain the most diverse and ecologically complex plant communities. The sheer numbers of plants, their unusual adaptations, the rarity of species, and the complex relationships that form among plants and between plants and animals make the rain forest community an unusual and important natural system. One of the great challenges of the twenty-first century will be to discover how to live in harmony with nature so that human needs are met without destroying the ecosystems on which they depend. Choices will be presented, and there will be times when sites of exploitation will have to be abandoned to let nature recover.

Wandering through the dense greenery of the Jungle reveals a tangle of foliage in an amazing variety of sizes, shapes, and textures. The rain forest is an environment that encompasses four basic layers—a floor of exposed roots, seedlings, and debris; an understory of stunted trees and shrubs; a high canopy of trees and vines that intercepts most of the sunlight; and the tallest trees emerging from the dense canopy to reach the light. Different

(above)
Jungle vines twine around the formal balustrade.

(opposite)
Mist rises from a waterfall in the Jungle.

(above)
Bromeliads.

(opposite)
Palm leaf (***Licuala ramsayi***).
Light changes continuously in the Jungle, spotlighting the tropical foliage and creating dramatic shadows in the undergrowth.

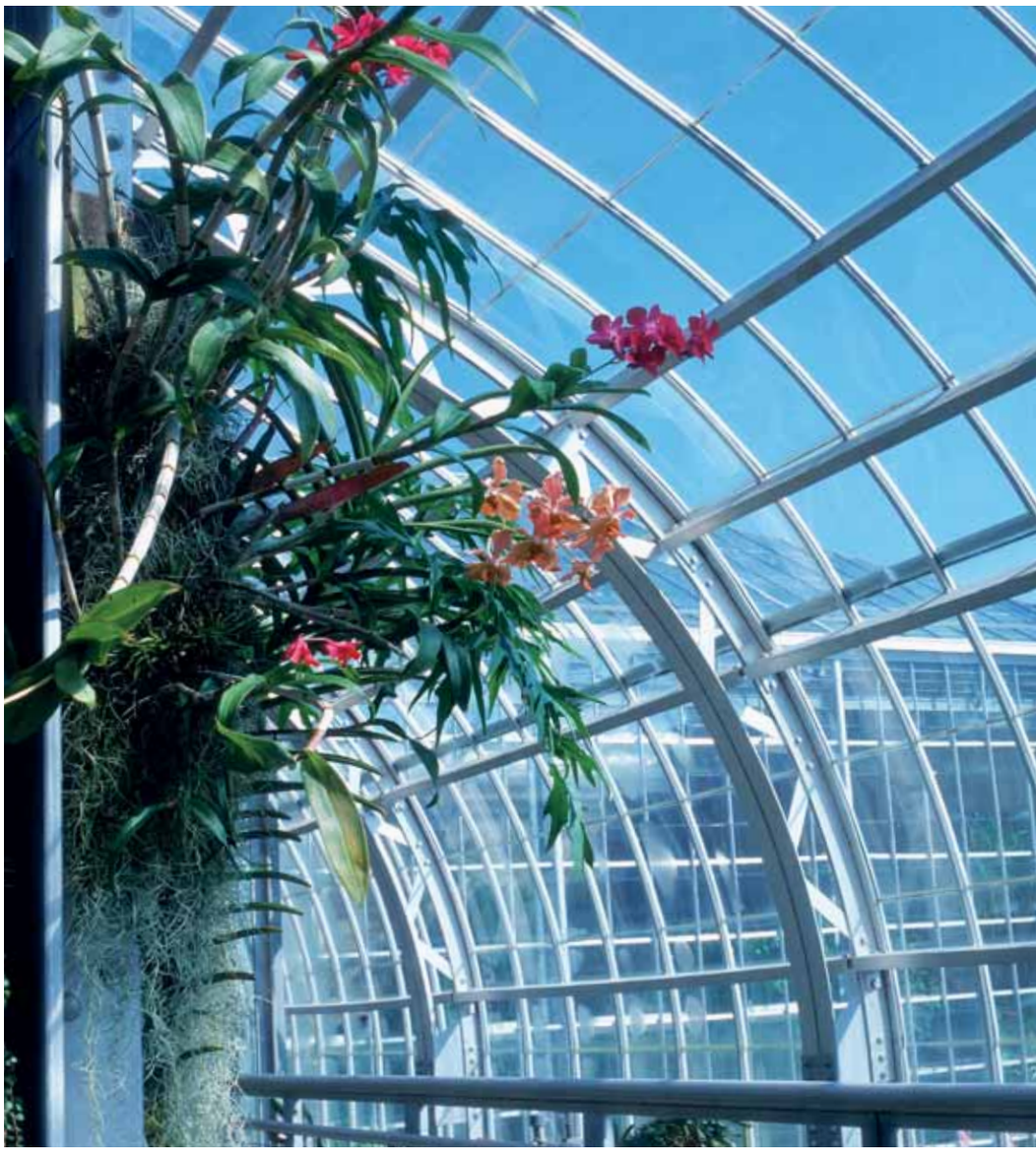
species of plants and plants in different stages of growth exist at the various levels. Each layer has a distinct microclimate creating survival challenges for the plants that exist there. Competition for water, light, and nutrients results in interesting adaptations, and many of these are on display. For instance, gigantic leaves like those of the elephant ear (*Alocasia* 'Calodora') take in more light in the deep shade, while the elongated drip tips at the ends of the leaves of the sacred fig (*Ficus religiosa*) move water efficiently to inhibit rot. Overlapping segments on the trunk of the traveler's tree (*Ravenala madagascariensis*) allow it to store water. The "chewed" appearance of the window leaf vine (*Monstera obliqua*) discourages insects from feasting on the leaves. Buttressed roots of the philodendrons and aerial roots of the many epiphytes allow these plants to absorb moisture efficiently. High overhead, the parasol leaves of the snakewood (*Cecropia peltata*), a fast-growing but weak-wooded tree, reach for the sunlight above the jungle canopy.

Distinct patterns, subtle colors, and suprising textures emerge from the misty atmosphere in the Jungle. The bright green branches of the vessel fern (*Angiopteris evecta*), believed to be a division of the original plant brought from New Zealand by the U.S. Exploring Expedition in 1842, form lacy shadows in the undergrowth. Meandering paths are lined with a dozen species of prayer plants (*Ctenanthe* spp.), whose leaves look hand-painted with delicate designs. Trunks of palms and cycads reveal unexpected textures, including the velvet brown fuzz of the teddy bear palm (*Dypsis lastelliana*), the porcupine spikes of a Mexican palm (*Astrocaryum mexicanum*), the twisted weave of the zombie palm (*Zombia antillarum*), and the knobby protrusions of a sago palm (*Cycas circinalis*). In the understory, showy orchids, delicate gingers, and heart-shaped anthuriums contribute splashes of vivid color that stand out against the tropical foliage.

(above and center)

Jungle vistas.

Visitors enjoy losing themselves in the luxurious foliage of the tropical rain forest. Overlooking the trickling stream and tucked in quiet corners, benches provide welcome stopping points for observation and contemplation.
A canopy walkway circles high above, allowing a monkey's-eye view of the treetops, as well as close inspection of flowering vines and epiphytes. From the heights, visitors can look out on striking vistas of the Mall and the U.S. Capitol.

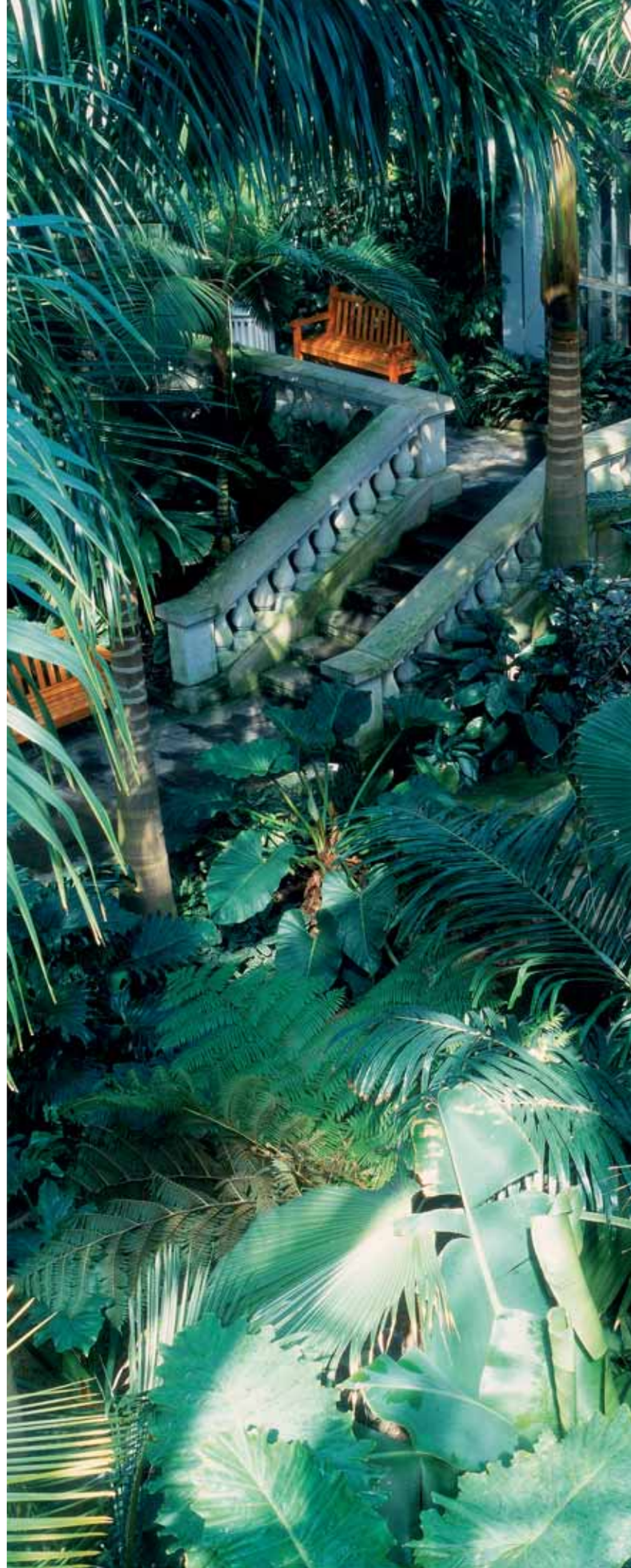


(above)

Epiphytic orchids.

Epiphytes such as these orchids are aerial acrobats, anchoring high in trees but taking nothing from their hosts. The roots of epiphytes have a special coating that absorbs moisture from the air, allowing them to thrive where there is no soil. By establishing themselves in lofty perches, epiphytes can compete for light and nutrients in the crowded tropical forest.

(above)
Capitol dome visible from the Jungle canopy walkway.



(center)
Viewed from above, jungle foliage engulfs the abandoned plantation.

(above)
Water flows through the center of the Jungle.

(above left and opposite)

Prayer plants.

Leaves of the prayer plants are among the most colorful and distinct of the rain forest. Their intricate patterns are actually a deterrent to insects. The darker splotches look like leaves on top of lighter leaves, confusing an insect into eating only a small portion instead of destroying the entire plant. The deep purple or maroon underside of each leaf enhances energy absorption—the pigments are attuned to the altered spectrum of the forest floor.

(above right and right)

Vines.

The Rangoon creeper (*Quisqualis indica*) and the window leaf vine (*Monstera obliqua*) are typical of the plants that turn trees into crowded habitats. The dense growth of intertwining vines forms a self-supporting vertical column that does not require deep, anchoring roots, giving access to light and water. In combination with epiphytes, vines create elevated ecosystems where insects and other animals thrive above the forest floor.

(left and above)

Tropical flowers.

Flowers in unusual shapes and every imaginable hue populate the Jungle. Blue ginger (*Dichorisandra thyrsifolia*), yellow lollipops (*Pachystachys lutea*), and deep orange pagoda flower (*Clerodendrum splendens*) are among the colorful blossoms hidden in the tropical foliage.

(opposite)

Strangler fig (*Ficus aurea*).

The dark, rounded leaves of the strangler fig protrude from the slim fronds of a palm. A vine with a macabre twist, the strangler fig is well adapted to the competitive crush of the tropical rain forest. Seeds often germinate in the crowns of trees, where they have been deposited by birds. Once established, a vine gradually makes its way down the side of a tree, anchors into the soil, and begins to twist and spread around the trunk, eventually strangling its host.

Survival strategies.

Color, size, pattern, and texture all contribute to the survival of plants in the tropical rain forest.

Rare and Endangered Species

In a quiet passageway between the Garden Court and Plant Exploration, two beds of plants face each other—on one side tropical plants, on the other cacti and succulents. What can they possibly have in common? Unfortunately, all of these different plants share a seemingly inevitable fate—extinction.

Under natural conditions, plants become extinct when they are so rare that reproductive success is threatened or they cannot survive a local catastrophe, such as a fire or ice storm. Over geological time, shifts in climate, cataclysmic geological events, and arrival of new species have caused extinction, especially among plants with small populations. Human activities—habitat destruction, over-harvesting, collection of rare species for commercial trade, and introduction of invasive non-native species—accelerate the natural processes.

The U.S. Botanic Garden is one of many botanic gardens worldwide that actively participate in the conservation of endangered species by maintaining live specimens in their collections, studying wild plants at risk, banking seeds of rare plants, and introducing rare plants to the horticultural trade. As one of 62 repositories for plants that have been seized by customs agents through the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Botanic Garden accepts and cares for orchids and succulents.

(above)

Foxtail palm (*Wodyetia bifurcata*).

The Australian foxtail palm was thought to be extinct in the wild, but was rediscovered in 1979. It has gotten a new lease on life because of its popularity in the landscape trade.

(left)

CITES plants.

Endangered cacti are cared for at the Production Facility.

(opposite)

Golden barrel cactus (*Echinocactus grusonii*).

The golden barrel cactus has suffered habitat loss due to the building boom in the desert Southwest.

West Courtyard
Southern Exposure

A meandering stone path leads through the west courtyard past a tranquil pond surrounded by cascading boulders. The sunny seclusion of the enclosed garden, protected from the elements and heated by light reflecting off the surrounding glass surfaces, creates a microclimate that is slightly warmer than the norm for Washington, D.C. The bright flowers, trees, and evergreen shrubs growing here are not usually winter hardy in this area—the garden features plants native to North America but normally found in the Southeast, the Gulf Coast to Texas and Mexico, or the Southwest. The unusual mix of plants gives a balance of textures and forms rarely seen in a Mid-Atlantic garden.

Among the featured plants are species that love wet soils and species that are drought-resistant, providing challenges to the Conservatory gardeners. Four small trees anchor the landscape. The loblolly bay (*Gordonia lasianthus*) is a native of swamps and moist areas of the southeastern United States. The loblolly has leathery, dark green leaves and produces large cup-shaped white flowers in midsummer. Another resident of swampy areas, the needle palm (*Rhapidophyllum hystrix*), has become rare in its native southern habitat, though it thrives as a landscape plant from the Gulf Coast to the Atlantic coast of South Carolina. It is considered to be one of the hardiest palms in the world. In the courtyard winter, the palm's tips turn brown, but the plant responds with hearty growth when warm weather returns. By contrast, the desert willow (*Chilopsis linearis* ssp. *linearis*) is accustomed to arid heat where it grows in the desert washes of the Southwest. Though related to the catalpa in the eastern United States, the tree has thin willowy leaves and a profusion of fragrant pale lavender trumpet-like flowers in the spring. The mescal bean (*Sophora secundiflora*), also known as the Texas mountain laurel, is another drought-adapted native of the desert Southwest.

(above and left)
Desert willow
(*Chilopsis linearis* ssp. *linearis*).
In a sheltered corner of the Southern Exposure garden, the desert willow blossoms generously.

(opposite)
The Southern Exposure garden on a bright spring day.

(above and right)

Surviving the cold.

The effects of cold and snow are ameliorated by the surrounding building and paving stones. Plants such as tussock grass (*Nassella tenuissima*) and the needle palm (*Rhapidophyllum hystrix*) survive and thrive.

(opposite)

Blue beargrass tree (*Nolina nelsoni*).

Snow collects on the geometric spikes of the blue beargrass tree, an unusual occurrence for this native of the dry mountains of Mexico.

The evergreen foliage of the mescal bean is a backdrop to spectacular violet-blue flowers that grow in clusters and smell like grapes.

In an orchestrated coexistence, several western and eastern *Nolina* species provide interesting textures to tie together distinct areas of the courtyard garden. The most striking of these is the large blue beargrass tree (*Nolina nelsoni*) from the mountains of Mexico. Growing up to 15 feet, its spiky upright leaves differ from the trailing grass-like swirls of the other *Nolina* species. The two Texas varieties, the wiry Texas sacahuista (*Nolina texana*) and the wider-leafed Devil's shoestring (*Nolina lindheimeriana*), are popular ground covers known for their drought resistance and heat tolerance. Most *Nolina* species are native in the Southwest, but two of the three eastern species grow here alongside their western relatives. Both the Georgia beargrass (*Nolina georgiana*) and Britton's beargrass (*Nolina brittoniana*) from southern Florida are endangered, their sandy habitats disappearing to development. All of the *Nolina* species are distinguished by the fine serrated edges of individual leaves and the tall flowering stems that shoot skyward from their evergreen foliage.

In keeping with the emphasis on plant conservation throughout the Conservatory, many rare and endangered native plants star in this

(above and center)

Pitcher plants (*Sarracenia*) and White topped pitcher plants (*Sarracenia leucophylla*).

Curious and exotic pitcher plants are perched like sculptures on the boulders and along the path. Natives of southern seepage bogs, these carnivorous plants are kept in pots so they remain very wet. Pitcher plants trap insects in their long "throats" and digest them.

(opposite)

Texas gaillardia.

Mounds of pink gaillardia (*Gaillardia aestivalis* var. *winkleri*) brighten the courtyard garden from summer through fall. This pink variety is related to a rare white wildflower that can be found only in one county in Texas.

(above)

Garden life.

All sorts of insects and animals thrive in the shelter of the Southern Exposure courtyard. Birds, hummingbirds, butterflies, and dragonflies are common visitors, while year-round residents include this frog, pictured in early spring as it awakens from hibernation.

garden. Examples include the Neches river rose-mallow (*Hibiscus dasycalyx*), a shrub that bears large white flowers with cherry red centers. It is now hard to find in its tiny east Texas habitat. The Alabama snow wreath (*Neviusia alabamensis*) is a shrub named for the clusters of delicate white and yellow blossoms that appear on its branches in April. Timber harvesting and development are threatening its home on the forested bluffs of the Cumberland Plateau. The Florida burrhead (*Echinodorus floridanus*) is a newly discovered species that grows in only two counties of the Florida panhandle. A member of the water plantain family, it produces showy three-petaled white flowers on tall wand-like stems.

Among the annuals that brighten the garden during summer and fall is phlox (*Phlox drummondii*), a native Texas wildflower that has been cultivated to yield simple, bright blossoms in shades that range from white to pink and red. Dune sunflowers (*Helianthus debilis*), native to the sand dunes of South Carolina to the Gulf Coast, grow in low mounds that produce a profusion of bright yellow flowers. Shocking orange California poppies (*Eschscholzia californica*), growing as tender perennials or annuals, depending on climate, appear here in both the spring and the fall.

Plant Exploration

Water spills over the rim of a giant clay jar and splashes into a stone-rimmed pool, calling to mind the wells of far-off villages where people gather to fill buckets and gossip. The plants surrounding the pool are exotic—birds of paradise (*Strelitzia reginae*) from South Africa, anthuriums from tropical America, and the towering Norfolk Island pine from off the coast of Australia. Many of these plants were introduced to the United States in the 1800s after daring sea voyages of discovery. At that time, eagerness to find new plant sources of food, medicine, and fiber fueled global exploration. One such journey was the U.S. Exploring Expedition of 1838–1842 led by Lt. Charles Wilkes. His fleet of six small ships traveled 87,000 miles charting coastlines and collecting specimens of birds, animals, and plants. The U.S. Botanic Garden, officially named in 1850, was placed on the Mall to tend to the live plants and seeds that returned with the expedition. Other government-sponsored expeditions, notably the voyage of Commodore Matthew Perry to Japan in 1852, have added unusual and important plants to the collections of the Botanic Garden.

Since the dawn of civilization, plants have moved from place to place at the speed of human travel. Discovery of new species—from the humble potato that enriched European diets to quinine bark that held malaria at bay—has repeatedly changed the course of history. Even today, plant exploration continues at a frenetic pace. Botanic gardens, universities, government agencies, and private companies are sending scientists in search of useful and beautiful species, as well as the wild relatives of important crop plants. Apart from locating new species in the wild, there are two other ways new plants are "discovered." One of these is hybridization, the crossbreeding of species or distinct varieties to create a new variety, a process that also can occur naturally. The other is through the new science of bioengineering, in which the genes of plants are augmented or cancelled "by design" to produce a specific result.

(opposite and above)
Bird of paradise (*Strelitzia reginae*) and Mandela's Gold (*Strelitzia reginae* 'Mandela's Gold')
The striking orange and blue bird of paradise, a wild species at home in tropical climates, may have been collected in the South Seas by the U.S. Exploring Expedition. Its relative, the uncommon yellow 'Mandela's Gold,' is a modern cultivar from South Africa.

(opposite)

Parrot's flower (*Heliconia psittacorum*).

Plant exploration continues today with more urgency than ever, as habitats disappear due to human encroachment, pollution, and wars. Although this Heliconia was named 200 years ago, botanists continue to discover new species of Heliconia in remote corners of the world. As part of the Botanic Garden's partnership with the Smithsonian, rare new plants are grown at the Production Facility and displayed in the Conservatory.

(above left and right)

Views of the Plant Exploration room in the Conservatory.

(bottom right)

Expedition heritage.

Native yellow hibiscus, also known as ma'o hau hele (*Hibiscus brackenridgei*), at left, and iliau (*Wilkesia gymnoxiphium*) were discovered in Hawaii during the U.S. Exploring Expedition of 1838–1842.

(right)

Hawaiian plant exhibit.

The Botanic Garden hosts several temporary exhibits each year to illuminate the history of plant discoveries and to show how exploration continues today, both in the field and in the lab. This display highlighted efforts to preserve the rare and endangered plants of Hawaii.

(left)

Hinahina, Hawaiian silverswords (*Argyroxiphium sandwicense* ssp. *macrocephalum*).

These silverswords are part of an exceptional collection of rare and endangered Hawaiian plants acquired by the Botanic Garden in 2003.

Orchid House

A simple boardwalk leads into the Orchid House, a misty forest sanctuary heavy with fragrance where every branch and stone cradles a spectacular blossom. Orchids are among the most adaptable of plant species, growing in just about every habitat throughout the world. Their growth cycle varies depending on the climate in which they are found. More than 25,000 wild species of orchids are thought to exist, and artificial hybrids may add another 100,000 to their numbers. The noteworthy orchid collection at the U.S. Botanic Garden contains more than 5,000 species and hybrids, many of which are rare, endangered, and threatened specimens that have been deposited here through CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Only 200 orchids are on display at any time, but these represent the incredible variety of forms, sizes, and colors that are found in this coveted family of plants.

Epiphytic orchids perch delicately on the tree trunks and branches that surround the walkway. Most tropical orchids are epiphytes, plants that grow without soil on other plants. The roots have a special outer covering that soaks up any available moisture in the air and can absorb nutrients from decaying organic matter. Although epiphytes use their roots to anchor onto trees and shrubs, they take nothing away from the host plant. Some epiphytic orchids dangle long chains of ethereal blossoms that look like fluttering insects, while others trumpet their existence through a clump of two or three huge purple or pink flowers. Shape and color are two of the strategies orchids have evolved to attract pollinators.

The same principles that apply to the roots of epiphytes also work for orchids that have adapted to survival on rocks and stones. Called lithophytes, these grow in the cracks between stones or creep along the surface of boulders, soaking up whatever moisture accumulates there. Terrestrial orchids grow in the ground like other familiar plants.

(opposite)
Pansy orchid
(*Miltoniopsis* Drake Will 'Ruby Falls').

(above)
Spider orchid
(*Brassia verrucosa*).

Since the eighteenth century, orchids have been sought by collectors, leading to the disappearance of wild species and the destruction of their habitats. Many orchids in the Botanic Garden have been confiscated by customs agents and deposited here for preservation through CITES (see page 43 for more information).

(ABOVE)
ORCHID
(*Laeliocattleya* BARRY STARKE
'THE KING').

(center and above)

Orchid House.

Hundreds of colorful orchids festoon the rocks and branches of the Orchid House. Plants are rotated constantly from the Production Facility, where thousands of species and hybrid orchids are grown.

(above left)
Golden Shower orchid
(*Oncidium sphacelatum*).

(above right)
Asian slipper orchid
(*Paphiopedilum* F. C. Puddle).

(right)
Orchid
(*Catasetum saccatum*).

(opposite)
Orchid
(*Cattleya maxima*).

Hybrid orchids.

The mania for new orchids has contributed to the creation of spectacular hybrids by crossing different species. The science of tissue culture revolutionized propagation, and modern genetics has opened the door to designing plants with only desired traits.

(above)
Orchid
(*Beallara* Marfitch 'Howard's Dream').

(right)
Orchid
(*Cattleya* Portia 'Coerulea').

(above)
Orchid
(*Catasetum* Jumbo Eagle).

Medicinal Plants

In contrast to the profusion of colorful blooms in the Orchid House, there is a bracing simplicity to the plants in the medicinal collection. These specimens are not presented for their beauty, though many have attractive leaves, blossoms, and fruits. Each plant in this display is valued for its healing properties. The medicinal collection at the U.S. Botanic Garden, which numbers more than 200 plants, includes species and natural or cultivated varieties that are currently acknowledged to provide therapeutic value by research scientists as well as by healers from allopathic, homeopathic, herbal, ethnobotanical, and other widely accepted healing traditions.

The use of plants to treat illness is found throughout human cultures. In pre-industrial societies, the knowledge of plant medicines usually rested with the shaman or healer and was passed from generation to generation through apprentices. Among the most ancient recorded uses of medicinal plants are those found in China and India, where the holistic approach to the treatment of human disease is still practiced. Western uses of medicinal plants can be traced back to the Greeks and Romans, who formalized many of the herbal cures found today. All of these traditional uses of medicinal plants are now under scrutiny as potential life-savers. Since an estimated one-quarter to one-half of modern manufactured drugs contain or were derived from botanical ingredients, medicinal plants are important commodities.

Some of the plants on display are familiar to anyone who has a home garden, while others are legendary miracle cures. Peppermint (*Mentha* x *piperita*) has been used for centuries in teas to treat everything from headaches to stomachaches. The seeds of the castor bean (*Ricinus communis*) produce castor oil, a fast-drying, non-yellowing oil used primarily in industry but also in some medicines. Ma huang or Chinese ephedra (*Ephedra sinica*) is traditionally employed to treat viral and bacterial infections, and also in Western medicine for nasal congestion and asthma. Saw palmetto (*Serenoa repens*) contains an ingredient that has been effective in combating prostate cancer.

(opposite)

Saw palmetto
(*Serenoa repens*).

Fruits of the saw palmetto have been used as a folk remedy to treat tumors, and studies are now under way to test its effect on prostate cancer. In Europe it is widely used as a treatment for benign prostatic hyperplasia (BPH).

(above)

Turmeric
(*Curcuma longa*).

The delicate beauty of its flower belies turmeric's power as a spice and medicine. Like its relative ginger, turmeric roots are ground to flavor food. Turmeric has anti-inflammatory qualities, and in cultures where turmeric is used regularly, rates of Alzheimer's disease are significantly lower.

(above left)

Golden trumpet vine
(*Allamanda cathartica*).

The leaves, roots, and flowers of this vine are used to make a powerful purgative, and the milky sap has antibacterial properties.

(below left)

Shihu
(*Dendrobium nobile*).

Extracts from this orchid are used as a sedative and to treat fever and dehydration.

(right)

Betel
(*Piper betel*).

From a climbing shrub that grows in India and Southeast Asia, betel leaves are used in cooking but also chewed the way gum is. The leaves contain a volatile oil that is a stimulant. It is used to treat respiratory ailments.

(left)

Aspilia
(*Aspilia mossambicensis*).

Chimpanzees in the wild chew aspilia to get rid of intestinal parasites. Animals use plants to "treat" their ailments, and scientists are beginning to study this phenomenon for clues to modern medicines.

(bottom left)

Himalayan yew
(*Taxus wallichiana*).

Interest in medicinal plants underscores the need to conserve plants in the wild, as fewer than five percent of flowering species have been screened for their medicinal value. Also, when a valuable plant is discovered, it is essential to protect it. The Pacific yew (*Taxus brevifolia*), related to this Himalayan yew, was discovered as the source of the anti-cancer agent taxol. A rush on yew ensued in the Pacific Northwest, almost destroying the population of this slow-growing tree. Fortunately, the critical molecule was synthesized in a laboratory, allowing it to be combined with the complex core molecule that is now processed from the needles and twigs of cultivated yew species. This has diminished the demand, thereby saving yews in their native habitat.

(center)

Papaya (*Carica papaya*).

Native to the American tropics, papaya has been used in Mexico to treat sunburn, to aid digestion, and to expunge parasites.

(above right)

A researcher studies medicinal plants.

(above)

Madagascar periwinkle (*Catharanthus roseus*).

The rosy periwinkle, grown in gardens throughout the world for its profuse blossoms, is a medicinal powerhouse. Complex alkaloids extracted from its leaves are the source for drugs to treat lymphocytic leukemia, Hodgkin's disease, testicular cancer, and childhood leukemia.

World Deserts

On a bright day, cacti and succulents cast sinuous shadows on the sand-colored boulders of the World Deserts. The peculiar shapes and menacing textures demonstrate how desert plants have evolved extraordinary adaptations to cope with harsh environments where water is scarce. Arid portions of Africa, Australia, North America, and South America make up about one-fifth of the Earth's land surface. The deserts spread across these continents can be hot or cold, flat, mountainous, or coastal, but they all receive less than ten inches of rain each year.

The succulent plants scattered along the winding path through the World Deserts are specimens from both Old World deserts (Euphorbiaceae) and New World deserts (Cactaceae). They demonstrate the remarkable similarities among plants that evolved independently in isolated sections of the world. The *Adenia glauca* from South Africa has a thick waxy stem similar to that of the elephant foot tree (*Nolina recurvata*) found in the American Southwest. These stems allow the plants to store water during rainfall for use later. The giant spikes of the octopus tree (*Didierea madagascariensis*) from Madagascar resemble those of the saguaro cactus (*Carnegiea gigantea*) found in the United States. The spikes provide protection from the wind as well as from predators.

The display includes trees, shrubs, perennials, and annuals, representing the entire range of plants found in the desert environments of the world. The tiny leaves of the blue palo verde (*Parkinsonia florida*), native to the American Southwest, may fall off during an extended dry period, but the green of the trunk allows it to continue with photosynthesis. The tall, skeletal shapes of the perennial cacti are familiar, even if their names are not. *Cereus hildmannianus* is a night-blooming cactus from South America. The rounded paddles of the towering

(above)
An interpretive panel in the World Deserts.

(left)
***Echinopsis oxygona* blossoms.**
U.S. Botanic Garden

(opposite)
Parry's agave (*Agave parryi* ssp. *parryi*).
The subdued colors of the desert plants—gray-green, light blue, white, and silver—help reflect the rays of the sun. This striking silver agave is the source for tequila.

Texas prickly pear (*Opuntia engelmannii* var. *lindheimeri*) are lined with bright red "pears." Tiny *Cleistocactus winteri* creep atop the rocks. Annuals, such as the Mexican gold poppy *(Eschscholzia mexicana*), are particularly successful in arid climates, where their seeds can lie dormant for years. When conditions are just right, seeds germinate and plants quickly complete their life cycles.

At almost any time of year, some species will be in bloom in the World Deserts. Whether it's the waxy red-orange blossoms of the prickly pear, the delicate magenta puffs of the Baja fairy-duster (*Calliandra californica*), or the showy red and white spikes of a giant aloe (*Aloe mutabilis*), there is always a colorful surprise among the austere grays and greens of the desert plants.

(above left)
Alluaudia procera.

(left)
Echinopsis oxygona.
Tiny cacti nestle at the base of rocks along the path.

(opposite and right)
Giant aloes
(***Aloe mutabilis***).
Perched on boulders in the bright sunlight of the World Deserts, giant aloes reach out to the sun. Their dramatic red and white flower spikes appear in winter.

(above and center)

CAM Plants.

All plants must take in carbon dioxide (CO_2) in order to have the carbon needed for photosynthesis. This intake is done through tiny pores in the leaves called stomata. In most plants the stomata open during the day to take in CO_2 and give off oxygen and moisture. To conserve moisture, however, most desert plants, like the saguaro (at right) and other cacti have a slightly different photosynthetic process called CAM (crassulacean acid metabolism). The stomata on CAM plants are closed during the heat of the day and open at night. The CO_2 is taken in, converted to malic acid, and stored until daylight, when it can be transformed into sugar, the end product of photosynthesis.

(above)

Ferocious blue cycad (*Encephalartos horridus*).

Living up to its name, the spiky appearance of the ferocious blue cycad intimidates any creature considering it for a meal. This plant from South Africa is one of four specimens that survive from the U.S. Exploring Expedition of 1838–1842.

(above)
Blue palo verde
(*Parkinsonia florida*).

(center)
Pachypodium
(*Pachypodium saundersii*).

Spines and hairs on desert plants reflect sunlight and deflect winds that can dry out their surfaces. Like the threatening spikes on this pachypodium, they also make the plants hard to eat.

(above)
Bear's paw
(*Cotyledon tomentosa* ssp.
ladismithiensis).

Garden Primeval

Soft, moist air ruffles the stiff fronds of giant tree ferns. Water seeps into a pool, where clover-like ferns float across the surface. A serpentine path imprinted with the footprints of long-extinct creatures winds among dark, needle-leaved trees. Under clumps of ferns, a dinosaur egg is hidden. This is the Garden Primeval, an ancient forest as it might have appeared in the mid-Jurassic period of the Mesozoic Era, about 150 million years ago. During this time the climate began to dry. Seedless plants, such as ferns and club mosses that required tremendous amounts of moisture, began to cede territory to the gymnosperms, the first plants to reproduce using seeds.

Though many primitive plants became extinct, present-day survivors of some seedless plants are on display in the Garden Primeval. True ferns, such as the ladder brake fern (*Pteris vittata*), are the familiar ferns seen along streams and moist forest floors throughout the southeastern states and California. Though much smaller than their ancestors, these ferns reproduce in the same way, through spores. Fern leaves, called fronds, can be simple, as in the *Colysis wrightii*, or very divided, as in the fishtail fern (*Nephrolepis falcata*). The plants themselves range in size from the tiny Resurrection fern (*Polypodium polypodioides*) to the tall Australian tree fern (*Cyathea cooperi*). Club mosses, whisk ferns, and horsetails are related to ferns. They reproduce in a similar fashion, but their appearance can be quite different. Most have much smaller leaves than ferns. Trailing spike moss (*Selaginella kraussiana*) is a club moss that looks like a clump of tiny ferns. Rock tassel fern (*Huperzia squarrosa*) looks like a creeping pine branch. Horsetails, represented in the display by the scouring rush (*Equisetum hyemale*) from North America, grow upright and resemble small bamboo plants.

The wind-pollinated gymnosperms, cone-bearing woody shrubs and trees, are represented here by cycads, conifers,

(above)
European water clover (*Marsilea quadrifolia*).

(opposite)
Primitive plants.
Ferns, cycads, club mosses, whisk ferns, and horsetails thrive in the moist air of the Garden Primeval.

ginkgoes, and gnetophytes. The cycads bear seeds in cones, but plants are divided into male and female. The cones of male and female sago palms (*Cycas circinalis*) can be spied in the center of their palm-like crowns, while the cones of the small cycad *Zamia skinneri* are close to the ground. The ginkgo (*Ginkgo biloba*) is another ancient tree that bears its seeds on female plants. Only the male is on display, as the seeds are notoriously foul-smelling. The lush green Norfolk Island pine (*Araucaria heterophylla*), a true conifer, dominates the primeval landscape. In its tropical native habitat off the coast of Australia, it can grow to 200 feet.

(left and below left)
Sago palm (*Cycas circinalis*) male and female.

Though often given the name "palm" ("cycad" derives from the Greek word *cyckos*, meaning palm-like), cycads are actually related to conifers, plants they predate on the evolutionary scale. Among the most primitive living families of seed-bearing plants, cycads do not produce flowers but bear seeds in cones. Individual plants are either female or male—seeds are produced in the female cone and pollen is produced in the male cone. Though delicate and soft like ferns when they are young, cycads grow taller and stiffer as they mature. It may take a century or more for them to reach their usual height of ten feet. Of the several examples of cycads that exist in the U.S. Botanic Garden, one female in the Garden Court has survived since the Wilkes Exploring Expedition returned in 1842.

(above)
Ginkgo (*Ginkgo biloba*).

The unusual leaves of the ginkgo, or maidenhair tree, have inspired artists wherever the tree has flourished. Ginkgoes are gymnosperms, among the first of the seed-bearing plants. A tree is either male or female—the female bears a small, disagreeably smelly fruit. Fossil records show that ginkgoes were widely scattered over the globe, but only one species has survived to modern times. Individual trees can live as long as 3,000 years.

(opposite)
Norfolk Island pine (*Araucaria heterophylla*).

The Norfolk Island pine, a seed-bearing conifer, towers above its ancestors in the Garden Primeval.

(above and opposite)

Sporangia (spore packets) on Australian tree ferns (*Cyathea cooperi*).

True ferns, whisk ferns, horsetails, and club mosses are flowerless plants that survive from the moist, Paleozoic landscape of 350 million years ago. These plants do not produce seeds like conifers and flowering plants. Instead, their reproductive cycle includes a stage that produces spores (spots on the underside of the fronds). Once the spores are dispersed, they must have a moist environment in which to germinate.

(center left)

Fern (*Pseudodrynaria coronans*).

The leaves of ferns, called fronds, range from very simple (undivided) structures to compound (divided) and decompound (highly divided). New fern fronds emerge tightly curled in the familiar "fiddlehead" form and unfurl as they grow.

(above left and bottom)

Fern (*Blechnum brasiliense*).

Southeast Corner House

The sophisticated environmental controls in the Southeast Corner House can be manipulated to create special conditions that support a wide range of plants. A series of exhibits highlighting fragile ecosystems is planned for this transitional space. The first of these displays features an oasis, an island of green in the midst of desert aridity.

(above)

Cotton palm (*Washingtonia filifera*).

One of several palms native to the United States, the cotton palm was given its scientific name in honor of the first president. Found in isolated desert regions, the palms are propagated with the help of coyotes, who ingest the seeds and disperse them.

(right)

View of the oasis.

Stepping into the oasis after walking through the World Deserts brings a sense of relief common to parched travelers. The air is fresh and fragrant. Trickling water feeds a pool shaded by papyrus stalks. Lush vegetation, including figs, crowds the water's edge.

Plant Adaptations

In the quiet eastern corner of the Conservatory, changing exhibits focus on the ingenious ways in which plants are able to get what they need to survive. All the plants in a display share a specific survival adaptation. This exhibit highlights plants that form beneficial relationships with either fungi or bacteria.

(above and left)
Pink powder puff (*Calliandra emarginata*).
Legumes, like this pink powder puff, provide housing for nitrogen-fixing bacteria (*Rhizobium*). After colonization, sites along the roots develop into nodules that protect the growing bacterial colony. In return, bacteria make available atmospheric nitrogen, a vital nutrient for the plant.

East Courtyard

Children's Garden

Children are drawn to plants—their natural curiosity drives them to look, touch, and smell. In this inviting courtyard, children are allowed to indulge their sense of discovery, with no adult admonitions to hold them back!

(above, right, and opposite)

A garden to enjoy.

Though this garden is still evolving, it includes a number of elements to encourage interaction with plants and the natural environment. Small garden boxes are set up to make digging, planting, and harvesting easy for tiny hands. Big tubs filled with water lilies invite investigation, and a hand pump makes the fountain squirt. A tunnel of vines is the perfect place to hide, while a path of large stones leads skipping feet around the garden.


Plant Adaptations

East and West Galleries

In the East Gallery, a creative and comprehensive exhibit explores the science of plants. Designed to appeal to the curious of all ages, "How Plants Work: A Guide to Being Green" demystifies the life and reproduction of plants.

Using compelling displays that combine living plants with hands-on activities, the exhibit answers basic questions about plant function and survival. With a huge family tree of plants as the starting point, panels demonstrate how plants nourish themselves, reproduce, and fight off disease and predators.

Two 14-foot fiber sculptures dominate the exhibit. "Scarlet magnifica" shows off its xylem, phloem, and other parts, illustrating how the parts of a plant can vary as the result of adaptation. "Electra botanica," equipped with sophisticated electronics, demonstrates the steps of photosynthesis and shows how captured energy is used to manufacture seeds.

In contrast, the exhibit in the West Gallery emphasizes the countless ways in which plants enrich human life. Colorful displays feature useful, ornamental, and ceremonial objects, images, architecture, products, and even figures of speech, all examples of the contributions plants make to human comfort and culture.

(above and left)
West Gallery.
Bright sculpted canna blossoms invite visitors to smell the spices and essential oils that derive from plants. A giant sunflower (left) presents a short video about plant-based world cuisines.

(opposite)
East Gallery.
A fiber sculpture, "Scarlet magnifica" helps visitors understand the complicated life processes of plants.

Bartholdi Park

Bartholdi Park, a two-acre garden on the south side of the Conservatory, serves as a demonstration garden where visitors can learn to apply the latest horticultural techniques to their home landscapes. In geometrically arranged beds that complement the magnificent classical fountain designed by Frédéric Auguste Bartholdi, the garden features perennials and annuals in innovative combinations. The plantings are constantly updated to showcase new varieties, design trends, and garden maintenance methods.

Every type of plant is represented in Bartholdi Park—deciduous trees, evergreens, shrubs, perennials, annuals, vines, ground covers, roses, and bulbs. An urban microclimate, created by the southern exposure of the garden and the shelter of surrounding buildings, sustains many otherwise tender plants through most of the year. At each entrance, plants are positioned to frame the fountain, which is surrounded from spring to fall by colorful flowers. Gardens are designed in a variety of styles to complement distinct themes. Each garden uses trees and shrubs as backdrops for the showy blossoms of annuals and perennials. The largest theme garden, the Heritage Garden, uses hardy species native to North America to encourage wildlife-friendly gardening.

Bartholdi Park is also a refuge—an island of green where visitors, office workers, and a surprising diversity of birds and pollinators can find respite from the stresses of the city. Secluded benches offer quiet shade in the summer and sheltered sunlight in the winter. In warm weather, the splash of the fountain rhythmically underscores the chirps of nesting birds and the drone of busy insects. In every season, the colors and textures of the plants and flowers are exhilarating. And few park benches in the world offer such stately vistas, with the crystal roof of the Conservatory vying with the Capitol dome for a visitor's attention.

(above)
Rose
(*Rosa* 'Alchymist').
U.S. Botanic Garden

(opposite)
Bartholdi Park
in midsummer.

(above)

American Parterre.

Two stately rows of Japanese holly (*Ilex crenata* 'Sky Pencil') form a path to the fountain. Vigorous rosemary bushes (*Rosmarinus officinalis* 'Salem') surround the American Parterre bed that features a formal arrangement of perennials.

(opposite)

Tulips
(*Tulipa* 'Gudoshnik').

(left)

Bartholdi Park.

The benches and tables set out in warm weather are popular for picnics and meetings.

(above left)
Trifoliate orange (*Poncirus trifoliata*).

(above right)
Irises and giant allium (*Allium giganteum*).

(left)
Tulips and pansies surround Bartholdi Fountain in spring.

(far left)
Secluded benches.

(opposite)
Spring flowers in the Romantic Garden.

(opposite)

Heritage Garden.

Native plants flourish in the Heritage Garden. Signs describing sustainable gardening practices are placed throughout the beds to help home gardeners create healthy backyard habitats. The Heritage Garden was named as the 10,000th registered Backyard Wildlife Habitat by the National Wildlife Federation.

(above left)

American beautyberry (*Callicarpa americana*).

(above right)

Summer garden.

Plants including hydrangea (*Hydrangea* 'Blue Wave'), garden phlox (*Phlox paniculata* 'Becky Towe'), lamb's ears (*Stachys byzantina* 'Big Ears'), and Shasta daisy (*Leucanthemum* x *superbum*) thrive alongside native plants in the Heritage Garden.

(above)

Garden observations.

Keeping a daily notebook of plant observations is essential for a well-managed garden.

(right)

Yearly visitor.

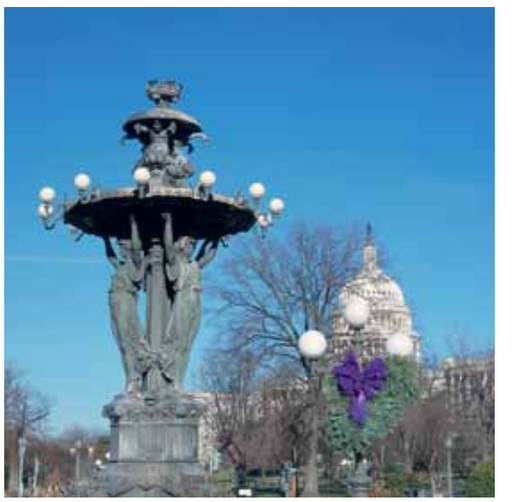
Camouflaged among fading tulip stalks and pansies, a mother duck hides her nest.

(above left and right)
Autumn in Bartholdi Park.

(left)
A bumblebee pauses on a pomegranate.

(near left)
Birdbath.

(opposite)
Japanese blood grass (*Imperata cylindrica*).



(opposite, above, and left)

Urban oasis.

Bartholdi Park is a refuge in the midst of the nation's capital. From a park bench, a visitor can see the Washington Monument, the National Museum of the American Indian, and the Capitol dome.

(above)

Cardoon (*Cynara cardunculus*).

The National Museum of the American Indian appears beyond the flourishing cardoon.

(left)

The Bartholdi Fountain at Christmas.

Bartholdi Fountain

The Bartholdi Fountain was created by Frédéric Auguste Bartholdi (1834–1904), the French sculptor who also designed the Statue of Liberty. It was first exhibited in Philadelphia at the International Exposition of 1876. The fountain was purchased by the U.S. Congress in 1877 for $6,000 and placed on the Botanic Garden grounds, then situated in the center of the Mall. Moved to its present location in 1932, the Bartholdi Fountain was restored in 1986.

The fountain, intended to be an allegorical representation of water and light, is designed in three identical sections with classical forms and symbols. Turtle-like aquatic monsters and large shells surround the base. The pedestal holds three sea nymphs rising on their toes, and fish spout water between them. The nymphs seem to hold the large basin, which is actually supported by the central column. Above the basin, three youthful tritons playfully hold out seaweed. Water spills from a crown at the very top into the upper basin, while jets shoot from the mouths of the fish and turtles.

The cast-iron fountain, painted to look like bronze, weighs 40 tons and is 30 feet high. It was originally lit by 12 gas lamps, making the fountain one of the first nighttime attractions in the city. These lamps were replaced by battery-powered electric igniters in 1881. The lights surrounding the large basin were added in 1885, and the fountain was completely electrified in 1915.

(above)
Bartholdi Fountain from above.
Architect of the Capitol

(opposite)
Bartholdi Fountain in afternoon light.

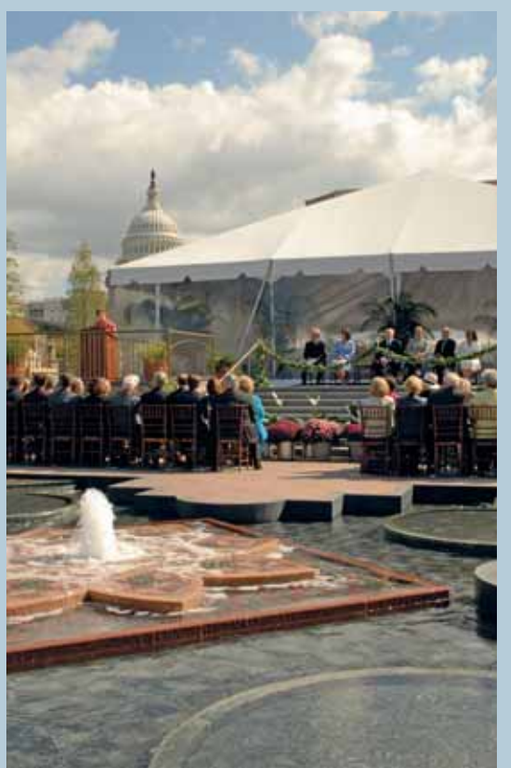

Maryland Avenue SW
Butterfly Garden
Gate
First Ladies Water Garden
Lawn Terrace
Gate
Regional Garden
Third Street SW
Amphitheater
Rose Garden
U.S. Botanic Garden Conservatory
Independence Avenue SW
Gate

The National Garden

A much-anticipated addition to the U.S. Botanic Garden, the National Garden opened to the public in October 2006. As part of the first public-private partnership project for the Architect of the Capitol, this garden was solely funded by private donations contributed to The National Fund for the U.S. Botanic Garden. More than 235,000 individuals from nearly every state raised money through garden club sales of flowers and other fundraisers.

Situated on the west side of the Conservatory, on one of the last vacant spaces on the National Mall, the three-acre garden showcases the natural beauty of North American flora. An abundantly landscaped path meanders through six distinct features. The Lawn Terrace, a formal space that connects the Conservatory to the new outdoor garden, is adjacent to a Butterfly Garden, filled with nectar plants to lure butterflies and other pollinators. The First Ladies Water Garden, an elegant pool and fountain constructed in five shades of bluestone and granite, was inspired by a Colonial-era quilt pattern named for Martha Washington. The Rose Garden celebrates the national flower with more than 100 roses selected from the eight classes grown today. The Regional Garden, featuring native perennials, shrubs, and trees from the Mid-Atlantic region, flanks a naturalistic stream. An amphitheater, sunk into the west end of the garden, provides a gathering place for educational programs.

A natural complement to the Botanic Garden, the National Garden is an outdoor classroom highlighting the great diversity of American plants. From this urban oasis, visitors are able to experience the beauty and power of nature, while enjoying the inspiring vistas of Capitol Hill and the Mall.



(above)

National Garden dedication, September 29, 2006.

First Lady Laura Bush speaks at the opening of the National Garden.

(opposite)

National Garden plan.

Associate Architects for the Architect of the Capitol

Appendix A
How to Read a Plant Label

Throughout the Conservatory, plants are labeled to help visitors recognize and remember them. Most plants have at least one common name, given in English, but their botanical names are usually in Latin. Labels are designed so that the essential information about a plant is presented consistently.

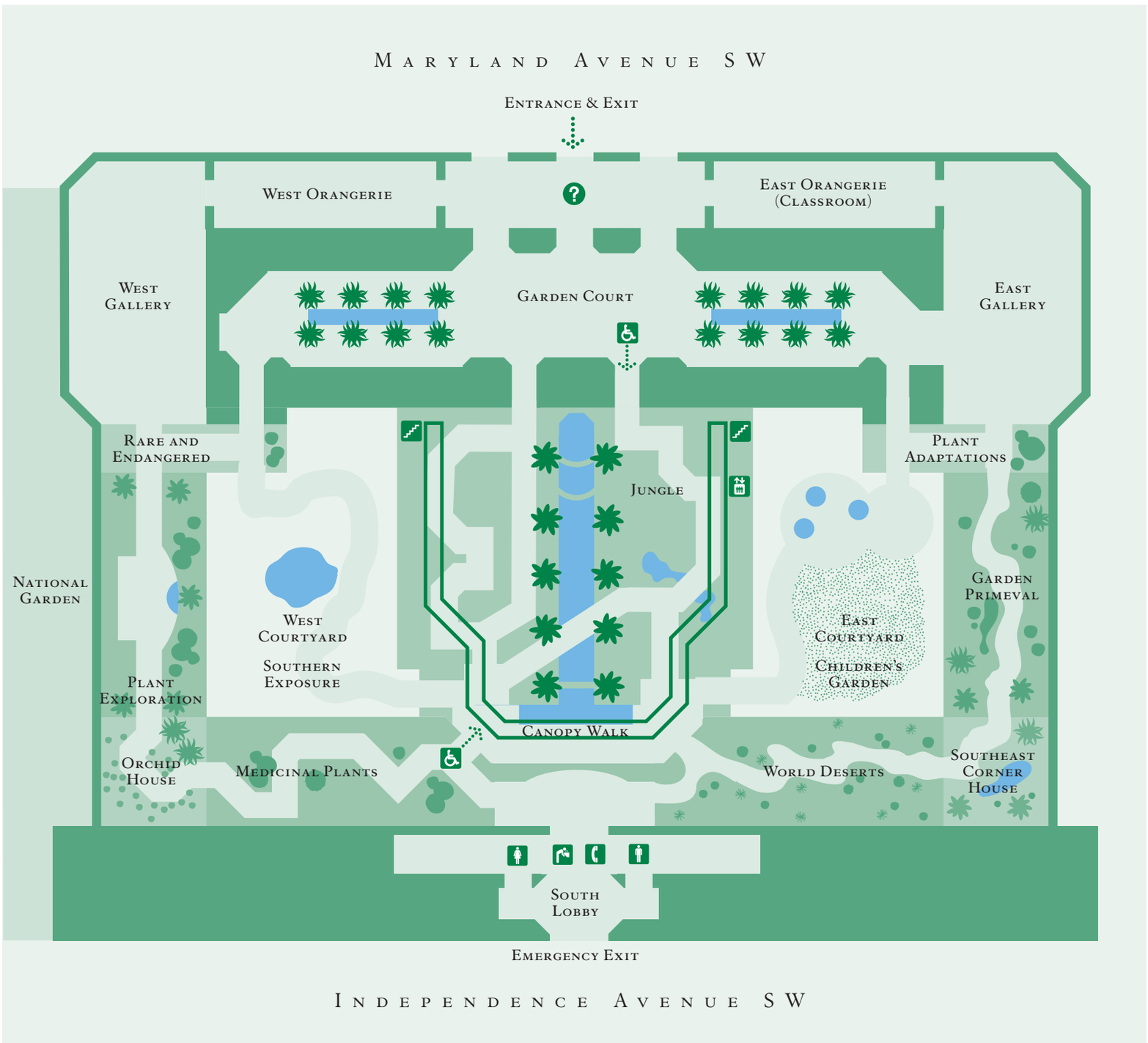
- The first line is usually the common name.
- The second line is the botanical name, which is always italicized:
  - first word indicates the genus (the subdivision of a plant family that may have many species);
  - second word is the species;
  - if there is a third word this is usually a subspecies or variety;
  - a word preceded by an x or enclosed in quotation marks indicates a cultivated variety.
- The third line indicates the plant family.
- The fourth line is its place of origin.
- Cultivated varieties do not show a place of origin because they do not appear in the wild.

(above)
A typical label in the Botanic Garden Conservatory.

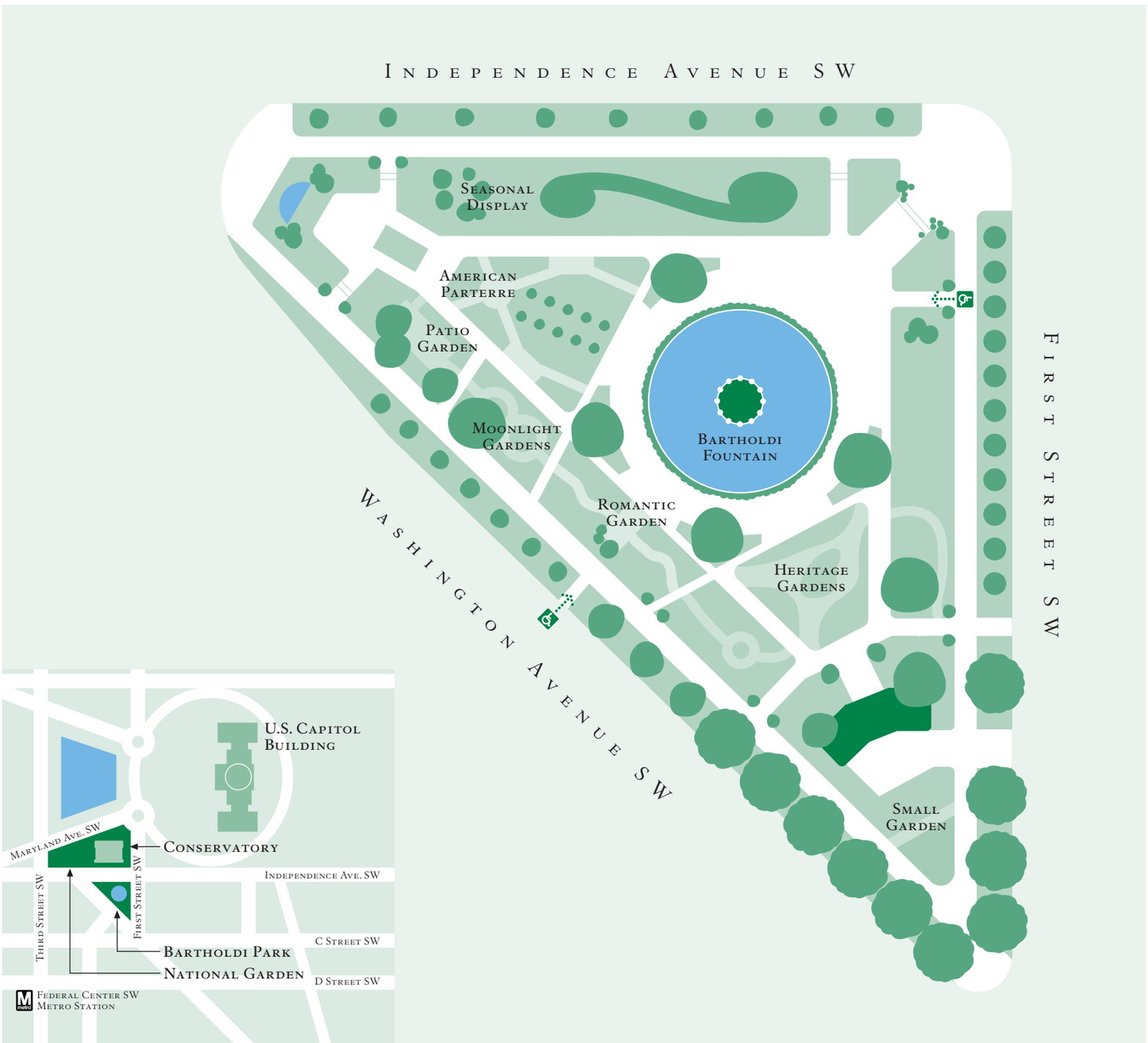
(opposite)
Bat plant
(*Tacca integrifolia*).

Appendix B

U.S. Botanic Garden Conservatory



Bartholdi Park



Appendix C
Leadership of the U.S. Botanic Garden

Captain Charles Wilkes	Supervisor of New Greenhouse	1842
Charles Pickering	Curator of National Institute	1842
	Wilkes Collection placed under the direction and control of the Joint Committee on the Library	1843
William D. Brackenridge	Horticulturist	1843–1854
William R. Smith	Gardener	1853–1863
William R. Smith	First Superintendent	1863–1912
Charles Leslie Reynolds	Superintendent	1912–1913
George Wesley Hess	Superintendent	1913–1921
George Wesley Hess	Director	1921–1934
David Lynn	**Acting Director and Architect of the Capitol**	1934–1954
Wilmer J. Paget	Assistant Director	1914–1945
J .George Stewart	**Acting Director and Architect of the Capitol**	1954–1970
Edmund Sauerbrey	Assistant Director	1945–1968
Mario E. Campioli	**Acting Director and Acting Architect of the Capitol**	1970–1971
Jimmie L. Crowe	Assistant Director	1968–1985
George M. White, FAIA	**Acting Director and Architect of the Capitol**	1971–1995
David T. Scheid	Executive Director	1985–1992
William L. Ensign	**Acting Director and Acting Architect of the Capitol**	1995–1997
Jeffrey Cooper-Smith	Executive Director	1993–1998
Alan M. Hantman, FAIA	**Acting Director and Architect of the Capitol**	1997–PRESENT
Holly H. Shimizu	Executive Director	2000–PRESENT

(OPPOSITE)
PERSIAN SHIELD
(*Strobilanthes dyerianus*).

Appendix D
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Index

Page numbers in *italics* refer to illustrations.
Headings in **bold** refer to sections of the Botanic Garden.

(page 180)
Rose Garden.
Against a backdrop of young hornbeams, roses bloom in the National Garden on the west side of the U.S. Botanic Garden Conservatory.

(opposite)
Orchid
(*Laeliocattleya* Ecstasy 'Orchidglade').