

THE ARBORETUM AT PENN STATE



Docent Manual

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PennState

Contents

INTRODUCTION	3
HOW TO GIVE A GREAT TOUR	4
OVERVIEW: HISTORY OF THE ARBORETUM AND PLANS FOR THE FUTURE.....	6
TOUR STOPS IN THE H.O. SMITH BOTANIC GARDENS.....	7
THE OVERLOOK PAVILION.....	8
RIDGE AND VALLEY SCULPTURE	9
EVENT LAWN AND KATHRYN BOWER SMITH STROLLING GARDEN.....	10
CHILDHOOD’S GATE CHILDREN’S GARDEN.....	11
ANNUAL DISPLAY GARDEN & JOAN MILIUS SMITH ESPLANADE	13
JOEL N. MYERS SUNDIAL.....	14
POLLINATOR AND BIRD GARDEN.....	15
ROSE AND FRAGRANCE GARDEN.....	16
OASIS GARDEN & LOTUS POOL.....	17
MARGERIE ENES SMITH SOARING WATERS FOUNTAIN.....	18
BOARDWALK AND DR. JAMES J. & LYNN D. RAMAGE MARSH MEADOW	19
NORTH (CONSERVATORY) TERRACE AND POPLAR COURT	20
BAMBOO ALLÉE.....	21
THE ARBORETUM BEYOND THE GARDENS.....	22
PHILANTHROPY AND COMMEMORATIVE PROGRAMS	24
RENTAL OPPORTUNITIES	24
FREQUENTLY ASKED QUESTIONS.....	26
SAFETY AND SECURITY	27
ADDITIONAL NOTES	28
BOTANY.....	29
Ancient Plants	29
Native Plants	30
Poisonous Plants.....	31
Edible Plants.....	32
Plants for Pollinators.....	33
GEOLOGY OF CENTRAL PENNSYLVANIA	34
The Time Spiral	36

THE SPRING CREEK WATERSHED..... 37

A BRIEF HISTORY OF CENTRAL PENNSYLVANIA..... 39

 First Inhabitants of Pennsylvania 39

 European Settlement 39

 The Iron Industry and Ecological Transformation 40

 Agriculture and Higher Education 40

 Arboretum History 41

INTRODUCTION

The mission of The Arboretum at Penn State is to engage the strengths of the University in promoting scholarship and education about plants, and their history and importance on earth.



Docents play a key role in accomplishing the mission of the Arboretum. They serve as greeters and conduct the majority of visitor tours. They are often the only Arboretum representatives that a visitor will meet.

Docents should be as prepared and informed as possible before undertaking their responsibilities, but are not expected to know every detail about the Arboretum or to provide a uniform visitor experience. Every docent will bring a unique perspective to his or her work.

The primary function of this manual is to articulate the elements of a successful tour, provide information that can help docents answer visitors' questions, and list emergency and other relevant information in a single document.

HOW TO GIVE A GREAT TOUR

- **Wear your name badge.**
- **Bring your cell phone.**
- **Wear comfortable shoes.** There is a considerable amount of walking involved in conducting a tour.
- **Be prepared.** You should be familiar with the tour stops and your route through the gardens, and have at least one thing to say about every stop. Rehearse what you plan to say, and don't be afraid to keep it short. Focusing on a single message is preferable to overwhelming people with too much information. Visitors who want more information than can be provided on a tour can be directed to the Arboretum website or the brochure stand.
- **Welcome tour group visitors and introduce yourself.** You may want to include a brief personal story about how you got involved at the Arboretum.
- **Get to know your audience.** Has the group visited the Arboretum before? Are they primarily in one age or family group? Does the group include Penn State alumni?
- **Give a quick overview of the tour route.** Point out the location of bathrooms, water fountains, brochure dispensers, and parking passes. Make sure that all guests have obtained a parking pass for their vehicles. Let them know about some garden highlights they can look forward to, give them an estimate of the length of the tour, and invite them to ask questions at any time.
- **Introduce the Arboretum.** Explain the mission of the Arboretum and provide a quick overview of its history.



Curator Shari Edelson giving a tour in the H.O. Smith Botanic Gardens

- **Guide the group through all tour stops in the H.O. Smith Botanic Gardens.** At some point during the tour, take a moment to point out the areas of the Arboretum beyond the gardens.
- **Explain the role of philanthropy in the creation and growth of the Arboretum.** Describe commemorative opportunities. Point out that the construction and operation of the Arboretum has been funded almost entirely through philanthropic contributions.
- **Avoid talking while walking.** Many visitors prefer to sit while listening to a docent speak, so you may wish to delay explanations until you have reached a space with seating. **If you need to talk while you are on the move, walk slowly backward so that your group can hear you.**
- **Make sure everyone can hear you.** If members of your group are lagging behind, wait for them to catch up.
- **Use questions to keep the group engaged.** People love to show what they know!
- **Give visitors a chance to ask questions. Repeat questions after they are asked to make sure that everyone hears them.** You do not need to give a comprehensive answer to every question. Visitors who want more information than can be provided on a tour can be directed to the Arboretum website or the brochure stand.
- **Be considerate of your group.** Avoid sensitive topics like politics, race, ethnicity, etc. Try not to walk or talk too fast, and try not to exceed the time allotted for the tour.
- **Thank visitors for coming and invite them to return.**

Information and resources that can help docents in providing tours are provided in the pages that follow.

OVERVIEW: HISTORY OF THE ARBORETUM AND PLANS FOR THE FUTURE

Land for an arboretum was first set aside by Penn State's Board of Trustees in 1914, but nearly a century passed before construction of The Arboretum at Penn State began.



The future site of the H.O. Smith Botanic Gardens in 2002, before construction began

The land that is now the site of the H.O. Smith Botanic Gardens and the Hartley Wood was purchased in 1989. Included in the sale was a three-story stone house which was remodeled to serve as the University president's residence, and is now known as Schreyer House after the donors who funded the renovation.

The first phase of Arboretum construction (Phase I) was made possible through a \$10,000,000 gift from Charles H. (Skip) Smith in 2007. The H.O. Smith Botanic Gardens are named in honor of Skip Smith's father, a State College contractor and developer. At the conclusion of Phase I, the botanic gardens contained over 17,000 individual plantings of 700 plant varieties.

The H.O. Smith Botanic Gardens cover only 30 of the Arboretum's 370 acres. In the future, the Arboretum hopes to add an Education Center, Conservatory, Planetarium, and many more plantings. These plans are contingent on securing funding. To date, nearly all the money that has been used to build the Arboretum has come from the generosity of private donors.

TOUR STOPS IN THE H.O. SMITH BOTANIC GARDENS

The H.O. Smith Botanic Gardens serve as the gateway to the larger Arboretum and are the primary focus of docent-led tours. There are thirteen tour stops in the botanic gardens. Guided tours stop at each of the designated locations, but docents choose how much time to spend at a given location based on visitor interest.

The thirteen tour stops are:

1. Overlook Pavilion
2. Ridge & Valley Sculpture
3. Event Lawn & Kathryn Bower Smith Strolling Garden
4. Childhood's Gate Children's Garden
5. Annual Display Garden & Joan Milius Smith Esplanade
6. Joel N. Myers Sundial
7. Pollinators' Garden
8. Rose & Fragrance Garden
9. Oasis Garden & Lotus Pool
10. Margery Enes Smith Soaring Waters Fountain
11. Boardwalk and Dr. James J. & Lynn D. Ramage Marsh Meadow
12. North (Conservatory) Terrace and Poplar Court
13. Bamboo Allée

Descriptive information and listings of noteworthy plants are provided for each stop in the following pages.

THE OVERLOOK PAVILION

The Pavilion is usually the starting point for docent-led tours, and is a good place for a **quick** tour stop. Visitors are usually eager to get out into the gardens.

The building is a popular rental venue for weddings and other celebrations. It contains restrooms, water fountains, brochure dispensers, and an office. Parking passes are available on the office door.

The Arboretum's commitment to environmental stewardship is expressed in the Pavilion's design. It is a Leadership in Energy and Environmental Design (LEED) certified "green" building. Environmentally-friendly features include a geothermal heating and cooling system, water-conserving dual flush toilets, and a rainwater infiltration system. The rain chains hanging from the eaves are an alternative to a traditional downspout that double as a water feature.

The canopy remains in place year-round. The side curtains are removed for the winter to protect them from strong winds.

The northwest end of the Pavilion is a good place to view the natural lands areas of the Arboretum, including the Hartley Wood, Big Hollow, and the Prairie Restoration Project area.



PLANT NOTES

Pavilion plantings are notable for providing year-round seasonal interest: spring, summer and fall blooms, and winter greenery.

Beds near the steps:

Possum haw viburnum (*Viburnum nudum* 'Winterthur')

Virginia sweetspire (*Itea virginica* 'Henry's Garnet')

Lenten rose (*Helleborus orientalis*)

Beds behind Pavilion:

Apple serviceberry (*Amelanchier x grandiflora* 'Autumn Brilliance')

Limber pine (*Pinus flexilis* 'Vanderwolf's Pyramid')

Christmas fern (*Polystichum acrostichoides*)

RIDGE AND VALLEY SCULPTURE

The Ridge and Valley sculpture depicts the local Spring Creek Watershed, which is found in the Ridge and Valley Province of the Appalachian Mountains.

The Ridge and Valley is a belt of long, parallel ridges and valleys that forms a central part of the Appalachian Mountains. Bald Eagle Mountain, visible in the west, is the westernmost ridge of the Ridge and Valley; beyond it lies a steep escarpment called the Allegheny Front and the beginning of the Allegheny Plateau.

The Appalachians were formed approximately 300 million years ago by plate collisions which resulted in the assembly of the supercontinent Pangaea. Now deeply eroded, the Appalachians originally rivalled the Andes or Rocky Mountains in size.

Sinuuous channels blasted into the bluestone pavement depict permanent streams, “bumpy” ones represent underground and intermittent water flow. Pits show the location of old iron mines.

The boulders at the edges and center of the map represent Bald Eagle, Nittany, and Tussey mountains. The spaces between the boulders depict water gaps, stream-carved passages which slice through the ridges.- In the pre-automobile era, water gaps allowed travelers to bypass steep climbs over the mountains.

The Overlook Pavilion itself is intentionally situated on a small watershed divide. Rainfall from the Overlook Pavilion’s roof falls onto the sculpture and flows out of the gap in the boulders which represent Bald Eagle Mountain, just as water in the Spring Creek watershed flows out through a gap in Bald Eagle Mountain and into the Susquehanna watershed. Pour a bottle of water on the map at the beginning of your stop, and it may be exiting the map by the time you are ready to leave.



Artist: Stacy Levy

PLANT NOTES

Pavilion plantings are notable for providing year-round seasonal interest.

Plantings include:

Apple serviceberry (*Amelanchier x grandiflora* ‘Autumn Brilliance’)

Bosnian pine (*Pinus heldreichii*)

Wild hydrangea (*Hydrangea arborescens* ‘Dardom’ White Dome®)

Japanese anemone (*Anemone x hybrida* ‘Andrea Atkinson’)

Annual and seasonal plantings: See plant list available in the Overlook Pavilion brochure rack.

EVENT LAWN AND KATHRYN BOWER SMITH STROLLING GARDEN

The Strolling Garden encircles the Event Lawn, an open space that can accommodate thousands of attendees for events like concerts, the Pumpkin Festival, and the Winter Celebration.

The Arboretum's "witness tree," the Hosler Oak, is located in the Strolling Garden. This white oak (*Quercus alba*) was the first tree planted at the botanic gardens. It will "witness" the growth of the Arboretum over time.

The Hosler Oak was selected in 2001 and "dug" and left in place to develop roots close to the trunk. By the time it was transplanted in 2005, it had a 9-foot root ball and weighed nearly 30,000 lbs. The tree was transported to the Arboretum by tractor trailer and hoisted into place with a crane.

The oak is named after Dr. Charles Hosler (retired senior vice president for research, dean emeritus of the graduate school, and professor emeritus of meteorology) and his wife, the late Anna Rosa Hosler. The tree was donated by PSU alumnus George Biemesderfer, whose career was influenced by Dr. Hosler.

The smooth stone beneath the Hosler Oak is part of the sundial. It marks the direction of the sundial's shadow at noon on the solstices as it would have appeared 65 million years ago, at the end of the Age of Dinosaurs.



PLANT NOTES

The Strolling Garden contains many ornamental members of the rose family, including varieties of chokeberry, crabapple, and potentilla, as well as ornamental pines, cypresses, and grasses.

Rose family plantings include:

Flowering crabapple (*Malus* 'Prairifire')

Korean mountain ash (*Sorbus alnifolia*)

Green hawthorn (*Crataegus viridis* 'Winter King')

Conifer plantings include:

Oriental spruce (*Picea orientalis* 'Skylands') **Alaskan cedar** (*Xanthocyparis nootkatensis* 'Pendula')

Flowering shrubs:

Panicle hydrangea (*Hydrangea paniculata* 'Limelight')

Bush clover (*Lespedeza thunbergii* 'Gibraltar')

CHILDHOOD'S GATE CHILDREN'S GARDEN

A thorough exploration of the children's garden could easily consume the entirety of a tour. It is probably a good idea to keep an eye on the time and move visitors along if you are running short of time for the remaining tour stops.

The children's garden is named for a line in Penn State's alma mater song ("When we stood at childhood's gate, Shapeless in the hands of fate, Thou didst mold us, dear old State"). It is designed to function as a natural classroom in which children of all ages can discover central Pennsylvania's native plants, animals, geology, history, and culture. The garden invites visitors to think about past and future, the grandest and smallest of scales, and the world around us as well as the one below our feet.

The garden entrance is designed to convey the feeling of descending into central Pennsylvania from the air, experiencing it on the grandest scale. The colors and undulating shape of the gate's canopy and entrance stones suggest the region's patchwork of mountains, fields, and forest, and the pools that flank the gate recall the many natural springs.

The garden's central area invites visitors to contemplate how land use has changed over time. The lawn with the resting bison recalls Pennsylvania's original native prairie openings that offered scattered habitat for this once-native animal. Further along, rounded willow huts reproduce the crop-guarding encampments of the native Susquehannock peoples.

Beyond the Susquehannock encampment are the raised beds of the Harvest Gardens, which suggest the region's



PLANT NOTES

The children's garden features wild plants which are native to the Appalachian Mountains as well as crop plants (in the Harvest Garden).

Appalachian native plants include:

Spicebush (*Lindera benzoin*) – fragrant leaves, host plant for Spicebush Swallowtail caterpillars

Mountain laurel (*Kalmia latifolia*) – prolific white blooms cover Appalachian forests in early summer

Dutchman's pipe (*Aristolochia macrophylla*) – host plant for pipevine swallowtail caterpillars, named for flowers which resemble old-fashioned meerschaum pipes

Sassafras (*Sassafras albidum*) – traditional Appalachian tea and medicinal plant

Pawpaw (*Asimina triloba*) – produces edible fruit, with a taste similar to banana or mango

Highbush blueberry (*Vaccinium corymbosum* 'Patriot') – berries are food source for people and wildlife, including black bears

Plant lists for the Harvest Garden are available in the Garden Shed.

agricultural economy while also giving children an opportunity to learn about planting cycles. The Harvest Gardens provide as much as 2,000 lbs. of food per year to the local food bank.

The Glass House serves as an education center, and provides a sheltered, indoor space for cool-season activities. In the winter, it houses a holiday tree decorated with ornaments made by local children. The nearby sod-roofed shed holds tools and educational materials.

Rocky ridges beyond the lawn were built from concrete and sandstone. The ridges offer a cross-sectional view of an **anticline**, or arched fold. A complex of anticlines and U-shaped folds (**synclines**) underlies the Ridge and Valley Appalachians.

A cave reproduces the subterranean world of local limestone valleys, including sculpted dripstone formations and a bat colony. An elevated sinkhole opening drips water from the cave's vegetation-covered roof; small stalactites can be seen forming where the water drips.

The creek which winds through the rocky ridges suggests a water gap. Water gaps are a common feature of the Appalachians, in which a stream or river cuts a steep-sided, narrow pass through a mountain.

Pennsylvania's prehistoric past is evoked by the larger-than-life fossils along the Fossil Gap trail and the Time Spiral pavement. The sculptures reconstruct animals that were common at a time when Pennsylvania was located beneath a warm, shallow ocean. The Time Spiral maps the last 541 million years of earth history, from the rise of multicellular life to the present day, at the center of the spiral.

At the rear of the garden, the woodland environment is recreated as a magical forest in which children can play among clusters of native bolete mushrooms, meet a giant Spicebush swallowtail caterpillar, and imagine themselves small enough to live inside a tree stump. A lookout in the fence at the rear of the garden offers a chance to observe birds at the feeder and bird bath.

ANIMAL SCULPTURES

Sculptures and bas relief plaques recreate animals which are native to the Appalachian region.

Amphibians:

American bullfrog (*Lithobates catesbianus*)

Eastern hellbender salamander (*Cryptobranchus alleganiensis*)

Spotted salamander (*Ambystoma maculatum*)

Birds:

Great Blue Heron (*Ardea herodias*)

Eastern Screech Owl (*Megascops asio*)

Barred Owl (*Strix varia*)

Insects:

Spicebush swallowtail caterpillar (*Papilio troilus*)

Mammals:

Black bear (*Ursus americanus*)

Big brown bat colony (*Myotis lucifugus*)

American bison (*Bison bison*)

Eastern cottontail rabbit (*Sylvilagus floridanus*)

Red fox (*Vulpes vulpes*)

Northern raccoon (*Procyon lotor*)

Reptiles:

Black rat snake (*Pantherophis obsoletus*)

ANNUAL DISPLAY GARDEN & JOAN MILIUS SMITH ESPLANADE



The Annual Display Garden and Joan Milius Smith Esplanade provide a place to enjoy the Arboretum's seasonal flower displays. It is also a popular event space and wedding venue.

Plantings are changed three times a year. The spring display features tulips and other flowering bulbs, timed to reach peak bloom on Penn State graduation weekend. In summer, tulips are replaced by heat-loving annuals and tropical plants. In autumn, the display features hardy plants like chrysanthemums, ornamental kales and cabbages, and grasses.

The arch at the end of the garden serves as a trellis for gourds and flowering vines.

The post-and-wire fence at the outer boundary of the garden supports espaliered fruit trees. Espalier is an ancient technique which trains trees or shrubs to grow in a narrow area. It was a common space-saving technique in European castle gardens. Wire cages at the base of the trees protect the bark of the young trees from hungry rabbits and voles, which are common in the garden.

PLANT NOTES

The Display Garden is notable for seasonally changing plant displays, including spring bulbs, summer annuals, and hardy autumn ornamentals.

Hedge:

Cornelian cherry (*Cornus mas*)

Fruit Tree Espaliers:

Apple (*Malus domestica* 'Lodi', 'Topaz', 'Crimson Crisp', 'Liberty')

Seasonal Displays:

Plant lists with tag numbers are located at the Overlook Pavilion's brochure stand.

JOEL N. MYERS SUNDIAL

The sundial was donated to the Arboretum by Joel N. Myers, founder of Accuweather, Inc. It differs from the average garden timepiece not only in size but in its high

degree of accuracy. A skilled reader can use it to determine the time to within a few minutes of the actual solar time. The sundial's accuracy is due to its layout and design, which was determined by a computer program and is specific to its location on planet earth.



Docents are not expected to master telling time using the sundial. Detailed instructions for reading the sundial are available on the panel located at the sundial, and in a brochure available at the Overlook Pavilion. Visitors who wish to know what time it is may refer to the panel or brochure . . . or check their watch or cell phone.

Parts of the sundial:

- Gnomon (NO-mon): tall, triangular stone which casts the shadow.
- Timepieces: pillow-shaped stones which lie in front of the gnomon and mark the hours. Because of Earth's axial tilt, the length of the shadow cast by the gnomon changes with the seasons. The three arcs of timepieces are therefore most accurate for different seasons.
 - Innermost arc: most accurate in the summer, when shadows are short.
 - Middle arc: most accurate in fall and spring, when shadows are moderately long.
 - Outermost arc: most accurate in the winter, when shadows are longest.
- Blue, white, and reddish-brown inlays: mark the position of the shadow on the solstices and equinoxes and can be used to determine time more accurately.
- 27th piece of the sundial: the smooth granite rock beneath the Hosler Oak. It marks the direction of the shadow at noon on the solstices as it would have appeared 65 million years ago, at the end of the Age of Dinosaurs.

POLLINATOR AND BIRD GARDEN

This garden, scheduled to be completed in 2021, will add over three acres to the H.O. Smith Botanic Gardens. This space has been designed to attract all of our region's insect pollinator species as well as the broadest possible range of resident and migratory birds.

Pollination is the work of many species, including familiar ones like European honeybees and less well-known ones, including moths, beetles, flies, and wild bees. There are over 300 bee species in Pennsylvania, and over 4,000 in North America.

Working with a large team of Penn State-based and outside experts, including Penn State's [Center for Pollinator Research](#), the Arboretum has designed a garden that encourages ecological diversity by incorporating [habitats](#) such as a pond, wetlands, woodland, and dry meadow. The new gardens will showcase over 390 unique species and varieties—most of which are native to Pennsylvania or the greater Appalachian region. Its objectives are to expand scientific knowledge of pollinator biology, demonstrate strategies for conservation of threatened pollinators and their host plants, and cultivate an understanding of pollinators and their contribution to society.

Pollinators are essential to agriculture and natural landscapes, but many have declined in numbers because of parasites, pesticides, habitat loss, and losses in plant diversity. Home gardeners who want to attract pollinators can adopt strategies seen in the Pollinator and Bird Garden, including planting large swaths of a single plant instead of isolated specimens, and growing a diverse array of species to provide food and shelter for pollinators during multiple life stages.



PLANT NOTES

Plants and planting layouts have been chosen to attract bees, moths and butterflies, hummingbirds, and other pollinator species.

Plants for butterflies:

Whorled milkweed (*Asclepias verticillata*) – food for Monarch caterpillars

Blue mistflower (*Conoclinium coelestinum*) – attracts adult butterflies of many species

Plants for bees:

Clustered mountain mint (*Pycnanthemum muticum*) – attracts a wide variety of bees and pollinating flies

Giant coneflower (*Rudbeckia maxima*) – attracts a wide range of native bees

For hummingbirds:

Red hot poker (*Kniphofia 'Little Maid'*) – hummingbirds are often attracted to reddish, tube-shaped flowers

ROSE AND FRAGRANCE GARDEN

The vine-covered stone walls of the Rose and Fragrance Garden are designed to give visitors the feeling of being in an outdoor room. The bower at the center of the garden is a rental space.



The walls themselves are made of sandstone from Curwensville, PA, that is used in many places around the Arboretum and the Penn State campus. The stone was also used for many prominent building projects in the past, including the steps of the Philadelphia Art Museum and the Rockville Bridge, the longest stone railroad bridge in the world, which crosses the Susquehanna River near Harrisburg.

At the center of the garden is a bower which is shaded by a native wisteria (*Wisteria frutescens* 'Amethyst Falls'). Cascading purple flowers are present in the spring.

The rose varieties in the garden were selected for their hardiness, disease resistance, and fragrance. They are ideal choices for the home gardener due to their ease of care.

The garden also contains some delicate plants, like the fragrant southern magnolia (*Magnolia grandiflora* 'Edith Bogue'), which is a gamble in relatively chilly central Pennsylvania.

The garden contains 40 varieties of tree peony donated by a local enthusiast, Franklin Chow. There are three cultivar groupings: Chinese, Japanese, and North American/European. Several species of the ancestral wild tree peony are also represented in the collection.

PLANT NOTES

Plants were selected to engage and delight the senses. They include a mix of perennials (roses, tree peonies, vines), herbs (sage, dill), and annuals which offer a variety of colors, textures, and fragrances.

Trees:

California incense cedar
(*Calocedrus decurrens*)

Kentucky yellowwood (*Cladrastris kentukea*)

Japanese stewartia (*Stewartia pseudocamellia*)

Southern magnolia (*Magnolia grandiflora* 'Edith Bogue')

Shrubs:

Sweetshrub (*Calycanthus x raulstonii* 'Hartlage Wine')

Chinese witch hazel (*Hamamelis mollis* 'Wisely Supreme')

Father Hugo rose (*Rosa xanthina* f. *hugonis*)

Vines:

Large-flowered climbing rose
(*Rosa* 'New Dawn')

OASIS GARDEN & LOTUS POOL

The benches in the Oasis Garden provide a welcome opportunity for tour groups to sit and relax.

The main feature of the Oasis Garden is the Lotus Pool, which contains both hardy and tropical water plants. The goldfish in the pool were surreptitiously added by unknown visitors; they thrive without any assistance from the Arboretum.

The water in the pool is only about 2 feet deep. A black vegetable dye added to the water creates the illusion of greater depth, enhances the water lily and lotus blooms, and hides the roots of the plants.

The pool plantings were donated by George Griffith ('56) who has been cultivating and hybridizing water lilies since he was an undergrad at Penn State.

The lotuses (*Nelumbo nucifera*) in the pool are especially noteworthy. They originate from two plants grown from seeds that were found buried in a dry lakebed in Manchuria. The seeds were viable even though carbon-dating showed them to be 830 to 1250 years old.

Potted palms and cycads are added to the garden only after the danger of frost has passed. In the winter, these delicate plants are housed in the University's greenhouses.



PLANT NOTES

The central pool showcases aquatic plants. The beds which surround the pool feature tropical plants in the summer months.

Plantings include:

Empress tree (*Paulownia tomentosa*)

Sweetbay magnolia (*Magnolia virginiana*)

Panicle hydrangea (*Hydrangea paniculata* 'Interhydia' Pink Diamond™)

In the Lotus Pool:

Umbrella plant (*Cyperus alternifolius*)

Tropical day-blooming waterlily (*Nymphaea* 'Queen of Siam')

MARGERY ENES SMITH SOARING WATERS FOUNTAIN

The name of the fountain refers to the arching streams that come soaring up from the underwater jets. The fountain has joined the Nittany Lion and the stone wall at the stadium as a favorite spot for photos of graduating seniors.

At night, the fountain is illuminated by underwater lights.

In the winter, the fountain is drained and covered, and a lighted winter display is installed on top.

Wading in the fountain is prohibited due to the underwater lighting fixtures and jets.



PLANT NOTES

American smoketree (*Cotinus obovatus*)

Trumpet-creeper (*Campsis radicans*
'Judy')

Shrub rose (*Rosa* 'Chewmaytime' Oso
Easy® Paprika)

Staghorn sumac (*Rhus typhina*
'Dissecta')

Chinese sumac (*Rhus chinensis*
'September Beauty')

BOARDWALK AND DR. JAMES J. & LYNN D. RAMAGE MARSH MEADOW



The boardwalk serves as the Arboretum’s “front door,” ushering visitors from main campus into the garden. The boardwalk was the gift of Penn State’s 2010 senior class. It was built using innovative steel pin supports to avoid excavation for footers in this fragile groundwater recharge zone.

The Marsh Meadow is marsh-like only occasionally, when heavy rains result in temporary ponding. It nevertheless serves a critical environmental function, allowing rainwater runoff from the adjacent neighborhood to percolate through soil and recharge the groundwater. Water that enters the Marsh Meadow eventually finds its way to wells that provide water for the Penn State campus. To protect this critical resource, Penn State has designated the Marsh Meadow as one of its Water Resource Preservation areas.

Due to the importance of the area for groundwater recharge and the weak underlying geology, no permanent structures may be built here or in the space in front of the law school.

PLANT NOTES:

The meadow is planted with switchgrass, which waves in the wind, mimicking the effect of wind on the water. The meadow is bounded by water-tolerant trees and shrubs with colorful twigs and berries, which provide winter interest.

Plantings include:

Switchgrass (*Panicum virgatum* ‘Shelter’)

Red-osier dogwood (*Cornus sericea* ‘Cardinal’)

Bloodtwig dogwood (*Cornus sanguinea* ‘Midwinter Fire’)

Coral-bark willow (*Salix alba* subsp. *vitellina* ‘Britzensis’)

Bald cypress (*Taxodium distichum*)

Dawn redwood (*Metasequoia glyptostroboides*)

Black alder (*Alnus glutinosa*)

NORTH (CONSERVATORY) TERRACE AND POPLAR COURT

The North Terrace will eventually serve as the entrance to a conservatory, a planned 10,000 square foot glass building which will house a year-round display of tropical plants. At the current time, tropical plants are seasonally displayed on the terrace, representing the theme of the future conservatory. The terrace is a rental space.

Catalpa trees (*Catalpa bignonioides* 'Aurea') are located at each corner of the terrace and are periodically cut back to the height of the walls to create a "green room" effect. The unusually large leaves of the Catalpa hint at its tropical affiliation; Catalpa is the only tree-sized northern member of a mostly tropical plant family (the *Bignoniaceae*).

The Poplar Court is located on the site of the future conservatory. The tall, narrow poplar trees which frame the Court are fast-growing, making them an ideal choice for this temporary planting.

The terrace is a good place to point out the role of foliage contrasts in a garden setting; for example, the dark foliage of ninebark (*Physocarpus opulifolius*) contrasts with the silver variegation of the ornamental grasses (*Miscanthus sinensis* subsp. *condensatus* 'Rigoletto') to create a dynamic color combination.



PLANT NOTES

The North Terrace showcases tropical plants which represent the theme of the future conservatory. The tall, narrow, fast-growing poplars which frame the Poplar Court are temporary plantings, which will eventually make way for the Conservatory.

Plantings include:

Shrubs:

Rose-of-Sharon (*Hibiscus syriacus* 'Notwoodtwo' White Chiffon™)

Ninebark (*Physocarpus opulifolius* 'Mindia' Coppertina®)

Perennials:

Akransas blue star (*Amonia hubrichtii*)

Blackberry lily (*Iris domestica* 'Hello Yellow')
Maidenhair grass (*Miscanthus sinensis* subsp. *condensatus* 'Rigoletto')

American senna (*Senna hebecarpa*)

BAMBOO ALLÉE

The allée creates a green “hallway” leading from the Strolling Garden to the Soaring Waters Fountain and walled gardens.

The allée functions as a breezeway, funneling cool air between the Strolling Garden and the Soaring Waters Fountain. On hot days, it is one of the coolest spots in the garden.

Bamboos are extremely fast-growing. Some species grow up to a foot per day. They flower unpredictably and infrequently, with many varieties taking up to 100 years to flower. Bamboos flower only once, after which they set seed and die. They make up for infrequent seed production by spreading aggressively from underground rhizomes, which can make them extremely invasive in the garden landscape and prone to escape into the wild. The Arboretum’s bamboo is controlled by a 30-inch-deep underground barrier which prevents roots from escaping from the bed.



PLANT NOTES

The Bamboo Allée is planted with two species of bamboo:

Yellow-groove bamboo (*Phyllostachys aureosulcata* ‘Spectabilis’)

Nude-sheath bamboo (*Phyllostachys nuda*)

THE ARBORETUM BEYOND THE GARDENS



Although tours do not typically take visitors outside of the H.O. Smith Botanic Gardens, docents should inform visitors about the Arboretum’s natural areas, which include numerous hiking and biking trails.

BIG HOLLOW

Big Hollow is a narrow limestone valley, visible beyond the trees at the end of the slope beyond the Overlook Pavilion. It is an “underdrained” valley; water flows underground rather than in a surface stream. Wells which provide water to the Penn State campus are found in Big Hollow.

HARTLEY WOOD

The Hartley Wood is a rare remnant of old-growth forest. Some of the oak trees in the wood are more than 300 years old. This area is used for historical interpretation classes, research on invasive plants, and field instruction. Hiking trails, including the Marilyn Quigley Gerhold Wildflower Trail, are located throughout Hartley Wood. Through the Wildflower Trail project, the Arboretum is actively restoring this area to a more natural state by removing invasive species and planting native ones.

AVIAN EDUCATION PROGRAM

The Arboretum has had an active bird banding program. Under the guidance of avian experts, birds are captured, measured, weighed, and banded. Band numbers are entered into a national identification system. Data gathered by this program demonstrates that the Arboretum is a stopover for migrating birds, and that some resident birds return year after year.

HYBRID CHESTNUT SEED ORCHARD

This 10-acre orchard is a research site co-sponsored by the University and The American Chestnut Foundation. This orchard is a key component in a breeding program to develop blight-resistant American chestnuts by hybridizing with resistant Chinese chestnut and then repeatedly backcrossing to American chestnut. If this effort is successful, reintroduction of American chestnut to the wild may restore a once abundant part of America's forests.

RAIL TRAIL

A 1.3 mile, crushed-limestone trail designated for pedestrian/bicycle use built on a portion of the historic Bellefonte Central Railroad grade. At the turn of the 20th century, Penn State students came to campus via the rail line. One of those students was H.O. Smith, for whom the Smith Botanic Gardens are named.

PENNSYLVANIA PRAIRIE RESTORATION PROJECT

A 15-acre patch of hillside being transformed by volunteers into a limestone prairie like those that existed in central Pennsylvania prior to European settlement. One large prairie is known to have existed in the Centre Hall and Old Fort area in nearby Penns Valley. Our prairie site is being reclaimed by clearing invasive shrubs, planting grasses and wildflowers native to central Pennsylvania, and periodically burning to keep out woody plants and encourage native species.

PHILANTHROPY AND COMMEMORATIVE PROGRAMS

Philanthropy is critical to development at the Arboretum, and will determine the rate of future growth. To date, with the exception of utilities and the parking lot, all garden construction has been made possible by private contributions.

The Arboretum at Penn State is a special place to honor or remember a loved one and the selection of a commemorative tree or bench contributes to a legacy of natural beauty for future generations.



More than 160 trees were planted in the botanic gardens during Phase 1 of development, and through the Arboretum's commemorative program, many now stand as lasting tributes. A commemorative plaque is placed near each tree.

The contribution for a tree or bench (\$5000) is payable over five years. Funds are used to cover installation, maintenance, and if need be, replacement. A portion of the funds is added to the Endowment for The Arboretum at Penn State to ensure long-term care of the gardens.

Additional information on philanthropy and commemorative programs is available at the brochure stand and on the Arboretum's website.

RENTAL OPPORTUNITIES

The H.O. Smith Botanic Gardens are a popular venue for weddings, special events, and professional photography. Visitors who inquire about rentals or who wish to schedule a professional photo shoot should be directed to Kathleen (Kate) Reeder, the Arboretum's event and marketing coordinator.

Those interested in renting a venue can read about pricing, venue descriptions, and frequently asked questions by clicking on "Rental Venues" on the Arboretum's home page at <https://arboretum.psu.edu/>

Rental venues in the Arboretum include:

- Overlook Pavilion
- Joan Milius Smith Esplanade
- Bower in the Rose & Fragrance Garden
- Oasis Garden Terrace
- North (Conservatory) Terrace
- Event Lawn
- Bigler Road Lawn
- Birch Overlook
- Hawthorn Entry

FREQUENTLY ASKED QUESTIONS

- **Is there an admission fee? Do visitors have to pay for parking?**
 - The Arboretum is open to the public free of charge. Parking in the Arboretum lot is also free, but visitors must obtain a pass from the caddy on the office door at the Overlook Pavilion.
- **Are dogs allowed at the Arboretum? What about service animals?**
 - Leashed dogs are allowed everywhere at the Arboretum EXCEPT in the botanic gardens. This is for the comfort of our visitors and health of our plant collections. Service animals are welcome everywhere.
- **Does the Arboretum have a gift shop? Do you sell plants?**
 - At this time we do not have a gift shop. Arboretum apparel may be purchased using the order form on our website, or at festivals. We do not currently sell plants.
- **Does the Arboretum have a cafeteria or coffee shop?**
 - At this time we do not have a dining facility, though one is planned for the future Arboretum complex. Nearby campus cafés are located at the Dickinson Law School's Lewis Katz Building directly across Bigler Road, the Smeal College of Business Building (directly across Park Avenue), and the Berkey Creamery (across Park Avenue, at the intersection of Bigler and Curtin Roads).
- **Can I pick some flowers/harvest some fruit?**
 - Other than during organized harvest events, visitors may not pick plant material in the gardens.
- **I have a very specific question about an ailing/unidentifiable/one-of-a-kind plant. Who should I ask?**
 - Botanical brain teasers should be addressed to the Arboretum's director of horticulture and curator, Shari Edelson.

SAFETY AND SECURITY

In an emergency:

- Outdoor Campus Emergency Phones are located at the parking lot entrance to the Arboretum nearest the Overlook Pavilion and on Bigler Road at the entrance to the Katz Building. These phones will connect the caller with University Police.
- If using a cell phone:
 - Call (814) 863-1111 for University Police.
 - Call 911 for a medical emergency.
- Please do not administer CPR or first aid UNLESS you are trained and certified and are acting within the parameters of your certification.
- If you notice an issue related to facilities, call the Office of Physical Plant (OPP) Service Desk at (814) 865-4731.
- To report child abuse, call PA Child Line at (800) 932-0313.
- The phone number for the office at the Overlook Pavilion is (814) 865-8080.
- The phone number for the Arboretum's main administrative office, in Room 320 of the Forest Resources Building, is (814) 865-9118.

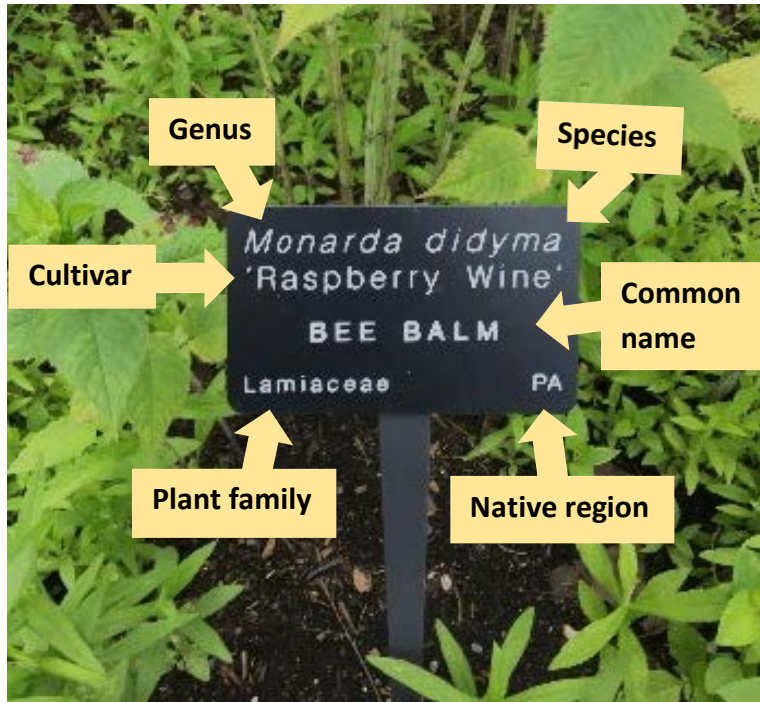
ADDITIONAL NOTES

Docents are not expected to master all details of Arboretum knowledge, or to convey them during the limited time provided by a tour. Therefore, **you are not required to read the following pages**. However, the information in them may be of interest and may help answer visitor questions.



BOTANY

There are over 800 varieties of plants cultivated in the botanic gardens, and many more in the natural lands outside the garden. The plants in the garden have been selected for characteristics like color, shape, texture, fragrance, hardiness, and botanical interest. Every plant that is a part of the permanent collections has been accessioned (given a unique number),



recorded in our database, and mapped following strict procedures.

If you want to know more about a particular plant, start by looking for a plant display label. Display labels are found directly in front of plants or a mass of plants throughout the gardens and will tell you the botanic name, cultivar (plant variety produced by selective breeding), common name, plant family, and the plant's native region. Looking up the botanic name is usually the best way to get reliable information about a plant;

common names can be confusing and are often shared by unrelated species.

Below are a few especially interesting categories of plants which can be found in the botanic gardens.

Ancient Plants

Plants representative of ancient lineages can be found throughout the botanic gardens. The oldest plant in the garden, and one of the most primitive, is a fossil lycopod trunk fragment, found in the children's garden near the Time Spiral patio feature. Modern lycopods, also known as ground pines or clubmosses, are small plants which are common in Pennsylvania forests. Like ferns, they reproduce using spores rather than seeds. Tree-sized



Fragment of fossil lycopod in the children's garden

lycopods lived in Pennsylvania swamps during the Paleozoic era, and fossil lycopods make up much of the coal which we burn today.

Many living examples of ancient groups can be found in the Arboretum's Grove of the Ancients, planted at the margins of the Marsh Meadow. The Grove includes:

- Ginkgo (*Ginkgo biloba*). Ginkgos are non-flowering seed-bearing plants. They predate the dinosaurs, known from fossils dating back 270 million years. Once common throughout the world, ginkgos are today reduced to a single species native to China.
- Dawn redwood (*Metasequoia glyptostroboides*). Dawn redwood is a true living fossil, and was believed extinct until a small living population was discovered in a remote valley in China. Fossils of this conifer are known from the late Cretaceous (end of the Age of Dinosaurs).
- Magnolia (*Magnolia* spp.). Once thought to represent the earliest flowering plants, Magnolia is often used to represent the evolution of flowers in artistic reconstructions of the Cretaceous. Modern genetic studies have revealed that magnolias are not ancestral to flowering plants, and that other plants, such as water lilies (*Nymphaea* spp.), lie closer to the origins of flowering plants.

Native Plants

The botanic gardens as a whole showcase ornamental plants from many temperate-climate regions of the globe, including Pennsylvania-native plants and those with origins elsewhere on Earth. However, certain garden areas, such as Childhood's Gate Children's Garden and the Pollinators' Garden, primarily feature plants native to Pennsylvania. In addition, the Arboretum's natural areas – specifically the Gerhold Wildflower Trail in Hartley Wood and the nearby prairie restoration site – are excellent spots to view native species. Interesting native plants include:

- Yellow birch (*Betula alleghaniensis*) – Children's Garden. This important timber tree is the source of much of the wood sold as "birch" in North America.
- Meehan's mint (*Meehania cordata*) – Children's Garden. Often mistaken for invasive ground ivy (*Glechoma hederacea*), this mat-forming mint makes a good ground cover in shady areas.



Pennsylvania native
mayapple (*Podophyllum
peltatum*)

- Blue false indigo (*Baptisia australis*) – throughout the botanic gardens. Native Americans used *Baptisia* to produce dyes which were a substitute for those produced by indigo (*Indigofera* spp.).
- Witch hazel (*Hamamelis virginiana*) – Children’s Garden. The leaves and bark of witch hazel are used in astringent preparations, which are used to treat rashes and other skin irritations. Witch hazel is a rare autumn-blooming tree; it bears spidery yellow flowers at a time when most deciduous trees are losing their leaves.

Poisonous Plants

Many common garden plants are poisonous. Toxicity often depends on dose: a plant which is safe to consume, or even medicinal, in small amounts may be poisonous in a larger amount. The possibility of encountering toxic plants is one reason why visitors are asked not to pick or taste things from the garden, and why children should remain under adult supervision at all times, including in the children’s garden. Interesting poisonous plants include:

- Lenten rose (*Helleborus* spp.) – Overlook Pavilion, Strolling Garden. The common name comes from the blooming season; Lenten rose is often seen flowering in the snow. All species of *Helleborus* are toxic, and ingesting large quantities can be fatal. *Helleborus* is often confused with the significantly more toxic but unrelated *Veratum album*, also called white hellebore.
- Dutchman’s pipe (*Aristolochia macrophylla*) – Children’s Garden, Oasis Garden. Species in the genus *Aristolochia* have a long history of use as a medicinal herb and dietary supplement, but *Aristolochia* has been shown to cause kidney damage and to be a potent carcinogen.
- Angel’s trumpet (*Brugmansia x cubensis*) – Seasonally displayed in the North Terrace and Annual Display Garden. Angel’s trumpet is sometimes ingested by people who wish to experience its hallucinogenic properties; to do so may be deadly, as all parts of the plant contain potent alkaloid poisons.



Toxic Angel’s trumpet, showing the trumpet-shaped blooms for which it is named

Edible Plants

Edible plants are scattered throughout the garden. They include familiar crop species, like those planted in the Harvest Gardens in the children’s garden, fragrant herbs like sage and thyme in the Rose and Fragrance Garden, and also less familiar plants that are never seen in a grocery store. Edible plants in the botanic garden include:



Pawpaw (*Asimina triloba*) in bloom

- Serviceberry/juneberry/shadblow/saskatoon (*Amelanchier* spp.) – Ridge & Valley Sculpture, Strolling Garden, Children’s Garden. Serviceberry fruits have an almond and blueberry flavor and are sometimes used for pies and jams. The common name “shadblow” derives from the timing of the bloom; white *Amelanchier* flowers open around the same time that a fish called shad return to New England streams to spawn.
- Apple (*Malus domestica*) – Children’s Garden, Display Garden. Domestic apples originated in Central Asia, and have been cultivated for thousands of years. Apples were introduced to the Americas in the 1600s. Apples rarely exhibit desirable characteristics when grown from seed. Therefore, most apple trees are produced by grafting, a technique in which the shoot of a desired apple type is joined to rootstock of a different type.
- Pawpaw (*Asimina triloba*) – Children’s Garden, Tropical Grove. Pawpaws produce the largest edible tree fruit indigenous to North America. The flavor is somewhat similar to banana and mango, but the fruits spoil very quickly, and are therefore never seen in stores.
- Sassafras (*Sassafras albidum*) – Children’s Garden, Tropical Grove. Sassafras is the main ingredient in traditional root beer and in sassafras tea. It is an ingredient in filé powder, a common thickening and flavoring ingredient in gumbo.
- Rose (*Rosa* spp.) – Rose & Fragrance Garden, Strolling Garden. Rose petals are distilled for use in perfumery (rose oil) and as flavorings (rosewater). The fruit, or rose hip, is rich in vitamin C, and is used to make jellies, teas, breads, pies, and liquors.

Plants for Pollinators

Attracting pollinators is the focus of the Pollinators' Garden, but is a goal throughout the garden. Some interesting pollinator-friendly plants include:

- Bee balm/Bergamot/Oswego tea (*Monarda didyma*) – Pollinators' Garden. Bee balm is an aromatic herb in the mint family (*Lamiaceae*). Its odor is considered similar to that of the bergamot orange (*Citrus bergamia*), which is used to flavor Earl Gray tea.
- Milkweed (*Asclepias* spp.) – Pollinators' Garden,



Monarch butterfly and honeybee feeding on aster flowers

Children's Garden. There are over 140 species of milkweed native to North America. The plant is named for its sticky white sap, which contains chemical compounds which deter insect herbivores. The flowers provide nectar for many insect species and the plant is a food source of Monarch butterfly caterpillars, which protect themselves from predators with toxins accumulated from their diet.

- Trumpet creeper (*Campsis radicans*) – Children's Garden, wall near the Soaring Waters Fountain, Pollinators' Garden. The tube-shaped red and orange flowers of this vine are highly attractive to pollinators, particularly hummingbirds.
- Spicebush (*Lindera benzoin*) – Strolling Garden and Childhood's Gate Children's Garden, near the caterpillar sculpture. The turpentine-like scent and flavor of the berries gives spicebush its name. The plant is a favorite food source for Spicebush swallowtail caterpillars, which can often be found by looking inside tube-shaped leaves. Caterpillars roll the leaves by applying silk to the leaf edge, creating a sheltered space in which to hide.

GEOLOGY OF CENTRAL PENNSYLVANIA

Geology has had a significant impact on the Arboretum. For example, the Hartley Wood owes its survival in part to its steep, rocky terrain, which made logging difficult, and the sinkhole-pocked bedrock of the Marsh Meadow prevented its use as a building site. The botanic gardens incorporate many aspects of central Pennsylvania geology in their design.

The Arboretum is located in the westernmost valley of Pennsylvania's Ridge and Valley Province. The Ridge and Valley is a belt of long, parallel ridges and valleys which stretches from southeastern New York to northern Alabama. It is a distinct physiographic province (an area with similar rocks and landforms) of the Appalachian Mountains.

The rocks of the Ridge and Valley were deposited during the Paleozoic era (541-251.9 million years ago). The Paleozoic was a time of immense geological and biological change. Over the course of the Paleozoic, multicellular organisms became abundant and diverse, plants and animals emerged from the ocean and conquered the land, and many familiar organismic groups evolved, including fish, mollusks, amphibians, reptiles, and seed plants.

In the early Paleozoic, Pennsylvania was located near the equator, underneath a shallow ocean. Thick layers of limestone and sandstone accumulated on the ocean floor. The remains of marine organisms, like the corals and the nautiloid reconstructed in the children's garden, were incorporated into the rock layers as they were deposited.



Larger-than-life fossil reconstructions in the children's garden

Starting around 325 million years ago, plate tectonic movements began to push small continents together,

assembling them into a single supercontinent called Pangaea. During the slow-motion collision of continents, the flat-lying limestones and sandstones which had been deposited in the ocean were folded, faulted, and thrust upwards in repeated mountain-building episodes that created the early Appalachian Mountains.



Masonry in the children's garden depicts an anticline, or arched fold

The arched masonry of the rocky ridges in the children's garden shows a cross-sectional view of the sort of folded structures that make up the Ridge and Valley. .

The early Appalachians were enormous mountains, on the scale of the Andes or Rocky Mountains. In the Centre Region, the Nittany Arch, a Himalayan-scale anticlinal mountain composed of many smaller folds, rose over what is now the Nittany Valley.

At the end of the Paleozoic, Pangaea began to break apart. The era of Appalachian mountain-building ended, and erosional forces became dominant. By the end of the Mesozoic (the Age of Dinosaurs, 252-66 million years ago), the Appalachians had eroded nearly flat.

Central Pennsylvania would have remained a more or less flat plane but for tectonic movements which re-uplifted the long-buried roots of the old mountains. As the Appalachians were re-elevated, erosional forces began to excavate their ancient folds, revealing a characteristic pattern of resistant sandstone ridges and easily eroded limestone valley bottoms.

Today, the deeply eroded layers of the Nittany Arch create the limestone floor of the Nittany Valley and the sandstone-capped mountains visible from the Arboretum. The youngest remaining layers of the Arch form the Allegheny Front, the steep escarpment on the west side of Bald Eagle Mountain, which marks the beginning of a different physiographic province called the Allegheny Plateau.

As the Appalachians were re-uplifted, streams which were already present on the land surface sawed through them, creating features called water gaps. The In-and-Out Creek in the children's garden, which carves a path through the rocky ridges, is an example of a water gap. Passes created by water gaps were vital to travel in the pre-automobile era, allowing travelers to bypass steep climbs over high Appalachian ridges.



The In-and-Out Creek carves a water gap through rocky ridges in the children's garden



Deeply weathered limestone boulders in the children's garden depict a small-scale version of central PA's karst bedrock.

Erosion excavated the ridges and valleys and carved water gaps through the mountains, but chemical weathering also played an important role in the development of the modern landscape. The limestone underlying Nittany Valley and the Arboretum is deeply weathered by chemical processes. Natural acids from rainwater and decaying organic material percolate along fractures in the rock, dissolving carbonate minerals. If the deep soil of the valley was all removed, a "karst" topography would be revealed, with pinnacles of dissolution-resistant rock separated by deep fissures where weaker rock has dissolved away. Dissolution has created a weak and porous bedrock, permeated by many voids, caves, and sinkholes.

High porosity allows water to filter into the ground very quickly, which is why Nittany Valley has little standing water (and few mosquitoes).

The Time Spiral

The Time Spiral is a visual representation of the last 541 million years of Earth's 4.5-billion-year history, from the rise of multicellular life at the beginning of the spiral, moving inward to the present day at the center. If there is a single message to take away from the Time Spiral, it is that the history of life on Earth is vast, and that humans have played only a short part in it.

The bronze medallions inset into the pavement tell you the name of each time period, and depict an organism which typifies it. The Time Spiral can be divided into three major eras: the longest is the Paleozoic (541-252 million years, yellow labels), the second longest is the Mesozoic, or Age of Dinosaurs (252-66 million years, green labels), and the shortest is the Cenozoic, or Age of Mammals (66 million years-present, blue labels).

You can learn more about major earth history events from the graphic below.



THE SPRING CREEK WATERSHED

A watershed is an area in which all the water which falls on it ultimately flows out of a common outlet. State College sits within the Spring Creek watershed, bounded in the northwest by Bald Eagle Mountain and in the southeast by Mount Nittany and Tussey Mountain.

A drop of rain which falls on the Spring Creek watershed will flow through a local stream or the highly porous bedrock, exit the watershed through a narrow gap in Bald Eagle Mountain near Milesburg, and join Bald Eagle Creek. From Bald Eagle Creek, it will flow into the West Branch of the Susquehanna River, enter the Susquehanna River, and travel south until it reaches the Chesapeake Bay. Pollutants which enter the water along this journey have a negative effect on the health of the bay. Fertilizers are a particular problem, as they stimulate the growth of excess algae in the bay. The algal overgrowth blocks sunlight from reaching the bottom of the bay, inhibiting the growth of aquatic plants, and algal decomposition creates low-oxygen “dead zones” which are inhospitable to animal life.

In contrast to the pollution problems in the Chesapeake Bay, water quality issues in the Spring Creek watershed cannot be blamed on communities upstream. All the water in the Spring Creek watershed originates as rain or snow falling somewhere on the watershed; no other watershed feeds into the area.

At the turn of the 20th century, only about 10,000 people lived in the Spring Creek watershed. Pollution issues at the time were primarily a result of untreated sewage and animal waste, discharged into streams and sinkholes from homes, farms, and from the State Correctional Institution at Rockview, which dumped effluent directly into Spring Creek.

Construction of wastewater treatment plants starting in the early 20th century ameliorated the water quality problems, but treatment struggled to stay ahead of surging population growth in the wake of World War II.

Sewage was not the only pollutant to take a toll on water quality. In one notorious episode, sodium cyanide dumped down a drain on the Penn State campus killed 147,000 fish at the Benner Spring Hatchery and untold numbers of wild organisms. Leaky storage tanks of a State College chemical factory, now the Centre County Kepone Superfund site, leaked organochloride pesticide waste into the surface and ground water, resulting in portions of Spring Creek being designated as catch-and-release only due to chemical residues in the fish.



es
the many springs present in our region.

At the current time, water quality in the Spring Creek watershed has improved from historic lows. Most sewage is now treated, and disposal of toxic chemicals is generally better regulated than in the past. However, the human population in the watershed continues to surge, posing a threat to water quality. As the population grows, treatment facilities must handle more waste, and more land surface is covered by impermeable surfaces like buildings and pavement. The sub-watersheds of the urban State College area are particularly affected by the construction of impermeable surfaces, which direct large volumes of runoff over small areas of permeable land, intensifying erosion and the flow of pollutants like salt, motor oil, fertilizers, animal waste, and trash into streams and sinkholes.

Efforts to protect the health of the Spring Creek watershed are visible at the Arboretum. The Marsh Meadow preserves an infiltration area for water running off the Penn State campus and the College Heights neighborhood.



Meltwater pooling on the site of the future Marsh Meadow, prior to the beginning of Arboretum

A BRIEF HISTORY OF CENTRAL PENNSYLVANIA

First Inhabitants of Pennsylvania

Nomadic hunter-gatherers first entered Pennsylvania during the last Ice Age, when glaciers still covered northern areas of the state. These people left few traces in the archaeological record.

By the time of European contact, the inhabitants of Pennsylvania practiced a mixture of agriculture and hunting and gathering. Central Pennsylvania was home to several different Native American tribes belonging to Iroquoian and Algonquian cultural and linguistic groups: the Susquehannock, Lenni-Lenape (or Delaware), and Shawnee.



Crop-guarding hut in the Susquehannock encampment in the children's garden

European Settlement

European explorers reached Pennsylvania in the 1500s, beginning a period of cultural and biological exchange between the Old World and the New. Pennsylvania's native peoples, and Native Americans generally, were decimated by European diseases like smallpox and measles.

European colonists established permanent settlements in Pennsylvania starting in the early 1600s, at a time when Swedish, Dutch, British, and French powers vied for control of the territory. By the end of the 17th century, Great Britain and France had emerged as the dominant colonial powers, with western Pennsylvania controlled by the French, and eastern Pennsylvania under British dominion. Native peoples were increasingly pushed back from areas of European settlement.

European settlers began to invade central Pennsylvania in the 1730s, repeatedly violating territorial boundaries that had been agreed upon by native peoples and colonial authorities. Tensions between European invaders and native peoples escalated, and bloody conflicts ensued.

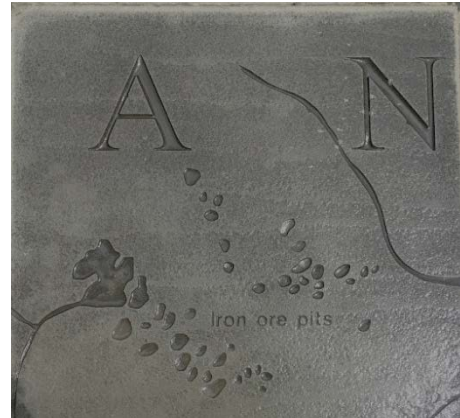
During the French and Indian War (1754-1763), native peoples allied themselves with both the French and the British. This territorial conflict between European powers resulted in the cession of French territory in North America to the British, and the expulsion of most native people to the west. By the early 1800s, native peoples had been exterminated or displaced from central Pennsylvania. Local place names serve as a reminder of their presence. For example, the names of Bald Eagle Creek and Fishing Creek are near-direct translations of the Lenni-Lenape *Waupelanewach Schiec-hanne* (Stream of the Bald Eagle's Nest) and *Namees-hanne* (Fish Stream). Other familiar place names are borrowed more directly. For example, the name

“Moshannon” derives from the Lenni-Lenape *Tankimoos-hanne* (Little Elk Stream), and Nittany seems to come from the Algonquian *Nitt-A-Nee* (Single Mountain).

The Iron Industry and Ecological Transformation

The first European settlers in central Pennsylvania were farmers. But it soon became clear that central Pennsylvania supplied all the ingredients necessary for 18th and 19th century iron production: iron ore, which was mined from surface deposits; limestone, used to remove impurities during the smelting process; and forests, which could be transformed into charcoal that fired the iron furnaces.

The first ironworks in Centre County was established in 1792. Nineteen furnaces soon operated in the area, including State College landmark Centre Furnace (intermittently in operation from 1792-1858), located on East College Ave. Centre Furnace produced as much as 1500 tons per year of high-carbon “pig” iron, which was refined into products like horseshoes, nails, and household items.



Iron ore pits marked on the Ridge and Valley map; these are particularly noticeable in the Scotia Barrens area.

The iron industry’s insatiable demand for wood resulted in widespread forest clearing and opened the land for agriculture, which prevented forest regrowth. Isolated patches of old-growth forest, like the Hartley Wood, survived only where unclear land ownership or unfavorable terrain protected them from logging.

Central Pennsylvania’s iron industry died out in the second half of the 19th century, as changes in fuel (from wood to coal), raw materials (from low-grade Pennsylvania ore to high grade ore from the Lake Superior region), and industrial processes transformed the business. Today, only overgrown ore pits and old furnaces remain to mark the existence of a once thriving industry.

Agriculture and Higher Education

As central Pennsylvania’s iron industry died out, agriculture took over as the region’s dominant economic engine. A growing need for agricultural and technical education led to the founding of the Farmer’s High School in 1855; contrary to its name, the Farmer’s High School conducted courses on a college level, and granted baccalaureate degrees from its inception.

In 1862, the Farmer’s High School was renamed the Agricultural College of Pennsylvania. In that same year, the first Morrill Act established the land grant system, which was intended to provide practical, technical higher education to a broad swath of the American population. The Agricultural College was designated Pennsylvania’s first and only land grant school. Two more

name changes followed: in 1874, the Agricultural College of Pennsylvania became the Pennsylvania State College, and in 1953, it became The Pennsylvania State University.

Penn State first set aside land for an arboretum in 1914, but it was not until 2007 that funds for construction became available.

Arboretum History

Various University groups, faculty and administrators, have advocated for an arboretum on campus since at least 1914, when the Board of Trustees set aside 25 acres for that purpose at the corner of Atherton Street and Park Avenue. There was never a follow-up to that board decision, however, and similar initiatives from the 1920s through the 1970s were also unsuccessful. A 1973 report, commissioned by Provost Russell Larson, recommended the creation of an arboretum on the Mitchell Farm (where the H.O. Smith Botanic Gardens are located now) and adjacent University property – roughly the footprint of the current Arboretum – but the Mitchell Farm was not acquired by Penn State until 1989.

In 1994 the University appointed a task force of faculty and staff to develop a white paper on the merits, feasibility, and location of a campus arboretum. The white paper was followed by work with a consultant to develop a master plan and cost estimates for a 370-acre arboretum adjacent to the University Park campus. The plan was presented to the President's Council in April 1999, and President Graham Spanier agreed to proceed with the project if a lead gift of at least \$10 million could be raised. Kim Steiner, professor of forest biology, was appointed arboretum director to coordinate further planning and promotion.

In order to assist with fundraising, refined cost estimates and detailed plans for the gardens portion of the arboretum were completed in 2002 with the assistance of a consultant.- The first material progress in developing the arboretum was achieved in 2002 when Dr. Steiner and his assistant, Kate Reeder, in partnership with College, Ferguson, and Patton Townships and State College, successfully applied for \$426,000 in state funding to convert a 1.3-mile section of railroad bed into a bike trail through the provisional arboretum. Construction of the trail was completed in fall 2005. Earlier in that year, a large, donated white oak tree (the Hosler Oak) was planted along the future Strolling Garden (but in a bare field) as the “witness tree” for the future growth of the arboretum.

Shortly after the Hosler Oak was dedicated in the fall of 2005, a visiting comedian, Michael Feldman, remarked that we were the only arboretum he had ever seen with just one tree. But that was soon to change. In March 2006, Charles H. “Skip” Smith made an initial inquiry with the University Office of Development about providing a major donation toward the arboretum project. Specific plans were developed for the use of a lead gift over the following months, and in July 2007 Skip donated \$10 million to build a portion of the “H.O. Botanic Gardens” as Phase I

of the Arboretum. Groundbreaking for construction occurred in November of that year, and the newly opened Arboretum was dedicated on April 25, 2010. That really marked the beginning of the Arboretum as a public garden, although we were open for visitation as early as September 2009.

Planning, fundraising, and construction have continued since 2010. The sundial was completed in 2011, the boardwalk over the Dr. James J. and Lynn D. Ramage Marsh Meadow in 2012, and Childhood's Gate Children's Garden in 2014. Fundraising for a bird garden and expanded pollinators' garden was successful, and construction and planting of a new three-acre Pollinator and Bird Garden will be completed in spring 2021. We have also completed conceptual plans and cost estimates for a fountain garden, a conservatory, and a planetarium.

In 2016 President Barron proposed developing an Arboretum Cultural District. This ambitious project would consolidate the University's museum collections in a space within and adjacent to the Arboretum. Since the cultural district concept was introduced, resources have become available to build the first element of that district—a new Palmer Museum of Art. Offices for Arboretum staff and meeting space for volunteers and public programs have been incorporated in the design of the museum, which is being built between the H.O. Smith Botanic Gardens and Bigler Road. Its completion is projected to occur in 2023.

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