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Title: Redesigning the Hardy Fern Garden

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Date: March 2006

Abstract:

The Morris Arboretum's Hardy Fern Garden created in 1987 is in need of some invigoration. At the start of this project, the Hardy Fern Garden lacked diversity and aesthetic appeal. The goal of this project was to create a positive visitor experience by redesigning this garden to have a diversity of ferns set in a naturalistic setting. In the new design, a stumpery was set as the background for a large variety of hardy ferns. Trees and shrubs were also added to provide enclosure and seasonal interest in the garden. The result is a new Hardy Fern Garden that will attract and educate visitors with a wide variety of ferns. The new Hardy Fern Garden with its stumpery complements yet contrasts the variety of non-hardy ferns showcased in the Fernery amongst stonework. At the same time, the new Hardy Fern Garden creates a space that provides a smooth transition from the surrounding gardens.

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FERNS AND THE MORRIS ARBORETUM

The Morris Arboretum has always showcased an extensive collection of ferns. The Morrises were enamored with a love of ferns, just like many others during the heyday of the Victorian fern craze or pteridomania (Allen, 1969). To this day, the Morrises pteridomania is still present within the Arboretum. The Fernery that the Morrises built houses a diverse collection of non-hardy ferns and stands as a testament to the Morrises' fondness for ferns. The Morrises also had an extensive collection of hardy ferns. Garden maps from 1901 show that the Morrises had a hardy fern garden that displayed over 100 types of fern species and forms. Unfortunately, the original Morris hardy fern garden has vanished with the passing of time. Another hardy fern garden was created in 1987 across from the Fernery entrance (Morris Arboretum, 1987). This hardy fern garden is still present, but little has been added to this garden since its inception. Just like the Morrises' original hardy fern garden, this garden is slowly vanishing as time passes. In an attempt to keep the spirit of the Morrises' pteridomania alive, it is time that the Hardy Fern Garden receives some enhancement.

RATIONALE AND OBJECTIVES BEHIND REDESIGNING THE HARDY FERN GARDEN

The Hardy Fern Garden in its current status does not do justice to the spirit of the Morrises' pteridomania. Since this garden is located right across from the Fernery, the garden should be a continuum of the Arboretum's fern collection. Unlike the Fernery, which showcases a diverse selection of ferns, the Hardy Fern Garden currently only showcases a meager seven species of ferns. This lack of diversity is partly due to the fact that some of the ferns have died out over the years without being replaced, leaving large, unsightly voids within the garden. This garden was probably never really planted with an extensive palette of ferns. This is apparent due to the fact that, of the ferns that remain, the garden is composed of broad drifts of ferns, leading one to infer that this garden was designed in that manner. Unfortunately, one would never really know because there are no records from the original planting of this garden. The Hardy Fern Garden is not, in its present state, a garden showcasing a range of hardy ferns, as would be implied by its name.

The Hardy Fern Garden should showcase a varied and diverse range of ferns. Bringing a diverse collection of hardy ferns to this garden will pay homage to the spirit of the Morrises' pteridomania. It will also create a display garden fit for the current day's mission of the Morris Arboretum by creating a space where visitors can view and learn about ferns that are hardy to the Delaware Valley Region while learning how to use these ferns in a garden setting. The Hardy Fern Garden is located in a prime spot within the Arboretum, being encircled by the Fernery, Rose Garden, Widener Woods, and the Fall Slope. The Hardy Fern Garden should also provide visitors with a fluid transition between these areas and thus, enhance the overall visitor experience to this area.

SITE ANALYSIS

The initial step in this project was to conduct a site analysis in the Hardy Fern Garden. Assessments were taken in order to determine sun levels within the garden, soil moisture, and soil pH. These assessments provided critical information that was used in the selection of ferns best adapted for the site's restraints. Garden maintenance issues were investigated along with some other qualitative assessments such as the path placement and garden mood. Views from the garden were also considered.

In July 2005, sun levels within the Hardy Fern Garden were analyzed. Digital photographs were taken at hour intervals throughout the day for nine repetitions. For each repetition, photographs were taken looking into the Hardy Fern Garden from four points outside of the garden. This allowed one to see where the sun infiltrates the garden throughout the day. Once all of the photographs were taken, the sunlight boundaries in the garden at each hour were mapped onto a diagram of the garden. The diagram was then colored to show designations within the garden based on how many hours of sunlight the area received (Figure 1). This diagram showed that the garden was considerably sunny with more than half of the garden receiving five or more hours of sunlight per day.

The garden was also visually assessed for soil moisture. Throughout the summer of 2005, this garden was quite dry in part due to the weather pattern that year. An example of that is that *Osmunda cinnamomea*, which can tolerate some sun, was looking quite scorched by the end of the summer. If other types of ferns are to be added to this garden, soil moisture will definitely impose a threat to their survival.

Soil moisture and sunlight levels within this garden pose obvious restrictions on fern growth and vigor. To make this site more conducive to growing ferns, it was decided that supplemental irrigation is necessary. When completed, the supplemental irrigation will be placed around the periphery of the garden, where it will not pose a threat to future work within the garden.

Soil samples were taken from the garden in the latter part of summer to determine the garden's soil pH. The results of the soil test revealed that the soil pH in this site was 7.2. Soil pH is known to be a major determinate in the growth of some ferns (Hoshizaki & Morgan, 2001; Mickel, 2003; Rickard, 2000). For the new garden design, ferns were selected based on their affinity for alkaline conditions.

The current garden contains some maintenance issues. The garden path and area along the periphery of the garden next to the *Tsuga diversifolia* are planted with turf and have to be continually maintained by mowing. The edge of the garden facing the Widener Woods can also be difficult to mow due to the fact that it cuts in towards the *Tsuga diversifolia*. The new design will consider solutions to these maintenance problems.

The site was also assessed in terms of its mood. When most people think of ferns, they picture them in a deep, lush, tranquil wooded area. The current Hardy Fern Garden does not provide a very peaceful, contemplative mood in which to observe the subtle differences between

fern varieties. The Hardy Fern Garden is sited in the middle of the service road, which leaves this site feeling very exposed. The path placement in the garden only heightens that feeling of exposure. The current path in the Hardy Fern Garden provides visitors with a quick in and out, especially since there is nothing really exciting for visitors to stop and contemplate along the way. The new garden design should address and change the current garden's mood—the feeling of openness, exposure, and hurriedness. Instead, the redesigned Hardy Fern Garden's mood should be one of intimacy, tranquility, and contemplation.

Along with creating a pleasing mood for visitors within the garden, the views that visitors experience while looking out of the garden were established. The view to the Fernery was established as a critical view, as was the view into the Widener Woods. The view to the Fernery showcases the architecture of the Fernery, while also reminding visitors of the collection of non-hardy ferns. The view into Widener Woods helps to give the garden a sense of depth. The new design for the Hardy Fern Garden should accentuate and frame these views.

Site assessment helped to expose restraints and goals for the new design. The next step was to use this information to design the new Hardy Fern Garden.

HARDSCAPE DESIGN

The initial step in the design process was deciding upon and implementing the hardscaping within the garden. The objective of the hardscaping in this garden is to create seasonal interest while providing a background for the ferns. In their native setting, hardy ferns grow in very wooded areas or on rock outcroppings. It was decided that either stonework or timber would provide the most naturalistic backdrop for the garden. In order to choose between the two of these hardscaping materials, the “genius of the landscape,” or surrounding landscape, was consulted. This garden is situated just off to the side of the Widener Woods. The Widener Woods is littered with decaying trees that have fallen throughout the year. Using timber for the hardscaping material became the obvious choice, as it would mirror the decaying trees in the woods and provide a nice contrast to the stonework used among the non-hardy ferns in the Fernery.

Upon deciding to use timber or some form of wood for the hardscaping, the ideas of creating a stumpery began to take root. In *The Plantfinder's Guide to Garden Ferns*, Martin Rickards talks about stumperies providing the perfect backdrop and color contrast for ferns (Rickards, 2000). It was decided that creating a stumpery in the Hardy Fern Garden would provide the perfect setting for ferns while creating intrigue and excitement for visitors. The use of a stumpery, which is a Victorian garden feature, fits nicely into the context of the peridomania and the Arboretum.

History of Stumperies

Stumperies were first created in the mid-1800s during the British Romantic Movement. During this period, there was a deviation from the classical forms of art to art that romanticized the lifestyles of the peasantry of the Middle Ages. During the Romantic Movement, gardens were designed to give an overly romanticized illusion of nature.

Edward Cooke created the first stumpery at Biddulph Grange in Staffordshire sometime around 1856. Cooke created his stumpery after being inspired by the rooteries created in previous years. Rooteries were piles of roots and soil into which plants were grown. Cooke took the idea of the rooteries to the next level when he created a ten-foot wall of stumps, root, and stems on either side of a path in the garden. It is interesting to note that Cooke's creation of the first stumpery coincides with the Victorian fern craze. Edward Cooke also had friends at Arley Hall in Cheshire who created their own stumpery in 1857 complete with a collection of ferns (Bourne, 2001).

After 1900, the construction of stumperies seemed to disappear just like the rotting stumps of stumperies past, but there have been some notable stumperies built in recent years. In 1996, The Prince of Wales installed a stumpery in his woodland garden. In 2001, Batsford Arboretum in Gloucestershire had many mature trees that had to be removed. They dug up the stumps and created their own stumpery in a bog garden and called it "The Swampery" (Bourne, 2001).

Construction of the stumpery in The Hardy Fern Garden

The construction of the stumpery in the Hardy Fern Garden began in the fall of 2005. The plan for the stumpery consisted of building a seated arbor and a few freestanding sculptural pieces out of stumps. The seated arbor was positioned in a manner that provided a view of the Fernery. In the garden, a level area was prepared with a layer of rock and landscape fabric for the seated arbor to be placed on. An assemblage of stumps, both decayed and solid, was collected. The solid stumps that still had bark on them were cleaned and debarked. The stumps for the seated arbor were positioned on a level surface outside of the garden to see how they would stack up. After figuring out the configuration, the seated arbor stumps were then moved into place on the level pad in the Hardy Fern Garden, and the freestanding stumps were also put into their respective positions within the garden. The stumps for the seated arbor were then secured using threaded rod to ensure safety. A seat was cut into the trunk of one of the stumps in the seated arbor to complete it.

Construction of the New Path and Steps

The path in the Hardy Fern Garden was moved to give more access into the garden. The existing entry point, near the Rose Garden, was kept, but the entry point across from the Fernery was moved a bit closer to the *Tsuga canadensis*. Another entry point was added at the top of the garden next to the *Tsuga diversifolia*. The path from the entry point across from the Fernery to the entry point near the *Tsuga canadensis* was a bit steep. To aid visitors using this path, stairs were added up the slope. To emulate the naturalistic, woodsy mood, the steps that were installed were earthen steps with risers made of four-foot long cedar posts. The entire path and steps are to be covered with wood chips to, again, emphasize the woodsy feeling of the garden.

HARDY FERN GARDEN PLANTING DESIGN

The main goal in the new design for the Hardy Fern Garden (Figure 2, The Final Design) was to create a design in which the ferns are showcased. With the new hardscaping in place, one may initially be drawn to the garden to behold the stumps. And, that's good because there was nothing to draw visitors into this garden before. However, once visitors are in the garden, the stumps should start to become part of the backdrop, while the ferns start to take center stage. The new design creates an environment in which visitors can enjoy and learn about the beauty and diversity among ferns that are hardy to the Delaware Valley region.

Fern Groupings

To make this garden more “user-friendly,” the new design is centered on groupings of ferns based on genera. The new design features ferns from *Adiantum*, *Arachniodes*, *Athyrium*, *Cyrtomium*, *Dryopteris*, *Matteuccia*, *Onoclea*, *Osmunda*, *Phyllitis*, and *Polystichum*. Grouping the ferns according to genera will make it easier for visitors to learn about differences between and within the different genera. For example, some ferns are dimorphic, which means that the fertile fronds look completely different than the sterile fronds. In the redesigned Hardy Fern Garden, visitors will be able to see that ferns in *Matteuccia*, *Onoclea*, and *Osmunda* are all dimorphic. When visitors take a closer look at the *Osmunda* grouping, they will be able to see how dimorphism is expressed differently between the species. *O. cinnamomea* produces two types of fronds—ones that are entirely sterile or entirely fertile. *O. claytoniana* produces fertile pinnae in the middle of the frond between sterile pinnae. *O. regalis* produces fertile pinnae on the terminal third of the frond. Not every visitor to this garden will realize, or care to realize, these details, but grouping the ferns according to genera will make it easier for interested visitors to notice these differences.

Grouping the ferns according to genera also made sense from a design perspective. Ferns within *Dryopteris* and *Osmunda* are, in general, more tolerant of sunnier locations than other genera, like *Athyrium*. The new design tries to situate more sun tolerant ferns within the areas of the garden that receive more sun.

The idea of grouping the ferns according to genera was the initial starting point for the new design. From that point, creating a stage for each fern became the goal by trying to compare and contrast colors, heights, forms, textures, etc. between different ferns. For example, in the *Athyrium* group, ferns were placed next to other ferns in an attempt to show off their best attributes. *A. niponicum* ‘*Pictum*’ ‘Ursula’s Red’ has fronds that are the color of silver drenched in wine red, and this fern was placed next to *A. x Ghost* to make the silver coloring more obvious. *A. filix-femina* ‘*Victoria*’ has crested tips and pinnae that are twice-ranked, giving the frond an ‘x’ appearance when viewed from the top. To showcase the delicacies of *A. filix-femina* ‘*Victoria*,’ it was placed near coarser textured ferns like *Cyrtomium falcatum* ‘*Rochfordii*’ and *A. otophorum*. In the *Dryopteris* group, ferns that are evergreen were placed next to semievergreen or deciduous ferns to showcase the progression of senescence as well as emergence, since evergreen ferns are typically late to emerge in the spring and late to senesce at the end of the season. For example, *D. erythrosora* has beautiful bronzed young foliage that turns to glossy green and remains evergreen. However, this fern is also very late to emerge in the spring, so it was placed next to *D. dilatata* ‘*Recurvata*,’ which is deciduous. In this manner,

D. dilatata ‘Recurvata’ can emerge in the spring and divert attention from the barren spot next to it, unfurl, and then provide a nice green backdrop for the emergence of the *D. erythrosora* fiddleheads and bronze young foliage.

Overall, the design subtly showcases each fern. One could showcase each fern through a complex series of interpretive panels. But, in keeping with the tranquil and reflective mood of the garden, the placement of the ferns within the garden can also showcase and teach visitors about the diversity of the ferns at their feet.

Trees and Shrubs

Some trees and shrubs were also introduced into the new garden design (Appendix B). Three *Halesia tetrapteras* were added as understory trees. These trees will help to incorporate this garden with the Widener Woods, which has many *H. tetrapteras*. These trees bloom in April, which will provide some early seasonal interest. In addition to the *Halesias*, another *Tsuga chinensis* will be added to the garden near the existing *Tsuga canadensis*. The new *Tsuga chinensis* will add more evergreen color while also creating a more enclosed garden.

The new design also features a border of shrubs that was added to this garden to help enclose the garden, create a backdrop for the ferns, and add seasonal interest. The border will consist of *Fothergilla gardenii* ‘Mt. Airy,’ *Hamamelis x intermedia* ‘Copper Cascade,’ *Itea virginica* ‘Henry’s Garnet,’ *Thuja koraiensis*, *Zenobia pulverulenta*, and the addition of some more *Comptonia peregrina*. The evergreen foliage of *Thuja koraiensis* will help to add more winter interest, while contrasting nicely in height to the *Tsuga* spp. Another group of *Comptonia peregrina* will be added by the entrance near the *Tsuga diversifolia* to complement the existing group of *Comptonia peregrina* by the entrance across from the Fernery. The *Hamamelis x intermedia* ‘Copper Cascade’ will add a nice touch of color to the garden in winter and its orange color will be just bright enough to carry one’s eyes past it into the Widener Woods. The *Hamamelis x intermedia* ‘Copper Cascade’ will accent, yet not overshadow, the *Hamamelis mollis* ‘Princeton Gold’ in front of the Rose Garden entrance. The *Fothergilla gardenii* ‘Mt. Airy,’ *Itea virginica* ‘Henry’s Garnet,’ and *Zenobia pulverulenta* will all add some nice early seasonal interest as they come into flower after the *Halesias* but before all of the ferns are in full splendor. These three shrub selections all have excellent fall color, which also adds seasonal interest to the garden while tying the garden into the neighboring Fall Nyssa Slope (Cullina, 2002; Dirr, 1997).

All of the trees and shrubs to be added to the garden were selected to add seasonal interest in times when the ferns may be waxing or waning. At the height of the season, the ferns become the focus, and the shrubs fade into the background.

THE HARDY FERN GARDEN INTO THE FUTURE

Once completed, the new Hardy Fern Garden should create an enhanced visitor experience. The stumpery within the garden will entice visitors to visit the Hardy Fern Garden and help create a tranquil, contemplative, woodsy atmosphere. Within this atmosphere, the stumps will become part of the backdrop from which the ferns will take center stage. The ferns will be displayed in a manner that showcases their subtle differences and invokes visitor interest and education. The garden will create a positive visitor experience by creating a fluid transition from the surrounding gardens. The Hardy Fern Garden will accentuate the surrounding gardens by featuring plants from those areas. The new Hardy Fern Garden will also help to strengthen the Arboretum's fern collection as a whole, which may spark visitor interest in the hardy ferns within the Hardy Fern Garden and the non-hardy ferns within the Fernery.

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APPENDIX A: FERN LIST FOR HARDY FERN GARDEN

| Scientific Epitaph | Common Epitaph | Hardiness Zones | Height (in.) | Fronds | Distinguishing Characteristics |
|---|-----------------------------------|-----------------|--------------|---------------|--------------------------------|
| <i>Adiantum pedatum</i> | Northern Maidenhair fern | 2-8 | 12-30 | Deciduous | fronds fork r |
| <i>Arachniodes simplicior</i> 'Variegata' | East Indian Holly Fern | 6-9 | 12-36 | Semievergreen | dark green c |
| <i>Athyrium augustum</i> forma rubellum 'Lady in Red' | Lady in Red Fern | 3-8 | 18-24 | Deciduous | reddish stipe |
| <i>Athyrium</i> x Ghost | Ghost Lady Fern | 4-8 | 18-24 | Deciduous | silvery folia |
| <i>Athyrium filix-femina</i> | Lady Fern | 4-8 | 12-24 | Deciduous | feathery fron |
| <i>Athyrium filix-femina</i> 'Cristatum' | Crested Lady Fern | 4-8 | 12-18 | Deciduous | crested fron |
| <i>Athyrium filix-femina</i> 'Frizelliae' | Tatting Lady Fern | 4-8 | 12-18 | Deciduous | pinnae redu |
| <i>Athyrium filix-femina</i> 'Veroniae Cristatum' | Crested Lady Fern | 4-8 | 18-24 | Deciduous | crested with |
| <i>Athyrium filix-femina</i> 'Victoriae' | Cruciate Lady Fern | 4-8 | 18-24 | Deciduous | pinnae held |
| <i>Athyrium nionicum</i> 'Pictum' 'Ursulas Red' | Ursulas Red Japanese Painted Fern | 4-9 | 12-24 | Deciduous | wine red ove |
| <i>Athyrium otophorum</i> | Eared Lady Fern | 5-9 | 12-18 | Deciduous | pale green f |
| <i>Cyrtomium falcatum</i> 'Rochfordii' | Holly Fern | 6-10 | 12-30 | Evergreen | margins coa |
| <i>Dryopteris affinas</i> | Golden-scaled Male Fern | 4-8 | 24-36 | Semievergreen | stipes and ra |
| <i>Dryopteris</i> x australis | Dixie Wood Fern | 5-9 | 48-60 | Semievergreen | slender, lust |
| <i>Dryopteris bissantiana</i> | Beaded Wood Fern | 5-8 | 12-24 | Evergreen | rounded, lea |
| <i>Dryopteris champonii</i> | Champion's Wood Fern | 5-8 | 12-36 | Evergreen | remains ere |
| <i>Dryopteris cycadina</i> (syn. <i>D. atrata</i>) | Shaggy Shield Fern | 5-8 | 18-24 | Deciduous | dense cover |
| <i>Dryopteris dilatata</i> 'Recurvata' | Recurved Broad Wood Fern | 4-8 | 24-40 | Deciduous | segment ma |
| <i>Dryopteris erythrosora</i> | Autumn Fern | 5-8 | 18-24 | Evergreen | bronze youn |
| <i>Dryopteris filix-mas</i> | Male Fern | 4-8 | 24-48 | Deciduous | sturdy statur |
| <i>Dryopteris filix-mas</i> 'Gracillis' | Gracillis Male Fern | 4-8 | 6-8 | Deciduous | congested, f |
| <i>Dryopteris ludoviciana</i> | Southern Shield Fern | 6-9 | 24-48 | Semievergreen | tall, slender |
| <i>Dryopteris marginalis</i> | Eastern Wood Fern | 2-8 | 18-30 | Evergreen | fronds everg |
| <i>Dryopteris remota</i> | Remote Wood Fern | 4-8 | 24-36 | Semievergreen | shaggy, gol |
| <i>Matteuccia struthiopteris</i> | Ostrich Fern | 2-6 | 36-50 | Deciduous | vase shape |
| <i>Onoclea sensibilis</i> | Sensitive Fern | 2-10 | 12-36 | Deciduous | fronds long |
| <i>Osmunda cinnamomea</i> | Cinnamon Fern | 2-10 | 30-48 | Deciduous | dimorphic fr |
| <i>Osmunda claytoniana</i> | Interrupted Fern | 2-8 | 24-48 | Deciduous | dimorphic fr |
| <i>Osmunda regalis</i> | Royal Fern | 2-10 | 24-50 | Deciduous | dimorphic fr |
| <i>Phyllitis scolopendrium</i> | Hart's-tongue Fern | 5-9 | 8-16 | Evergreen | leathery, ton |
| <i>Polystichum acrostichoides</i> | Christmas Fern | 3-9 | 12-24 | Evergreen | silvery scale |
| <i>Polystichum braunii</i> | Braun's Holly Fern | 3-8 | 10-28 | Evergreen | bristle-tooth |
| <i>Polystichum polyblepharum</i> | Tassel Fern | 5-8 | 12-24 | Evergreen | scales are b |
| <i>Polystichum setiferum</i> | Soft Shield Fern | 5-8 | 18-36 | Semievergreen | fronds gloss |

APPENDIX B: TREE AND SHRUB ADDITIONS TO HARDY FERN GARDEN

| Scientific Epitaph | Common Epitaph | Hardiness Zones | Height (ft.) | Distinguishing Characteristics |
|---|---------------------|-----------------|--------------|---|
| <i>Comptonia peregrina</i> | Sweet fern | 2-6 | 2-4 | fern-like foilage |
| <i>Fothergilla gardenii</i> 'Mt. Airy' | Dwarf Fothergilla | 5-8 | 5-6 | blue-green foliage and yellow-orange-red fall color flowers mid-April for 3-4wks |
| <i>Halesia tetraptera</i> | Carolina Silverbell | 4-8 | 30-40 | bell-shaped flower is April to early May |
| <i>Hamamelis x intermedia</i> 'Copper Cascade' | Witchhazel | 5-8 | 15-20 | orange flowers in February |

| | | | | |
|--|---------------------|-----|-------|---|
| <i>Itea virginica</i> 'Henry's Garnet' | Virginia Sweetspire | 5-9 | 3-4 | Flowers in May with 6" long racemes brilliant reddish purple fall color |
| <i>Thuja koraiensis</i> | Korean Arborvitae | 5-6 | 2-5 | silver undersides to foliage |
| <i>Tsuga chinensis</i> | Chinese Hemlock | 3-8 | 40-70 | evergreen |
| <i>Zenobia pulverulenta</i> | Dusty Zenobia | 5-9 | 2-3 | dusty blue foliage and yellow to red fall color small, anise-scented flowers in May-June |

Figure 1. Hardy Fern Garden Sunlight Assessment

