Title: **Fernery Website Update: A Guide to the Ferns in the Fernery**

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Abstract:

In order to further the educational mission of the Morris Arboretum of the University of Pennsylvania, as well as expand the visibility of its website, and create a valuable internet resource, this project creates an online guide to the ferns in the Dorrance H. Hamilton Fernery. The content for this guide is stored in a MySQL database. Online users can access this content in the Fernery section of the Morris Arboretum's website. PHP scripts format the fern information so that users can access it with any modern web browser. These scripts also provide tools for Fernery staff and volunteers to update and maintain the information in the database.

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INTRODUCTION AND GOALS

The Dorrance H. Hamilton Fernery contains a huge diversity of ferns. There are close to one hundred species of ferns representing over 40 genera. To further the Arboretum's mission to educate its visitors, it is ideal to provide botanical information about each fern. Physically labeling every fern in the Fernery would mar the beauty of the landscape. Instead this can be achieved optimally by means of an online guide to the ferns of the Fernery.

Creating this guide in the form of an online database has been a primary goal of this project. The database was designed to contain every fern in the Fernery, allowing users access to basic botanical information about the ferns, as well as to provide several photos to help identify each fern. This online database will be accessible through the Fernery website so that it can be used not only as a resource for people trying to identify ferns in the Fernery, but also as a general internet resource for temperate and tropical ferns.

Because the Fernery is not a static installation, the content of the database cannot be static. As plants grow, move, die, and change, so too must the content of the database. For that reason, the database has a clear and easy-to-use administrative interface so that the Fernery staff and volunteers can maintain and update its contents. Because the administrative interface is online, it also needs to be secure so that only authorized personnel can access it.

Building on the work of previous interns has been another goal of this project. Joshua Darfler, an intern from 2011-12, created a wonderful webpage containing good general information about the Fernery. With this webpage already in place, I have been able to spend my time exclusively on developing the database. Additionally, Bianca Mary Jessica Knoll, plant propagation intern in 2002-3, worked on identifying and photographing the ferns in the Fernery as well as in the rest of the garden. The Excel spreadsheet inventory that she produced has provided much of the material for the fern database and her beautiful photos were used liberally as the identifying pictures. Using the work of previous interns not only creates a better final product, but also honors their contributions and brings their work to a wider audience.

DATABASE SETUP AND PROGRAMMING

I chose to use a MySQL database with PHP because of its ubiquity in the internet world and my familiarity with both. MySQL (My Structured Query Language) is an open source, relational database. It is currently owned by Oracle, but its code is freely available. It is used widely over the internet including some very well known websites (Wikipedia, Facebook, and Craigslist). It is often paired with PHP (PHP: Hypertext Preprocessor) which is an open source scripting language that is imbedded in web pages. It works by running the PHP script imbedded in a file before the web server sends the user that file. That PHP script tells the server to get information from the database and how to include it in the webpage. It is formatted so that user's web browser can read it just like a normal web page, but it now includes content from a database, such as a list of all the ferns in the Fernery, or specific information and photos about a particular fern.

DATABASE STRUCTURE

The core of this project was the creation of the database. Nineteen fields were defined, and they are as follows:

ID : Unique numeric identification key for the database
SciName : Scientific Name of the fern
SynName : Any synonymous scientific names for the fern
ComName : Common Name(s) for the fern
Origin : Where the fern is native
Location : Where this fern is currently planted at Morris Arboretum
Acquired : Date fern was acquired – purchased, collected, sown, etc
Source : Where fern was acquired
Removed : Date fern died or was removed from the collection
CultInfo : Cultural information: what this fern needs to survive
MiscInfo : Miscellaneous information about the fern
GHNumber : Greenhouse accession number
Pres2003 : Was this fern present in B. Knoll's survey of the Fernery in 2003? This field is
    not displayed to the public.
Notes : This field is for in house record keeping. It is not displayed to the public.
PlantPhoto : Name of the picture file that shows the whole fern
FrondPhoto : Name of the picture file that shows the fern's frond
SoriPhoto : Name of the picture file that shows the fern's sori pattern
CrozierPhoto : Name of the picture file that shows the ferns crozier
OtherPhoto: Name of the picture that show other aspects of the fern (fertile fronds,
    rhizomes, bulbuls, etc)

WEB PAGE FILES

Once the database was created, the next task was to create the web pages that would allow access to its content. These pages are generated by the following PHP scripts:

admin.php – This is the script that generates the pages used to administer the database. When using the administration section, the Fernery staff person or volunteer will come first to a page that requests a password. This ensures that the rest of the administrative pages remain private and secure. (The administrative section includes a page where this password can be changed.) Once the correct password has been given, the user can add or remove ferns, as well as edit the fern information. It also allows the uploading of photographs in the jpeg format. When a picture is uploaded to the website, its location is noted in the database so that it can be associated with that particular fern. Also a smaller version of the photo, a thumbnail, is created so that a quick-to-load picture gallery can be created for the fern. An illustration of the fern editing administration page can be found in this paper's appendix.

fern.php – This is the script that generates the pages viewed by the public. It will generate an introductory page to the database, as well as the individual fern pages. The introductory page

describes the purpose of the database as a guide to the ferns in the Fernery. It also has a list of all the ferns by name, with a link to their individual pages. There is a simple map of the Fernery as well. If the user clicks on a section of this map, a list appears of ferns that are in that section of the Fernery. The ferns in that list will be linked to their individual pages. The individual fern pages will be divided with pictures on the left and text on the right. The text will give basic information about the fern: Scientific Name, Common Name, Country of Origin, etc. The picture part will have a large thumbnail, as well as several smaller thumbnails. By clicking on a thumbnail a large version of that picture will fill the browser window. From there you can either view the other pictures, or return to the main page. On the main page there is also a pull down menu that allows the user to select a different fern and view that fern's page. In the appendix there are two examples of these individual fern pages.

In designing the gallery viewer portion of the fern page, several options were explored. The goal was to have a quick loading initial page. This meant no big images. It was important for the user to be able to view a full resolution version of the image so that identifying characteristics could be more easily seen. The final requirement was that the gallery viewer would work on as many platforms as possible: computers, tablets, and smart phones. The solution that seemed to meet all these requirements was YoxView, a freely available, Jquery based, javascript plug-in. So while the PHP scripts created and organized the image files, YoxView ultimately displays the full sized images.

fern_template.html – This is a simple HTML file that has header and footer information that make all the pages look like they are part of the Morris Arboretum Website. The other PHP scripts look for the comment field:
<!-- This is where the fern database will insert content -->
and inserts the script generated content into that section. This formatting information should make it easier for Arboretum web masters to modify the look of the script generated pages without having to go into the scripts themselves.

header.php – This script is used by both admin.php and ferns.php. It contains the basic information for accessing the database as well as the header and footer information gleaned from the fern_template.html file.

<u>WEBSITE MODIFICATION</u>

The Arboretum's website required little modification to allow users access to the database. The only section that was modified was Joshua Darfler's Fernery webpage. A side box, formatted in the same manner as the self-guided Fernery tour box, creates a portal to the database's introductory page. See appendix for an illustration of the modified website.

Although it did not fall within the scope of this project, I highly recommend that the Morris Arboretum website be reconfigured so that the Fernery section is more visible and easier to find. Currently it is not possible to go directly to the Fernery section from the homepage. One must first pull down the 'Gardens & Exhibits' menu and click on 'Arboretum Features', from there 'Buildings' must be selected, and then finally the link to the Fernery section is available.

As a unique and crowd-drawing feature, I would place it in the same category as the Garden Railway and Out on a Limb.

<u>CONCLUSION</u>

Much like the work that came before this project, this online guide to the ferns of the Fernery is a work in progress. An online guide exists. It can and hopefully will be used by our guests to further their understanding of the ferns in our Fernery. The tools are in place for the continued maintenance and updating of this resource. This project also creates a new foundation for others to build upon. I fully expect that our website will change and the work of this project will mutate and change along with the website. At some point in time this database might be used to create self guided tours. QR codes on labels could access the information contained in the database. Wifi technology could be installed in the Fernery so that visitors could access the database while they are there. Whether it be smart phones, qr codes, or google glasses, as technology and the expectations of our visitors change, so too must we.

<u>References</u>

PHP Manual, http://www.php.net/manual/en/index.php, Copyright © 1997 - 2013 by the PHP Documentation Group

Appendices
Updated web page

Always Growing

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Plant Collection

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Garden Buildings

The Dorrance H. Hamilton Fernery

Select a Building

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- Log Cabin
- Mercury Temple and Grotto
- Pumphouse
- Springfield Mills
- Springhouse
- Widener Visitor Center

Ferns of the Fernery
A Guide to Our Fern Collection

Click to **view** the ferns of the Dorrance H. Hamilton Fernery"

The Dorrance H. Hamilton Fernery is the only remaining freestanding Victorian fernery in North America. Originally built in 1899 under the supervision of John Morris, the fernery stands today as a historical time piece, documenting the British obsession with ferns and glasshouses during the Victorian era. The building was constructed using locally mined stone and utilized cutting edge technology in glass cutting, steam heating, and architectural elements.

In the century following the original construction, the fernery slowly fell into disrepair, with several small renovation projects to protect it from destruction. Finally in 1994 the fernery was fully restored to its original grandeur with a gracious donation from board member Dorrance H. Hamilton and other contributors who responded to a major matching grant from the National Endowment for the Humanities. This $1.2 million renovation included restoring the roof to the original curvature, replacing and updating the heating and electrical systems, installing an advanced climate control system, and restoring the waterfall, ponds and stone walls. The blue flagstone plaza was also installed during this project to welcome visitors, and provide a shaded relaxing place to stop and enjoy the arboretum.

Self-guided Tour of the
Dorrance H. Hamilton Fernery

Click to **download** a Self-guided Tour of the Dorrance H. Hamilton Fernery"

Nestled in a curve of land below the rose garden, the fernery has become an iconic part of the Morris Arboretum. Its glittering rooftop welcoming visitors into a peaceful space filled with ferns, trickling waterfalls and reflecting pools. A wonderful place to explore in all seasons.

Interactive Timeline

1887   1898   1915   1917   1932   1956   1987   1994

Sample Fern Pages

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Blechnum brasiliense

Common Name(s): Brazilian tree fern
Location: right rear
Country of Origin: Brazil
Misc. Information: This small tree fern has beautiful red croziers and new fronds. As the fronds age they turn a bright green. It is native to Brazil and other parts of South America.

[Blechnum brasiliense ▼] [View a Different Fern]

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Quercifilix zeylanica

Common Name(s): oak leaf fern
Location: Front
Date acquired: 1996
Source: Logee
Country of Origin: China, Taiwan, Malaysia, Sri Lanka, Mauritius
Misc. Information: steps to tunnel

[Quercifilix zeylanica ▼] [View a Different Fern]

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Administration Page