

The Vasculum

The Society of Herbarium Curators Newsletter
Volume 9, Number 2 - July 2014

FROM THE EDITOR

Many of you are already familiar with SHC and *The Vasculum*, whereas others may be reading it for the first time. Either way, thank you so much for supporting our Society! Before going further, let me apologize for the July issue being a bit late, but I wanted to make sure that we included any and all information regarding the annual meeting, which this year was held the last week of July in Boise, ID as part of Botany 2014. I trust that you will agree that the updates were worth the wait! As I conclude my remarks, I once again ask that you consider penning an article for our “Featured Herbarium” section. Surely we must have members who are proud of their herbaria and wish to share information about them with the rest of us. Also, please contribute other items that you feel might be of interest to the herbarium community. This is one of the more important ways that you can help SHC to not only exist, but to thrive!

- Conley K. McMullen, James Madison University,
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Cypripedium parviflorum Salisb. var. *pubescens* (Willd.)
Knight (Pteridaceae) - © C.K. McMullen

SHC NEWS

A Message from the President

This year marks the 10th anniversary of the official constitution of the Society of Herbarium Curators – and what a decade it has been! As I pick up the reins from the very capable hands of Past President Alexander Krings (NCSU) for the 2014-2016 term, I wanted my incoming message not only to communicate the recent exciting developments in our Society but to open a forum among the membership about charting a course for the next 10 years.

This past year was a very productive one due to the dedicated efforts of our officers, committee members and ad-hoc volunteers. We funded two Master's-level floristics projects through our student research grant program, which will be managed as a standing committee in the coming years. I send my thanks to chair Ed Lickey (BDGW) and Becky Dolan (BUT) for leading this important outreach as well as to the 13 members who provided reviews of the proposals. We also welcomed a new Executive Board Member-at-Large, Rich Rabeler (MICH). Our society newsletter, *The Vasculum*, went “green” this year. Lead Editor Conley K. McMullen (JMUH) and team produced two excellent issues and distributed copies electronically to over 100 members, whose ranks have been tirelessly managed by our Membership chair Emily Gillespie (MUHW), Secretary Brenda Wichmann (NCU) and Treasurer Dale Kruse (TAES). Our standing as a nationally recognized society continued its growth and passed two important milestones. First, SHC became an official participating society of the Botany 2014 meetings in Boise; our logo graced the front cover of the scientific program for the first time. Second, the Executive Board approved the constitution of the first regional chapter of the Society. One of the explicit missions of the Society is to support regional networks of herbaria, and the inaugural Southeast chapter models a way that informal collaborations among institutions and people can transition more easily to democratic governance. Last but not least, the Society finished the year fiscally solvent.

Next year is shaping up to be a particularly important one for the Society. At the top of the to-do list is launching www.herbariumcurators.org on a new host server with new software. The complexities of this much-

needed renovation have been many, managed with persistence by Derick Poindexter (NCU), Zack Murrell (BOON) and Michael Thomas (HAW) and now Alexander Krings, but should be resolved in the near term. The importance of a functioning website for providing value to members, attracting new members, and disseminating information to stakeholders (e.g., the public, institutional administrators) cannot be understated. Likewise, the Society's 501 (c) 3 status is slated to be finalized.

Next year marks the beginning of the second decade of the Society and offers a time to reflect on the challenges and opportunities ahead. Those of you reading this newsletter will have ideas too, and I am eager to know what they are. Retaining and growing membership is a perennial challenge, one that is shared by many biological societies in the US today (Potter et al. 2013). A likely solution may be providing a clear return on investment to members. What can members of SHC receive for their yearly dues that they cannot receive elsewhere? Within the next 10 years, I propose that SHC could provide an organizational home for the regional networks of herbaria that have formed largely in response to recent solicitations from the National Science Foundation for collections' digitization. No fewer than 10 regional networks of herbaria provided reports at this year's meeting of herbarium curators at Botany 2014, a very positive development and one that I hope can continue even in the absence of federally funded initiatives. In the next issue of *The Vasculum*, I will outline comments I receive from members of SHC to begin a larger conversation about charting a course for the next 10 years, so please send them in!

Reference

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Botanically yours,

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HERBARIUM NEWS

Featured Herbarium: MTSU - Middle Tennessee State University Herbarium

Middle Tennessee State University is located in Murfreesboro, Tennessee, in the geographic center of the state. Established in 1911 as Middle Tennessee State Normal School, we are the largest undergraduate institution in the state, with a total undergraduate enrollment of more than 21,000 (Fall 2013). Graduate programs ac-

counted for an additional 2,700 students at that time, for a total enrollment of more than 23,000 students. The College of Behavioral and Health Sciences and the College of Basic and Applied Sciences accounted for nearly 45% of all undergraduate majors. The Department of Biology, within Basic and Applied Sciences, had 561 majors. Our department offers a B.S. in Biology and an M.S. in Biology. Our faculty contribute to several interdisciplinary degrees, including a Ph.D. in Molecular Biosciences and a Ph.D. in Math and Science Education.

The MTSU Herbarium (MTSU) is currently housed in the Davis Science Building, and is primarily used as a resource for undergraduate and graduate coursework in Biology. The collection comprises 19 cabinets and approximately 25,000 specimens housed in two different rooms. These spaces are not dedicated for the herbarium; one is a teaching lab and the other is a storage space. However, in August 2014 the collection (along with all of Biology and Chemistry) will move into a new facility (Fig. 1). The \$147 million science building is 250,000 square feet of research and learning space, and includes a fully dedicated herbarium! While small by some standards, we are elated to have a space fully dedicated to our collection, particularly in a time when many collections are being closed or relocated to other institutions. The new herbarium has been outfitted with 23 brand new Viking cabinets (Fig. 2), as well as built-in cabinetry for supplies and other equipment (Fig. 3).



Figure 1 – The MTSU Science Building with be opening fall 2014 with a dedicated herbarium.

Dr. Kurt Blum was the Curator of the MTSU collection for 30 years, and while he had no budget or release time for curatorial duties, he continued to grow the collection through student projects and course collections. Upon his retirement in 2013, I assumed the role of Curator. As a population geneticist with systematic leanings, I have had very limited experience curating collections. However, I have benefited from the knowledge of my colleagues Joey Shaw at the University of Tennessee in Chattanooga and Dwayne Estes at Austin Peay State University in Clarksville. Together, the three of us have

begun the process of developing a statewide network of curators (the Tennessee Herbarium Consortium) in an effort to provide curatorial support to other colleagues throughout the state. These efforts led to the submission of an NSF CSBR proposal in summer 2013 for Tennessee collections. Although the proposal was unsuccessful, we have continued to pursue grant support from multiple outlets to support curation and digitization efforts throughout the state. We are also part of the SERNEC TCN proposal submitted to the NSF ADBC program last fall; we have been recommended for funding and are awaiting final approval. Here at MTSU, I have received internal support for the collection from my department, as well as from a competitive grant through the MTSU Foundation Special Projects program.

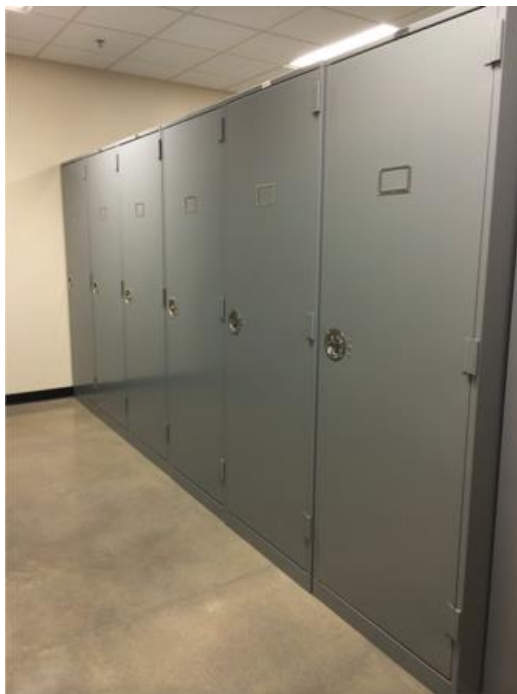


Figure 2 – All new cabinets for MTSU's new herbarium.



Figure 3 – Built-in storage for MTSU's new herbarium space.

As the MTSU herbarium curator, I have been actively involved in iDigBio digitization workshops, both as a participant and as an organizer. I have been a participant in the Paleocollections Workshop in Gainesville (2012), Specify 6 Workshop in Lawrence (2013), and Small Herbarium Workshop in Tallahassee (2013). I was a co-organizer with iDigBio for a combined symposium and workshop on workflows at the annual meeting of the Association of Southeastern Biologists (2013) and a presenter at the Small Collections Workshop in Boise (2014).

Here at MTSU, my efforts have focused on databasing and reorganization of the collection. When I was first hired in 2011, no one seemed to know how many specimens we had or what treasures they might hold. Estimates from my colleagues suggested that our collection was between 5,000 and 10,000 specimens. In the summer of 2013, two students and I counted every sheet in the collection. To our surprise, we discovered that we have nearly 25,000 specimens, significantly more than anyone had guessed. During the 2013-2014 academic year, I was lucky enough to have two undergraduate student workers intermittently focused on databasing the collection. We have roughly 25% of our records skeletally databased as of June 2014. My goal for the coming year is to continue databasing, while transitioning from an excel spreadsheet to input and management of data in Symbiota to allow online access to all collections. We will begin the adventure of imaging by purchasing equipment this fall.

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Third Georgia Herbarium Alliance Meeting Sponsored by NSF!

The third Georgia Herbarium Alliance meeting was held on 1 March 2014 in the new Biological Sciences building at Georgia Southern University in Statesboro, hosted by Herbarium Curator Alan Harvey (GAS). Representatives of all eight herbaria in Georgia (Fig. 1) were present. We welcomed Kevin Burgess, who had taken over the reins at Columbus State University Herbarium (COLG) a few years ago, and new Emory University Herbarium (GEO) curator and ethonobotanist Cassandra Quave (see <http://etnobotanica.us/>).

Alan first gave us the grand tour of GAS, just newly installed in a brand new facility (Figs. 2–4); herbarium staff had unpacked the last of the boxes the day before! We were especially impressed with the digital Christie Micro-Tile screen display (Fig. 2) at the entryway of this “green” building. Daniel Gleason, Director of the newly formed Institute for Coastal Plain Science at Georgia Southern University, then gave an overview presentation

about the eight natural history collections of the Georgia Southern Museum and their facilities.



Figure 1 - Attendees at the third Georgia Herbaria Alliance meeting. Front row (left to right): Alexandra Dorfzaun (GAS), Cassandra Quave (GEO), Melanie Link-Perez (AASU), Cristin Walters (GA), Stephanie Harvey (GSW); back row (left to right): Wendy Zomlefer (GA), David Giannasi (GA), Kevin Burgess (COLG), David Morgan (WGC), Alan Harvey (GAS), Richard Carter (VSC), Yonnie Williams (GSW). Photo credit: C. Quave.



Figure 2 - Alan Harvey, Curator of GAS, describing the Christie Micro-Tile screen display at the entry to the new Biological Sciences building at Georgia Southern University. Photo credit: W. Zomlefer.

The presentations continued with Wendy Zomlefer (GA) providing a review of the alliance with *Georgia herbaria: Where we are & where are we going?*, followed by Richard Carter (VSC) describing the development of the second largest herbarium in the state over the past several decades (*What's going on in that herbarium anyway?*). Each remaining herbarium representative then provided updates on their collections. Here are just a few of their

exciting developments: an interview with Melanie Link-Perez about AASU appeared in the *Savannah Morning News* (see <http://dining.savannahnow.com/news/2012-09-28/old-savannah-flowers-find-new-life-armstrong-atlantic-state-university>); Kevin Burgess has been expanding COLG collections via vouchers from his NSF-funded DNA barcoding work; Stephanie Harvey has acquired a camera and has started imaging GSW specimens; David Morgan (WGC) has been voucherizing his survey projects (including bryophytes); and Cassandra Quave procured internal funding for a full time collections manager at GEO!



Figure 3 - The brand new GAS compactor system! Photo credit: C. Quave.

We had a lively afternoon discussion covering many topics, including development of a cooperative website and possible funding sources for student projects. We also changed the name of our group from Georgia Herbarium Consortium to Georgia Herbarium Alliance, since "alliance" better defines the cohesion of our group and our common goals.

Our first alliance meeting was held at GA Herbarium (6 March 2010; Zomlefer 2010a), and the second, at VSC Herbarium (25 February 2012; Zomlefer & Carter 2012). This third session emphasized the progression of all Georgia herbaria programs since Wendy Zomlefer and David Giannasi first toured and surveyed them in 2008–2009 (Zomlefer 2010b). So, our state network, inspired by SERNEC over eight years ago, is now well established! The curators will keep in touch to support each other, and we all look forward very much to our next get-together.



Figure 4 – Alan Harvey, Curator of GAS, showing student-made plant drier. Photo credit: W. Zomlefer.

Participant costs for this meeting were covered by GA Herbarium's current NSF CSBR grant (DBI-1054329; PI Wendy B. Zomlefer & coPI David E. Giannasi).

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- Wendy B. Zomlefer, University of Georgia, wendydz@plantbio.uga.edu

John Bartram's Plants in San Francisco

One of the things I like most about plant collections is that they are often found in surprising places. A case in point is the herbarium of British aristocrat, Lord Robert Petre (1713-1742). Its 16 volumes are housed in the Sutro Library in San Francisco. This institution is named after its founder, Adolph Sutro (1830-1898), a German-American mining engineer who made a fortune from his work on the Comstock Lode and later served as mayor of San Francisco. He funded many projects in the city, including a library for which he bought vast book collections in Europe, including that being sold by Petre's descendants.

Petre had an avid interest in plants, especially in horticulture. He corresponded with John Bartram (1699-1777) in Philadelphia both directly and through Peter Collinson. Bartram was a farmer who became curious about plants and ended up developing a nursery trade that in-

cluded selling plants to several of the founding fathers of the United States (Wulf, 2011). He also sent specimens, seeds, and even seedlings to Britain - to Collinson, Petre, and others. Petre was one of his first and best patrons, buying thousands of tree seedlings to plant on his estate. He also had a collection of Bartram's specimens, which are found in several volumes at the Sutro.

This collection was seemingly unknown to botanists until Joseph Ewan wrote about in 1970. In the early 1980s the volumes with Bartram material (XI, XII, XIII, and XV) were lent to the Academy of Natural Sciences in Philadelphia. Elizabeth McLean (1984) wrote a preliminary report on the collection, and then Bartram's plants were given determinations, with the flowering plants studied by Alfred Schuyler and Ann Newbold (1987) and the mosses by William Buck (1985). The latter were collected by Bartram for both Petre and Johann Jacob Dillenius (1684-1747), the professor of botany at Oxford. Bartram admitted that he took little interest in mosses until Dillenius inquired about receiving specimens, and then Bartram did well in providing specimens of numerous mosses from up and down the East Coast.

I only spent a day at the library, on my way to Botany 2014 in Boise, so I didn't get to the mosses, concentrating on Bartram's flowering plants in Volume's XI and XII. The specimens have been beautifully conserved - removed from their original bindings (which have also been conserved) and interleaved with acid-free paper. Bartram obviously did a good job of pressing the plants he collected; the flowers, when present are well-mounted and nothing seems to have been done haphazardly (Fig. 1). Bartram relied on his British patrons for income, and he made sure that materials he sent were up to their collecting standards.

The plants in Volume XI do not have any notations from Bartram, and few are annotated at all, except for the recent determinations. Several do have old polynomial designations, perhaps written by the apothecary John Hill who worked on the collection for Petre. However, in Volume XII there are a number of notes in Bartram's hand, written on rough brown paper, probably cut from the sheets used to press and transport the plants. The remarks are usually just brief comments on where Bartram collected the specimen or something about its characteristics: for *Pluchea odorata*, "This I gathered in a pond as I came from Albany," and for *Saxifraga virginensis*, "This is one of our first spring flowers." In the case of *Comptonia perigrina*, its medicinal value is noted: "This we call sweet fern from its similitude to that plant. The root is a wonderful astringent for stoping of blood," for *Acer pensylvanicum* (Fig. 2) some quantitative measurements: "This I take to be a maple, the long pointed angular leaves is very remarkable; it growth near 20 foot high & 3 or 4 inches diameter with a green bark," and for *Lithospermum canescens*, its ecology: "This pretty flower growth in the mountainous part of our country on lime stone land."

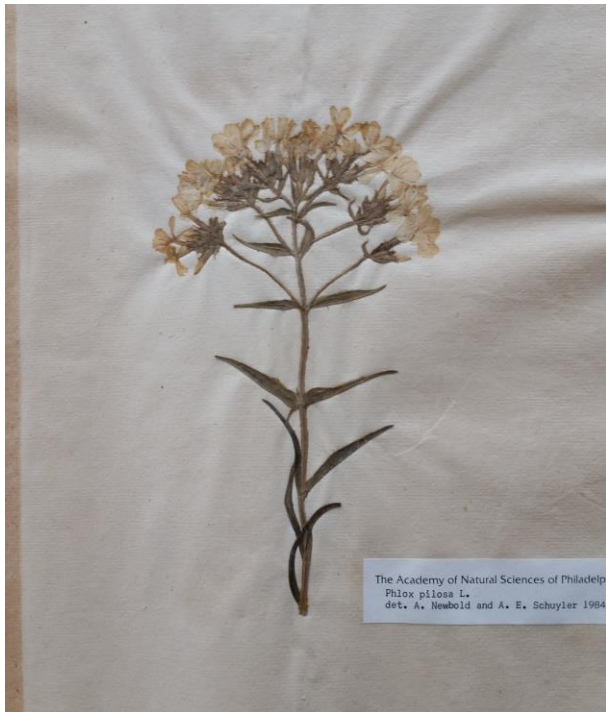


Figure 1 - *Phlox pilosa* L.

To see these labels with writing in Bartram's hand was a treat. His script is bold and easy to read. The ink tended to clot as he wrote perhaps because the paper was so rough. I've visited Bartram's farm in Philadelphia and have seen the room where he prepared his packages for Britain, so I can picture him carefully recording his insights. In order for Bartram to learn more about the identity of the plants he was gathering, he and Collinson devised a system whereby Bartram would create two collections of the same plants and number them. One set he kept, the other went to Collinson who sent the plant specimens on for identification to the Dutch botanist Jan Frederik Gronovius (1686-1782) or to Dillenius, in the case of the mosses. Collinson then sent a numbered list of plant names back to Bartram. This was distance learning, 18th-century style. There was a great deal of social-networking going on as well. Collinson and Petre both knew and shared plants with Philip Miller, the keeper of the Chelsea Physic Garden, and with John Martyn who succeeded Dillenius at Oxford.

Petre died of smallpox at the age of 29, at which point he had already been a member of the Royal Society for over 10 years, and a genus of plants had been named after him. He had also turned his grandmother's estate, Thorndon Hall, into a botanical showcase. Before his death, he had planted over 40,000 trees of 50 species. In addition, he had three "stoves" or hothouses erected, the largest being 30 feet high. The latter was filled with tropical plants, many from Jamaica. After Petre's death in 1742, all this botanical activity ceased, and by the time Collinson visited in 1762, Thorndon Hall and its grounds were in disarray and the hothouses were almost empty.

Petre's botanical library, however, was preserved until its eventual sale to Sutro in the 1880s.

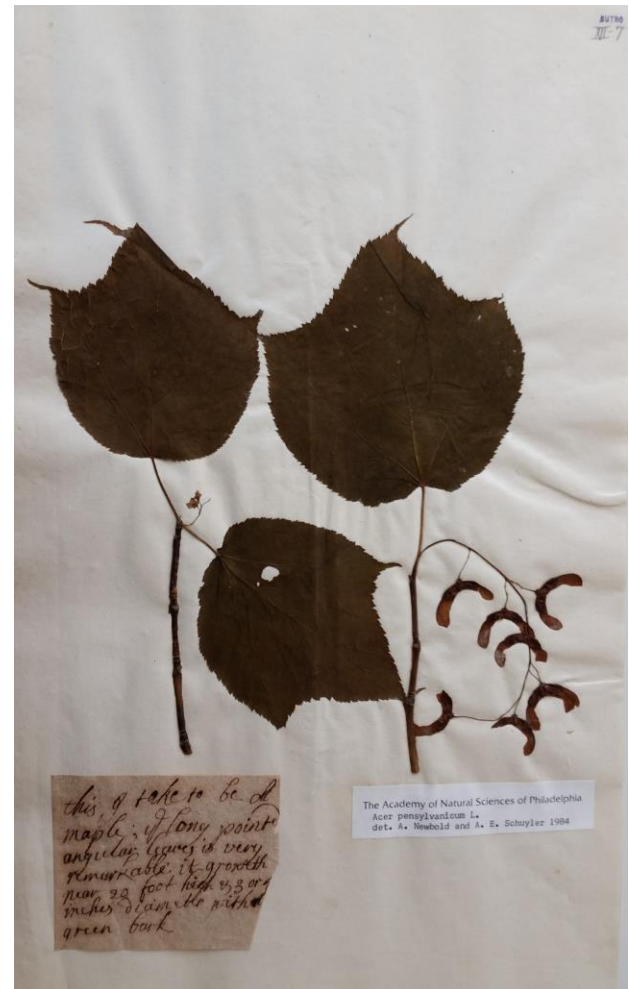


Figure 2 - *Acer pensylvanicum* L.

It was wonderful to examine a portion of Petre's herbarium and see that this small part of his botanical empire remains intact and orderly. It was also wonderful to see Bartram's own notes and the plants that he so carefully and beautifully pressed before he sent them on to his English patrons. While only a few of these plants are important in terms of typification, they are all valuable as historical artifacts that have several different kinds of significance. For example, they can reveal something about the ecological changes occurring during the colonial period. Schuyler and Newbold (1987) note that among the plants Bartram sent to England were seven species considered to be introductions, including *Achillea millefolium*, *Lamium amplexicaule*, and *Mollugo verticillata*: "Thus we know these plants have been in America for a long time although they may have been uncommon enough in the 18th century for Bartram to think he found something unusual" (p. 42). In addition, these specimens are important items in the history of colonial America, telling a great deal about the intercourse between the colonies and the home country. Though bota-

nists obviously focus on the scientific value of plant collections, it is important to remember their cultural value, which in the case of the Petre herbarium, is significant.

Note: I would like to thank Angelica Illeuca of the Sutr Library for her patient assistance before and during my visit.

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THE WIRED HERBARIUM **The U.S. Virtual Herbarium Project**

Disclaimer: I (Eric) am on the board of the U.S. Virtual Herbarium Project.

The U.S. Virtual Herbarium Project (U.S.V.H.) arose from an open meeting in 2008 at which those present were asked if they supported formation of a national virtual herbarium, i.e. development of a web-based resource that would enable searching the holdings of all the country's herbaria at once. There was unanimous support for the idea, and in 2009 the U.S. Virtual Herbarium project was born. It was endorsed by the American Society of Plant Taxonomists in August 2009. In February 2010, at an NSF sponsored workshop, it was recommended that the project should move forward by building on regional networks, some of which already existed, others of which were still in the planning or dream phase. In the fall of 2010, NSF announced the ADBC program that has led to the creation of iDigBio as the central aggregator of digital information from non-federal natural science collections and promoter of digitization in all collections, including herbaria.

The U.S.V.H. project has never received financial support. Instead, it encourages digitization by disseminating information and promoting communication among those working in herbaria. A key tool in these endeavors has been the initiation of an annual survey of US herbaria. One result of this survey is that many herbaria have updated their information in *Index Herbariorum* (IH). The U.S.V.H. herbarium survey has made it possible to identify herbaria that already had a database of label information that could be shared if they were shown how to post it online. It also has been able to identify herbaria which needed to get started on the most fundamental aspect of digitization, capturing label data. Thus, although the U.S.V.H. project is not funded, it has helped promote herbarium digitization in the US.

Herbarium digitization has enormous benefits for all involved. Larger herbaria have found that it substantially reduces the number of specimens they need to send on loan, which has led to significant financial savings and also reduced the damage than inevitably comes from handling specimens. Smaller herbaria find that digitization, by making their resources widely accessible, makes it easier to demonstrate to funding sources that their collections add value. It has brought a new awareness of the importance of standards and the concepts associated with taxonomy, nomenclature and geographic information. It has also produced an exciting new area for students to become involved with herbarium specimen curation and with research opportunities, such as exploring differences in collection time across decades or the distribution of morphologies across environmental landscapes.

What has the U.S. Virtual Herbarium Project accomplished? There have been enormous strides in herbarium digitization over the past five years, but the credit for this progress is largely due to a combination of forces: funding sources such as the National Science Foundation, the Institute for Museum and Library Services, and funds from state and local resources; the commitment of those in charge of herbaria; the very talented botanical programmers who have created software that make digitization so much easier than it used to be and web sites that appeal to many users; institutions and individuals who have worked with the programmers to make the digitization process more efficient; and iDigBio-sponsored workshops and webinars on various aspects of digitization. U.S.V.H. has been particularly effective in reaching out to small herbaria in the country, making them aware of the effort to digitize the nation's natural history collections and, in some instances, providing the connections that have enabled them to begin doing so. This has been accomplished in large part by responding to comments from respondents to the annual survey.

What can the U.S.V.H. project do in the next few years? Clearly, it should continue conducting the survey and using it to solicit comments about what herbaria need to start or accelerate their digitization. It must also increase

its efforts to disseminate knowledge and tools developed by funded projects to other herbaria so that the benefits of the funding may be multiplied. U.S.V.H. will promote collaboration among all herbaria in such activities as data capture, specimen verification, and georeferencing. One way for doing this is to create short, focused, online tutorials explaining the concepts involved. Another focus is going to be the development of ways in which digital herbarium resources can be integrated into courses. Finally, we need to revisit the idea of having a single portal/website for accessing information from US herbaria. There are such portals for bryophytes, lichens, fungi, and macroalgae, but each of these was built based on a single network. There are already multiple networks for vascular plants. Should there be a national portal for vascular plants, one that draws from other networks?

For more information about U.S.V.H., check out <http://www.wiu.edu/users/mfer1/USvirtualherbarium/>.

The results of digitization surveys can be read at <http://usvirtualherbarium.coffeecup.com/progress.html>.

- Eric Ribbens, Western Illinois University, E-Ribbens@wiu.edu; Mary Barkworth, Utah State University, mary@biology.usu.edu

OTHER NEWS

30th SPNHC Meeting Scheduled for Gainesville, FL in May 2015

Please see the following website for more information: <http://www.flmnh.ufl.edu/index.php/spnhc2015/home/>

Notice: Emerging Professionals Group

New Blog: Cracking the Collections - A group of emerging professionals in the natural history collection field got together at a Society for the Preservation of Natural History Collections (SPNHC) meeting a few years ago and decided to start a blog. It is online at: <http://crackingthecollections.wordpress.com/>. Although, the content includes all natural history collections, not just botany, it is important to spread the word and encourage “newbies” in the field to connect. Please share with your students! If interested in contributing, please contact the editors.

- Melinda Peters, Smithsonian Institution, pe-tersm@si.edu

MEMORABLE BOTANICAL TRIPS

Experiencing the Redwoods



I was fortunate to take a trip to California in June 2014 and visit a redwood grove in Montgomery Woods State Natural Reserve, located in Mendocino County, northern California (above photos and Figs. 1-2 © M. Peters).

Being from the East Coast, these majestic towers with their incredible architecture were a sight to see. The species located along the trail was *Sequoia sempervirens* (D. Don) Endl., or the coast redwood. I learned that in 2008 a huge forest fire swept through the area and charred many of the trees (Fig. 1). It was evident and interesting to see, but these trees evolved to handle such pressures and have persisted.

The understory was covered with ferns that in some places were a person tall (Fig. 2). Some signage in the reserve indicated that the three species of ferns were *Woodwardia fimbriata* Sm., *Polystichum munitum* (Kaulf.) C.Presl, and *Pentagramma triangularis* (Kaulf.) Yatsk., Windham & E.Wollenw. The common names listed were giant chain fern, western sword fern, and goldback fern. The names have probably changed, but I found it encouraging that they were trying to excite people and teach them a little something about ferns. What a treat to see this habitat and think about what these trees have experienced.



Figure 1 – Coast redwoods showing scarring from fires, Montgomery Woods State Natural Reserve, CA.



Figure 2 – Fern understory, Montgomery Woods State Natural Reserve, CA.

- Melinda Peters, Smithsonian Institution, pe-tersm@si.edu

NAME THAT PLANT

Congratulations, *once again* to Donna Ford-Werntz (WVA) for receiving the highest score on the latest plant “quiz”, which appeared in the January 2014 issue of *The Vasculum*. The species were, in order, *Zea mays* L., *Buckleya distichophylla* (Nutt.) Torr., *Vaccinium oxycoccus* L., *Magnolia fraseri* Walt., and *Epigaea repens* L.

I’ve included a few more photographs in this issue. If you can identify the plant in each photo (the first photo has more than one answer), feel free to email your answers to me. Additionally, I’d be happy to include any of your photos that you feel may stump our readers. Thanks in advance!

- Conley K. McMullen, James Madison University, mcmulck@jmu.edu



Plant #1 - © C.K. McMullen



Plant #2 - © C.K. McMullen



Plant #3 - © C.K. McMullen



Plant #4 - © C.K. McMullen



Plant #5 - © C.K. McMullen

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