

The Plant Press



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Botany Profile

10 Botanical Treasures Exemplify Herbarium

By Gary A. Krupnick

treasure (noun \ 'tre-zhər, 'trā- \):

2. something of great worth or value

- Merriam-Webster

Just under 5 million specimens are housed in the U.S. National Herbarium, placing it among the world's largest and most important. The plant collections of the Smithsonian Institution began with the acquisition of specimens collected by the United States Exploring Expedition (1838-1842). These formed the foundation of a national herbarium.

Among the collections are botanical specimens that hold a unique, and rather subjective, value to those who study them. These are some of the treasures of the U.S. National Herbarium. What makes a specimen a treasure? Is it because of its size, age, or rarity? Or perhaps it is due to the circumstances on where, when, or how it was collected.

The staff of the Department of Botany was asked earlier this year to list what they feel are the herbarium treasures—any specimen that is particularly interesting in some respect or aspect. The herbarium has a variety of impressive collections, from the type specimen collection (nearly 110,000 types, including almost 20,000 holotypes) to the 250,000 fern collections, the largest number of these plants in any institution in the Western Hemisphere. Only individual specimens, however, and not collections were considered for this list.

This list of 10 specimens was chosen based on having scientific, taxonomic, aesthetic, representative, historic, and/or cultural value.



Left: The holotype of *Argyroxiphium macrocephalum*. Right: The Flora of the Hawaiian Islands website has images for many species, including *Argyroxiphium sandwicense* subsp. *macrocephalum* from Hawaii's Haleakala National Park. (Photo by W.L. Wagner)

● **Wilkes collection type specimen: holotype of *Argyroxiphium macrocephalum* (US 59690).**

The large collection of over 8,000 plant specimens resulting from the U.S. Exploring Expedition (1838-1842), under the command of Lt. Charles Wilkes, was originally deposited in the National Institute for the Promotion of Science in 1844. These plant specimens were turned over to the Smithsonian in 1846 and constituted the foundation of the new national herbarium. The term National Herbarium arose only in 1894 when the Smithsonian merged the plant collections

with those of the U.S. Department of Agriculture across the Mall, despite having no botanist to act as curator. Lester Ward, a paleobotanist, who was collecting modern material for comparison purposes, was the nominal custodian. Once combined, it was called the U.S. National Herbarium.

Argyroxiphium sandwicense DC. subsp. *macrocephalum* (A. Gray) Meyrat ($\equiv$ *Argyroxiphium macrocephalum* A. Gray), the Haleakala silversword, is listed as threatened by the U.S. Fish & Wildlife Service and as vulnerable on

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Pedro Acevedo traveled to Panama City, Panama (3/17 – 4/5) to study *Paullinia* collections deposited at STRI and the University of Panama for a floristic treatment of Sapindaceae for Flora Mesoamericana.

Mauricio Diazgranados traveled to Miami, Florida (1/9 – 1/17) to attend the VI International Biogeography Society meeting and the II Network for Neotropical Biogeography meeting; to Austin, Texas (2/15 – 2/17) to attend a symposium and workshop on New Methods for Phylogenomics and Metagenomics at the University of Texas at Austin; and to Chicago, Illinois (2/20 – 2/24) to give a talk at Northwestern University.

Vicki Funk traveled to Panama City, Panama (1/6 – 1/9) to attend a meeting of the Global Plants Initiative; to Honolulu, Hawaii (1/12 – 4/16) to work at the University of Hawaii at Manoa; to Durham, North Carolina (2/13 – 2/15) to attend

a meeting with members of NESCent (National Evolutionary Synthesis Center); and to Lihue, Hawaii (3/3 – 3/11) to meet with members of the National Tropical Botanical Garden and to work in the herbarium.

Carlos García-Robledo traveled to Costa Rica (1/23 – 3/20) to collect data on plant-herbivore interactions and coextinctions in the Barva Transect, La Selva, Las Cruces and Parque La Amistad, and to teach the Organization for Tropical Studies Graduate Course “Ecology and Conservation.”

W. John Kress traveled to Costa Rica (1/31 – 2/6) to chair the Las Cruces Biological Station advisor committee meeting and to plan the Association for Tropical Biology annual meeting; to Mexico City, Mexico (2/11 – 2/14) to attend a DNA barcoding workshop at Universidad Nacional Autónoma de México; and to Rangoon, Myanmar (3/25 – 4/4) to participate in discussions on a new Flora of Myanmar project.

Rusty Russell traveled to Panama City, Panama (1/5 – 1/11) with **Sylvia Orli** and **Ingrid Lin** to attend a meeting of

the Global Plants Initiative; to Riverside, California (2/12 – 2/18) to participate in the Smithsonian-Riverside Science Week at the Riverside Metropolitan Museum and to address the Science Ambassadors Program at the University of California at Riverside to promote effective science communication.

Larry Skog traveled to Sarasota, Florida (2/20 – 2/27) to work on the collections of Gesneriaceae at the Marie Selby Botanical Gardens where he is a research associate.

Meghann Toner traveled to Chapel Hill, North Carolina (1/30 – 2/1) to represent the U.S. National Herbarium at the Seeds of Success partnership meeting.

Alain Touwaide traveled to Paris, France (1/26 – 1/29) to attend an international meeting organized by the National Center for Scientific Research (CNRS) to develop standards in the study of ancient manuscripts.

Warren Wagner traveled to Kauai, Hawaii (3/10 – 3/21) to conduct research on Marquesas plants at the National Tropical Botanical Garden and to participate in symposium and succession planning.



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Chair of Botany

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Visitors

Wenna Chen, South China Botanical Garden, Chinese Academy of Sciences; DNA Barcoding (2/9/12-2/9/13).

Panya Vij, Alexandria, Virginia; *Silene caroliniana* (Caryophyllaceae) (6/22/12-1/19/13).

Qing Liu, South China Botanic Garden, Chinese Academy of Sciences; *Sorghum* (Poaceae) (7/31/12-1/31/13).

Janelle Burke, New York Botanical Garden; Tropical Polygonaceae and Plumbaginaceae (8/1/12-12/31/14).

Leslie Johnson, University of Oregon; Historical expeditions project (9/5/12-1/4/13).

Brooke Scott and **Neal Freyman**, University of Maryland; Historical expeditions project (9/7/12-1/4/13).

Jianqiang Zhang, Peking University, China; *Rhodiola* (Crassulaceae) (10/8/12-10/7/13).

Genevieve Croft, Washington University;

Byrsonima crassifolia (Malpighiaceae) (10/16/12-10/16/13).

Jessica Adiwijaya, Iowa State University; Plant conservation internship (12/17/12-1/11/13).

Danielle Norwood, St. Mary's College of Maryland; Plant conservation internship (12/17/12-1/18/13).

Alyssia Phanethay, Western Carolina University; Plant conservation internship (1/2-3/2).

Dimitri Diagne, Germantown Friends School; Cuatrecasas imaging project (1/8-2/1).

Anne Cohen, Australia; Jacob Storck collections from Fiji (1/9).

Dave Gammon and 11 students, Elon University; Plant conservation and herbarium tour (1/14).

Julia Meirelles, Universidade Estadual de Campinas, Brazil; *Miconia*

Continued on page 5

Connecting Content at the US National Herbarium

The latest buzz term in natural history is “connecting content.” We see the term used officially in certain contexts, such as the California Academy of Science’s collaborative initiative to digitize natural history field notes and connect them to natural history collections and Biodiversity Heritage Library publications. But *connecting content* can also refer to projects which connect concepts in various content areas. In the US National Herbarium, we are using our KE EMu (Electronic Museum) data system to store different types of content, such as specimen data, photo images, mapping coordinates, and genetic voucher details, which connect to each other and to outside content. To date, we have nearly 1.2 million specimen descriptive records, 300,000 geocoded collection localities, and 185,000 specimen images and live plant images in EMu and available online at <<http://collections.mnh.si.edu/search/botany/?ti=2>> and <<http://collections.mnh.si.edu/search/botany/?ti=5>>. With these resources, we can illustrate botanical taxonomic and geographic checklists with both live images and plant specimen images, create locality maps of our collections, and connect our botanical research to our herbarium collections through the use of online tools.

Sometimes the merits of connecting our botanical content into one data storage system are shown to us in surprising ways. For example, this year we will be importing our botanical art images into EMu. Alice Tangerini, our botanical illustrator, discovered that the Department of Botany has most of the original botanical illustrations from the Report of the Expedition of the 35th Parallel, “Explorations and Surveys of a Railroad Route from the Mississippi River to the Pacific Ocean,” published in 1856. The exploration was funded by the U.S. Secretary of War and led by A.W. Whipple of the Corps of Topographical Engineers and accompanied by botanists, George Engelmann and J. M. Bigelow of St. Louis. The expedition was part of an initiative of the U.S. government to find a railroad route from the Mississippi to the Pacific Ocean.

If the Department of Botany had the original report drawings, shouldn’t we also have the specimens from the expedition? The notion of combing the herbarium for specimens from this expedition to match the drawings seemed daunting, as 70 percent of the herbarium specimens are not inventoried. But Botany has also embarked on the *Historical Collections* project, an effort to document the botanical explorations in the US National Herbarium and digitize the collections associated with the expeditions as part of the Global Plants Initiative (GPI). By querying the name of the expedition in our EMu system, we were able to retrieve 71 records and specimen images for the Whipple expedition and match many of them to the original illustrations. A score for both the Whipple Expedition illustrations and specimens! We could now digitally connect the illustrations to their voucher specimen records.

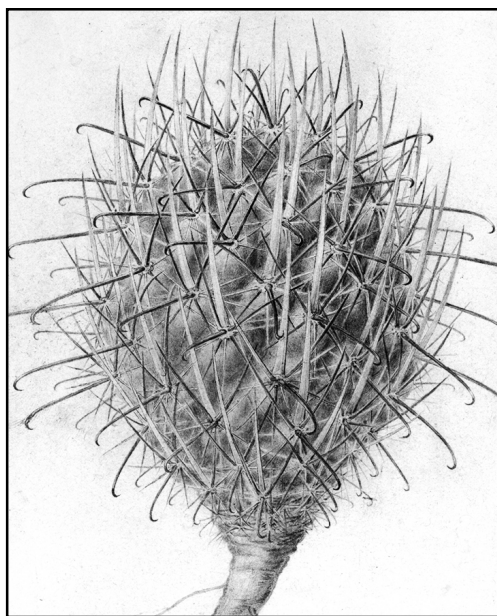
But not all illustrations matched specimen records at the herbarium. For example, a drawing of *Echinocactus whipplei* was likely to be the illustration of the type. The Whipple Expedition report contained a charming note about *Echinocactus whipplei*: “This species was discovered on Lithodendrow Creek, near

Editor’s Note

the Colorado Chiquito about 90 miles west of Zuni, in sandy plains, December 3-4, 1853. At first only dead specimens were found, afterwards young living ones were collected. We have named this very pretty species in honor of Captain A.W. Whipple, the zealous and talented commander of this expedition.” There was even a credit line to the illustrator, Paulus Roetter of St. Louis, who drew “with greatest accuracy” under the direction of Engelmann. Our Type Register specialist John Boggan managed to find a type of *Echinocactus (Sclerocactus) whipplei* at the Missouri Botanical Garden’s herbarium (MO) <<http://www.tropicos.org/Image/55472>>, which turned out to be the specimen used for the illustration (right down to the groups of spines). Warren Wagner explained that Engelmann, who was instrumental in founding the Missouri Botanical Garden, was likely to file all of the cactus types at MO.

We will most likely have more illustrations of content from other institutions, and we may also have specimens for which illustrations were made and deposited elsewhere. Clearly our future challenges for connecting content involve connecting not only data outside of our data system, but content outside of the Smithsonian Institution. In the case of the Whipple material, we can relate our botanical illustrations back to the MO specimen in our own database, but a better system would be the reciprocity of data between and among institutions. This concept of a global electronic botanical network is slowly taking shape in several digital formats throughout the botanical world, and the Department of Botany strives to be at the forefront of that movement.

- Sylvia Orli, guest contributor
IT Manager



The original 1856 botanical illustration of “*Echinocactus (Sclerocactus) whipplei*” drawn by Paulus Roetter, above, is housed at the National Museum of Natural History, whereas the type specimen is at the herbarium of the Missouri Botanical Garden.

Staff Research & Activities

Leafsnap was one of three Gold Medal Products presented at the 2013 Philadelphia Flower Show. **John Kress** and **Ida Lopez** worked with the Pennsylvania Horticultural Society to create a presentation for the show. The Gold Medal Plant Program <<http://www.goldmedalplants.org/>> had traditionally focused on trees, shrubs, and woody vines. For 2013, Gold Medal Products was added. A display showcased Leafsnap plus two other products and the 2013 Gold Medal Plants.

On February 27, 2013, **Alice Tangerini** taught four classes on botanical illustration to students at North Chevy Chase Elementary School in Maryland as part of Big Draw 2013, an annual art event. This year she treated the sixth-grade classes (about 132 students) to drawing demonstrations using pen and ink with stippling and line techniques on vellum using Tangerini's sample drawings of plants.

Elizabeth Zimmer has been named Deputy-Editor-in-Chief for the journal *Molecular Phylogenetics and Evolution*.

The Botany-Horticulture Library Transformed

By Robin Everly

When the August 2011 earthquake damaged the shelving in the Botany-Horticulture library, the last thing on anyone's mind was reorganizing the entire 100,000 book and journal collection, plus modernizing the reading room space. However, a year and a half later, this is exactly what has happened.

During meetings with the Department of Botany, Smithsonian Gardens, and Smithsonian Libraries, all parties decided this was an opportunity to consolidate and merge several collections. Several meetings were held in the fall of 2011 to discuss how to go about making this project a reality. Once the 18,000 books and journals, originally displaced by the earthquake, were brought back to the library in early January 2012, plans were



The Botany-Horticulture Library reading room area redesigned

already underway to prepare for two other major shifts of the collection. The first shift, occurred over three days in June, and involved incorporating 2,000 books on ferns and lichens and part of E. Yale Dawson's donation of phycology books with the main collection.

The second shift was an even more ambitious endeavor to integrate the approximately 10,000 books and journals brought over in 2004 from the former Horticulture Branch library when the historic Arts and Industries Building was closed for renovations. These books were already in the library space but shelved separately from the botany collection. This second project, which occurred over a two week period in November, required every book in the library to be moved, if only a shelf or two over. It also began the implementation of the reading room redesign because before this collection shift could take place, five stack ranges had to be permanently removed. Some of the stack space was restored in other parts of the library, but for the most part, space once designated for the collection was lost. During the planning process, decisions had been made with the Department of Botany and Smithsonian Gardens what part of the collection would be housed at an off-site facility in Landover, Maryland. Throughout the three major collection moves and shifts, the Botany-Horticulture library staff with the assistance of Natural History Library staff, was able to keep library services going continuously. There were some restrictions on library users being able to access the stacks themselves, but service was provided in a timely manner.

In December 2012, the redesign of the reading room and staff work areas began

and was completed four months later. A team from Smithsonian Design came up with an innovative plan to redesign the space. The space is now user friendly for both museum and library staff, and library visitors. Before the redesign, the stacks determined where new equipment was placed, often in any available space, not necessarily based for convenience. Now, major items used by staff such as the periodical display area, a library carrel with a computer, a large table with chairs, the copier/scanner machinery, plus a new comfortable seating area are all conveniently located near each other. There is also two work spaces for library staff, where before there was only one for the librarian. There are still two desks for quiet study away from the reading room area. Wifi is also now accessible throughout the entire library.

The catalyst for all this change, an unusual natural disaster for the Washington D.C. area, has truly been a silver lining and opportunity for Smithsonian Libraries to improve services for the present and future library users of the Botany-Horticulture library. With all the hard work of moving collections and redesigning space behind us, this librarian plans to come up with ways to promote the library and its wonderful collection in the year ahead.

Notes from the Plant Mounting Room

By Melinda Peters

The plant mounting room is buzzing with productivity as we enter spring time. It has been a pleasure getting to know



Left to right: *Kermadecia* sp. (US 3653808); *Gonolobus suberosus* (L.) R.Br. var. *suberosus* (US 3653822); *Carica papaya* L. (US 3639503).

the dedicated volunteers, contractors, and staff plant mounters who help prepare the specimens for our research programs. These are treasures of the US collection. We are working on current exchange material for curators while also incorporating specimens from the backlog. The plant mounters have unique backgrounds and are a delightful group to work with. I am also happy to report that two new volunteers, **Joan Carpenter** and **Traute Bushley**, have joined the mounting crew, are learning the protocol, and are contributing to this wonderful group. For the first three months of 2013, we have mounted 3,362 specimens for the collection.

I am working on incorporating “learning moments” for the volunteers who are interested in botany and encourage curators and visitors to stop by the mounting room to share any plant knowledge or stories. Many of these volunteers have been coming to work on this project for years and it just shows that they enjoy contributing to our nation’s collection and find it a rewarding experience.

Noteworthy newly mounted acquisitions:

- Specimen US 3653808 is an unidentified species of *Kermadecia* (Proteaceae) from New Caledonia given to us through our exchange program with the Missouri Botanical Garden. It is one of the first specimens I have mounted for US and highlights what we can do with bulky material. We use more stitching to secure the base and inflorescence, while incorporating linen straps over leaf tips and stems.
- Specimen US 3653822 is a new record for Maryland of *Gonolobus suberosus*

(L.) R.Br. var. *suberosus* collected by R. H. Simmons with Chris Frye, Wes Knapp, and Caroline Haynes on 13 June 2009. We received it as a gift and it will be deposited in the D.C. Herbarium. Due to its rarity, we only acquired a small sample and a photo. To protect the specimen fragment, a clear archival film encloses the specimen, highlighting another mounting method used at the US National Herbarium.

- Specimen US 3639503 is an ethnobotanical specimen of *Carica papaya* L. from Micronesia. The specimen was sent to us on exchange from the New York Botanical Garden. The label includes instructions on how to cure an infected cut: “Take the tuber, pound and wrap in a piece of cloth. Squeeze on the wound.”

Visitors

Continued from page 2

(Melastomataceae) (2/11-2/14).

Robert Lücking, The Field Museum; Lichens (2/19-2/20).

Robert Muscarella, Columbia University; DNA barcoding project (2/19-2/22).

Rosari Kingston, University College Cork, Ireland; Medieval herbals (2/20).

Natalie Iwanycki, Royal Botanical Gardens, Ontario, Canada; Collections management (2/21).

Ashley Egan, East Carolina University; Phaseoleae, Psoraleae, and *Pueraria* (Leguminosae) (2/25-2/26).

Sarah Everts, Chemical & Engineering News, Germany; Staff interview (2/25).

Kerry Barringer, Brooklyn Botanic

Garden; Scrophulariaceae (2/26-2/27).

Koray Durak, Bogazici University, Turkey; Byzantine medicine (2/26-5/15).

Tyler Kartzin, University of Georgia, and **Robert Pringle**, Princeton University; Plant DNA barcode project (2/27).

David Tank, University of Idaho; Orobanchaceae (2/27-2/28).

Bill Peery and 19 students, The Potomac School, Virginia; Herbarium tour (2/28).

Eric Schuettepeltz, University of North Carolina; Leptosporangiate ferns (2/28-3/1).

Ken Karol, New York Botanical Garden; Characeae (3/4-3/5).

Scott La Greca, Cornell University; Lichens (3/4).

Marcelo Vianna Filho, Jardim Botânico de Rio de Janeiro, Brazil; *Cecropia* (Urticaceae) and *Dorstenia* (Moraceae) (3/7-3/9).

Carolina Guerriero, Instituto Darwinion, Argentina; South American Bambusoideae (Poaceae) (3/8-4/6).

Jeferson Costa, Universidade Federal de Minas Gerais, Brazil; Tectariaceae (3/11-3/22).

Rozijane Fernandes, Universidade Federal de Minas Gerais, Brazil; Thelypteridaceae (3/11-3/22).

Rachel Jabaily, Rhodes College; *Scaevola* and *Goodenia* (Goodeniaceae) (3/11-3/12).

Elizabeth Johnson, Montana State University; Pacific Islands flora internship (3/11-3/15).

Jeanmaire Molina, New York University; Plant DNA barcode project (3/13).

Clayton Costa, Towson University; Asteraceae (3/18-3/20).

Chanvearsna Omark, University of Maryland, College Park, and **Amanda Sikirica**, University of Illinois at Urbana-Champaign; Cuatrecasas imaging project (3/18-3/22).

Jacqueline Quander, Tufts University; Plant conservation internship (3/18-3/22).

Marcela Mora-Pinto, University of

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The Diaries of Floyd Alonzo McClure

By Emily Hunter, Field Book Project
Originally published on the Field Book Project Website <<http://nmnh.typepad.com/fieldbooks/>>

We get to know some interesting characters by reading field notes. Floyd Alonzo McClure (1897-1970) was one of these characters that I had the pleasure of learning about while cataloging SIA collection T90028.

McClure was a bamboo guy. (We really get familiar with these collectors, don't we?) To put it another way, he studied Bambusoideae, a large group of genera in the grass family (Poaceae), for the majority of his career. His major work was the publication "The Bamboos, a Fresh Perspective," which was published in 1966. McClure's connection to the Smithsonian began in 1940s, when he joined the National Museum of Natural History as an Honorary Research Associate. But let's start a little earlier.

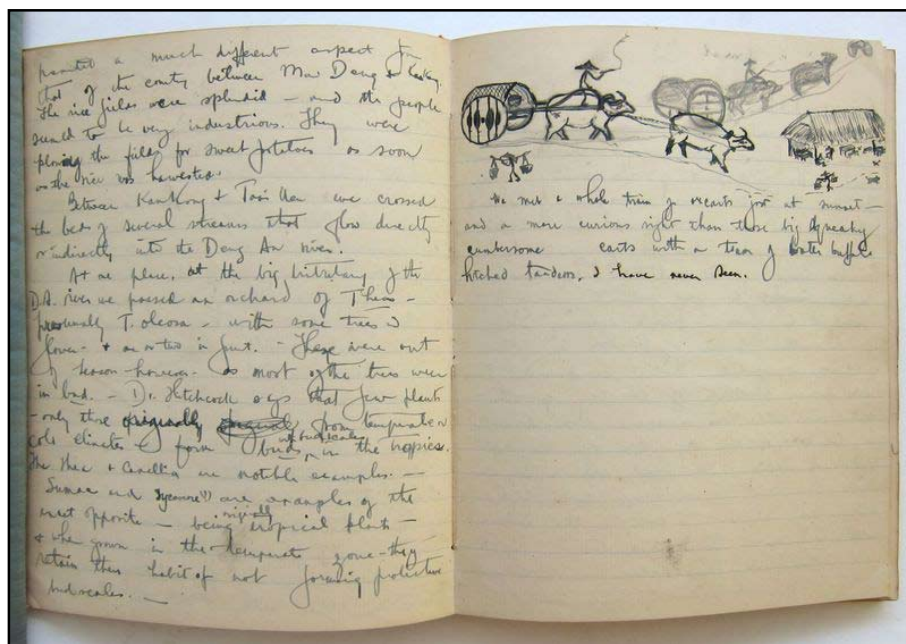
China

McClure was born in 1897 in Shelby County, Ohio. He attended Ohio State University where he earned a BS in Agriculture in 1919. That year, McClure took a position in China teaching Economic Botany at Canton Christian College (later Lingnan University), a move that would define much of his life and career and lead him to spend 24 years in that country.

McClure found a lot to learn about in China beyond just bamboo. He studied



Floyd Alonzo McClure conducting field work, possibly in China, circa 1919-1950. SIA Acc. T90028. Box 7 Folder 15. No negative number.



McClure's diary from Hainan, China, 1921. SIA Acc. T90028. Box 8 Folder 24. No negative number.

Chinese language and culture. He was interested in the land, the people, and the local customs. As a botanist, these interests served him well. Navigating the country, speaking with farmers, and learning local uses for bamboo plants certainly must have informed his career in economic botany.

McClure lived in Canton, China and went on collecting expeditions throughout Hainan province in 1921, 1922, 1929, and 1932. He collected bamboo specimens mainly, but occasionally other grasses, orchids, and other higher plants. He wrote about his daily experiences and observations in his diaries. While reading through, I found his reflections on the people and cultures he observed respectful and thoughtful. He made "tentative" observations, and allowed for differences in perspective and opinion. McClure was a humble man. His field notes made it very clear that even though he was a teacher, he enjoyed learning from others around him. The Japanese invasion of China in 1941 forced McClure to return to the United States where he would spend the rest of his life.

Family

It's easy to get lost in McClure's diaries. They speak of his day-to-day life, a blend of family and botanizing. Amidst teaching and conducting botanical work in the lab, McClure went on bicycle rides with his wife Ruth, and spent a great deal of time with his two young daughters,

Sophie Louise and Janet (or "Bunny").

His entries depict a loving and dedicated husband and father. McClure's family did, indeed, seem to become enmeshed in his professional life. The first and strongest example is the fact that McClure brought his new wife to Canton where they spent the first decades of married life together and raised two children. When McClure took trips, his wife and children sometimes came along. In 1959, Ruth became his research assistant, working with him daily until he passed away.

Economic Botany

McClure saw the connections between studying plants and thinking about how they can contribute to a society, reinforce culture, and even take a role during war times.

In 1943 McClure was recruited for his knowledge of bamboo by the U.S. military. If that sentence sounds odd to you, you are not alone—I also was surprised to learn this! During World War II, the National Defense Research Committee was looking for someone with a deep knowledge of bamboo to research options for making ski poles for troops in extreme northern climates. At the time, wood was expensive and increasingly in demand. Bamboo was practical and fairly cheap. McClure was their man. McClure traveled to Central American locations to research and conduct experiments on bamboo species that could be used to make ski poles. I haven't found a great deal of informa-

tion on the result of these efforts, but I certainly hope that U.S. troops benefited from McClure's knowledge of safe, sturdy bamboo species.

Often, interesting tidbits like this one are wrapped up in the field notes. It's what makes field notes so unique; they are rarely cut and dry, and more often than not, include all sorts of information beyond just lists of specimens collected. McClure's diaries can give us a wealth of information on culture, wartime activities, family life, and the man behind the books.

Keeping an Eye Open for Plant Exudates and Amber

By Jorge Santiago-Blay, Department of Paleobiology

Several collaborators, including Joseph B. Lambert (Northwestern University, Evanston, Illinois), and I have been steadily pursuing the study of plant exudates (e.g. resins, gums, kinos) and ambers (fossilized plant resins) worldwide for several decades. Through their chemistry as well as biological inclusions, in the case of amber, these materials help us understand our past. For example, amber materials we have studied from Chiapas, Mexico, contain inclusions, such as the base of a barnacle and carbonates strongly suggesting a tropical coastal environment million of years ago.

If the exudate happens to be a resin, the nuclear magnetic resonance NMR spectroscopy profile can help us determine the botanical provenance, such as

the plant family and sometimes the genus. For instance, using the carbon-13 isotope, the resinous exudates of conifers can be placed into their correct family (e.g. Pinaceae, Cupressaceae, etc.). Additionally, the same resinous exudates of pines and their allies can be further correctly identified to genera if proton NMR is performed.

Some key discoveries resulting from those efforts have included the establishment of a typology of ambers of the world as well as a classification of modern plant exudates of the world. Although exudates have distinct physical properties, looks can be deceiving. An exudate collected from *Pinus coulteri* D. Don (Pinaceae) is a resin and it is the most commonly collected exudate in conifers. Milky exudates, often called latexes, are also resins, as in the materials oozed by *Euphorbia tirrualii* L. (Euphorbiaceae). Exudates from cherry trees, like those that ornate our nation's capital, are gums, as in the case of *Prunus* sp. (Rosaceae).

Exudates are ubiquitous in the plant world. If any reader sees materials that look like plant exudates, I will appreciate a sample (100 mg or the approximate volume of an eraser on a pencil) or knowing about who to contact to collect such materials.

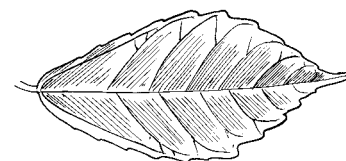
The Plant Press Has a New Web Presence

The Plant Press is available online at http://nmnh.typepad.com/the_plant_press/. This website, hosted by the blogging ser-

vice company TypePad, highlights stories that are published in the printed newsletter. *The Plant Press* is now available in a variety of formats: printed, online pdf, and now highlighted articles from each issue on the website.

The benefits of the new website are that articles are easily searchable; search engines will find the articles; articles can be emailed, facebook shared, tweeted, pin-terested, and reblogged; readers can post comments about each article opening a dialogue about the latest topics; images are in color and can be expanded; and articles can contain additional images beyond those printed in the hardcopy. All articles from back issues are searchable and can be found in pdf format, and a select number of back articles have been and will be converted into online articles.

The editor of *the Plant Press*, **Gary Krupnick**, is open to comments and suggestions on how to improve the website. He can be reached at krupnickg@si.edu.



Visitors

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Alabama; *Paradrymonia*, *Nautilocalyx* and *Chrysothemis* (Gesneriaceae) (3/21-3/30).

David Borsheim, Independent researcher; Valles Caldera cryptogam project (3/22).

Petros Bouras-Vallianatos, King's College, United Kingdom; Medicinal plants in *Historia Plantarum* collection (3/25).

Doug Goldman, US Department of Agriculture, North Carolina; Flora of North America (3/25).

Maria Madeiros, University of São Paulo, Brazil; *Tynanthus* (Bignoniaceae) (3/25-3/29).

Angelica Ramirez Roa, Herbario Nacional de Mexico; Gesneriaceae (3/25-3/29).

Shannon Still, Chicago Botanic Garden; Plant modeling project (3/25-3/29).

Alexander Krings, North Carolina State University; Asclepiadaceae (3/28).

James Reveal, Cornell University; Cyperaceae (3/28-3/30).



Left panel: Resins from *Pinus coulteri* D. Don (Pinaceae). Central panel: Latexes from *Euphorbia tirrualii* L. (Euphorbiaceae). Right panel: Gums from *Prunus* sp. (Rosaceae). Images by Roy (Chip) Clark.

Treasures

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the IUCN Red List. Threatened by human vandalism and grazing by cattle and goats, wild populations are on the rebound due to high conservation attention. The Hawaiian endemic is restricted to a 1,000 hectare site in the crater and on the outer slopes of Haleakala Volcano on the island of Maui.

❷ Historical collection: Mexican Boundary Survey. *Castilleja lanata* (US 93751).

The specimen of *Castilleja lanata* Gray was collected along the border of the United States and Mexico during a survey to establish the boundary with large stone markers during and immediately following the U.S.-Mexican War (1846-1848). The U.S. National Herbarium maintains tens of thousands of plant specimens collected during scores of pre-1900 expeditions, surveys, and voyages of discovery. They forever link biodiversity with events that define the growth of our country as well as global exploration.

The Sierra woolly Indian paintbrush is a hemiparasitic perennial herb found in the deserts of the US-Mexico border from Arizona, New Mexico, and Texas into northern Mexico.

❸ Lichens as biological monitors: *Flavoparmelia baltimorensis* (US Barcode 00536547).

Research by James Lawrey (George Mason University) and Mason Hale



Left: *Castilleja lanata* (US 93751). Right: *Hibiscadelphus woodii* (US 3313194).

(Smithsonian Institution) demonstrated a relationship between lichen growth and air pollution over a 78 year period from specimens collected on two Potomac River islands: Bear Island and Plummers Island (*Science* 204: 423-424, 1979; *The Bryologist* 84: 449-456, 1981). Longitudinal data such as that which can be obtained from herbarium collections are extremely valuable in measuring environmental change and variability. The lichen collection of the U.S. National Herbarium, with approximately 250,000 specimens, is the



largest lichen collection in North America and one of the ten largest collections in the world.

The rock greenshield lichen, *Flavoparmelia baltimorensis* (Gyeln. & Förliss) Hale, is commonly found on acidic rock and rarely tree bases. Its distribution includes eastern and southwestern North America.

❹ New Hawaiian species: *Hibiscadelphus woodii* (US 3313194).

Hibiscadelphus woodii Lorence & W.L. Wagner was first collected in 1991 by Ken Wood (National Tropical Botanical Garden) on this island of Kaua'i and described by Dave Lorence (NTBG) and Warren Wagner (Smithsonian Institution). With only 4 individuals in the original population, this rare species is now believed to be extinct, but remains listed as critically endangered by the IUCN Red List and endangered by the U.S. Fish & Wildlife Service. Efforts to propagate the species have also been unsuccessful. The genus *Hibiscadelphus* consists of seven species endemic to the Hawaiian Islands. Due to the destruction and severe alteration of the diverse dry and mesic forest habitats and loss of all of the Meliphagid birds in the Hawaiian Islands, six of the seven *Hibiscadelphus* species have apparently gone extinct in the wild, although at least two of these are maintained through cultivation. The status of the entire genus is extremely precarious at present. The US Type Herbarium has isotype collec-



Detail of *Flavoparmelia baltimorensis* (US Barcode 00536547). This specimen from Plummers Island exhibited higher levels of lead concentrations due to atmospheric pollution stress from automobile exhaust than comparable specimens from the nearby Bear Island, which is more remote from traffic.

tions of three of the six extinct species: *Hibiscadelphus giffardianus* (US 691067 & 691068), *H. wilderianus* (US1627175), and *H. woodii* (US 3313194).

⑤ **Local extirpation: *Zizania aquatica* (US 2313301).**

A specimen of *Zizania aquatica* L. (wild rice) was collected in 1958 by F.A. McClure on Theodore Roosevelt Island, representing the last known natural population in the immediate Washington, DC area along the Potomac and Anacostia Rivers. Changes to the local landscape, such as the disappearance of this native species, are documented in the DC Herbarium which is a segregated collection of over 68,000 regional specimens that is available online at <http://botany.si.edu/DCFlora/dcherbarium.htm>. This specimen is also part of the US National Herbarium's extensive grass collection of over 500,000 specimens which include over 90 percent of the type specimens in the family.

⑥ **Deepest photosynthetic marine algae: Undescribed species in the order Corallinales (Rhodophyta).**

A purple, crustose, coralline alga collected in 1983 at a depth of 268 meters by Mark and Diane Littler, retired Smithsonian Research Botanists, documented the presence and photosynthetic productivity of deep-water communities. This marine



Detail of *Hecistopteris kaieteurensis* (US 33760054), a specimen of the world's second smallest terrestrial fern. Carol Kelloff found this fern growing in moss on the side of a tree in Kaieteur National Park, Guyana.

organism found on the San Salvador seamount in the Bahamas generated excitement because it was the deepest that photosynthesis had been found to occur. This is a remarkable example of how plants and plant-related organisms can adapt to extreme environmental conditions. The algal species remains undescribed, but current activity on the specimen includes attempting to extract DNA from the specimen for DNA barcoding analysis.

The Algal Collection of the U.S. National Herbarium is represented by specimens preserved on herbarium sheets, microscope slides and liquid preparations. The collection is comprised of marine, estuarine, freshwater, terrestrial (including cave) and airborne algae and is worldwide in origin, with strong representation of tropical and subtropical marine algae.

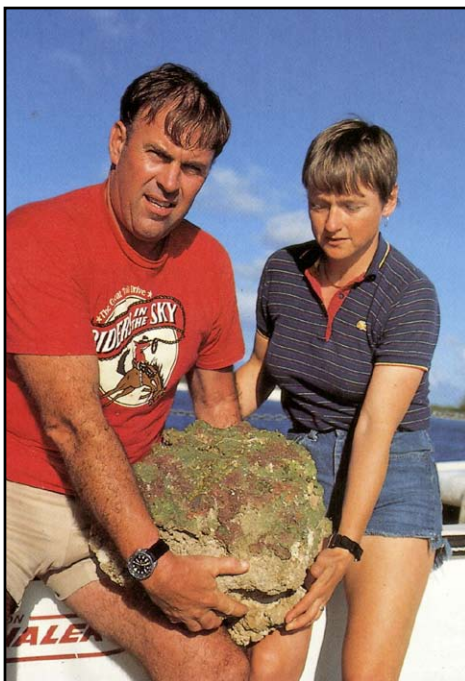
⑦ **New fern species: *Hecistopteris kaieteurensis* (US 33760054).**

The world's second smallest terrestrial fern (*Amer. Fern J.* 88:155-157, 1998) was discovered in 1997 by Greg McKee and Carol Kelloff, NMNH Museum Specialists, while on a collecting expedition in Guyana for the Biological Diversity of the Guianas Program, directed by research botanist Vicki Funk. For the past 20 years, this program has worked to document a highly bio-diverse region of northern South America known as the Guiana Shield. Smithsonian botanists are very active in conducting fieldwork such as this to better understand global plant diversity.

Hecistopteris kaieteurensis Kelloff & G.S. McKee is native to Guyana and Brazil, and grows embedded in moss carpets with only the sporangial portion of the lamina visible. Kelloff found this fern growing in moss on the side of a tree while putting in her study plots at Kaieteur National Park, Guyana. The fronds measured up to 2 cm long but are only 0.5-1 mm wide.



Left: *Zizania aquatica* (US 2313301). Right: On the deck of the submersibles mother ship the R/V *Johnson*, Mark and Diane Littler hold a crustose coralline growing attached a rock substrate collected from a depth of 268 meters off the northern border of San Salvadore Island, Bahamas, in October 1983.



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This specimen of *Taxodium distichum* (US w42707) was once ranked as the fifth oldest living tree in the world and the overall state champion in Florida before it was destroyed by an arsonist on January 16, 2012.

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⑧ Champion tree: *Taxodium distichum* (US w42707).

"The Senator" tree from Longwood, Florida, was the oldest bald cypress tree in the world at 3,500 years old, and standing at 118 feet, when it was destroyed by an arsonist in January 2012. The specimen of its wood was donated by the Seminole County Board of Commissioners and has been accessioned into the Department's Wood Collection. With over 47,000 specimens (and online access at <http://botany.si.edu/colls/wood/>) this collection provides original source materials for applied research activities. Applied research results in improved products and technologies that, in turn, improve our standard of living.

Taxodium distichum (L.) Rich. is a slow-growing and long-lived conifer widely distributed along the Atlantic Coastal Plain, westward along the lower Gulf Coast Plain to southeastern Texas.

⑨ World's largest seed: *Lodoicea maldivica* (US 3609441).

Native to the Republic of Seychelles Islands, an island country off the east coast

of Africa, this species of palm tree produces what are considered to be the largest seeds in the world. The entire palm fruit (a double coconut), containing a single seed, can weigh up to 50 pounds. This fruit is an excellent example of the remarkable diversity of size, structure, function, even



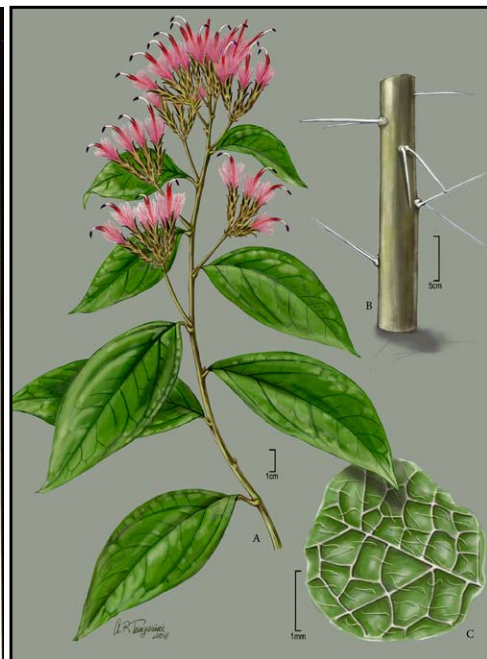
Lodoicea maldivica (US 3609441)

color of the more than 400,000 species of plants and plant relatives.

The Coco de Mer, *Lodoicea maldivica* (J.F. Gmel.) Pers., is historically known from five islands, but it now occurs naturally only on two islands—Praslin and Curieuse. With a restricted range, slow growth rate, and limited dispersal ability, *L. maldivica* is listed as endangered in the IUCN Red List. Its main threats are illegal harvesting and poaching, human induced fires, and introduced pathogens.

⑩ New Compositae species: *Fulcaldea stuessyi* (US 3580444).

Fulcaldea stuessyi Roque & V.A. Funk is a recently described member of the



Left: *Fulcaldea stuessyi* (US 3580444). Right: Illustration of *Fulcaldea stuessyi* by Alice Tangerini.

Compositae, or sunflower family of flowering plants. The specimen was discovered in 2010 in northeastern Brazil by research botanist Vicki Funk (Smithsonian Institution) and confirmed as a new species using DNA sequencing and morphological examination (*Taxon* 60(4): 1095-1113, 2011). Known only from the type collection, this species is restricted to Bahia occurring in seasonally deciduous forests.

Full color illustrations of the new species' physical characteristics were captured by Alice Tangerini, botanical illustrator. These plates and over 9,100 others are archived as part of the Catalog of Botanical Illustrations which is available online at <http://botany.si.edu/botart/>.

The Compositae collection is one of the most significant collections in the U.S. National Herbarium, having been actively curated for at least the past 100 years. There are approximately 500,000 specimens, with the strongest representation in the Neotropical Compositae.

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Publications

Adey, W.H., H.D. Laughinghouse, J.B. Miller, L.C. Hayek and J.G. Thompson. 2013. Algal turf scrubber (ATS) flowways on the Great Wicomico River, Chesapeake Bay: productivity, algal community structure, substrate and chemistry. *J. Phycol.* <http://dx.doi.org/10.1111/jpy.12056>

Chin, S., S. Lutz, J. Wen and D. Potter. 2013. The bitter and the sweet: inference of homology and evolution of leaf glands in *Prunus* (Rosaceae) through anatomy, micromorphology, and ancestral-character state reconstruction. *Int. J. Plant Sci.* 174(1): 27-46. <http://dx.doi.org/10.1086/668219>

Deng, T., D. Zhang, Z. Liu, G.C. Tucker, H. Sun, J. Wen and Z. Nie. 2013. *Oxalis wulingensis* (Oxalidaceae), an unusual new species from central China. *Syst. Bot.* 38(1): 154-161. <http://dx.doi.org/10.1600/036364413X661953>

Dorr, L.J. 2012. *Apeiba trombetensis* (Malvaceae: Grewioideae), a new species from northern Brazil. *Brittonia* 64(4): 374-380. <http://dx.doi.org/10.1007/s12228-012-9251-3>

Hardy, C.R. and J. Ryndock. 2012. Floral morphology and organogenesis in *Tinania pringlei*, along with a review of floral developmental variation in the spiderwort family, Commelinaceae. *Bot. Rev.* 78(4): 416-427. <http://dx.doi.org/10.1007/s12229-012-9108-1>

Harris, A., J. Wen and Q. Xiang. 2013. Inferring the biogeographic origins of inter-continental disjunct endemics using a Bayes-DIVA approach. *J. Syst. Evol.* 51(2): 117-133. <http://dx.doi.org/10.1111/jse.12007>

Huang, W., H. Sun, T. Deng, S.G. Razafimandimbison, Z. Nie and J. Wen. 2013. Molecular phylogenetics and biogeography of the eastern Asian-eastern North American disjunct *Mitchella* and its close relative *Damnacanthus* (Rubiaceae, Mitchelleae). *Bot. J. Linn. Soc.* 171(2): 395-412. <http://dx.doi.org/10.1111/j.1095-8339.2012.01321.x>

Liu, X., J. Wen, Z. Nie, G. Johnson, Z. Liang and Z. Chang. 2012. Polyphyly of the *Padus* group of *Prunus* (Rosaceae) and the evolution of biogeographic disjunctions between eastern Asia and eastern North America. *J. Plant Res.* <http://dx.doi.org/10.1007/s10265-012-0535-1>

Nicole, S., E. Negrisolo, G. Eccher, R. Mantovani, T. Patarnello, D.L. Erickson, W.J. Kress and G. Barcaccia. 2012. DNA Barcoding as a reliable method for the authentication of commercial seafood products. *Food Technol. Biotechnol.* 50(4): 387-398.

Nie, Z., T. Deng, Y. Meng, H. Sun and J. Wen. 2013. Post-Boreotropical dispersals explain the pantropical disjunction in *Paderia* (Rubiaceae). *Ann. Bot.* <http://dx.doi.org/10.1093/aob/mct053>

Robinson, H.E. and J.F. Pruski. 2013. *Zyzyura*, a new genus of Eupatorieae (Asteraceae) from Belize. *Phytotkeys* 20: 1-7. <http://dx.doi.org/10.3897/phytokeys.20.4033>

Rojas-Sandoval, J. and E.J. Meléndez-Ackerman. 2013. Spatial patterns of distribution and abundance of *Harrisia portoricensis*, an endangered Caribbean cactus. *J. Plant Ecol.* <http://dx.doi.org/10.1093/jpe/rtt014>

Roque, N. and V.A. Funk. 2013. Morphological characters add support for some members of the basal grade of Asteraceae. *Bot. J. Linn. Soc.* 171(3): 568-586. <http://dx.doi.org/10.1111/boj.12000>

Specht, C.D., R. Yockteng, A.M. Almeida, B.K. Kirchoff and W.J. Kress. 2012. Homoplasmy, pollination, and emerging complexity during the evolution of floral development in the tropical gingers (Zingiberales). *Bot. Rev.* 78(4): 440-462. <http://dx.doi.org/10.1007/s12229-012-9111-6>

Swenson, N.G., X. Mi, W.J. Kress, J. Thompson, M. Uriarte and J.K. Zimmerman. 2013. Species-time-area and phylogenetic-time-area relationships in tropical tree communities. *Ecol. Evol.* <http://dx.doi.org/10.1002/ece3.526>

Tellería, M.C., G. Sancho, V.A. Funk, I. Ventosa and N. Roque. 2013. Pollen morphology and its taxonomic significance in the tribe Gochnatieae (Compositae, Gochnatioideae). *Plant Syst. Evol.* 299(5): 935-948. <http://dx.doi.org/10.1007/s00606-013-0774-1>

Temeles, E.J., Y.J. Rah, J. Andicoechea, K.L. Byanova, G.S.J. Giller, S.B. Stolk and W.J. Kress. 2013. Pollinator-mediated selection in a specialized hummingbird-*Heliconia* system in the Eastern Caribbean. *J. Evol. Biol.* 26(2): 347-356. <http://dx.doi.org/10.1111/jeb.12053>

Wasshausen, D.C. 2012. Acanthaceae, pp. 225-233. In A. Idárraga, R. del C. Ortiz, R. Callejas and M. Merello, eds. *Flora De Antioquia: Catálogo De Las Plantas Vasculares, Vol. II.* Universidad de Antioquia, Bogotá, Colombia.

Wen, J., R. Kiapranis and M. Lovave. 2013. *Ampelocissus asekii* J. Wen, R. Kiapranis & M. Lovave, a new species of Vitaceae from Papua New Guinea. *Phytokeys* 21: 1-6. <http://dx.doi.org/10.3897/phytokeys.21.4512>

Zhu, W., Z. Nie, J. Wen and H. Sun. 2013. Molecular phylogeny and biogeography of *Astilbe* (Saxifragaceae) in Asia and eastern North America. *Bot. J. Linn. Soc.* 171(2): 377-394. <http://dx.doi.org/10.1111/j.1095-8339.2012.01318.x>

Art by Alice Tangerini

***Fulcaldea stuessyi* Roque & V.A. Funk**

A specimen and illustration of *Fulcaldea stuessyi* is one of the top 10 treasures of the US National Herbarium. Here Alice Tangerini explains the process that went into her drawing of this species (from *Taxon* 60(4): 1095-1113; 2011): "The illustration of *Fulcaldea stuessyi* Roque & V.A. Funk was made using traditional and digital methods. I began with sketches in pencil which were composed into a layout. These sketches were traced onto drafting film using special drafting film pencils. The finished pencil drawing was scanned into Photoshop and the color was added. Colors were selected from digital photographs provided by the authors. The choice of the background color was selected to highlight the important character of the white hairs on the inflorescence, disk flowers, and achene."



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