



*Dogwood
Apr 20, 1919.
Rock Creek Park*

Department of Botany & the U.S. National Herbarium

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That time when we all stayed home The critical need for herbaria and continued plant collecting

By Julia Beros

Herbaria are not static institutions. They are not dust boxes growing stale or overgrown libraries of dead plants. Yet there is a stigma that knowledge of local flora has reached its capacity, taxonomy is “old school”, and resources should not be allocated to grow herbarium collections. “A collection” implies perhaps a finite assemblage of representatives of a flora, a catalogue of greatest hits, and a singularly definitive portrait of a biological moment in time. A biological collection though is more principally representative of change. Collections serve as a record of biodiversity with supreme detail that informs all other aspects of plant research: systematics and floristics, evolution and ecology, conservation and land management, and education. Though beyond this, collections record the activity of scientists and research institutions, and places this scientific effort into an historical context. It is likely that the current coronavirus pandemic will leave a great void in the biological records of herbaria as it alters the capability, resources, and focus of plant collecting as the pandemic continues to limit and alter the ways in which we may safely interact with our world. Currently, a piece of our landscape’s

history is at risk of being erased, or more so never being recorded.

It has been noted (for some time now) that plant collecting was already on the decline before the COVID-19 pandemic stalled many research trips. According to Prather et al. 2004 (*Syst. Bot.* 29:15-28), the general trend for plant collecting has been on decline since the 1960s (taken from a diversely sampled 71 herbaria). Discussed by Daru et al. 2017 (*New Phytol.* 217: 939-955), (and referencing many other discussions of the great decline in plant collecting) the ramifications of this trend are amplified by the widespread biases in

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Pandemic

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herbarium collections. These biases include the influence of “mega-collectors” whose preferences shaped the content of collections beyond their own time at an institution. Other biases are temporal, geographic, and spatial, all limiting and skewing collections representation.

Presently the general focus for many institutions is largely in the Neotropics, as it is still understudied in comparison with many temperate floras, often shifting resources away from local floristic studies. With strong efforts being made to study and research the tropical flora, particularly in the Amazon, there is also a growing concern for repatriating and protecting the biological property of countries in these intensely studied regions (to mitigate the effects of scientific and economic exploitation as has been a recurring theme in history). However, there is continual evidence that temperate floras are not “complete” as new species are still being described, ecologies change rapidly with urban growth, destruction, and climate change (often altering plant distributions and population sizes), and species extinctions are not being fully documented.

There is another urgent danger: outlined in a letter to Congress from the American Alliance of Museums, it is estimated that nearly a third of museums are in jeopardy of permanently closing because of the conditions of the pandemic, and this includes herbaria. In addition, Funk and Morin 2000 (*SIDA* 18:35-52) note that herbaria in the southeastern U.S. are at a high risk of closing, making the floristic study of those regions an urgent endeavor. Despite facing the continued everyday challenges of low resources and staffing, and the urgent concern for the future of small herbaria, herbarium collections still provide incredible raw data for researchers and inform new scientific findings regularly.

2020 has shaped an incredibly unique scenario marked by viral and societal factors whose clash are catalyzing great change. Simi-

lar periods in history show a pause in collecting at the U.S. National Herbarium. In 1918 during the flu pandemic, accessioned collections dropped nearly in half from the previous year. Despite the challenges during the 1918 pandemic, local teen botanical enthusiast, Helen Barron, collected, pressed, and mounted plants, creating a personal herbarium that reflects the flora of Washington D.C. during that time (see page 4). Leaving behind a catalogue of books filled with tenderly pressed and methodically labeled specimens, Barron’s recreational botany has offered the unique perspective of plant collecting in a pandemic.

While amateurs and enthusiasts often prove to be critical support for filling in collection gaps, the international exchange of collections among institutions ensures a safeguard in protecting collections and completing the historical record. Museum Specialist **Erika Gardner** recounts a time at her previous institution, in which Mare Nazaire, California Botanic Garden curator, uncovered a large stack of specimens from Berlin predating World War II. Many

of these collections were thought to be lost in the war, but through the collaboration of the two institutions these specimens were returned to Berlin and helped rebuild their lost collections. As unexpected circumstances arise it proves crucial to have a collaborative network among herbaria to support our global efforts in documenting and researching biodiversity. As we have just heard news of another fire devastating natural history collections in Brazil (the Federal University of Minas Gerais’ Natural History Museum and Botanical Garden in Belo Horizonte), we should be reminded of the importance of supporting our international community.

Due to the current pandemic, Smithsonian researchers have canceled collecting trips leaving them in a bit of flux as they figure out how to carry on with their research. **Benjamin Crain** canceled trips to Palau this year marking the longest collecting gap in an ongoing survey of the flora of the islands. **Rob Soreng** has postponed trips to Nepal at least until 2021, delaying his research on the genus *Poa* as part of the Flora of Nepal. **John Kress** has



Through the collaborative work and careful planning of NMNH and the Department of Botany, botany contractors Victor Shields and Julia Beros have returned to the museum to turn the lights back on in the conveyor room. Picking up right where they left off, they continue to image the Poaceae. (photo by V. Shields)

By the numbers

The staff of the Department of Botany is making a strong push to make the U.S. National Herbarium's collection of over 5 million specimens available online. The Botany Specimen Catalog is available at <https://collections.nmnh.si.edu/search/botany/?ti=2>.

During the current pandemic with staff sequestered in their homes, work continues to accomplish the goals of a fully accessible catalog of specimens. Notable numbers and figures below.

13

The number of collections and information technology staff and contractors from the Botany Department dedicated to cleaning up catalog records.

560,000

The number of EMu specimen records corrected and amended during the first three months of the pandemic

260,000

The number of new specimen images added to museum's database since March 2020.

4,000

The approximate daily average number of public queries to the Botany Specimen Catalog during the spring months of 2020.

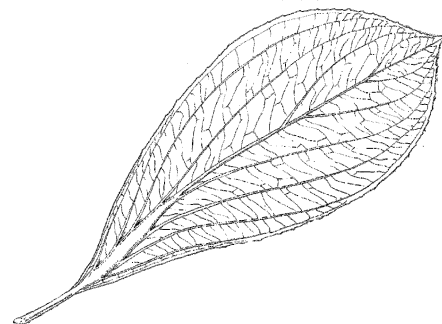
cancelled field work in the Caribbean and the western coast of the U.S. Despite their typical dependence on field work, Smithsonian's ForestGEO has seen some positive impact in local capacity building at one of their sites in Papua New Guinea (see page

5). ForestGEO is seeing the efforts of a strengthened scientific capacity of in-country partners paying off, as lack of international travel is allowing more opportunity for on-site personnel to develop the skills of their field crew. Smithsonian botanists continue to write up new species from the existing herbarium collections (see back page). Dynamic bryology duo **Karen Golinski** and **Harold Robinson** continue to describe new species uncovered in a backlog of mosses, even as they now collaborate from across the continent.

While travel is stunted, many are focusing on the existing collections and data cleanup. Amateur collectors have a great opportunity to contribute knowledge and data of local floras as well. Perhaps through encouraging more citizen scientist opportunities like the iNaturalist challenges in the spring, efforts of local botanical enthusiasts can help to fill floristic data gaps. While many are still waiting for a safe return to collecting, I and fellow botany contractor Victor Shields have returned (at a distance and fully masked) to the National Museum of Natural History in Phase 1 reopening to restart the conveyor belt and continue to image the herbarium collections. Through this restart more work will be created to support and continue the role of other contractors and staff, and more of the collections will be made accessible to the public.

Many are already noticing shifts in the wildlife around our homes, a new vibrancy, and it will be exciting when we start collecting again to see how the ecology has shifted. Perhaps we will see more unbiased randomized collecting, more wholly representative of the local flora in 2020. With our lives limited to our local spheres, this has the potential to benefit the basic infrastructure of our institutions: reinvigorating interest in collecting and researching local flora, and strengthening herbarium collections. When we look back on the collections from this time, as well as the possible lack of records, what will we be able to glean about our relationship to nature through this pandemic? How will we decipher our reactions to the crises that we are facing, and what impact will they leave in our biological record? This could be a great time to reimagine traditional models of plant collecting and the priorities and primary uses of herbaria. While

the hazy yet inevitable consequences of this challenging time will test the strength of the botanical community, it also presents a perfect opportunity to holistically reevaluate our needs and priorities, create room for more robust and evolving collections, and plan for ways to protect the future of our historic specimens. Our history, after all, informs our present.



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On the cover: A dogwood specimen collected in Rock Creek Park on April 20, 1919. From Helen Barron's herbarium book, *Spring Flowers 1919*. (photo by Sue Lutz)

A DC teenager's 1917-1919 herbarium

By Erika Gardner

Helen Barron was 13 years old in 1917 when she started pressing and preserving plants creating her personal herbarium. As the Spanish Flu was sweeping through her hometown of Washington, D.C., Barron found solace in Rock Creek Park and surrounding areas of the district by collecting plant specimens. Barron continued collecting plants in the Washington, D.C. region until 1919. Nearly a century later, in 2013, Mary Clagett Horm, Barron's daughter, donated Barron's two herbarium books, *Spring Flowers 1917-1918* and *Spring Flowers 1919*, to the US National Herbarium. Upon accepting these collections, we were unaware of their historical significance. Little did we know, in about seven years, all of our lives would be put on hold and we too would be living during a global pandemic.

These books were placed on a shelf in the specimen preparation room along with other pressed plant books. Very seldom would we handle these books unless we were showcasing them for a tour. Sitting in my home office, I could not help but think about which specimens in the US herbarium were made during the 1918 Spanish Flu pandemic. In an instant, the images of Barron's books came to mind. I could see the hand drawn dogwood on the periwinkle-colored cover and the date 1919 written in black ink. I asked **Sue Lutz**, the Collection Manager, to gain access to these books and take a few photos to share. The plants are beautifully pressed and presented on each page. It is extraordinary to imagine a teenager collecting and pressing these specimens during a time when her world was also turned up-side down.

Bound within Barron's 1917-1919 herbarium books are countless untold stories about a teenager living in quarantine. Unfortunately, we will never know her stories as she passed away before her daughter donated these books, but we can paint a picture from looking at her specimens.

A lot has changed in a century. Yet, we are experiencing something very similar to Barron's time in quarantine. People are noticing nature in their backyards and surrounding neighborhoods. From plants to birds, there has been a surge of interest in nature under our noses and under our



Top: Helen Barron's herbarium book, *Spring Flowers-1919*. A hand drawn dogwood graces the cover. **Bottom:** A look inside. A mayapple specimen collected in Rock Creek Park on May 10, 1918, from Helen Barron's herbarium book, *Spring Flowers 1917-1918*. (photos by Sue Lutz)

toes. At the National Museum of Natural History, Smithsonian scientists are offering more live online programming to a wider audience. Botany was given a spotlight during the spring to connect with the public via various forms of social media. Barron found a connection to nature by collecting plants and documenting the name and date on each page in her her-

barium. It is a simple approach to learn the flora and a great way to document the passing of time.

We will continue to care for her books, and her legacy will live on in our collection: a teenager living during a global pandemic, immersing herself in nature, and leaving a record for us to reflect upon.

ForestGEO network adapts in response to COVID-induced changes

On March 11, the World Health Organization declared the COVID-19 (coronavirus) outbreak a global pandemic. Since then, daily life around the world has drastically changed, and physical distancing, face masks, and a surge in teleworking have become a way of life for many. Fieldwork at Forest Global Earth Observatory (ForestGEO) sites around the world has been severely impacted, with many unique long-term monitoring projects on hold. Decades-long studies of flowering and fruiting patterns of trees, foraging behavior of primates, dynamics of insect populations, and the 40-year census of the Barro Colorado Island (BCI) plot are now stopped. These interruptions are going to have lasting effects on our ability to understand how the world's forests are responding as climate changes. Alongside the disappointment and uncertainty that COVID-19 has introduced, a spirit of flexibility, a willingness to adapt and rise to the occasion wherever possible, has also emerged. Below, ForestGEO staff share how members within the ForestGEO network have found opportunities amid the disruption.

Although physical distancing precludes field crews from embarking upon Wanang's third census, colleagues at ForestGEO's partner institution, the New Guinea Bintang Research Center, have been able to continue with research throughout the coronavirus pandemic. Vojtech Novotny, a principal investigator (PI) of the Wanang

plot in Papua New Guinea, frames travel restrictions and their fallout on scientific research "as a test on the rhetoric of 'capacity building' within tropical countries," noting that "if a sudden interruption of international travel causes tropical research to stop, then it is a sign that the capacity building has not been really robust."

One of ForestGEO's main goals is to strengthen scientific capacity among in-country partners at every level, from field crew members to postdocs to PIs. Rolando Pérez started at Barro Colorado Island (BCI) as a field technician in 1986, by 1995 he was supervising censuses, and since 2018 he's been a PI of the plot. He and his crew set out to begin BCI's ninth census this past January, but by March they needed to halt their efforts in order to stay safe and abide by public health mandates. Although unplanned, Pérez now has time to harness his 30 years of knowledge into concrete training tools. He has created a series of written lessons, complete with photographs, to introduce the concepts of archiving plants in an herbarium, identifying important field characteristics of trees, and grouping plants into families and species based on those characteristics. He hopes to use these tools with his field crew and to make them accessible online for anyone with an interest in BCI's flora. Pérez suggests that "the new generation of scientists from the ForestGEO network should not only learn how to analyze data, they should also be able to recognize, at

least, the most common species that appear in the plots and about which they are writing." The shelter-in-place orders have created an unexpected window of opportunity for Pérez to strengthen capacity in BCI for this underappreciated set of skills.

Luisa Gómez, a master's student at Universidad Nacional de Colombia, Sede Medellín in Colombia, is leading the third census for

Amacayacu's 25-ha plot. Between July 2019 and March 2020 Luisa and her crew were able to census 18 ha of the plot, but then needed to pause the census in light of public health measures. Gómez said that in the interim, "we have significantly advanced in cleaning and formatting the third census dataset and in identifying trees with taxonomic problems." She notes that identification work has been done in partnership "with other institutions and researchers associated with the plot, particularly, the botanical crew in the SINCHI Institute." Although data collection is not currently possible, the opportunity to prepare data for future analyses and to collaborate with partner organizations is being strengthened.

Bailey McNichol, a doctoral student at the University of Nebraska-Lincoln, has played a crucial role in the inaugural censuses of both the Niobrara and Indian Cave plots. The former was completed in July 2019, and the latter was scheduled to finish in the spring 2020 field season. Sabrina Russo, PI of both plots, said that McNichol "has plenty of research that she can do with the data we have right now, but her research progress for her degree would be faster if she could continue data collection, and especially if we could finish the Indian Cave plot in summer 2020." Because she is presently unable to collect new data, McNichol is pivoting from censusing Indian Cave to starting the analysis for the introductory plot paper for Niobrara – an endeavor that will give her first-author experience.

Greg Gilbert, PI of the Santa Cruz plot, remains committed to maintaining student employment and involvement in research despite the current lockdown. He said, "All the work done for tree censuses and phenology monitoring is done by University of California Santa Cruz undergraduates – some as paid crew leaders and others as for-credit interns gaining experience in field ecology. We have had to suspend all data collection at the Santa Cruz plot for the coming months. For our paid crew leaders, we are actively finding online tasks in support of research that they can do. Those students rely on their jobs to be able to attend college; we are dedicated to ensuring they continue to be paid."



Cliffson Idigel and Joseph Kua, field crew members at the Wanang 50-ha plot (photo from Wanang's first census). (photo by George Weiblen)

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Many students in forest science depend on short-term opportunities to earn income and gain field experience. Travel restrictions and physical distancing measures have restricted opportunities to learn together in-person. Bianca Gonzalez had expected to move from New Mexico to Virginia to begin her internship at the Smithsonian Conservation Biology Institute in May. Instead, she will begin her internship remotely, an approach facilitated by online collaborative tools like GitHub. Gonzalez's internship, involving analysis of tree cores from ForestGEO sites to explore the climate sensitivity of tree growth, can be done remotely. While the in-person advantage of the internship is gone, ForestGEO staff scientist and Bianca's internship advisor, Kristina Anderson-Teixeira, notes that "we're trying to replace some of the more casual communications among team members with instant messaging and collaboration apps (Slack and Microsoft Teams). I'm hoping that it can maintain some of the informal 'chat' that would occur if we were all together, and where everyone can feel comfortable asking others in the lab for help."

Suzanne Ou, a 2019 ForestGEO Research Grant recipient and doctoral student of Kabir Peay at Stanford University, also embraced the digital landscape to connect people to her research by creating a virtual field trip to ForestGEO's Lambir

plot in Malaysia by creating a fantastic Twitter thread, complete with beautiful photographs and conversational, informative narrative.

Last year Ou participated in ForestGEO's Annual Analytical Workshop in Singapore. Due to travel restrictions and the need for physical distancing, ForestGEO will be unable to offer its annual workshop in 2020. For Caly McCarthy, one of ForestGEO's administrative assistants, this means that her spring schedule, typically filled with orchestrating travel for over 30 international participants of the workshop, has a new vacancy. She identifies this found time as an opportunity for professional development and has been learning the nuances of ArcGIS Online to create customized maps of the ForestGEO network. She explains that she's also taught herself some basic HTML tags and is using them to maintain functionality of hyperlinks, margins, line breaks, and other formatting options on the ForestGEO website. She said, "It's been surprisingly satisfying to learn these new skills."

The pandemic has caused lots of uncertainty. ForestGEO staff is unsure how they will recover from gaps in data collection and what the implications will be for future training and research activities. What they do know is that the ForestGEO network is resilient and adaptable, and they are proud of the ways that members of the ForestGEO community are adjusting their work during this unprecedented time.

The importance of genomics in preventing pandemics

The coronavirus disease 2019 (COVID-19) pandemic has had a major impact on human health and the global economy this year. To address future pandemics, scientists from the Smithsonian's National Museum of Natural History (NMNH), University of California at Davis (UCD), and University of Guelph (UG) recently wrote an opinion piece about the importance of genomics in facilitating preemptive strikes and developing rapid responses to global outbreaks to come. The commentary appears in the June 23, 2020 issue of the *Proceedings of the National Academy of Sciences* (117: 13852-13855). In the article, authors **W. John Kress** (NMNH), Jonna Mazet (UCD), and Paul Hebert (UG) argue for the establishment of a global, genomic-based biosurveillance platform to detect pathogens that pose a threat to humans and other species. Such a "pandemic interception system," they explain, would be of immense value to saving lives as well as global biosecurity, biodefense, and the world's economy.

The authors discuss in detail how three major global research programs are ready to lead the way in supporting this platform: BIOSCAN (directed by Hebert), the Earth BioGenome Project (EBP; co-chaired by Kress), and the Global Virome Project (GVP; lead by Mazet). These global programs, which are currently developing approaches in comparative genomics, aim to be able to detect all pathogens hosted by birds and mammals that can be transferred to humans. But beyond protecting our own species, the authors stress that protecting other species is just as important in maintaining a healthy planet. Viruses and fungal pathogens have caused similar pandemics in cattle, amphibians, bats, honeybees, and many species of trees.

By understanding the causes and processes behind pathogen transfers, a biosurveillance platform can work proactively to prevent future infections. Kress, Mazet, and Hebert write, "now is the time to use the full power of science through cooperative efforts among initiatives such as BIOSCAN, GVP, and EBP to advance our understanding of the complex web of interactions that span the domains of life."



The Barro Colorado Island field crew as they embark upon their 2020 census. Standing, from left to right: Salomón Aguilar, Maikol Guevara, Richard Martínez, Guillermo Aguilar, Victor Rojas, Luis Aguilar, Anayansi Cerezo, Rolando Pérez, Luis Cedeño, Luis Navarro; kneeling: Biancolini Castro, Luis Martínez. (photo courtesy of ForestGEO)

Children are learning how to press plants at home

During the current COVID-19 pandemic, teachers and parents have been looking for creative ways for their children to connect with nature and learn about science. Museum Specialist **Erika Gardner** and members of the Office of Education & Outreach at the National Museum of Natural History (NMNH) have recently produced a set of videos, articles, and webinars to teach, inspire, and guide children and adults on the joy and creative process of pressing plants. These activities allow individuals to connect with, learn about, and document the plants growing in their own yards.

The team made a video on how to build your own plant press, which was uploaded to NMNH's Twitter, Facebook, Instagram, and YouTube accounts. Smithsonian Voices also published an article, "How to Press Plants from Your Backyard," which was uploaded to the Smithsonian Magazine webpage: <https://www.smithsonian-mag.com/blogs/national-museum-of-natural-history/2020/05/22/how-press-plants-your-backyard/>. The step-by-step instructions include a list of materials and the processes of assembling a press, drying the plants, and removing the pressed plants. The activity is designed for both younger and older children, and adults can get in on the fun as well.

Once the plants are dried and pressed, creative activities come into play. In a June 13 video webinar for families, Gardner showed families how to use pressed plants for art projects like greeting cards and bookmarks, and she shared best practices for keeping one's own pressed plant collections.

A kindergarten teacher from the Lang-



Artwork as the result of a distance learning experience for kindergartners from the Langley School in McLean, Virginia. The children learned how to build their own plant presses and then created beautiful art from the plants they found in their own yards.

ley School in McLean, Virginia, recently made use of the videos to engage her students in a natural history activity as a distance-learning lesson. The teacher was looking for an activity to allow her students to "feel official and important" while asking her students to help document their backyard natural history. The teacher sent Gardner a few photos of her students' work by way of expressing their thanks for making the lesson "so memorable and special" for them (see images below). The teacher writes, "we had so much fun and created beautiful art from the plants we



found in our yards. We didn't know it could be so easy!" These science skill-building activities are ways to help children explore the natural world.



Several families sent photos of their homemade plant presses to the museum's Department of Education & Outreach.

Meetings and festivals go virtual in 2020

The Earth Optimism Digital Summit

The Earth Optimism Summit, hosted by the Smithsonian Institution, was originally scheduled to take place in Washington, DC, with concurrent sister events around the world, on April 22-26, 2020, to coincide with the 50th anniversary of Earth Day. In re-

sponse to the coronavirus global pandemic, the Summit was moved to a digital event on those days, and it successfully showcased

stories of both small and large-scale actions, framing the conversation and demonstrating that success is possible.

The Earth Optimism Digital Summit launched with a film night on Earth Day, April 22, and then continued April 23 and 24. A live broadcast with formal programming online on Facebook Live, Twitter, YouTube and on the Earth Optimism website attracted viewers from around the world, and the digital summit was re-broadcasted through that weekend. More than 100 global leaders shared successful conservation and sustainability strategies being deployed worldwide, and discussed how to scale and mainstream these strategies to achieve transformative change.

Topics ranged from climate to food to finance to oceans and environmental and climate justice; and featured young activists, boots-on-the-ground conservationists, artists and filmmakers, scientists, journalists, political and business leaders.

Started in 2017 through a partnership between the Smithsonian Institution and the Cambridge Conservation Initiative, the Earth Optimism movement emerged from two key realizations: 1) that fear without hope leads to apathy rather than action, and 2) that conservation successes are widespread yet not widely appreciated.

Earth Optimism aims to fundamentally shift how we reframe the narrative about our planet – from doom and gloom to optimism and opportunity.

Among the nearly 50 live sessions were scientists and educators from the National Museum of Natural History (NMNH). Each morning began with Deep Dives for close looks at contemporary issues and included workshops, panel discussions, and

questions from the live audience. Danielle Duran (Office of the Deputy Director) served as a panelist and moderated the

workshop, “Decoding policy and regulation: How to make a difference in the electricity industry.” **Gary Krupnick** (Department of Botany) served as a panelist and hosted the session, “Collaborating to solve a crisis: The story of the North American Pollinator Protection Campaign (NAPPC).” Nick Pyenson (Department of Paleobiology) convened the panel discussion, “What is science diplomacy and why is it essential in the 21st century?” During the main session, NMNH Advisory Board Member Katharine Hayhoe joined NMNH Director Kirk Johnson for the discussion, “Communicating About Climate”, and Hayhoe was a speaker in the presentation, “Climate Change Solutions.” Sabrina Sholts (Department of Anthropology) was a speaker in the very timely discussion, “Fighting Pandemics.”

Most presentations were uploaded to YouTube and can be viewed at <https://earthoptimism.si.edu/calendar/2020-dc-summit/>.

SPNHC & ICOM NATHIST

By C.L. Kelloff, M. Toner, and L. Palmer

The COVID-19 pandemic has made us rethink how we do business. Many of us are working at home and balancing family

needs with work projects. Activities such as concerts, conferences, and all events where people congregate are cancelled or postponed. The joint meeting with the Society for the Preservation of Natural History Collections (SPNHC) and International Committee for Museums and Collections of Natural History of the International Council of Museums (ICOM NATHIST) was scheduled to be held in Edinburgh, Scotland in 2020. Instead of cancelling, a group of committed SPNHC members including Liath Appleton, Andrew Bentley, Emily Braker, Mariana Di Giacomo, Phaedra Fang, Elspeth Haston, Shelley James, Talia Karim, Amanda Lawrence, Paul Mayer, Cindy Opitz, Rebecca Newberry, Deborah Paul, Christel Schollaardt, Barbara Thiers, Debra Trock, Dorit Wolenitz, and Breda Zimkus created a meeting that took place in the digital world. Special thanks to all.

SPNHC and ICOM NATHIST hosted the virtual meeting on 8-12 June 2020 using the Zoom video conferencing platform. The conference was free to members and offered online events to foster conversations across the joint worldwide communities, included a plenary session, symposia, presentations as well as 5-minute specimen spotlights. Total attendance was just under 2,000 participants. Business and committee meetings for the two societies were held via Zoom, allowing members to attend and participate from across the world. Zoom allows for participants to chat with one another during the conference and this allowed for lively real time discussions. With two time-blocks established for the sessions to ensure that the meeting was as globally inclusive as possible, it was deemed a success with the average number of attendees per session well over 200.

The SPNHC symposium, “Envisioning Collections Management for the Evolving Biodiversity Data Lifecycle,” originally scheduled for June 10, was postponed by the symposium organizers out of respect for colleagues who were participating in [#strike4blacklives](#), [#shutDownSTEM](#), [#shutDownAcademia](#), and other associated events occurring on the same day. The symposium was rescheduled and held on June 23. The session included talks on the different aspects of the biodiversity data





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lifecycle (e.g., collection, digitization, mobilization, management, publication). **Sylvia Orli** (Smithsonian's Department of Botany) gave a presentation on the effect of digitization (particularly during the Covid-19 restrictions) on the work practices of collection managers.

For those interested in the SPNHC and ICOM NATHIST meeting, the sessions have been recorded and can be watched via the SPNHC YouTube Channel at <https://www.youtube.com/channel/UClqmXpv8eKDjNc6FsdYtajg>.

The Smithsonian Folklife Festival

Since 1967, the Smithsonian Folklife Festival has celebrated the power of culture, creativity, and community on the National Mall in Washington, D.C. Although this year's plans were upended by the coronavirus global pandemic, the Smithsonian remains committed to making space for sharing ideas, food, and music.

The Folklife Festival went "Beyond the Mall" this year with digital programming on June 24 through July 5. Artisans and experts from the United Arab Emirates, Northeast Brazil, the U.S. Department of Energy Solar Decathlon, and the Smithsonian's Conservation Commons were featured. Many of these sessions explored how communities draw upon their cultural practices to address and adapt to environmental challenges, foster empathy, and create a more equitable world. Programs on June 24, July 2, and July 5 highlighted the work that the Festival has been doing in conjunction with the Earth Optimism initiative: <https://festival.si.edu/2020/>

earth-optimism. Archived versions of the programs are available for viewing at <https://festival.si.edu/schedule/archived-events>.

Digital programming began even before the two weeks of "Beyond the Mall." On May 14, one program featured the research project, American Ginseng: Local Knowledge, Global Roots. The program brought together three women involved in ginseng conservation and can be viewed at <https://youtu.be/p8h7evFzgCc>. As the participants reported, American ginseng faces many threats such as encroaching suburban sprawl, extraction industries, and the environmental impact of global warming. Conservation efforts—protection by government agencies, education on good stewardship, cultivation in forest settings, and research into accelerating its propagation—help ensure American ginseng for future generations.

The blog, "Asian and American Ginseng: A Plant's Migration Around the World," written by project intern Shirly Chang, discusses how the research group headed by **Jun Wen** (Smithsonian's Department of Botany) is exploring the mysteries of the disjunction of Asian ginseng (*Panax ginseng*) and American ginseng (*Panax quinquefolius*). Asian ginseng naturally occurs along the border of China, Russia, and North Korea while American ginseng is found in the wild in the Appalachian Mountains of North America. Among Wen's conclusions is that the ancestor of American ginseng dispersed from Asia approximately 14.65 Ma (million years before present) across the Bering Bridge. Wen's research continues as she dives deeper into the evolutionary story of ginseng.

Other articles, videos, and activities centered around American ginseng can be found on the Festival's blog at <https://festival.si.edu/blog/2020-folklife-festival/american-ginseng>. The project team is currently working on a web site with profiles of ginseng experts and a space for people to post their own experience with the plant. It is hoped that if the Smithsonian Folklife Festival is able to be presented in person on the Mall next summer, visitors will be able to learn even more about American ginseng through demonstrations, discussions, and hands-on activities directly from those with years of traditional knowledge about the many wonders of American ginseng.



American ginseng (*Panax quinquefolius*) served as a focal point during one of the projects presented during the Smithsonian Folklife Festival. (photo by R.A. Howard)

Friedrich Vierhapper and the serendipity of Facebook

By Sylvia Orli

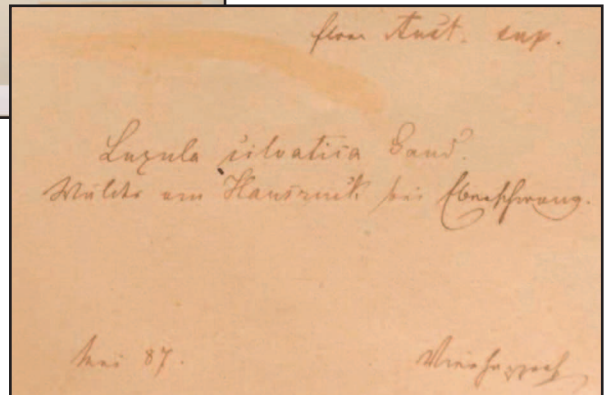
For several years, the Department of Botany's Information Technology team has been reviewing transcriptions of specimen labels returned from the digitization company Picturae and fixing the records that are incorrectly transcribed. Many specimen labels have terrible handwriting. One kind of label consistently puzzled the team. The label is slightly pinkish with a legible taxonomic name, but every other word is written in an unreadable script. Because the team could not read these labels, we imported these records on to the online catalog as "illegible" with the hopes of one day correcting the record.

I posted examples of these labels in the Facebook page "Herbarium Junkies" with the hopes that crowdsourcing might solve the problem. Herbarium Junkies was created in 2012 by Museum Specialist **Erika Gardner** when she was in graduate school. She made the page as a bit of a joke, dedicated to herbarium devotees like herself, to post funny and interesting items about herbaria. The Facebook group has since ballooned to over 2,000 members, and has a global membership of botanists, herbaria workers, and plant enthusiasts. Group members post confusing labels, interesting herbarium specimens, images of field work, and all sorts of topics related to herbaria.

My illegible label post caught the eye of Clemens Pachschnoll, doctoral student at the University of Vienna, who verified that the label was written in the Kurrentschrift script, a Germanic cursive script popular in pre-WW2 Germany. He also verified that the collector was Friedrich Vierhapper Sr. Vierhapper (1844-1903) and his son, Friedrich Karl Max Vierhapper (1876-1932), were prominent Austrian botanists of the 19th and early 20th centuries. The Vierhappers specialized in the Flora of Austria and other European countries. Vierhapper Jr. has the genus, *Vierhapperia*, named after him. Clemens put me in touch with Michael Hohla of Austria, who specializes in the Flora of the Innviertel (the western part of Upper Austria). Amazingly, he and his colleagues had published a monograph of the Vierhappers, "Father and son Vierhapper – two lives dedicated to Botany" in 2019 (*Stapfia* 110: 1-202; https://www.zobodat.at/publikation_vol-



A specimen of *Luzula silvatica* Gandich collected in Austria, May 1887, by F. Vierhapper. Prof. Michael Hohla transcribed this location as "Wälder am Hausruck bei Eberschwang".

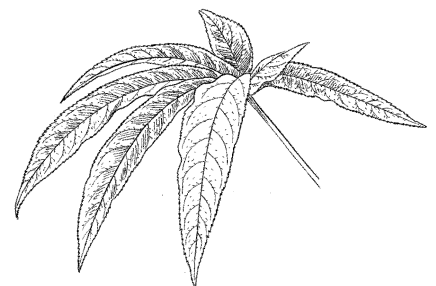


umes.php?id=61962), and Hohla was delighted to see these inscrutable labels.

I scoured the herbarium catalog for more of these herbarium specimen images to send to him for translation and transcription. He asked an important question – why does the US Herbarium have so many specimens from Vierhapper? Who might have sent them? Although specimen exchange was common between the USNH and Austria, these specimens appeared to come in a shipment. I checked the specimen catalog and indeed, all Vierhapper specimens came from the same sheet number sequences.

To date, the team has found more than 176 Vierhapper specimens, and will almost certainly find more as the digitization conveyor continues to chug through the collection. Being unable to return to the US

Herbarium because of Covid 19 restrictions, we cannot look in the herbarium ledgers to see who might have sent these Vierhapper specimens, but we will be very interested to investigate once we return. We welcome any insight on this herbarium exchange. Please send your comments to orlis@si.edu and be sure to join the Herbarium Junkies Facebook group.



Researchers split the birdcatcher trees (genus *Pisonia*) into three

-Adapted from Pensoft

The birdcatcher trees – genus *Pisonia* – are infamous for trapping birds with their super-sticky seed pods that would frequently entangle the body of the ‘victim’. Left flightless, the poor feathered creatures eventually die either from starvation or fatigue, or predators. Similarly notorious are the birdcatcher trees for botanists, who have been baffled by their complicated classification for the last three centuries.

Smithsonian Research Associate **Marcos A. Caraballo-Ortiz** and graduate student Elson Felipe Rossetto (Universidade Estadual de Londrina, Brazil) are working to untangle the classification of these trees. A recently published paper appears in the open-access scholarly journal *PhytoKeys* (152: 121-136; 2020).

The authors of the paper reestablished two genera: *Ceodes* and *Rockia*, where both had been previously merged under the name of *Pisonia*. Now, as a result, there are three distinct lineages of birdcatcher trees from the islands of the Pacific and Indian Oceans: *Ceodes*, *Pisonia*, and *Rockia* (Nyctaginaceae).

“Previous molecular studies on *Pisonia* species from around the world showed that species were clustered into three major groups, and here we assign names for each of them. With this new classification, a large number of the species known as *Pisonia* will be henceforth named *Ceodes*. This includes the Parapara (*Ceodes brunoniana*) and the birdlime (*Ceodes um-*



Ripe fruits (anthocarps) of the birdlime tree (*Ceodes umbellifera*). (photo by Ching-I Peng [deceased])

bellifera) trees, both native to many islands, including Hawaii and New Zealand. They are commonly planted in gardens for their lush and sometimes variegated foliage, as well as their fragrant white flowers. However, the cabbage tree (*Pisonia grandis*) will still be technically known as *Pisonia*,” adds the study’s lead author Felipe Rossetto.

Birdcatcher trees have generated much controversy in the popular media because of their seed pods (anthocarps) secreting a sticky substance that sticks to the feathers of seabirds or other animals for dispersal. Sometimes, though, too many seed pods can harm or kill birds, especially small ones, by weighing them down and rendering them flightless. This macabre practice

has led to many controversies and local campaigns aiming to remove the trees, even illegally.

Despite their forbidding reputation, birdcatcher trees have positive effects on ecosystems and are important components of vegetation, especially for small islands. Sadly, there are many endemic and already endangered species of birdcatcher trees that only exist on a few small islands where they are effectively placed at the mercy of local people.

Many species of birdcatcher trees are large and tolerate harsh environments like seafronts and rocky cliffs, making them prime nesting spots for seabirds. Birdcatcher trees are also ecologically curious and could be regarded as keystone species on small islands because their soft branches can sustain many types of invertebrates; their flowers are an important food source for bees and ants; their dense leaf litter nourishes the soil; and their roots have intimate interactions with native underground fungi (mycorrhiza).

Although most people relate birdcatcher trees with beaches and coastal habitats, there are species that are only found in mountains or rainforests. For example, the species now allocated to the genus *Rockia* is endemic to the Hawaiian archipelago. These are small trees able to grow in dry to mesic mountain forests. Using the new classification, future studies can explore in detail the hidden diversity of these enigmatic plants, and find out how trees with high dispersal capabilities evolve into species endemic to small island ecosystems.



Large cabbage trees (*Pisonia grandis*) dominate the landscape of a small island in the Pacific Ocean. (photo by Jean-Yves Meyer, Délégation à la Recherche de Polynésie Française, Tahiti, French Polynesia)

ForestGEO data key to the development and testing of the NGEE-Tropics' FATES model

A new paper in *Biogeosciences* (17: 3017-3044; 2020) is the first to describe FATES (Functionally Assembled Terrestrial Ecosystem Simulator), a new Vegetation Demographic Model that, when operated within Earth System Models, will improve predictions of the future structure and function of tropical forests, including whether tropical forests will serve as carbon sinks or sources over the next century. In this publication researchers tested the new FATES model against data from the ForestGEO 50-ha plot on Barro Colorado Island (BCI) in Panama. The BCI data set spans nearly 40 years and includes eight censuses of all trees greater than 1 cm diameter (DBH – diameter at breast height) providing an ideal testbed for the development of FATES.

A fully operational and tested version of FATES is the end goal of NGEE-Tropics (Next Generation Ecosystem Experiment - Tropics), a ten year, \$100 million project that aims to create a representative, process-rich tropical forest ecosystem model. NGEE-Tropics is supported by the U.S. Department of Energy with principal collaboration among five national labs, several federal agencies, and ForestGEO.

NGEE-Tropics collaborators have said that “[m]ost earlier Earth System Models treated tropical forests simply as layers of big leaves without resolving the size-structure, functional diversity, and competitive dynamics that exert large effects on ecosystem process responses to environmental change.” But tropical forests are not as simple as a uniform pile of leaves. They have incredibly high species diversity, and there’s virtually no species overlap between tropical forests of the Amazon, the Congo, and Southeast Asia. Complex feedback loops between forests and the atmosphere, which are being exacerbated by changing climatic conditions, further complicate modeling.

It’s critical that models be improved because tropical forests have a disproportionately large effect on Earth’s systems. Although tropical forests cover less than 7% of Earth’s surface, they contribute 34% of total terrestrial gross primary productivity, are responsible for 33% of land-atmosphere water exchange through



Eleven partner institutions lead the NGEE-Tropics project, with many more in supporting roles. (image from <https://ngee-tropics.lbl.gov/partners-collaborators>)

evapotranspiration, and hold about 50% of intact forests’ carbon. Tropical forests are currently the largest source of uncertainty in Earth System Models, to the point that modelers are unsure whether tropical forests will have a net positive or negative carbon balance over the next century.

Members of the modeling and empirical communities have come together to work on a model that diminishes these uncertainties and more thoroughly represents the dynamics of tropical forests. Such a model will be able to inform conservation priorities and policies surrounding land use as Earth’s climate continues to change. Advances in computing power have also been an important factor in facilitating the NGEE-Tropics project. The FATES model aims to represent vegetation dynamics at leaf, tree, community, and regional scales.

Members of the ForestGEO network are especially involved with tree-level representation. Because the network has research sites across all latitudes of tropical forest, ForestGEO is well positioned to provide ground data for improving and testing the FATES model. Beyond standardized census data, the ForestGEO net-

work also has complementary surveys (e.g., soils, plant functional traits) and infrastructure (e.g., canopy cranes in Panama) that facilitate more detailed representation of tropical forest complexity within Earth System Models.

ForestGEO is proud to contribute to this ambitious and important project, where prediction and protection of the future of tropical forests go hand in hand.



AWARDS



Alice Tangerini receives the Jill Smythies Award from the Linnean Society

Smithsonian botanical illustrator **Alice Tangerini** is the proud recipient of the Linnean Society's 2020 Jill Smythies Award. The award is given to a botanical artist for outstanding, diagnostically relevant published illustrations. The award is given to an artist "in recognition of excellence in published illustrations in aid of plant identification, with the emphasis on botanical accuracy and the accurate portrayal of diagnostic characteristics." The award was established in 1986 by the late Bertram 'Bill' Smythies in honor of his wife, the late Florence Mary 'Jill' Smythies, a botanical illustrator whose career as was cut short by an accident to her right hand. The Linnean Society is the world's oldest active biological society.

Tangerini has been the botanical illustrator of the Department of Botany at the Smithsonian's National Museum

of Natural History since 1972. She has illustrated over 1,000 plant species. Her illustrations are created using pen and ink or brush with ink, and more recently digital painting. To date, Tangerini remains the only permanent staff botanical illustrator ever hired by the Smithsonian.

Tangerini will be presented with the award by the president of the Linnean Society at their anniversary meeting in its rooms at Burlington House in London

where the Society resides. While the anniversary meeting is traditionally held on Linnaeus's birthday on 24 May, the date has been rescheduled to early December 2020 because of the ongoing coronavirus pandemic. Previous recipients of the Jill Smythies Award include Deborah Lambkin (2019), Niki Simpson and Juliet Williamson (2018), and Karin Douthit and David Williamson (2017).



The Linnean Society of London
@LinneanSociety

The Jill Smythies Award is given to a botanical artist for outstanding, diagnostically relevant, published illustrations. This year we give the Jill Smythies Award to Alice Tangerini from @NMNH.

11:02 AM · May 26, 2020 · Twitter Web App

In May, the Linnean Society of London announced via Twitter that Alice Tangerini is the recipient of the 2020 Jill Smythies Award. She will receive the award at a future meeting of the Society.



Jerome McDonald volunteering in the Fossil Lab – always with a smile. (photo by Abby Telfer)

IN MEMORIAM

By Erika Gardner

On May 7, 2020, the Department of Botany lost a dedicated and amazing plant mounting volunteer, **Jerome McDonald**. He started volunteering at the National Museum of Natural History in 2005. During his time at the museum, he served a variety of volunteer roles. He first started with mounting plant specimens for Botany under the training and supervision of Katherine Rankin. In 2008, he participated in the training program to prepare fossils in the fossil lab for the Department of Paleobiology. He was an integral part of the Thursday plant mounting group, along with his wife **Zelda McDonald**. In 2018, unrelenting health issues put his volunteering appointments on hold. Zelda also took time off from volunteering to assist Jerome with his medical needs.

During Jerome's time in Botany, he was always sharing intriguing and captivating stories. He was full of worldly knowledge and enjoyed traveling. He was also an avid cross-stitcher and a needle point enthusiast. His attention to fine details and meticulousness was evident in his needle work. It was always a treat when he would share his works of art with us. His artistic skills transpired in the specimen preparation realm. His plant specimen preparations always looked like works of art. Jerome also took to the finer things in life; he was a connoisseur of cocktails, food, and cigars. He had a fantastic sense of humor and was always armed with a fun joke or story to tell. We will miss his contributions of beautifully mounted specimens as well as his jovial laugh and kind spirit.

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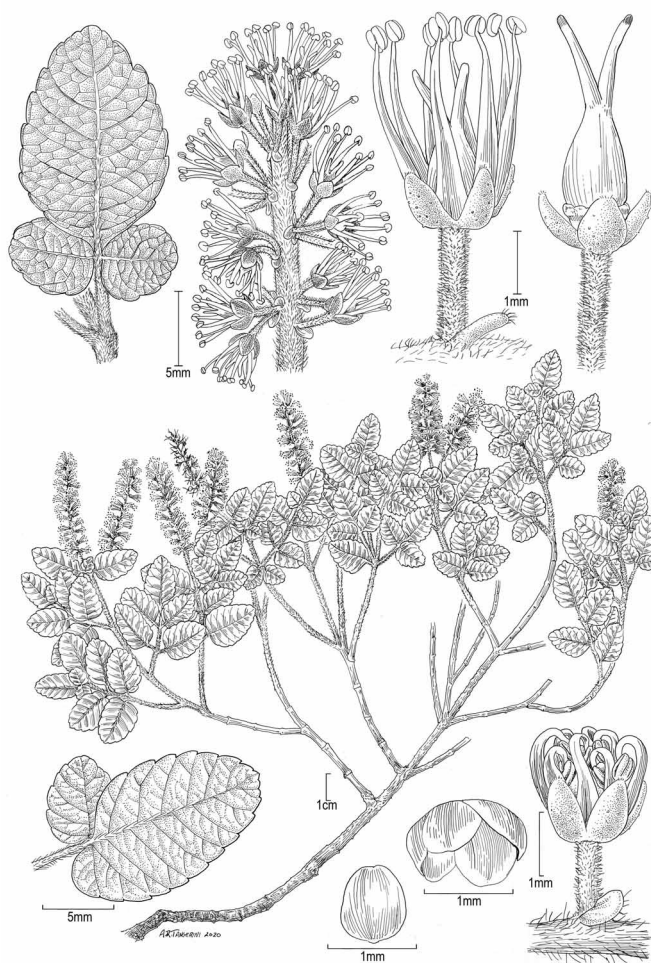
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ART BY ALICE TANGERINI

Weinmannia sp.

A new species of *Weinmannia* (Cunoniaceae) from Guaramacal was recognized recently by Santos Miguel Niño (PORT) and Laurence Dorr, who continue to work on the flora of this national park in Venezuela. They intend to coin its specific epithet from the name UNELLEZ of the Venezuelan university co-hosting their research. In February 2020, they asked Alice Tangerini to prepare an illustration for publication. She had finished the final pencil drawings by March 11 and had just started to ink a couple of the details when staff of the Smithsonian Institution were told to telework because of the COVID-19 pandemic. Taking the unfinished plate home, Tangerini was able to complete the inked version by mid-April using as a reference photocopies of the specimen that had to be left in the U.S. National Herbarium. Her workspace at home proved adequate for drawing in pen and ink as she had home supplies and fortuitously brought films and papers when Museum-based work was halted. Certain other modifications to her home workspace had to be made, such as controlling for the bright afternoon sunlight. *Weinmannia* was a genus Tangerini had not previously illustrated but she was able to refer to drawings in the Botanical Art Collection, which had been made by other artists when José Cuatrecasas described new species of the genus.



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