

## Plant and lichen discovery in the southern Philippines

By Manuela Dal Forno and Jun Wen

**O**n January 11, 2023, we started our journey to the Philippines, Manueala Dal Forno from Fort Worth Botanic Garden in Texas and Jun Wen from the National Museum of Natural History in Washington, DC. Little did we know then what adventures would wait for us in the Philippines. After traveling around 40 hours “door-to-door,” we arrived at our host institution, Central Mindanao University (CMU) in Maramag, Bukidnon Province on Mindanao Island.

This journey, “Expedition 4,” was the fourth of a larger botanical project which started in 2018. For this most recent expedition, we worked in the Philippines for a total of 29 days and visited two main locations: Mt. Balatukan, part of the Mount Balatukan Range Natural Park in Misamis Oriental Province, in northern Mindanao; and Dinagat Islands, where we visited multiple municipalities, including Loreto, Basilisa, San Jose, Libjo and Tubajon. Toward the end of the trip, we collected in two additional localities, Mt. Musuan and Mt. Nebo, in the Valencia Valley of Bukidnon Province relatively close to our base at CMU. We were very fortunate to have the help of our Filipino colleagues who worked on the logistical details, such as meal planning, lodging, and securing permits ahead of time with the local communities and authorities. We especially thank Academician Dr. Victor Amoroso, Dr. Fulgent Coritico, Dr. Florfe Acma and Ms. Joie Lagumbay at CMU for their hard

work on all the logistics for the expedition, and for the support from the local governments and communities.

Our trips were largely covered through two NSF-funded grants (DEB 1754697 and 1754667), namely, “Collaborative Research: Plant Discovery in the southern Philippines.” The main PI for this project is Peter Fritsch from the Fort Worth Botanic Garden (FWBG, more specifically BRIT, or Botanical Research Institute of Texas), with co-PIs Darin Penneys (University of North Carolina at Wilmington, WNC), Manuela Dal Forno (FWBG), and Dan Nickrent (Cornell University).

The trip had 31 participants including several colleagues

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**The expedition was a great international collaboration effort with a mission of collecting diverse specimens of plants and lichens, training next-generation biologists, communicating biodiversity science with local stakeholders, and facilitating collaborations.**



## Philippines expedition

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from different institutions. Participants from the Philippines included colleagues from Central Mindanao University (CMU), University of the Philippines-Manila (UP-M), Bukidnon State University, Mindanao State University (MSU), University of the Philippines-Los Baños (UP-LB), University of Southeastern Philippines, National Museum of the Philippines, and Department of Environment and Natural Resources. Participants from outside of the Philippines included colleagues from California Academy of Sciences, Missouri Botanical Garden, Botanischer Garten, Freie Universität Berlin (BGBM), University of California Botanical Garden, and Smithsonian's National Museum of Natural History (US). In addition to this core group of participants, for each location we visited, we also worked with 10–20 locals from that specific *barangay* (native name equivalent to village, or the smallest political unit).



**Group photo during the first field day at Mt. Balatukan (Gingoog City, Barangay Kalagonoy, Mount Balatukan Range Natural Park) on January 18, 2023. (self-timed photo)**



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**On the cover: Lichens covering a wooden house in Mt. Balatukan, Phillipines. (photo by Manuela Dal Forno)**

The Philippine archipelago is mainly volcanic and includes over 7,000 islands, with the typical vegetation being tropical rain forest. With that said, it rained almost every day in the field in this biome, so rain jackets, ponchos, rain pants, umbrellas, and rubber boots were indispensable to keep ourselves a bit dry. We also visited Lake Bababu in Basilisa, Dinagat Island, which had a beautiful forest on limestone karst or ultramafic substrates. As per the focus of the NSF grant, we concentrated only on the southern part of the Philippines, that is the Visayas and Mindanao.

Our field team was composed of small focus groups: two seed plant groups, two lichen groups, two pteridophytes groups, and two bryophytes groups to ensure efficiency and best coverage of collections in each locality we visited. The activities of the lichen and seed plants teams will be emphasized here in this article. Overall, the expedition was a great international collaboration effort with a mission of collecting diverse specimens of plants and lichens, training the next-generation of biologists, connecting and communicating biodiversity science with local stakeholders, conveying the importance of conserving plant resources, and facilitating collaborations.

The seed plants groups included Peter

Fritsch and Tiana Rehman (FWBG), Darin Penneys (WNC), Jun Wen (US), Vanessa Handley (Montgomery Botanical Center), Florfe Acma (CMU), Melanie Guiang (CMU), Noel Lagunday (CMU), Noe Mendez (CMU), Niko Briones (CMU), Samson Salba (CMU), Aldrin Hongko (CMU), Jeffrey Mancera (UP-M) and Jennifer Opiso (CMU). Over 700 collection numbers were made, each mostly with 3–8 duplicates, at least two sets of silica-gel preserved samples for DNA-based phylogenetic and phylogenomic studies, as well as photos documented for each collection. The collections included all plant taxa we encountered that had flowers, fruits, or seeds. These collections will be extremely valuable for systematic, floristic, and other biodiversity research, especially for studying the biodiversity assembly of the Philippine archipelago. Our collections also included specimens of a number of species new to science.

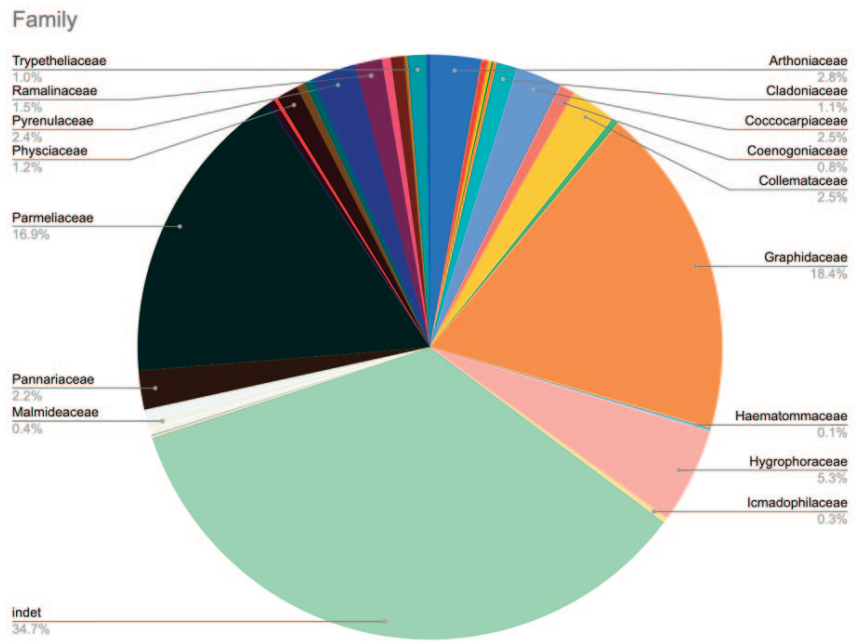
The lichen team started small in the very first expedition but has been growing strong! Besides Manuela Dal Forno (FWBG), the former and current Lichen Team members of this project are Alice Gerlach (FWBG), Aurfeli D. Nietes (UP-LB), Bibiana Moncada (BGBM), Eralene C. Taer (CMU), Franchesca C. Vega (MSU), Ivy Adlaon (CMU), Jayson Pucot



(DSSC), Jovi Nobleza (CMU), Qweenie P. Abaya (CMU), Rasel Lacandula (CMU), and Yvonne Love Cariño (CMU). For Expedition 4, our team was composed of five team members for the main locations (Moncada, Cariño, Lacandula, Taer and Dal Forno), with three additional students participating in the local nearby day trips (Vega, Abaya, and Adlaon).

About 2800 lichen vouchers were collected during this expedition, with the family distribution shown in the graph on the right. The most representative families amongst our samples are Graphidaceae and Parmeliaceae, unsurprisingly, since these are the two most species-rich families of lichen-forming fungi. We also have a large amount of sampling from lobaroid Peltigeraceae, e.g., *Sticta*, *Pseudocyphellaria*, and *Podostictina* (not included in the graph). For a large portion of the collections (34.7%), we were not able to confidently assign a family in the field (indet in the graph). We look forward to working with these samples in our labs, especially the more challenging groups.

While at Mt. Balatukan, in the Scout Camp campsite where we camped, the Lichen Team enjoyed collecting from a wooden house covered in lichens. Many of



The families of the lichens collected during Expedition 4. (figure by Manuela Dal Forno)

these lichens belong to *Usnea* (Parmeliaceae) but also *Lecanora* (Lecanoraceae) and Arthoniaceae. All specimens were left out to dry in their collecting packets.

While on Dinagat Island, our favorite location was the Upper Montane Dwarf

Forest over ultramafic soil, locally known as Bonsai Forest, in Loreto. Besides overall great flora and funga, we observed the only *Cladonia* population on the island as well

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Left: Musa fibers from the native species *Musa textilis* in Mt. Nebo in Bukidnon Province. (photo by Jun Wen)  
 Right: Victor Amoroso, Tiana Rehman, Manuela Dal Forno, Peter Fritsch, Jun Wen, Darin Penneys, Bibiana Moncada, and Jeff Mancera (from left to right) visiting the Fernery at Central Mindanao University on January 15, 2023. (photo by Victor Amoroso)



## Philippines expedition

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as a high diversity of *Nepenthes* (pitcher plants).

At the end of the expedition, Wen was invited to deliver a lecture at CMU on collections-based integrative systematics in

the age of genomics and informatics. It was warmly received by the faculty and students.

The expedition was fruitful and successful. Beyond the important collections made, it played a very important role in training many young biologists and strengthening the academic ties and col-

laborations between several institutions in the USA and the Philippines. We hope the cooperation and friendships will lead to better understanding of the biodiversity and conservation of the Philippine archipelago, a major biodiversity hotspot in southeastern Asia. The current population growth, deforestation and mining



Top left: View of the Lake Bababu in Basilisa, Dinagat Island on January 31, 2023. (photo by Manuela Dal Forno)

Above: Lichens covering a wooden house in Mt. Balatukan. (photo by Manuela Dal Forno)

Top right: Lichen Team in Mt. Balatukan with a nice *Lobaria* specimen. On the left, top to bottom: Manu Dal Forno, Rasel Lacandula, Ermalene Taer; on the right, top to bottom: Yvonne L. Cariño, Bibiana Moncada. (photo by Manuela Dal Forno)

Right: Dr. Alexander Abella, the OIC (Officer-in-Charge) President of CMU, and Dr. Florfe Acma, Director of the Center for Biodiversity Research and Extension in Mindanao (CEBREM) presenting a certificate and gifts to Jun Wen after her lecture at CMU on February 8, 2023. (photographer unknown)





have presented major threats to the vulnerable tropical forests in the Philippines. Conservation efforts which engage the local communities are eminently needed in the southern Philippines.

Wen gratefully thanks Fritsch, Dal Forno, and all the CMU hosts and colleagues for inviting her participation on this amazing journey.

For more information about this project, please visit: <https://www.manueladal-forno.com/lichens-of-the-southern-philippines> (especially for the lichen component), and our official NSF award abstracts: [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1754697&HistoricalAwards=false](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1754697&HistoricalAwards=false); and [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1754667&HistoricalAwards=false](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1754667&HistoricalAwards=false).



Top: Some members of seed plants team collecting in Dinagat Island Province with showy flowers growing on ultramafic soils. Left to right: Florfe Acma, Jennifer Opiso, Tiana Rehman, Noe Mendez, and Jun Wen. (photographer unknown)  
Above: Lichen collections drying at room temperature in Mt. Balatukan. (photo by Manuela Dal Forno)  
Right: Small *Nepenthes* in the bonsai forest (finger for scale). (photo by Manuela Dal Forno)





## Registration now open for the 2023 Smithsonian Botanical Symposium

The Department of Botany at the National Museum of Natural History (NMNH) and the United States Botanic Garden (USBG) will host the 20<sup>th</sup> Smithsonian Botanical Symposium, “**New Horizons in the Study of Neotropical Floras**,” on 19 May 2023.

The tropical regions of America—the Neotropics—have long intrigued explorers and scientists who sought to study, catalog, and explain their incredible biodiversity, which includes more than 100,000 plant species. The origins, evolution, and even species composition of the Neotropical flora are far from understood and are the subject of active research in the face of ongoing habitat loss and climate change. The 20<sup>th</sup> Smithsonian Botanical Symposium will feature current research on the natural history, geographic diversity, evolution, and conservation of plants in the Neotropics. Speakers will include scientists who explore this incredible flora and contribute to our understanding of how and why there are so many plant species in tropical America.

In addition, the 20<sup>th</sup> José Cuatrecasas Medal for Excellence in Tropical Botany will be awarded at the Symposium to an international scholar who has contributed significantly to advancing the field of tropical botany. The award is named in honor of Dr. José Cuatrecasas, a pioneering botanist who spent many years working in the

Department of Botany at the Smithsonian and devoted his career to plant exploration and taxonomy in tropical South America.

The Symposium will be in a hybrid format with both online and in-person attendance. The talks will be held at NMNH in Washington DC, and an evening reception and poster session will take place at USBG.

We request all attendees, both in-person and virtual, to register. The event is free; there is no registration fee to attend the Symposium.

Register at [https://smithsonian.zoom.us/webinar/register/WN\\_ZpJaS8XdSYWBjFkDpXAx1A](https://smithsonian.zoom.us/webinar/register/WN_ZpJaS8XdSYWBjFkDpXAx1A).

### Tentative schedule

**Friday, May 19, 2023**

(all times are Eastern Daylight Time)

- 1:00 pm – Opening remarks and the presentation of the José Cuatrecasas Medal for Excellence in Tropical Botany
- 1:15 pm – **Lúcia G. Lohmann** - An integrative approach to studying Neotropical floras: A case study from the Amazon
- 1:45 pm – **M. Alejandra Jaramillo** - Piper evolution and ecology: A peppery tale from the understory
- 2:15 pm – Break
- 2:45 pm – **Patricia Dávila-Aranda** - Wild plant conservation in Mexico in the 21st century
- 3:15 pm – **Alejandra Vasco** - Accelerating lineage discovery to document Neotropical fern diversity
- 3:45 pm – Break
- 4:15 pm – **Paola Pedraza-Peñalosa** - Documenting the flora of a diversity hotspot: Las Orquideas National Park, Colombia
- 4:45 pm – **Panel discussion**
- 5:15 pm – Wrap-up
- 6:00 pm – Reception and poster session at USBG (in-person only)



## A look at the Guiana Shield plant collections of Redden and Wurdack

For more than 30 years, the Biological Diversity of the Guiana Shield (BDG) studied, documented, and preserved the biological diversity of the Guiana Shield in northern South America, which comprises parts of French Guiana, Suriname, Guyana, and Venezuela. The BDG program resulted in numerous publications, and a recently produced publication documents a decade of specimen collections by former and current Smithsonian botanists **Karen Redden** and **Ken Wurdack**. The open access publication written by Carol Kelloff, Karen Redden, Ken Wurdack, and Sara Alexander (*Smithsonian Contribution to Botany*, no. 116) is available for download at <https://doi.org/10.5479/si.21912828>.

In 2006, **Vicki Funk** asked Redden and Wurdack, who had met in the U.S. National Herbarium the previous year, if they would conduct a joint collecting expedition for the BDG. The BDG had maintained a full- or part-time resident collector in Guyana from 1986 until 2000, after which point it sponsored regular collecting expeditions to locations across the Guiana Shield. Redden and Wurdack's first trip in 2006 was followed by 16 more (5 jointly plus additional expeditions by Redden with others), in a collaborative partnership that would last until the BDG's final expedition in 2014.

These expeditions, some of which also included lichenologist and Acanthaceae specialist Erin Tripp, resulted in thousands



On “Palm Mountain” in October 2008. Left to right: Claudius Perry, Nigel John, Pads Ragnauth, Karen Redden, Elvis Joseph, and Ken Wurdack. (self-timed photo)

of collections (about 50 by George Mason University student Eric Forbes; 600 by Tripp; 1,800 by Wurdack; and 6,300 by Redden), including type specimens, silica gel and liquid preserved specimens, thousands of color photos, and colorful stories of both intrepid exploration and fieldwork foibles.

The new publication includes an introduction by BDG Director Vicki Funk and Carol Kelloff, collections of special interest, narratives and maps of all expeditions, a detailed list of collection localities, and lists of collections (both by collector and number, and by determined taxa).

Some of these expeditions have already been recounted in *The Plant Press*. The initial joint trip of 2006 (*The Plant Press* 12(1): 1, 9-10) included an encounter with an odd yellow fungus on inflorescences of *Xyris surinamensis* growing in savannas in the Pakaraima Mountains of western Guyana. Wurdack's notice of this fungus blossomed into a pair of publications detailing the discovery of a new species of parasitic fungus engaging in flower mimicry (*The Plant Press* 24(1): 9).

A joint Redden–Wurdack expedition in May 2009 tried to reach the summit of Mt. Tulameng, an under-collected 5,000-foot (1,525-meter) tepui near the Guyana–Venezuela border. When low water levels made it impossible to reach the foot of the tepui by boat, the expedition continued up

the Kako River to explore a waterfall, and Tulameng was left for a future expedition. That expedition, in 2010, reached the summit after braving daily downpours, rampant mildew, nests of frightful bullet ants, and slippery mud. The path to the summit yielded a new species of orchid, *Aspidogyne tulamengensis* Ormerod & Carnevali (collection Wurdack 5333). The journey also included crystal clear creek waters and a spectacular waterfall (*The Plant Press* 14(1): 1, 8-11).

In 2012, the final large BDG-sponsored exploratory expedition tackled Kamakusa, the third highest tepui (5,511 feet /1,691 meters elevation) within Guyana, and one of the wettest environments on Earth (*The Plant Press* 16(1): 8-10). While the nearby Imbaimadai region had been heavily botanized, the peak of Kamakusa itself was unreachable by botanical expeditions; only Stephen Tillet had collected among the lower slopes in 1960. This trip, then, was to document diversity, establish a baseline for future conservation efforts, and find endemic and rare species. Despite a medical evacuation, cold winds and excessive rains, the expedition endured. The trip did yield at least five undescribed species, including a new epiphytic species of Melastomataceae and a shrubby Rutaceae that appear to be endemic to the summit, as well as probable new cryptogams.



*Xyris surinamensis* inflorescences comparing similar flowers (left) and fungal pseudoflowers (right). (photo by Ken Wurdack; doi: 10.1080/00275514.2019.1668991)



## A new genomic resource available for Annonaceae

Cherimoya (*Annona cherimola*) has been an appreciated food source since Pre-Columbian times in the Americas. Although it is currently considered an underutilized fruit crop, it is still important at the local level in several regions of Central and South America. It is commercially cultivated in several countries such as Chile, Ecuador, Peru, Spain, and USA (California), among others, and has a clear niche for expansion in regions with subtropical climates. It belongs to the Annonaceae, the largest family on the Magnoliid clade, sister to the eudicot and monocot clades of angiosperms. But, unfortunately, the progress on cherimoya breeding is hindered by the little genetic and genomic information available, which is a critical bottleneck for breeding, selection, diversification, conservation, and evolutionary studies not only of cherimoya but also in other species in the Annonaceae.

In a recently published paper in *Plants People Planet* (doi: [10.1002/ppp3.10366](https://doi.org/10.1002/ppp3.10366)), Smithsonian Botany postdoctoral fellow **Alicia Talavera**, researchers Noé Fernandez-Pozo, Antonio J. Matas Arroyo,

and professor Iñaki Hormaza from Instituto de Hortofruticultura Subtropical y Mediterránea La Mayora (IHSM La Mayora-UMA-CSIC), Málaga, Spain in collaboration with Aureliano Bombarely from Instituto de Biología Molecular y Celular de Plantas, IBMCP (CSIC-UPV), Valencia, Spain have provided an important resource to fill this knowledge gap, a chromosome-scale genome sequence, which is available at the IHSM subtropicals database, [https://ihsmstropicals.uma.es/easy\\_gdb/index.php](https://ihsmstropicals.uma.es/easy_gdb/index.php).

The final reference genome resulted in an assembly of 1.13 Gb and N50 of 170.86 Mb, anchored into 7 pseudomolecules and with a completeness of 95.6%. A total of 41,413 protein-coding genes were identified, many of which were related with secondary metabolism, defense mechanisms, stress response and development. The results of this study provide novel significant genomic resources not only for cherimoya and other species of the Annonaceae but also for understanding the evolution of the earlier divergent angiosperms.



*Annona cherimola* tree and flower morphology. Pruned tree (top), female stage of the flower (bottom). (photos by Alicia Talavera; images from *Plants People Planet*, doi: [10.1002/ppp3.10366](https://doi.org/10.1002/ppp3.10366))

## Diving into the green algae of Puerto Rico

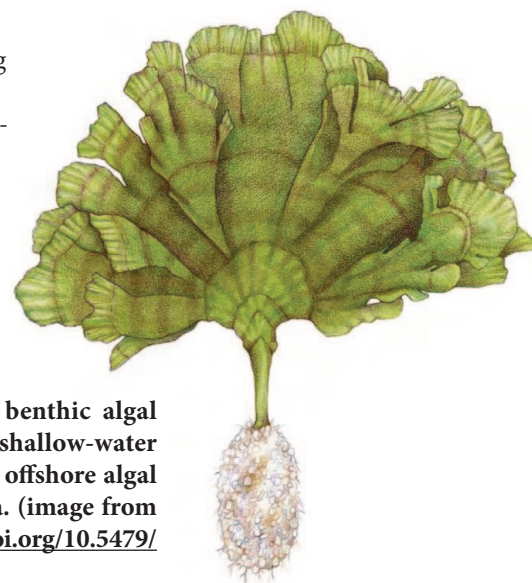
A new taxonomic study of the benthic species of green algae known from Puerto Rico has recently been released. “The marine benthic algal flora of Puerto Rico, II. Chlorophyta and Prasinodermatophyta” by **David L. Ballantine**, **James N. Norris**, and **Hector Ruiz** was published in *Smithsonian Contributions to Botany*, No. 117.

This treatment covers the two phyla, eight orders, 25 families, 50 genera, and 150 species of green algae that occur in the benthic marine communities in Puerto Rico. The study includes information on type locality, distribution, habitat, descriptive accounts of anatomy, taxonomic status, and an image or illustration of most species. One feature of this series that stands out is the quality of illustrations due to many *in situ* habit photos by co-author Ruiz.

Puerto Rico is the eastern-most island of the Greater Antilles and defines the northern boundary of the Caribbean Sea, thus the north coast borders the Atlantic Ocean while the remaining coasts face the Caribbean.

The marine algal flora of Puerto Rico has been intensively studied, with reports dating back to the 1800s, and has the best-known algal flora of any island or island group in the region. This is especially true of its deep-water flora that has been the subject of extensive exploration by submarine, dredging, scuba, and technical diving. David Ballantine spent most of his 37-year professional career teaching and studying algae as a professor at the University of Puerto Rico, and his long-time collaborators James Norris (curator emeritus NMNH) and Hector Ruiz (HJR Reefscaping, an environmental consulting group) are coauthoring an entire series including brown, green, and red algae.

**Illustration of *Udotea flabellum*, a benthic algal species generally found in sandy, shallow-water habitats to 10 m depths as well as in offshore algal plains throughout the Caribbean Sea. (image from *Smithson. Contrib. Bot.*, doi: <https://doi.org/10.5479/si.22185874>)**





## Relocation of the Botany Research Greenhouse

In December 2022, the Department of Botany moved its living collections at the Museum Support Center (MSC) in Suitland, Maryland, to a temporary greenhouse. In February 2023 the 28-year-old

Botany Research Greenhouse was razed for the construction of Pod 6. The new replacement greenhouse is under construction at MSC with occupancy scheduled for September 2023.



**Top:** The new Department of Botany greenhouse under construction, April 2023. The new headhouse sits on left, the new greenhouse foundation is in the middle, and the temporary greenhouse is on right.

**Bottom left:** Razing of old greenhouse, February 16, 2023.

**Bottom right:** Interior temporary greenhouse with Botany living collections, April 2023.  
(all photos by Ken Wurdack)



## AJ Harris (1978-2023), former Peter Buck postdoctoral fellow

By Jun Wen

Former Smithsonian Botany Peter Buck postdoctoral fellow **AJ Harris** passed away on January 15, 2023, following a long battle against cervical cancer. She was 44 years old. I was extremely saddened to hear this news from her husband Andrew Dabbs, and with a heavy heart I pass the sad news to her Smithsonian Botany colleagues and to many of her friends.

AJ had an impactful career in the field of plant biogeography and evolution where she developed her research integrating plant phylogenetics, biogeography, and biodiversity informatics. She majored in religious studies as an undergraduate student at North Carolina State University (NCSU) in 2005. She then pursued plant systematics and evolution for her master's degree at NCSU (2005-2007) with Jenny Xiang as her advisor. She received her doctoral degree in Botany at Oklahoma State University (OSU) in 2015 under the direction of Michael Palmer, with her dissertation research on "Evaluating past and present plant distributions using biodiversity informatics." I served on her graduate committee at OSU. During her dissertation research, AJ spent ten weeks in at the National Museum of Natural History as a graduate fellow in Botany during the



**AJ Harris working at the US National Herbarium in 2016. (photo by Mary Sangrey)**

summer of 2014. She was a Smithsonian Botany Peter Buck postdoctoral fellow in 2016-2018. She subsequently spent two years as a postdoctoral fellow at Oberlin

College in 2018-2020. AJ accepted an associate professor position in South China Botanical Garden, in Guangzhou, China in 2020.

While AJ was working on the phylogenetics and biogeography of the buckeye genus *Aesculus* (Sapindaceae) at NCSU, she encountered issues related to inferring biogeography of the genus due to the uncertain phylogenetic relationships of the group. This is a common challenge faced by biogeographers. She came up with an algorithm to explore the impact of phylogenetic uncertainties on biogeographic inference by statistically sampling the many phylogenetic trees derived from a dataset of her study model *Aesculus*. She developed RAD@Y, a Python 2.5 user interface program that implemented her method published in *Journal of Systematics and Evolution* in 2009 (DOI: [10.1111/j.1759-6831.2009.00044.x](https://doi.org/10.1111/j.1759-6831.2009.00044.x)). The method was later incorporated into the computer program S-DIVA (Statistical Dispersal-Variance Analysis), co-developed by AJ and her collaborators published in *Molecular Phylogenetics and Evolution* in 2010 (DOI: [10.1016/j.ympev.2010.04.011](https://doi.org/10.1016/j.ympev.2010.04.011)). She and her collaborators have subsequently



**AJ Harris with her friends and colleagues at the US Botanic Garden in Washington D.C. during the Smithsonian Botanical Symposium in 2017. Left to right: Zhumei Ren, Sue Lutz, AJ Harris, and Harlan Svoboda. (photographer unknown)**



developed another computer software RASP (Reconstruct Ancestral State in Phylogenies, DOI: [10.1016/j.ympev.2015.03.008](https://doi.org/10.1016/j.ympev.2015.03.008)) for inferring ancestral state using S-DIVA, Lagrange (DEC), Bayes-Lagrange (S-DEC), BayArea and BBM (Bayesian Binary MCMC) method. Both S-DIVA and RASP have been widely used by the biogeography research community, and the latter is a comprehensive software in biogeography and has gained more popularity in the last few years.

At the Smithsonian, AJ used highly integrative approaches to pursue studies on phylogenetic and biogeographic assembly on the Northern Hemisphere intercontinental disjunct plants. She tackled the phylogenetics and biogeography of the charismatic maple genus *Acer* and its close relatives, *Dipteronia*, *Aesculus*, and the neotropical *Billia*. She also conducted field work in the U.S. and Costa Rica during her fellowship. She provided analysis on the morphological and molecular variational patterns of *Aesculus-Billia-Acer* compara-

tively. Part of her work also incorporated ecological traits in the diversification and assembly of North American maples, especially on functional traits of fruits and leaves. Furthermore, AJ successfully utilized morphology, palynology, and paleontology in her systematic studies on *Acer*, *Aesculus*, and Staphyleaceae.

AJ was very collaborative and worked well with colleagues in different academic stages. AJ had a fantastic presence at the Smithsonian, mentoring undergraduate interns and helpful to graduate students, postdocs, and visitors in the Department of Botany, especially when focused on phylogenetic, phylogenomic, and biogeographic analyses.

During her time at the Smithsonian, AJ organized an important symposium on the assembly of the North American flora at the XIX International Botanical Congress held in Shenzhen, China in July 2017. The symposium was nicely done with 12 speakers exploring the advances of the

topic from perspectives of phylogenetics, ecology, paleobotany, paleoclimates, biogeography, and bioinformatics. The set of papers was published as a special issue in *Journal of Systematics and Evolution* in September 2018 (DOI: [10.1111/jse.12459](https://doi.org/10.1111/jse.12459)), with AJ as the lead editor of the special issue “*Continents as Units for the Study of Floristic Assembly and Biodiversity: Focus on North America*.”

AJ was an active reviewer for many journals. She served as an editor for *Ecology and Evolution* for several years. She was an editorial board member for *Journal of Systematics and Evolution* from 2019-2023.

AJ was such a warm soul and was extremely helpful to numerous colleagues and friends nearly to the end of her life. Almost everyone is in disbelief that AJ is gone! She will be deeply missed by her friends and colleagues. AJ is survived by her husband Andrew Dabbs and her parents, Nancy and Joseph Harris.



AJ Harris and her friends and colleagues in front of the National Museum of Natural History in 2017. Left to right: Kaimei Zhang, Jun Wen, Emma Frawley, AJ Harris, Sue Lutz, and Zhumei Ren. (photographer unknown)



## Alice Tangerini and Stanley Yankowski each recognized for 50 years of career service

On February 15, 2023, the National Museum of Natural History held a staff recognition ceremony where the museum honored museum staff for their career service and presented peer recognition awards. Career service awards were given to **Alice Tangerini** and **Stanley Yankowski** for their 50 years of service, **MaryAnn Apicelli** for her 30 years of service, and **Ingrid Lin** and **Meghann Toner** for their 10 years of service.

At the ceremony, **Laurence Dorr** gave remarks about Tangerini before Sant Director Kirk Johnson awarded her with her 50-year pin. Dorr shared Tangerini's story about how she got started at the museum and her accomplishments to date. In part:

In 1972, after graduating with a Bachelor of Fine Arts from Virginia Commonwealth University, Alice was hired as a full-time Smithsonian employee. She is the first and to date only botanical illustrator employed by the Institution in its long history. Since her debut with Lyman Smith, she has illustrated over 1200 species of plants for numerous curators and research associates, and her illustrations have appeared in countless scientific periodicals, floras, textbooks, and other book publications. Unlike other disciplines in the museum where color is critical, botanical illustrations are typi-

cally B&W line art, which Alice has mastered. She has worked with pen and ink, graphite, and—recently—digital color to produce illustrations. Her attention to detail is unparalleled and sometimes she discovers characters that the scientist utilizing her talents failed to see. Thus, the eponymous bromeliad or pineapple relative *Navia aliciae* came to be named in her honor after she observed characters overlooked by the authors of the species who were consequently obliged to revise their manuscript. [...]

For many of us who work in botany Alice's artistic talents have made our scientific publications more attractive (and impressive). For all of us who work in botany, this super friendly, knowledgeable, great baker, who takes on all sorts of projects, even though she's overloaded with work, has made the herbarium a more pleasant and congenial place to work. We hope to see her smile here for years to come.

Similarly, **Eric Schuettelpelz** gave remarks about Yankowski before Johnson awarded him with his 50-year pin. In part:

In 1972, Stanley Yankowski graduated from the State University of New York at Oswego, with a degree in Biology. He had taken a graduate course in

plant anatomy and corresponded with Richard Eyde, a curator in Botany, who invited him to visit the National Museum of Natural History to explore opportunities. Later that year, Stan moved to Washington, having accepted a position in the Plant Anatomy Lab, where he would be able to use his newly acquired laboratory skills. Over the next 50 years, Stan worked closely with several curators in botany. But arguably his biggest impact was through his work with interns and fellows. Stan was a master in the anatomy lab and a patient teacher. He was especially skilled at sectioning and staining challenging samples—skills he passed on to generations of students. [...]

For decades, Stan was also responsible for the management of our vast wood collection, corresponding with researchers and preparing sections for study. His talents in imaging wood diversity are currently on display in the Objects of Wonder exhibit [in the museum].

The Smithsonian Department of Botany offers congratulations and expressions of gratitude to Tangerini, Yankowski, and all other staff members for their years of service.



Alice Tangerini (left) and Stanley Yankowski (right) receive their 50-year pins from Sant Director Kirk Johnson. (photos by Phillip R. Lee, Smithsonian Institution)



## BY THE NUMBERS

The National Collections Program has released its 2022 collection assessment report. Notable numbers and figures for the United States National Herbarium include:

**5,003,019**

The total number of specimens housed by the herbarium

**108,113.63**

The number of cubic feet of collection space

**8,039**

The number of new specimens acquired and added to the collections in 2022

**3,015**

The number of specimens sent out on loan for study in 2022



Three specimens of the water-lily genus *Nymphaea*, among the 5+ million specimens housed by the United States National Herbarium. Comprising about 60 species and among the most successful early lineages of flowering plants, *Nymphaea* is native to all continents except Antarctica. Cultivated varieties of this genus are grown worldwide for their ornamental flowers. Water-lilies are especially diverse in the tropics of South America where these three specimens were collected. (photo by Gary Krupnick)

## VISITORS

**Dumbarton Oaks & Harvard Graduate School of Design** (13 graduate students); Herbarium tour (1/9).

**Joo-Hwan Kim**, Gachon University, South Korea; *Acorus* (Acoraceae) and *Erythronium* (Liliaceae) (1/11-1/12).

**Robert Raguso**, Cornell University; NSF Dimensions of Biodiversity (Onagraceae) (1/13).

**Craig Barrett**, West Virginia University; Poaceae and Orchidaceae (2/2-2/3).

**Beatriz Valente**, Rio de Janeiro Botanical Garden and New York Botanical Garden; *Miconia* and *Leandra* (Melastomataceae) (2/9-2/10).

**Zacky Ezedin**, University of Minnesota-Twin Cities; ForestGEO (2/27-3/1).

**Zhiqiong Lan**, Chengdu University of Traditional Chinese Medicine, China; Medici-

nal plant diversity in Sichuan, China (3/1-12/22).

**New Hampshire Academy of Sciences** (11 students and 7 researchers/chaperones); Herbarium tour (3/3).

**Raymund Chan**, Independent researcher, Singapore; Compositae (3/7-3/23).

**Batsaki Yota**, Dumbarton Oaks, **Matthew Battles**, Harvard University, and eight other guests; Extinct plant discussion and herbarium tour (3/9).

**William Brightly**, University of Sheffield; Poaceae (3/13-3/24).

**Destiny Brokaw**, Washington State University; Hawaiian *Cyrtandra* (Gesneriaceae) (3/13-3/17).

**Elizabeth McMurchie**, Iowa State University; *Guadua* (Poaceae). (3/13-3/17).

**Douglas Goldman**, USDA NRCS; North American *Myosotis* (Boraginaceae) (3/14-3/16).

**Stephanie Paine Crossin**, Central Indiana Land Trust Incorporated; E. Lucy Braun Indiana collection (3/15).

**Aadia Mosely-McCloud**, Howard University; Herbarium research (3/16).

**Alice Fornasiero**, **Maria Navarrete Rodriguez**, and **Rod Wing**, King Abdullah University of Science and Technology, Saudi Arabia; Poaceae (3/21-4/4).

**Sabina Lara-Cabrera**, Universidad Michoacana de San Nicolás de Hidalgo, Mexico; Lamiaceae (3/27-3/31).

**National Native Seed Conference** (17 participants), Washington DC; Herbarium tour (3/27).



## TRAVEL

**Benjamin J. Crain** traveled to the Republic of Palau (1/4 – 2/6) to participate in a field excursion to collect data for the Palau Orchid Conservation Initiative, including a field team of researchers from the Smithsonian Environmental Research Center, Illinois College, Chicago Botanic Gardens, and a group of undergraduate students.

**Stuart Davies** traveled to Manila and Palanan in Luzon, Philippines (3/5 – 3/18) to give seminars and a training workshop for the field staff for the start of the 6<sup>th</sup> census of the ForestGEO plot in Palanan.

**Laurence Skog** traveled to Sarasota, Florida (1/7 – 1/15) to visit Marie Selby Gardens and confer with newly hired garden Research Associate, John L. Clark.

**Warren Wagner** and **Gary Krupnick** traveled to Kalaheo, Hawai'i (2/5 – 2/10) to participate in a 5-day workshop on island rare plant conservation genetics at the National Tropical Botanical Garden.

**Jun Wen** traveled throughout the southern Philippines (1/11 – 2/12) to participate in a collaborative research expedition for lichen and plant discovery and to give a lecture on collections-based integrative systematics at Central Mindanao University.

## STAFF ACTIVITIES

On March 8-10, **Gary Krupnick** participated in an exploratory workshop on the interdisciplinary approach of plant humanities focused on plant extinctions at Dumbarton Oaks in Washington, DC, co-hosted by *Arnoldia*, the quarterly magazine of Harvard's Arnold Arboretum.



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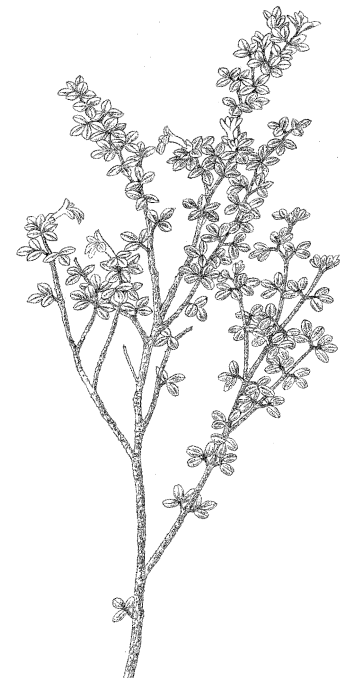
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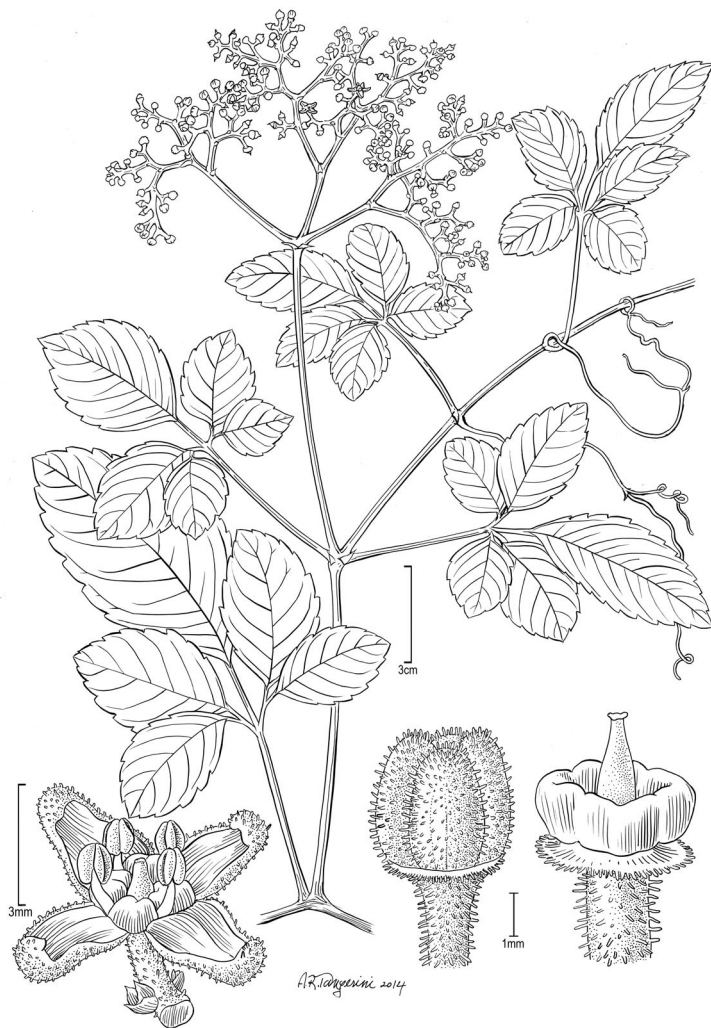




ART BY ALICE TANGERINI

## *Causonis japonica* (Thunb.) Raf.

*Causonis japonica* (Vitaceae) is the type species of the genus *Causonis* Raf., which was recently resurrected as a segregate of the genus *Cayratia* Juss. based on phylogenetic and morphological evidence. The species is widely distributed in eastern Asia (Japan, Korea, and China) and southeast Asia (the Philippines and Vietnam). Alice Tangerini's illustration used three collections as resource material: the habit was reconstructed from a collection by Mac Alford, former intern in Botany, (Mississippi, 2002), the flower was reconstructed from a Fumihiro Konta collection (Tokyo, 1997), and the bud and floral disk were from Jun Wen's pickled material (Yunnan, 2014). Wen also supplied digital images of the habit and inflorescence which aided in making a more natural appearance. The illustration had to be reduced to a 3-inch format for *Flora of North America*; thus, all figures were sized to fit an 8 x 12 inch plate and the reproduction, happily, kept all of the linework.



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