

Harold Robinson, prominent Smithsonian botanist, dies at 88

Harold E. Robinson, Smithsonian Curator Emeritus, passed away at the age of 88 on December 17, 2020, after suffering a major stroke earlier in the week.

Robinson was born in 1932 and raised in Winchester, Virginia. From an early age, he showed an interest in the natural world and has long balanced a focus on plants with a profound interest in zoology. Robinson carried out his undergraduate studies at Ohio University, where he majored in Botany and minored in Zoology. He then continued at the University of Tennessee, where he earned a Master's degree with a Botany major and Entomology minor. Although his thesis focused on flowering plants, he also began working on mosses, which were the focus of his Ph.D. research at Duke University. Robinson graduated from Duke in 1960, again with a Botany major and a Zoology minor. After a brief stint at Wofford College, he accepted a position at the Smithsonian Institution in 1962.

During his 49 years as a Curator in the Department of Botany, and subsequently as a resident Curator Emeritus, Robinson was incredibly productive, publishing more than 950 papers. Using comparative morphology, Robinson carried out extensive studies of the largest and most diverse of the plant families (Asteraceae, over 27,000 species). This work capitalized on the

use of micromorphology, not extensively employed prior to his work on the family, and required a large collection like that in the United States National Herbarium.

Robinson was also a specialist on the Dolichopodidae, a group of flies, with more than 30 publications on this side interest. Despite these broad interests in the sunflower family and flies, Robinson also kept up with work on the mosses, which was where he got his start in graduate school. He continued to occasionally study these plants using the same micromorphological techniques he employed elsewhere,

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Robinson

Continued from page 1

published 50 research papers on bryophytes, and continued to curate these plants in the U.S. National Herbarium.

In 2010, his work was recognized with the Asa Gray award from the American Society of Plant Taxonomists.

Top: Harold Robinson, 1965.
(photo by Smithsonian Institution)

Bottom: Harold Robinson and Vicki Funk in October 2019.
(photo by Ken Wurdack)



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On the cover: *Bishopanthus soliceps* (Asteraceae) in Amazonas, Peru. (photo by L.E. Bishop)
See page 3 for more information about this species.





When Harold Robinson described the monospecific *Bishopanthus* (Asteraceae) in 1983 (*Phytologia* 54: 63), he did so after receiving the collection shortly before publishing his review of the tribe Liabeae, and he did so without including an illustration of the species *B. soliceps*. Fast-forward to 2013, Robinson with Vicki Funk and Alice Tangerini published an article (*PhytoKeys* 30: 65-73) that included both an illustration by Tangerini (above) and a field photograph of the species by collector L.E. Bishop (front page). The species has not been found since its original discovery in 1983 in Amazonas, Peru, in the mountains behind Tingo at 6,500 ft. Tangerini drew the species by resurrecting the fragments of the destroyed type in which all plant fragments were contained in a fragment folder.

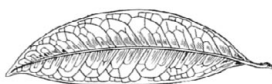
Reflections and memories of Harold Robinson

Harold Robinson left quite an impression on all of those who met him. The Department of Botany received many messages expressing sympathy and condolences upon his passing. Here are a just a few reflections of our colleague and friend.

Back in the 1970s, friend and freelance contract illustrator Mary Monsma and I decided to have a surprise birthday party for Harold. For some reason we thought it was his 50th birthday so we alerted some of the staff that this was planned and held in NMNH Room W520 where Mary worked. We had a cake made that said, "Happy 50th Birthday", and had other foodie items and plates all arranged on the table.

We had to decide how to have Harold come to the room since he wouldn't come unless there was a reason to do so. Harold had placed a plant in the window next to Mary's drawing table and asked Mary to watch to see if it began to exude latex and if it did to summon him right away. Mary reluctantly went to his room to ask him to come to W520 to check it. When Harold appeared in the doorway, we all exclaimed "Happy Birthday Harold!". He realized the plant was a false bribe to have him come and said to Mary, "You, of all people!" and then saw that we had added a year to his age on the birthday cake so he madly stomped out and went down the hall. We followed him down the hall with the cake in our hands, but he was too annoyed with us to partake in the celebration. We ended up eating it ourselves.

– Alice Tangerini



Harold Robinson with
NMNH intern Abby Moore, 2003.
(photo by Smithsonian Institution)

I first met Harold Robinson in 1977 or 1978 when the professor at Duke University teaching the Bryology class I took invited him to meet our class. Lewis E. Anderson, who had been Harold's dissertation advisor, was the professor and the class was wonderful, a combination of Bryophyte taxonomy and field work. We wandered all over the southeastern U.S. collecting mosses and then identifying them in the lab. I cannot recall why Harold was visiting Duke, but Lewis set up the introduction with a few stories. The first was that he took exception to the way Harold described a new genus of moss in his honor, *Bryoandersonia* H. Rob. was described as forming "julaceous" branches, which apparently was a sly dig at Lewis who had been overweight. It took me a long time to appreciate that julaceous means resembling an ament or catkin and is not technically a synonym for fat. The second story was that Harold could be quirky. For some reason when a student at Duke he decided not to speak, and according to Lewis it was months (or longer) that Harold remained silent.

After getting a M.A. at the University of North Carolina at Chapel Hill, I then moved to the University of Texas at Austin. There I met another side of Harold.

According to Billie Turner, professor of Botany and systematist specializing in Asteraceae, Harold was the architect of a crazy scheme to reorder the species-rich Eupatorieae (Asteraceae). As I recall, Billie kept assigning his students projects to revise different groups of Eupatorieae and I always thought it was part of an effort by Billie to discredit Harold the upstart Bryologist turned Synantherologist. I was not especially interested in Asteraceae, so I never became heavily invested in the debate, which ultimately Harold won. His application of micromorphological techniques common to Bryology to the study of Asteraceae was revolutionary and proved illuminating.

Arriving in DC in early 1992, I became a professional colleague of Harold and grew quite fond of him. We, as did many others, chatted most days and the subjects were all sorts of things Botanical and otherwise. Yes, some of them were stories about Lewis and others Billie. Harold told me that he remembered his visit to the class that Lewis taught, but he did not remember me. He laughed his well-known Harold laugh when I told him Lewis took exception to being called julaceous.

– Laurence J. Dorr

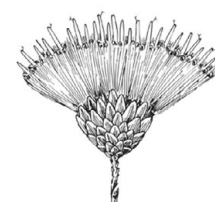




I have so many fond memories of Harold coming by to chat in “his” chair about anything and everything - he seemed to have an encyclopedic knowledge of just about anything we chatted about. I couldn’t help but indulge the opportunity to chat with him, pick his brain, and make jokes. When I first started my postdoc and was living in Fairfax, Virginia, I often tried the patience of my fellow carpool mates who would arrive and be waiting for me to finish conversing with Harold before leaving.

I’ve been working on an NSF grant proposal for the African and Malagasy Vernoniae - a number of which Harold and Vicki had begun to revise. As such I had been corresponding with Harold - particularly on another new genus of Compositae from Madagascar... but admittedly not as often as I wish. I had hoped to have been able to visit a few times this year to work with Harold on these - with a large collection from Vicki and my 2016 trip to Madagascar and another large collection from Madagascar last December (these are in a box in Carol’s office until the herbarium opens back up from the COVID pandemic). Harold was a great teacher for those who would ask (sometimes with a bit of persistence) and always had a humble answer. His replies were often prefaced with “well, this is how I see things, but who knows if they’ll stay that way.”

– Morgan Gostel



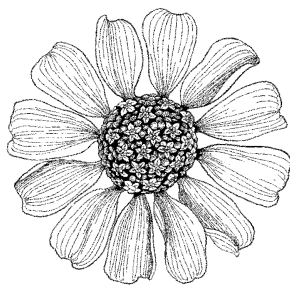
Top: Harold Robinson with Vicki Funk, Taylor Quedensley, Mauricio Bonifacio, and Mauricio Diazgranados. (photo by Smithsonian Institution)

Bottom: Asa Gray awardees Vicki Funk, Harold Robinson, and Warren Wagner in 2018. (photo by Carol Kelloff)

I was Harold's timekeeper while he was still working full time. As with all federal employees, if individuals had more than 240 hours of annual leave employees are encouraged to use their leave before the end of the calendar year or lose it. I smile about how Harold handled that situation with his time because almost every year he would have excess leave. Harold's solution – submit his leave request to use up those hours and still come into the office because he just didn't want to stay home. I guess we were his family.

More recently it was Harold's habit to stop by my office after looking in his mailbox. He would always say, "well, I may as well stop by to visit for a minute while I am down here" and sit down in front of my desk to talk. His mind was so sharp as he would discuss American history and the genealogy of his family. If I wasn't busy, he would spend ten or fifteen minutes with me discussing many topics. When the phone rang or if someone would walk in for work related things, he would wander quietly away to return another day.

– Mary Ann Apicelli



Top: National Museum of Natural History Director Kirk Johnson thanks Harold Robinson and Vicki Funk for a gift establishing an endowment toward research awards to people studying the Compositae collection, in 2015.
(photo by Smithsonian Institution)

Middle: Harold Robinson with Raymund Chan.
(photo by Carol Kelloff)

Bottom: Harold Robinson with Mauricio Bonifacino, Bertil Nordenstam, and Vicki Funk. (photo by Smithsonian Institution)



When I first came to the U.S. National Herbarium Harold was a fast friend. He had seemingly endless and obscure anecdotes, knowledge, and wisdom, and I had open ears. Our offices were next to each other, and he confessed that there used to be a window gap between the two, but it was filled because there were complaints of his loud and frequent cussing. Not a day was dull with Harold next door, and I am grateful for all that he shared of his knowledge and friendship, not to mention his unwavering dedication to science and the pursuit of knowledge. He inspired me to look for truth, to have patience and a steady gaze, to work with purpose, to practice light-hearted hijinks, and to indulge in curiosity.

– Julia Beros

The most brilliant person I ever personally had the chance to meet.

– Charles Zartman

This is a huge loss. I only met Harold a few times, but he graciously corresponded and answered many questions via email. I smile when his work on Dolichopodidae is described as a “side interest”, given his enormous contributions. But it was a side project, and a testament to how remarkable he was. His work on micro-dolichopodids remains a huge inspiration for me. He kept specimens in his office - these were of interest to him and thus

will be an important addition to the NMNH Diptera collection.

I remember the amazing collecting stories he told which he recalled in vivid detail (30-40 years later). I regret not recording these stories that were full of personal, historical and biological insight. I told him that he should write an autobiography, but he just laughed (his characteristic laugh). Selfishly, I hope he did. It was an existence well spent.

– Justin Runyon



Harold Robinson and Ken Wurdack at the 2009 Smithsonian Botanical Symposium during a reception at the U.S. Botanic Garden. (photo by Leslie Brothers)

Harold Robinson and Mauricio Bonifacio in May 2008. (photo by Carol Kelloff)

Robert Ireland (1932–2020)

By Robin Everly, Jennifer Doubt, and Linda Ley

Robert “Bob” Root Ireland (1932–2020) was a longtime Research Associate at the U.S. National Herbarium (US), Department of Botany, Smithsonian Institution, in Washington, D.C. He died on December 8, 2020, in Ottawa, Ontario, Canada, at the age of 88. Ireland was preceded in death by his wife, Ellen, who died in 1996, and he is survived by two sons, Ed and Joe.

Born in Kingman, Kansas, on September 25, 1932, Ireland received his B.A. (1956) and M.A. (1957) from the University of Kansas. Upon graduating, he was hired by Conrad V. Morton of the Smithsonian Institution as ‘Herbarium Aid in Cryptogams’, and one year later he was promoted to Assistant Curator of Bryophytes. He remained at the Smithsonian until 1962 when he relocated to Seattle to assist Elva Lawton in producing the *Moss Flora of the Pacific Northwest*. While working part time for Lawton, he began his doctoral program at the University of Washington. His thesis was entitled, “A taxonomic revision of the genus *Plagiothecium* in North America.” He obtained his doctoral degree in 1966.

Upon graduating, Ireland was offered

the position of Curator of Bryophytes at the National Museum of Natural Sciences (now the Canadian Museum of Nature) in Ottawa, Ontario, which was previously held by bryologist Howard Crum. From 1991 to 1994 his title was Research Scientist, Bryophytes. During his tenure at the Canadian Museum of Nature, Ireland, with his active program of field work and many bryological connections—not to mention his strong curatorial focus—expanded the size of the Bryophyte Herbarium (CANM) to approximately 250,000 specimens, focusing primarily on Canadian bryophytes. Alongside his own research at the National Museum, Ireland supported many students and enthusiasts in the exploration of bryophytes, inspiring great esteem in the Canadian botanical community for his kindness, professionalism, and expertise.

Ireland was a Research Associate at the Missouri Botanical Garden beginning in 1990, and he was also a Research Collaborator at the U.S. National Herbarium from 1999 to 2004, and then a Research Associate from 2004 to 2016. In 2001, he received the first of two National Geographic Society grants to study the moss flora of the Bio-Bio region of south-central Chile. At the U.S. National Herbarium, he worked closely with **Harold E. Robinson**, Re-

search Botanist Emeritus, who passed away in December 2020, in Arlington, Virginia.

In addition to contributing taxonomic treatments to major floras such as the *Moss Flora of Mexico*, the *Moss Flora of Central America*, the *Moss Flora of China* and the *Bryophyte Flora of North America*, Ireland authored or co-authored 85 papers and books, including the *Moss Flora of the Maritime Provinces*. Published in 1982, the clear keys to the species, full generic key, and comprehensive glossary of this latter work make it a contemporary favorite that is highly valued by bryologists. Many of its illustrations were republished, with Ireland’s support, in J. Faubert’s three-volume *Flore des Bryophytes du Quebec-Labrador* (2012–2014).

Ireland’s research bibliography can be found in the *Smithsonian Research Online* database <<https://research.si.edu/publications/>>. The most recent paper attributed to him in the database is “Studies on the moss flora of the Bio-Bio Region of Chile: Part 3” (Ireland, R.R., G. Bellolio, J. Larrain, and R. Rodriguez. 2017. *PhytoKeys* 77: 1–20. <https://doi.org/10.3897/phytokeys.77.10926>).

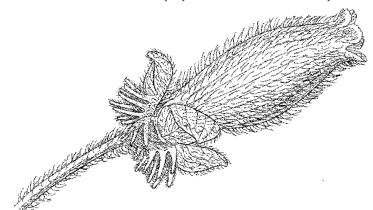
Ireland took a special interest in the Botany and Horticulture Library, which is part of Smithsonian Libraries and Archives. Over the years he donated many books, including the *Illustrated Moss Flora of Antarctica* by Ryszard Ochrya, Ronald I. Lewis Smith and Halina Bednarek-Ochrya (2008). He helped librarian **Robin Everly** select bryological books for the library and contributed funds for future book purchases.

In April 2015, Ireland was made an Honorary Member of the Société québécoise de bryologie. The society called Ireland “a figurehead of twentieth century Canadian bryology”, http://societequebecoisedebryologie.org/membres_honoraires.html.

For further reference, see “There is no moss on this rolling stone!” by Vicki Funk (*The Plant Press* 13(1): 14–16; 2010).



Robert Ireland at work in the herbarium at the Canada Museum of Nature in 1972.



Fake flowers, real news: a new plant-fungus association in Guyana

Fungi exploit their environment and interact with plants in a myriad of complex and sometimes devastating ways – from symbiotic associations in lichens, endophytes, and mycorrhizae, to wood decayers and parasites causing crop diseases. One of their most remarkable and rare life-history strategies is floral mimicry, where a parasitic fungus induces flower-like structures. These “false flowers” or pseudoflowers usually are infected leaves that mimic the look, smell, and rewards (a sugary fungal exudate) of real flowers to attract insects which then disperse the fungal spores to other plants for new infections and to effect outcrossing. The best-known systems involve rust fungi and diverse hosts, including *Puccinea* + *Boechera* (Brassicaceae), *Uromyces* + *Euphorbia* (Euphorbiaceae), and *Molinilia* + *Vaccinium* (Ericaceae).

In a pair of recent papers (Laraba et al., *Mycologia* 112: 39–51, 2020; Laraba et al., *Fungal Genet. Biol.* 144: 103466, 2020), Smithsonian Department of Botany scientist **Ken Wurdack** and mycological collaborators at the U.S. Department of Agriculture and Purdue University describe a novel neotropical plant-fungus association between yellow-eyed grasses (*Xyris* spp.; Xyridaceae) and a new pseudoflower-producing species of parasitic fungus. This research was begun during BDG-sponsored (Biological Diversity of the Guiana Shield Program) fieldwork by Wurdack, who in 2006 encountered an odd fungus on inflorescences of *Xyris surinamensis* in the savannas above Kaieteur Falls in the Pakaraima Mountains of western Guyana. Wurdack's field studies were expanded during plant collecting expeditions in 2010 and 2012 (see *The Plant Press* 14(1): 1, 9–11, 2011; 16(1): 8–10, 2013) that explored other savannas in this region of the Guiana Shield known for tepuis (table-top mountains) and high biodiversity. The savannas typically form on thin, sandy soils over sandstone rock outcrops in the uplands (300–900 m) between mountain peaks, and are rich in endemic Xyridaceae. The fungus mimics the flowers of *Xyris* with yellow-orange petaloid fungal tissue that slowly grows to envelope an inflorescence, and apparently fools visiting small bees which otherwise seek to collect pollen. These fungal pseudoflowers had



Xyris surinamensis inflorescences comparing similar flowers (left) and fungal pseudoflowers (right). (image by Ken Wurdack)

been sparingly noted in the *Xyris* systematics literature and incidentally collected with plant specimens. Wurdack surveyed *Xyris* specimens in the U.S. National Herbarium (US as well as MO and NY) and discovered pseudoflowers on 20 historical collections dating back to 1919, which encompassed only four *Xyris* species (of 250+ worldwide) in the Guiana Shield region of Colombia, Venezuela, and Guyana.

In the research of Laraba et al., a fungus was cultured from the *Xyris* pseudoflowers that the authors newly describe as *Fusarium xyrophilum* I. Laraba, K. Wurdack, Aime & O'Donnell, and use molecular phylogenetic analyses to discover its closest relatives are surprisingly from Africa. The fungus was further characterized using modern methods to determine its genome, sexual reproductive mode, and secondary metabolites. Those results paint a detailed picture of the life history of a parasitic fungus that forms unique pseudoflowers made entirely of fungal tissue, can infect all parts of its *Xyris* host, can manipulate host growth through the production of phytohormones, can produce mycotoxins for defense, and can produce pigments and volatiles that are known to attract insects. Many evolutionary and ecological questions remain unanswered,

such as: How did this complex mimicry evolve and how is it maintained despite affecting host fertility? Why is it so host-specific? How does a disease that affects plant fertility coexist with its host? The studies of Laraba et al. are testament to new surprises coming from basic tropical biodiversity research.



Savanna along the Kako River in the Pakaraima Mountains of Guyana with mixed *Xyris* species and fungal pseudoflowers on *X. surinamensis* (indicated with arrows). (photo by Ken Wurdack)

America's crop cousins are numerous, imperiled, and more needed than ever

Wild cranberries have a sanctuary in West Virginia and wild peppers have a protected area on Arizona's border with Mexico. But many hundreds of other crop wild relatives native to the United States – including those related to apples, hops, grapes, pumpkins and sunflowers, to mention but a few – do not have designated conservation areas or, even when warranted, protected status.

The plight of America's crop wild relatives is an overlooked subtheme in the era of human-driven biodiversity loss. A new study in *Proceedings of the National Academy of Sciences* <<https://doi.org/10.1073/pnas.2007029117>> for the first time outlines how poorly protected these plants are: More than half of the 600 plants assessed in the study may be endangered in their natural habitats, while only 7% are well represented in conservation repositories such as public gene banks and botanical gardens. The study was authored by scientists at the International Center for Tropical Agriculture (CIAT), Saint Louis University, U.S. Department of Agriculture's Agricultural Research Service (USDA ARS), Colorado State University, Museo de Historia Natural in Peru, the Smithsonian's National Museum of Natural History, and NatureServe.

"We don't usually think of the United States or North America as a hotspot of globally important agricultural biodiversity, compared to regions like the Fertile Crescent, Southeast Asia, or Mesoamerica where so many of the crops we grow originated," said Colin Khoury, the study's lead author and researcher at the Alliance of Biodiversity International and CIAT. "But our research shows that there's a stunning number of native plants that are, or could be, key to the future of agriculture."

The plants can be found across the U.S., including in Alaska, Hawaii, and in its overseas territories, although certain regions of the continental U.S. are particularly diverse. "We also show that previous efforts to conserve these plants, while laudable, haven't been sufficient to safeguard this cultural and natural heritage," said Khoury, who is also affiliated with Saint Louis University and hosted at the U.S. Department of Agriculture's Agricul-

tural Research Service (USDA ARS), National Laboratory for Genetic Resources Preservation.

Wild relatives of crops are the ancestors and other closely related plant species of the staples on our dinner tables. Having evolved to survive climate extremes, withstand pests and diseases, and to thrive in a wide variety of environmental conditions, these plants have characteristics that scientists can use to breed hardier, more productive crops. Many native species have already yielded great value, for instance, wild sunflowers, which provide up to \$400 million in annual benefits to farmers through better resistance to pests and diseases and other traits. Others have proved to be critical to entire agricultural sectors, such as wild native grapes widely used as graft-stocks around the world due to their resilience against the deadly insect pest, phylloxera.

"Continuing to find and use these traits could prove critical to food security and the sustainability of agriculture, both here in the United States and around the world, as climate change and natural resource

limitations such as water availability worsen," Khoury said. "But unless we take urgent action to better safeguard these native plants, many will probably disappear."

Wild plants are constantly under pressure as their natural habitats are disturbed or destroyed, and as invasive species and climate change make their native homes more difficult to thrive in. Many crop wild relatives, such as wild peppers, are also harvested by people, presenting a unique challenge for conservationists to ensure both that locals have access to plants of cultural importance, and that the species survive for the long term.

Wild relatives that need urgent conservation include those of cereals, fibers, fruits, nuts, oils, pulses (such as beans), spices, sugar and vegetable crops. Collectively, these crops are worth at least US \$116 billion a year to U.S. producers, according to the USDA. Robust protection of these plants in conservation repositories would cost a tiny fraction of those proceeds.

Examples of crop wild relatives that are



The cucumber-leaf sunflower (*Helianthus debilis* Nutt. subsp. *cucumerifolius*) on the left, a wild relative of the cultivated sunflower (*Helianthus annuus*), is native to Texas. The buffalo gourd (*Cucurbita foetidissima* Kunth) on the right, a wild relative of pumpkins and squash, is native from the western United States south to central Mexico. Khoury et al. (2020) modeled the distributions and determined conservation priorities for 600 wild relatives native to the U.S., including these two species. (sunflower photo by Katarzyna Stepień; buffalo gourd photo by Colin Khoury)

highly threatened include a salt-tolerant sunflower native to a few locations in New Mexico and Texas, a wild pumpkin occurring only in south-central Florida, and a wild rice inhabiting one small stretch of the San Marcos River in Texas.

“The USDA ARS has prioritized collecting and safeguarding crop wild relative species within the United States. Our project helps provide the information needed to make this happen,” said Stephanie Greene, a USDA ARS Supervisory Plant Physiologist and study co-author. “Along with conservation practitioners in botanical gardens, land management agencies, and other interested organizations, USDA ARS scientists will be taking these findings forward to collect these important genetic resources.”

The work ahead is substantial. Scientists need to collect plants in the field, increase the capacity of conservation facilities to care for the species for the long term, and study the plants so that information on their potential to support agriculture is widely available. Dauntingly, this is needed against a backdrop of declining numbers of field botanists and other practitioners who are essential to this work.

“Reliable information is needed to minimize gaps in the conservation of crop wild relatives, which ultimately benefit all of society,” said Anne Frances, Lead Botanist at NatureServe and co-author of the research. “Completing and regularly updating our understanding of which plants are at highest risk of extinction is essential to prioritize and guide conservation action. This study takes a giant leap towards providing this essential information.”

Establishing new protected areas for the species, especially in rapidly urbanizing areas of the country, will be a huge challenge. Alternatively, taking advantage of existing protected areas and other open spaces where the plants grow can provide easier wins. In many places, simply ensuring land managers are aware of crop wild relatives on their lands would make great progress toward their conservation. In some areas of the country, the authors acknowledge, these wild plants are barely recognized, and may even be mistaken for weeds or invasive species.

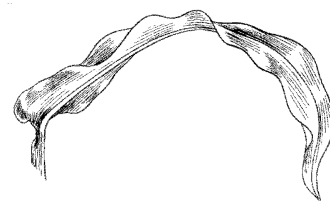
“By evaluating 600 species across the country we were able to identify geographic hotspots of crop wild relative diversity,” said Daniel Carver of USDA ARS

and Colorado State University, and co-lead author. “We’ve compared this information with the locations of the thousands of natural protected areas in the U.S. to show-case where habitat conservation of these species is currently occurring and where the gaps in protection need to be filled.”

Protecting and making sure that these useful plants are available to present and future generations requires not only conservation action but also raising awareness. Hobbyists, gardeners, and nature lovers of all ages can get in on the action. A good way to start is with a visit to one of the countries’ hundreds of botanical gardens, which in combination boast some 120 million visitors in the U.S. during a typical year.

Botanical gardens are ramping up their efforts to inform the public about crop

wild relatives, which occur not only in the wilderness but also in local parks, neighborhoods, and peoples’ back yards. “Botanical gardens and other organizations interested in crop wild relatives could play a pivotal role in introducing these plants to people, communicating their value and plight, and better connecting the concepts of food security, agricultural livelihoods and services provided by nature for the public,” Khoury said.



ForestGEO celebrates 30th anniversary

As 2020 came to a close, the Forest Global Earth Observatory (ForestGEO) marked three decades as a global research network with a landmark new paper published in *Biological Conservation*, “ForestGEO: Understanding forest diversity and dynamics through a global observatory network.” The article describes the network’s history, methodology, contributions to forest science, future directions, and need for ongoing financial support.

What began as a single plot with a powerful new methodology grew into a global network collaborating to examine the drivers of forest dynamics. Every five years ForestGEO field crews at all 71 research sites map, measure, tag with a number, and identify to species every stem

with a diameter at breast height or DBH (the standard for measuring trees) equal to or greater than 1 cm in plots that are typically between 15 and 50 hectares. In addition to contextualizing the growth and evolution of the network, the new paper authored by Stuart Davies and an international team of 156 co-authors synthesizes key metrics from each plot in a data-dense table that identifies each site’s area, first census year, tree count, species count, Fisher’s alpha, census count, elevation, mean annual temperature, and mean annual precipitation. This table highlights the diversity of the ForestGEO plots, and it offers a platform from which to consider future cross-site analyses.



The Forest Global Earth Observatory (ForestGEO) is a global network of forest research sites and scientists dedicated to the study of tropical, temperate, and boreal forest function and diversity. The multi-institutional network comprises 71 forest research sites across the Americas, Africa, Asia, Europe, and Oceania.

Researchers find new grass species in Maloti-Drakensberg area in southern Africa

Adapted from an article written by Leonie Bolleers, University of the Free State, South Africa

In their search to learn more about the impact of humans and climate change on grasses in the Drakensberg Mountain Centre (DMC), one of the most studied mountain systems in the region, a group of scientists found a new grass species, which they named *Festuca drakensbergensis* Sylvester, Soreng & M.Sylvester [*PhytoKeys* 162: 50–54, f. 1, 2. 2020] (common name unknown; herein could be designated the ‘Drakensberg Alpine Fescue’). The Maloti-Drakensberg Park World Heritage Site is a transnational property spanning the border between the Kingdom of Lesotho and the Republic of South Africa.

The team who is working on the project includes Vincent R. Clark, Head of the Afromontane Research Unit at the University of the Free State (UFS), Steven P. Sylvester from the Nanjing Forestry University in Nanjing, Jiangsu, China, and **Robert J. Soreng** from the Department of Botany at the Smithsonian Institution in



Anthony Mapaura (doctoral student, left) and Rob Soreng in the Afroalpine grassland of Tiffindell, below Ben McDuhui, Eastern Cape Province, South Africa. (photo by Mitsy Sylvester)

Washington, DC., along with Mitsy Sylvester and Caroline Mashau (Ph.D. student).

The species, discovered in February and March 2020, was found during extensive fieldwork by the Sylvesters and Soreng and herbarium research across the 40,000 km² Maloti-Drakensberg area. The DMC has a very high endemic plant diversity, says Clark (fieldwork vouchers at NU, PRE, US, and more to be distributed).

“It is the only mountain system in [continental] Africa south of Mt. Kilimanjaro with an alpine component,” Clark adds. The DMC has a montane sub-center (below 2800 m) and an alpine sub-center (2800 to 3482 m).

Sylvester says the species was easily recognizable during their fieldwork being found fairly common throughout the Afroalpine landscape. Although at that point they only knew it to be a distinct taxon, they realized that the species was new to science when they tried to identify it and compared it with other closely related *Festuca* taxa.

Besides this discovery, the team also re-instated two varieties of *Festuca caprina* and rediscovered the overlooked *F. exaristata* E.B.Alexeev, all of them endemic to the DMC. Sylvester believes that these discoveries highlight the importance of these

high-elevation ecosystems as harbors of unique biodiversity that require focused conservation efforts.

Although grasses are a dominant species that control the ecosystem function in the Afroalpine grasslands, they are the least known of all plant species found in these ecosystems. Up until now there has been a lack of focused research on Afroalpine grasses in southern Africa.

“We provide a taxonomic reappraisal of the *Festuca caprina* Nees complex that will aid future ecological and biogeographical research in the DMC and allow us to better understand the complexities of these ecosystems and how to conserve and manage them,” says Sylvester.

According to Clark, the new species contributes to the grazing and rangeland value of the Maloti-Drakensberg. “It also has functional value in terms of maintaining ecosystem integrity and associated water production landscape value in the area,” he says.

“The species seems fairly robust to pressures from grazing and burning, being found in both heavily grazed areas and semi-pristine areas, and may prove a useful species as part of a seed mix of native grasses for reseeding degraded Afroalpine slopes and ski slopes,” mentions Sylvester regarding the benefits of this indigenous



***Festuca drakensbergensis* in an Afroalpine grassland field at Tiffindell, Drakensberg Mountains. (photo by Rob Soreng)**



Steven Sylvester (left) and Rob Soreng in the Drakensberg Mountains, Afroalpine grassland, Tugela Plateau with a view of Devil's toothpick, Kwazulu-Natal Province, South Africa. (photo by anonymous tourist using Rob Soreng's camera)

species to the region.

The species is very common in Lesotho in Bokong Nature Reserve, Sehlabathebe National Park, and Sani Pass, and at Tiffindell and AfriSki ski resorts. Soreng believes the species is likely to have a wider distribution range across the Maloti-

Drakensberg than what was documented at PRE (The National Herbarium, SANBI, Pretoria) before research was cut short due to the COVID-19 pandemic.

According to Sylvester, this taxonomic research feeds into a large-scale ecological study looking at the response of Afroalpine

ecosystems to different grazing and burning regimes that is being run in collaboration with Clark and Soreng, and M. Sylvester and C. Mashau.

"While our research has uncovered interesting novelties and provided a greater understanding of the taxonomy of grasses from high elevation Maloti-Drakensberg, there is still much to be done with regards to taxonomic research of cool-season grasses in southern Africa," says Sylvester.

Clark supports this notion and states that there is a major need for a better holistic understanding of the alpine zone in the Maloti-Drakensberg, given immediate pressures from over-grazing, land-use transformation, invasive species, and climate change.

"This is because the Maloti-Drakensberg is the most important water tower in southern Africa, providing water for some 30 million people in three countries. As the Maloti-Drakensberg is dominated by natural grasslands, understanding grass diversity and ecological behavior is a primary need in the face of immediate human impacts and global change," he says.

Discovering the hidden pollinators of *Platanthera*

A massive community science project using interval photography to capture rare and unknown pollinator relationships across North America has been launched by scientists at Texas A&U University, with guidance from the North American Orchid Conservation Center (NAOCC), Smithsonian's National Museum of Natural History, and the New York Botanical Garden. The goal of the project is to discover and more deeply understand the evolutionary history and trajectory of one of the most speciose groups on North American orchids, *Platanthera*. The key to unlocking its secrets lies in part in finding its pollinators.

As it stands, little is known about pollinator relationships in North American orchids, and *Platanthera* is no exception. Of the approximately 200 species of North American orchids, just over 100 have published records of pollination. Discoveries of orchid pollinators are important: most flowering plants need pollinators. Pollinators mediate reproduction, gene flow, dispersal, and in some cases even speciation.

In order to understand how the members of *Platanthera* evolved and diversified in North America, orchid scientists must come to know their pollinators. With this information, researchers will not only be able to unravel how they came to be, but will also be able to predict where they might be now and how they might adjust to climatic and geographic changes in the future.

This project needs your help. We are asking the dedicated and passionate orchid, pollinator, and naturalist communities to go out and document their observations. A strategy for pollinator observation has been devised using interval photography and everyday digital cameras, in the hopes that with enough participants around the continent, even the most elusive relationships can be captured. The pilot study will hopefully be launched this field season. If you are interested in participating, feel free to reach out directly or visit the project website for more information. Contact Lydia Morley at lydia.morley@tamu.edu, or visit the project website at <https://platantherapollinators.wordpress.com/>.



Platanthera huronensis in Little Cottonwood Canyon, Salt Lake City Utah. (photo by Lydia Morley)

Molecular techniques in focus: common misconceptions about tissue preservation for DNA

By Gabe Johnson

Countless Ph.D. research botanists sincerely believe such misconceptions as: ethanol immediately destroys DNA in leaf tissue collections, leaves in both fresh and spent silica gel are equally dry, desiccated tissues rehydrate in absolute ethanol, and that EDTA inhibits all deoxyribonuclease (DNase) activity. Ethanol treatment of plant tissue for molecular studies is especially misunderstood by researchers in recent times, even though it can be a useful tool to improve DNA preservation for molecular studies. In this Information Age with the ability to sequence and process trillions of nucleotides of data in a single study, the capacity to isolate high quality DNAs must advance to utilize these new technologies to their fullest potential. Greater DNA quality and quantity are required for many of these next-generation sequencing methods than were necessary for traditional PCR-based Sanger methods. Obtaining sequenceable DNAs from a more complete taxonomic sampling will require an equally diverse set of DNA extraction tools, including ethanol preservation and pretreatment.

Biological tissues typically undergo a “treatment” such as freezing or drying prior to DNA extraction. The degree to which this treatment preserves the nucleic acid content of the leaf depends on the needs of the researcher and the logistical limitations of the field work. Such treatments can be as simple as allowing harvested leaves to dry in ambient conditions (usually with poor results) or the use of one of an array of desiccants, solvents, buffers, or cryogens (see Funk et al., *Biodiversity Data J.* 5: e11625; 2017). While a diversity of tissue treatment methods has been used to preserve DNA (i.e., Hamilton et al., *Anal. Biochem.* 49: 48-57; 1972), by the mid 1990’s silica gel desiccation was the default method for plant systematics studies (Chase et al., *Taxon* 40: 215-220; 1991). This preservation method has many virtues by being simple, inexpensive, non-toxic, and satisfactory for most major lineages of plants from algae to angiosperms, as well as fungi. However, the resulting DNA quality has limitations, and in particular is more fragmented than if ex-



Tissue from a collard leaf, *Brassica oleracea* L., is preserved in 96% ethanol to preserve DNA. (A) Since vascular tissue contains much less DNA per unit area, the large veins are removed. (B) Leaf lamina is quickly torn into ~1 cm² pieces by hand. The ruler to the right is in cm. (C) Leaf fragments very easily fit into the mouth of a 50 mL conical vial. (D) The name of the plant and collection information is written in pencil on card stock and inserted into the vial; pencil writing does not dissolve away in ethanol. (E) To prevent excessive evaporation or accidental spills, the cap is sealed with parafilm. (F) The outside of the plastic vial is labeled with a special solvent resistant permanent marker. (G) Leaf fragments sink into the ethanol and chlorophyll leaches from tissues, leaving an off-white color. If the leaf fragments float and remain green after a couple hours, cut tissue into even smaller pieces. Adding isopropanol to the ethanol can also help. (photos by Gabe Johnson)

tracted directly using fresh or frozen tissues.

Just as DNA in herbarium specimens is better preserved for some lineages more than others, better DNA is extracted from silica dried tissues for certain taxa more than others. Tissue preservation media, dry or liquid, have a dual purpose: to protect the DNA within the tissue and to prepare the tissue for homogenization and efficient DNA isolation. Upon separation from the plant, a leaf undergoes a physio-

logical stress response that initiates many cellular processes related to senescence: wound formation, polyphenol oxidation, and apoptosis. These cellular changes can rapidly degrade the DNA through programmed exonuclease activity and oxidative stress from reactive chemical species used in wound defense.

It is a common misconception that dehydration can only occur in the absence of liquids. Immersing tissue in ≥96% ethanol also causes dehydration when water in the

tissues rapidly diffuses into solution to reach equilibrium. This diffusion actually occurs faster than in air desiccated by solid media such as silica gel or calcium sulfate. While rarely used for plants, ethanol desiccation is the preferred method of preserving DNA in insects; they are then stored in $\geq 96\%$ ethanol at sub-freezing temperatures. Ethanol does not inherently damage DNA, and is routinely used for nucleic acid precipitation. It cannot be stressed more emphatically that preserving tissues with ethanol for future DNA extractions is entirely different from using ethanol to prevent voucher specimens from rotting in the field. Herbarium voucher specimens collected in remote tropical field sites are routinely sprayed or soaked with 50-80% ethanol. This prevents microbial degradation of the specimen's morphological characters but poorly preserves its DNA, especially when coupled with subsequent high heat drying.

To preserve leaf tissue with ethanol for DNA extraction, it must be torn into small fragments to increase surface area (and break the epidermis) for diffusion and immersed quickly into a vial of $\geq 95\%$ ethanol at a general ratio of 1 mL per 1.0 cm² of leaf tissue (see image on page 14). If the tissues contain considerable water, changing the alcohol will keep concentrations high and can enable better preservation, as is also employed with insects. Preserved samples should be kept in the dark; even the emissions of fluorescent office lights can degrade the DNA in leaf samples in as little as a week.

Ethanol desiccation confers irreversible changes to the elasticity of the plant cell wall (i.e., makes it brittle) and facilitates the removal of secondary chemicals from the tissue. In contrast, after silica gel drying, the leaf tissue contains all native substances and its cell walls regain elasticity upon rehydration. Just because a leaf was dried once in silica gel does not mean it stays at an optimal low humidity forever in a plastic bag. After the initial desiccation in silica gel, water vapor slowly seeps through the polyethylene container and into the desiccant and tissue. Eventually, the silica gel will become fully hydrated, and if not replaced, the leaf tissue will equilibrate with the humidity of the room.

Buildings are generally kept at 40-60% relative humidity while a silica desiccator is about 30%. Although leaf tissue at am-



AWARDS & HONORS

The National Museum of Natural History began awarding Science Achievement Awards in 2003. The awards recognize exceptional scientific publications in natural history. On November 18, 2020, in close consultation with the museum's Senate of Scientists, an interdisciplinary review committee recognized the outstanding work of staff scientists for five scientific papers each published in 2018 and another set of five scientific papers and three books each published in 2019.

Among the awards, **Jonathan Price** and **Warren Wagner** received recognition for their 2018 paper, "Origins of the Hawaiian flora: Phylogenies and biogeography reveal patterns of long-distance dispersal" (*J. Syst. Evol.* 56(6): 600-620; <https://doi.org/10.1111/jse.12465>).

bient humidity contains significantly less water than a living leaf, the water available to the cell wall polysaccharides allow them to reform after mechanical deformation. This wall elasticity impedes homogenization in a bead beater and leads to reduced DNA yields. In contrast, leaves fully desiccated in ethanol do not regain the same elasticity after equilibrating to ambient humidity.

Just as ethanol desiccation renders plant and fungal cell walls permanently brittle, it also irreversibly inactivates the plant cell's endogenous deoxyribonucleases, DNases (Linke et al., *BioTechniques* 49: 655-657; 2010). Contrary to popular belief, many families of nuclease enzymes are cofactor-independent and digest DNA in the absence of divalent cations such as Mg²⁺ and Ca²⁺. Since the concentrations and activity of cofactor independent nucleases vary among lineages of plants, these are not problematic for all plant systematists, which leads to common misunderstandings about them. Such DNases can quickly fragment in the DNA in the lysis buffer, even if it contains chelators like EDTA. While nucleases in silica desiccated leaves immediately regain their function upon rehydration, as little as briefly grinding tissue in ethanol can effectively inactivate all DNase activity (Adams et al., *Mol. Ecol.* 8: 681-684; 1999).

Regardless of how leaf tissues were initially desiccated, subsequently treating samples in ethanol is a valuable method to improve DNA extractions by inactivating DNases, modifying polysaccharides to increase cell wall fragility, and removing many secondary metabolites. DNAs from silica dried material treated with ethanol before extraction are the same quality and quantity as those preserved in ethanol (Akindele et al., *Conserv. Genet. Resour.* 3: 409-411; 2011). Therefore, while ethanol desiccation is not necessarily a replacement for silica gel, it is a valuable accessory to be used with the various reagents and tools needed to best preserve the DNA of a particular organism in a certain location and quantity.

Aside from its obvious limitations as a flammable liquid, ethanol is an invaluable resource for preserving plant nucleic acids *in situ*. It is unfortunate that misconceptions about its effect on plant collections have prevented its use more broadly in phylogenetic research. Using evidence-based research to demystify many long-held assumptions about collecting tissues for DNA extraction, molecular systematists can design better-informed collection strategies to obtain high quality DNAs from taxa long thought to be impossible to sequence.

János Xántus, a 19th century collector

By Julia Beros

“There are thousands and thousands of ways to dig out a little plant, even if one has to resort to digging with his own nails,” such is the acumen of János Xántus, rather John Xantus, or perhaps Louis Vesey, or potentially and more accurately, J. Xántus de Vesey. A man enrobed by myth and lore Xántus was a famed Hungarian lawyer, then Lieutenant and then exile, but foremost a self-taught collector of plants and animals who contributed to the foundations of the Smithsonian Institution and the namesake to many novel species. Depending on where you look for information he is described as a zoologist, or an ornithologist, a naturalist, but never defined as a botanist. In a recent publication in *Ann. Mus. Hist. Nat. Hung.* (111: 145-177; 2019) by Daniel Pifkó of the Hungarian Natural History Museum’s Botany Department, researchers endured a massive undertaking of finding and accurately cataloging Xántus’ early plant collections from the 1850s in North America, which were sent largely unidentified and with jumbled data, ultimately delivering clarity and placing his collections in context with its greater and mythic history.



Isotype of *Clarkia xantiana* (Onagraceae) collected in the vicinity Fort Tejon, California by János Xántus between 1857 and 1858.

Born in Hungary in 1825, Xántus finished his secondary schooling and promptly pursued a legal career. In 1848, the Hungarian Revolution spurred war and Xántus at age 23, equipped with cartographic skills, became a chief lieutenant. He was captured and sent to Austria to be enlisted in the army there, but was soon freed and while fleeing was arrested again in Prague, where he somehow escaped and absconded to the United States. Arriving with seven dollars, Xántus made a career of odd jobs, visiting different cities and leaving “after picking conflicts” with locals, and then enlisted in the U.S. army where his unlikely career in science began. Enlisting under the name “Louis Vesey” his first station was at Fort Riley in Kansas where he met William Alexander Hammond, military physician and neurologist who made a hobby of collecting biological specimens for naturalist friend Spencer Fullerton Baird (Smithsonian Curator who served as Assistant Secretary and then as the Smithsonian Institution’s 2nd Secretary from 1878-87). The serendipity of this first assignment for Xántus gave him not only opportunity and motivation to collect biological specimens but training and mentorship from one of the world’s leading naturalists of the time as well. As one of Baird’s goals was to make the natural history collections more robust he was happy to enlist more collectors (keeping a vast list of contacts around the continent to solicit for collecting and sending material) and continue building the nation’s collections of a practically unstudied flora, essentially from scratch.

Xántus’ time with the army took him to Fort Tejon, California as a paramedic and, to the displeasure of his superiors, he continued collecting both plants and animals in his free-time for Baird. He soon left the army and joined the U.S. Coast Survey in Cabo San Lucas, Mexico. Again, not on the greatest terms with his superiors, he continued collecting and sending material to Baird. Despite a lack of resources, experience and knowledge in the field, and often necessary tools, Xántus always found a way to procure specimens and preserve them as safely as possible with detailed information about location in his notebook, and with duplicates, often covering most of the important taxa in each region. His per-



Holotype of *Mimosa xanti* (Fabaceae) collected in Cape San Lucas, Mexico by János Xántus between August 1859 and January 1860.

sonal enthusiasm and curiosity for naturalism motivated him to learn on his own time reading guide books and corresponding with Baird when possible. Throughout his travels and time collecting in North America, legend says that Xántus fathered multiple children in a small tribe in the Baja California Peninsula of Mexico while also acting as a “diplomat” to so-called local despots. Despite this unconfirmed gallivanting, he sent back 122 different flowering plants, 17 of which were previously undescribed. He wrote frequently to his mother during his time in North America, often seasoning his letters with “imaginary achievements.” It is noted that his murky history is in part a result of both the lack of corroborated written history surrounding Xántus and his fabled tales regaled to his mother that were often unsubstantiated but retold and republished as some of the few records of his time collecting on the continent. His scientific achievements, however, are certainly not imagined.

Among his collections from California and Baja, Xántus sent 245 species of flowering plants. This does not include the sea stars and shellfish, the birds, the 200 mammals, the sloshing jars of fish, the insects,

the bird's nests, and any reptile that happened to cross his path. All of this material, comprising thousands of specimens, is part of the first systematic study of North American ecologies. His contributions are honored not only in his efforts in collecting and seeing that all material be sent to experts in each field (Asa Gray having identified and described all of the herbarium collections), but many of the species described from these bestow his name. Xántus made a point to have duplicate material sent to different institutions which he outlined in a letter, namely The Academy of Natural Sciences of Philadelphia, and the Royal Hungarian Society of Natural Sciences (which forwarded the material to the Hungarian National Museum).

An exile of a volatile political climate and a wartime escapee, Xántus found his way back to his home country via an extended collecting trip through North America. Upon returning in 1862 he made detailed records of his new-found knowledge in collecting and preparing biological specimens. Fueled by his curiosity he pursued knowledge and discovery and faced new challenges at every point of his career with an enthusiasm to study the natural world. Using the tools of our scientific collections, the tedious record keeping, the notebooks filled with numbers correspon-

ding to other numbers corresponding to illegible five-syllable scribbles, the obscure letter or two with a one-word clue about a specimen's location tucked away between drying plants or bookmarking a page in a flora publication, the researchers at the Hungarian Natural History Museum became detectives unravelling the cluttered catalog of Xántus' legacy. A man said to be the inspiration for *Winnetou's* "Old Shatterhand," among other mythic characterizations, he is an example of the rich history of botanical collecting and collaborative work of science. As a correspondent to Baird he worked independently as a refugee in a new country with little experience in ecology, botany, or fieldwork, and with little guidance beyond intermittent letters and available books. Inspired by the world he was discovering and inspired by his own potential, he worked alone but as

part of a greater mission: "the increase and diffusion of knowledge."

Over 300 plant specimens collected by Xántus can be viewed in the Smithsonian's online Botany Specimen Catalog <<https://collections.nmnh.si.edu/search/botany/?q=cr+xantus>>. I also encourage readers to view Pifkó's publication:

Pifkó, D. 2019. Botanical activities of János Xántus (1825–1894) and his herbarium at the Department of Botany of the Hungarian Natural History Museum (HNHM). *Ann. Mus. Hist. Nat. Hung.* 111: 145–177. <http://publication.nhmus.hu/annales/cikkreszletes.php?idhoz=7652>

I would like to thank Zoltán Barina for sharing this publication with me and for his contagious enthusiasm for botany!

The 18th Smithsonian Botanical Symposium, 13-14 May 2021, to explore plant symbioses

The Smithsonian's Department of Botany and the United States Botanic Garden will hold the 2021 Smithsonian Botanical Symposium, "Plant symbiosis: The good, the bad, and the complicated," on 13-14 May 2021. Originally scheduled for May 2020 but canceled due to the COVID-19 pandemic, this symposium will adapt to a virtual setting and be spread over two days.

Plants, like all organisms, exist in collaboration and competition with other life forms. As primary producers, plants form the basis of most food webs. In many cases they also depend on insects, vertebrate animals, bacteria, and/or fungi to survive and reproduce. Sometimes these interactions are especially close and long lasting and such symbioses are among the most fascinating relationships in the natural world. The 18th Smithsonian Botanical Symposium will explore current research in the diversity of plant symbioses, examining the relationships plants have with insects, fungi, bacteria, and even other plants. Speakers will include botanists, ecologists, microbiologists, and geneticists whose research unravels the complicated

relationships that plants have with their collaborators and competitors in the natural world.

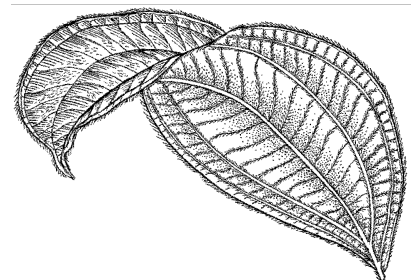
In addition, the 18th José Cuatrecasas Medal in Tropical Botany will be awarded at the Symposium. This prestigious award is presented annually to an international scholar who has contributed significantly to advancing the field

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 in tropical South America.

Attendees will need to register online. Further details will be posted soon at <https://naturalhistory.si.edu/research/botany>.



Syntype of *Chaenactis xantiana* (Asteraceae) collected in the vicinity Fort Tejon, California by János Xántus between 1857 and 1858.





AWARDS & HONORS

David Kenfack elected as a Fellow to the African Academy of Sciences

David Kenfack, ForestGEO staff scientist, has been elected as a Fellow to the African Academy of Sciences. This distinguished membership recognizes African scientists who have “attained the highest level of excellence in their scientific field and have made significant contributions to the advancement of science regionally and globally.” Begun in 1986, there are now more than 400 Fellows in the African Academy of Sciences.

Kenfack is currently the coordinator of ForestGEO’s Africa Program and is a principal investigator of the Korup (Cameroon), Mpala (Kenya), and Ngel Nyaki (Nigeria) plots.

He was born in Bafou, Cameroon and completed both his undergraduate and graduate studies at the University of Yaoundé (1984-1995). In 1996, he was hired as a field manager for the first census of the Korup 50-ha plot. In 2002, he moved to the United States to pursue a Ph.D. in Ecology, Evolution and Systematics from the University of

Missouri-St. Louis. Upon obtaining his degree in 2008, he began a post-doctoral fellowship at the University of Michigan, Ann Arbor (2008-2009). Between 2010 and 2012 he served as a research fellow at Harvard University’s Arnold Arboretum, and in 2012 he was hired as the Africa Program coordinator for the ForestGEO network. In 2016 he became a Smithsonian Tropical Research Institute staff scientist.

Kenfack describes his work saying, “I use a combination of morphological, molecular, ecological and spatial data to explore plant groups with challenging taxonomy to understand their evolutionary history and biogeography.” He has authored over 80 peer-reviewed publications.

The African Academy of Sciences’ announcement of its 2019 class of fellows has been posted at <https://www.aasciences.africa/news/african-academy-sciences-announces-election-2019-fellows>.

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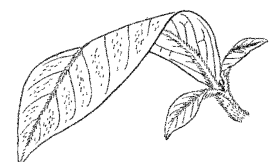
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ART BY ALICE TANGERINI

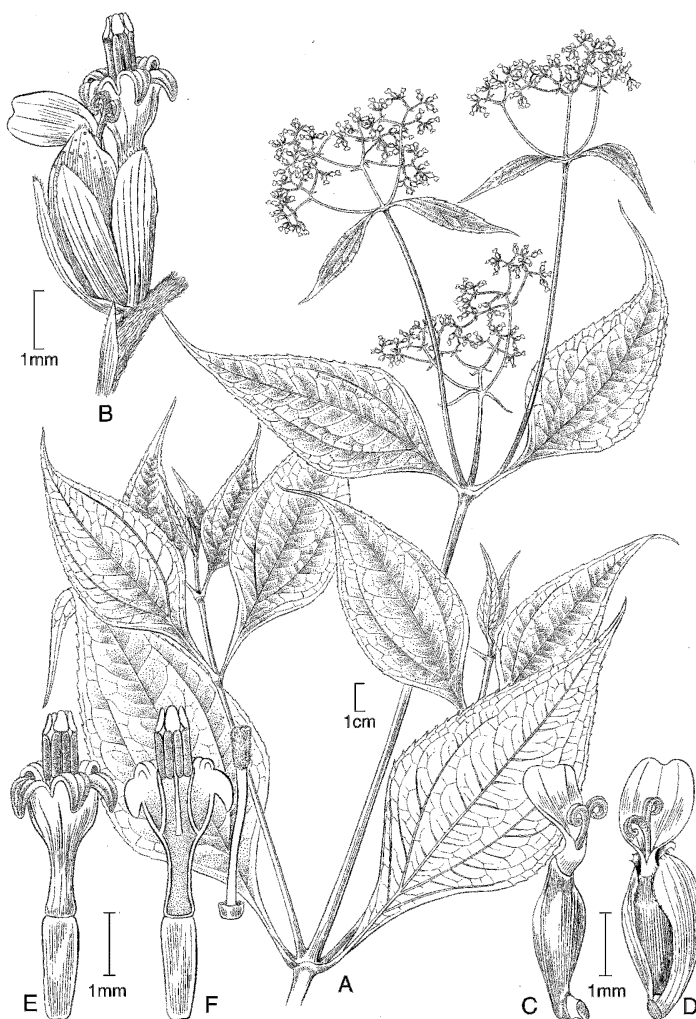
Stachycephalum asplundii H.Rob. & Tangerini

When Alice Tangerini was examining plant specimens for a series of *Stachycephalum* (Asteraceae) illustrations in 2006, she discovered some interesting features of the achene on a particular specimen. Her observations did not agree with what Harold

Robinson had asked her to draw. Robinson concluded that the species that Tangerini was drawing was a new species. To give credit where credit is due,

Robinson added Tangerini's name as plant author with his.

Stachycephalum asplundii H.Rob. & Tangerini is published in *Flora of Ecuador* 77(2): 125-127; fig. 55) (2006). The species is found in the Ecuadorian province of Napo, in the Rio Cosanga valley.



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