

The Plant Press



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National Museum of Natural History

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July-September 2010

Botany Profile

A Fresh Perspective on a Botanical Puzzle Box

By Jimmy Triplett

Bamboo. The very name evokes a wealth of imagery: a symbol of grace and beauty, a feast fit for a panda, or perhaps a villainous weed, breaching property lines. Whatever the association, everyone knows bamboo. And yet, what *is* a bamboo? From a botanical perspective, few such “well-known” plants have harbored so much mystery: How many species are there? For that matter, how many genera? Why do they wait so long to flower? And where are they from, anyway?

In the years since molecular evidence entered the botanists’ toolbox, phenomenal progress has been made in our understanding of bamboos, including their relationship with other grasses, their diversity, and their natural history. We now know that bamboos are in the core of the grass family (Poaceae), sister to rice and bluegrass, and not primitive cousins as once thought. Molecular data have also revealed overlooked species, including one in the Southeastern U.S. (hill cane, *Arundinaria appalachiana*) and a multitude of taxa in Central and South America, Asia, and Africa. Yet despite this progress, countless puzzles remain, especially as we look closer at relationships among species.

The true bamboos (Poaceae subfamily Bambusoideae) are estimated to encompass upwards of 1,400 species in some 120 genera. Recent molecular studies suggest that four major lineages arose relatively early (in the mid-Oligocene, ca. 30 mya), but apparently diversified more recently (during the Miocene, ca. 15 mya). These lineages include the

temperate bamboos (*Arundinaria* in North America and their allies in Asia, Africa, and Madagascar, including *Phyllostachys*, *Pleioblastus*, and *Sasa*), New World tropical bamboos (including *Chusquea* and *Guadua*), Old World tropical bamboos (including *Bambusa* and *Dendrocalamus*), and an unusual, morphological throw-back: the so-called herbaceous bamboos (including *Olyra* and *Sucrea*), represented by some 110 primarily American species that lack the obvious bamboo features (woody culms, complex branching, long flowering cycles, etc.). Each of these major groups contains striking diversity and present unique challenges for taxonomists.

The National Museum of Natural History has fostered a rich legacy in bamboo research, both field and descriptive. The great agrostologist Mary Agnes Chase (1869-1963) made substantial contributions to our understanding of these giant grasses, collecting specimens in Central and South America and describing the intricacies of bamboo flowers in relation to other grasses. The Botany Department was also home to Floyd McClure (1897-1970), who turned his attention to bamboo diversity in the Americas after a long career as a professor and field botanist in Southeast China. More recently, Smithsonian botanists Thomas Soderstrom (1936-1987) and Cleofé E. Calderón (1929-2007) made immense contributions to bamboo taxonomy, amassing a vast collection through field work and herbarium exchange. Consequently, the U.S. National Herbarium now has one of

the leading collections of bamboo in the world, with over 37,000 specimens and thousands of photographic images, plus an archive of rare literature and field notes. The legacy of these botanists can also be found in living collections at the U.S. National Arboretum and in private collections of friends and colleagues. For example, a peak into Mary Sangrey’s office in the museum reveals a healthy but rare bamboo, *Pseudoxystenantha monadelpha* of Sri Lanka, a gift from Thomas Soderstrom.

As a postdoctoral fellow in the Department of Botany, I have had the opportunity to explore these resources while aspiring to make my own contribution to bamboo systematics. My research is guided by Paul Peterson, for his expertise in grass evolution, and Jun Wen, whose expertise includes biogeography and the flora of Asia. My project focuses on the *Arundinaria* clade of the temperate bamboos. I am attempting to pinpoint the underlying cause of taxonomic confusion in this group while exploring its fascinating biogeographic history (including a disjunction between East Asia and North America). The temperate bamboos encompass over 600 named species in approximately 32 genera. However, their taxonomy is highly controversial; in many cases, a so-called species has moved in synonymy among as many as five different genera. This reflects the fact that features used to define species and genera are neither obvious nor indisputable.

In the U.S., we have three endemic

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Pedro Acevedo and **Gary Krupnick** traveled to San Juan, Puerto Rico (4/6 – 4/12) to participate in a workshop of endangered Puerto Rican plants at the Botanical Garden of the University of Puerto Rico.

Walter Adey traveled to Steuben, Maine (6/12 – 9/12) to do field work in the Gulf of Maine to the Labrador Sea, to make coralline collections for use in establishing seawater temperatures and seawater proxies.

Emanuela Appetiti and **Alain Touwaide** traveled to Rome, Italy (4/5 – 4/6) to conduct research in the libraries of Rome and Naples; to Venice, Italy (4/6 – 4/16) to attend a conference and conduct research at the Marciana Library; to Sicily, Italy (4/22 – 5/9) to deliver talks and teach classes at the Universities of Messina; and to Athens, Greece (6/24 – 6/29) to attend a series of scientific events and meetings.

Laurence Dorr traveled to Madagascar (4/9 – 5/3) to present a paper at the XIXth Congress of AETFAT (“Association for the Taxonomic Study of the Flora of Tropical Africa”) in Antananarivo, to study

Malagasy plant specimens in the herbaria in Antananarivo, and to conduct field work in the Andringitra Mountains; to Ithaca, New York (5/25 – 5/28) to participate in a Ph.D. defense at Cornell University, present a lecture on Madagascar, and collaborate on a research project; and to Fairfax City, Virginia (6/8) to participate in a M.S. defense at George Mason University.

Robin Everly, traveled to Seattle, Washington (5/18 – 5/22) to attend the 42nd Annual Meeting of the Council on Botanical and Horticultural Libraries (CBHL).

Vicki Funk traveled to Chicago, Illinois (4/14) for an Encyclopedia of Life (EOL) synthesis group meeting to discuss incorporating the *Compositae* Virtual Key project; to Wildwood, New Jersey (5/2 – 5/3) and Hampton, New Jersey (5/3 – 5/4) for plant collecting in the southern New Jersey area; and to Las Vegas, Nevada (5/18 – 5/26) to attend the iPlant 2010 Conference.

Linda Hollenberg traveled to Ottawa, Canada (5/30 – 6/6) to attend the joint conference of the Society for the Preservation of Natural History Collections and the Canadian Botanical Association, and co-chaired a special interest group discussion on collection management issues in botany.

W. John Kress traveled to Miami, Florida (4/8 – 4/10) as an invited keynote speaker at the University of Miami; to Omaha, Nebraska (5/5 – 5/6) to participate in a workshop on “Gingers and Gorilla Health” at the Henry Doorly Zoo; and to Dominica (5/24 – 6/5) to continue field

work on the *Heliconias* and hummingbirds of Dominica.

Diane and **Mark Littler** traveled to Ft. Pierce, Florida (6/12 – 7/30) to attend a conference, present an invitational lecture, and perform field research on Cyanophyta at the Smithsonian Marine Station, Ft. Pierce.

Rusty Russell traveled to San Francisco, California (4/22 – 4/24) to speak to the Board of Advisors for Earthwatch Institute; to Riverside County, California (4/24 – 5/2) for continuing fieldwork in the San Jacinto Mountains; to Redlands, California (5/3 – 5/4) to conduct a one-day workshop at the Environmental Sciences Research Institute (ESRI) on developing educational initiatives using historic specimen data; and to Boston, Massachusetts (5/15 – 5/21) to attend a Earthwatch meeting and training.

Laurence Skog traveled to Storrs, Connecticut (5/3) to see the new collections facility and examine specimens of Gesneriaceae in the herbarium of the University of Connecticut.

Alice Tangerini traveled to New York City and Brooklyn, New York (5/6 – 5/9) to attend the opening of the American Society of Botanical Artists exhibit, “Losing Paradise: Endangered Plants Here and Around the World,” at the New York Botanical Garden; and to meet with Paul Harwood at the Brooklyn Botanical Gardens.

Alain Touwaide and **Emanuela Appetiti** traveled to Italy (4/5 – 5/9) to attend the annual conference of the

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Chair of Botany

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Web site: <http://botany.si.edu/>

Visitors

Mike Martin, Johns Hopkins University; *Ambrosia* (Compositae) (1/1/09-6/30/11).

Qing Liu, South China Botanic Garden, Chinese Academy of Sciences, Guangzhou; *Chloridoideae* (Poaceae) (7/4/09-7/4/10).

Weidong Zhu, Kunming Institute of Botany, China; *Astilbe* (Saxifragaceae) and *Aruncus* (Rosaceae) (1/1-4/30).

Jimmy Triplett, University of Missouri; North American *Arundinaria*, and Asian *Pleioblastus*, *Sasa*, and *Sasamorpha* bamboos (Poaceae) (1/1-12/31).

Jianying Xiang, Kunming Institute of Botany, China; *Dryopteris* (Dryopteridaceae) (1/1-12/31).

Saroopa Samaradivakara, Genetech Research Institute, Colombo, Sri Lanka; Plant DNA barcoding (3/1-4/30).

Frank Farruggia, University of Utah; *Solanum* (Solanaceae) (3/30-4/2).

Ze-long Nie, Kunming Institute of Botany, China; Phylogeny of *Ampelopsis* (Vitaceae) (4/1-5/28).

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A Personal View of the Grand Challenges

By V.A. Funk

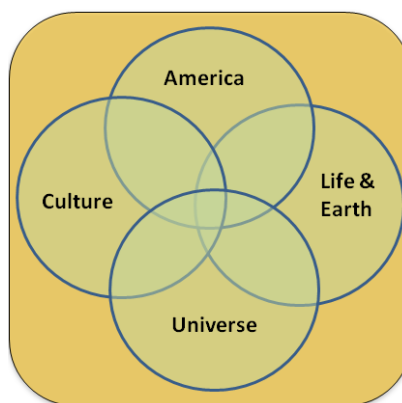
Last year I had the wonderful experience of serving as the Co-Chair of the Smithsonian's Strategic Planning Committee. When I was first asked to take on this responsibility I found the whole concept to be a bit overwhelming. It did not help that we had two sets of consultants and a committee of over 20 people, many of whom were Directors or Assistant Directors or other experienced high-ranking administrators. I was fortunate to have as my Co-Chair Kevin Gover, the Director of the National Museum of the American Indian, who had a great deal of experience with committees and managing large groups of sometimes independent minded individuals; indeed he was far better than I was at dealing with some of the problems that arose. We were ably assisted by Pherabe Kolb, from the Office of the Under Secretary for Finance and Administration. In fact, Pherabe saved the day many times during the process. We quickly realized that one meeting per month would not move us along very fast so we started a Monday "lunch bunch" that anyone on the Steering Committee could attend and it was there that much of the work was done. After the Committee finished their work the actual Strategic Plan document was written by Carole Nevis and the staff of the Office of Policy and Analysis along with the unit directors, the Under Secretaries, and, of course, it was all carefully watched and commented on by the Secretary. There were many stages to the process but this article is not about the process but about the vision, or at least my view of the vision.

So you might ask, what did the committee do? We developed the four Grand Challenges. The idea was that the Smithsonian Institution was not living up to its full potential. It had previously been noted that the synergy among the various units was lower than it could be and we decided that if we could come up with overarching themes that would bridge the gaps among the units then we could more powerfully address issues of great concern. Each Grand Challenge was seen as a "tent" that members of various units could work under to address broad issues along with colleagues from outside the Smithsonian. Each of the Challenges was viewed as a home for ideas that could involve many units, make a major contribution to knowledge, and be of interest to the public. It was acknowledged that making this work would involve all parts of the Smithsonian, the knowledge gatherers, the disseminators, and the infrastructure that allows all of it to take place. This idea was ably reflected in the SI 2010 Folklife Festival when we were all invited to have tables in any of the four tents that represented the Grand Challenges.

During the process we held several meetings for the staff and several of us visited individual museums and met with concerned individuals. Based on recent history, many members of the SI staff thought that such Grand Challenges would be a threat to the creative

research process; that the independent researcher would be ignored in favor of special projects chosen by leaders of the Grand Challenges or some other individual. They feared that the already scarce resources that are currently available to the SI research and collections staff (i.e., Scholarly Studies, Fellowships, Restricted Endowment) would be diverted to the new Grand Challenges. However, it was always my impression from my meetings with the Secretary that he was firmly against this concept. He was, and is, a big supporter of independent research frequently stating that it is what makes the Smithsonian such an amazing resource; that without such "excellence in research" we would not have the ideas and resources to draw upon to meet the Grand Challenges. My interpretation of what he said was that all money (except for some start up funds) for the Grand Challenges would come from New Money only and I repeated this many times in my meeting with concerned staff. As soon as the Grand Challenges were identified and approved by the Board of Regents the Secretary began to seek funding and I believe he will be successful in his efforts to raise the money needed.

Many possible topics were considered for the Grand Challenges and we eventually settled on four concepts: Unlocking the Mysteries of the Universe; Understanding and Sustaining a Biodiverse Planet; Valuing World Cultures; Understanding the American Experience. These quickly became known by shortened versions of their names: **The Universe, Biodiversity, World Cultures, American!** They were selected because the Smithsonian has expertise in each of these areas from more than one Unit and because they cross the barrier between Science and Art-History-Culture; a task that many thought was unbreachable. One of the most fun things we did in



One of the versions of the graphic drawn by the "Lunch Bunch" of the Strategic Planning Committee. The names of some of Grand Challenges were constantly changing and some are not the same as the final version.

the Committee was to come up with ideas that would fit under one of the Grand Challenges but that also would cross between two or possibly more of them. For instance, one that is dear to my heart is life on Earth and our interest in sustaining it. This is perhaps the most difficult and time sensitive challenge. To accomplish this we must understand life and how it changes. We must also understand the processes of Earth that allowed life to evolve. We must understand human culture to work to develop methods to preserve life, including what is happening in our

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Chair
With
A
View
—
Warren
L.
Wagner



Staff Research & Activities

Gabe Johnson participated in Planting Science <<http://www.plantingscience.org/>> as a Planting Science Mentor during the spring semester with the Botanical Society of America. Johnson grew *Ceratopteris richardii* (the C-Fern, a specially derived cultivar of the tropical homosporous fern) along with high school students in Louisiana (Louisiana Academy of Math, Science, and the Arts). Johnson discussed fern reproductive biology with the students through the online mentoring program. He also worked with curriculum developers Renee Lopez-Smith and Teresa Woods and the students' teacher Allison Landry, who are creating a C-Fern module for Planting Science so that other teachers can use C-Fern to teach plant reproduction in the classroom. This important program will help students become interested in botany and encourage them to think about plants.

Gary Krupnick and summer intern **Anna Braum** participated in Endangered Species Day and the United States Botanic Garden on May 21. Sponsored by USBG, the U.S. Fish and Wildlife Service and the Endangered Species Coalition, the festival included tours of the U.S. Botanic Garden's endangered and native plants, lunchtime talks on federal endangered species programs, and presentations and displays by the USFWS, NOAA Fisheries, U.S. Forest Service, U.S. Geological

Survey, the Endangered Species Coalition, the Smithsonian's National Museum of Natural History and other agencies and non-profit organizations. Krupnick and Braum displayed herbarium specimens of endangered plant species and publications from Botany. Gary Hevel from NMNH's Department of Entomology displayed rare and endangered entomological specimens.

The Smithsonian Institution, the National Science Foundation, and the Ocean Studies Board of the National Research Council sponsored a two-day symposium May 24-25, to celebrate the scientific contributions and value of scuba as a research methodology. **Mark and Diane Littler** were invited to present their research findings ("Crustose Corallines Revealed") along with over 50 other top U.S. scholars and international collaborators. The focus was on the scientific contributions accomplished by placing the trained scientific eye into the underwater environment on self-contained compressed gas. Oral presentations included research from around the world on coral reefs, blue-water environments, under-ice polar habitats, temperate kelp forests and other sites of interest. Results will be disseminated to scholars through publication of the symposium proceedings as a volume in the *Smithsonian Contributions to the Marine Sciences* series by Smithsonian Institution Scholarly Press.

Mark and Diane Littler presented an invitational public lecture entitled "Panama's Undersea Realm: Fascinating Findings and Phenomena", for the Ocean Science Lecture series at Harbor Branch Oceanographic Institute/Florida Atlantic University on June 23.

On June 25, **Ida Lopez** and **Alice Tangerini** and two Botany interns, **Lois Bangiolo** and **Aleksandra Ogurtsova**, held a one day program on the National Mall as part of the Smithsonian Inside Out venue at the 2010 Smithsonian Folklife Festival. Their presentation, "Leaf ID-What Tree Is This?" featured Tangerini showing her samples of leaf drawings as part of the old technology of identification by botanical illustration and Lopez demonstrating new identification technology using the Instant Identification System's soon-to-be-released Apple iPhone application called LeafID. Visitors were asked to choose a leaf from a bouquet of fresh specimen branches. A poster and chart of leaf char-

acters created by Bangiolo and Ogurtsova highlighted details that visitors used to identify the species. Visitors then drew and colored the leaf samples or photographed and identified the leaf using the iPhone LeafID application.

On May 6-9, **Alice Tangerini** traveled to New York City for the opening of "Losing Paradise: Endangered Plants Here and Around the World," an exhibit of selected botanical art from the members of the American Society of Botanical Artists. The exhibit is on display at the New York Botanical Garden through the end of July when it moves to NMNH and opens August 14. The reception at NYBG was attended by 20 artists and members of NYBG staff and donors. Opening remarks were made by Robin Jess, ASBA president, and Carol Woodin, ASBA Exhibits Coordinator. The reception was preceded by a tour of the Rare Book Room at The LuEsther T. Mertz Library given by Steve Sinon, Head of Information Services and Archives at NYBG. Bobbi Angell, NYBG botanical artist, narrated a viewing of selected works from their extensive collection of botanical art. Tangerini attended the reception with her former SI Art Research Fellow, Nancy Friedemann. Alice also visited the Brooklyn Botanical Garden along with other ASBA artists as guests of the Herbarium Supervisor Paul Harwood, who gave the artists a tour of the BBG gardens and facilities.

Awards & Grants

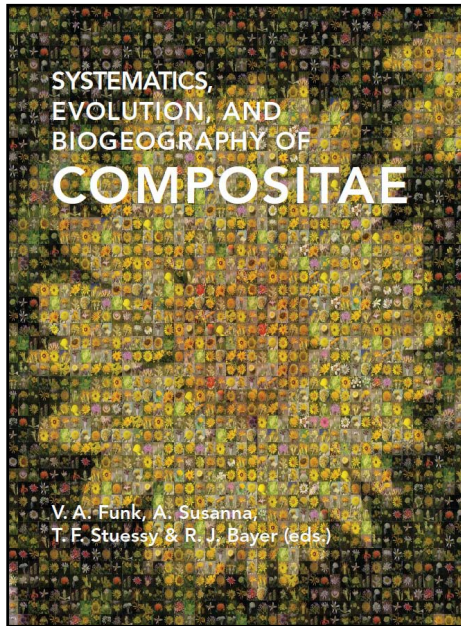
Mark Littler received the 2010 Distinguished Alumni Award from Ohio University's College of Arts and Sciences. The award ceremony will take place September 24, 2010. Preceding the ceremony, Littler will mentor and advise students in the Department of Environmental and Plant Sciences.

Vicki Funk, as lead editor of the book *Systematics, Evolution, and Biogeography of Compositae*, was selected to receive the Stebbins Medal for 2007-2009 from the International Association for Plant Taxonomy (IAPT). The medal is given for "an outstanding article or book on plant systematics and/or plant evolution." Funk will receive the award on August 3, 2010, at the American Society of Plant Taxono-



Gary Krupnick displays herbarium specimens of endangered species at Endangered Species Day at the US Botanic Garden (Photo by Yuri Huta/Endangered Species Coalition)

mists (ASPT) banquet at the Botany 2010 meeting in Providence, Rhode Island.



New Faces

The Smithsonian Institution has awarded fellowships to twelve accomplished artists from the United States and abroad to conduct research at Smithsonian museums and research facilities as part of the 2010 Smithsonian's Artist Research Fellowship (SARF) Program. This pan-Institutional program provides artists with financial support to conduct research for a two-month residency period, offering them access to special collections and to the diverse areas of expertise at the Smithsonian. The awarded recipients for 2010 include **Jocelyn Chateauvert**, an artist who expresses the natural world through her jewelry, sculpture and installation artworks from the plant-based papers she makes by hand. Chateauvert is intrigued by the physical adaptability of plants: their ability to dominate their environment, exploiting and expanding around obstacles like water, rocks and even other plants. She is participating in field research at the NMNH's Biological Diversity of the Guiana Shield and then consulting the specimen and botanical illustration collections at NMNH, working with **Vicki Funk**, **Alice Tangerini**, and Curator of Art Jane Milosch from the Office of the Under Secretary for History, Art, and Culture. On her travels to the Guianas Chateauvert will document, through sound, drawings and photography, plant life for its sculptural qualities and organic architecture en

masse. She will also record observations of plants textural record of survival evidenced through scarring, insect predation and wind influence.

This summer, the National Museum of Natural History launched a new internship program, the Natural History Research Experiences (NHRE). Hundreds of applications were received and 18 were selected by an *ad hoc* committee. **Maddie Brown**, freshly graduated in Anthropology at Brown University, is one recipient. Interested in ethnobotany and classical culture, Brown is working with **Alain Touwaide** and **Emanuela Appetiti** on a program concerning the diet of ancient Rome. The hypothesis is that the Romans of classical antiquity chose their diets based on identifiable nutritional principles and guidelines. Brown will examine Classical texts for literary references to important agricultural and food plants, in order to attain a solid foundation on which sorts of plants the Romans of the 1st century AD were interested. She will combine this textual evidence with botanical data from both regional flora guides and the herbarium's collections in order to determine with greater certainty which plant species the Romans were probably consuming. This information will allow her to reconstruct how ancient Roman diets changed throughout the seasons as well as to ascertain the nutritional properties of their diets as a whole.

Another NHRE intern is **Heidi Wollaeger**, a Biology major with a minor in Studio Art at Wittenburg University in Ohio. While working with **Liz Zimmer** this summer, Wollaeger will examine genetic variation among populations of the cucumber magnolia, *Magnolia acuminata*. There have been previous suggestions that the species includes subspecies found in different geographic regions in the eastern United States. She will be amplifying and sequencing DNA from over 80 samples for three to four chloroplast DNA spacer regions that have been useful in differentiating populations of other plant species. Wollaeger is interested in doing graduate work in Botany and possibly in Museum Studies. She previously has done volunteer work at the Cleveland and Hollandia Botanical Gardens and the Cleveland Museum of Natural History; at the latter she used anatomical techniques to study fossil plants.

Travel

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Renaissance Society of America in Venice, conduct research at the National Library in Venice, meet with collaborators in Milan and Naples, and make presentations in Messina, Sicily; and to Toruń, Poland (6/17 – 6/20) to attend the meeting of the International Association for the History of Nephrology.

Jimmy Triplett traveled to Beijing, China (4/17 – 4/20) to visit the Chinese National Herbarium; and to southeastern China (Zhejiang, Guangdong and Guangxi Provinces), Hong Kong, and Hokkaido, Japan (4/20 – 5/13) for field research on the temperate bamboos.

Jun Wen traveled to Beijing, China (4/17 – 4/20) and Hangzhou, China (4/20 – 5/1) to conduct research and field work on *Dendropanax* (Araliaceae).

Jamie Whitacre traveled to Panama City, Panama (4/13 – 4/16) to participate in the Laboratories of Analytical Biology "Information Technology Road Show" at the Smithsonian Tropical Research Institute; and to Las Vegas, Nevada (5/24 – 5/26) to attend the iPlant 2010 Conference.

Kenneth Wurdack traveled to St. Louis, Missouri (5/7) to conduct herbarium research at the Missouri Botanical Garden; and to Guyana (6/20 – 8/4) to collect plants.



For the Record

The History of the US National Herbarium: The following footnote for authors Conrad V. Morton and William L. Stern was missing in the April-June 2010 issue of *The Plant Press* (13(2): 1,16-19): † Conrad V. Morton (1905 – 1972) was Curator, Division of Ferns in the Department of Biology from 1926 to 1972. William L. Stern (1926 –) was Curator, Division of Woods in the Department of Biology from 1960 to 1968, and is now retired, living in Florida, and working to complete a volume on orchid anatomy.

United States National Herbarium – Centennial Milestones: The article in *The Plant Press* (13(2): 10-11) incorrectly states that the herbarium began compactORIZATION in 1999. CompactORIZATION began in 1995. The first two bays were completed in 1999.

The 2010 Smithsonian Botanical Symposium to Explore Ethnobotany on 24-25 September

The Department of Botany will convene the 2010 Smithsonian Botanical Symposium, “**Food For Thought: 21st Century Perspectives on Ethnobotany,**” to be held at the National Museum of Natural History in Washington, D.C., on 24 – 25 September 2010. People are dependent upon plants for food, clothing, medicine, fuel and other necessities of life.

Humans and plants have interacted for as long as humans have existed, but our relationship is not static. Since

the advent of agriculture we have exerted evolutionary pressure on plants that are of importance to us. Indigenous and industrialized societies have interacted with plants in their environments and influenced not only crop plants, but also cultural landscapes. The Smithsonian Botanical Symposium, hosted by the Departments of Botany and Anthropology, will examine the 21st century transformation of the study of interactions between plants and people. Invited speakers will cover a wide range of topics: from the role molecular biology now has in elucidating crop domestication to the ways in which peoples across myriad ecosystems interact with specific plants and landscapes.

The speakers at the Symposium will be **Ruth Defries** (Columbia University), **Eve Emshwiller** (University of Wisconsin), **Cameron McNeil** (Lehman College), **Allison Miller** (St. Louis University), **Kenneth M. Olsen** (Washington University in St. Louis), **Torben Rick** (Smithsonian Institution), and **Julie Velásquez Runk** (University of Georgia).

The Botanical Symposium is one of many activities planned to celebrate the Centennial of the National Museum of Natural History. Symposium participants are invited to visit the new David H. Koch Hall of Human Origins, which is dedicated to the understanding of human origins. This major exhibition is based on decades of cutting-edge research by Smithsonian scientists, and it tells the epic story of human evolution and how this occurred over the course of six million years in response to a changing world.

The 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.

Sponsors of the Symposium are the Department of Botany, the Office of the Associate Director for Research and Collections, the United States Botanic Garden, and the Cuatrecasas Family Foundation.

Visit <http://botany.si.edu/sbs/> for registration and additional information about the 2010 Smithsonian Botanical Symposium. You may also call 202-633-0920 or email sbs@si.edu for more information.

Gramíneas de Zacatecas, México

Paul Peterson and fellow scientists Yolanda Herrera Arrieta and Armando Cortés Ortiz have produced a taxonomic

treatment of the grasses from the Mexican state of Zacatecas. Published in *Sida, Botanical Miscellany*, this treatment includes 284 species in 91 genera with six subspecies, 30 varieties, and four forms. Written entirely in Spanish, this publication contains keys for determining the taxa, descriptions, illustrations (at least one per genus), distribution maps, and specimens examined. Zacatecas is centrally placed in México (bisected by the Tropic of Cancer), located primarily east of the Sierra Madre Occidental and west of the Sierra Madre Oriental with nearly 75% of the state between 6000–8000 feet in elevation (10,501 ft on the tallest mountain).

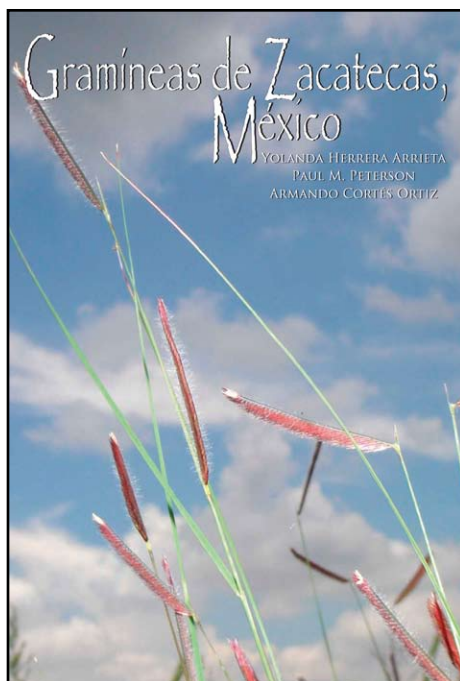
In 1546, the Basque, Juan de Tolosa, made a major silver strike in Zacatecas in the rough, arid mountains deep in Chichimec territory. Ciudad Zacatecas still harbors Mina El Edén, an active silver mine on top of Cerro del Grillo. Today much of the high plateau between the two Sierras is covered with C₄ grasslands that include xerophilous shrubs, pinyon–juniper, and oak woodlands.

This important study, supported by CONABIO (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad) and the Smithsonian, will be used by land managers, ranchers, ecologists, scientists, and plant enthusiasts who need to identify grasses throughout Zacatecas and surrounding states. Peterson will be traveling with Jeffery Saarela (Canadian Museum of Nature and former Smithsonian Research Training Intern) this fall, and together with Herrera Arrieta and Cortés Ortiz, will begin working on a grass flora of San Luis Potosí.

Smithsonian Staff Create First-Ever Human Sunburst

Standing in the shape of the Smithsonian Institution sunburst, close to 4,000 Smithsonian staff, interns, fellows and volunteers gathered on the National Mall in front of the Smithsonian Castle on Thursday, July 1, for a group portrait.

This was the first-ever attempt to gather the employees and others for a group shot in the Smithsonian’s 164-year history and was the largest gathering of Smithsonian employees, fellows, interns, volunteers and retirees to date.





Smithsonian staff create a sunburst (Photo by Dane Penland, Smithsonian Institution)

The photo was organized by the Smithsonian Community Committee and was taken during the Smithsonian Staff Picnic, held annually on the National Mall.

Visitors

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Chin Siew-wai, University of California-Davis, Singapore; *Prunus arborea* (Rosaceae) species complex (4/1-6/30).

Zhou Zhuo, Kunming Institute of Botany, China; *Cyanthus* (Campanulaceae) (4/1/10-3/29/11).

Li-min Lu, Chinese Academy of Sciences; *Parthenocissus* (Vitaceae) (4/1/10-3/31/11).

German Carnevali, Centro de Investigacion Cientifica de Yucatán A.C., Mérida, Mexico; Orchidaceae, Flora of Guaramacal (4/5-4/18).

James Bryant, Riverside Metropolitan Museum; Edmund Jaeger collections (4/9).

Nadia Roque, Universidade Federal da Bahia, Salvador, Brazil; Brazilian Asteraceae (4/19-4/30).

Fernando Alzate, Instituto de Biología Universidad de Antioquia, Medellín, Colombia; *Bomarea* (Alstroemeriaceae) (4/27-5/17).

Bertrand Ndzenen, University of the District of Colombia; DNA research (5/1-8/30).

Torke Benjamin, New York Botanical Garden; *Swartzia* (Fabaceae) (5/5-5/7).

Brian Sidoti, University of Wisconsin; *Tillandsia* (Bromeliaceae) (5/5-5/7).

Rafael Pinto, New York Botanical Garden; *Swartzia* (Fabaceae) (5/5-5/8).

Kerry Carfagno, University of Mary Washington; Cyanolichen Index (5/14-8/30).

Genna Fleming, University of Maryland; Plant Image Collection (5/14-8/20).

Dario Bonacorsi and Paolo Morazoni, INDENA, Milan, Italy; Fundraising (5/17).

Suman Neupane, Old Dominion University; Asian *Hedyotis* (Rubiaceae) (5/17).

Linda Prince, Rancho Santa Ana Botanic

Garden; Molecular research (5/17-5/21).

Lois Bangiolo, Smith College; Internship (5/17-8/13).

Marjorie Shropshire, University of Florida; Information technology (5/17-6/25).

Anna Braum, George Mason University; Plant conservation internship (5/17-8/20).

Michael Calonje, Montgomery Botanical Garden; *Zamia* and *Ceratozamia* (Zamiaceae) (5/20-5/21).

Rhiannon Knol, Randolph College, and **Robert MacInnis**, George Mason University; Map internship (5/23-8/13).

Matthew Johnson, Virginia Polytechnic Institute and State University; Plant conservation internship (5/24-8/12).

Kelsey Branch, College of William and Mary; United States grasses (5/24-8/20).

Megan Ondricek, Southern Virginia University; San Jacinto project (5/24-8/20).

Abbi Simons, Rochester Institute of Technology; Micro-imaging project (5/24-8/20).

Lillian Waller, William and Mary College; Botanical Expeditions research (5/24-8/20).

Fred Short, Director Seagrass Net, University of New Hampshire; Seagrass research (5/27).

Jyoti Gajurel, Tribhuvan University Central Herbarium, Kathmandu, Nepal; Herbarium management, Commelinaceae (6/1-6/21).

Yovanna Kolitsopoulos, Fordham University; Internship (6/1-7/30).

Heidi Wollaeger, Wittenberg College; *Magnolia acuminata* (Sapindaceae) (6/1-8/8).

Madeline Brown, Brown University; Natural History Research Experiences internship, *Historia Plantarum* (6/1-8/10).

Allen Thomas, Cabrini College; Map internship (6/1-8/13).

Dylan Brown, Dickinson College, **Sarah Miller**, St. John's College, and **Robert Pettit**, University of Maryland; U.S. Exploring Expedition (6/1-8/20).

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Ruth F. Schallert, 90, Botany & Horticulture Branch Librarian

Born in Whitehall, Wisconsin to Roy A. and Leila Fortun, **Ruth Schallert** developed her interest in the sciences at an early age helping her father around the family pharmacy after school and during holidays. A favorite recollection of those times was scooping orange-pineapple ice cream for customers, oranges and pineapples being a rare treat in those Northern climes.

She received her bachelor's degree at Luther College, Decorah, Iowa. After obtaining her library degree at the University of Michigan, Ann Arbor, she took a position at the Art Library, University of Iowa, Iowa City. Her next two library positions were with the Pacific Salmon Investigations Library of the U.S. Fish and Wildlife Services in Seattle, Washington and with the Naval Oceanographic Office Library in Washington, D.C. While living in Seattle, she and husband William Schallert had two daughters, Karla and Lisa.

After a brief period at the Smithsonian's National Museum of Natural History Entomology Branch Library, in 1966 she became the Smithsonian Botany Branch Librarian and in March 2003 the Smithsonian's Botany/Horticulture Branch Librarian. In June of 2003, the Council of Botanical and Horticultural Libraries (CBHL) awarded her the Charles Robert Long Award of Extraordinary Merit.

Schallert received the CBHL Award in honor of her professional library service since 1966 in the Natural History Museum as well as in recognition of her many collaborative activities with members of the American Library Association, the Special Libraries Association, the Society for the History of Natural History, the European Botanical and Horticultural Libraries group, and CBHL. She was a past-president of CBHL and was instrumental in designing the original bylaws for this Council. Some of Schallert's other honors include an alumni award in 2002 by Luther College and the naming of a new plant species in 1982 by Christine Burton, *Hoya schallertiae*, in recognition that the library research assistance Schallert gave her was "far beyond the call of duty."



Ruth Schallert in 2007 (Photo by Chip Clark)

Schallert's publications included two articles in professional journals:

- Churgin, S. and **R.F. Schallert**. 1980. History of the Smithsonian Libraries, with special emphasis on natural history. *Journal of the Society of the Bibliography of Natural History* 9(4): 593-606.
- White, J.J. and **R.F. Schallert**. 1986. Illustrations in the *Contributions from the U.S. National Herbarium*, 1890-1974. *Huntia* 6(2): 147-163.

After living in the woods of Accokeek, Maryland for many years and upon the passing of her husband Bill, Schallert moved to Arlington, Virginia to be closer to work and family. With great reluctance, Schallert retired from the Botany/Horticulture Branch Library in 2007, after 41 years of service. Later in 2007 she moved to Philadelphia to The Watermark at Logan Square retirement community in Center City to be near her younger daughter. Once settled, she volunteered two days a week at the Free Library of Philadelphia almost next door. A born librarian, she also took over voluntary management of the Watermark Library.

While on vacation in Cape May with her daughter Lisa, she fell, fracturing her hip. She subsequently had several strokes and lapsed into a coma, dying in her sleep on June 2, 2010. Schallert is survived by her daughter Lisa, and sons-in-law Alan

MacBride and Robert Farrall.

A memorial fund is being set up to in Ruth's name to honor her many years of service as the Botany Branch Librarian. A check can be made out to "Smithsonian Institution Libraries" and mailed to Rachele Hardy, National Museum of Natural History, Smithsonian Institution Libraries, NHB Room 26mz, MRC 154, PO Box 37012, Washington DC 20013-7012, or donated online through the SIL website at <http://donate.sil.si.edu/v/Donate.asp>. Please indicate in your correspondence that you are remembering Ruth Schallert.

Planting a Garden with the First Lady

Smithsonian Research Associate **Christopher Puttock** met with the First Lady of the United States Michelle Obama several dozen Congressional spouses, and students to plant of a native butterfly garden at the Marie H. Reed Community Learning Center on April 29, 2010. The Monarch Biodiversity Garden was designed by Puttock, who is also Executive Director of Chesapeake Natives, Inc., Chief Botanist for the Natural Partners Monarch Sister Schools Program, and leader of the Rotary District 7620 Environmental Conservation Committee. These three organizations were integrally involved with the supply, preparation, and delivery of this outdoor classroom.

Chesapeake Natives, Inc. <<http://www.chesapeakenatives.com>> is a Maryland-based non-profit organization that strives to preserve, propagate and promote plants that are native to the Chesapeake watershed. By protecting and restoring native plants, Chesapeake Natives is helping to sustain the regions local fauna, including its pollinators (including butterflies), and in sustaining the local flora aesthetic that makes the Chesapeake watershed unique. Chesapeake Natives' activities make native plants available to school and community projects in the DC, Baltimore and Annapolis area.

Chesapeake Natives works closely with the Monarch Sister Schools Program <<http://www.monarchsisterschools.org>> which is an initiative of the nonprofit Natural Partners to involve school children across North America in the protection and restoration of the habitat of the Monarch



Christopher Puttock planted a native butterfly garden with first lady Michelle Obama at the Marie H. Reed Community Learning Center on April 29, 2010.

butterfly, including its threatened winter habitat in the highlands of central Mexico and its disappearing milkweed habitat along its migratory flyway from Mexico to Canada. The Program provides the support that schools need to plant and sustain a Monarch Biodiversity Garden in their schoolyard (habitat restoration), create an outdoor classroom (STEM education) and establish a relationship with a sister school in Mexico (cultural exchange). The program is currently working with more than 20 schools in the Washington, D.C. metropolitan area.

The Environmental Conservation Program of Maryland/DC Rotary District 7620 is a part of the Rotary Preserve Planet Earth Program that started in 1990. Rotarians of Rotary Clubs in District 7620 are actively engaged in supporting elementary schools both financially and with volunteer service hours to sustain Monarch Biodiversity Gardens. In addition to the Monarch Sister School Program, almost all 70 Rotary clubs in the D.C. and Maryland area engage in numerous environmental activities in the District and across the world.

In addition to taking an active role in planting the garden Obama and the Congressional spouses painted butterflies on the mural during this community service afternoon. The butterfly murals that now surround Monarch Biodiversity Garden at Marie H. Reed Learning Center were designed by Loretta Thompson of the Sitar

Center for the Arts. The event was coordinated for the first lady by Lynsey Jeffries of Higher Achievement.



Visitors

Continued from page 7

Brittany Roger, Maryland Institute College of Art, and **Marielle Saums**, Carnegie Mellon University; Plant conservation internship (6/1-8/20).

Alice Zicht, Oberlin College; Arizona Flora project (6/1-8/20).

Christine Milne, Holy Cross; Cyanobacteria (6/1-8/27).

Alexey Zinovjev, Private, Randolph, Massachusetts; Salicaceae (6/2-6/3).

Hayley Hamilton and Tseday Zewdu Tegegn, University of the District of Columbia; Compositae (6/2-8/15).

Lorah Patterson, Western Michigan University; Botanical Expeditions research (6/3-8/30).

Christiane Staiger, MERCK Pharmaceuticals, Neu-Isenburg, Germany; Fundraising (6/4).

Francisco Morales, Instituto Nacional de Biodiversidad, Heredia, Costa Rica; Apocynaceae (6/7- 6/11).

Nancy Ogden, Florida Institute of Oceanography; Herbarium research (6/7-6/11).

Austin Campbell, St. Albans School for Boys; Internship (6/7-7/30).

Steven Chong, San Jose State University; Cyanolichen Index (6/7-8/20).

Caitlin Graney, Catholic University of America; U.S. Exploring Expedition (6/7-8/20).

Ashley Hlebinsky, University of Delaware, and **Kristin Krammer**, Gettysburg College; Botanical Expeditions project (6/7-8/20).

Holly Markley, University of Maryland; Plant conservation internship (6/7-8/20).

Rachel Barclay, Luther College; Katzenberger Art History internship, Cactaceae (6/7-8/25).

Adriana Mendoza, University of Maryland; Medicinal plant barcoding (6/7-12/31).

John Bly, American University; Plant conservation internship (6/14-8/20).

Lauren Kass, University of California-Santa Barbara; Frozen tissue collection (6/14-8/20).

Phil Gibson, University of Oklahoma; *Alnus* (Betulaceae) (6/16).

Kelda David, Shawn Francis, and Edgar Hunter, Dominica State College, Roseau; West Indian plant specimens (6/21-6/25).

Jose Zuñiga, Rancho Santa Ana Botanic Garden; *Meliosma* (Meliosmaceae) (6/21-7/15).

Michael and William Dix, Universidad del Valle de Guatemala, Guatemala City; Bromeliaceae (6/23-6/29).

Myron Kimmach, *Cactus and Succulent Journal*, Editor; Crassulaceae and Cactaceae (6/24-6/25).

Riccardo Baldini, Università degli Studi, Dipartimento di Biologia Evoluzionistica, Firenze, Italy; *Lasiacis* (Poaceae) (6/28-7/9).

Alejandra Jaramillo, University of Icesi, Cali, Colombia; Piperaceae (6/28-7/23).

Andrew Woo, Washington University; Bibliography of the U.S. Exploring Expedition (6/30-7/26).

Grand Challenges

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own back yard, America. Such a topic is not restricted to Science but rather crosses all four Grand Challenges. New insights will come from new ways of approaching the challenge. I hope it is clear that these four challenges were not viewed as independent from one another nor were they viewed as belonging to either Science or Art-History-Culture, but rather as an integrated whole. We developed a graphic that showed how we viewed the Grand Challenges and it shows that, in our view, they should all overlap and that the real power will be in those that cross over the traditional boundaries we have in the Smithsonian.

When I first agreed to take on this responsibility I was told by a colleague that the first rule of Strategic Planning (really of all administrative jobs) is to “do no harm.” I took this admonition seriously because the last thing any of us wanted was to make our colleagues working lives more difficult. I believe the Grand Challenges have the potential to bring together diverse groups of Smithsonian staff and their colleagues around the world to address interesting and important questions that will result in exciting forums and publications, exhibits, websites and education materials and contribute to solutions to important issues we face today. They also have the potential to develop into an additional layer of administration and to divert core funding if new funds are not found. As one of the proponents of the Grand Challenges I hope for the former and I urge all of you, if you agree with the vision, to do what you can to see that it is turned into reality.



Profile

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species of temperate bamboo: *Arundinaria gigantea* (river cane) in the Southeast and west to Illinois and Texas, *Arundinaria tecta* (switch cane) in the Atlantic coastal plain, and *Arundinaria appalachiana* (hill cane) in the mountains of Alabama, Georgia, North Carolina and Tennessee. Somewhat surprisingly, these three are only distantly related to bamboos in



Sasamorph *borealis*, a temperate bamboo native to Japan, and one of the putative parents of *Pseudosasa japonica*, a well-known and widely-cultivated bamboo recently revealed to be an intergeneric hybrid. (Photo by Jimmy Triplett; Kanagawa Prefecture, Japan)

Central and South America. Instead, our native canes are close relatives of East Asian bamboos (the *Arundinaria* clade, including *Pleioblastus*, *Pseudosasa*, *Sasa*, and *Sasamorph*); however, their closest relative within this group remains a mystery. China and Japan both have a vast diversity of temperate bamboos, and the taxonomy is quite complex. The trend of increasing taxonomic confusion from North America to China by way of Japan matches the increase in species richness: where more taxa overlap, taxonomy becomes less clear-cut. And nowhere is bamboo taxonomy more perplexing than in China, the center of bamboo diversity, where the current classification is a rough approximation at best.

Recent molecular research on the *Arundinaria* clade has brought a certain degree of clarity to this group, setting the stage for taxonomic revisions. One revelation from my dissertation research, using chloroplast sequence data and whole-genomic DNA fingerprinting (AFLPs), was an apparent undercurrent of hybridization and reticulate evolution. My molecular experiments hinted that many of the boundary-blurring taxa in Japan (including *Semiarundinaria*, *Sasaella*, and *Hibanobambusa*) were products of intergeneric hybridization. And as genetics

became a mosaic, so too did morphology. This surprising result contrasts with the rare occurrence of flowering in bamboos, and demands careful scrutiny with other lines of evidence.

In my current project I am using DNA sequence data from nuclear genes to evaluate the role of hybridization while also seeking a better understanding of phylogeny and biogeography. Nuclear data are valuable because they can track genetic contributions from both parents. My preliminary data strongly support hybridization as the culprit for taxonomic confusion, and also revealed hybrids where none were suspected. For example, all available data confirm that *Pseudosasa japonica*, a well-known plant in cultivation world-wide (and the type species of the genus *Pseudosasa*), is in fact a hybrid between two divergent bamboos in Japan!

My postdoctoral project has already provided valuable information about species in Japan and the U.S., and I hope to use these methods to shed light on the complex situation among their relatives in China. Towards this end, I recently had the opportunity to conduct field work in Southeastern China with Jun Wen and colleagues from various regional universities and gardens, including Zhejiang University and the South China Botanical

Gardens in Guangzhou. In April and May, we traveled throughout Zhejiang, Guangdong, and Guangxi Provinces in search of relatives of *Arundinaria*. The trip was a huge success, and we collected material from over 200 wild populations, several providing new tests of reticulate evolution. For example, in Zhejiang Province we collected *Sasa qingyuanensis* and *Yushania baishanzuensis*, two rare endemics. Where these plants have overlapping distributions, we also discovered another bamboo that was not readily identifiable, but intermediate between *Sasa* and *Yushania*: perhaps, a recent hybrid?

Complementing field work in China and my previous work in Central and Southern Japan, I also visited Hokkaido this past May, and hiked through mountains where *Sasa*, *Sasamorpha*, and *Pleioblastus* have their northern-most distributions. Here, among the melting snow of late spring, it was easy to locate forests with a dense understory of evergreen bamboo. In some localities, I was able to find striking examples of intergradation among sympatric species. Field collections from these sites in Japan and China are now a permanent part of the U.S. National Herbarium, and will provide ample material for ongoing investigations of bamboo diversity and evolution.

The implications of reticulate evolution in the bamboos may extend to very deep levels in this group, with some exciting implications for plant diversification in general. One of the more interesting preliminary findings is that polyploidy (genome doubling) appears to have occurred prior to the diversification of the temperate bamboos. In this group, every species examined to date is tetraploid (having four sets of chromosomes). My recent molecular evidence reveals that for any given gene, temperate bamboos have two very different copies of that gene – a tale-tell sign of hybridization. The fascinating thing is that this particular genetic merger appears to have occurred very early in the history of the temperate bamboos. In other words, the common ancestor of the temperate bamboos was itself a hybrid!

It is my hope that this work at the Smithsonian will provide a starting point for new lines of investigation, specifically, factoring hybridization, lineage reticulation, and polyploidy into our understanding of biodiversity and evolution. By

highlighting reticulate evolution and peeling away its complexity like the layers of an onion, we should be in a better position to characterize diversity in these giant grasses (or else, to abuse my own simile, we may find tears in our eyes!). With an improved understanding of speciation amidst ongoing lineage reticulation, it should be possible to construct a more accurate taxonomy and to revisit puzzles in bamboo natural history within an evolutionary framework. The golden age of bamboo taxonomy is still very much in the present, and the U.S. National Herbarium will continue to provide fresh perspectives about these plants that are mysterious, but not incomprehensible.

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Art by Alice Tangerini

***Sinarundinaria walkeriana* (Munro) CS Chao & Renvoize**

The temperate bamboos are a complex group in Asia, Africa, Madagascar and North America. The bamboo illustrated here (from Soderstrom and Ellis 1988, *Smithson. Contrib. Botany* 72: 1-75) is from Sri Lanka and was originally described in *Arundinaria* (now a North American endemic), but its closest relatives remain a mystery. "*Sinarundinaria*," like so many bamboo names, is something of a taxonomic way station. New molecular evidence is providing an improved understanding of bamboo evolution, including their phylogeography and the recurring role of lineage reticulation, as described in this issue of *The Plant Press*.



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