

The Plant Press



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Botany Profile

Keep Cool and *Carex* On

By Pedro Jiménez-Mejías

The Neotropic harbors one of the most striking biotas of the World.

It has attracted the attention of researchers since the establishment of modern biology. Indeed, the understanding of Neotropical organisms has played a major role in the development of some of the most significant works in evolutionary biology, such as Humboldt's basis of modern biogeography, the understanding of the Great American Interchange of fauna between North and South America during the Cenozoic Era, or the building of Darwin's Theory of Evolution itself. In addition, the Neotropic harbors amazingly diverse biomes, including one of the most biodiverse communities on Earth, the Amazon rainforest. Moreover, it is extensively known that the formation of the Andes promoted diversification and speciation, not only by the creation of new environments on its slopes, but also as a result of the diverse influence the mountain range had on the surrounding territories.

Under such an overwhelming presence, some discrete organisms remain mostly unnoticed and poorly understood. Among them there are many Neotropical graminoids, i.e. grass-like plants. Graminoids are the main components of non-tree dominated ecosystems, such as prairies, savannahs, or wetlands, which cover a significant portion of South America. Despite the lack of showiness seen in other flowering plants, graminoids are extremely important in terms of biomass, serving as shelter and aliment to many creatures, as well as serving as resource foundations for human com-

munities.

The genus *Carex* is one of these graminoids. *Carex* are sedges belonging to the family Cyperaceae, unlike true grasses which belong to family Poaceae. Under its current delimitation, *Carex* ranks as the third largest genus of flowering plants, containing close to 2,000 species, with new species discovered every year. Sedges of the genus *Carex* are cold-adapted, which is clearly depicted by its almost cosmopolitan distribution but total absence from tropical deserts and rainforest basins. The genus is known to have originated during the early Cenozoic probably in southeastern Asia. It spread and diversified through the northern hemisphere entering the southern hemisphere in South America, Africa, and Australasia by diverse colonization events. During its radiation *Carex* has always remained as a temperate element.

In the tropics, *Carex* species only occur on mountains. Most *Carex* species in South America are found in the Patagonia steppe and the Andean grasslands, although a number of taxa also inhabit the Argentinian pampas and the Brazilian-Uruguayan campos. Only seven species are known from the highest Guyanan tepuis. In Central America and the Caribbean, *Carex* is limited to the mountains as well. *Carex* also has one of the most striking disjunctions of the world, the bipolar disjunction, in which the same species occurs at high latitudes of both hemispheres. Compared to other bipolar plant genera, *Carex* has the largest number of species with a total of six species—five

are present in southern South America and one in New Zealand. Despite being considered aquatic plants, *Carex* inhabits a number of habitats, and the Neotropical members of the genus are found in wet environments as well as dry pastures and forest understories.

In Central and South America and the Caribbean, the genus *Carex* comprises about 200 species with a large majority of them endemic to the Neotropic. Neotropical *Carex* are rather phylogenetically diverse and have entered the continent many times from diverse areas of the world. While the most natural colonization route appears to be from North America via Central American mountains, there are a variety of situations. For example, recent studies in bipolar *Carex* point to direct long-distance dispersal colonization events between the higher latitudes of North and South America, rather than a stepping-stone dispersal mode through the intermediate ranges. On the other hand, direct colonization from Western Europe to Rio de la Plata region seems to have happened at least in the species of the section *Spirotachyae*. Africa could be another source area for at least the subtropical species of the section *Indicae*, an unusual *Carex* species with large open-paniculate inflorescences. More studied, but not less striking, is the dispersal through the Pacific. Two groups of species show close affinities with species in southern Australasia: the rush-like species of the section *Junciformes*, and the hooked-sedges of the former genus *Uncinia*. The

Continued on page 16

Pedro Acevedo traveled to Rio de Janeiro and Mato Grosso do Sul, Brazil (8/14 – 8/27; 9/12 – 9/15) to collect plants for his phylogenetics studies of Sapindaceae in the Neotropics.

Gabriel Arellano traveled to Barro Colorado Island, Panama (9/16 – 10/1) to conduct fieldwork and train technicians in a 50-ha dynamics ForestGEO plot.

David Ballantine traveled to Shenzhen, China (7/21 – 7/30) to attend the XIX International Botanical Congress.

Manuela Dal Forno traveled to Graz, Austria (9/3 – 11/7) to learn new analyses and techniques in lichen microbiology with Martin Grube at the University of Graz.

Stuart Davies traveled to Rio Grande, Puerto Rico (7/16 – 7/31) with **Gabriel Arellano**, **David Kenfack**, **Mauro Lepore**, **Haley Overstreet**, and **Lauren Krizel** to participate in the Center for Tropical Forest Science - Forest Global Earth Observatory (CTFS-ForestGEO) Dimensions Workshop funded by the National Science Foundation; and to Huntsville, Alabama (9/6 – 9/8) to visit a potential new ForestGEO site and give a lecture at

Alabama A&M University.

Laurence Dorr traveled to Shenzhen, China (7/15 – 7/26) to attend the XIX International Botanical Congress and to participate in the Nomenclature Section.

Ashley Egan traveled to Shenzhen, China (7/21 – 7/30) to attend the XIX International Botanical Congress where she presented a paper; and throughout Arkansas, Alabama, Louisiana, and Mississippi (9/25 – 10/16) to conduct population level sampling of *Phaseolus polystachios* (Fabaceae).

Sally Eichhorn traveled to Shenzhen, China (7/19 – 7/29) to attend the annual International Association for Plant Taxonomy (IAPT) Council Meeting.

Vicki Funk traveled to Shenzhen, China (7/15 – 7/30) to attend the XIX International Botanical Congress where she co-organized a session on Compositae and a session on “Systematic Agenda 2050,” and participated in the Nomenclature Section; and to Paris, France (9/14 – 10/11) to work in the herbarium to identify specimens collected from Madagascar.

Karen Golinski and **Spencer Goyette** traveled to Haida Gwaii, Canada (7/3 – 7/30; 9/11 – 9/27) to collect bryophyte specimens for the Global Genome Initiative (GGI) and search for rare mosses; and to Yellowknife, Canada (8/6 – 8/13) to collect bryophytes and participate in two BioBlitzes at the invitation of the Government of Northwest Territories.

Morgan Gostel traveled to Shenzhen, China (7/20 – 8/1) to participate in the Global Genome Biodiversity Network Asian Regional Workshop and to attend the XIX International Botanical Congress where he presented two talks and organized a workshop for the Global Genome Initiative for Gardens (GGI-Gardens); to Stillwater, Oklahoma (9/6 – 9/8) to give an invited seminar at Oklahoma State University; to Munich, Germany (9/23 – 9/30) to sample the living collection at the Botanischer Garten Munchen-Nymphenberg for GGI-Gardens and to work in the herbarium.

Matthew Haynsen traveled to Shenzhen, China (7/21 – 7/30) to attend the XIX International Botanical Congress where he presented a poster.

AJ Harris traveled to Guangzhou, China (7/20 – 7/23) to work in the herbar-

ium of the South China Botanical Garden (IBSC); to Shenzhen, China (7/24 – 7/31) to attend the XIX International Botanical Congress where she co-organized the symposium, “New insights on the assembly and biodiversity of the flora of North America,” gave a talk, and presented a poster; and to western North Carolina (9/8 – 9/11) to collect plants.

Pedro Jiménez-Mejías traveled to St. Louis, Missouri (9/19 – 9/27) to study the collection of Neotropical *Carex* at the Missouri Botanical Garden.

Joe Kirkbride traveled to Copenhagen and Aarhus, Denmark (9/11 – 9/22) to attend the VII International Rubiaceae and Gentianales Conference and to examine the collections of Ecuadorian Rubiaceae at the Aarhus University Herbarium (AAU) and the University of Copenhagen Herbarium (C).

W. John Kress traveled to Shenzhen, China (7/15 – 7/30) to attend the XIX International Botanical Congress where he gave a keynote lecture, “Tropical plant-animal interactions: Coevolution in the Anthropocene,” and he co-organized two sessions on DNA barcoding.

Gary Krupnick traveled to Cartagena, Colombia (7/23 – 7/29) to attend the International Congress for Conservation Biology where he presented a talk, “The immense value of scientific collections in conservation research.”

Sue Lutz traveled to Booth Harbor, Maine (7/3 – 7/19) to assist **Walter Adey** in a collecting trip.

Marcelo Pace traveled to Shenzhen, China (7/22 – 7/29) to attend the XIX International Botanical Congress where he presented two papers and a poster; to São Paulo, Brazil (8/11 – 8/18) to prepare course materials and write papers at the University of São Paulo; to Rio de Janeiro, Brazil (8/18 – 8/27) to attend the 68th Brazilian Congress of Botany where he presented two papers and taught two graduate courses on bark anatomy and macroscopic anatomical identification of lianas; and to Mato Grosso do Sul, Brazil (8/27 – 9/10) to collect plants in the Pantanal region.

Paul Peterson traveled to Shenzhen, China (7/15 – 8/23) to attend the XIX International Botanical Congress where he co-organized the session, “Poaceae:



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Chair of Botany

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Continued on page 5

Leaves of Grass

Cultured readers will recognize this as the title of a constantly reworked book of poetry authored by the 19th century American poet and self-promoter Walt Whitman. I must confess that as much literature as I read in secondary school and college I was never a fan of Whitman's poetry (perhaps this means I am not cultured). Nonetheless, it is impossible not to be familiar with some of his verse. My wife recently grew quite fond of "Song of the open road", which is from the second edition of his collection. She first became familiar with this poem courtesy of a catchy television advertisement for a luxury automobile. (The self-promoter reincarnated in an all too American way?). I surprised myself when I realized that I knew by heart several stanzas of "When lilacs last in the dooryard bloom'd", his elegy to Lincoln that first appeared in the fourth edition of his book. I also surprised myself when I discovered that reading Whitman's poetry was much more enjoyable now than when I was young.

The title of Whitman's collection is a pun. "Leaves" are another word for the pages on which the poems are printed. Look closely at the library catalog entry for any unpublished Botanical thesis or dissertation and you will see the typescript described as being composed of leaves, not pages. "Grass", which has other connotations for us now, was once printer's slang for works of minor value, items typeset when there was idle time. Whitman's leaves grew from 12 poems in the first edition published in 1855 to almost 400 in the final "deathbed" edition of 1891.

The U.S. National Herbarium has quite a few leaves of grass. I do not know how many we began with but we now estimate that there are 500,000 leaves or specimens in our collection (plus some 2,500 bulky bamboos). Like Whitman's book, we also are constantly reworking our collection to make it better, more discoverable, serviceable, more "readable", and dare I say poetic. Recently, with substantial financial support from the National Collections Program of the Smithsonian Institution we set in motion a series of changes that will vastly improve the physical and intellectual curation of the grass herbarium.

We are reorganizing the collection in a phylogenetic scheme consisting of 12 subfamilies, 52 tribes, and 762 genera and nothogenera (hybrid genera) based on Soreng et al. (*Journal of Systematics and Evolution* 55: 259-290; 2017). We currently file genera alphabetically, but this has created serious curatorial challenges. When research dictates that a genus should be split or separate genera should be combined the alphabet is very uncooperative. Whenever the curatorial challenge involved opposite ends of the alphabet, the default was to leave material under an incorrect or older name. As a result, the same species sometimes can be found in more than one location and sometimes under multiple

different names.

Additional improvements will include refolding the genera and moving away from a color-coded geographical system, which was unique within the herbarium. We discovered that the colored-folders used in the grass herbarium were not properly buffered and consequently not ideal for long-term conservation. We are convinced that standardizing the materials used and the geographic scheme across the herbarium will prove to be more efficient. Grass types now are kept immediately adjacent to the grass portion of the herbarium and moving them to the correct sequence within our separate vascular plant type collection will make finding them more logical. With a recent redesign of our compactors, we were also able to add a substantial number of new herbarium cases to this portion of the herbarium and this will permit a long-overdue decompression of the grass collection as well.

Earlier with other National Collections Program support, we re-housed the bulky bamboo specimens in new metal cases and we completed their inventory. Each bulky specimen is now reconciled with its relevant herbarium sheet in the grass collection. We also were able to process a backlog of unmounted field collections, freeing up space and generating ca. 20,000 sheets for exchange. Additional funds have been obligated to prepare or mount many of these specimens so that they can be made more readily available for study.

What made me associate an American poet with our grass collection? I trace it to one of those unexpected queries one receives as Chair. A member of our Public Affairs Office noticed last spring that it was Walt Whitman's birthday (31 May) and she asked me how many species of grass were named for the poet. I think she envisioned a quick tweet melding science and art. The short answer, however, is none. In fact, "whitmanii" is not a very popular epithet for any vascular plant, grass or otherwise. I hope American agrostologists will take note. The author of *Leaves of Grass* certainly deserves better than the ignominy of an eponymous rest area on the New Jersey Turnpike.



Chair

With

A

View

—

L.J.

Dorr



Staff Research & Activities

On July 24 and August 1, **Liz Zimmer**, **W. Carl Taylor** and **Gabe Johnson** with the assistance of two interns, **Henry Schaffer** and **Yash Kalburgi** conducted an introductory botany course for the Q?rius Youth Science Academy. Here area teenagers learned to collect and press plant specimens from the Smithsonian Gardens Pollinator Garden, properly maintain a field notebook, mount a herbarium specimen, and observe morphological characters under light and electron microscopy. The students also learned how to properly preserve and label leaf tissue for molecular studies, and participated in a quick DNA precipitation demonstration.

Immediately after attending the XIX International Botanical Congress (IBC) in Shenzhen, China, **Paul Peterson** and **Konstantin (Kostya) Romaschenko** traveled to Yunnan and Sichuan Provinces for 26 days (29 Jul–24 Aug) to collect grasses. They managed to gather 290 numbers exploring remote areas of western Yunnan and Sichuan near the Yangtze and Mekong Rivers (near the border of Myanmar and Tibet Province) and intervening mountains between 1851–4705 meters. Peterson and Romaschenko were accompanied by Jie Cai, Curator of the seed bank collection at



Paul Peterson and Kostya Romaschenko pressing grasses at the expedition diver's fathers-in-law house above the town of Yongzhi, Yunnan; in scree slopes just below the road they found *Phaenosperma globosum*, a monotypic genus, species, and tribe [Phaenosperrmateae, subfamily Pooideae]. (photo by Jai Cai, Kunming Institute of Botany)

Kunming Institute of Botany (our sponsor) and Zhang Wei, a new botany student. Habitats ranged from extremely xeric along the major rivers with *Rumex hastatus* D. Don, *Incarvillea arguta* (Royle) Royle, *Vitex*, *Sophora*, and *Artemisia* to temperate and alpine slopes with *Larix potaninii* Batalin, *Betula albosinensis* Burkill, *Picea*, *Abies*, *Juniperus*, *Quercus*, *Juglans*, *Rhododendron*, and *Berberis*. Interesting grasses included *Bromus sinensis* Keng ex Keng f., *Neyraudia arundi-*

nacea (L.) Henrard, *Piptatherum munroi* (Stapf) Mez., *Ptilagrostis yadongensis* Keng f. & J.S. Tang, *P. dichotoma* Keng ex Tzvelev, *Tripogon chinensis* (Franch.) Hack., and *T. sichuanensis* S.M. Phillips & S.L. Chen. In addition, Romaschenko presented a longer version of his IBC talk on the *Phylogeny, Geography, and Classification of Stipa* to a group of 24 students and faculty.

New Faces

In May, **Pedro Jiménez-Mejías** joined the Department of Botany of the National Museum of Natural History as a post-doctoral fellow. He is working under the supervision of **Laurence Dorr** and **Jun Wen** in the evolution and systematics of the mainly boreo-temperate genus *Carex* in the Neotropics. Little attention has been given to the mode and tempo of evolution of herbaceous temperate elements in the Neotropics, even though they constitute an important amount of the biomass in cold-adapted not-tree dominated communities, such as the Patagonian steppes and the Andean punas and páramos. Jiménez-Mejías received his Ph.D. at the Universidad Pablo de Olavide of Seville, Spain, where he studied the systematics and evolution of two *Carex* groups with especially problematic taxonomy. He has conducted post-doctoral studies in the



***Ptilagrostis dichotoma* with an open panicle, 1-flowered spikelets and plumose awns. (photo by Jai Cai, Kunming Institute of Botany)**



New faces in Botany Department: Pedro Jiménez-Mejías (left) and Mauro Lepore

Real Jardín Botánico (Madrid, Spain), Washington State University (Pullman, Washington), and the New York Botanical Garden (Bronx, New York). His research also includes evolution and systematics of Resedaceae and Boraginaceae, and genetic studies in endangered species.

To help scientists get the most out of their data, the Smithsonian has hired a new IT specialist in August, **Mauro Lepore**. Working with the Center for Tropical Forest Science and Forest Global Earth Observations (CTFS-ForestGEO), Lepore is writing and maintaining a collection of small computer programs that help forest ecologists analyze data of over six million trees. Lepore joined the Smithsonian in 2016 as a research fellow at the Smithsonian Tropical Research Institute. He researched how coral reefs in Bocas del Toro, Panama, have changed over the past 7,000 years in response to human impacts. The ideas he developed led to the paper, "Look to the past for an optimistic future," which was recently published in *Conservation Biology* (O'Dea et al. 2017). Lepore earned a Ph.D. in Ecology in 2015 from the University of Queensland, Australia, and graduated in marine biology in 2008 from the University of Buenos Aires, Argentina.

Travel

Continued from page 2

Systematics and phylogeny of major lineages," participated in the Nomenclature Section, and to collect grasses in Yunnan and Sichuan provinces.

Konstantin Romaschenko traveled to Shenzhen, China (7/15 – 8/24) to attend

the XIX International Botanical Congress where he presented a paper, participated in the Nomenclature Section, and to collect grasses in Yunnan and Sichuan provinces.

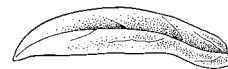
Eric Schuettpelz traveled to Costa Rica (7/1 – 7/9) to conduct research and collect ferns; and to Shenzhen, China (7/15 – 7/30) to attend the XIX International Botanical Congress where he presented a paper and participated in the Nomenclature Section.

Robert Soreng traveled to Shenzhen, China (7/15 – 7/30) to attend the XIX International Botanical Congress where he presented a paper, "Phylogenetic classification of the Poaceae (Gramineae): A comparison with the past & 2017 update," and participated in the Nomenclature Sec-

tion.

Jun Wen traveled to Shenzhen, China (7/15 – 8/11) to attend the XIX International Botanical Congress and to conduct field work in Hubei, Hunan, Guizhou, Guangdong and Guangxi provinces; throughout Illinois, Indiana, Kentucky, and Missouri (9/13 – 9/17) to collect plants and to conduct herbarium studies at the Missouri Botanical Garden; and throughout Arizona (9/26 – 9/29) to collect native grapes, naturalized ivies, and medicinal plants.

Elizabeth Zimmer traveled to Shenzhen, China (7/20 – 7/30) to attend the XIX International Botanical Congress where she presented a paper, "Isoetes of Eastern North America."



Staff on the Move

Sue Lutz has accepted a supervisory detail to serve as the Acting Collections Manager for the U.S. National Herbarium and began her duties on 1 September. Lutz joined the Department of Botany in 1997 in an administrative post while working half time as a research assistant to curator **Walter Adey**. For the last 10 years she has split her time working with Adey on algal biogeography and the systematics of coralline algae, and **Jun Wen** on the systematics of Vitaceae and the biogeography of intercontinental disjunct plants in the Northern Hemisphere.



Sue Lutz (right) preparing alga for voucher herbarium, with Danielle Lucid. (photo by Karen Loveland Adey)

I Know What You Did Last Summer: Reflections from Botany Interns

The Department of Botany is happy to host high school, undergraduate, and post-graduate student interns throughout the year. Internship activities peak during the summer, and 2017 was no exception. Below are a number of reflections from both interns and their supervisors highlighting the intern summer experience in Botany.

Clara Cebral-Marani, rising senior at a Virginia high school:

This past summer, I was a summer high school intern in the Botany Department and had the privilege to have **Erika Gardner** as my mentor. The internship was an incredible experience for me. I assisted Gardner in multiple tasks, such as care and handling of specimens, transaction entry using KE EMu database, and preparation of large lots of specimens to be shipped to herbaria worldwide. I attended several collection tours and two useful lectures. One of the lectures was about how to apply for a Smithsonian job, which will be useful in the future. I was fortunate to work with a fun group, and was able to enjoy the Great American Solar Eclipse with them.

Colleen Murdock, recent graduate of Trinity College:

It was such a pleasure working with CTFIS-ForestGEO this summer. I learned so much about their extensive global reach of 65 research sites and hundreds of scientists working to understand the dynamics of the Earth's forests. I enjoyed contributing to their wide variety of projects, including organizing and adding content to their new website and helping chart and analyze geographic data. Thank you so much for a wonderful learning experience. I'm moving on to an internship with Smithsonian's Center for Learning and Digital Access this fall, so I hope to stay involved with ForestGEO in the future.



Summer Botany Interns (clockwise from top left): Clara Cebral-Marani (in group, third from the right) joins Botany staff to view the partial eclipse on the National Mall in Washington DC on 21 August 2017; Colleen Murdock; Elizabeth O'Brian (in group, second from left) joins her advisors Vicki Funk, Bort Edwards, and Aleks Radosavljevic; Katherine Rudebusch

Libby O'Brien, undergraduate student at Villanova University:

I was fortunate enough to spend this past summer in the Botany Department working with **Vicki Funk**, **Bort Edwards**, and **Aleksandar Radosavljevic** as a part of the Natural History Research Experience (NHRE) program. Over the course of 10 weeks, I joined the team investigating the diversity of the Guiana Shield of northern South America. I analyzed patterns of richness and diversity from both genetic and spatial data. It was a summer of firsts: my first research experience and my first encounter with genetic data. I learned how to navigate the Metro system in Washington, D.C. as well as how to manipulate spatial data in programs like BioDiverse. It was a summer of re-strategizing what to do with so many data points and remembering to write everything down. I am grateful for all of the guidance and mentorship I've received from my mentors, as well as their willingness to keep me in the loop for the continuation of this project. I look forward to furthering this research with the wonderful group of people I met in Botany.

Alice Tangerini hosted intern **Katherine Rudebusch**, who was a recent graduate of the University of California at Monterey Bay's Scientific Illustration Program. Rudebusch scanned dozens of illustrations for uploading to the Botanical Art Collection in EMu's multimedia site. Many of these required extensive manipulation to remove discoloration from the backgrounds, usually due to long storage in acidic environments. She also rehoused these illustrations in archival protective sleeves and folders. Rudebusch visited several museums on the National Mall during her stay and joined Tangerini at Hirschhorn Museum evening art programs. On her last week, Rudebusch started work on an illustration of a new species of Fabaceae from the Amazon for researcher **Aleksandar Radosavljevic**.

Visitors

Morgan Gostel, George Mason University; Compositae and GGI-Gardens Program (9/1/15-8/31/18).

Afzal Shah, Quaid-i-Azam University, Pakistan; Tylophorinae (Apocynaceae) (12/29/16-6/1/17).

Yousheng Chen, Chinese Academy of Sciences, China; Pan-Himalayan Cardueae and Gnaphalieae (Asteraceae) (12/31/16-12/30/17).

Xu Su, Qinghai University, China; Triticeae (Poaceae) (12/31/16-3/1/18).

Jacob Suissa, Harvard University; Isoetes and Asteraceae internships (2/2-8/1).

Yuan Xu, South China Botanic Garden; *Androsace* (Primulaceae) (4/1/17-3/31/18).

Molly Megan, Smith College; Digitization internship (5/22-8/18).

Tag Hauschild, Ohio University; Botanical illustration techniques (5/23-8/23).

Elisabeth Bui, Australian National Herbarium; Asteraceae (5/30-6/3).

Henry Scheffer, Field Museum; Isoetes (5/30-8/15).

Jun Lim, University of California, Berkeley; Hawaiian *Peperomia* (Piperaceae) (6/2-8/15).

Shae-lyn Briggs, Wilkes University; DNA barcoding internship (6/5-7/28).

Renee Klann, Smith College; DNA barcoding internship (6/5-7/28).

Joyce Chery, University of California, Berkeley; Paullinieae (Sapindaceae) (6/8-9/22).

Hiltje and Paul Maas, Naturalis, Netherlands; Neotropical Annonaceae and Costaceae (6/10-6/20).

Larry Bird, National Museum of American History; Saguaro cactus (*Carnegiea gigantea*) (6/12).

Sylvia Kinoshian, Utah State University; *Ceratopteris* (Pteridaceae) (6/12-6/13).

Megan Proska, Dallas Arboretum; Herbarium tour (6/12).

Luciana Solomon, Instituto de Botanica Darwinion, Argentina; *Senecio* (Asteraceae) (6/15-6/28).

Greta Reinhart, Edgewater, Maryland; Botanical Art Collection internship (6/19-7/19).

Natalie Howe, U.S. Department of Agriculture; Lichens (6/26).

Melissa Chung, Wisconsin Department of

Natural Resources; Cameroonian Comelinaceae (6/30).

Clara Cebal-Marani, Vienna, Virginia; Collections care internship (7/5-8/25).

Mary McKenna and 10 students, University of Virginia Blandy Field Station; Herbarium tour, plant conservation (7/7).

Muriel Poston, National Science Foundation; Loasaceae from Chile and Argentina (7/7).

Julian Campbell, Bluegrass Woodland Restoration Center; Flora of North America and *Monarda* (Lamiaceae) (7/26-7/27).

Karla Sosa, Duke University; *Cheilanthes* (Pteridaceae) (7/31-8/1).

Colleen Murdock, Trinity College; CTFS-ForestGEO internship (8/1-9/20).

Jennifer Ackerfield, Colorado State University; Asteraceae (8/2-8/18).

Mark Tebbitt, California University of Pennsylvania; Andean *Begonia* (Begoniaceae) (8/3).

Aline Pontes, Universidade Federal de Pernambuco, Brazil; *Xylopia* (Annonaceae) (8/8-8/18).

Marianne Schnaubelt, University of California, Irvine; Herbarium volunteer (8/14-8/21).

Terry Lott, Florida Museum of Natural History; Veinless winged seeds of Apocynaceae, Bombacaceae, Celastraceae, Ericaceae, Escalloniaceae, Gyrostemonaceae, Malvaceae s.l., Meliaceae, Myrtaceae, Onagraceae, Proteaceae, Rubiaceae, Rutaceae, Vochysiaceae (8/29-8/31).

Suzana Costa, Universidade Estadual de Campinas, Brazil; Tribe Cryptangieae (Cyperaceae) (9/4-9/8).

Fred Barrie, Missouri Botanical Garden; Gesneriaceae (9/18-9/22).

Fabian Michelangeli, New York Botanical Garden; Melastomataceae (9/18-9/21).

Fumiyo Iwamatsu, The University of Kitakyushu, Japan; Bamboo (Poaceae) (9/25-9/28).

Noel and Pat Holmgren, New York Botanical Garden; *Penstemon* (Plantaginaceae) (9/28).

New Welcome Sign Provides Fresh Look to Fourth Floor Herbarium Entrance

By Robin Everly

Last year the Department of Botany announced its new exhibit in the fourth floor public space entitled, *Botany in a New Era of Discovery*. Created by botany staffers, this exhibit gave the area an updated look, as well as explaining the department's research to museum visitors. Four case studies of how new plant species were discovered by staff botanists are featured with intriguing story panels.

Along the same lines, this year Botany Department Chair **Laurence Dorr** decided it was also time to update the U.S. National Herbarium interior staff spaces beginning with the fourth floor. In March 2017, a committee was established to create a welcome panel along the fourth floor north wall to be followed by five display panels in the future. The committee is comprised of Department of Botany staff **Rose Gulledge** (committee chair), **Ingrid Lin**, **Melinda Peters**, **Alice Tangerini**, and Smithsonian Libraries librarian, **Robin Everly**.

The committee has been hard at work coming up with ideas and plans to transform this wall, plus the fourth floor entrance, and the three exhibit cases outside the Chair's office. The first completed project is the signature panel, *Welcome to the U.S. National Herbarium*. It is a lovely photograph of our iconic National History Building and dome taken by Lin. As Tangerini stated after selection, "The photo is timeless and fresh looking." The committee poured over 50 photographs of various photos of the building and surrounding gardens.

The committee's next project, after having our craft shop spruce up the exhibit cases, is to display Department of Botany items selected for the National Museum of Natural History's biannual Board meeting. Also this year, the work will begin on a second panel—telling the story of how the Japanese flowering cherry trees came to the United States. So next time you visit the herbarium, please be sure to check out the new welcome sign and our updates to beautifying and improving our fourth floor



A new welcome sign greets visitors to the U.S. National Herbarium. Standing in front of the sign is the exhibit committee (from left): Ingrid Lin, Alice Tangerini, Melinda Peters, Robin Everly, and Rose Gulledge. (photo by Gary Krupnick)

work space.

The committee would like to thank Smithsonian Facilities staff, particularly Kevin Moyers and LaMont Alexander, who have been a tremendous help in the committee accomplishing its work and vision.



Melinda Peters, Rose Gulledge, and Alice Tangerini disassemble a display case to prepare it for new material. (photo by Ingrid Lin)

Ensete superbum Still in Bloom: A Rare Medicinal and Ornamental Plant

By Shruti Dube

In the Botany Research Greenhouses in Suitland, Maryland, as we enter the fall months many plants are heading towards dormancy, but an *Ensete superbum* (family Musaceae) is still flowering and has been in bloom for more than two months. The plant that is in flower is the progeny of individuals collected and brought to the greenhouses by **W. John Kress** and **Mike Borden**. This species had been collected twice. The first time was in July 1999 in Peik Chin Myang Caves near Pyin-Oo-Lwin, Myanmar, growing in shallow soils on steep limestone cliffs in understory. The other was collected in April 1999 at Ban Tham Arawan between Loei and Udon Thani in Phu Rua District of Nong Bua Lamphu Province, Thailand. The Thai plant was growing on the ledges of limestone cliffs. Both plants flowered and then died in 2006 and 2008, respectively. The plant currently in flower was grown from seeds of the Thai plant.

Ensete superbum is a monocarpic herbaceous species of banana native to India in the Western Ghats, but can also be found growing at the rim of forests in Myanmar and Thailand. Plants may grow up to 4 m in height with a massive base, and a pseudo-stem made up of overlapping leaf sheaths. The leaves are oblong, narrowed to the base with short deeply grooved petiole and bright green in color. The inflorescence is first spherical, later a curved terminal spike on a robust peduncle. The bracts are orbicular, dark brown-red, 1 m long and broad, dense rows each with 10 to 15 flowers. The outer perianth is whitish, the inner perianth is shorter than the outer. The fruits are oblong berries about 7.5 – 8.0 cm long and triangular with subglobose, smooth brown or black seeds. The propagation is only by seed as it does not produce suckers and it is non-stoloniferous. It dies back in winter and resumes the next spring from the corm.

In India seeds are widely used to treat diabetes, leucorrhoea, and kidney stones. Collection of seeds and seedlings, indiscriminate harvesting of plants for medicinal purposes, and destruction of immature fruits by monkeys and elephants have driven this species to the verge of extinction. Several measures have been taken to conserve this species, including ex situ cultivation in the Botany Research Greenhouses.

The massive base of the plant and red flower head with broad leaves are morpho-



The participants of the 7th annual ForestGEO data analysis workshop

logical features that add to its appeal and makes it a good garden plant.

ForestGEO Hosts Summer Data Analysis Workshop

The Center for Tropical Forest Science - Forest Global Earth Observations (CTFS-ForestGEO) hosted 64 participants from 19 countries on 16-31 July 2017 in Rio Grande, Puerto Rico near the Forest-

GEO plot in Luquillo for their 7th annual data analysis workshop. It was 2 weeks of hands-on mentoring by senior scientists from ForestGEO and the Smithsonian Tropical Research Institute (STRI) to graduate students and postdocs to collaborate on their research. The goal is to have these up and coming researchers publish their papers post-workshop.

The annual workshops are an ongoing collaboration between ForestGEO and the Chinese Forest Biodiversity Monitoring Network (CforBio) with the Chinese Academy of Sciences. The U.S. National Science Foundation has provided financial support for the workshops since 2011 with the grant entitled, “Integrating functional, phylogenetic and genetic components of diversity for an improved understanding of forest structure, dynamics, and change.” At the workshop participants worked meticulously on forest site analyses focused on biomass and carbon storage, spatial dynamics, demography, and seed-seedling and phenology dynamics.

The workshop ended with a full day of scientific presentations where each participant gave a 5-minute lightning talk. All participants shared research findings from the workshop and received feedback and ideas about how to keep their research projects moving forward.



Ensete superbum blooming in the Botany Research Greenhouses. (photo by Leslie Brothers)



Botanists Endorse Shenzhen Declaration on Plant Sciences

Over 7,000 botanists from 77 countries gathered in Shenzhen, China during the last week of July to participate in the XIX International Botanical Congress. A pivotal outcome of the conference was the release of the Shenzhen Declaration on Plant Sciences. Written by a committee of 14 botanists, including **W. John Kress** and **Jun Wen** from the Smithsonian's Department of Botany, the Declaration calls for botanists to focus their work in ways to help society mitigate the detrimental impacts of human activities on plants and habitats with a goal of sustainability for future generations. It was recently published in the *Journal of Systematics and Evolution* and *PhytoKeys*.

The Declaration is structured around seven priorities that are far-reaching and broad in their scope: urging botanists to frame their studies in the context of a changing world; increasing the amount of funding to achieve global sustainability; boosting international collaboration across disciplines; developing new technologies; identifying all plant species before they go extinct; safeguarding traditional botanical



The XIX IBC Opening Ceremony. (photo by the International Botanical Congress)

knowledge; and heightening greater public engagement.

With the accelerating rate of change our planet and our societies are experiencing, the intent of the Declaration is a clear commitment to strategic action. Plants are not optional, and are vital to a functioning ecosystem. By framing all botanical disciplines (taxonomy, development, evolution, ecology, physiology, and genetics) in the context of our rapidly changing globe, botanists can contribute to the formation of a sustainable and healthy world.

Botany Department Takes Part in the Shenzhen Nomenclature Section at IBC

The Nomenclature Section of the XIX International Botanical Congress (IBC) was held at University Town, Shenzhen, China, from 17–21 July 2017, during the week prior to the main International Botanical Congress. The Section was attended by 155 participants from 30 countries. The average attendance (based on counts made by **Vicki Funk**) at any one point was 120-130 people. The event celebrated the 150th anniversary of the first rules for naming, i.e., Alphonse de Candolle's *Lois de la Nomenclature Botanique*.

Before the deliberations began on the morning of 17 July, De-Yuan Hong, one of the two Honorary Presidents of the Organizing Committee of the XIX IBC, welcomed the participants on behalf of the IBC. He emphasized that nomenclature is a cornerstone of taxonomy, as well as all of the botanical sciences. The deliberations during the rest of the week were chaired by Sandra Knapp, President of the Nomenclature Section, while expertise on the *Code* itself was provided by Nicholas Turland, Rapporteur-général, and **John Wiersema**, Vice Rapporteur and Research Associate in NMNH Department of Botany.

The Botany Department had good



Vicki Funk, Eric Schuettpelz, Paul Peterson, Laurence Dorr, and Konstantin Romaschenko attending the Nomenclature Section of the XIX IBC in Shenzhen, China, (photo by unknown passerby)

representation at the Section meeting with active participation by staff members **Laurence Dorr** (Chairman), **Vicki Funk**, **Eric Schuettelpelz**, and **Paul Peterson**, and by Research Associates **Konstantin Romaschenko** and **Robert Soreng**.

In total 397 proposals to amend the *Code* were submitted for consideration, plus 16 from the floor. This is the largest number presented to any Botanical Congress since the Stockholm Congress of 1950. Most of the decisions were decided by a show of hands, but some required a card vote where attendees voted by placing their card in either a yes or a no box. Some of the major decisions accepted were as follows:

1. The meeting agreed on a framework for the registration of new names and nomenclatural acts of plants and algae. A new, permanent Registration Committee will recommend on the official recognition of nomenclatural repositories. Registration for algae and plants will be voluntary, at least for the next six years; it cannot become a requirement for valid publication before the next IBC in 2023.

2. There is now an expanded Division III on governance of the *Code*, i.e., how the rules for naming algae, fungi, and plants can be changed. Since the rules were first written, methods for managing and changing the rules have partly depended on memory and records kept in hard-to-find publications. Anyone new to nomenclature would find it very difficult to understand the correct procedures, but now everything will be clearly spelled out in the *Code*.

3. Mycologists use the same rules for naming fungi as do botanists and phycologists for naming plants and algae, but there are some special rules for fungi. The Nomenclature Section in Shenzhen voted to put all the rules that apply solely to the naming of fungi into a dedicated chapter of the *Code*, and that chapter will in the future be changed and improved by the Nomenclature Session of an International Mycological Congress, which takes place every four years. The next one will be in 2018 in Puerto Rico. The decisions taken at the Fungal Nomenclature Session of an International Mycological Congress relating solely to names of organisms treated as fungi, once accepted by a subsequent plenary session of the same Congress, are binding on the Nomenclature Section convened at the subsequent International



Vicki Funk at the Nomenclature Section of the XIX IBC in Shenzhen, China, with the “yes” and “no” voting boxes. (photo by Sandra Knapp)

Botanical Congress. Such decisions will however be open for any editorial adjustments deemed necessary by the Editorial Committee.

Thanks to the efforts of all involved, we will have a new *Shenzhen Code* next year! That gives us six years to prepare for the next Nomenclature Section meeting at the IBC in Rio de Janeiro in 2023.

The official “Report of Congress action on nomenclature proposals” can be found in issue 66(5) of *Taxon*.

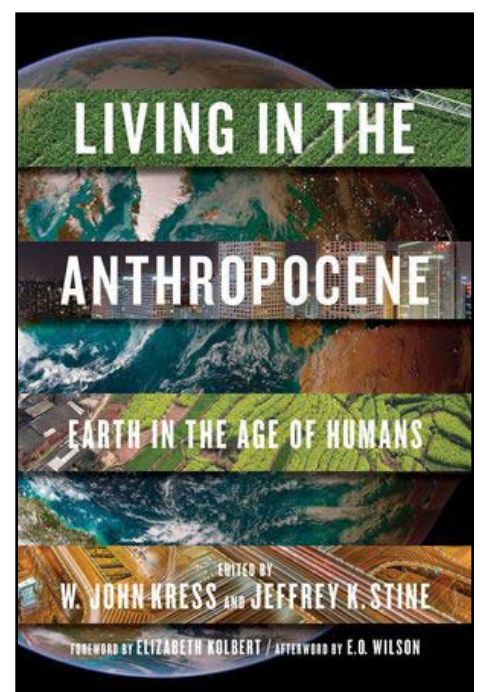
Earth’s timeline, they are driving major changes to the planet’s ecosystems. Even now, the basic requirements for human life—air, water, shelter, food, nature and culture—are transforming the planet as billions of people compete for resources. These changes have become so noticeable on a global scale that scientists believe this is a new chapter in Earth’s story: the Anthropocene, or Age of Humans.

Continued on page 13

Living in the Anthropocene: A Collection of Essays on the Age of Humans

Living in the Anthropocene: Earth in the Age of Humans, edited by **W. John Kress** (Curator of Botany at the National Museum of Natural History) and Jeffrey K. Stine (Curator for Environmental History at the National Museum of American History), explores the causes and implications of the Anthropocene, or Age of Humans, from multiple points of view, including anthropological, scientific, social, artistic and economic.

Although humans arrived recently in



Significant Changes Uncovered in the Marine Ecosystem of the Gulf of Maine

The coastal waters of Maine have seen a considerable rise in summer temperature during the last decade, and there is concern for the future of many coastal fisheries, including seaweed harvest. Along the immediate coast, seaweeds are the major supplier of primary productivity to the marine ecosystem. They also provide the major element of community structure, and are potentially the best indicators of long-term changes resulting from climate change.

During the early 1960s, **Walter Adey** developed an extensive and quantitative area cover database in the Gulf of Maine for the calcified and long-lived coral-line red algae. This was followed up by similar research into the Arctic and across the entire North Atlantic. From 1990 to 2007, he extended his work to all fleshy seaweeds using biomass. This summer, from June 15 to September 22, 2017, Adey revisited the stations of this unique database in the eastern Gulf of Maine to develop comparative data and to examine changes underway in the region.

Joining Adey on his field trip were



Alca i crew on completion of last leg of 2017 cruise: (back left to right) George Georgiadis, Silvana Campello, Karen Loveland Adey, Maggie Johnson; front Thew Suskiewicz, Tim Goertemiller, Walter Adey. (photo by Karen Loveland Adey)

scientists Matthew Suskiewicz, doctoral student from Laval University in Quebec, Canada, and Douglas Rasher from the Bigelow Laboratory for Ocean Sciences in Boothbay Harbor, Maine. They utilized the 64-foot research vessel *Alca i* with

Adey was the chief scientist and captain. Several of Adey's former and current university students and post-docs assisted the project as official Smithsonian volunteers. **Sue Lutz** served as senior technician.

Preliminary results are currently being analyzed. Earlier research had shown that two cold-water indicator species, the corallines *Clathromorphum compactum* and *Lithophyllum orbiculatum*, are abundant in the colder eastern part of the Gulf of Maine. A combined analysis from the 1960s to 2017 of both species at 12 stations shows a mean drop in cover of 39 percent of total cover. In addition, 11 of 12 stations showed a drop in cover, with only a single station showing a slight rise.

Seaweed biomass in waters 10-20m deep on the outer Maine coast between 1995-2007 were highly dominated by three Subarctic species: the kelp *Agarum clathratum* (canopy), the red *Ptilota serrata* (understory), and red *Euthora cristata* (epiphytic). In the 2017 collections there was almost no algal biomass at 20m. At 10m, all three dominant seaweeds occurred only as very small plants or fragments. It appears that in the roughly ten-year interval between surveys, the deeper water Subarctic component of the seaweed community was radically reduced.



Technicians sorting seaweed species in Alca i lab (left to right): Jack Girard, Alex Brett with co-PI Thew Suskiewicz. (photo by Karen Loveland Adey)

Several key invertebrate species (especially the keystone Subarctic species *Strongylocentrotus drobachiensis*, the green sea urchin, and *Asterias vulgaris*, the northern sea star), abundant in early surveys, were essentially absent. Crab species from southern waters and barnacles had taken their place. The barnacle abundance is especially interesting in that the research team can quantitatively demonstrate changes using the abundant collections of rocks bearing corallines in the U.S. National Herbarium. The great abundance of barnacles, competitors for space with the corallines, as compared to their absence in earlier collections, could be due to the presence of greater plankton populations (on which the barnacles feed), due to increasing nutrients, or the absence of a Subarctic predator.

The research team has uncovered significant changes (temperature, turbidity, nutrients, seaweed populations, and invertebrate populations) in the Gulf of Maine during the past decade, and these have serious implications for benthic community structure and for human coastal communities. In-depth analysis of data obtained during this summer's cruise is required to sort out the role of each factor. Clearly rising seawater temperatures is a major factor, and a great reduction in the



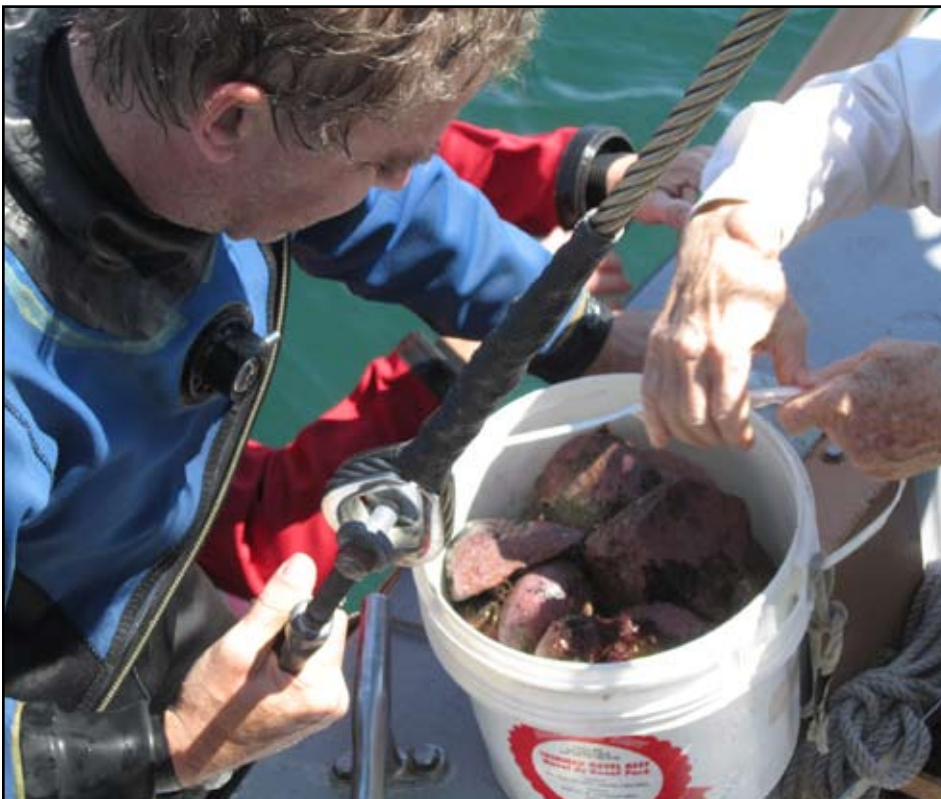
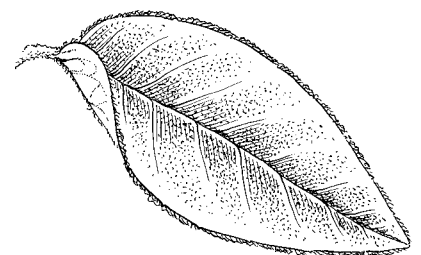
Thew Suskiewicz, Maggie Johnson and Walter Adey holding kelp *Saccharina latissima*. (photo by Karen Loveland Adey)

previously important Subarctic component of benthic community structure is the most striking result.

Anthropocene

Continued from page 11

Living in the Anthropocene: Earth in the Age of Humans, published by Smithsonian Books, contextualizes the era by presenting paleontological, historical and contemporary views of various human effects on Earth. It discusses environmental and biological systems that have been changed and affected; the causes of the Anthropocene, such as agricultural spread, pollution and urbanization; how societies are responding and adapting to these changes; how these changes have been represented in art, film, television and literature; and finally, offers a look toward the future of the environment and people's own lives. This important look at humankind's effect on Earth features essays by renowned, award-winning science writers Elizabeth Kolbert, E.O. Wilson and many other experts.



Part of coralline collection in bucket. (photo by Karen Loveland Adey)

A New Critically Endangered Tree Species Depends on Unique Habitat Found Only on Kauai

-Adapted from Pensoft Publishers

A new tree species, *Melicope stonei* (Rutaceae), endemic to the Hawaiian island of Kaua'i, is assessed as Critically Endangered according to IUCN criteria. The newly described *Melicope* is apparently restricted to unique old growth forest featuring a combination of tree species that are only found on Kaua'i.

The volcanic island of Kaua'i is the oldest of the high Hawaiian Islands featuring deeply eroded drainages, well-defined canyons, and stunning tall coastal seacliffs. It is also the most floristically rich of the Hawaiian Islands with *Melicope stonei* becoming the 249th endemic plant species known from only Kaua'i and nowhere else on earth.

Numerous threats currently endanger the new species and its unique home, including habitat degradation by introduced pigs and deer, predation of seeds by rats, environmental events such as hurricanes, fire caused mostly by humans, and competition with invasive non-native

plant species.

Representatives of the new tree species are around 5 to 12 m tall with trunks measuring up to 25 cm in diameter. Perhaps the most striking characters of *Melicope stonei* are the beautiful soft pubescence on the underside of its large leaves and its ramiflorous inflorescences, meaning that the flowers spring directly from the branches below the leaves.

Interestingly, the new species was first collected and documented as early as 1988. Since then 94 individuals have been mapped by local botanists in regions featuring unique high canopy mesic forest.

The new species has been officially described and named in the journal *PhytoKeys*. In their paper, Ken Wood (National Tropical Botanical Garden), Marc Appelhans (University of Göttingen, Germany), and Warren Wagner (Smithsonian Institution) also raise concerns on the conservation status of this unique tree which is severely limited to a 1.5 km² area of occupancy on Kaua'i. When interviewed, the authors make a strong case for increasing funding opportunities and enhancing a greater conservation ethic throughout world communities. "Unfortunately, in Hawai'i alone there are 424 federally threatened and endangered plant taxa with very few research biologists and limited funding available to adequately monitor and protect them," explains



Among the most striking characters of *Melicope stonei* are the ramiflorous inflorescences, the flowers that spring directly from the branches below the leaves. (photo by Kenneth R. Wood)

the team of scientists. "We are hoping for a renaissance in the natural sciences whereby society values the perpetuation of species diversity with as much enthusiasm as perhaps sports and entertainment."

"With respect to previous research scientists, we are pleased to name *Melicope stonei* in honor of Benjamin Clemens Masterman Stone, British-American botanist who had contributed over 300 publications to science during his career along with many keen insights into Hawaiian *Melicope*."

New Grass Discovered in the Mountains of Turkey

By Kayleigh Walters

Discovery of a new species of grass was reported for Turkey by Research Associate **Robert Soreng** (Smithsonian Institution) and colleagues Evren Cabi (Namik Kemal University), Lynn Gillespie (Canadian Museum of Nature), and Ekaterina Boudko (Tweed Inc.). The species is described in a recent issue of *Turkish Journal of Botany* (41: 189-199; 2017). In 2014, Soreng, Cabi, and Burçin Çingay (Nezahat Gökyiğit Botanic Garden) were



Hard to capture on their own because they live among a unique combination of other tree species, representatives of the new tree species, *Melicope stonei*, are around 5 to 12 m tall with trunks measuring up to 25 cm in diameter. (photo by Kenneth R. Wood)

on a collecting trip in south-central Turkey when they came across an unusual, mat-forming grass of the genus *Alopecurus* (foxtail) growing alongside their new *Belardiochloa* species (see *Plant Press* 18: 9; 2015). Boudko had just completed her master's degree on relationships within and among *Alopecurus* and its allies in 2014. The debate of "is this new or just an odd form of an already known species" began. Like the best of modern detectives, they conducted DNA analysis on this mysterious grass to get more information for their hypothesis. The DNA results came in: this was new. The botanists took their specimens out for re-analysis, and hit the herbaria to examine dried plants of similar taxa. They searched the published floras of Turkey, Greece, Europe, the Orient, Syria, Palestine, Sinai, Iraq, Iran, and the Soviet Union – their specimens' characteristics were not matched in any of these. It appeared they really did have a plant on their hands that was previously undescribed by the scientific community.

Alopecurus goekyigitiana Cabi & Soreng is named for Ali Nihat Gökyiğit, an individual important for his contributions to the Illustrated Flora of Turkey and to Turkish botany. It is a pale, greyish-green grass that forms large mats and has long, slender stems with a short, dense,

spherical inflorescence that is golden-yellow in color. It was found in the Taurus Mountains, on steep, craggy, mixed sedimentary-rock terrain, covered in arid high steppe to low subalpine vegetation. The researchers believe this new grass has a small range of not more than 100 km². Due to *Alopecurus goekyigitiana*'s limited range and the fact that it grows in a heavily grazed area, the researchers classed *A. goekyigitiana* as Endangered (EN) – although they do hope that its remote and rugged environment will offer some protection.



Conservation Biologists Find Reasons for Optimism

By Kayleigh Walters

Sometimes it feels like everything is bad news. Everything that is wrong with the world can hover in the background of our thoughts like a heavy storm cloud. In the recent paper, "Earth Optimism: Suc-

cess Stories in Plant Conservation," **Gary Krupnick** (Department of Botany) and Nancy Knowlton (Department of Invertebrate Zoology) inform us that not only is this focus self-defeating, but it is often incorrect. Conservation biology has seen repeated successes through sustained hard work and focus. The paper was published in the *Annals of the Missouri Botanical Garden* (102: 331-340; 2017).

The field of conservation biology is suffering from a focus problem; it is one of the only scientific discipline in which loss and the negative is so heavily focused on. While it is important not to be blindly optimistic, the media and educational material primarily highlight habitat destruction and loss, rather than discoveries of new plants or conservation successes. Many experts are even unaware or simply uninterested in stories of positive progress, leading to fewer encouraging stories being published. This contributes to people's perception of an unending, insurmountable problem where their actions have little impact. Rather than forwarding an outlook of despair, we need to see stories of successful actions and exciting discoveries.

The Global Strategy for Plant Conservation (GSPC) acknowledged this issue, and came up with a plan. This document, originally adopted in 2002 and extended through 2020, includes 16 goal-oriented targets specifically established for the survival and preservation of the world's plant biodiversity. In support of this, Krupnick and Knowlton argue for a four-pronged approach to including more stories of optimism into public outreach and education. They are discovering species, saving species, protecting spaces, and restoring habitats. Hearteningly, there are more examples of stories from each of these categories than there is room in this short summary. With technological advancement, we are now closer than we have ever been to a complete database of all world plants. The development of image recognition software for identifying new species will also help in discovering new species.

Success in saving species is also an important area of focus. While people and organizations have been working to delist species from the Endangered Species Act through recovery, many areas around the world have developed programs to rees-



Alopecurus goekyigitiana in the central Taurus Mountains of Turkey (left), and detail of the inflorescence. (photos by Evren Cabi)

Continued on page 16

Optimism

Continued from page 15

establish rare and endangered plants. One such area is Hawaii where a local program has taken recovery actions for 148 plant species. A specific example is the *Argyroxiphium sandwicense* subsp. *sandwicense*, the Big Island silversword, which went from 15 individuals in the wild to 13,600 on Mauna Kea alone after intervention.

Two more areas of success are in the protecting of spaces and restoring habitats. According to a recent report by the United Nations Environment Program and the IUCN, 14.7% of the Earth's land area, covering 202,467 spaces, is currently protected. Fear over the impact of climate change upon protected areas can even be somewhat tempered; a 2016 empirical study on mammal and bird species in protected tropical forest areas found that populations were not negatively impacted in ways that projected data would have predicted over a 3 to 8 year period.

As the article "Earth Optimism" states in its final paragraphs, "the goal is not to brush aside the bad news, but rather inspire the replication and scaling up of successful conservation actions." While a sense of urgency is important, news and celebration of the successes conservationists have accomplished is equally, if not more, needed.



Carex and other herbaceous species form part of the diet of the beautiful vicuña (*Vicugna vicugna*) in the high dry puna in Salta province, Argentina. (photo by Pedro Jiménez Mejías)

Carex

Continued from page 1

latter seem to have originated in South America, and then colonized Australasia. Eventually, although unclear, some preliminary results seem to point to a south-to-north colonization within America in a few species groups.

Despite its great ability to disperse, the vast majority of *Carex* species do not display any unequivocal long-distance disper-

sal syndrome. *Carex* fruit is a one-seeded nutlet that is enclosed in a bract-derived structure known as an utricle or perigynium. Only the utricles of the species belonging to the former genus *Uncinia* display a clearly ectozoochory syndrome: a hook that protrudes from the utricle beak and help the fruits to strongly attach to hair and feathers. Most utricles are unspecialized or only help to float the diaspore for a limited amount of time. Lately, a role of bird-mediated endozoochory has gained attention to explain the disjunctions. However, there is growing evidence of the role of non-standard stochastic events involved in the long-distance dispersal of plants with unspecialized diaspores.

My research in the Department of Botany at the National Museum of Natural History is a natural continuation of the work that I conducted during my former postdoctoral studies. While at Washington State University, my colleagues and I developed a global phylogeny of *Carex* including sequences of more than 1,000 species (>50% of the genus) (*Syst. Bot.* 41: 500-518; 2016). The phylogeny gives us the perfect framework to test biogeographical hypotheses on a global context. Did *Carex* species enter the Neotropic through windows of opportunity or was it more a progressive process? Did immigrating species adapt to the new environments they colonized or were they pre-adapted to these and thus did they establish as suitable habitats were created or coloniza-



***Carex crassifolia*, a rare species endemic to northern Argentina and southern Bolivia. Specimen from Salta province, Argentina. (photo by Pedro Jiménez Mejías)**



Carex subdivulsa, a very poorly understood species, which until recently was only known from its type locality in La Rioja province, Argentina. (photo by Pedro Jiménez-Mejías)

tion routes opened? Are in-situ radiations correlated with niche shifts?

Carex is not the only boreo-temperate plant group that has colonized the Neotropic several times. The grasses of the genus *Poa* display a rather similar situation with multiple colonizations into the Neotropic and a few in situ radiations. The study of these mostly neglected cold-adapted



Carex sororia, a species common in the grasslands of Paraguay, northern Argentina, Uruguay and southeastern Brazil. Specimen from Entre-Ríos province, Argentina. (photo by Sabina Donadio)

plants is key to properly understanding the evolutionary history of grassland communities in South America. It actually should be a matter of immediate conservation concern: under the current climate change scenarios, the populations at the distribution edges may be the most affected by global warming. The invaluable resources and opportunities that the Neotropical grasslands harbor, while hardly explored, may vanish before we are able to understand them.

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Continued on page 18

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Continued from page 17

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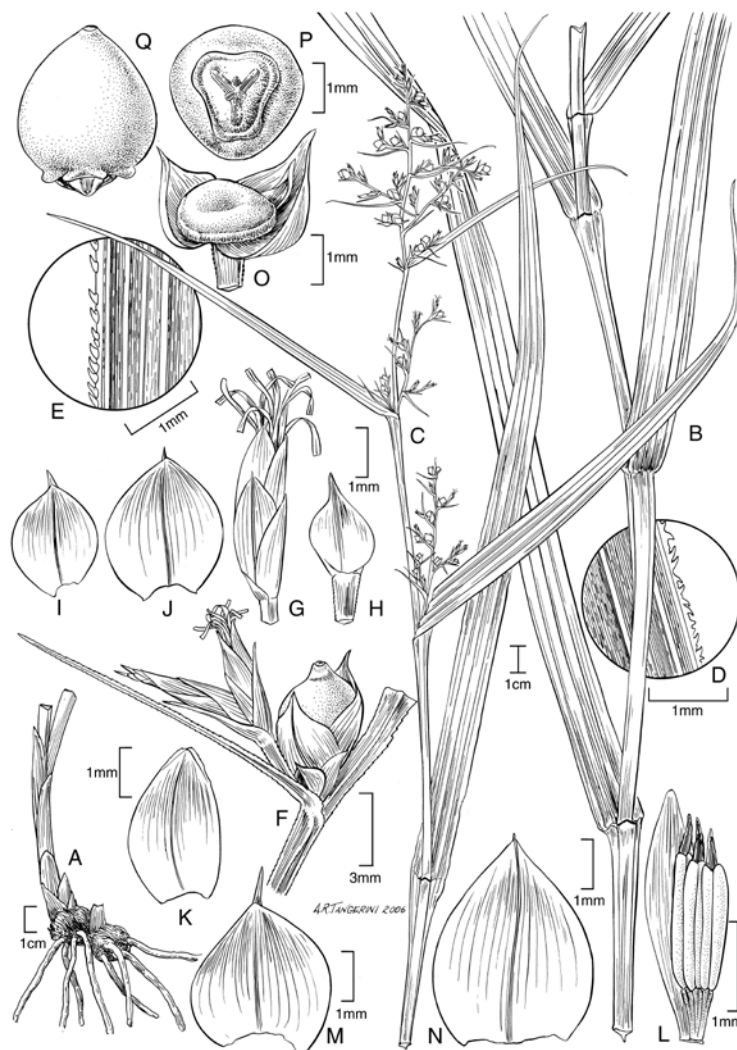
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Art by Alice Tangerini

***Scleria tropicalis* M.T. Strong**

Like *Carex* (see cover article), *Scleria* is a sedge with unisexual flowers. It can be found up to 2000 meters elevation in the Andes Mountains in South America. Laurence Dorr, Basil Stergios, and Ramon Caracas collected the type specimen of *Scleria tropicalis* at 1800 meters in Guaramacal National Park in Venezuela in 2005. Mark Strong described the species in 2007 in a paper published in *Harvard Papers in Botany* (11: 199–201). Illustrating *Scleria tropicalis* presented an issue for Alice Tangerini who wanted to fit the habit on a page at life size. The 2-meter plant had been folded at several joints to fit on a herbarium sheet so portions had to be cut from the drawing for clarity of presentation. By drawing the inflorescence separately, it could be scanned, placed in the layout with the habit, and floral and leaf details in Adobe Photoshop, without obscuring important structures.



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