

The Plant Press



Smithsonian
National Museum of Natural History

Special Symposium Issue - see page 13

New Series - Vol. 13 - No. 4

October-December 2010

Botany Profile Food, Glorious Food

By Gary A. Krupnick

The ninth annual Smithsonian Botanical Symposium was held on 24-25 September at the National Museum of Natural History in Washington, DC, bringing together botanists, anthropologists, archaeobiologists, and other scientists to examine "Food for Thought: 21st Century Perspectives on Ethnobotany." The event, hosted by the Departments of Botany and Anthropology, was held in collaboration with the United States Botanic Garden.

The symposium began with opening remarks by Warren L. Wagner, Chair of the Botany Department, and Cristián Samper, Director on the National Museum of Natural History. As Wagner introduced Samper, a slide of the Encyclopedia of Life webpage for "*Sampera* V. Funk & H. Rob, 2009" was displayed. The webpage <<http://www.eol.org/pages/17860196>> recently went live in honor of Samper's birthday. Vicki Funk and Harold Robinson named the genus *Sampera* (Asteraceae) in honor of Samper's research and service.

Before the seven invited speakers gave their talks, Laurence Dorr presented the ninth José Cuatrecasas Medal for Excellence in Tropical Botany to Beryl B. Simpson, C.L. Lundell Professor of Systematic Botany, University of Texas at Austin. Simpson is an expert in the phylogeny and biogeography of various angiosperm groups, with particular emphasis on plants from the American Southwest, Mexico, and Central and South America. While accepting her award, Simpson spoke of her long relationship with the Smithsonian Institution,

a place "dear to [her] heart." She was honored to have been in the same department with Cuatrecasas for several years, and even noted that she had named a species (*Polylepis pepeii*) in his honor, using for the species epithet a form of his nickname "Don Pepe."

Bruce D. Smith, Curator of North American Archaeology, Smithsonian Institution, who chaired the morning session, introduced the first set of speakers. Kenneth Olsen of Washington University in St. Louis first spoke of "Genetic Signatures and Consequences of Dual Crop Domestication Events in the Old World Tropics." Olsen discussed evidence as to whether or not certain species under domestication were brought into cultivation once or multiple times. He presented two case studies, coconut (*Cocos nucifera*) and rice (*Oryza sativa*), which both show evidence of more than one domestication event. Using microsatellite markers and a worldwide germplasm collection, Olsen showed differentiation between coconut populations in the Pacific and Indian Oceans. These patterns reveal that cultivated coconuts are derived from two distinct ancestral gene pools, with independent cultivation origins in the Pacific and Indian Oceans. There is also evidence of Pacific coconut admixture in the southwestern Indian Ocean, specifically along ancient Austronesian trade routes.

Olsen also spoke of the two independent origins of rice domestication. Two monophyletic groups (*Japonica*, Aromatic and *Indica*, Aus) are nested within *Oryza rufipogon*. A weedy rice (red rice, *Oryza sativa*) has lead to major loss in rice crop yields in the southern United States. Using molecular neutral markers, Olsen examined the origin of US weedy rice: US crop varieties (de-domestication), other Asian domesticated rice, wild *Oryza* populations, or multiple origins. He argued that the weed is likely derived from domesticated rice, but not directly derived from extant crop varieties, which suggests a long-term presence of current weed populations.

Next, Allison Miller of Saint Louis University spoke about the "Evolution of Clonally Propagated Plants under Domestication." Miller presented two case studies, horseradish (*Armoracia rusticana*) and pecan (*Carya illinoensis*), to explain the evolutionary dynamics of clonally-propagated crop perennials. One of the evolutionary consequences of clonal reproduction for plant mating systems is reduced fertility. Miller explored the possible mechanisms underlying reduced fertility by testing the hybrid origin of horseradish. A phylogenetic and Bayesian approach suggests a progenitor-descendant relationship between *A. macrocarpa* and *A.*



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Pedro Acevedo traveled to London, Leiden, and Berlin (7/3 – 7/28) to study collections of Sapindaceae from the Guianas; and to Manaus, Brazil (9/4 – 9/18) to coordinate a symposium on Sapindales in the Amazon Basin, to present a talk at the 61st National Brazilian Botanical Congress, to visit the INPA herbarium to study *Paullinia*, and to visit a plantation of Guaraná (*Paullinia cupana*) in EMBRAPA, Manaus, Amazonas.

Walter Adey traveled to Quebec City, Canada (9/24 – 9/28) to deliver a talk at Laval University.

Laurence J. Dorr traveled to Philadelphia, Pennsylvania (9/23) to use the library of the Academy of Natural Sciences and to participate in a Ph.D. committee meeting at Drexel University.

Christian Feuillet traveled to Macapa, Brazil (7/24 – 8/8) to study the collections of Gesneriaceae and Passifloraceae of the Herbário Amapaense (HAMAB) and to attend the 2nd International Congress on Biodiversity of the Guiana Shield; and to Paris, France (9/8 – 9/22) to work on the *Passiflora* and *Dilkea* collections, espe-

cially the types from the Guianas at the Jussieu herbarium and to present a talk at the Passiflora Society International Meeting 2010 near Blois.

Vicki Funk traveled to Providence, Rhode Island (7/30 – 8/5) to present a paper at Botany 2010; and to Manaus Brazil (9/4 – 9/9) to present a paper the Brazilian Botanical Congress.

Carol Kelloff traveled to Providence, Rhode Island (7/30 – 8/5) to present a poster at Botany 2010.

Gary Krupnick traveled to Edmonton, Canada (7/3 – 7/7) to present a poster at the 24th International Congress for Conservation Biology.

Dail Laughinghouse traveled to East Lansing, Michigan (7/10 – 7/13) to present a poster at the PSA annual meeting; to Belize (7/16 – 7/23) to conduct field work mainly with cyanobacteria and diatoms; to Steuben, Maine (7/25 – 7/31) to take a seminar on freshwater diatoms at the Humboldt Institute; and to Ceske Budejovice, Czech Republic (8/16 – 8/20) to deliver a talk on a new combination of a cyanobacterium, based on material from South America at the 18th International Association for Cyanophyte Research Symposium.

Diane and Mark Littler traveled to Belize City, Belize (8/11 – 8/26) to continue ongoing research; to Athens, Ohio (9/23 – 10/1) to receive an award, give a seminar, and discuss future research at Ohio University; and to Tallahassee, Florida (10/7 – 10/10) to attend a workshop.

Ida Lopez traveled to Lynchburg, Vir-

ginia (9/7) to present the LeafID application project to the college biology class of the Central Virginia Governor's School for Science and Technology (CVGS) and use their assistance in gathering more data for the project.

Paul Peterson traveled to Wye Mills, Maryland (7/24 – 7/27) and Annapolis Junction, Maryland (8/23 – 8/24) to collect with state botanist Christopher Frye, Maryland Department of Natural Resources; to Providence, Rhode Island (8/1 – 8/4) to present a talk at Botany 2010; to Bennington, New Hampshire and Brunswick, Canada (8/5 – 8/10) for a collecting expedition; and to Little Rock, Arkansas (9/1 – 9/2) and San Antonio, Texas (9/2 – 9/3) to collect grasses.

Harold Robinson traveled to Providence, Rhode Island (8/1 – 8/5) to attend Botany 2010 as an invited speaker.

Rusty Russell traveled to Riverside, California (7/9 – 7/25) for the "Mapping of Century of Change in the San Jacinto Mts." project; and to Woods Hole, Massachusetts (9/23 – 9/27) to attend a conference at the Marine Biological Laboratory.

Laurence Skog traveled to Providence, Rhode Island (7/30 – 8/5) to attend Botany 2010.

Robert Soreng traveled to Russia and Georgia (7/13 – 8/23) to collect seed of grasses and other forages in the northwest Caucasus Mountains and adjacent steppes.

Alice Tangerini traveled to Pittsburgh, Pennsylvania (9/21 – 9/26) to attend and participate in the Annual Meeting of the

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Chair of Botany

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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) (7/4/09-7/26/10).

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).

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).

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

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

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The Grand Challenges of the New Smithsonian Consortia

By W. John Kress

One of the enduring strengths of the Smithsonian is its great diversity of museums, research units, and intellectual endeavors, which have evolved over the lifetime of the institution. However, when the Secretary of the Smithsonian Wayne Clough launched the new strategic plan for the Institution last year, one of his main priorities was to consolidate these diverse scholarly activities into four “Grand Challenges.” *Unlocking the Mysteries of the Universe*, *Understanding and Sustaining a Biodiverse Planet*, *Valuing World Cultures*, and *Understanding the American Experience*. It was clear to the Secretary and the Strategic Planning Committee that the immense diversity of activities was a challenge to condense into an easily understood core mission of the Smithsonian. This problem was especially acute as the biggest capital campaign in the history of the Institution was about to be launched. Thus these four Grand Challenges were designed to distill the complexity of the Smithsonian into a more focused message to bring forth to our public constituents.

As pointed out by the Secretary in a recent address, the Smithsonian established the scope and depth of its scientific and cultural collections in the 19th century, built and expanded its great museums in the 20th century, and is now strengthening its core scholarly and scientific disciplines by fostering a greater level of interdisciplinary research and education through the Grand Challenges. As a means to accomplish this transformation, four Consortia, each of which corresponds to one of the Grand Challenges, were established and a director was selected from within the ranks of the Smithsonian community to lead each one.

As Director of the *Consortium for Understanding and Sustaining a Biodiverse Planet*, I have accepted the challenge to follow-through on the Secretary’s vision for the Strategic Plan. Both *Unlocking the Mysteries of the Universe* and *Understanding and Sustaining a Biodiverse Planet* consortia are located in the Office of the Under Secretary for Science. Dr. Eva Pell, who was appointed as Under Secretary for Science less than a year ago, has been instrumental in developing the conceptual as well as practical aspects of launching these two consortia. The goal of the Biodiversity Consortium is to generate major new interdisciplinary research programs, and funding to support them, across all units and museums at the Smithsonian that are focused on the biological sciences, which includes activities at the National Museum of Natural History, the Smithsonian Tropical Research Institute in Panama, the National Zoo and the Smithsonian Conservation Biology Institute in Front Royal, Virginia, and the Smithsonian Environmental Research Center on the Chesapeake Bay, as well as certain aspects of the Museum Conservation Institute in Suitland, Maryland. This task is not an easy one, but fortunately we were presented with a gift of \$10 million across all four Consortia to initiate

the process. As a result we have just launched the first institution-wide competition for funds to act as seed money to define and enable new cross-cutting programs to be developed by Smithsonian scholars. So far the number, breadth, and innovation of the proposals we have received are wildly encouraging.

A major question that I asked myself before I accepted the position as Director of the Biodiversity Consortium was whether or not the Smithsonian is indeed uniquely positioned to succeed in such a multi-dimensional approach to biodiversity. I reviewed the scope and depth of the taxonomic, evolutionary, phylogenetic, ecological, and conservation expertise and activities across the Institution; I evaluated the extent and projected growth of our scientific collections that are so essential to documenting the diversity and distribution of species across the planet; I studied the list of scientists currently in our departments, the roster of research projects currently underway, and the level of peer-reviewed funding currently available to make sure that we will be successful in these endeavors; and I compared all of these metrics with other similar natural history museums and academic institutions around the world pursuing these goals.

The conclusions I drew from these inventories were encouraging and illuminating. Yes, we have the scientists in our departments to succeed at understanding and sustaining a biodiverse planet; yes, we are engaged in cutting-edge and far-reaching projects in biodiversity research and sustainability; yes, our collections are growing at a substantial and manageable rate; and, yes, most surprising, our levels of internal and external funding support for our natural history research are substantial. On the other hand it was also obvious that we have much work to do to have the impact on biodiversity research and conservation that such a world-recognized scientific institution should be able to achieve. For example, we need to make a substantial effort to increase our activities in next-gen genomics applications across taxonomic and genetic disciplines; we need to augment our more traditional specimen inventory with a genome-quality tissue repository; we need to revolutionize our capabilities in bioinformatics management and analyses of specimen, genetic, and ecological data; we need to mobilize and synthesize our pan-institutional efforts in marine sciences; and, we need to collectively benefit from our extremely broad approach to understanding climate change and carbon cycling in past, present, and future environments. These are just a few of the possible and immediately obvious multi-disciplinary areas of research and infrastructure that cut-across scientific units at the Smithsonian. And these are exactly the areas of excellence that the Smithsonian’s Secretary, Under Secretary for Science, and Consortia are trying to build with both internal and external, new and existing funding. The next decade will be a Grand Challenge for all scholars at the Smithsonian as we move together into a new era of understanding and sustaining a biodiverse planet.

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With
A
View
—
Warren
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Wagner



Staff Research & Activities

W. John Kress was selected as the Director of the Consortium for Understanding and Sustaining a Biodiverse Planet. Four Consortia, each reflecting one the Grand Challenges of the Smithsonian's Strategic Plan, will draw from various fields to advance research and provide core content to inform exhibitions, curricula, and public programs.

On 8 September, **Gary Krupnick** hosted the bimonthly meeting of the Plant Conservation Alliance, a consortium of ten federal government member agencies and over 225 non-federal cooperators representing various disciplines within the conservation field, at the National Museum of Natural History. The meeting consisted of a behind-the-scenes tour of the exhibition "Losing Paradise? Endangered Plants Here and Around the World" and a presentation about the research of the Plant Conservation Unit of the Botany Department.

Robert Soreng joined a U.S. Department of Agriculture expedition, cosponsored by the Vavilov Institute of Plant Industry (WIR), 13 July to 23 August 2010, and lead by Doug Johnson, USDA-ARS, Logan, Utah, to collect seed of grasses and other forages in the northwest Caucasus Mountains and adjacent steppes. Soreng collected about 300 herbarium vouchers for the grasses and silica dried leaves for DNA studies. The first set was sent to US, and the second set went to WIR. On 18-24 August, he revisited the herbarium of Komarov Botanical Institute (LE) to examine specimens and types of *Poa* and related genera, 16 years after his previous visit to work on the C.B. Trinius herbarium with Paul Peterson and Carol Annable (*Guide to the Microform Collection*, Trinius Herbarium, IDC, 1995).

In September, **Alice Tangerini** attended the American Society of Botanical Artists annual meeting and conference which was held in Pittsburgh, Pennsylvania, at the Hunt Institute for Botanical Documentation. As an ASBA Board of Directors member, Tangerini attended the Board Meeting and gave her report on

the Members Gallery website where she is coordinator between members and the Webmaster, Frank Reynolds, who also maintains the Hunt Institute website. The ASBA is moving towards a more active web based organization since members are located throughout the U.S. and 22 foreign countries. Tangerini will likely be working with a web committee on improvements to the Members gallery website in the coming year. The meeting culminated in the awards ceremony where the "James J. White Award for Service to Botanical Art" was instituted to honor James White, former Hunt Curator of Art and former Collections Manager in the Botany Department, NMNH. The award was given to his assistant and current Curator, Eugene Bruno.

On 22 July, **Alain Touwaide** presented a two-part seminar for Smithsonian Resident Associates on the history of ancient scientific books. On 19-20 August, Touwaide and **Emanuela Appetiti** attended the Ghafiqi Workshop devoted to the 12th-century Andalusian botanist al-Ghafiqi and organized at McGill University in Montreal, Canada. Touwaide presented a paper on "Exploring Ghafiqi's Herbal." On 25 August, Touwaide made a one-hour seminar presentation to Smithsonian docents on plants and peoples. On 11 September, Touwaide and Appetiti organized a lecture on "Greek Medicine at the Smithsonian" for the delegates of the American Hellenic Educational Progressive Association (AHEPA). The lecture was followed by a visit of the museum.



Awards & Grants

Martin R. Kalfatovic (Smithsonian Institution Libraries) and **Laurence Dorr** received support from the Atherton Seidell Grant Program to prepare an on-line version of *Taxonomic Literature*, ed. 2, and its supplements that will be incorporated into the Biodiversity Heritage Library (BHL), the digitization component of the Encyclopedia of Life.

Vicki Funk, as lead editor of the book *Systematics, Evolution, and Biogeography of Compositae*, received the Stebbins



Vicki Funk (center) receives the IAPT Stebbins Medal from Warren Wagner and Pamela S. Soltis (Chair of the Stebbins Medal Committee).

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 received the award at the American Society of Plant Taxonomists (ASPT) banquet at the Botany 2010 meeting in Providence, Rhode Island.

Vicki Funk received a Distinguished Alumnus Award from Murray State University, Murray Kentucky. Funk received her B.S. (1969) and M.S. (1975) from Murray State University; after her Masters she went on to Ohio State University for her Ph.D. and the New York Botanical Garden for a postdoctoral fellowship. On October 8, 2010, as part of the award activities, Funk presented a departmental seminar on some of her research and in the evening she gave a short after-dinner talk about her experiences.

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

The American Society of Plant Taxonomists awarded **Harold E. Robinson**, a prolific expert on the sunflower family, their Asa Gray Award for outstanding career achievements at the society's



Staff, volunteers, and fellows of the National Museum of Natural History celebrate the museum's 100th birthday.

annual meeting in August. Robinson is hailed by his peers as a leader in research productivity, with his publication of 900 papers and over 600 new species names in his 54-year career.

Alain Touwaide was elected Overseas Fellow of the Royal Society of Medicine of the UK in July 2010, and **Emanuela Appetiti** has been appointed on the Advisory Board of the World History of Science On-line (WHSO).

Travel

Continued from page 2

American Society of Botanical Artists.

Alain Touwaide traveled to New York County, New York (7/15) to meet with the Greek Council; and to Montreal, Canada (8/18 – 8/21) to attend and present a paper at conference on ancient Arabic botany, pharmacy and medicine, organized by McGill University.

Warren Wagner traveled to Beijing, China (7/4 – 7/12) to attend the Interna-

tional Association for Plant Taxonomy council meeting and to speak at the international conference “New Frontiers in Plant Systematics and Evolution”; and to Providence, Rhode Island (7/31 – 8/5) to attend Botany 2010, and the council and business meetings of the American Society of Plant Taxonomists.

Jun Wen traveled to Beijing, China (7/4 – 7/7) to attend the international conference “New Frontiers in Plant Systematics and Evolution”; to Kuming, China (7/7 – 7/28) for fieldwork in Yunnan; to Providence, Rhode Island (8/1 – 8/5) to attend Botany 2010 and to collect on her way to and from the conference; to Singapore (8/17 – 9/5) to collect *Tetrastigma* in the Malesiana region and to attend the 8th Flora Malesiana Symposium; and to Knoxville, Tennessee (9/15) and Tallahassee, Florida (9/16) to make collections of Vitaceae in the southeastern US.

Elizabeth Zimmer traveled to Providence Rhode Island (7/30 – 8/5) to attend Botany 2010.

Staff Centennial Celebration

Staff, volunteers, fellows and others gathered on October 5, 2010 to celebrate the National Museum of Natural History's 100th birthday. The celebration kicked off with a photograph taken on the front steps of the museum, followed by a wine and cheese reception in the Rotunda.

To learn more about what has happened at this museum since the doors opened in 1910 visit the “Celebrating 100 Years” website <<http://www.mnh.si.edu/onehundredyears/>> where you will find a timeline, interviews, and photographs.

In the above photograph, members of the Botany Department are standing together on the right side, approximately half way up the stairs.



Cyanolichen Index

On 2 August, the Encyclopedia of Life (EOL) published 853 new taxon pages for cyanolichens, lichens whose phycobiont is a cyanobacterium. This is the latest milestone in a project begun two years ago with support from the Drouet Fund, a bequest of the late Francis Drouet which supports care and maintenance of cyanobacterium collections.

The lichen collection of the United States National Herbarium constitutes one of the finest and most complete research resources of its kind. Specialists worldwide take advantage of these specimens and their related data to support studies in systematics, ecology, biogeography, and other species-based research. Over the last 50 years there have only been two lichen curators caring for these collections, **Mason Hale** and **Paula Depriest**, the latter departing almost ten years ago. Even during their respective curatorial tenures, the backlog of unprocessed specimens was considerable and, despite a steady flow of foreign students under Depriest, a great deal of curation and specimen identification was needed. Also, except for the single family Parmeliaceae (a Hale specialty), no non-type specimens had been databased or imaged.

The Cyanolichen Index was a project conceived by **Rusty Russell** to improve the state of the lichen collections by processing and conserving backlog collections, improving specimen level identifications, and databasing specimens. Because the Drouet bequest specifies support of cyanobacteria, those lichen taxa containing blue-green phycobionts (mainly *Nostoc*) were project priorities. Finally, in concert with lichen specialists around the world, the plan included the creation of an EOL page for each species.

The first task was to continue an existing contract with Patty Groome who had been processing backlog lichens under an earlier Collections Conservation Grant. The majority of the backlog lichens have been housed at the Museum Support Center and, under the guidance of **Greg McKee**, collections coordinator for ferns, lichens and bryophytes, specimens were prioritized, selected and returned to the Mall for processing. Including the work conducted under the earlier grant, a total of 12,300 specimens have been processed, conserved and added to the collection.

This is the critical step, making these important specimens available for scientific study.

Next we addressed the need to electronically deliver specimen data, a process that we pioneered in 1970 with the Type Register. In the early 1990s, the lichen family Parmeliaceae was completely databased resulting in over 40,000 specimen records. Contractor Jackie Carroll began the task of entering cyanolichen data into EMu, the electronic museum specimen catalog. She was followed by Zuvayda Abdurahimova, a lichenologist and former Fulbright Scholar from Turkmenistan, who has also improved the curatorial state of the collection by resolving nomenclatural problems and identifying new collections. Since the project's inception, almost 7,000 specimen records have been created.

Finally, Kerry Carfagno, a student at the University of Mary Washington in Fredericksburg, was hired to begin the tedious task of assembling species information from published sources and organizing it for eventual posting to the Encyclopedia of Life. An online workspace <http://cyanolichens.lifedesks.org> was set up to manage the mountain of data being acquired. Information (when available) is provided on life habit, morphology, habitat, distribution, toxicity, and conservation status. In addition, protolog citations, synonyms, and a reference list of data sources are also included. Eight lichen scholars have signed up to review and approve content.

Compared to the majority of EOL pages, this project represents a unique methodology for acquiring and delivering data. It is the only EOL effort encompassing this many taxa that draws its information solely from the published literature. With each bit of data properly referenced against a bibliographic resource that numbers almost 400 titles, the species information is both well-cited and easily revisited, and it results from the published efforts of the entire community rather than a single researcher or research team. Hundreds of high quality images were graciously provided through a Creative Commons license by Stephen Sharnoff who produced all of the photographs for the landmark publication *Lichens of North America*, Yale University Press, 2001. And, at the urging of Carfagno, hundreds more were provided by a site devoted to tropical lichen <<http://www.tropicallichens.net>>

which is now a content partner in EOL.

The task of improving collections in an enterprise as large as the U.S. National Herbarium is daunting and never-ending. But a multi-year push to make positive changes in this particular part of our collection has been very successful due to the graciousness of our partners and the competence of our staff, students, and contractors.



Catalogue of Seed Plants of the West Indies

As a contribution to the International Year of Biodiversity, in early December **Pedro Acevedo** and **Mark T. Strong** will be posting the final version of the "Catalogue of Seed Plants of the West Indies." This catalogue, which is part of the "Flora of the West Indies" webpage <<http://botany.si.edu/antilles/WestIndies/catalog.htm>>, contains a searchable updated list of scientific and common names of the seed plant taxa known to occur in the Bahamas, Greater Antilles, and Lesser Antilles. The Catalogue is expected to be an essential tool for conservation and biogeography studies in the West Indies, the third most important biodiversity hotspot in the world, with high priority for conservation due to the loss of habitat. Nearly 30,000 scientific names and 30,000 common names are treated in the catalogue, comprising 231 families, 1,945 genera, and a total of 10,525 indigenous taxa with 71% (7,479 taxa) endemism. Additionally, the website provides distributions of the species within and outside of the West Indies, and numerous color images. A printed version of the catalogue is expected early in 2011.



Thespesia grandiflora DC (Malvaceae) is an endemic species from Puerto Rico but it is widely cultivated through the Caribbean and other tropical regions.

The Field Book Project

The Smithsonian has taken part in hundreds of national and international field surveys and expeditions including the historically significant United States Exploring Expedition (1838-1842), United States and Mexican Boundary Survey (1848-1855), Biological Survey of the Panama Canal Zone (1910), Botanical Explorations of Haiti (1919), and the Botanical Explorations in Amazonian Peru and Brazil (1929). Field books documenting these explorations number in the thousands, yet descriptive access points for these items are typically minimal at best, making discovery challenging and relevancy assessments nearly impossible for offsite research.

Although earlier attempts within the Department of Botany to improve access to field books, such as the searchable *Collector's Field Books and Miscellaneous Notes Index* greatly improved access to field books and related materials within the museum, more detailed information about these collections is still needed. Now, the Department, in conjunction with the Smithsonian Institution Archives (SIA), will go several steps further in making field books accessible throughout the Institution. *Exposing Biodiversity Field-books and Original Expedition Journals at the Smithsonian Institution*—or the *Field Book Project*—is an effort to locate and make accessible field research materials. A searchable database will be developed to describe, cross-reference, and locate each field note collection and every set of documents within.

This database will also serve as the framework for a larger registry system that will allow other organizations to enter detailed records for their field book holdings in an aggregated digital repository. The goal of the registry is to alleviate the struggle of scholars who must search for related materials that are physically dispersed throughout multiple facilities or in disparate locations even within the same institution.

Because field books provide the context in which a specimen was collected, they are useful, for example when reconstructing a collector's itinerary in order to locate specimens. As **Vicki Fuck** noted in conversation, this is especially

important if a specimen was collected only once. A detailed catalog of field books would allow users to identify the specific resources needed to reconstruct an itinerary without the need to travel.

The Field Book Project is collaborating with the broader biodiversity community to ensure that we build on existing standards and consider various research needs. Through our partners at the Biodiversity Heritage Library (BHL), we hope to garner the interest and participation of other custodians of biodiversity field books worldwide.

We look forward to working with our SI colleagues and invite comments and feedback while we develop the catalog system. Anyone interested in testing the registry in the future when a prototype is available may contact Sonoe Nakasone at 202-633-1061 or nakasones@si.edu.

LeafID Enlists Citizen Scientists

As natural habitats continue to disappear, biologists increasingly find the need for more help in searching for species. Engaging the citizen scientist is one of the goals of the LeafID application that **John Kress, Ida Lopez**, and collaborators at Columbia University and the University of Maryland are developing. The smart phone application, currently in beta-testing, is able to identify a tree based on an image of the leaf. This NSF funded project has created datasets of locations for appli-

cation uploads. Beta-testing applications include the trees of Rock Creek Park in the Washington, DC area and the trees of Central Park, New York.

A library of leaf images is necessary to capture the morphological differences in each species of trees found in the app. To achieve that library, images of 50 different leaves taken with a cellular phone are utilized. The app algorithm searches this library to come up with ranked possible matches of species.

Hoping to draw future scientists, Lopez travelled to Lynchburg, Virginia on 7 September 2010, to meet with the college biology class of the Central Virginia Governor's School for Science and Technology (CVGS) and to make use of their assistance in capturing leaf images for the project library. Early that morning, Lopez met with the class of 19 students, Cheryl Lindeman, class teacher and Biology/Partnership Coordinator for CVGS, and Nancy Cowden, botany professor at Lynchburg College. The group met at Lynchburg's Old City Cemetery, a 26-acre historic cemetery and arboretum with many old, established trees. Greeting the group that morning was Bruce Christian, Ted Delaney and other staff members of the Old City Cemetery. The students were incredibly focused on their task. After preliminary instructions on the requirements for the images, the group was able to collect and image over 500 leaves in less than two hours thus adding another 11 of the harder-to-find tree species to the LeafID library.



Ida Lopez (far right) with college biology students of the Central Virginia Governor's School for Science and Technology (CVGS).

Art and Science Presented in a Unique Exhibition

The traveling exhibition, “Losing Paradise? Endangered Plants Here and Around the World,” recently opened at the Smithsonian’s National Museum of Natural History in Washington, DC. The exhibition, a collaborative effort between the American Society of Botanical Artists and the museum, showcases botanical illustrations and features work from several renowned artists, including **Alice Tangerini**. The exhibition is on display until 12 December 2010.

Focusing on global conservation, the exhibition educates the public about endangered, threatened, and extinct plants. Additional custom content designed by the museum for this venue highlights the unique and provocative way scientists and conservation biologists are approaching the loss of plant biodiversity—particularly through their work with botanical artists whose captivating and scientifically accurate images serve as an essential historical record of plant species.

With 44 framed artworks by various international artists from Australia, Brazil, Israel, South Africa, South Korea, the United Kingdom, and the United States; eight interpretive panels; and two cases of specimens and objects from the museum’s botany collection, “Losing Paradise?” tells the valuable and fascinating story of species like the critically endangered *Mortoniadendron uxpanapense*. It was found when researchers re-evaluated collections from the 1980s, and it is documented through artistic illustration using the museum’s herbarium specimens.

A companion catalog, with an essay by exhibition curator and conservation biologist **Gary Krupnick**, accompanies the exhibition. The catalog <<http://www.amsocbotartists.org/ASBA-Catalogs.html>> expands on the stories of each plant included in the exhibition and the methods taken by the artists to visually capture the endangered specimens.

“Determining which species are endangered is a complicated endeavor,” said Krupnick. “With conservation assessments of plant species woefully behind, we are devising ways to use data from historically collected specimens to identify rare and endangered plant species. The museum’s work in conservation assessment is critical as each year more species are lost to habitat destruction and degradation.”

A companion website <http://www.mnh.si.edu/exhibits/losing_paradise/index.html> to the exhibition features a study of the illustrations of endangered plants and a view of herbarium specimens up-close, a chance to share your own botanical illustrations with others online, and a way to send a painting of an endangered plant to a friend via e-postcard.

Visitors

Continued from page 2

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

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

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

Rhiannon Knol, Randolph College, and **Robert MacInnis**, George Mason University; Maps 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).

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

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

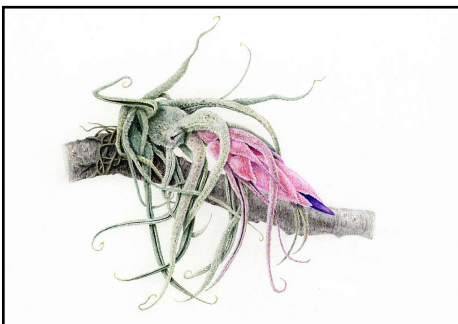
Madeline Brown, Brown University; Natural History Research Experiences internship, *Historia Plantarum* (6/1-8/10).

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.



Artists and the exhibit design team, including Alice Tangerini (top row, third from left) and Gary Krupnick (top row, far left), at the opening reception for the exhibition “Losing Paradise? Endangered Plants Here and Around the World.”



Tillandsia pruinosa by Karen Coleman

Exploring Expedition (6/1-8/20).

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).

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).

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 (6/7-2/31).

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).

Amy Chang, Johns Hopkins University; Collections management internship (6/17-8/13).

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

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).

Livia Radici, University of Messina, Italy; Ancient toxicology (7/1-8/15).

Marina Cortes, Columbia University; *Heliconia* (Heliconiaceae) (7/6-12/31)

George Ferguson, University of Arizona; Conifers (7/7-7/16).

Jorge Mena-Ali, Franklin and Marshall College; smut *Microbotryum* infecting Portulacaceae (7/12-7/13).

Marc Baker, Arizona State University; Cactaceae (7/13-7/14).

Sheena Friend, Virginia Technical Institute; *Arachis* (Fabaceae) (7/14-7/15).

Steve Muzos, University of Texas; *Bambusa* (Poaceae) (7/14-7/16).

Eric Roalson, Washington State University; Hawaiian *Cyrtandra* (Gesneriaceae) (7/15-7/16).

Ghilleen Prance, Royal Botanic Gardens Kew, United Kingdom; *Barringtonia* (Lecythidaceae) (7/19-7/20).

Antsa Randriamihaja and **Greg Zell**, Arlington County Department of Parks and Recreation; Flora of Arlington County (7/20).

Alberto Rigolio, University of Oxford, United Kingdom; Science in the Medieval Mediterranean (7/20).

Vincenzo Tavernese, University of Messina, Italy; Ancient medicinal plants (7/20-8/15).

Carlos García-Robledo, University of Miami; Plant-herbivore interactions (7/20/10-7/19/11).

Brian Forni, United States Congress; *Historia Plantarum* (8/2).

Marianna Koronitou, University of Athens, Corinth, Greece; Medicines of Byzantine physician Nicholaos Myrepsos (8/3-8/28).

Roger Sanders, Bryan College; *Lantana* (Verbenaceae) (8/4-8/6).

Sean Carrington, University of the West

Indies, Cave Hill Campus, Bridgetown, Barbados; Lesser Antilles seed plant endemics (8/4-10/31).

Juan Chen, South China Botanical Garden, Guangzhou, China; *Curcuma* (Zingiberaceae) DNA barcodes (8/9-2/15/11).

Richard Pell, Carnegie Mellon University; Artist in Residence program (8/10-8/11).

Thomas Mione, Central Connecticut State University; *Hebecladus* and *Jaltomata* (Solanaceae) (8/13).

Rubens Coelho, Universidade Estadual de Campinas, Laboratório de Sistemática Vegetal, São Paulo, Brazil; Sapindaceae (8/16-8/30).

Sushil K. Paudyal, Old Dominion University; Catesbaeeae-Chiococceae complex (Rubiaceae) (8/26-8/27).

Susan McCombs, Michigan State University; Greek manuscripts of Dioscorides' *De materia medica* (8/27).

Andrew and Deirdre Bean, Independent researchers, Sydney, Australia; Losing Paradise exhibit and herbarium tour (8/30).

Hannah Ahn, University of Michigan; Plant conservation internship (9/1-12/2).

Renard Cohen, Resolution Pictures, Fogelsville, Pennsylvania; Visualizing manuscripts of botany and Renaissance herbals (9/7).

Alejandro Rojas, Universidad Nacional de Costa Rica; Costa Rican ferns (9/9-9/17).

Nevien O'Keeffe, George Mason University; *Quercus* (Fagaceae) (9/17- 2/31).

George Dangas, Columbia University Medical Center and Hellenic Medical Society of New York; Ancient Greek medicine (9/21).

Alexander Krings, North Carolina State University; North American Rubiaceae (9/21).

Frank Farruggia, University of Utah; Central and South American *Solanum* (Solanaceae) (9/24-9/26).

Erin Tripp, Rancho Santa Ana Botanic Garden; *Ruellia* (Acanthaceae) (9/27-9/28).

Plants Used in Medicine 2,200 Years Ago are Identified

In collaboration with geneticist Robert Fleischer of the Center for Conservation and Evolutionary Genetics, **Alain Touwaide** and **Emanuela Appetiti** have unlocked the mystery of a 2,200-year-old medicine. The story started in 1974, when Italian archaeologists under the direction of Francesco Nicosia and Antonella Romualdi of the Italian Department of Antiquities located a shipwreck in the Gulf of Baratti in Tuscany, Italy. The techniques and materials of construction, together with the cargo, indicate that the ship was built ca. 140-120 B.C. Its load included merchandises of different origins: probably Syro-Palestine, Cyprus, the Aegean island of Rhodes, Asia Minor, and also Pergamon and Athens. This suggests that the ship was sailing from the eastern Mediterranean area probably to Pisa or Marseille, the final destinations of the commercial road from the East. It sank, instead, close to the harbor of Populonia in Tuscany, an important stop in the maritime road between the eastern and western Mediterranean.

In 1982 archeologists found a surgical instrument (a hook) and a mortar, which suggested that a physician was on board of the ship. Then, in 1989, they brought to light numerous remains related to the medical profession: a copper bleeding cup, a tin pitcher with a filter, 136 boxwood vials, and tin containers. In 2004, Touwaide and Appetiti received two fragments of the tablets extracted from the tin container to identify their possible plant components and to determine what medical conditions the tablets were used to treat. At the same time, the Laboratory of Analysis of the Department of Antiquities was studying the inorganic components.

After some years of tenacious effort, the cross-disciplinary team has succeeded in identifying components of the tablets thanks to next-generation DNA sequencing performed by Fleischer. First results seem to indicate that the tablets contained at least carrot, radish, parsley, celery, wild onion, and cabbage—simple plants found in a garden. There was probably also yarrow and the more exotic hibiscus, possibly

introduced in the Mediterranean area from Asia.

Significantly, all the components of the pills identified so far (be they vegetal or inorganic) can be found in the ancient medical texts that Touwaide and Appetiti have been locating for years in manuscripts preserved in collections worldwide, transcribing and digitizing them, studying and databasing their information (all activities that contribute to the program of the Institute for the Preservation of Medical Traditions aimed at recovering the medical heritage of the ancient Mediterranean world).

The identification of the plant components in this medicine is an absolute première: the tablets are the only archaeological remains of ancient medicines known so far, and their analysis is the first ever performed. Though preliminary, the results confirm the value of the cross-disciplinary approach, and call for new analyses leading to definitive results.

New Website Displays Edward Palmer Collections

Edward Palmer (1831-1911), often regarded as “the father of ethnobotany,” gathered extensive natural history collections in North and South America during the late nineteenth century and established standards for plant collecting and reporting, particularly for plants useful to people. His scientific framework is still used today. This new Botany website, Edward Palmer Collections <<http://botany.si.edu/colls/palmer/>> provides a window into the Palmer Collection to communities where Palmer originally collected, as well as to scientists and the general public.

Palmer’s botanical collections (over 100,000 in number) reside at research institutions all over the world. The Palmer botanical collection in the U.S. National Herbarium at the Smithsonian Institution remains the largest, containing over 16,000 specimens collected over sixty years. This mass of work includes specimens collected while Palmer worked as a Smithsonian field representative, a scientist at the Smithsonian’s Bureau of American Ethnology, and as a collector and “expert” at the Department of Agriculture. Palmer’s botanical collections from Mexico remain extremely valuable, in

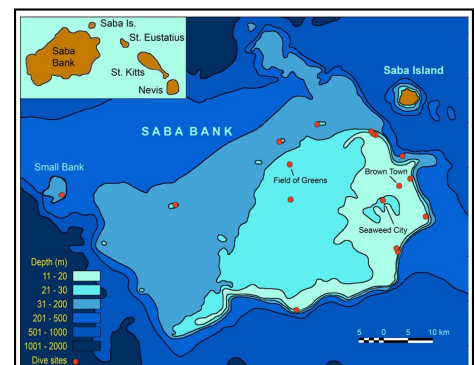
particular because they include plants that were new to science at the time. Palmer’s intrepid soul was his greatest strength; he followed the emerging railroad lines into areas of Mexico not previously explored by naturalists or scientists. His observations in these areas illuminated cultural changes taking place in Indigenous communities throughout Mexico and in the North American Southwest.

The Palmer website spotlights the connections between the botanical and anthropological collections that Palmer made in the North American Southwest and Mexico from 1867–1898. There are 17 narratives of these connections, including Gummed Stone Footballs, Akimel O’odham Basket Trays, and Spines of Mesquite Tattooing. Images of the Palmer botanical collections are shown with collected objects that were created from these plants.

The project received Federal support from the Latino Initiatives Pool, administered by the Smithsonian Latino Center. This is a contribution from the Recovering Voices initiative of the National Museum of Natural History.

Saba Bank is Designated as a Protected Area

As a direct result of the research of **Mark and Diane Littler** and **Barrett Brooks** (*PLoS ONE* 5(5): e10677. doi:10.1371/journal.pone.0010677), as part of a team funded by Conservation International, the Netherlands Antilles passed and published a National Decree (as of 2 October 2010, no. 94) designating the Saba Bank as a protected area. The decree prohibits anchoring (by tankers and other large ships) on the entire Bank, both in territorial waters and in the European Economic Zone (EEZ), with a few excep-





tions, such as hydrographic survey vessels, salvage vessels, search and rescue vessels, and fishing boats from Saba, St. Eustatius, and St. Maarten with a permit to fish on the Bank. The Coastguard of the Netherlands Antilles and Aruba will be enforcing this prohibition.

With an ocean area of approximately 2,500 km², this makes the Saba Bank the fifth largest marine protected area in the Wider Caribbean. The average depth of the Bank is about 80 feet, and there are extensive coral reefs on the eastern and south-eastern edges. New species of seaweeds, fish, and gorgonians have been discovered on the Bank which has been found to be among the richest areas of the Caribbean in seaweed diversity. Much of the area and its biodiversity still remain to be explored.

An application for Particularly Sensitive Sea Area (PSSA) status has been sent to the International Maritime Organization (IMO) by the Netherlands. It will be discussed at the next meeting of the environmental committee of the IMO in the spring of next year. PSSA status will allow further regulation of international shipping to protect the Bank.

Botany Partakes in Coral Reef Exhibit

In 2005 twin sisters in Sydney, Australia, Margaret and Christine Wertheim, a mathematician and an artist, were contacted by some environmentalists to help them create a display to represent how global warming and pollution are affecting the world's coral reefs. Since then, the project has spread over three continents and has involved thousands of people. The interdisciplinary project, which combines marine biology, mathematics, feminine handicraft, and environmental activism, continues to raise awareness and public interest in coral reefs here in the United States. Successful displays have been hosted in numerous U.S. cities, including

New York, Chicago, Los Angeles, and Scottsdale. DC's first community coral reef exhibit made of crocheted, knitted and other media, even recycled materials, will be displayed in the Natural History Museum's Sant Ocean Hall, 16 October 2010 to 24 April 2011. A small group from the Botany Department (**Elaine Haug, Maria Faust, Jenny Datiles, Shruti Dube, Nistha Dube, and Marielle Saums**) contributed to the project. Margaret Wertheim, the mathematical twin sister, relates the coral reefs through some of crocheted pieces to the newly discovered "hyperbolic geometry," which gives the upcoming exhibit its name, the *Hyperbolic Crocheted Coral Reef Exhibit*.

The dynamics of a coral reef involve plants as part of a coral-microbial partnership. The corals on a coral reef live in a partnership with microscopic plants, but many are unseen – these microscopic species are hidden in the plankton or within the tissues (zooxanthellae) of corals. The simplest plants on the reef are the microalgae (some are a little more than a fuzz of brown or green on the bare reef surfaces), while others have broad leafy blades of turtle grass, *Thalassia testudinum*, fine blades of sea grasses, and kelp. Like all algae, microalgae use special pigments to capture the energy from sunlight. In the process known photosynthesis, they use this energy to convert carbon dioxide and water into sugars, which they need in order to grow.

The coral polyps provide a safe and secure home for the zooxanthellae, a microbial form, which lie hidden within the tissue of corals, and in turn the microalgae provide the corals with sugars and other food that help the corals to grow and build the coral reef. Thanks to this partnership, corals can thrive even in places where there is little food to be filtered from the water. Many reef corals get 80-90 percent of their food from these tiny algal partners and catch very little for themselves. It is the photosynthetic pigments of the algae which give the corals their beautiful colors. And it is this dependence on sunlight which means that reef corals only thrive in clear shallow waters.

The Botany staff made their artistic pieces as realistic as possible and provided photographs to identify each piece to a living species. Stephen Carins, a deep sea coral specialist in the Department of Invertebrate Zoology, and Christopher Mah, an

Echinoderms specialist, loaned the group books containing images of specimens from coral reefs. Mah created a blog site for the Botany crochet and recycled material pieces and added some information about the exhibit at <<http://echinoblog.blogspot.com/2010/09/echinoderm-sneak-peak-of-hyperbolic.html?spref=fb>>. The reef will be divided into three parts, a living reef (colorful pieces), a dead reef (all white, beige, and mauve pieces), and toxic reef (pieces composed of recycled material).

Jennifer Lindsay has been coordinating the museum crochet project. She has a website and a Flickr site devoted to the art work <<http://www.mnh.si.edu/exhibits/hreef/communityreef.html>>. Hundreds of people have contributed items, and each contributor will be acknowledged for their efforts. The Botany group created 47 pieces.



This crocheted red brittle star (*Ophiothrix purpurea*) appears in the new exhibition "The Hyperbolic Crochet Coral Reef."

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Smithsonian Botanical Symposium

Simpson Receives Ninth Cuatrecasas Medal

The Department of Botany and the United States National Herbarium present this annual award to a botanist and scholar of international stature who has contributed significantly to advancing the field of tropical botany. The José Cuatrecasas Medal for Excellence in Tropical Botany is named in honor of Dr. José Cuatrecasas (1903-1996), a pioneering botanist and taxonomist who spent nearly a half-century working in the Smithsonian Institution's Department of Botany. Cuatrecasas devoted his career to plant exploration in tropical South America and this award serves to keep vibrant the accomplishments and memory of this outstanding scientist.

The winner of this prestigious award is selected by a committee made up of four botanists on the staff of the Department in consultation with other plant scientists outside of the Smithsonian Institution. Nominations for the Medal are accepted from all scientists in the Botany Department. The award consists of a bronze medal bearing an image of José Cuatrecasas on the front with the recipient's name and date of presentation on the back. Highlights from past presentations to the recipients are available on the Symposium Archives at <http://botany.si.edu/events/sbsarchives/>.

Beryl B. Simpson of the University of Texas at Austin is the ninth recipient of the José Cuatrecasas Medal for Excellence in Tropical Botany. Simpson's area of expertise is the phylogeny and biogeography of various angiosperm groups, primarily from the American Southwest, Mexico, and Central and South America. The award committee was impressed with her monograph of Krameriaceae and her revisions of Andean genera such as *Polylepis* (Rosaceae) and *Perezia* (Asteraceae) as well as other tropical groups of plants. Simpson's papers on biogeography,

plant-insect interactions, and her text book on economic botany are all evidence of a rich and diverse career. The award committee also took note of her three decades of guiding and supervising students as a Professor at the University of Texas and of her many contributions to tropical botany through directing the University of Texas herbaria and service as editor or officer of professional societies.

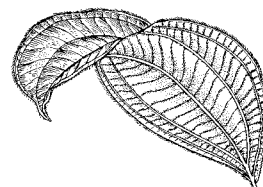
Simpson received her A.B. *magna cum laude* from Radcliffe College in 1964, and her M.A. and Ph.D. from Harvard University in 1967 and 1968, respectively. She continued at Harvard, first as a post-doctoral fellow and then as an Assistant Curator of the Gray Herbarium. In 1972, she joined the Smithsonian Institution as an Associate Curator in the Department of Botany at the National Museum of Natural History. In 1978, she secured an appointment as Professor at the University of Texas at Austin, and in 1994 became the C.L. Lundell Professor of Systematic Botany. Simpson has held several major offices with professional societies, such as President of the Society for the Study of Evolution, Chairman of the U.S. Committee to the International Union of Biological Sciences, President of the Botanical Society of America, and President of the American Society of Plant Taxonomists. In 1994, she was honored as an Elected Fellow of the American Academy of Arts and Sciences.

Past recipients of the Cuatrecasas Medal are Rogers McVaugh of the University of North Carolina at Chapel Hill (2001); P. Barry Tomlinson of Harvard University (2002); John Beaman of the Royal Botanic Gardens, Kew (2003); David Mabberley of the University of Leiden, The Netherlands, and the Royal Botanic Gardens, Sydney (2004); Jerzy Rzedowski and Graciela Calderón de Rzedowski of Instituto de Ecología del Bajío,

Michoacán, Mexico (2005); Sherwin Carlquist of Rancho Santa Ana Botanic Garden and Pomona College (2006); Mireya D. Correa A. of the University of Panama and Smithsonian Tropical Research Institute (2008); and Norris H. Williams of the Florida Museum of Natural History and the University of Florida, Gainesville (2009).



Beryl Simpson, C.L. Lundell Professor of Systematic Botany at the University of Texas at Austin, accepts the 2010 José Cuatrecasas Medal for Excellence in Tropical Botany from Laurence Dorr (Chair of the Cuatrecasas Medal selection committee). (Photo by Ken Wurdack)



Abstracts from the Speakers at the Smithsonian Botanical Symposium

The ninth annual Smithsonian Botanical Symposium was held 24-25 September 2010. The symposium, “Food For Thought: 21st Century Perspectives on Ethnobotany,” explored the 21st century transformation of the study of interactions between plants and people. The invited speakers covered 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. Below are the speakers’ abstracts from the papers that were presented.

Kenneth Olsen

Washington University in St. Louis

“Genetic Signatures and Consequences of Dual Crop Domestication Events in the Old World Tropics”

Neutral markers and candidate genes can provide complementary insights into crop origins and the genetic changes underlying domestication. Here I discuss recent findings on the evolution of two Old World crops that each arose through at least two domestication events: coconut (*Cocos nucifera*) and rice (*Oryza sativa*). For coconut, we have taken advantage of microsatellite markers and a worldwide germplasm collection to examine the geographical context of its domestication history. We find evidence of two highly differentiated genetic subpopulations that correspond to the Pacific and Indian Ocean basins, with persistent population structure on a global scale despite long-term human dispersal. Genetic admixture is apparent only in the region corresponding to the ancient Austronesian trade route that connected Southeast Asia to Madagascar and East Africa. Interestingly, the definitive domestication traits—dwarf habit, self-pollination, and ‘*niu vai*’ fruits (i.e., rounded fruits with sweet liquid endosperm)—arose only within the Pacific domestication event. This finding parallels that of rice, where examinations of candidate genes indicate that most major



Chair of the Botany Department Warren L. Wagner (left) with the speakers of the 2010 Smithsonian Botanical Symposium (left to right): Kenneth Olsen, Bruce Smith (morning symposium chair), Allison Miller, Torben Rick, Eve Emshwiller, Julie Velásquez Runk, Laurence J. Dorr (symposium convener), Ruth Defries, Dolores Piperno (afternoon symposium chair), Cameron McNeil, and Beryl Simpson (Cuatrecasas Medal recipient). (Photo by Ken Wurdack)

domestication alleles arose in the *japonica* rice domestication event and were only subsequently introgressed into the independently-domesticated *indica* subspecies.

Allison Miller

Saint Louis University

“Evolution of Clonally Propagated Plants under Domestication”

The development of sustainable agricultural practices is one of the primary challenges facing the global scientific community. Perennial crops are an important component of sustainable agriculture, and provide an abundance of edible plant products including fleshy roots and other below-ground materials, fruits, and seeds. Current understanding of the way in which plants evolve under domestication is based largely on studies of sexually reproducing annual crops. Perennial crops are often propagated asexually via clones, but relatively little is known about how clonally propagated perennials respond to artificial selection pressures. Based on life history characteristics (e.g., long juvenile phases) and mode of reproduction, relatively slow rates of evolution in perennial crops have been suggested. However, a growing body

of literature demonstrates that perennial species, like annuals, exhibit substantial morphological and genetic evolution under domestication. I present two case studies of clonally propagated perennial crops (horseradish, pecan) with different targets of selection (roots, fruits) and characterize their evolutionary histories under domestication. These studies highlight important aspects of the evolution of clonally propagated perennials under domestication, including breeding system evolution and broad domestication bottlenecks. Domesticated perennials present an important opportunity to investigate the tempo and mode of evolutionary processes in long-lived species, and to examine the evolutionary and ecological consequences of clonal reproduction.

Eve Emshwiller

University of Wisconsin

“Human/Plant Interactions in Crop Evolution: Integrating Different Sources of Data in Contemporary Ethnobotany”

Although ethnobotany is a multidisciplinary field by definition, most ethnobotanical studies are centered primarily in either the social sciences or the natu-

ral sciences, and few studies integrate between these domains. Yet when we draw on data and methods from across disciplinary boundaries in studies of the evolution and conservation biology of crop plants, we may uncover information that would have remained hidden if the studies were conducted within a single discipline. Both studies of crop origins and studies of ongoing crop evolution can integrate anthropological survey data with molecular data. Our studies of the Andean tuber crop “oca,” *Oxalis tuberosa*, have addressed both the crop’s origins (of polyploidy and domestication) and its continuing evolution, and have integrated data from surveys of farmers with molecular, morphological, and DNA ploidy data. Hypotheses derived from survey data were tested with other data sources, leading to new insights that would probably not have been revealed otherwise.

To conserve crop genetic diversity, we need to know what is happening to that diversity through space and time. Because humans are primary dispersal agents for clonally-propagated crops, investigators have used surveys to study “seed flows” of Andean tubers to determine the directions and amounts of “seed tubers” exchanged and transported among farmers. We are now investigating the effects of those exchange networks on the geographic distributions of oca’s clonal genotypes as

identified by AFLP and morphological data. New results of spatial-statistical analyses will be presented at the symposium.

Cameron L. McNeil
Lehman College, The City University of New York

“*Theobroma cacao* L.: Chocolate in Ancient and Modern Mesoamerica”

This presentation will examine the use of cacao in Mesoamerica, both in the past and present. The species *Theobroma cacao* originates in the Amazon Basin. From the Amazon cacao was likely introduced as a cultigen to Mesoamerica. The pre-Columbian role of cacao in Mesoamerica was culturally and economically more significant than it was in South America. Mesoamericans predominantly consumed the seeds of the tree, whereas South Americans predominantly consumed the sweet pulp. While the areas where the species thrived in Mesoamerica were limited, the seeds were easily transportable and became a valued source of stimulants. By 1900 B.C. cacao was used in feasting rituals as evidenced by chemical residue analysis of vessels from Paso de la Amada, Mexico. For pre-Columbian peoples *T. cacao* came to be associated with markers of life passage events (such as birth, marriage, and death), was linked to rulership and power, and was used as a medium



NMNH Director Cristián Samper presents opening remarks at the 2010 Smithsonian Botanical Symposium. (Photo by Ken Wurdack)

of exchange. Where cacao grew well, it was one of several important tree crops which undoubtedly aided populations in preserving forest cover while providing an esteemed comestible and trade good. While the Spanish during the colonial period initially preserved the orchards of cacao, gradually coffee and cattle usurped the lowlands along river-ways where the tree thrived. Today, traditional cacao consumption and production has been lost in many areas, and where it remains it is gradually disappearing.

Julie Velásquez Runk
University of Georgia

“Exploring Connections in Culturally Oriented Ethnobotany: Examples from Panama and the U.S.”

As the first decade of the 21st century soon will come to a close, there is no doubt about the interconnectedness of the world and the rapid pace of globalization. The ubiquity of such connections runs counter to some of the history of ethnobotany, which often has centered on



Speaker Eve Emshwiller discusses human-plant interactions in crop evolution. (Photo by Ken Wurdack)

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a crisis narrative of documenting endangered traditions. Where current conditions and ethnobotany's traditions meet results in exciting productive spaces for research. Here I will draw upon my research in Panama to explore some of those spaces in culturally focused ethnobotany, discussing expanding notions of time and space, the integration of power and politics, and the incorporation of multiple methodological tools in research. In addition I will show how ethnobotanical ideas are becoming ever more understood in the U.S. at the local level by their integration into the local food and primitive skills movements.

Torben Rick

Smithsonian Institution

"Archaeology, Marine Paleoethnobotany, and California Coastal Ecosystems"

California's Channel Islands contain a lengthy record of human interactions with marine and terrestrial ecosystems, spanning some 13,000 years. Native Americans living and foraging on the islands during the Holocene appear to have influenced the size and age of marine mollusks, affected the distribution and abundance of seals and sea lions, and translocated terrestrial mammals from the mainland

and between islands. Largely absent from recent discussions of human interactions with island ecosystems is the use of island marine and terrestrial plants. Here I explore the use of marine plants (kelp and sea grass) by Island Chumash peoples drawing on ethnographic and archaeological data.

Ruth Defries

Columbia University

"Food, Landscapes and the Planet's Life Support System"

The Earth's metabolism cycles carbon and nitrogen among the atmosphere, land and ocean and makes our planet uniquely suited to produce food for the 6.7 billion-strong human population. Since people first domesticated crops about 9,000 years ago, human societies have struggled to obtain secure food supplies by diverting and manipulating carbon and nitrogen from these cycles to benefit crops and livestock. Agricultural landscapes are the visible face of successes in this millennia-long endeavor. But this massive, global-scale transformation of the planet's landscapes also has consequences for climate and other species. These unintended consequences potentially undermine the planet's life support system. Examples from commercial food production in the southern Amazon to subsistence farming

in central India illustrate the vast array of landscapes, food production systems, and implications for the planet.

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rusticana, and that *A. rusticana* may have been domesticated from *A. macrocarpa* in Hungary or the Ukraine. The next step in future research is to ask whether horseradish is mate-limited and self-incompatible.

Miller's second case study explored how domestication bottlenecks reduce genetic variation in cultivated populations. Her data suggest that three factors have shaped the variation in domesticated pecan trees: (1) native pecans exhibit geographic patterns of genetic variation; (2) domesticated populations were derived from geographically and genetically distinct native populations; and (3) local environmental control of flowering time suggests a mechanism for ongoing gene flow with wild progenitors. Her results support the role of perennial crops in sustainable agriculture and food security.

Following Miller was Eve Emshwiller from the University of Wisconsin at Madison who examined the role of human and plant interactions in crop evolution. Emshwiller presented her 17 years of ethnobotanical research on the origins and the continuing evolution of the tuber crop oca (*Oxalis tuberosa*) in the Central Andes. In discussing the origins of oca, an octoploid species, she spoke of the "*Oxalis tuberosa* alliance," a clade of diploid species from the Andes. Emshwiller hypothesized that *Oxalis tuberosa* is the result of autoallopolyploidy, the hybridization of three diploid species.

Emshwiller continued with a discus-



Speaker Torben Rick discusses paleoethnobotany of the California coastal ecosystems. (Photo by Elaine Haug)



Speaker Cameron McNeil describes the ethnobotany of chocolate in ancient and modern Mesoamerica. (Photo by Ken Wurdack)

sion of the enthnntaxonomy of oca in three communities in southern Peru. Her research integrates anthropological survey data with molecular data. Through surveys, Emshwiller found different modes of exchange of the crops at different scales. Patterns of distribution of clonal genotypes of oca are correlated with distributions of different human languages and dialects. Some genotypes have very restricted distributions while others are widespread, leading to implications on how to conserve the oca varieties. Emshwiller expressed concern about the status of oca in the villages, as many farmers are switching to either an introduced potato or growing feed for dairy cattle.

After lunch, Dolores R. Piperno, Curator of Archaeobotany and South American Archaeology, Smithsonian Institution, chaired the session and introduced the afternoon speakers. Chocolate was the topic on everyone's mind as Cameron L. McNeil of Lehman College, The City University of New York, discussed the ritual associations of *Theobroma cacao* in ancient and modern Mesoamerica. An archaeologist, McNeil presented results from her 9-year research program from Copan, which is on the southeastern Maya periphery. Evidence shows that cacao was used both culturally and economically in Mesoamerica nearly 4,000 years ago. Seeds were used as money, and the cacao beverage was a sign of wealth in paintings on vessels. Two plant species were commonly used: cacao (*Theobroma cacao*)

and pataxte (*T. bicolor*). Pataxte, a more expensive form of cacao, contains high levels of ethylene, which can be used to ripen other fruit such as bananas. Because of the ripening process, pataxte was associated with the "male" in artwork, while cacao was associated with the "female." Chemical residue analysis of vessels from 1900 B.C. shows evidence of cacao. Most believe cacao was only consumed as a beverage, but other vessels show possible use of cacao as a sauce. Today, the traditional uses of cacao in Mesoamerica are fading away as fields once devoted to cacao are being turned over to cattle and sugar. Additionally, soda is being used as a substitute for home-grown cacao in many rituals.

Cultural anthropologist Julie Velásquez Runk from the University of Georgia in Athens followed McNeil's talk by "Exploring Connections in Culturally Oriented Ethnobotany: Examples from Panama and the U.S." Focusing her research on the Wounaan people of the Darién in eastern Panama, Velásquez Runk explored the endangered traditions in agriculture, medicine, art, and decoration while living with the Wounaan for over two years. The lunar cycle has a strong influence on their traditions, as the high and low tide affect the harvesting time of plants. Velásquez Runk explained how the development of the Pan-American Highway has impacted the livelihoods of the Wounaan, once a nomadic people who are now sedentary. She described how the Wounaan perceive

their land as a relationship and network between the plant, rivers, and spirits, as opposed to conservationists who focus on trees and forests with a bias on the physical rather than the spiritual.

Next, Torben Rick of the National Museum of Natural History spoke about "Archaeology, Marine Paleoethnobotany, and California Coastal Ecosystems." As a zooarchaeologist, Rick was able to provide a unique perspective on the intersection of botany, biological sciences, and anthropology. Most marine plants have not come under domestication, but Native Americans have a history of interacting with kelp forest ecosystems around the Northern Channel Islands of California. Rick described how kelp forests sustained hunter-gatherers on the Channel Islands for 10,000 years. There is evidence that the Chumash people used kelp as a fuel source, boat anchors, and protection against magic. It is difficult, however, to ascertain whether or not kelp was harvested, mainly because fronds preserve poorly in the archaeological record. In the Channel Islands, there is an abundant sea grass archaeological record, but none for kelp. Rick explained

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Acknowledgements

The success of the Symposium was due to the significant time and efforts of the following people:

Organizers

- Laurence J. Dorr
- Joshua A. Bell
- Nancy Khan
- Gary Krupnick
- Igor Krupnik
- Sue Lutz
- Sylvia Orli
- Warren L. Wagner
- Jamie Whitacre

Support

- Mary Ann Apicelli
- Patricia Davis

Photographers

- Elaine Haug
- Kenneth Wurdack

And many others who had helped in a myriad number of ways.

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that there is an archaeological record for three invertebrate animal species that live on kelp (*Calliostoma annulatum*, *C. ligatum*, and *Tegula brunnea*), and thus Native Americans may have used the kelp to harvest these animal species. He argued that an increase in the integration of ethnobotany and ethnozoology—especially in archaeological research—can provide new insights into anthropology.

The final speaker of the day was Ruth Defries from Columbia University who spoke about “Food, Landscapes and the Planet’s Life Support System.” Defries, a geographer, discussed how the Earth’s metabolism cycles carbon and nitrogen among the atmosphere, land, and ocean, which makes our planet uniquely suited to produce food for the 6.7 billion-strong human population. She explained that an increase in food production triggers population growth, and that when ecological parameters limit further increases in food production, population density will decrease (starvation, migration). She showed how the discovery of an industrial way to synthesize nitrogen allowed for a tremendous increase in food production, which lead to an increase in the global population size. Defries then contemplated doomsday scenarios where drought and increasing food prices lead to riots and instability. She pointed out trends such as when the size of urban areas increases,



Speaker Ruth Defries discusses the planet’s life support system. (Photo by Elaine Haug)

income and the consumption of animal products also increase. The challenge for the future, she explained, is how to intensify food production while maintaining biodiversity. She pointed out that there are no clear answers on the horizon.

From Olsen’s morning talk focusing at the genome level to Defries’ final presentation at the global level, the 2010 Smithsonian Botanical Symposium provided a unique perspective on the interactions between humans and plants.

Supplementary Symposium Links on the Web

The website to the 9th Annual Smithsonian Botanical Symposium <<http://botany.si.edu/sbs/>> has many links and documents related to the conference. Included on the website is the full program, abstracts of the talks, links related to the speaker’s presentations, and selected images from the various events. A digital video recording of the presentations will be posted soon. Additional items related to the Symposium can be added to the list of links and documents by sending an e-mail to sbs@si.edu.

The Symposium archive pages <<http://botany.si.edu/events/sbsarchives/>> also includes programs, abstracts, and images from the past six symposia: “Linnaean Taxonomy in the 21st Century” (2001); “The Convention on Biological Diversity” (2002); “Botanical Frontiers in Southeast Asia” (2003); “Botanical Progress, Horticultural Innovations, and Cultural Changes” (2004); “The Future of Floras: New Frameworks, New Technologies, New Uses” (2005); “Island Archipelagos: Cauldrons of Evolution” (2006); “Partners in Evolution: Interactions, Adaptations, and Speciation” (2008); and “Genes, Genomics and Genome Evolution in Plants” (2009).



Opening reception of the ninth annual Smithsonian Botanical Symposium at the United States Botanic Garden. (Photo by Ken Wurdack)

Additional Scenes from the 9th Annual Smithsonian Botanical Symposium



Clockwise (from top left): Dolores Piperno and Torben Rick at the reception at the US Botanic Garden (Photo by Ken Wurdack); NMNH Director Cristián Samper talks with Jennifer Tafe and USBG Executive Director Holly Shimizu (Photo by KW); Speakers Julie Velásquez Runk and Ruth Defries at the evening reception at the NMNH exhibition “Losing Paradise? Endangered Plants Here and Around the World” (Photo by Elaine Haug); The Symposium dinner in the Rotunda of the National Museum of Natural History (Photo by EH); and Jay Bolin and speaker Allison Miller at the evening reception (Photo by KW).



Art by Alice Tangerini

***Persea americana* P. Mill**

Persea americana (Lauraceae), the avocado, was an illustration for *Medicinal Plants of the West Indies* (Reference Publications, 1982) by Edward S. Ayensu.

Tangerini made the drawing using herbarium specimens and photographs from books in the Botany library. The avocado, although primarily noted as a food product, was listed as having medicinal qualities: "Leaf and bark teas for diarrhea, colds. Poultice of leaves for headache, rheumatism, sprains. Leaves boiled for tea for the blood. Drink for colds and lotion for pains. Leaves for fever and pain; high blood pressure."

The book was the second in a series on medicinal plants edited by Robert DeFilipps and illustrated by Tangerini, Cathy Pasquale and Mary Monsma.

The ethnobotany and evolution of other cultivated plants were discussed at the ninth annual Smithsonian Botanical Symposium on September 25, 2010.



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