Department of Botany & the U.S. National Herbarium

The Plant Press

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Botany Profile

In Search of Beans and Cassava in Guyana

By Karen M. Redden and Kenneth J. Wurdack

Karen Redden and Kenneth Wurdack met in the United States National Herbarium in 2005 and began a continuing collaboration that would involve exploring the remote jungles of Guyana together for weeks at a time. Since 2005, their paths crossed numerous times: Redden attended Wurdack's interview seminar for his current position as Assistant Curator in Botany and Wurdack served on Redden's dissertation committee and was one of her molecular advisors. They are co-authors on two papers and presently Wurdack is co-advisor with Vicki Funk of her current Postdoctoral Fellowship at the Smithsonian. Some of their greatest challenges together, however, were faced not in the concrete jungles of Washington, DC, but far away in the rain forests of Guyana.

Redden had done numerous expeditions to Guyana for her dissertation research on caesalpinioid legumes and many of these collecting trips were funded through Smithsonian Institution's Biological Diversity of the Guiana Shield Program (BDG). BDG is a long-standing program at the Institution that has sponsored numerous expeditions to study the flora and fauna of Guyana and is responsible for over 60,000 plant collections housed at the National Museum of Natural History. Vicki Funk, Director of BDG, asked if they would do a joint collecting expedition. Their first trip to Guyana was in the fall of 2006. Thus began the Redden & Wurdack expeditions resulting in over 3,000 collection numbers to date with numerous photos, silica gel and liquid preserved supplementary collections and countless hours of jungle tales.

For the first leg of their first journey together in the fall of 2006, they flew from the capital city, Georgetown, to Kaieteur National Park which features one of the most powerful and impressive waterfalls in the world. They collected the plateau area around the top of Kaieteur Falls and followed the Potaro River gorge downstream. Kaieteur is also the study site of Carol Kelloff, Assistant Director of BDG, whose dissertation research focused on using plant data as a tool for conservation and development at Kaieteur National Park. Their 2006 team also included Cody Hinchliff (Washington State University Ph.D. student), Elford Liverpool (University of Guyana student), Claudius Perry (Wapishana parataxomist and long-time guide to Redden and other collectors), and Paul Benjamin (local Patamona guide).

In addition to general collecting of the region's flora, the main reason for targeting Kaieteur National Park was to find an undescribed species of *Paloue* (Leguminosae: Caesalpinioideae) that had been previously collected "on the trail to Kaieteur Falls" by G.S. Jenman in 1881 and again in 1958 by V. Graham. After five days of hiking, climbing, sliding, boating, portaging, and collecting, their search was finally successful farther down the gorge near Waratuk Falls. Much to their delight, the small riparian tree was in flower and early fruit. They obtained ample material for description and phylogenetic studies (see illustration on back cover and its recent description as *Paloue sandwithii* Redden in *Brittonia* 60: 257-260; 2008).

Further downstream on the Potaro they searched for the distinctive saxifragalean genus *Whittonia*. Perhaps the only endemic plant genus to Guyana, it is known from a single collection; the 1959 type made from a solitary tree that was felled for that original collection. Although they were armed with detailed notes from the original collector, Brian Whitton, *Whittonia* eluded them.

They left the gorge and traveled a short distance by truck to Eagle Mountain, in the eastern foothills of the Pakaraima mountain range. They continued general collecting in the area but they also had a special interest in recollecting *Haematostemon guianensis*. This member of the Euphorbiaceae is endemic to two adjacent mountain peaks, Eagle and Mahdiana Mountains and known from only three collections. They found this plant as a locally abundant small tree along an old road that flanked the mountain. Molecular phylogenetic analysis using their new collection of this enigmatic species has surprisingly indicated it is close relative of *Dalechampia,* a group of often showy vines.

Other areas collected in 2006 included Madhia, Micobe and the middle Mazaruni River region between Peaima Falls and Isseneru Village. Before their expedition, no scientists had explored this region of the middle Mazaruni River. They found it to be botanically diverse, and many interesting collections were made. Noteworthy among these

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Travel

Walter Adey traveled to Lancaster, Pennsylvania (10/7 – 10/8, 10/28 – 10/30, 11/18 – 11/19) to analyze algae on test floways for the ATS Energy Project at Muddy Run; to Kennett Square, Pennsylvania (10/14 – 10/16) to meet with the Exelon staff regarding the ATS Energy Project; to Steuben, Maine (11/23 – 11/29) to make a presentation at the Humboldt Field Research Institute; and to Gloucester Point, Virginia (12/16 – 12/18) to attend an organizational meeting of the Algal Biofuel Workshop at the Virginia Institute of Marine Science at the College of William and Mary.

Robert Faden traveled to St. Louis, Missouri (10/17 – 10/18) to attend the 55th Annual Systematics Symposium at the Missouri Botanical Garden and to conduct herbarium work on African Commelinaceae.

Maria Faust traveled to Noumea, New Caledonia, French Polynesia (10/21 – 11/2) to participate at the Ciguatera and Related Biotoxin Workshop and present a paper on the latest developments of causative organisms in ciguatera research.

W. John Kress traveled to Barcelona, Spain (10/5 – 10/9) to attend the 2008 IUCN World Conservation Congress; to Bangkok, Thailand (11/17 – 11/21) to deliver an invited talk on gingers in a symposium on the evolution and ecology of Asian Dry Forests; and to China (12/29 – 1/8) to provide a keynote address in the Xishuangbanna Tropical Botanical Garden Conference on Biodiversity Conservation and to act as chairman of the Expert Review Committee on the 50 Year Anniversary of Xishuangbanna Tropical Botanical Garden.

Gary Krupnick traveled to Barcelona, Spain (10/5 – 10/9) to attend the 2008 IUCN World Conservation Congress.

Mark and **Diane Littler** traveled to the Smithsonian Marine Station at Ft. Pierce, Florida (12/25 – 2/15) to conduct field research on functional-form, biosystematics and comparative ecology of South Florida marine algae and seagrasses concentrating on HABs (Harmful Algal Blooms) in Florida Bay and changes in the Looe Key National Marine Sanctuary 25 years after their initial survey.

Rusty Russell traveled to Buenos Aires, Argentina (11/16 – 11/21) to participate in the partners meeting of the Latin American Plants Initiative, a project to catalog and digitally image all plant specimen types from the Americas.

Alice Tangerini traveled to Pasadena, California (10/29 – 11/1) to participate in the 14th annual meeting and conference of the American Society of Botanical Artists.

Alain Touwaide and **Emanuela Appetiti** traveled throughout Turkey (10/12 – 10/28) to present the inaugural lecture at the 700th anniversary of the foundation of the Darus Sifa hospital, to present lectures at Cukurova University and Istanbul University, and to conduct fieldwork in Soloi, Tarsus, Adana, Anavarza, and Antakya; to Pittsburgh, Pennsylvania (11/6 – 11/9) to chair a session at the annual meeting of the History of Science Society; and to Chapel Hill, North Carolina (11/20 – 11/21) to serve on the thesis committee for Master's student Dereck Alexander and to give a lecture at the University of North Carolina, Chapel Hill.

Warren Wagner traveled to Los Angeles, California (10/16 – 10/19) to give an invited presentation at the 34th Southern California Botanists Symposium at California State University Fullerton and a presentation at the Rancho Santa Ana Botanic Garden.

Anna Weitzman traveled to Western Australia (10/19 – 11/2) to give a presentation, run a literature standards workshop, and attend an executive committee meeting at the Biodiversity Information Standards (TDWG) annual meeting; and to Philadelphia, Pennsylvania (11/26) to get input on INOTAXA from Dan Janzen and Winnie Halwachs.

Jun Wen traveled to Jakarta, Indonesia (10/18 – 11/19) to conduct field work on *Prunus* (Rosaceae), Araliaceae and Vitaceae; and to New Brunswick, New Jersey (12/18) to attend a graduate committee meeting/thesis defense.

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Visitors

Lei Xie, Beijing Institute of Botany, China; *Clematis* (Ranunculaceae) and *Circaea* (Onagraceae) (1/2/07-1/2/09).

Blanca Leon, Universidad Nacional Mayor de San Marcos, Lima, Peru; Peruvian *Tillandsia* (Bromeliaceae) and flora (10/18/07-10/18/09).

Marina Cortes, Columbia University; *Heliconia* (Heliconiaceae) (2/1-12/20).

Lu Jin-Mei, Kunming Institute of Botany, China; *Adiantum* (Adiantaceae) (2/1/08-1/31/09).

Rong Li, Kunming Institute of Botany, China; Asian *Schefflera* (Araliaceae) (2/15/08- 2/14/09).

Athena Tellis, Thomas Jefferson High School for Science and Technology; *Magnolia* (Magnoliaceae) (6/30/08-2/28/09).

Whitney Hoehn, University of Hawaii Manoa; *Remya* (Asteraceae) (9/2-12/13).

Fernando Alzate, Intituto do Biologia, Universidad de Antioquia, Medellin, Colombia; *Bomarea* (Alstroemeriaceae) (9/26-11/7).

Barbara Ertter, University of California Berkeley; North American Rosaceae and Potentilleae (9/29-10/2).

Luisito Evangelista, Philippine National Museum, Manila; Diatoms (9/30-10/1).

It's All In The Genes

The synthesis of genetics and evolutionary biology, initially forged in the 1950s and 1960s with the advent of molecular methods for comparing proteins, has been greatly enhanced by subsequently emerging nucleic acid approaches. Automated DNA amplification and sequencing, in particular, have provided systematic and evolutionary biologists with the tools to compare specific genes across a range of taxa, from both newly collected specimens, as well as archival ones. As a result of this, molecular laboratories have expanded beyond universities' facilities to many botanical gardens and museums, including the Smithsonian.

Meanwhile, first using plant model systems such as *Arabidopsis* and rice, scientists have examined functional changes and differential gene expression in multigene families, identified genes contributing to complex phenotypic traits, and sequenced entire nuclear and organellar genomes. Subsequently, for more complex genomes, such as those of maize and tomato, and where much of the genome resides in heterochromatin, enrichment techniques have been developed in order to make the expressed genome regions accessible to cloning and sequencing. New model systems also are emerging, including *Populus* (cottonwood), a model tree species, and *Aquilegia* (columbines) and *Mimulus* (monkey-flower), two genera shown to exhibit adaptations to pollinators and to environmental variables. Beyond the angiosperms, there are now genome projects for key place holder taxa of land plants (mosses-*Physcomitrella*; lycophytes-*Selaginella*; ferns-*Ceratopteris*) as well as exemplars of green, red and brown algae. And now, next-generation sequencing technologies promise a new era of "evolutionary genomics" by substantially increasing sequencing rates and lowering costs, allowing increasingly finer-scale genomic comparisons across all plants.

With this year's annual Smithsonian Botanical Symposium, our invited speakers will highlight recent advances in comparative molecular genetics, including studies of genome structure and fluidity, of the role of gene families in the evolution of new functions, of the nature of "speciation genes," and of the ways in which gene and genome studies are influencing phylogenetics. We also will hear about the influence of genomics on evolutionary studies of systems other than those of plants. Emerging techniques in both complete genome sequencing and bioinformatics will also be discussed as they offer the promise of "complete genome bar coding" in the foreseeable future. Many of the projects to be discussed, as well as our symposium, have been underwritten by the National Science Foundation, in large part by its Plant Genome Program. A new initiative of the NSF, the iPlant Collaborative <http://iplantcollaborative.org/home>, has just been established; its goal is to provide a cyberinfrastructure platform for addressing "grand challenges" across all of plant biology. Among the initial workshops already held to delineate specific challenges are one to address the ways in which plants adapt to their environments and one to implement the assembly of a green plant tree of life that enables comparative plant biology.

During this bicentennial celebration of Charles Darwin's birth, it is worth noting that many of his contributions to biology arose from his study of plants. Besides his depiction of an evolutionary tree, the single illustration in the *Origin of Species*, Darwin wrote at least six other books about the nature of botanical systems, including works on plant floral dimorphism, effects of different plant fertilization modes, plant domestication, plant movement, and insectivorous plants and orchids. Darwin's particular interest in orchids will be highlighted by the National Museum of Natural History's hosting of the 15th annual orchid show, this year entitled "Orchids Through Darwin's Eyes," which opened January 24th. We hope to see you there and at the Symposium on March 28th.

- **Liz Zimmer**, Guest contributor
  Research Botanist & Curator

Chair With A View

Warren L. Wagner

Chun-Lin Huang, Taiwan National Museum of Natural Science, Taichung; DNA barcoding (10/2-10/17).

Nicholas J. Turland, Missouri Botanical Garden; Flora of China (10/13-10/15).

Michael Dillon, Field Museum of Natural History; Nolanaceae (10/13-10/16).

Job Kuijt, University of Victoria, Canada; *Psittacanthus*, *Phthirusa* and *Arceuthobium* (Loranthaceae) (10/15-10/17).

Richard Olmstead, University of Washington; National Ecological Observatory Network (NEON) meeting (10/20-10/23).

Pat Lu-Irving, University of Washington; Verbenaceae (10/20-10/24).

Geeta Bharathan, State University of New York Stonybrook; General herbarium research (10/23).

Wesley Knapp, Maryland Natural Heritage Program and Delaware State University; *Juncus* (Juncaceae) and *Rhynchopsora* (Cyperaceae) (11/3).

Jesus Rodrigo Botina Papamija, Universidad del Valle, Cali, Colombia; Smilacaceae (11/5-12/1).

Emily Moran, Duke University; Fagaceae (11/6).

Continued on page 5

Staff Research & Activities

Vicki Funk has been selected to serve as co-chair of the Smithsonian Institution Steering Committee, in charge of creating a Strategic Plan that will help the Institution build consensus about its strengths and broad themes of focus for the future. These themes will be communicated with the new U.S. President, Congress, donors, the American people and other key stakeholders to create new opportunities for funding and to boost the public's enthusiasm about the Institution's collections and research.

Gary Krupnick presented the invited talk "The Value of Herbarium Specimens in the Conservation of Threatened Plant Species" at the University of Maryland, College Park, on 17 November, and at the Cosmos Club in Washington, DC, on 19 November.

On 23-24 October, Krupnick participated in the 8th Annual North American Pollinator Protection Campaign (NAPPC) International Conference, held in Washington, DC. The conference was preceded by a field trip on 22 October, to Plummers Island, Maryland, led by tour guides **W. John Kress** and John Brown (Department of Entomology), and organized by Krupnick.

On 8 December, Krupnick attended the National Council for Science and the Environment's 9th National Conference on Science, Policy, and the Environment: Biodiversity in a Rapidly Changing World held in Washington, DC.

Mark and **Diane Littler** presented the keynote address, "Recent Advances in Marine Botany" for the 30th Annual Southeastern Phycological Colloquy, 24–25 October. The conference was held at the Guana • Tolomato • Matanzas National Estuarine Research Reserve near St. Augustine, Florida.

New Faces

In November, **Gabriel Johnson** joined Smithsonian's Laboratories of Analytical Biology (LAB) at the Museum Support Center (MSC) as a molecular biology laboratory technician. Johnson's work at LAB will primarily support molecular research for the Department of Botany. He received his BS at Lebanon Valley College under the influence of botanist Steve Williams. His subsequent MS from Southern Illinois University was advised by Karen Renzaglia and focused on embryology of the model fern *Ceratopteris* (recently published in the *Journal of Plant Research* 121: 581-592; 2008).

Gabriel Johnson

Awards & Grants

Deborah Bell received a grant from the National Cancer Institute to mount and inventory the NCI Voucher Plant Collection housed at the U.S. National Herbarium.

Alice Tangerini received an award from the American Society of Botanical Artists (ASBA) for "Excellence in the Field of Scientific Botanical Art" on 1 November, at their annual meeting held in Pasadena, California. Tangerini had recently been elected to the Board of Directors of the ASBA and her new responsibilities include maintaining the online Members' Gallery and providing scientific illustration input to an organization whose membership is primarily botanical artists.

Tangerini also received a grant from the Latino Initiatives Pool, administered by the Smithsonian Latino Center, to support the inventory of artwork in the José Cuatrecasas collection. Cuatrecasas' artwork collection includes approximately 450 drawings made by numerous artists of hundreds of species of plants which were part of his research in the plants of Andean South America. Tangerini hired contractor Carlos Martinez to make scans of the artwork, enter information about each drawing in the Botanical Art Catalog website, and mount and label the artwork as is necessary. Since many of the drawings were published in South American journals, Martinez's knowledge of Spanish has proven invaluable. Martinez first visited Tangerini's office while he was a student at Virginia Commonwealth University majoring in scientific and biological illustration. He graduated in 2006 with a BFA.

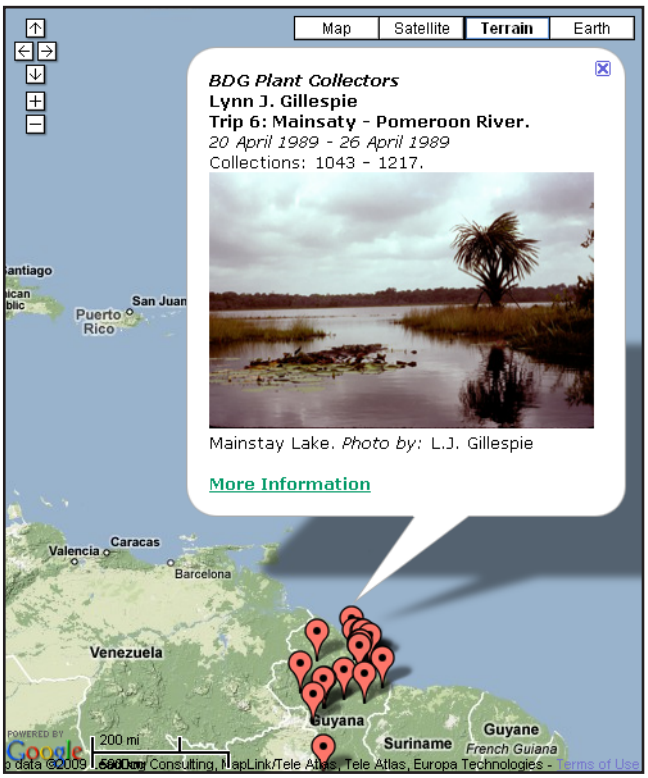
Alain Touwaide has been elected "to the rank of American Association for the Advancement of Science (AAAS) Fellow" in the Section of History and Philosophy of Science, "for distinguished contributions to understanding of ancient, medieval and early modern roots of the modern life sciences and especially for all that followed from knowledge of plants in antiquity." The award ceremony will take place in Chicago, Illinois, in February, during the AAAS annual meeting.

Data from Guiana Shield Collecting Expeditions Now Online

The Biological Diversity of the Guiana Shield (BDG), a field-based program, has sponsored collecting expeditions for all groups of organisms in all areas of the Shield. The program operates out of Guy-

ana, the least well-known biologically of the areas of the Shield (Guyana, French Guiana, Suriname, and two departments of Venezuela). From 1986 to 1998 the program maintained a resident plant collector in Guyana and organized major expeditions. The data from the resident plant collector expeditions are now available on the BDG website at http://botany.si.edu/bdg/expeditions.html.

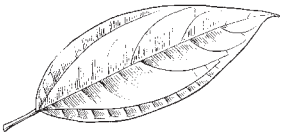
The collecting effort has produced about 53,500 plant collections. These BDG collections, in addition to plant specimens from the US National Herbarium, make a total of more than 145,000 plant records held by the BDG Program.



Map of Lynn Gillespie's expedition trips across Guyana from the Biological Diversity of the Guiana Shield program web site.

Collecting expeditions to remote and unexplored areas are the primary way to document biological diversity. In these expeditions, field work resembles the legendary trips of old. Although travel is easier on both ends of the trip (e.g., airplanes) and new types of data are collected (e.g., DNA samples, GPS coordinates), the major part of field work is essentially the same as it was during the time of Humboldt (1799-1804) and Spruce (1849-1864): a lot of time is spent walking, paddling a canoe, cutting trail, dragging supplies in and out of boats, setting up camp in the rain and heat or rain and cold, and collecting and processing specimens.

In this website, information is shown about expeditions conducted by the "BDG Plant Collectors" for the program, including collection localities, trip reports, lists of collections, and images showing different aspects of field work, using Google Maps as a mapping application. Currently, data are available for Lynn Gillespie's trips (1989-1991), and for two trips made by Karen Redden (2004-2005).



Visitors

Continued from page 3

Paul Maas, University of Utrecht, Netherlands; Annonaceae (11/8-11/14).

John Clements, Iwokrama Rainforest Reserve, Guyana**; Dane Gobin**, Georgetown, Guyana; **Edward Glover**, United Kingdom; **Elizabeth Losos**, Organization for Tropical Studies; **David Rampersad**, The University of the West Indies, Trinidad and Tobago; **Raquel Thomas,** Iwokrama Rainforest Reserve, Georgetown, Guyana; and **Thomas Wagner**, University of New Castle, United Kingdom; Iwokrama Rainforest Reserve (Guyana) science committee meeting (11/10-11/11).

Ania Wieczorek, University of Hawaii Manoa; Solanaceae (11/10-11/14).

Robin Jess, **Derek Norman**, and **Carol Woodin**, American Society of Botanical Artists (ASBA); ASBA exhibit jury panel (11/12)

Chris Haufler, University of Kansas; Asian *Polypodium vulgare* (Polypodiaceae) (11/19).

Raymund Chan, Universiti Teknologi Malaysia; Liabeae/Arcoteae (Asteraceae) (11/19-12/17).

Frank Axelrod, University of Puerto Rico; Flora of Puerto Rico and the Virgin Islands (11/24-11/26).

Roger Troutman, Independent researcher; *Liatris* (Compositae) (11/24-11/26).

Frank Axelrod, University of Puerto Rico, San Juan; Flora of Puerto Rico (11/24-12/5).

Andrew Oliver, Brown University; *Historia Plantarum* collection (11/25).

Jonathan Amith, Gettysburg College; Mexican ethnobotanical collections (12/9).

Melanie Schori, Ohio University; Icacinaceae (12/10-12/11).

David and **Caroline Monsees**, Independent researchers; *Historia Plantarum* collection (12/12, 12/16).

Alexey Zinovjev, Independent researcher; Salicaceae (12/17-12/18).

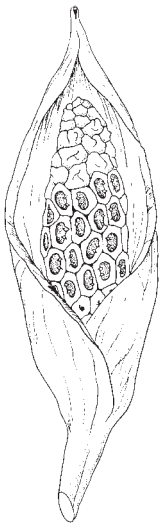
Mauricio Diazgranados, St. Louis University; Compositae (12/17/08-1/7/09).

Pedro Fiaschi, Virginia Commonwealth University; *Schefflera* (Araliaceae) (12/19).

Jose Meireles, Duke University; *Ormosia* (Fabaceae) (12/19).

Tina Ayers, Northern Arizona University; Lobelioids (Campanulaceae) (12/22-12/23).

Randall Scott, Northern Arizona University; *Brickellia* (Compositae) (12/22-12/23).



Institute for the Preservation of Medical Traditions

Biological diversity, including plants, is currently under strong pressure, as many species are threatened with extinction. This phenomenon affects also the knowledge about the plants and their possible uses, alimentary, medicinal or others. The threat of disappearance becomes even more severe when knowledge about the plants was written in an endangered language. Several human groups over time, however, described their vegetal environment in written texts, analyzed the plants and created taxonomical systems, and eventually recorded their alimentary, medicinal, cosmetic and decorative uses of plants.

Such knowledge, which came from the dawn of human history and was handed down through generations, was recorded in writing at some point in time, and then faithfully transmitted without interruption until the dawn of printing and modern science. Although many such documents have been destroyed over time, thousands have survived. These unique and irreplaceable pieces are now preserved in rare book rooms of libraries across the world such as the Vatican Library in Rome, the British Library in London, the Library of Congress in Washington, DC, and the Suleymaniye Library in Istanbul. However carefully preserved they might be, these documents are exposed to the unavoidable damage resulting from time. Additionally, they are not always easily accessible to scholars, and, in many cases, their handwriting is difficult to decipher. The information contained in these works needs to be properly understood and interpreted.

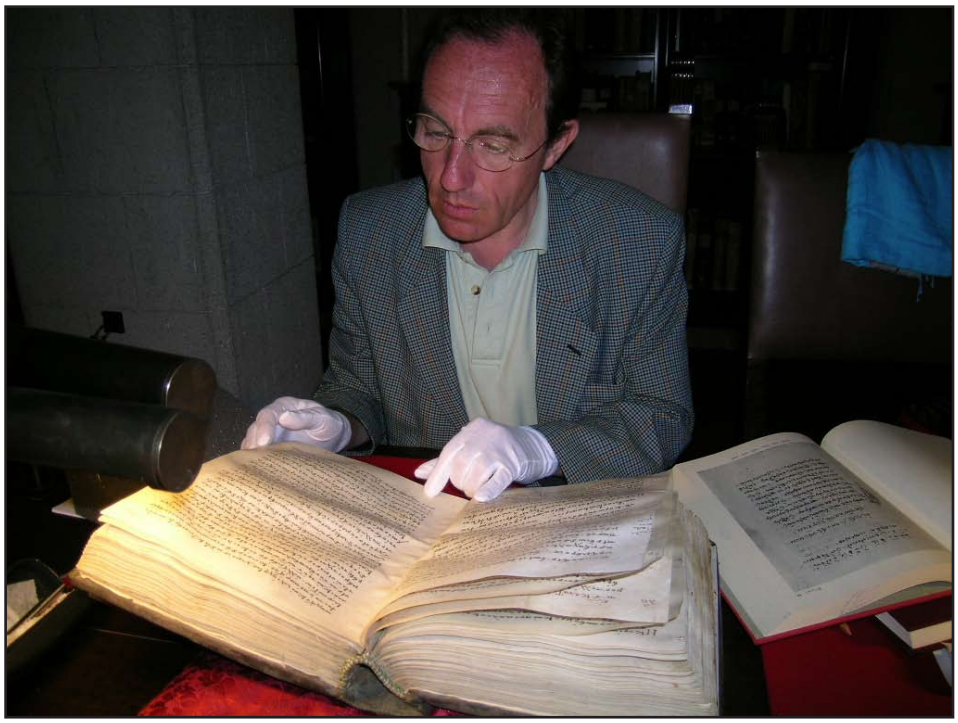
Texts recording the ancient knowledge of plants and their uses are of fundamental importance not only because they document the production, development and evolution of botanical knowledge and uses of plants, but also because the information about uses of plants contains data that might provide leads for renewed applications, particularly in the fields of medicine and therapeutics.

To conduct and foster research on these maters, **Alain Touwaide** and **Emanuela Appetiti** have created the Institute for the Preservation of Medical Traditions (IPMT), which is hosted in the Department of Botany. It is a nonprofit 501(c)(3) center for innovative research on the recovery, preservation, and study of ancient botanical and medical traditions. With the library resources of the *Historia Plantarum* collection (12,000+ items), and in collaboration with libraries, museums and research centers across the world, IPMT will host in-house research, support extra-mural programs, and provide teaching for students (be it at the Smithsonian or at their own universities) and expertise for the scientific community.

Alain Touwaide in the shop of a traditional healer in Konya, Turkey, 2008 (Photo by Emanuela Appetiti)

To prevent the loss of the ancient body of knowledge, Touwaide and Appetiti have created an unprecedented repository of knowledge made of three major collections of data and aimed at bringing ancient botanical knowledge and medical expertise from the shelves of libraries to the desk of scientists and benches of laboratories. The first collection contains images of books (written by hand or printed) from libraries across the world that have been systematically inventoried and analyzed on site. The resulting digital images of these books have been identified, data-based, and provided with meta-data on the books they come from, the plants they analyze, and the uses of such plants they report. The second collection is a digital library, which contains the text of the books recorded and digitized in the first collection. Several such texts have been or are currently being digitized in the original language, in a searchable format, to make multiple types of searches possible. The third collection is a series of computerized databases containing scientific information from the texts. Relevant data are extracted from the texts and reformatted to be recorded in the databases and retrieved in different ways. These three collections will be linked with each other, to make it possible to start from a certain book, to see its scanned pages, to read its text in a computerized version (instead of the possibly undecipherable calligraphy of the copyist on the image of the book), and to have its information available in a systematically organized way.

In the first phase, IPMT will focus on Mediterranean botanical and medical traditions, capitalizing on Touwaide's and Appetiti's primary research. This phase includes the *Flora of Classical Antiquity*; a world catalogue of Greek manuscripts with botanical treatises and medical texts on plant medicines; a Web site on botanical illustration during the first centuries of printing; research in the collections of the US National Herbarium; field work to locate specimens (dry and living) of plants mentioned in the texts; and laboratory analysis of plant remains from archeological sites. The data produced in this



Alain Touwaide deciphering a manuscript conserved in the library of the Monastery of St. John, Patmos Island, Greece, 2007 (Photo by Emanuela Appetiti)

phase were the result of Touwaide and Appetiti's research in libraries, archeological sites, and research centers across the world. Touwaide and Appetiti have signed agreements of collaborations with many of these institutions in order to create a consortium.

Later on, IPMT will conduct, encourage, and host research on other botanical and medical traditions in order to cross-reference botanical knowledge and uses of plants across time and space. This phase will include research of the so-called Unani medicine of India, where the troops of Alexander the Great imported ancient Greek science in the 4th century B.C. and contributed to enrich the local tradition, and China, where the Mediterranean botanical and medical knowledge arrived in the late 13th and early 14th centuries through the intermediary of the Arabic World.

The resources accumulated are unique reference works for the scientific community. IPMT has already received several invitations to collaborate in new research programs such as the analysis of human tissue from Egyptian mummies to possibly identify the plants these people consumed, be it as alimentary substances or as medicines; similarly the analysis of plant and human remains from archeological sites such as Mycenae in order to reconstruct the diet of an early Mediterranean population; and a new project to grow seeds from archaeological sites of 2,500 years ago, to assess the possible variation of plant species over time, offering a significant contribution to our understanding of the plant world.

By its innovative and cross-disciplinary nature, the research promoted by IPMT will open new avenues for the understanding of the natural environment and its biological diversity and diversification, together with the interaction between humans and plants, and the construction of knowledge, be it medical or botanical, among different cultures. This without mentioning the cataloguing and preservation of a wealth of documentation threatened with extinction, and a humankind's heritage of knowledge exposed to oblivion.

Orchids through Darwin's Eyes

The 15th Annual Orchid Show is currently on display at the National Museum of Natural History (NMNH) in the special exhibition gallery off the Museum's Rotunda. The show is a joint presentation of the Smithsonian Institution Horticulture Division and the U.S. Botanic Garden, hosted by NMNH. The show runs from 24 January through 26 April.

The exhibit titled "Orchids through Darwin's Eyes" celebrates the world of orchids, the 200th birthday of Charles Darwin, and the 150th anniversary of the publication of *On the Origin of Species*. Orchids were studied by Charles Darwin (1809–1882), and influenced his formulation of theories of natural selection and evolution. His 1862 book *On the Various Contrivances by which British and Foreign Orchids are Fertilised by Insects, and on the Good Effects of Intercrossing* focused on their pollination biology and adaptation and the rare first edition of this work is on display in the exhibit. Since then, orchids have starred in scientific studies on plant adaptations. This exhibit explores the world of orchids and their adaptations and evolution through the eyes of Darwin and those he influenced—naturalists, horticulturists, and scientists who continue to find new insights and curious surprises while working with these captivating plants.

The exhibit displays live plants but also features the first undisputed fossil evidence of orchids—a piece of Dominican amber entombing a bee with orchid pollinia on its back. The amber specimen is on loan from Harvard University and will be its first public display since being described and featured on the cover of *Nature* in 2007 (448: 1042-1045).

The Museum was involved with developing the exhibit script with Sally Love in the NMNH Office of Exhibits serving as Exhibit Developer, working on the scientific content with museum botanist **Ken Wurdack**. Over-all responsibility for the exhibit came from the Horticulture Division, working in cooperation with the Office of Exhibits Central.

Recipients of the José Cuatrecasas Award Visit NMNH

Fernando Alzate is a Ph.D. biologist from the Instituto de Biología, Universidad de Antioquia, Medellín, Colombia. The principal aim of his visit, between 26 September and 8 November 2008, was to study the collections of *Bomarea* (Alstroemeriaceae) housed in the U.S. National Herbarium with the purpose of conducting a taxonomic revision of the genus. During the visit he revised all *Bomarea* specimens in the US collection, amounting to more than 1,000 sheets. Alzate describes the US collection of *Bomarea* as the most valuable in the Western Hemisphere due to the large number of species (about 90% of those known for the genus) and specimens, and the enormous historical value of the collection. Alzate noticed that many of the type collections are from localities that have since been converted to urban areas or rural farms. The US collection also has a high representation of the morphological

Fernando Alzate

variation of many taxa, which assisted in the delimitation of the various species.

Jesus Rodrigo Botina-Papamija from the Universidad del Valle, Colombia visited the U.S. National Herbarium from 4 November to 4 December 2008, for the project "Taxonomy of Smilacaceae Vent. in Andean Region of Northern South America." Knowledge of the species of *Smilax* of Bolivia, Peru, Ecuador, Colombia, and Venezuela, and their geographic distribution, is not satisfactory, because most herbarium specimens in these countries and in major herbaria of the United States and Europe are undetermined, and those that are determined may be determined incorrectly. Preliminary data processing was conducted to show the possible number of species of *Smilax* from the Neotropics, and also a probable synonymy of some species. Botina-Papamija examined 47 *Smilax* type collections (35 from Central America, 11 from South America, and 1 from the West Indies), and 642 *Smilax* specimens (392 from South America except Brazil, Chile, Uruguay, and Argentina, and 250 from Central America) in the U.S. National Herbarium. Within the *Smilax* of the Andean region of Northern South America, he examined 223 specimens. He cannot say with certainty

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Smithsonian
Botanical Symposium

27-28 March 2009
National Museum of Natural History

"Genes, Genomics, and Genome Evolution in Plants"

In collaboration with the United States Botanic Garden
Supported by the National Science Foundation and the Cuatrecasas Family Foundation

Ever since Darwin, biologists have sought to understand how species evolve. The complexity and flexibility of the plant genome, as first revealed by Mendelian genetic methods, likely render plants especially able to adapt to changing environments. The new tools of genomics, initially driven by studies of model organisms, are now being applied across the diversity of plant life. Comparative studies have addressed the role of variation in genes, gene families and genomes in such processes as speciation, domestication and floral development. This Symposium, hosted by the Department of Botany, will highlight results of current studies on plant genes and genomes, especially as they apply to fundamental questions in evolutionary biology, crop improvement and ecosystem sustenance in rapidly changing environments worldwide.

Maize (*Zea mays* L.) (Illustration by Nicolle Rager Fuller, National Science Foundation)

Information and registration at http://botany.si.edu/sbs/
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Registration is now open

Mireya Patricia Sánchez Cordoba

how many species of *Smilax* there are in the Neotropics. After comparing lists of *Smilax* presented by several researchers, he believes that in the Neotropics there could be about 100 species of *Smilax*. Only Brazilian and Colombian species are typified in accordance with current botanical laws of nomenclature.

Mireya Patricia Sánchez Cordoba, from the Universidad Nacional de Colombia, visited the U.S. National Herbarium from 20 October to 20 November 2008. Her visit contributed towards her Ph.D. thesis "Analysis of Vegetation Riches and Phytogeographical Patterns of the Colombian Guiana Shield Region." One objective of her thesis was to compare the vegetation of Colombian Guiana Shield Region with the vegetation of Guiana Oriental Province (Guyana, Suriname, and French Guiana). During her stay she reviewed several plant families of the Guianas and, with the assistance of plant specialists, determined about 85 Colombian specimens. Using resources from the Botany Library and the Biological Diversity of the Guiana Shield Program (BDG), Cordoba was able to establish the distribution of the various species.

Profile

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are several critical to Redden's research interests. These collections facilitated her discovery of hybridization among the species of *Paloue* and the closely related genus, *Elizabetha* (Redden et al., in prep.). A fruiting specimen of a previously undocumented hybrid was collected on a small tributary off the Mazaruni River. Additionally, a new species, *Passiflora tecta* collected on this trip, was described by Christian Feuillet in 2007.

Because of the success and dynamics of their first expedition, they joined forces again in the fall of 2008. On this trip they traveled to the 200,000 acre Conservation International Guyana (CIG) conservation concession in the upper Essequibo River watershed in southeastern Guyana. This concession is just north of King William IV Falls, the obstacle that prevented R.

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Ken Wurdack, Claudius Perry, and Karen Redden (left to right), in the CIG conservation concession, September 2008 (Photo by A. Rodriguez)

Profile

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Schomburgk in further navigating up the Essequibo in 1836 during his famous explorations of Guyana. This area has changed little since then and contains a remarkable variety of habitats that support a high diversity of plants and animals. A recent BBC documentary, "The Lost Land of the Jaguar", was filmed, in part, in the concession. Redden and Wurdack stayed at the BBC campsite. Compared to their tarp-covered bush camps, their wood-constructed campsite was a treat at the end of their journey. The other team members included Claudius Perry, Padmini "Pads" Ragnauth (University of Guyana student), Andrew Rodriguez (photographer), and four very knowledgeable CIG conservation officers: Henry James, Nigel John, Elvis Joseph, and Hendricks Simon.

The research team spent a total of six weeks in the CIG concession and visited two main areas: first "Himara Creek" at the southern boundary of the concession close to the Suriname border and second, "Palm Mountain," the highest mountain in the concession. For the team to reach these areas, transportation involved trucks, boats and long hours on foot. After a daylong HiLux truck ride from Georgetown to the edge of the Rupununi savanna at Apotari, they launched their boats upstream on the Essequibo River where they spent the next three days traveling to their first site. They found the creeks draining into the Essequibo clogged with fallen logs, and much of their time was spent chain sawing, clearing debris and portaging their boats around, under or over these logs or "tacoba." Fluctuating water levels exposed new logs every day, so their path needed frequent clearing.

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

The second site in the CIG concession, "Palm Mountain," involved backpacking 16 km to the foot of the mountain with all rations and personal supplies as well as two sets of climbing spikes, pruning poles, five gallons of ethanol, 25 pounds of newspapers, 10 pounds of silica gel and other collecting supplies. The mountain top was dominated by a palm-rich forest, with bromeliad-covered, rocky outcroppings affording a wonderful panoramic view of the Essequibo River and surrounding primary rain forests. While collecting, they often heard the cat-like calls of cock-of-the-rock birds and saw at least three species of monkeys. As their trip drew to a close, they begrudgingly headed out of the forest and back to Georgetown. Although the collections are still being processed, they will most assuredly contain many interesting taxa from this previously uncollected area.

For more information about these and other BDG sponsored expeditions please see the newly expanded BDG website <http://botany.si.edu/BDG/index.html> which includes their collections and trip photographs georeferenced using Google Maps (see page 4 of this issue of the *Plant Press*).

Contemplating how to free a boat (back to front): Claudius Perry, Andrew Rodriguez, Karen Redden and Pads Ragnauth (October 2008). (Photo by K. Wurdack)

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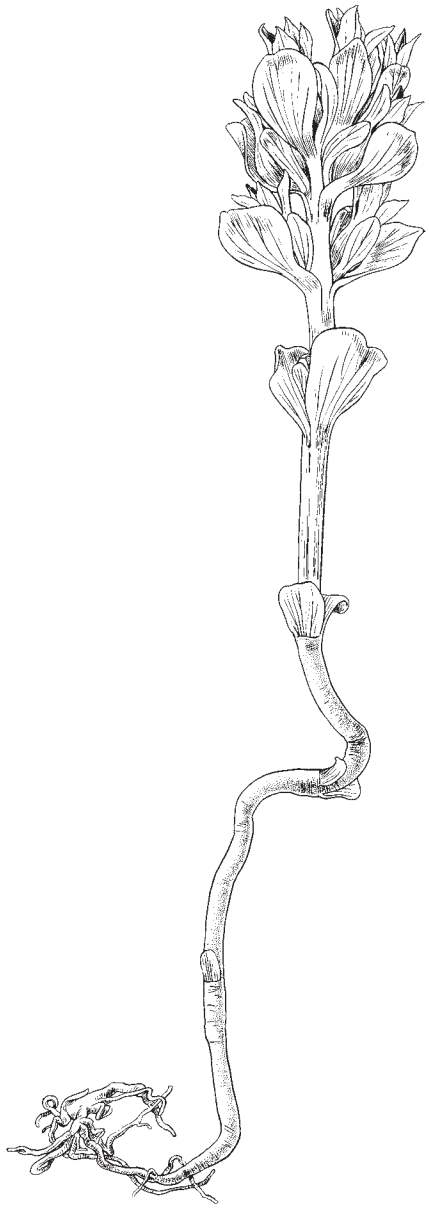
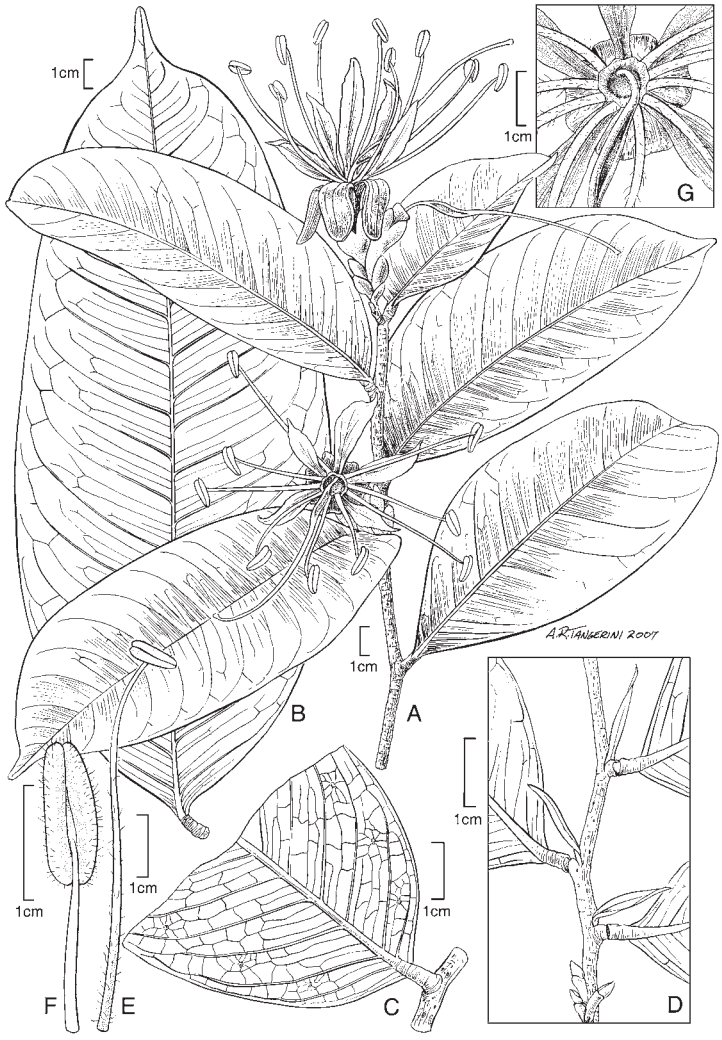


Art by Alice Tangerini

Paloue sandwithii Redden

Paloue sandwithii is named in honor of Noel Y. Sandwith (1901–1965). His work with this genus and numerous other taxa has contributed greatly to our knowledge of Neotropical legumes. *Paloue sandwithii* is one of five species and is known from only five collections near Kaieteur National Park, Guyana, South America. It differs from the other *Paloue* by possessing five sub equal petals, large coriaceous leaves, and unique venation characteristics.



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