

The Plant Press



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Botany Profile

Botanists Promote Endangered Planet Conservation

By Robert DeFilippis

Several large regions of the world are confronting environmental problems shaped by intrinsic sets of geographical, biological, and human parameters that have operated for varying periods of time. Among the recurring problems, it is believed that overlooked populations of potentially valuable medicinal plants are at risk on a worldwide basis, and could be extirpated before their pharmacologically active chemical compounds can be studied in anticipation of future use. Will a wider significance eventually be accorded, for example, to the fact that in Brazil *Heliotropium elongatum* (Boraginaceae) and *Ilex paraguariensis* (Aquifoliaceae) are used to treat anthrax?

Typical of regional situations facing Latin America are the progress of Amazonian economic development with its attendant rainforest fragmentation and loss of biodiversity, and the conversion of Central American woodlands into pastures for beef cattle. Characteristic of Africa is the struggle to repel desertification in the vast sub-Saharan Sahel and the resulting desperate search for alternative sources of firewood.

Europe has the prolonged effects of denudation throughout the Mediterranean area to contend with. In fact, deforestation is thought to have strongly influenced the demise of the civilizations of Mesopotamia (ca. 2000 BC), Bronze Age Minoan Crete (ca. 1450 BC), Mycenaean Greece (ca. 1200 BC), Cyprus (abandoned ca. 1050 BC), Greece in the

Golden Age of Athens (ca. 400 BC), the Roman Republic (ca. 400 BC), and the Venetian Republic (ca. 1500 AD).

The Pacific Ocean realm contains often highly specialized endemic floras in fragile, isolated island ecosystems. Pre-adapted to life without predators, many indigenous plant communities, as in Hawaii, have been strangled by introduced weeds and rooted-out by feral animals. The calamity is worsened by the fact that some Pacific areas, such as Fiji (for Degeneriaceae), are within the Cretaceous cradle of evolution of the primitive flowering plants, and intensive research into their floras can still teach us much about how angiosperms originated.

The Pacific Islands have historically been variously impacted by the insatiable sandalwood trade, the phenomenon of mass dieback of forests, land clearance for mining, the practice of total conversion of islands into coconut plantations for the copra trade, by nuclear detonations so severe that not even the ants will return to some atolls, and by accumulations of silt from accelerated terrestrial soil erosion into coral reefs. Smithsonian marine phycologists have extensively investigated the Pacific algae, some of which grow into structures that, to most people, would be indistinguishable from pink coral. As will be seen later in this article, attention to biodiversity of Indo-Pacific ecosystems is one focus of the Plant Conservation Unit in Botany.

Smithsonian botanists have traditionally provided conservation advice and practical applications during the course of their studies. Examples include

research on Iwokrama and Kaieteur (Guyana) emanating from the Biological Diversity of the Guianas Program directed by Vicki Funk, which was also instrumental in setting up the conservation center in Guyana (see related article in this issue); Warren Wagner's studies of endangered plant species of the Hawaiian archipelago (he and Vicki Funk edited a book containing their articles on this subject); Pedro Acevedo investigating conservation status of sapindaceous vines and examples of West Indian plant habitat degradation; studies of deforestation, forest fragmentation and plant-animal interactions in Brazil by John Kress; Mark and Diane Littler on diversity and diseases of coral reefs; studies of algal degradation in coral reefs by Walter Adey; and of environmental problems on northern kelp forests by James Norris.

To these are added the diverse perspectives of Stanwyn Shetler and Paul Peterson on global climate change and its effects on spring temperate flora; the complexity of plant-pollinator relationships and their importance for the conservation of species and communities by John Kress; case studies in lichen conservation by Paula DePriest; and the biodiversity of Atlantic dinoflagellate assemblages in the microscopic foodweb as affected by severe waste disposal problems and hurricane damage, undertaken in Belize by Maria Faust.

Turning to the United States, it is known that by the year 1991 the lower 48 states had lost more than 95 percent of the original forests, which were removed

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Travel

John Kress traveled to Bangalore, India (7/13-7/24) to attend a meeting as Executive Director of the Association for Tropical Biology, and to Myanmar (8/12-8/29) to conduct field research and fund raising for the Myanmar Center for Botanical Research.

James Norris (7/17-7/19) traveled to Lafayette, Louisiana to participate in a doctoral examination as a graduate committee member.

Gary Krupnick traveled to Hilo, Hawaii (7/28-8/5) to attend and be a presenter at the Annual Meeting of the Society for Conservation Biology, and to Bonn, Germany (9/10-9/17) to meet with colleagues on the World Wildlife Fund "Ecoregions of the World" Project.

Robert Faden (8/3) traveled to the New York Botanical Garden, Bronx for herbarium work, and to hear the Ph.D. seminar of Chris Hardy, former summer Research Training Program intern with Faden in 1994-1995.

Warren Wagner (8/9-8/23) traveled to

Boulder, Colorado to visit the herbarium and collect leaf samples for DNA study of Onagraceae and Caryophyllaceae, and to Albuquerque, New Mexico for field research and to attend meetings.

Vicki Funk traveled to Albuquerque, New Mexico (8/10-8/20) for field research on Asteraceae; to Santa Barbara, California (9/8-9/11) to attend a Biogeography (NCEAS) Meeting and for book editing; to Georgetown, Guyana (10/6-10/13) in preparation for Guyana Symposium 2001, presenting a lecture and meeting with officials of the UG, EPA, and Guyanan government officials; and (10/20-11/17) for one day at the University of Washington, Seattle as committee member for the Ph.D. qualifying exam of Susan Grose (on *Tabebuia*, Bignoniaceae), and then proceeding to Sydney, Australia for research on Asteraceae.

Laurence Skog (8/11-8/17) traveled to Albuquerque, New Mexico to attend annual meetings of the Botanical Society of America and American Society of Plant Taxonomists. He also visited the Sevilleta Field Station of the University of New

Mexico to observe the confluence of the Great Basin vegetation zone and the Chihuahuan Desert flora.

Dan Nicolson traveled to Australia (9/2-9/18) to attend the 5th Flora Malesiana Symposium in Sydney, preceded by a field trip out of Cairns to the northern Queensland rainforests; and to Vienna, Austria (10/15-10/24) to attend a symposium of the International Association for Plant Taxonomy.

Pedro Acevedo (9/4-9/17) traveled to western Jamaica to conduct a floristic inventory of the Dolphin Head Mountains with George Proctor.

Mark and Diane Littler, and Barrett Brooks (9/12-9/26) traveled to Bocas del Toro, Panama for field research.

Paul Peterson (9/15-10/20) traveled to Mexico on a field trip to collect grasses.

Dieter Wasshausen (9/18-9/22) traveled to the New York Botanical Garden, Bronx, New York to examine specimens of flora of Bolivia, Ecuador and Brazil.

Paula DePriest (10/18-10/27) traveled to Vienna, Austria to attend a meeting of the International Association for Plant Taxonomy.



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Visitors

A. Edward Salgado, Christian Brothers University, Memphis, Tennessee; *Asplenium* in Southeast Asia and Polynesia (7/14-11/20).

Gorky Villa, Pontificia Universidad Catolica del Ecuador; Flora of Yasuni National Park (8/6-8/14).

Evginey Banayev, Central Siberian Botanical Garden, Novosibirsk, Russia; *Alnus* (8/12, 8/17).

Steven J. Casper, Washington University, St. Louis, Missouri; Antimalarial plants from Peruvian Amazon (8/13).

Nam Sook Lee, Ewha Women's University, South Korea; Liliaceae (8/27-8/28).

Tom Wendt, University of Texas, Austin; Sapotaceae, Polygalaceae (8/27-8/28).

Susan Grose, University of Washington, Seattle; Bignoniaceae (8/28-9/22).

Tracy Parker, Forestry Unit, Jamaica; Jamaican Lauraceae (8/29).

Tetsuo Koyama, Kochi Prefectural Makino

Botanical Garden, Kochi, Japan; Medicinal *Coptis* (Ranunculaceae) and *Panax* (Araliaceae) (9/4).

Marcus Alves, New York Botanical Garden, Bronx and University of São Paulo; Cyperaceae (9/7).

Susan Wisser, Landcare Research, Lincoln, New Zealand; New Zealand flora (9/10-9/14).

Peter Hoch, Missouri Botanical Garden, St. Louis; Onagraceae (9/23-9/26).

Jorge Crisci, Museu de La Plata, Argentina; Onagraceae (9/23-9/26).

Liliana Katinas, Museu de La Plata, Argentina; Onagraceae (9/23-9/26).

Ihsan Al-Shehbaz, Missouri Botanical Garden, St. Louis; Brassicaceae (9/25).

Ovidiu Dragastan, University of Bucharest, Romania; Bryopsidalean algae (Chlorophyta) (10/3-11/2).

Walter Holmes, Baylor University, Waco, Texas; Ecuadorean *Mikania* (Asteraceae) (10/15-10/19).

What is Botany?

What is Botany? I admit it: we are paraphyletic. Botany at the Smithsonian is all over the Tree of Life: green plants, fungi, brown algae, red algae, and dinoflagellates scattered around the Eukaryota, and then those cyanobacteria and associated (rather disassociated) green plant chloroplasts found in the second major clade of life - the Bacteria.

In fact, taken together, our studies in Botany encompass more of life on the planet than any other unit at the Smithsonian, with the exception, perhaps, of Paleobiology. The direct lineages of the organisms investigated in Botany stretch back to the Early Proterozoic of 2 billion years ago. In contrast, the vertebrates, invertebrates, and insects are clustered at the very tip of the tree in the Metazoan clade, at the most going back only a mere 600 million years. Admittedly, the arthropods comprise an enormous diversity of species currently on the planet, but they are confined to a single twig at the tip of the Tree. Botany at the Smithsonian includes work on five of the nine major lineages in the Eukaryota and two of the three major branches of the "Big Tree of Life." That is a big chunk of the natural world to understand.

Within the green plants, at the Smithsonian we have some of the best collections and curators of non-vascular and vascular plants: bryophytes, ferns, and flowering plants. Within the fungi, our lichen collections and research are among the most extensive on the continent. All four major algal groups (greens, yellows, browns, and reds) that stretch over three major clades in the Eukaryota are currently being studied and documented by our scientists. Within the "ciliate" clade, our dinoflagellate specialist has created one of the best documented collections of the last few decades.

Finally, The Francis Drouet Cyanobacteria Collection housed in Botany is a gold mine of described and undescribed members of this critical clade of Bacteria that indirectly gave rise to all green plants. Botany at the Smithsonian goes beyond what we traditionally think of as the study of plants. Not only does it span the major lineages of life on earth, but also its major habitats, including marine and fresh water as well as tropical, temperate and polar terrestrial environments.

The discipline of botany is a distinctive scientific endeavor and field of inquiry with its own set of rules (e.g., The International Code of Botanical Nomenclature), societies (e.g., Botanical Society of America,

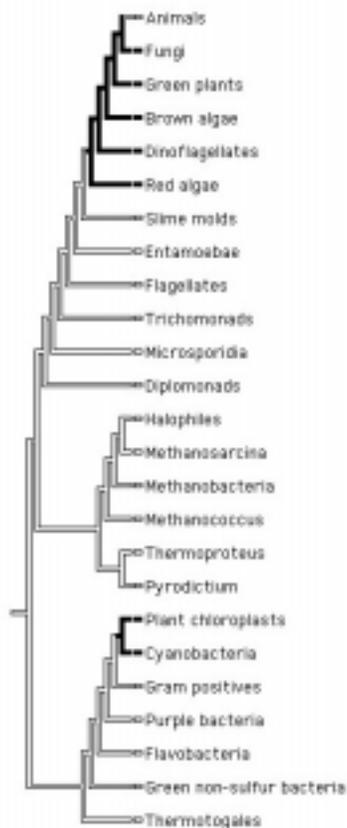
International Association for Plant Taxonomy), and publications (e.g., *American Journal of Botany*, *International Journal of Plant Sciences*, *Systematic Botany*). Our colleagues are most commonly found at other botanical institutions, such as botanical gardens, university herbaria, and some natural history museums. Our professional meetings are primarily concentrations of botanists, but the topics under discussion and presentation cut across many fields of study, including taxonomy, ecology, evolutionary biology, and conservation. Although the charismatic megafauna often win

the public's attention for inspiring the conservation of habitats, those habitats are defined by their vegetation. Conducting an inventory of the plants is invariably the first priority in the assessment of a new conservation area, and an understanding of plant diversity is the foundation for conserving the entire biota.

Plant systematic studies are wide-ranging and often interdisciplinary. By definition some of our organisms, e.g., lichens, represent co-evolutionary relationships that cut across lineages within our "plant" taxa. These within-plant interactions and dependencies are also exemplified by the mycorrhizal fungi and their host trees found in both the tropics and temperate zones. The explosive radiation of angiosperms, on the other hand, is in part a result of relationships that have evolved between plants and animals, namely between flowers and the insects and vertebrates that pollinate them. Botany, therefore, by its nature is a discipline that stretches beyond the already broad

boundaries of its taxa.

From the perspective of the diversity of all life on the planet, we, as botanists, are forever looking outward and cannot work in the narrow confines of our own special groups. The mission of Botany at the Smithsonian is to discover the diversity of plant life in marine and terrestrial environments, to describe this diversity, to interpret the evolutionary origin of this diversity, and to explain the processes responsible for this diversity. This mission can only be achieved by understanding how humans are affected by and have altered plant diversity on the planet. This is what we do best as botanists, and what we must continually strive to expand and do better as our contribution to understanding the natural world.



**The Tree of Life
(Botany indicated in black)**

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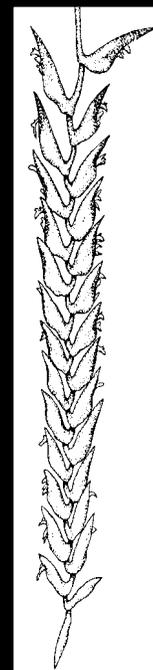
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Staff Research

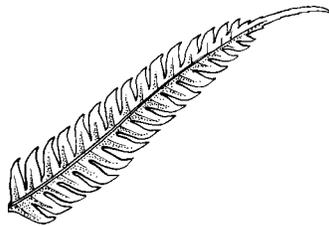
Mark and Diane Littler and Barrett Brooks, with volunteer Connie Gasque, did field work in Bocas del Toro, Panama (19 Sept - 4 Oct), where they concluded a field experiment on nutrient/herbivore interactions and set up another experimental study in a different habitat. The highlight of the trip was the discovery of a new collecting site, a reef platform at a depth of 30-40 feet, that had a wealth of extremely rare and potentially undescribed Caribbean macroalgal species. During two dives on the last working day of the expedition, the team collected abundant material of over 100 different species, and more are expected to be found in this most unusual habitat.

The Association for Tropical Biology (ATB) convened its 2001 Annual Meeting in Bangalore, India in July. **John Kress**, Executive Director of ATB, attended the conference at which he organized a symposium entitled "Systematics and Evolution of Tropical Plants - A Case Example: the Zingiberales." Six speakers from four countries presented papers on various aspects of the evolution and ecology of the gingers, heliconias, and relatives. After the conference, Kress and Kyle Williams, graduate student at Duke University, traveled to the Western Ghats where they were hosted by Profs. K.G. Bhat and N.A. Madhyartha. At Udupi they found some very interesting gingers, including the endemic genus *Paracautleya*, represented by *P. bhatti*, an interesting disjunct from the Himalayas.

From July to September, **Walter Adey** covered the outer coast of Nova Scotia, southeastern through northern Newfoundland, southern Labrador and the northern Gulf of St. Lawrence. The purpose was to establish a network of 40 intertidal stations, each with a series of quantitative quadrats for biomass of each algal species and the numbers of grazers and other critical invertebrates. This effort begins a five to six year project to characterize the Atlantic Subarctic Region, as established by the Adey and Steneck theoretical biogeographic model (Thermogeographic

Model) published this year. Virtually all prior algal data for the region are based on algal presence/absence, rather than abundance, cover or biomass, and is inadequate to define biogeographic regions. Pleistocene climatic forcing and the climatic complexity of glacial, rocky coastlines allows the interfingering of floras which cannot be easily separated on a presence/absence basis. Quantitative analysis produces a clear picture of distribution, which in turn translates into evolutionary patterns over Pleistocene time.

Paul Peterson visited Mexico on 18 September - 18 October and attended the XV Congreso Mexicana de Botánica in Querétaro. He made field collections of grasses with Jesus Valdes Reyna (Universidad de Antonio Narro, Saltillo) in Nuevo Leon and Tamaulipas, Socorro González Elizondo (CIIDIR-Durango) in southern Durango and Zacatecas, Octavio Rosales Carillo (Universidad de Aguascalientes) in Jalisco and Michoacan, and Yolanda Herrera Arrieta (CIIDIR-Durango) in Mexico, Tlaxcala, and Puebla. He collected 378 numbers, with many seeds of *Bromus* sect. *Bromopsis* and other interesting samples of chloridoid grasses for later molecular analyses. At the Mexican Congress, Yolanda Herrera Arrieta and Peterson presented results from an anatomical survey of all 150 species of *Muhlenbergia*.



Staff Activities

Alice Tangerini and volunteer Maxine Schein have been archiving a series of algae illustrations that appeared in the early Fisheries Bulletins. The illustrations came from Lisa Palmer, Museum Specialist in Fishes, who found them stored with the fish collection in old, dust-covered acidic folders. Schein cleaned, repaired and mounted the artwork, and labeled it for storage in archival boxes. **James Norris** helped to track down the publications for most of the art, based on sketchy refer-

ences on the folders. The publications included articles by William Randolph Taylor "Marine Algal Vegetation of the Gulf of Mexico" (1954), W. D. Hoyt, "Marine Algae of North Carolina" (1917), and Hugh M. Smith, "Seaweed Industries of Japan" (1904).

In the Smith publication, the pen and ink illustrations, possibly drawn by a Japanese artist, are quite exquisite and feature the production of *nori* for human consumption and other uses. The subject matter ranges from pictures of tools used in the process to scenes of fishermen harvesting the seaweed. Associated with these illustrations were delicate Japanese watercolor and ink wash paintings, which provided the original source material.

Tangerini also attended the Guild of Natural Science Illustrators (GNSI) Annual Conference in Bar Harbor, Maine during 12-18 August, hosted by the College of the Atlantic, on Mount Desert Island. One workshop, taught by Dolores Santoliquido, was on acrylic and color pencil mixed media and suited botanical subject matter with its layers of alternating pencil and paint. An Adobe Photoshop demonstration on entomology included emphasis on designing custom brushes for repeated structures and on replicating the other half of the insect by a simple copy method. By taking classes in Adobe Photoshop and Illustrator, and an introduction to 3D rendering software, Tangerini returned with enough knowledge to colorize one of her inked drawings digitally, *Alsinodendron trinerve* (Caryophyllaceae), for Warren Wagner.

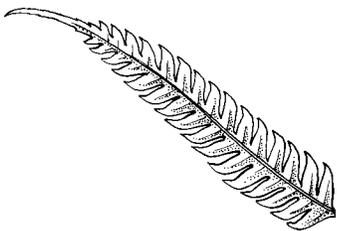
Warren Wagner attended the Botany 2001 meetings in Albuquerque, New Mexico in August, where he gave a talk entitled "Origin of the Hawaiian Subfamily Alsinoideae and Preliminary Relationships in Caryophyllaceae Inferred from matK and trnL C-F Sequence Data," co-authored by Molly Nepokroeff (senior author), **Elizabeth Zimmer**, Stephen Weller, Ann Sakai and Richard Rabeler. He also collected Onagraceae in Colorado and New Mexico.

Wagner visited the Missouri Botanical Garden (MBG), St. Louis from 11-15 October to meet with Peter Hoch (MBG) and Jorge Crisci and Liliana Katinas, both from Museo de La Plata in Argentina, who are collaborating with Wagner and Zimmer on a project, entitled "Evolution and Historical Biogeography of Onagraceae Tribe

Onagreae, a Major Lineage Derived from the Madro-Tertiary Flora.” Katinas and Crisci are Smithsonian Mellon fellows, working with Hoch since mid-August and will return to Argentina on 19 October.

Elizabeth Zimmer attended a workshop of the NSF-supported group “Deep Gene: Toward an Integration of Plant Phylogenetics and Plant Genomics.” It was held on 16 August in Albuquerque, New Mexico at the close of the annual BSA/ASPT meetings. Zimmer also participated in a meeting of the “Washington Area Consortium for Systematics and Evolution” which was held at the George Mason University - Manassas campus on 2 October. She participated in the 2001 Discovery/Celera Young Scientist Challenge at NMNH on 22-24 October, serving as “SI Scientist-in-Residence” for the molecular genetics challenge sponsored by Celera.

Zimmer traveled to Albuquerque, New Mexico from 24-28 October to sit on a “visioning panel” for the third decade of Long Term Ecological Research (LTER) sites sponsored by the National Science Foundation. On 28-29 October, along with other members of “Deep Gene” (R. Olmstead, D. Mandoli, J. Banks and B. Mishler), she visited Clemson University’s biotech facility. She attended the thesis seminar of Alejandra Jaramillo at Duke University on 30 October through 1 November.



New Faces

Jessica Braun, a graduate of St. Mary’s College of Maryland, has begun work as a contractor for **Warren Wagner**. She will be involved in the inventory of hundreds of specimens collected in the Hawaiian Islands and the preparation of over a thousand images for the Hawaiian flora website. Braun, who will be here for nine months, previously worked as a contractor with the Biological Diversity of the Guianas Program.

Aizhong Liu, a postdoctoral fellow working with **W. John Kress**, arrived on 16 October. His interest is in the systematics of wild bananas (*Musa*). While at the Smithsonian for one year, Liu will use phylogenetic techniques to study the origin of domestic bananas by comparing different DNA regions, in order to clarify the phylogenetic relationships within *Musa*. Liu received his Ph.D. from Kunming Institute of Botany, the Chinese Academy of Sciences, with De-Zhu and Kress as advisers.

Aaron J. Proujansky, an undergraduate student at Princeton University, is a volunteer intern with the Biological Diversity of the Guianas Program, studying the medicinal plants of the Guianas.

Matthew Smith from Silver Spring, Maryland has begun an internship with **Robert Faden**, to study the comparative leaf anatomy of the Streptolirionaceae, a small subtribe comprising three genera of Commelinaceae. Smith will also assist the Collections Management Unit and the inventorying of Myanmar collections.

Joining the Laboratory of Molecular Systematics (LMS) is **Miguel Volovsek**, whose doctoral research was on the molecular systematics of Nemerlian red algae, under the guidance of Max Hommersand at the University of North Carolina, Chapel Hill. At the LMS, Volovsek is working with Judith Skog, George Mason University professor and Smithsonian Research Associate and **Elizabeth Zimmer**. He is investigating phylogenetic relationships among species in the fern genus *Elaphoglossum*.

Talks Presented

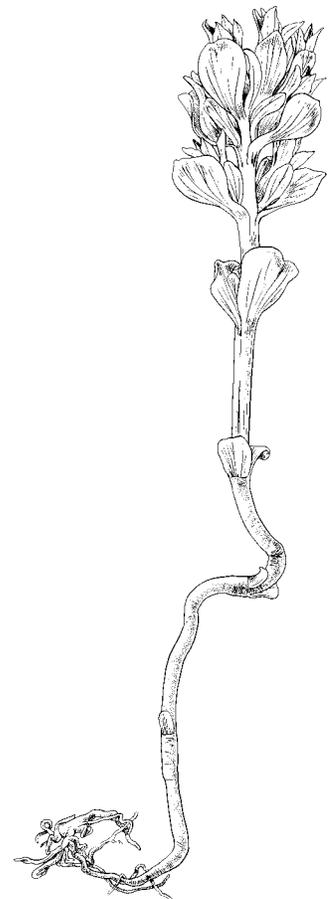
John L. Clark, graduate student in the Department of Biological Sciences at George Washington University (Washington, D.C.), under a joint program with the Smithsonian Institution (Section of Botany and Laboratory of Molecular Systematics), presented a talk entitled “Preliminary Phylogeny of *Alloplectus* (Gesneriaceae) Based on Morphology and ITS Sequence Data” at the Botany 2001: Plants and People Conference, Annual Meeting of the American Society of Plant Taxonomists and the Botanical Society of America, held in Albuquerque, New Mexico on 12-16

August. Clark’s Smithsonian co-advisers for his Ph.D. in systematics are **Laurence Skog** and **Elizabeth Zimmer**.

W. John Kress presented an invited seminar on 11 October at Duke University, where he is Adjunct Professor of Botany. The seminar was entitled “An Evolutionary History of the Zingiberales: Phylogeny, Classification and Ecology.”

Gary Krupnick presented a seminar entitled “From Floras to Ecoregions: Plant Richness and Endemism in the Indo-Pacific” to the Botanical Institute, Department of Systematics and Biodiversity at the University of Bonn, Germany on 13 September.

Rachel Levin, Mellon Junior Fellow working with **Warren Wagner** and **Elizabeth Zimmer**, presented a seminar entitled “What Can Floral and Vegetative Fra-grances Tell Us About the Evolutionary Relationships Within Three Genera in the Plant Family Nyctaginaceae” to the Behavior, Ecology, Evolution and Systematics (BEES) group at the University of Maryland on 17 September.



Comments on the Effects of the September 11 Attacks

Botany staff received numerous e-mail messages of concern and condolence following the September 11 terrorist attacks. Among the countries from which messages were received are: Canada, Chile, China, Cuba, France, India, Kenya, Malaysia, Mexico, Peru, Romania, Russia, South Africa, Spain, Switzerland, United Kingdom, and Venezuela.

Visits to the US National Herbarium by collaborators with **Warren Wagner** and other researchers the week of 23 September were cancelled, and planned field work in Venezuela by **Laurence Dorr** as well as plant collecting in Gabon by **Deborah Bell** and **Stephen Smith** were cancelled. Several Botany staff members were traveling during the events, and had difficulties returning to Washington, D.C.

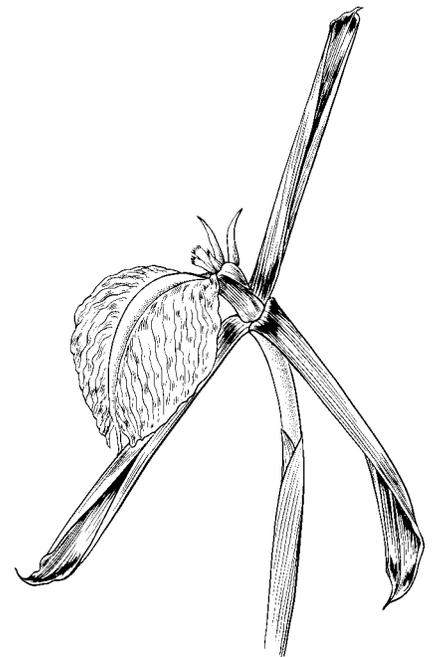
Dan Nicolson was in Sydney, Australia attending a Flora Malesiana Symposium at the time of the attacks, and he reports the following: "Flags were immediately lowered to half-mast and everyone was as shocked as us. I had e-mail messages from Russia, Mexico, Brazil, etc. The symposium continued until 14 September when we took a field trip to a botanic garden in the Blue Mountains. Sunday 15 September my wife and I flew back to Los Angeles where our onward flight to Dulles was cancelled. In Australia, when they saw that my wife was born in Beirut, we were immediately taken away to have all our baggage hand searched. In Los Angeles we had to wait a day to get seats to Washington-Dulles Airport, so we went to a motel overnight. Security was extremely high and it took three hours in long lines to check our bags and clear security. People were patient."

Gary Krupnick was in Bonn, Germany, meeting with collaborators at the University of Bonn. He arrived in Germany the day before the attacks, and had a successful morning working session before news of the terrorist actions were received. Work continued, but with a heavy heart. He had planned to return to the United States on Friday 14 September. Those plans changed, and after a few days of unclear travel conditions, returned on Monday 17 September. Instead of the direct flight to Dulles Airport, he had to take a flight into Newark Airport and then catch a shuttle into Dulles. Flying into Newark provided the devastating view of the famous New

York skyline minus the World Trade Center, with smoke still rising six days after the events. Krupnick reports that he received heartfelt sympathy and support from his colleagues in Germany, and that many memorials and candle light vigils occurred around the cities of Bonn and Cologne.

Vicki Funk was in Santa Barbara, California, at a biogeography meeting at NCEAS, and she reports the following: "I was out bird watching in the morning and did not get to the meeting until the scheduled time of 9 a.m. (noon EST). I had checked out of my hotel and had my small bag with me. I was scheduled to return to D.C. via American Flight #76 which was the actual plane that was headed to Los Angeles when it crashed into the Pentagon. Everyone at NCEAS has been looking for me and we were frantic to find a television and see what was happening. We had people in from Europe as well as all over the U.S. Obviously we were not going anywhere and no one was the least bit upset. Considering the alternative we all felt glad to be alive. We could not get through on the phone and we were all quite concerned about what was happening on the East Coast. Finally we were all able to contact our friends and family and everyone was okay. Although the people at NCEAS were wonderful and Santa Barbara is a nice place to be stuck, I wanted to come home. I tried to rent a car but there were none available. The airlines were very nice and tried hard to get us out but the planes were not flying and when they started again it was going to be the next Monday, maybe, before we could get out. So I took Amtrak from Santa Barbara to Los Angeles, Los Angeles to Chicago (via Albuquerque and Kansas City), Chicago to Philadelphia, Philadelphia to Washington and then got on Metrorail to East Falls Church. I started Friday around noon and I arrived at home around 10 p.m. on Monday. The train was packed and also was pulling 20-30 mail cars and had three engines. I had a seat, not a sleeper, and early on Saturday morning I opened my eyes and we were stopping briefly at Winslow, Arizona. I started humming the song from the Eagles ("Standing on a corner in Winslow, Arizona, what a fine site to see, a girl my lord in a flat bed ford

slowing down to take a look at me...") and before long all the baby boomers in the car were singing along. It was a long three days but everyone was subdued and very easy going. We were all just glad to be headed in the right direction. Arizona and New Mexico were nice but by the time we got to eastern Colorado, Kansas and western Illinois, sorry folks, but it was all farmland and we saw very little natural vegetation. I was very happy to be home and very grateful to be alive."



Discovery Young Scientist Challenge

On 22-24 October, Botany played host to 40 of the country's top middle school science students, as part of the Young Scientist Challenge sponsored by Discovery Communications, Inc. Using the upcoming 200th anniversary of the Lewis and Clark Expedition as an historical backdrop for the challenge, each student was tested for plant identification and map reading skills. The winners receive scholarship awards, while many others receive discretionary prizes such as opportunities to join scientists in the field.

The 2002 Smithsonian Botanical Symposium

At the 1992 Earth Summit in Rio de Janeiro, world leaders agreed on a comprehensive strategy for the conservation, sustainable development, and equitable sharing of the benefits of biodiversity. This strategy was transformed into the Convention on Biological Diversity (CBD) that has now been signed and/or ratified by over 175 nations. The Convention was an affirmation that the world's biodiversity is a common concern of humankind and it has radically changed how we think about and manage the Earth's biological resources. The responsibilities, priorities, and practices of taxonomists and natural historians for discovering and describing biodiversity have been significantly altered since the Earth Summit. The 2002 Smithsonian Botanical Symposium, entitled "The Convention On Biological Diversity: The Globalization of Natural History Science," will address the impact of the CDB on scientists and its ramifications for understanding the natural world.

This Symposium, to be held 5-6 April 2002 at the National Museum of Natural History in Washington, D.C., follows the highly successful first Smithsonian Botanical Symposium hosted by the Department of Botany in 2001. The previous conference entitled "Linnaean Taxonomy in the 21st Century" addressed the fundamental question of how we name plants and animals in light of recent advances in understanding the evolutionary relationships of organisms. Invited speakers and participants engaged in discussion and debate to determine if we should change the Linnaean system to meet today's needs in taxonomy and classification.

The second José Cuatrecasas Medal in Tropical Botany will be awarded at the Smithsonian Botanical Symposium. This prestigious award is presented annually to an international scholar who has contributed significantly to advancing the field of tropical botany. The award is named in honor of Dr. José Cuatrecasas, a pioneering botanist who spent many years working in the Department of Botany at the Smithsonian and devoted his career to plant exploration in tropical South America.

The Symposium will include a day of

invited speakers followed by a keynote address, and is being sponsored by the National Museum of Natural History, the Cuatrecasas Family Foundation, the International Association for Plant Taxonomy, and the United States Botanic Garden.

For more information contact Dr. W. John Kress, Head of Botany, Department of Systematic Biology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560-0166; Tel: 202-357-2534; E-mail: kress.john@nmnh.si.edu; or visit <<http://persoon.si.edu/sbs/>>.

Symposium on Biodiversity of Guyana

A recent symposium on the biodiversity of Guyana was generously supported by an anonymous donation received through the Office of the Associate Director for Research and Collections (ADRC) in the National Museum of Natural History, and by the Biological Diversity of the Guianas (BDG) Program. Instrumental in the success of the undertaking were **Carol Kelloff**, assistant director of BDG who organized the meeting, and **Tom Hollowell**, data manager of BDG who coordinated the informative poster sessions. Kelloff provided the following report:

"The University of Guyana and the Smithsonian Institution's Biological Diversity of the Guianas Program hosted a symposium entitled 'The Biodiversity of Guyana: A Global Perspective for the Future' in Georgetown, Guyana from 7-10 October. At the opening reception, James Rose, Vice-Chancellor, University of Guyana, **Vicki Funk**, Director, Biological Diversity of the Guianas Program, and Ronald Godard, American Ambassador, welcomed over 200 guests.

"Funk announced the completion of the publication *Preliminary Checklist of the Plants of the Guiana Shield, Volume 1: Acanthaceae - Lythraceae* by T. Hollowell, P. Berry, V. Funk and C. Kelloff. The Shield encompasses Venezuela (Amazonas, Bolívar, Delta Amacuro) and the three Guianas. Complimentary copies are available upon request. The Symposium

was dedicated to Dr. George L. Walcott (1928-2001), former Principal and Vice-Chancellor of the University of Guyana, who was instrumental in establishment of the University's Centre for the Study of Biological Diversity.

"Plenary speakers of the symposium were Major General (ret'd.) Joseph Singh, of Conservation International - Guyana; Dr. John Terborgh, Duke University; Dr. Godfrey Bourne, University of Missouri - St. Louis; Dr. Andre Chanderbali, University of Guyana; Dr. I. Ramdass, National Wildlife Survey, EPA - Guyana; and Dr. Kathryn Monk, Executive Director, Iwokrama International Centre for Rainforest Conservation and Development.

"Invited speakers presented 26 papers on a variety of topics, including taxonomy and geographical distributions, conservation and ecotourism, sustainable development, and biochemical prospecting. Speakers included Hollowell on the mangroves of Shell Beach, Guyana; Funk on estimating biodiversity in Guyana; and Kelloff on balancing conservation and ecotourism in Kaieteur National Park. The approximately 100 participants who attended each session included members from Conservation International - Washington, D.C. and Guyana, Iwokrama International Centre for Rain Forest Conservation and Development, Guiana Shield Initiative - Surinam, students from the University of Guyana and Queen's College (high school), non-governmental organizations, embassies, and various agencies of the Government of Guyana.

"More than 30 posters were prepared by scientists from the Smithsonian Institution, Guiana Shield Initiative, and students from the University of Guyana, Iwokrama, and others. Subjects of the posters included research on butterflies, frogs, spiders, avian and other vertebrate diversity, phylogeny of Bignoniaceae, Cannaceae and Zingiberaceae, the river otter, mosquito bacteria (*Bacillus*), and primates of the Essequibo River region. The posters remain on display at the Centre for the Study of Biological Diversity, University of Guyana, and will be available as teaching aids to the University and surrounding schools. This was the first scientific meeting held in Guyana and all deemed it a success."

In The Spirit of Don José

John L. Clark, graduate student in the joint George Washington University – Smithsonian Institution program in Systematics, has provided the following appreciation of José Cuatrecasas:

“One of my biggest regrets about my Ph.D. program is that I never got to meet Don José. I arrived at the Smithsonian Institution’s Department of Botany and the George Washington University’s Department of Biological Sciences to start my Ph.D. in 1998, two years after Don José had passed away. Despite not meeting him in person, he has provided a tremendous amount of support for my dissertation. I recently received funds from the José Cuatrecasas Botanical Fund, to explore gesneriads in the Andes of Ecuador for my Ph.D. dissertation on the genus *Alloplectus* (Gesneriaceae).

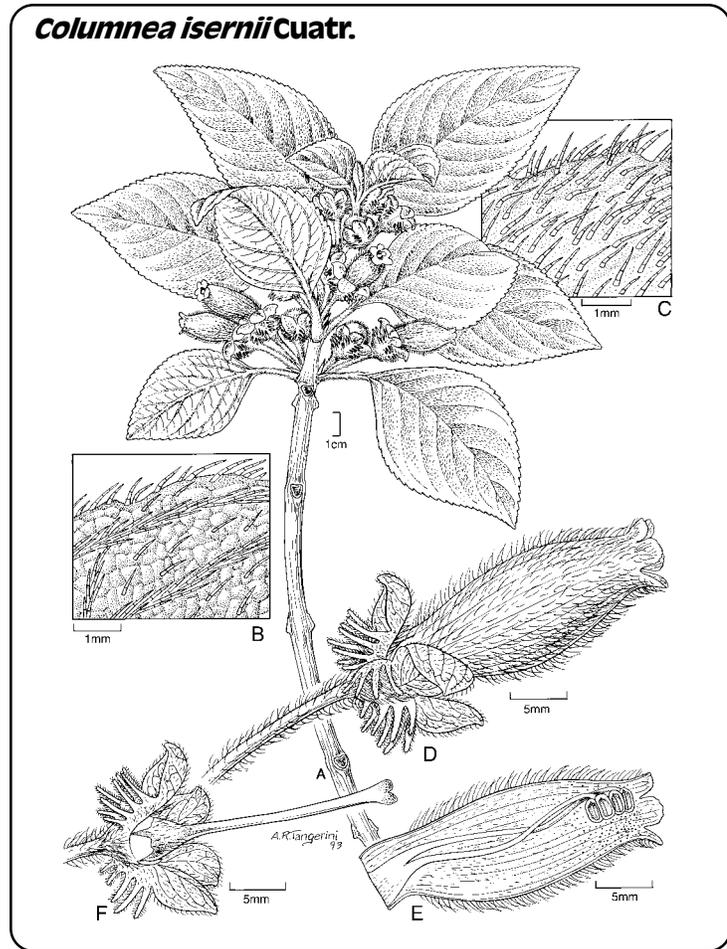
“Throughout a 3-month period I set up 13 expeditions to the slopes of the Andes. In southern Ecuador I trekked between Paramo areas to lowland rainforest on the eastern and western slopes. I also conducted numerous expeditions in the Cordillera de los Guacamayos and the Cordillera de los Llanganates on the north-eastern slopes of the Andes. I brought back over 640 collections with numerous duplicates, 60 packets of gesneriad seed, 1,200 slides, and leaf material in silica gel for molecular systematic studies.

“With my Ph.D. advisor, **Laurence E. Skog**, we are in the process of describing and identifying a number of discoveries from this trip. One of the most exciting collections is *Columnea isernii* Cuatr. This Ecuadorean species has an unusual yellow- and purple-striped corolla with densely sericeous pubescence and a deeply dissected calyx. The plant was one of the last species that Dr. Cuatrecasas described before his unanticipated and inauspicious departure from Spain in 1939. To our knowledge, *Columnea isernii* has only been collected seven times.

“Two previous collections in the US National Herbarium are dubious due to the lack of flowers or fruits. The holotype is located at the Real Jardín Botánico in Madrid, Spain, and is probably one of the few collections with mature flowers. In October 2001 *Columnea isernii* flowered at the US Botany Research Greenhouse, and

was photographed by horticulturist Leslie Brothers. It was subsequently chosen as the ‘Plant of the Week’ and the photo was displayed on the Botany webpage <<http://person.si.edu/plofweek/query.cfm>>, under the genus query ‘*Columnea*.’

“Thanks to the José Cuatrecasas Botanical Fund I was able to explore and collect in the Ecuadorean Andes and continue research towards my Ph.D. dissertation on the evolution and systematics of *Alloplectus*.”



New Type Specimen Web Interface

Data from the US National Herbarium Type Specimen Register have been available on an internet gopher server since 1993. Within the next two years the type specimen data and data for other inventoried collections will be available through the new museum-wide collections catalog. The process of reconfiguring the data for the new catalog has given us the opportunity to create an interim web interface that will let us present the data along with the nearly 8,000 images from our on-going type specimen imaging project. This new Web presentation includes all vascular plant types at US except for those in the Asteraceae,

Poaceae and the ferns.

For these groups and the types of cryptogams, the search interface on the gopher server is still available. Additional taxa will be added as the data are converted. Types in the US National Herbarium are filed under the basionym and all queries search only the basionym fields. Over time we have added the current name to some records as specimens are annotated and this information is displayed, but not searched.

The Type Specimen Register is found on the Botany web site <<http://www.nmnh.si.edu/departments/botany.html>> under the Collections link.

Type Specimen Imaging Project

The Type Imaging Project has been designed to create a high-resolution digital image of each specimen in the US National Herbarium's Type Register. The web interface presents three derivatives of the high-resolution image—a thumbnail, a large display image (1,020 pixels wide) and a smaller image sized for printing on a single sheet.

Type specimens are selected for the imaging project in one of three ways. Firstly, all type specimens being sent on loan are being digitized prior to shipment. Secondly, special projects or requests made by staff and visitors are considered. Thirdly, entire families are chosen for digitizing. Approximately 8,000 specimens have been completed since January 2000, many by contractor Susan Hunter, who has departed for California as of October 2001. Future plans include resumption of imaging on the approximately 90,000 types in the herbarium, which could span six or more years. It is hoped to provide close-ups of critical features and three-dimensional views of bulky fruits and other large parts.

Requests for high-resolution copies of images should be directed to Rusty Russell. All research related requests will be handled as a priority. Depending on the number of images requested, a small processing fee may be charged. Commercial, including not-for-profit, requests for high-resolution images will be charged according to a fee schedule.

The project uses a PhaseOne Light Phase digital camera back on a Hasselblad body, strobes and reflectors, and IEEE 1394 (firewire) cabling; a 14.5MB file is collected in Photoshop 6.0 where white balancing and color balancing are done. The image is saved as a TIF file using the bar code number of the specimen as the filename. Derivatives for web presentations are created in batches.

Botany Web Site Update

A website created to provide a searchable tool on the flowering plants and ferns of the Hawaiian Islands, both native and naturalized, is nearly ready to go public.

The site contains a flexible query form that allows one to conduct a search by family, genus, or island. It also allows one to select the way in which the results of the query are displayed, as a simple checklist or with distribution and full nomenclatural information. The databases supplying information for the website are works-in-progress and updates will be provided as the information is obtained. Enhancements to the site are already in preparation; these include the addition of US National Herbarium specimen collection information, identifying characteristics at the species level, images (illustrations and photographs), and synonyms for naturalized plants.

The long-term goal for the website is to expand the scope of the project to eventually provide the most complete reference on the flora of the Pacific Basin. Additions in the near future will include Micronesian and Marquesan island groups. This preliminary version of the Hawaiian flora website should be online by the end of November. The site will be linked under the Botany Research page <<http://www.nmnh.si.edu/botany/projects.htm>>.

Book Notice *A New Century of Biology*

The Smithsonian Institution Press has just published "A New Century of Biology" edited by **W. John Kress** and Gary Barrett (University of Georgia). The eleven essays contained in the volume, contributed by Ernst Mayr, Gene Likens, Gordon Orians, Marvalee Wake, Lynn Margulis, Dan Janzen, Tom Lovejoy, Ian Prance, Edward Wilson as well as Barrett and Kress, consider how our discipline must evolve to address the problems of the twenty-first century. Because human activity and increased population will continue to have a profound effect on the environment, biologists must define an effective strategy for integrating the biological sciences with global economics and human social structure.

Forty Years of Plant Mounting

October 2001 marks the 40th year of plant mounting by **Mary Skinner**. She began in 1961 as a US herbarium contract mounter at home, and then from 1969 to 1986 she mounted plants in the National Museum of Natural History for the Herbarium Services Unit. After retiring in 1986, she began in the same year as a contract specimen mounter for the Biological Diversity of the Guianas (BDG) Program, and is still going strong. With mounting enthusiasm we file our congratulations on her accomplishment, which at a probable average of around 3,000 sheets per year could amount to nearly 120,000 sheets.

Conservation

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as required for the burgeoning concerns of agriculture, economic development, and the timber industry. The industrialized North American continent must also deal with large-scale wetland drainage, the disruptive effects of high-technology terrain vehicles (swamp buggies, dune buggies, snowmobiles, motorcycles), and the exploitation of endangered species and their critical habitats through commercial poaching on federal lands, as well as mass collecting for the trade in medicinals (e.g., ginseng, goldenseal) and ornamentals (e.g., cacti, orchids, carnivorous plants).

By 1973, approximately 36 states had laws, or had produced state reports by local conservation committees, concerning rare plant conservation, usually geared to prevent the picking of wildflowers. However, by then a groundswell of concern had also developed for the national status of endangered and threatened plants. This led to the inclusion of plants as a category for protection under the U.S. Endangered Species Act of 1973. Previous versions of the Act had provided only for animals. The Act directed the Smithsonian Institution to develop lists of nationally endangered and threatened plant species and recommendations for their conservation, and to submit a report to Congress within one year of enactment of the law, which was in December 1973.

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Conservation

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It is highly significant, and in retrospect a foretaste of the coming posture of Smithsonian conservation work, that in March 1973, nine months prior to the US Endangered Species Act, the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) became law, and before that, the first IUCN *Red Data Book* on worldwide endangered plants had been started at Kew as early as 1970.

To fulfill the mandate of the US Act, an Endangered Flora Project was set up in 1974, in the Department of Botany, National Museum of Natural History. It was organized by the Botany chair and director of the Endangered Species Program, Prof. E.S. Ayensu, who is currently an inspector of the World Bank, and was coordinated by Robert DeFilipps. Endangered plant data from all 50 states, Puerto Rico and the Virgin Islands were assembled from numerous collaborating botanists nationwide. The enterprise was greatly helped by curators in the Smithsonian Botany Department such as Ray Fosberg for Hawaii, as well as expertise at the level of Rupert Barneby (*Astragalus*), Lyman Benson (Cactaceae), Lincoln Constance (Apiaceae), Peter Raven (Onagraceae), and Reed Rollins (Brassicaceae).

The subsequent report, submitted to Speaker of the House Carl Albert in 1975, concluded that 10 percent of the species, subspecies and varieties in the native flora of the continental United States, and 50 percent of the Hawaiian flora, could be categorized as endangered, threatened or extinct. Most of the continental plants under scrutiny occurred in California, Florida, Texas and the Pacific Northwest. The information was soon made available to a wider public in a book by Ayensu and DeFilipps entitled *Endangered and Threatened Plants of the United States* (1978) published by the Smithsonian Institution and World Wildlife Fund.

The US Congress authorized the Secretary of the Interior to officially review and list, as endangered or threatened, various species from the Smithsonian's candidate lists pursuant to the Act. Under periodical reauthorizations of the Act, and in the wake of extensive fine-tuning by Interior of the Smithsonian plant lists over

the past 25 years, the vanishing flora of the United States is being investigated and conserved at the federal level. Non-governmental organizations are an integral part of all efforts, federal, state, and local, to conserve plants in the nation.

The Endangered Flora Project existed from 1974 to 1978, and then shape-shifted into a new entity, the Office of Biological Conservation, which adopted a worldwide relationship to conservation during the period of its existence from 1978-1983.

As of late 1983, the office assumed its present designation, the Plant Conservation Unit. Early on, public education materials began with the book *Our Green and Living World: The Wisdom to Save It* (1984), by E.S. Ayensu, V.H. Heywood, G.L. Lucas and R.A. DeFilipps, published by Smithsonian Institution and Cambridge University Press. It uniquely contains an Introduction by HRH The Prince Philip, and an Epilogue by Mrs. Indira Gandhi, Prime Minister of India, both persons of exceptional international influence in conservation.

There was much Smithsonian cooperation with the Threatened Plants Unit (headquartered at Kew) of the IUCN (Gland, Switzerland) and its affiliated agencies, including botanical contributions to four major reference works that remain of inestimable value. The Unit's S. Jane Villa-Lobos was co-author with S.D. Davis et al. of *Plants in Danger: What Do We Know?* (1986, IUCN), which presented data for all countries in the world; USA information was provided by the Unit's DeFilipps and P. Gregerson.

Plants in Danger was followed by the 10,530-entry *World Plant Conservation Bibliography* (1990, Royal Botanic Gardens, Kew); numerous references were submitted by Villa-Lobos and DeFilipps. The next major product bearing contributions from the Plant Conservation Unit was under the editorship of S.D. Davis, Prof. V.H. Heywood, and the Unit's Villa-Lobos and Olga Herrera-MacBryde, namely the *Centres of Plant Diversity, Volume 3: The Americas* (1997, IUCN & WWF). A prodigious amount of information written by the Smithsonian Latin American Plants Program staff (i.e., the Unit's Villa-Lobos with MacBryde) is contained therein, gleaned from informants worldwide, in the form of regional overviews for Middle America and South America; the North America overview was contributed by S.L.

Maina (Plant Conservation Unit) and Villa-Lobos.

The fourth principal cooperative effort for comprehensive references to help conservationists was the *1997 IUCN Red List of Threatened Plants* (1998, IUCN, edited by K.S. Walter and H.J. Gillett). The *List* was assembled by a coalition of organizations including the Smithsonian Institution. Citations of many thousands of Latin American endangered and threatened plant species were contributed for the lists, based on the instrumental work of Villa-Lobos and MacBryde.

Today, the 21st century *Mission* of the Plant Conservation Unit is "to document and describe plant diversity on the planet in order to understand how humans are affected by and have altered this diversity." This propels itself into a *Vision*, namely "to provide scientific information to our national and international audiences, both public and professional, on plant diversity for the purpose of species conservation and managing human impact on natural environments." To achieve these goals, the Unit is increasingly integrating its services on behalf of, and assisting with the coordination of, conservation exercises being performed by the Botany curatorial staff.

Currently, the director (since 1999) of the Plant Conservation Unit is Gary A. Krupnick, working under the aegis of the Head of Botany, W. John Kress. Krupnick is an evolutionary ecologist and environmental botanist, investigating the scope of ecoregional analysis. As an undergraduate, he developed an interest in restoration ecology, which involves removing invasive non-native plants and trying to restore damaged habitats to their original condition.

Krupnick is from Encino, California. He received a B.A. degree *cum laude* from the University of California at San Diego (1990) and Ph.D. from the University of California at Irvine (1996). From 1996-1999, he was a postdoctoral research fellow at Pennsylvania State University, investigating plant responses to the environment, and he has also done extensive research on floral herbivory, resource allocation in plant growth, and sex expression in members of Capparaceae and Cucurbitaceae.

Computer techniques are a strong feature of Krupnick's *métier*. He is editor of the monthly *Biological Conservation*

Newsletter (BCN), which reaches 600 subscribers in 84 countries. Through its pages and presence on the Web, he has reported on topics ranging from predictions of widespread rainforest loss in Brazil, to Walter Adey's work on endangered coral reef ecosystems, to the launching of the *2000 IUCN Red List of Threatened Species*, which contains data on all plant and animal groups. Adaptations of articles on noteworthy events, such as the rediscovery of a presumed extinct tree (*Trochetia parviflora*, Sterculiaceae) on Mauritius, are included in the *BCN*. Jane Watkins, a stalwart volunteer, helps with the voluminous mailings of these documents. Krupnick has also produced a web page for the *Newsletter* at <<http://rathbun.si.edu/bcn>>.

June 2001 saw the presentation of a new searchable *Bibliography* on *BCN* online, consisting of over 16,000 citations from the important "Current Literature" section that appears in each issue of *BCN*, dating back from 1983 to the present. Its reference database includes more than 13,800 articles from 940 journals. Also, Krupnick recently helped place on the web the landmark volume on *Centres of Plant Diversity: A Guide and Strategy for Their Conservation – Volume 3: The Americas*, <<http://www.nmnh.si.edu/botany/projects/cpd/>>.

The terrestrial biodiversity of the Earth is the focus of a major program in which the Plant Conservation Unit is currently participating, with a view to assessing plant species richness worldwide. Krupnick and Kress are collaborating with the World Wildlife Fund (WWF) and the Biomaps Project group at the University of Bonn, Germany, in a study of the 871 ecoregions of the world, aiming for an understanding of each ecoregion and its plant species, areas of endemism, and degrees of threat in each region, in order to set conservation priorities. Within this framework, Krupnick is specializing in the Indo-Pacific ecoregions (ranging from Thailand east to New Caledonia), comprising a total of 84 ecoregions. Eventually he will arrive at a conceptualization of the comparative status of the Indo-Pacific area amongst all the world's ecoregions, including which of all the ecoregions have the most plant species and endemics. To date Krupnick has mapped out the presence or absence of 4,200 species for the 84 Indo-Pacific regions, including

Bignoniaceae, Caesalpiniaceae, Dipterocarpaceae, Ericaceae, Euphorbiaceae, Fagaceae, Mimosaceae, and Rosaceae.

In the future, the Plant Conservation Unit is slated to coordinate the participation of Botany in the Smithsonian Institution's Monitoring and Assessment of Biodiversity (MAB) Program study of biodiversity and conservation assessment in the East-Central African nation of Gabon. Funded by the Shell Oil Company, the initial planning stages provide for three field-collecting trips to be undertaken by Smithsonian scientists including two botanists, with an extensive report on the results to follow.

Also on the horizon is a proposed book entitled *Plant Conservation: A Natural History Approach*, to be produced by Botany and edited by Krupnick and Kress. Its focus will be a spectrum of current conservation issues, including a historical perspective of plant diversity and its present condition; the contemporary causes of extinction including the evolutionary consequences of reduced diversity and species interactions; threats and consequences of plant extinctions; and a message concerning the conservation of plant diversity, assessment, management strategies, and further action.

Hopefully, an understanding of plants, and the threats they face, will be brought even more into the forefront of the equation of conservation biology, and the planetary quest for stabilization of our vanishing flora.

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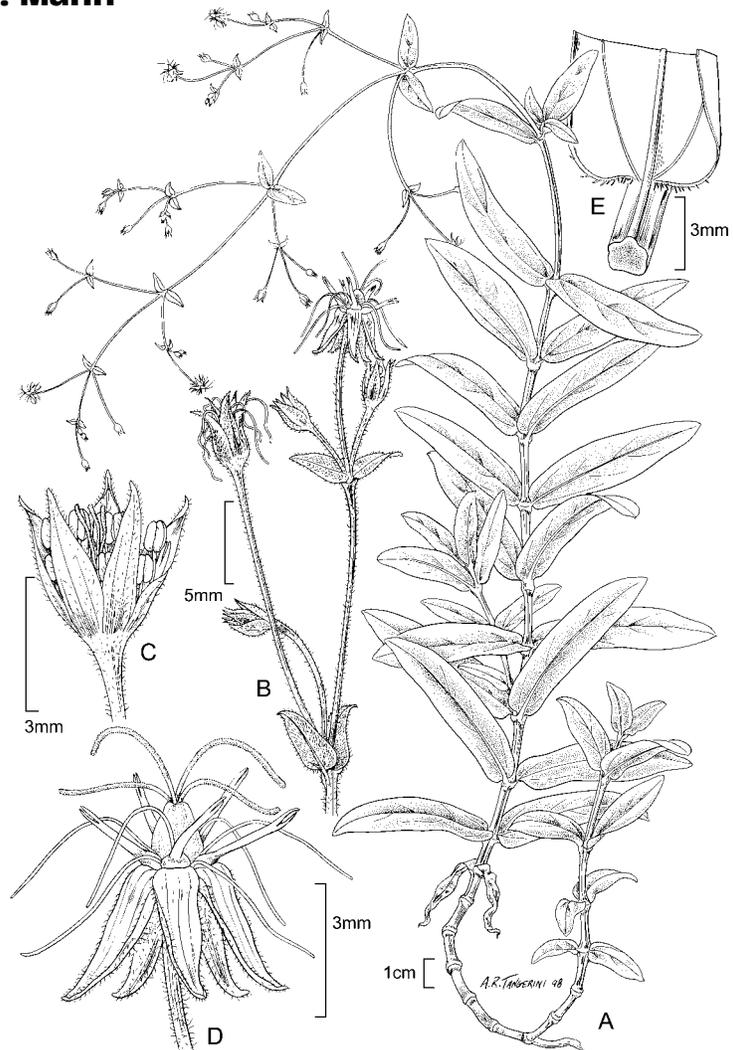
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Art by Alice Tangerini

***Schiedea amplexicaulis* H. Mann**

Schiedea amplexicaulis H. Mann (Caryophyllaceae) is an extinct species that once inhabited the island of Kaua'i, Hawai'i. Tangerini drew this image based upon an isotype specimen at the Paris Herbarium (P) collected on the Voyage of the French naturalist Ezechiel Jules Rémy (1851-1855). *Schiedea amplexicaulis* is one of 106 plants believed to have gone extinct in the Hawaiian Islands in the past few centuries. All *Schiedea* species are currently threatened with extinction, and 638 Hawaiian plants are currently at risk (8% of the vascular flora).



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